Résumés / abstracts

Polar Worlds
PARIS 2011
Mondes Polaires

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Résumés / abstracts

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Conférence internationale
Mondes polaires
sciences environnementales et sociales
pour comprendre les changements observés

Paris 2011
26-28 janvier

International Conference
Polar Worlds
Environmental and Social Sciences
to Understand Observed Changes

25 janvier

18h-21h *remise du kit conférencier*
accueil et soirée brise-glace

26 janvier

9h00 *accueil*

9h30 **Ouverture**

9h40 **Mr Michel Rocard**

10h20 **Dr Yves Frenot**

11h00 *pause café*

11h30 **Dr Valérie Masson-Delmotte**

12h10 **Pr Igor Krupnik**

12h50 *Informations pratiques*

13h-14h *déjeuner*

14h-16h **Plénière 1**

14h00 **Pr Jon-Ove Hagen**

14h40 Ch. Marlin
15h00 M. Therrien
15h20 A. Kies
15h40 A. Choquet

16h00 *pause café*

16h20-17h20 **Sessions parallèles 1**

1a	1b	1c	1d
Hervé	Vlassova	Blangy	Bernard
Maj	Cunsolo-Willox	Chanteloup	Meinander
Degeorges	Petit	Verbitsky	Delangle

19h-23h ***dîner de gala lycée hôtelier***

27 janvier

9h00 *accueil*

9h30-13h **Plénière 2**

9h30 **Pr Julie Cruikshank**
10h10 F. Tolle
10h30 A. Decaulne
10h50 S. Crate

11h10 *pause café*

11h40-13h **Plénière 3**

11h40 M. Heide-Jorgensen
12h00 F. Laugrand
12h20 M. Kakekaspan
12h40 K. Hoffmann

13h-14h *déjeuner*

14h-16h **Plénière 4**

14h00 **Pr Hugh French**
14h40 E. Gautier
15h00 E. Crubézy
15h20 R. Soare
15h40 D. Joly

16h00 *pause café*

16h20-17h40 **Sessions parallèles 2**

2a	2b	2c	2d	2e
McLain	Saintenoy	Joliet	Nemova	Baltzer
Guigon	Séjourné	Bakke	Murzina	Massa
Duchemin	Pearce	Tommasini	Roche	Perren
Dupré				

19h-23h30 ***soirée vins-fromages en bateau mouche au fil de la Seine***

28 janvier

9h00 *accueil*

9h30-11h10 **Plénière 5**

9h30 **Dr Rasmus Ole Rasmussen**
10h10 K. Reedy-Maschner
10h30 V. Randa
10h50 A. Lavrillier

11h10 *pause café*

11h40-13h **Plénière 6**

11h40 C. Alix
12h00 V. Bichet
12h20 M. Roué
12h40 V. Douglas

13h -14h *déjeuner*

14h-15h40 **Plénière 7**

14h00 V. Vaté
14h20 Th. Martin
14h40 A. Fedchuk
15h00 A. Maire
15h20 F. Vincent-Féria

15h40 *pause café*

16h00-17h15 **Plénière 8**

16h00-16h30 Posters

16h30-17h15 **Synthèse et clôture**

Conférence internationale

Mondes polaires

sciences environnementales et sociales
pour comprendre les changements observés

Paris 2011
26-28 janvier

International Conference

Polar Worlds

Environmental and Social Sciences
to Understand Observed Changes

January 25

18:00 – 21:00 *retrieval of conference kit*
icebreaker welcome party

January 26

9:00 *registration desk open*

9:30 **Opening**
9:40 **Mr Michel Rocard**
10:20 **Dr Yves Frenot**
11:00 *coffee break*
11:30 **Dr Valérie Masson-Delmotte**
12:10 **Pr Igor Krupnik**
12h50 *Practical information*
13:00-14:00 *lunch*

14:00-16:00 **Plenary 1**
14h00 **Pr Jon-Ove Hagen**
14:40 Ch. Marlin
15:00 M. Therrien
15:20 A. Kies
15:40 A. Choquet
16:00 *coffee break*

16:20 – 17:20 **parallel sessions 1**

1a	1b	1c	1d
Hervé	Vtasova	Biangy	Bernard
Maj	Cunsolo-Willox	Chanteloup	Meinander
Degeorges	Petit	Verbitsky	Delangle

19:00 – 23:00 ***banquet dinner at lycée hôtelier***

January 27

9:00 *registration desk open*

9:30-11:10 **Plenary 2**
9:30 **Pr Julie Cruikshank**
10:10 F. Tolle
10:30 A. Decaulne
10:50 S. Crate
11:10 *coffee break*

11:40-13:00 **Plenary 3**
11:40 M. Heide-Jorgensen
12:00 F. Laugrand
12:20 M. Kakekaspan
12:40 K. Hoffmann
13:00-14:00 *lunch*

14:00-16:00 **Plenary 4**
14:00 **Pr Hugh French**
14:40 E. Gautier
15:00 E. Crubézy
15:20 R. Soare
15:40 D. Joly
16:00 *coffee break*

16:20-17:40 **parallel sessions 2**

2a	2b	2c	2d	2e
McLain	Saintenoy	Joliet	Nemova	Baltzer
Guigon	Séjourné	Bakke	Murzina	Massa
Duchemin	Pearce	Tommasini	Roche	Perren
Dupré				

19:00 – 23:30 ***wine and cheese "bateau mouche" down the River Seine***

January 28

9:00 *registration desk open*

9:30-13:00 **Plenary 5**
9:30 **Dr Rasmus Ole Rasmussen**
10:10 K. Reedy-Maschner
10:30 V. Randa
10:50 A. Lavrillier
11:10 *coffee break*

11:40-13:00 **Plenary 6**
11:40 C. Alix
12:00 V. Bichet
12:20 M. Roué
12:40 V. Douglas
13:00-14:00 *lunch*

14:00-15:40 **Plenary 7**
14:00 V. Vaté
14:20 Th. Martin
14:40 A. Fedchuk
15:00 A. Maire
15:20 F. Vincent-Féria
15:40 *coffee break*

16:00-17:15 **Plenary 8**
16:00-16:30 Posters session
16:30-17:15 **Final Synthesis**

26 janvier / January 26

Allocution d'ouverture / Opening speech

Mr Michel ROCARD
ancien Premier ministre de la France, Ambassadeur de France pour les pôles

The French Polar Institute, a support agency for scientific research in polar regions of both hemispheres

Dr Yves FRENOT
directeur de recherche CNRS, directeur de l'Institut polaire français, IPEV, Brest, France

The French Polar Institute *Paul-Emile Victor* (IPEV) is the French support agency in charge of the implementation of national programs in the polar areas. It has the status of Public Interest Group (Groupement d'intérêt public, or GIP) and is located at Brest. The partners supporting the Institute are the French Ministry for Research, the National Centre for Scientific Research (CNRS), the French Ministry of Foreign Affairs, the French Atomic Energy Commission (CEA), the French Research Institute for Exploitation of the Sea (Ifremer), the French Meteorological Agency (Météo-France), the French Space Agency (CNES), Terres Australes et Antarctiques Françaises (TAAF) and Expéditions Polaires Françaises (EPF).

IPEV operates 6 permanent stations in the polar regions[1]: one in the Arctic, at Ny-Alesund, Svalbard (Awipev station, jointly operated by France and Germany), three in the subantarctic islands located in the Southern Indian Ocean (Iles Crozet, Kerguelen and Amsterdam), one on the coastal area of Terre Adélie (Dumont d'Urville station), and one at Dome C, inland the Antarctic continent (Concordia station, jointly operated by France and Italy).
In addition, IPEV operates 3 ships for its logistical and scientific purposes: *Marion-Dufresne*, a 110 m long oceanographical vessel, *Astrolabe*, an ice class ship, and *La Curieuse*, a small trawler-type vessel based at Kerguelen Islands during 2 months per year.

IPEV's missions are:

- to support and to implement national and international scientific and technologic programs in polar regions,
- to organise scientific expeditions,
- to build and to maintain infrastructure and equipment in support of research,
- to participate in the international scientific and logistic discussion through regular collaboration with other polar agencies
- to organise oceanographical campaigns, using its ships

Some 60 research programs are selected every year on the recommendation of a scientific council (an international panel of 16 independent experts). Most of these projects are related to important environmental issues such as climate change and its impact of terrestrial and marine ecosystems, glaciology, atmospheric chemistry and physics, biodiversity, adaptation to cold environment... A specific support is provided to long term studies and observatories in earth and life science.

France was actively involved in the International Polar Year 2007-2008 and IPEV implemented several large international projects using its infrastructures. This presentation will provide a quick overview of the French contribution to IPY.

Finally, according to the current worldwide increasing interest in the development of researches in the Arctic, IPEV is participating to a general reflection in France on the best way to contribute to this effort. This presentation will give the view of the French Polar Institute on this important issue.

[1] Dumont d'Urville and the subantarctic stations are jointly operated by IPEV and TAAF (Ministry of Overseas Territories)

KEY-NOTE

Past, present and future polar climate change: facts and challenges

Dr Valérie MASSON-DELMOTTE

paléoclimatologue, directeur de recherches au Laboratoire des Sciences du Climat et de l'Environnement (CEA-CNRS-UVSQ/IPSL, Gif-sur-Yvette), France

This presentation aims to place the current changes in polar regions in the perspective of past changes, thanks to quantitative paleoclimatic reconstructions, and the perspective of future risks, explored by climate model projections. Intensive efforts have been made and still need to be deployed to monitor climatic changes in polar regions. In the Arctic, mechanisms of polar amplification are at play and produce remarkable magnitudes and rates of climate change. Key Earth system feedbacks are also at play, coupling the atmosphere, ocean, sea ice, land surfaces and carbon cycle. Some of the observed changes, such as the decline of Arctic sea ice, occur faster than anticipated by climate model projections. Changes in the polar regions have the potential to affect the global climate system, through changes in the atmospheric and oceanic circulations and through carbon cycle feedbacks. Greenland and Antarctic ice sheets already contribute to the observed sea level rise, and their future behaviour is of major concern regarding the magnitude of sea level rise in the coming centuries and long term irreversibilities linked with anthropogenic climate change.

Scientific challenges lie in the long term monitoring, the understanding of the processes at play, and the ability to anticipate future risks in polar regions. The impacts of climate change which combine a complex mixture of opportunities and vulnerabilities also raise political challenges linked with mitigation and adaptation strategies and call for new multi-disciplinary approaches involving human and environmental sciences.

KEY-NOTE

Crossing boundaries : what did we learn in IPY 2007-2008 and who learnt it ?

Pr Igor KRUPNIK

Arctic Studies Center, Conservateur des collections ethnologiques arctiques et nordiques, Smithsonian National Museum of Natural History, Washington DC, Etats-Unis ; Membre du Joint Committee de l'Année Polaire Internationale 2007-2008

The International Polar Year (IPY) 2007–2008 was the broadest scholarly initiative in polar studies ever undertaken, and the social science and humanities field in IPY was the largest and the most diverse program of its kind, judging by the number of projects, nations, and scientists involved, level of funding, and the breadth of research topics. It is estimated that 35 projects in social sciences and humanities implemented during IPY and scores of related initiatives engaged more than 1,500 researchers, students, indigenous experts and monitors, and representatives of polar indigenous people's organizations. For the first time, physical, biological, social, and humanities researchers, and local community-based experts were encouraged to join forces under a common multi-disciplinary framework; dedicated efforts were made to encourage cross-disciplinary studies linking socio-cultural processes, climate change, and ecosystem health.

To many polar social scientists, the legacy of collaboration with a broad spectrum of experts from other disciplines during IPY was eye-opening. The paper explores the impact of multiple experiences learned in course of the interaction with the largest-ever group of scholars from many fields and in conducting joint research during the IPY era (2002–2012). It covers the history of the belated social sciences 'entry' to the IPY program in 2002–2004; the use and misuse of the 'human dimensions' paradigm to define the social sciences and humanities field in IPY; new/old questions that social scientists asked in IPY; different vision of the science 'frontiers' and 'discoveries' by scholars from various disciplines; and the record of IPY across-boundary partnerships, including those among specialists within the social sciences and humanities; academic researchers, community experts, and indigenous organizations; Arctic and Antarctic specialists; social scientists and scholars from physical and natural science disciplines. The lessons of IPY 2007–2008 may be instrumental to the planning for future multi-disciplinary initiatives, including the next IPY in 25 or 50 years from now.

Séance plénière 1 / Plenary 1

Glaciers, climat et sociétés : les mondes polaires à l'épreuve des changements

Glaciers, climate and societies: polar worlds under changes

(modérateur Thierry BROSSARD, CNRS France)

KEY-NOTE

Arctic glaciers and their contribution to global sea level

Jon Ove Hagen, Thorben Dunse[1], Trond Eiken[1], Jack Kohler[2], Geir Moholdt[1], Chris Nuth[1], Thomas V. Schuler[1]

[1]*Department of geosciences, University of Oslo, Norway*

Pr Jon-Ove HAGEN

glaciologist, Department of geosciences, University of Oslo, Norway

The glaciers and icecaps (GIC) in the world are main contributors to sea level changes. In the last IPCC-report it was stated that the glacier contribution to sea level was about 1.8 mm/yr and that 1.1 mm or about 60% stems from melting glaciers and ice caps. Even though the contributions from the large ice sheets have increased over the last decade, the GICs are still a main contributor.

During the International Polar Year (IPY) selected target GICs have been studied in the Arctic. We show examples from activities on Svalbard with main focus on the Austfonna ice cap (~8000 km2). Studies have been focused on 1) Surface mass balance 2) Elevation changes by satellite data, airborne laser profiles and ground-based GPS 3) Dynamics; surge and calving. The net surface mass balance on Austfonna shows slightly negative results for the period 2004-2008. The calving is important (2.5 km3/yr) and stands for 30-40 % of the total mass loss. This is typical for Arctic ice caps. The elevation change measurements on Austfonna show a thickening in the interior of c. 0.5 m/yr, and an thinning closer to the coast of 1-2 m/yr, indicating a large dynamic instability. The current overall data indicates that the high Arctic (Canada, Svalbard, Russian Arctic) with about 1/3 of all ice in worlds GICs have an increasing negative mass balance but with large regional variations. The net mass balance is: B = - 38 ± 7 Gt/yr or a specific value of bn = - 0.15 ± 0.03 m/yr which is in SLE = 0.11 ± 0.02 mm/yr. Thus they contribute less than 15 % of the current ice input to global sea level, but has a potential to larger contribution.

Climate recent evolution observed in Svalbard (air temperature and precipitation): a focus on the last 40 years in Ny Alesund (79°N)

Christelle MARLIN[1] **and Madeleine GRISELIN**[2]

[1] *UMR IDES université Paris Sud Orsay, France,*

[2] *CNRS, UMR ThéMA, université de Franche-Comté, Besançon, France*

In Svalbard, the longest time-series of meteorological data started in 1917 (Longyearbyen station), i.e. a 93-year period of climate evolution (temperatures and precipitations). The temporal evolution of the annual air temperature shows a global increase of +1,3°C in 93 years, than a gradient of +0,14°C per decade at Longyearbyen. But when analyzing the curves in detail, we see various sequences of warmer and colder short periods.

In Ny Alesund, 100 km further north, climate parameters have been recorded since 1969. The mean annual temperature has increased by 2,05°C during the last 41 years and the annual amount of precipitation has increased by 57 mm (+14 mm/decade). But does these global data reflect the most important processes? In fact, the global increase of the air temperature occurs during the last 12 years whereas there is no significant gradient during the first 30 years of the considered period (1969-1998).

The global increase of precipitation recorded in Ny Alesund is exclusively due to the rain amount increase whereas the snow amount remains constant through the whole period 1969-2010.

Considering the monthly and daily data, the increase of the air temperature is actually linked to an increase of the cold season's temperatures whereas summer seems less impacted. Moreover, daily data shows an increase in the number of warm events (T air above 0°C during winter) during the cold periods, which is the most specific change in present-day climate compared to the 70s. These warm events are particularly fatal to glaciers when associated with liquid precipitation.

Through a network of temperature loggers set on a 10 km2 basin 6 km from Ny Alesund (the Austrelovenbreen glacier basin), we can estimate the impact of these warm events on glaciers. Sometimes in winter, particularly in the last decade, air temperature is positive on the whole glacier and rain occurs at a very high altitude: that combination can totally destroy the snow cover in a few days.

That is probably the most important change observed concerning climate in that area for the last 12 years.

Bridging communication between Inuit communities and scientists. Lexical innovation in Nunavut (Arctic Canada): terminology related to climate change

Michèle THERRIEN
CERLOM, INALCO, Paris, France

Forced to adapt to alternating periods of rising and falling temperatures, the Inuit have, throughout their long history, constantly modified aspects of their technology, social structure and worldview, but also aspects of their language, enlarging their vocabulary to cope with new fields of experiences.
Since their first contacts with Westerners in Alaska, the Central Arctic and Greenland, Inuit have shown a clear preference for creating new words rather than borrowing vocabularies from English, Danish (or Russian in Alaska). But if naming a new concept, or a new object, is an exciting intellectual game, it is far from being an easy task. In fact it is quite a challenge when it comes to technical terminology, for example that related to climate change. The Nunavut Arctic College, located in Iqaluit, has played a crucial role in supporting lexical innovation; organizing numerous workshops and publishing several specialized glossaries.

Fully aware that lexical innovation gives rise to difficulties, Inuit consider nevertheless that developing an accurate terminology in their own language is essential to fill the communication gap between Inuit and scientific communities. Creating a new terminology is a prerequisite to Inuit full involvement in the Arctic climate change debate. This paper will focus on a few examples to show how neology acts as a strategic positioning in this debate.

Multiparameter studies in meltwater of Werenskioldbreen (Svalbard); hints for supercooling

Antoine KIES, J. JANIA[2], O. HENGESCH[1], A. NAWROT[3], Z. TOSHEVA[1], M. GRABIEC[2]
[1] *Laboratoire Physique des Radiations (LPR), University of Luxembourg, Luxembourg*
[2] *Faculty of Earth Sciences, University of Silesia, Poland*
[3] *Institute of Geoecology and Geoinformation, Adam Mickiewicz University, Poland*

To recognize subglacial outflow in proglacial streams and improve the understanding of Svalbard polythermal glaciers, radon, electrical conductivity (EC), total dissolved gas pressure (TDGP), CO2, temperature, pH and chemical compounds were measured during April-May sampling campaigns on outflows in the forefields of Werenskioldbreen.
The natural radioactive noble gas radon showed levels up to 33 Bq/L (April 2010), documenting significant contact of water with sediment and bedrock at the glacier bed. Radon data, together with continuous measurements of radon, EC, temperature, TDGP and CO2 in the melting period, give information on drainage footpaths and hints to the draining system.

At the largest outflow in the central part of Werenshioldbreen radon concentrations were up to 8 Bq/L in the middle of the melting period (2007).
Temperatures lower than 0 °C were measured in artesian outflows during melting seasons 2007 and 2009. Observed was the presence of frazil ice thus documenting supercooled meltwater. Radar sounding show overdeepening under Werenskiodbreen. Meltwater ascending the adverse slope from the overdeepening toward the glacier margin at a faster rate than it can be heated by friction may be supercooled (Alley,2003; Evenson,1999; Knight, 2008; Tweed, 2005) . Supercooled meltwater that emerges from this overdeepened basin via artesian vents cause growth of the observed frazil ice at the glacier margin. It is the first time that supercooling is described at a Svalbard glacier.

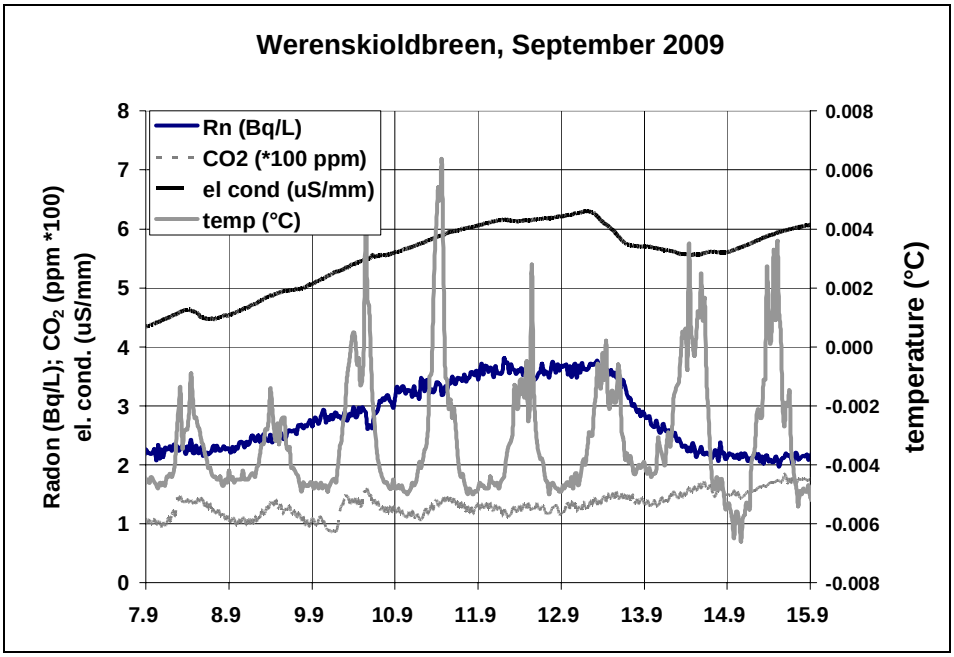

Fig. 1: Example of continuous measurements at an outflow at Werenskioldbreen

Ref.

Alley R.B.; Lawson D.E.; Everson E.B.; Larson G.J., 2003: Sediment, glaciohydraulic supercooling, and fast glacier flow. Annals of Glaciology 36, 135-141

Evenson, E.B., Lawson, D.E., Strasser, J.C., Larson, G.J., Alley, R.B., Ensminger, S.L., Stevenson, W.E., 1999. Field evidence for the recognition of glaciohydraulic supercooling. In: Mickelson, D.M., Attig, J.W. (Eds.), Glacial Processes Past and Present. Geological Society of America Special Paper 337, pp. 23–35.

Knight P.G.; Cook, S.J. 2008: Glaciohydraulic supercooling. Progress in Physical Geography 32, 65-71

Tweed F.S.; Roberts M. J.; Russell A. J. 2005: Quaternary Science Reviews 24, 2308-2318

L'extension du plateau continental en Arctique et en Antarctique
The continental shelf extension claims in Antarctica and in the Arctic

Anne CHOQUET

Juriste, Consultante - Chercheur associée UMR AMURE, Université de Brest, UEB, France

A flag planted on the seabed? The photos of a Russian flag in titanium planted 4,261 meters below the North Pole during summer, 2007 made the world tour. Would we be back in the time of the explorers in search of new territories with the common law principle of Terra Nullius?

Such images intrigue. Nevertheless for some years, it is said more and more often that the States want to extend their national maritime spaces to reinforce their rights on the resources, mineral in particular.

States indeed showed their will to extend their continental shelf off their territory. The Arctic and Antarctica do not escape it.

Nevertheless, if the polar regions raise common problems of delimitation of the continental shelf (demarcation of baselines, proofs to be brought and rights of the coastal States), the initiatives of States are organized within a different legal framework.

If the extension of the Antarctic continental shelf is envisaged while the current principle is the interdiction of the mineral resources exploitation except for scientific purposes, the extension of continental shelves in the Arctic is envisaged while the coastal States are not subjected to the same regulations and while the exploitation of mineral resources seems at present inevitable.

Un drapeau planté au fond des mers ? Les images d'un drapeau russe en titane planté au pôle Nord géographique à 4261 mètres de profondeur sous la banquise pendant l'été 2007 ont fait le tour du monde. Serait-on de retour à l'époque des grands explorateurs à la recherche de « territoires sans maître » qui pourraient être appropriés ?

De telles images intriguent. Pourtant depuis quelques années, on nous parle de plus en plus de la volonté des Etats d'étendre leurs espaces maritimes nationaux afin d'étendre leurs droits sur les ressources, minérales

notamment. Les Etats ont en effet montré leur volonté d'étendre leur plateau continental au large de leur territoire. L'Arctique et l'Antarctique n'y échappent pas.
Pourtant, si les régions polaires posent des problèmes communs de délimitation du plateau continental (délimitation des lignes de base, preuves à apporter et droits des Etats côtiers), les initiatives des Etats s'inscrivent dans un cadre juridique différent. Si l'extension du plateau continental antarctique s'envisage alors que le principe actuel est l'interdiction de l'exploitation des ressources minérales sauf à des fins scientifiques, l'extension des plateaux continentaux en Arctique s'envisage alors que les Etats côtiers ne sont pas soumis à la même réglementation et que l'exploitation des ressources minérales semble actuellement inéluctable.

Sessions parallèles 1 / Parallel sessions 1

1a – Pouvoirs autochtones / Indigenous peoples taking control

(modérateur Alexandra LAVRILLIER,GSRL, CNRS, Paris, France)

Respecter l'autorité des aînés ou celle du patron ? Les dynamiques locales du pouvoir chez les Inuit de l'Arctique canadien
Respecting the elders or respecting the boss? Dynamics of power among the Canadian Inuit

Caroline HERVÉ

PhD student, Centre de recherches historiques, EHESS, Paris / Cerlom-INALCO Paris / Centre interuniversitaire d'études et de recherches autochtones, Université Laval

In the context of political negotiations for indigenous self-government, Inuit people distinguish themselves by having succeeded in negotiating their own government. Through the different agreements signed between the Inuit of Nunavut, Nunatsiavut or Nunavik and the federal and regional governments, Canadian Inuit leaders strove to gain a larger degree of control over the local economy, education and culture. However, in the creation of new institutions for self-government, the imitation of regional or federal structures seems to remain the only way of doing. In Nunavut, the program Inuit qaujimajatuqangit, an attempt to define Inuit core values and incorporate them into public management, didn't prove to be a great success. In that context, it seems important to re-examine the patterns of power relationships on a local level, and take them into account in the definition of new government structures.
This presentation will explore one pattern of local governance in Nunavik that seems to be of a particular importance still today: the respect toward the oldest (angajuk). In their daily relationships, Inuit are supposed to behave in a certain manner like helping their oldest fellow (ikajuqtut), following them (maliktut), respecting them (ilirasuktut). Refusing a request of an oldest person is unthinkable and it put Inuit in tricky situations when they are assigned to a position of leadership. This presentation takes a closer look at the articulation of traditional authority patterns to western rules on a local level.

Depuis plusieurs décennies, les Inuit du Canada travaillent à la mise en place de nouvelles structures gouvernementales pouvant assurer leur autonomie politique. Ils revendiquent ainsi leur droit à gérer eux-mêmes les questions relatives à l'éducation, à la culture et au développement économique de leur région. Or, les institutions imaginées et mises en place pour assurer cette autonomie politique ne sont bien souvent que le pâle reflet des structures fédérales et provinciales. Même au Nunavut, le programme Inuit qaujimajatuqangit, créé dans le but d'intégrer les valeurs inuit aux pratiques managériales de l'administration publique, ne semble pas résoudre ce problème. Dans ce contexte, il paraît donc important de réexaminer les caractéristiques du pouvoir au niveau local et de les prendre en considération dans la définition des nouvelles structures gouvernementales. Dans ce cadre, cette présentation propose une analyse des relations de pouvoir au niveau local. Un aspect semble particulièrement vital dans les communautés du Nunavik : le respect des aînés. Les jeunes sont pris dans des relations de contraintes et d'obligation envers les personnes qui leur sont plus âgées : ils doivent les aider (ikajuqtut), les suivre (maliktut), les respecter (ilirasuktut). Leur refuser une requête est impensable et cela les place dans des situations délicates lorsqu'ils occupent des positions de leadership. Cette présentation entend donc réfléchir à la façon dont les Inuit articulent le respect des valeurs inuit aux normes occidentales dans le cadre des relations de pouvoir au niveau local.

Transitions culturelles, sociales et politiques dans une région « nationale » en arctique iakoute / Fédération russe – République Sakha (Iakoutie)
Cultural, social and politic transitions in a "National" region in Yakut Arctic / Russian Federation –Republic of Sakha (Yakutia)

Émilie MAJ
Centre for landscape and culture, Université de Tallinn Estonie

The fall of the Soviet Union and the shift to a market economy have engendered among the peoples living in the Russian Arctic a transition process whose consequences affect both individuals and society as a whole. The paper proposes to study the case of the social, cultural and political transformations that have taken place over the last twenty years in an Arctic region of Sakha Republic (Yakutia).
The Eveno-Bytantaj region was the first "National" region created in the Sakha Republic (Yakutia) following the claims of intellectuals among the local lineage maybe (tügehir) of Even people. This area is inhabited by a majority of Evens who, under the pressure of the Soviet policy of Russification and Yakutization, have forgotten their own language. The last speaker of the Even dialect tügehir died two years ago. Since the "nationalization" of the region, Even language is taught at school, but without any substantial results because children do not practice the language outside of the classroom. Meanwhile, the Yakut language, used as a first language in everyday life, is either not taught nor written or spoken in these special classes. My contribution will analyze the impact of "national" policy on local ethnic identity.
Today, because of the benefits reserved for Aboriginal peoples, parents prefer to register their children as Evens (Indigenous) and not as Yakut (only considered as Natives by Russian law). The inhabitants of this region are still mainly living from reindeer husbandry but the conditions of reindeer herders are deteriorating due to the removal of Soviet-era subsidies. Alcoholism is encouraged by the underground economy which sprung up with the transition to a market economy. Unemployment and violent deaths rate higher than in the capital. For these reasons, those who have the financial opportunity move to the city, especially the families of farmers who can sell the meat of their private livestock. The practice of farming and the main village of the Eveno-Bytantay region are threatened by the introduction of a hydroelectric power station, which should be put in place parallel with the installation of a factory for ore processing. As a result of economic imperatives, the village could be submerged under a dam.
I examine the influence of Russian federal policy and national regional development, whose economic and social consequences seem currently incompatible. This example will illustrate the complexity of relations between minority and dominant people and the limits of regional policy in Sakha Republic (Yakutia), a strategic part of Russian Federation because of its position north of the Arctic Circle and its large reserves of precious ores. The contribution reviews environmental determinism in the context of an Aboriginal population living in the delicate Arctic environment. It proposes, finally, a reflection on the notion of progress and aspirations and choices for the development in the extreme environmental conditions beyond the Arctic Circle.

La chute de l'Union soviétique et l'ouverture à l'économie de marché a entraîné chez les peuples de l'arctique russe un processus de transition dont les conséquences touchent aussi bien l'individu que la société dans son ensemble. La contribution propose une étude de cas, sous la forme d'un bilan des changements culturels, sociaux et politiques qui ont eu lieu depuis vingt ans dans une région de l'arctique iakoute.
La région eveno-bytantaj fut la première région « nationale » créée en République Sakha (Iakoutie), sous la pression des intellectuels évènes de la lignée locale (tügehir). Elle abrite une majorité d'Evènes, qui, sous la politique soviétique de russification et de iakoutisation ont oublié leur propre langue. La dernière locutrice du dialecte évène tügehir est décédée il y a deux ans. Depuis la « nationalisation » de la région, la langue évène est enseignée à l'école, sans succès car les enfants ne pratiquent pas cette langue en dehors. Parallèlement, la langue iakoute, pourtant utilisée comme première langue dans la vie de tous les jours, n'est enseignée ni à l'écrit ni à l'oral dans ces classes spécialisées. La contribution analysera l'impact de la politique « nationale » sur l'identité ethnique locale.
Aujourd'hui, du fait des avantages sociaux réservés aux aborigènes, les parents préfèrent déclarer leurs enfants comme Evènes (aborigènes) et non comme Iakoutes (uniquement considérés comme des autochtones). La région vit encore essentiellement de l'élevage de rennes, pratiqué par les Evènes, dont les conditions de vie se dégradent en raison de la suppression des aides de l'époque soviétique. L'alcoolisme est encouragé par l'économie souterraine qu'a engendrée l'économie de marché. Chômage et morts violentes ont des taux supérieurs à ceux de la capitale. Pour ces raisons, ceux qui en ont les moyens financiers s'exilent vers la ville, en particulier les familles d'éleveurs qui peuvent vendre la viande de leur bétail privé. La pratique de l'élevage et le village principal de la région sont menacés par l'implantation du barrage d'une station hydro-électrique, qui devrait être mise en place suite à la mise en service d'une usine de traitement des minerais extraits à ses environs. Pour des impératifs économiques, le village pourrait donc être immergé sous un barrage.
J'examinerai l'influence de la politique fédérale russe et nationale sur le développement régional, dont les pendants économiques et sociaux semblent actuellement incompatibles. Cet exemple illustrera les la complexité

des rapports entre minorité et peuple dominant et les limites de la politique régionale dans cette région, stratégique pour la Fédération russe du fait de sa position au nord du cercle polaire et de ses importantes réserves en minéraux précieux. La contribution propose ainsi le commentaire d'un déterminisme environnemental sur une population aborigène vivant dans l'espace naturel arctique à l'équilibre fragile. Elle envisage, enfin, une réflexion sur la notion de progrès et les choix de développement envisageables dans les conditions naturelles extrêmes du cercle polaire.

The challenges of Greenland: adaptation to climate change, natural resources and self-governance

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Greenland, one of the world's most vulnerable places to the impacts of climate change, is beginning to experience an industrial development in its energy sector, after gaining more autonomy from Denmark in June 2009. An enormous potential for natural resources brings foreign investors to Greenland. At the same time, geopolitical developments in the changing region of the Arctic are also giving Greenland a central position.
Greenland was already a key element of Danish climate diplomacy prior to the UN Conference on Climate Change in Copenhagen in December 2009. Political and scientific guests from all over the world travelled to see the impacts of climate change at the Ilulissat Icefjord, a world heritage site. Among them, US Speaker Nancy Pelosi, European Commission President José Manuel Barroso and German Chancellor Angela Merkel.
Greenland's challenge is to reach a balance between greenhouse gas emissions – which today are insignificant for a territory four times as large as France – and the necessary development that Greenland is putting on track to be economically independent from Denmark. Before the Copenhagen Climate Conference, Greenland requested to emit about 15 times more CO2 compared to its 2007 level, which would have cost Greenland its possible independence. Denmark therefore agreed to a strategy that allows Greenland to have its own climate policy. Emissions of the country's population are to be cut by 5% on 2007 levels in the period 2013-2020 but emissions from the raw material sector as well as new industries will be exempt from calculations in this period.
Will Greenland be a "green" land, not because of the ice melting, but due to a sustainable development? Among its targets, Greenland aims to supply 60% of its electricity demand with water power in the period 2013-2020.

The current situation in Greenland and its challenges towards a possible independence bring not only foreign investors, but also a greater interest from the world community. What is the future of the relationship between Denmark and Greenland?

1b – Bien-être autochtone / Indigenous peoples' well-being

(*Modérateur Virginie VATÉ, GSRL UMR 8582, CNRS, Paris, France)*

Revealing Interactions between Human Capital, Quality of Life and Environmental Changes within Socially-oriented Observations : Lessons from the IPY PPS Arctic Project in the Russian North

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Socially-oriented Observations (SOO) in the Russian North have been carried out within multidisciplinary IPY PPS Arctic project under the leadership of Norway and supported by the Research Council of Norway as well as Russian Academy of Sciences. The main objective of SOO is to increase knowledge and observation of changes in quality of life conditions (state of natural environment including climate and biota, safe drinking water and foods, well-being, employment, social relations, access to health care and high quality education, etc.) and - to reveal trends in human capital and capacities (health, demography, education, creativity, spiritual-cultural characteristics and diversity, participation in decision making, etc.). SOO have been carried out in industrial cities as well as sparsely populated rural and nature protection areas in observation sites situated in different biomes (from coastal tundra to southern taiga zone) of Murmansk, Arkhangelsk Oblast and Republic of Komi. SOO were conducted according to the international protocol included in PPS Arctic Manual. SOO approaches based both on local people's perceptions and statistics help to identify main issues and targets for life quality, human capital and environment improvement and thus to distinguish leading SOO indicators for further monitoring. SOO have revealed close interaction between human resources, quality of life and environmental changes. Negative changes in human capital (depopulation, increasing unemployment, aging, declining physical and mental health, quality of education, loss of traditional knowledge, marginalization etc.), despite peoples' high creativity and optimism are becoming the major driving force effecting both the quality of life and the state of environment and overall sustainability.
Human induced disturbances such as uncontrolled forests cuttings and poaching are increasing. Observed changes in climate and biota have become an add factor influencing land use and overall sustainability. In relation to the future sustainability in nature and society it is northern communities, their adaptive capacities and creativity that are decisive. SOO enables to identify and monitor the implementation of local strategies that will stimulate the human capital improvement and act not only as the agent of economic modernization but as important solutions for better state of environment and society.

Changing Climate, Changing Health, Changing Stories: Using Digital Storytelling for Climate-Health Research in Rigolet, Nunatsiavut, Canada

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For Canada's Northern regions, climate change poses significant challenges to the health and well-being of residents. Inuit communities are particularly vulnerable to environmental changes, as many Inuit continue to live lifestyles closely tied to, and reliant upon, the natural environment. Communities have reported climate change impacts on access to safe fresh drinking water and traditional foods, decreased physical activity, unstable travel conditions, ice changes, and unpredictable weather patterns, all of which impact health (physical, mental, emotional, and spiritual) and well-being in these regions.
Starting in 2009, and using an EcoHealth framework, the Rigolet Inuit Community Government, in Nunatsiavut, Newfoundland and Labrador, Canada, began a multi-year community-driven, participatory, storytelling project, funded by Health Canada's First Nations and Inuit Health Branch, which examined the impacts of climate change on human health. Utilizing digital storytelling as a method to complement interviews, population surveys, and focus groups, the community of Rigolet work with social science researchers, epidemiologists, and a not-for-profit organization to gather stories and data about climate change in the region, the climate-health relationship, and current and possible adaptation strategies. The 'digital dialogues' created through this project

created powerful health media campaigns, as well as an innovative narrative EcoHealth method for discovering, analyzing, and sharing the impacts of climate change on health and well-being in Inuit communities in locally-appropriate and culturally-sensitive formats.
This presentation will discuss the process of utilizing digital stortyelling as a narrative method to document and share stories about the effects of climate change on human health, as well as the research results emergent from this project. Examples of the digital media created through this project will be screened and displayed, followed by a discussion of utilizing digital stories not only to conduct research about climate-health relationships and adaptation strategies in Aboriginal communities, but also to create culturally-relevant health media. Information will also be provided about the emergence of the My Word: Storytelling and Digital Media Lab in Rigolet, and the opportunities for community-based research and capacity building programs this centre can provide to Northern communities, researchers, and policy makers. Finally, broader benefits and concerns when using this participatory method for climate change research will be discussed, as well as the potential for more global applications.

A new ritual instituted to display and share Inuit "Traditional Knowledge": the mid-winter celebration of the Return of the Sun in the Eastern Canadian Arctic (Nunavut)

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In 1993, a festival called « Qaggiq » was held for the first time in the community of Iglulik (Igloolik), as a celebration of the reappearance of the sun above the horizon in mid-January. Organized by the Iglulingmiut Elders' Committee, this celebration officially aimed at displaying some of the games that the (nomadic) inhabitants of the region used to perform until the first decades of the XXth century, after the mid-winter return of the sun.
While it was originally presented as a way to recall the joy expressed by the ancestors about that particular time of the season, this Qaggiq festival evolved to turn into a larger ritual in the following years, as it became a means of celebrating the Iglulingmiut « traditional culture » as a whole. During the past 17 years, the festival has indeed been including a growing number of practices, which are all presented as expressions of Iglulingmiut or « Inuit » tradition.
In this paper, I will consider the forms taken by these practices, by questioning the significant place of competitive games within this contemporary attempt to revive and hand down « traditional knowledge » among/through the different generations of community members. This examination will involve a comparative perspective including other Inuit communities of the Eastern Canadian Arctic (such as Mittimatalik-Pond Inlet) that recently started to hold a festival of the "Return of the Sun" as well.

1c – Tourisme polaire : possibilités et difficultés / Polar tourism: possibilities and difficulties

(Modérateur Véronique ANTOMARCHI, CERLOM, INALCO, Paris, France)

ECOTRAD : Aboriginal Ecotourism in the Arctic: a collaborative research project between the caribou Inuit and the Saami reindeer herders

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Inuit and Sami communities are facing major environmental and economic changes due to global warming, mineral exploration, hydroelectric development, timber harvesting. The disturbances caused by climate changes may increase in frequency and severity and will have a major impact on High Arctic and sub Arctic ecosystems in the future. Facing these challenges, the communities have similar concerns; sustain their traditional lifestyle, generate new jobs for the young ones, preserve the knowledge of the elders, regain and recapture their own culture and language.

The project aims at understanding how Aboriginal tourism can contribute to the well being of northern communities, preserve and enhance their traditional cultures, sustain their natural resources, and help community members face the challenges of climate change and economic dependency. It is based on the hypothesis that northern communities in different geographic regions face comparable challenges and that a comparative analysis between such communities provides new insights on the possible ways to face them. For this, we are working in partnership with 2 communities, the Inuit Inland Caribou from Baker Lake in Nunavut and the Sami Reindeer Herder of Övre Soppero of Northern Sweden that share a traditional livelihood based on the same species Rangifer tarandus and similar challenges despite the differences in their ecological and socio economic context.

Collaborative research and social action tools developed by Chevalier (www.sas2.net) are being used to bridge scientific and community based knowledge, to explore future scenarios and models and nurture an Arctic aboriginal ecotourism network of practitioners. The project is funded by the French Polar Research Institute for 2 years. It is promoting direct collaborations and exchanges between Inuit and Sami communities and produces new strategies for Aboriginal tourism development based on lessons learned from the stakeholders' collective experiences and new aboriginal research techniques and methodologies.

L'animal sauvage dans l'Arctique canadien : Enjeux de l'exploitation d'une ressource
Issues concerning wildlife as a touristic resource in Nunavut

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Wildlife becomes a touristic product particularly emphasised for territories development. A part of the touristic activity in the arctic region in Canada depends on the wealth and the uniqueness of wildlife from polar region. Two different tourism activities around arctic wildlife can be distinguished: wildlife watching tourism and trophies hunting tourism. If these two kinds of tourism seem antonymic, both search exotic experiences by the encounter of wild animals. With touristic development, cultural issues could happen between Inuit culture and the one from tourists. If the non-consumptive wildlife watching is developing thanks to cruise ships and the creation of national park, this kind of tourism could not match Inuit culture as well as the trophy hunting one. Indeed, trophy hunting allows Inuit to use hunting knowledge, which is the heart of the Inuit culture. Today, tourism in arctic is affected by climate change. Polar bears for instance are more and more protected, which limit trophy hunting tourism.

The analysis of touristic dynamics and its link with territorial development will be presented. The concept of cultural diversity and biodiversity are questioned and will be used to show the uses and stakes of wildlife tourism in polar region.

L'animal sauvage devient un produit touristique particulièrement mis en valeur pour le développement des territoires. A ce titre, la mise en tourisme de la région arctique repose en grande partie sur la richesse et la singularité des animaux des milieux polaires. Deux types de tourisme autour de la faune arctique peuvent ainsi être distingués et sont en pleine expansion : le tourisme de vision et le tourisme de chasse. Certaines formes de

tourisme sembleraient plus adaptées que d'autres selon les territoires. Par exemple, au Canada, le gouvernement du Nunavut, sous l'impulsion de l'organisme fédéral Parc Canada, a créé quatre parcs nationaux en moins de 10 ans. Même si les Inuit sont en partie intégrés à l'économie de ce tourisme, et si la gestion de ces parcs doit tenir compte des savoirs inuit comme des savoirs scientifiques occidentaux, les représentations et pratiques touristiques générées par ces parcs ne correspondent guère à leurs représentations de la nature (S. Dupré, 2009). Contrairement à ce tourisme naturaliste, le tourisme de chasse semblerait mieux s'accorder avec le mode de vie et certaines conceptions Inuit. Même si les représentations de l'animal restent différentes, notamment en ce qui concerne l'usage des animaux chassés (trophée pour les uns, gibier pour les autres), cette forme de tourisme repose sur la mobilisation de savoirs relatifs à ce qui constitue le cœur de la culture inuit : l'activité cynégétique. Au sein de cette communication nous analyserons les interrelations liant la gestion de la faune sauvage avec les logiques de développement touristiques au sein des territoires. Les notions de diversités culturelles et de diversités biologiques seront alors interrogées, ce qui permettra de présenter les enjeux de l'exploitation touristique de la faune sauvage en arctique canadien.

References:

Antomarchi V., 2009, "Tourisme, identité et développement en milieu inuit. Le cas de Puvirnituq au Nunavik", Téoros, 28, 1, p. 52-60.

Bulbeck C. 2005. Facing the wild, earthscan, p. 309

Collignon B., Les Inuit, ce qu'ils savent du territoire, L'Harmattan, 1996, 254 p.

Curtin S. 2009. Wildlife tourism : the intangible, psychological benefits of human-wildlife encounters, in Current issues in tourism, vol1-2, n° 5-6, p. 451-474

Dowsley M. 2009. "Inuit-organised polar bear sport hunting in Nunavut territory, Canada", in Journal of ecotourism, vol 8, pp. 161-175

Etienne S., Mercier D., André MF. 2005. « Chronique polaire », Norois, n°194, p. 125-148

Freeman M., Hudson R. et Foote L., 2005, Conservation hunting: people and wildlife in Canada's north, Edmonton, CCI Press

Grenier A., Le tourisme polaire, Téoros, vol 28, n°1, Presses de l'université du Québec 2009, 104p.

Légaré A., 1991. « Le tourisme dans l'Arctique : le cas de la region de Baffin , T.N.O », in Inuit Studies, n° 15, pp. 107- 126

Lemelin R H, Wiersma E. 2007. « Gazing upon Nanuk, the polar bear: the social visual dimensions of the wildlife gaze in Churchill, Manitoba », in Polar geography, 30 :1, pp. 37-53

Roué M., Introduction : entre cultures et natures, Revue internationale des sciences sociales 2006/1, N° 187, p. 11-18.

Wenzel G., 1991. Animal rights, Human rights, University of Toronto press, p. 206

Antarctica and Tourism: The Need for Change

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Fifty years after the Antarctic Treaty (1959) entered into force, the world's coldest continent has become an increasingly popular tourist destination, and tourism is now one of the two human activities most associated with the continent. Although not mentioned in the Antarctic Treaty, tourism has become an important focus of discussion and debate for the Antarctic Treaty Consultative Parties (ATCPs) as the expanding tourist numbers have drawn attention both to the human impacts of tourism upon a fragile environment, and the need for long-term planning and regulation of tourism in the Antarctic. Attempting regulatory intervention in Antarctic tourism, however, is a difficult task. The non-sovereign status of the Antarctic, the decision-making structures that have evolved under the Antarctic Treaty System, the unique nature of this commons regime, and the problem of non-parties cumulatively represent formidable challenges to policy initiatives in this area. Additionally, differences between the Treaty parties in respect to issues such as permanent land-based facilities for tourism highlight the lack of agreement on how tourism in the Antarctic should be addressed and managed.
This paper examines the growth of Antarctic tourism in recent decades, key human impacts of tourism on this wilderness continent, and the extant measures (such as Environmental Impact Assessment reports) that seek to contain and mitigate tourist contact with the Antarctic environment. It also considers the adequacy of the existing measures, both Antarctic Treaty Consultative Parties and industry-generated, in the context of differing perspectives on interfaces between tourists and the Antarctic and the nature of resource protection that is emerging under the Antarctic Treaty System. Finally, the paper assesses the options for changes to Antarctic tourism management and policy direction against the backdrop of a complex set of multi-layered sovereignty, national interest, security, liability and enforcement challenges.

1d – Neige, glace et eau: observation, quantification, spatialisation / Snow, ice and water: observation, quantification, spatialisation

(Modérateur François COSTARD, UMR IDES université Paris Sud Orsay, France)

Acquisition et traitements automatiques d'images numériques haute résolution de glaciers polaires
Automated high resolution digital image acquisition and processing applied to polar glaciers

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Thanks to the availability of high quality commercial off the shelf (COTS) digital cameras, high resolution image (sub-meter pixel size over a glacier basin covering several square kilometers) acquisition becomes affordable with spatial and time densities unavailable using classical methods such as distributing scalar sensors (ablation sticks, thermometers, anemometer) and satellite imagery. Furthermore, images provide a complentary information with respect to scalar sensors during data interpretation (weather conditions, cloud cover, equilibrium line altitude) which is otherwise only available when the experimenter is continuously present on site.
However, quantitative analysis of images acquired under natural light illumination exhibits processing challenges hardly addressed in classical industrial vision algorithms where constant artificial light illumination is used. We present the main characteristics of the autonomous picture acquisition system developed as part of the HydroSensor-FLOWS program, used on various glacier areas throughout the world, demonstrating battery autonomy longer than 6 months in a polar environment (time interval between to servicing sessions) and the ability to record 3 to 10 pictures every day during at least 1 year.
The challenges associated with storing and processing the huge amount of data gathered this way (12 000 pictures acquired by an average of 10 cameras located on a polar glacier basin during 3 years, 500 pictures acquired during 2 months in West-Greenland, or more than 10 000 pictures acquired in Argentina and in the French Mont Blanc area over 2 years) will be assessed, including the implementation of algorithms for the automated classification aimed at extracting a usable dataset. Quantitative data analysis -- whether extracting ice motion in the case of moving glaciers, or snow covered areas -- is then applied to the image subset identified as usable. Finally, the geometry of the images acquired following an oblique viewing angle is modified in order to comply with mapping projections in order to quantiatively compare the resulting areas with those computed on aerial and satellite images acquired with a much lower frequency (1 to 2 images every month).

L'imagerie photographique numérique propose aujourd'hui, par l'exploitation d'appareils commercialement disponibles à coût réduit, l'acquisition d'informations matricielles d'excellente qualité (taille du pixel inférieure au mètre sur l'ensemble d'un bassin glaciaire de quelques kilomètres carrés de surface) avec une densité spatiale et temporelle inaccessible par des méthodes plus classiques de distribution de capteurs scalaires (balises, thermomètres, anémomètres) ou d'imagerie satellite. Par ailleurs, l'image présente une complémentarité aux capteurs scalaires dans l'interprétation des informations (conditions météorologiques, couverture nuageuse, ligne d'équilibre) qui, sinon n'est accessible que par une présence permanente de l'expérimentateur sur le site observé.
Cependant, l'exploitation quantitative d'images acquises en lumière naturelle présente des difficultés rarement abordées dans les algorithmes de traitement de vision industrielle en illumination artificielle. Nous présenterons les principales caractéristiques des dispositifs de prise de vue autonomes développés dans le cadre du projet HydroSensor-FlOWS, et exploités sur divers glaciers dans le monde, démontrant une autonomie de plus de 6 mois en environnement polaire (intervalle de temps entre deux maintenances) et la capacité d'enregistrer 3 à 10 photos par jour pendant au moins 1 an. La masse d'informations acquises (12 000 photographies par 10 appareils photo en moyenne sur un bassin glacier polaire sur 3 ans, 500 photos sur 2 mois au Groenland ou 10 000 photos en 2 années en Argentine et dans le massif du Mont Blanc) pose des difficultés de gestion de données, de stockage et de traitement automatique pour une classification des images exploitables sur lesquelles nous proposons une stratégie de traitement. L'analyse quantitative -- qu'il s'agisse d'extraction de déplacements de masses de glace pour les glaciers en mouvement ou de conditions d'enneigement -- est alors appliquée aux images identifiées comme exploitables. Finalement, la géométrie des images acquises en vue oblique est

modifiée pour être représentée en projection cartographique dans le but d'une analyse quantitative des surfaces aux propriétés recherchées, et comparaison avec les photographies aériennes ou satellite acquises avec une périodicité réduite (1 à 2 images par mois).

About UV Albedo of Polar Snow

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We have studied the UV albedo of polar snow as part of the International Polar Year IPY ORACLE-O3 cluster project (Ozone layer and UV radiation in a changing climate evaluated during IPY, http://www.awi-potsdam.de/atmo/ORACLE-O3), which deals with experimental
and modelling research on the ozone layer, UV radiation and the effects of personal UV exposure during the IPY 2007-2008. During IPY, our UV related Finnish effort included the start of new continuous broadband measurements on Arctic snow UV albedo, in Sodankylä (67o22'N,26o39'E, 179 m asl), in 2007. We have studied SZA asymmetry of albedo found in the Arctic and Antarctic albedo data. The spectral albedo and water liquid content of intensively melting Arctic snow have been measured during the Snow Reflectance Transition Experiment (SNORTEX), in Sodankylä, Finland, in April 2009. In addition, Radiative Transfer (RT) model calculations have been used to study e.g. the effect of the measured local albedo on radiative forcing. Our results may have implications for satellite data utilization and modeling approaches in polar environments.

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References

Meinander O., A. Kontu, K. Lakkala, A. Heikkilä, L. Ylianttila and M. Toikka, 2008.
Diurnal variations in the UV albedo of arctic snow, Atmos. Chem. Phys., 8, 6551–6563,
Meinander O, Wuttke S, Seckmeyer G, Kazadzis S, Lindfors A and Kyrö E, 2009. Solar zenith angle asymmetry cases in polar snow UV albedo, Geophysica Vol. 45, Nos. 1–2,
http://www.geophysica.fi/pdf/geophysica_2009_45_1-2_183_meinander.pdf.

Hydrological and geochemical response of a polar glacier facing the recent climate changes (Austrelovenbre, Svalbard, 79°N)

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The Brogger-peninsula glaciers (Svalbard, 79°N) like many other glaciers all over the world have been shrinking for the past century since the end of the Little Ice Age due to global warming. The freshwater fluxes flowing from glaciers mainly depend on climatic indicators (T, P) but also on other parameters like the thermal state of glacier, the water routing within and below the glacier, the permafrost and the hydrodynamic characteristics of the moraines and rock structures forming the catchment. The objective of the presentation is to show the relationships existing between the hydrological response of a small glacier of the Brogger peninsula (Austrelovenbre glacier), the climatic conditions and these other parameters.
The Austrelovenbre glacier basin has two well-defined outlets that concentrate all water fluxes: one connected to the glacier and the other influenced by the proglacial moraine groundwater discharge. The hydrological response

of the river system has been studied since 2007 by continuous monitoring of climate (T, P) and hydrological parameters (Q, T, EC). In addition, geochemical measurements have performed on water samples (anions, 18O, 2H, 3H, 34S) in order to discuss the water origin, the water routing in the catchment and the water-rock interaction processes.

Results :
The main outlet of the glacier shows a hydrograph (Q vs time curve) with two dynamics: a daily cyclicity and several isolated flood events. The daily fluctuations are induced by air-temperature variations. Most main flood events mainly result from rainfall events. When those events occur during warm periods or at the beginning of the freezing period, the floods may be highly amplified. The geochemical data indicate SO4-Ca water type : Ca is an abundant element in the geological formations and S is due to pyrite oxidation and jarosite dissolution. The origin of S is discussed on the base of 34S measurements.
The second outlet displays a smoothed hydrograph showing no abrupt variation linked to atmospheric condition change. The Q-curve results from (1) the discharge of the supra-permafrost aquifer within the proglacial moraine, (2) the snow melting and (3) the permafrost thawing. The geochemical results confirm these origin of the stream water.

27 janvier / January 27

Séance plénière 2 / Plenary 2

Perception des dynamiques
Perceptions of Dynamics at work

(modérateur Christelle MARLIN, IDES, Univ Paris-Sud et CNRS, Orsay, France)

KEY-NOTE

Unreasonable Relationships in Disorderly Terrain: Certainties and Uncertainties

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Two parallel discussions currently engage researchers working in the Arctic and Subarctic. One centres on how (or whether) social sciences and humanities can contribute to scientific studies of environmental change; a second concerns potential contributions of indigenous knowledge to environmental sciences. Some scientists are now engaged in trying to assign value to traditional ecological knowledge (TEK) in projects that involve integrating local conceptions into existing knowledge frameworks. Historians and anthropologists who work with oral tradition propose an alternative approach. They reason that greater knowledge value - especially the possibility of surprises - may come from unfamiliar oral accounts that don't seem to fit easily within conventional frameworks.
Drawing on historian Luise White's insights about orality in Africa and on Brazilian anthropologist Viveiros de Castro's perspectival approach, I argue that local conceptions of what it means to be a person underlie narratives about glacier/human interactions during times of uncertainty. Culturally distinct understandings of personhood, in turn, challenge nature/culture binaries that no longer seem as firm as they once did. Paying attention to unfamiliar stories from people whose ancestors experienced climate change may help us expand scholarly epistemologies as we enter times of greater environmental uncertainty.
My presentation builds on accounts I first heard from senior indigenous women in northwestern North America about unorthodox behavior of glaciers. These glaciers were depicted as sentient, willful beings that responded directly and sometimes dramatically to human behavior, often with devastating results. Similar themes turn up in colonial records where such ideas were invariably discounted. Nor do they provide straightforward data for contemporary science. Yet they may contribute to our session theme if we view them as "good to think with," to use Levi-Strauss's felicitous phrase.

During the eighteenth and nineteenth centuries, indigenous peoples in arctic and subarctic settings undeniably experienced both environmental and social uncertainties. Two fundamental processes that are usually discussed independently coincided in the 18th and 19th centuries: geophysical changes associated with Little Ice Age (the turf of natural sciences) and European colonial incursions (a sphere of social sciences and humanities). Elders draw on stories of misbehaving glaciers to frame resulting uncertainties, both social and environmental. These narratives provide glimpses of a world as seen by people who were experiencing boundary-disturbing events.

Seasonal snow cover dynamics and melting processes on a polar glacier

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A glacier mass balance is dependent on numerous factors including temperatures, precipitations, solar radiation, and snow cover. Whereas temperatures and water precipitations are rather easily and commonly instrumented on the field, the monitoring of snow cover is trickier and constitutes a seldom documented variable. It is not easy to have an accurate overview of snow cover dynamics as they are subject to brutal variations over time and space (Griselin 2009). The hydrological consequences of the snow cover are directly linked to two complementary factors: The snow height and its corresponding water equivalent. The height and the quality of snow have an impact on albedo and therefore on ice protection. The water equivalent does have an influence on snow melting and, most importantly, on the outflows. Quantifying the contribution of snow to outflows does bring crucial information on the hydrological regime.
A monitoring protocol based on a network of stakes and complemented with regular snow drilling campaigns has been carried on the Austre Lovénbreen (Spistberg, 79°N). These campaigns are covering the entire hydrological season, including the snow accumulation maximum.
Data was collected over the course of three full hydrological years (2007-2010). Results show that snow cover is consistently stable until the end of may, while melting processes are slowly initiating. Melting is then clearly getting faster with rain events potentially causing breaks in the timeline. The comparison of height and water equivalent shows that both measures are complementary. A season with more snow can have less corresponding water than another season. It is also notable that, while snow height is subject to clear variations, the water equivalent remains remarkably stable, showing the importance of snow quality and density. This kind of data can only be collected in the field and is a powerful tool when combined with remote sensing data.

Ref: GRISELIN M., MARLIN Ch., LAFFLY D., BERNARD E., DELANGLE E., FRIEDT J-M., SCHWAMBORN G. et TOLLE F., 2009 : « Recent climate change observed in Svalbard since fourty years in Ny Alesund (79°N) », *MOCA 09, Our warming Planet, Joint assembly, symposium J01 Observations of High Latitude Climate Change,* Montréal, 19-29 juillet 2009.

Changes in recent snow-avalanche occurrence in Northern Iceland by compiling geomorphic and dendrochronologic evidence

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Snow avalanches pose a serious hazard for several Icelandic coastal urban nuclei in the north-western, northern and eastern parts of the country. Most of these communities developed during the first part of the 20th century, and encounter dramatic situations due to the occurrence of lethal snow-avalanche events between 1974 and 1995. In those areas, historical data regarding snow avalanches are scarce and not reliable enough. Furthermore, land-planning irreversibly destroyed geomorphological evidence of snow avalanches past occurrence. As in Iceland snow avalanches occur most often by cycles that affect several areas in a few days span time, investigating remote areas with limited human influence seems the key to gather relevant information on the recent and sub-recent snow-avalanche activity (occurrence and magnitude, runout distance and lateral dispersion).
Thus, geomorphological evidence, such as slope gradient distribution on colluvial cones and snow-avalanche transported and deposited boulders mapping in the distal parts of the cones are used to define topographic models of the runout distance of snow avalanches. By transferring the results of the model to inhabited areas, the areas at risk are highlighted (figure 1). Furthermore, relative dating of the snow-avalanche boulders, carried out with vegetation cover and rock hardness measurements, discriminates several generations of snow-avalanche magnitudes, clearly underlining a shift during the last decades, with events reaching shorter distances (figure 2). Dendrogeomorphological and dendrochronological methods are also applied in prone areas, enabling mapping the preferential snow-avalanche paths and surveying the snow-avalanche occurrence during the tree life, i.e. during the last 100 years in Northern Iceland (figure 3). The results underline snow-avalanche "cycles" with

several areas responding the same ways to the repeating snow-avalanche stress, and individualize several avalanchy winters from 1950 to 1970, and since 2000.

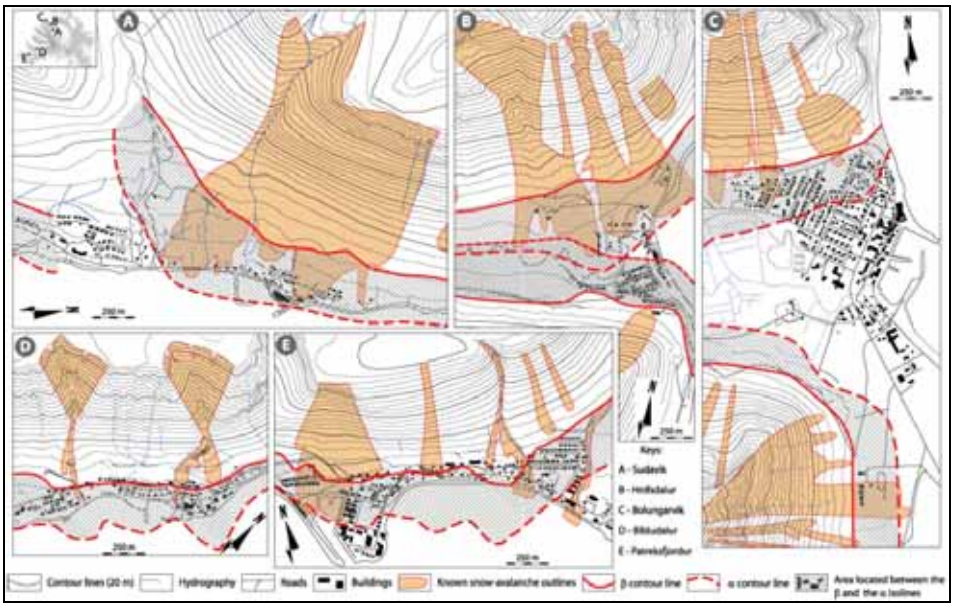

Figure 1: Inhabited areas at risk according to the topographic model

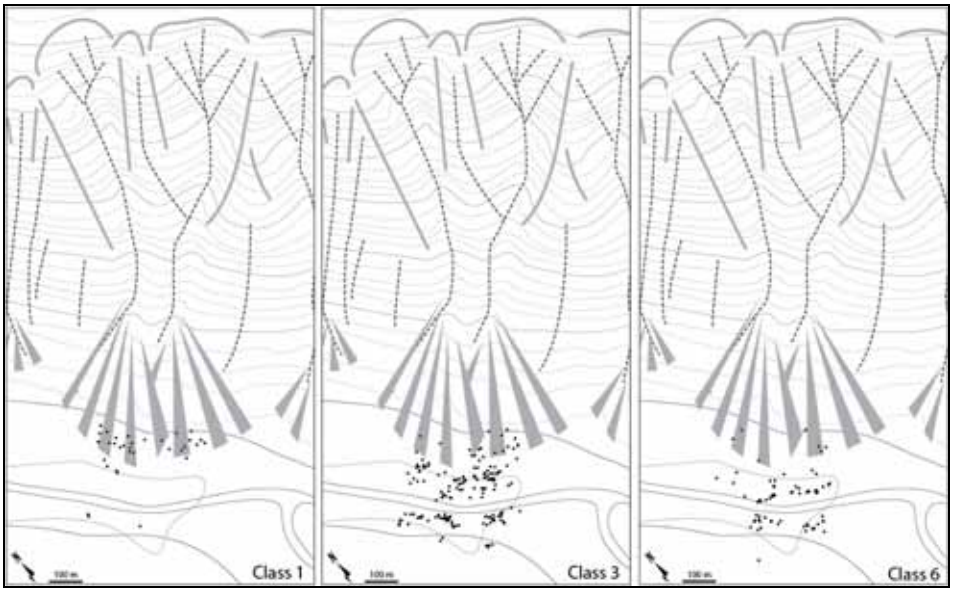

Figure 2: Spatial distribution of snow-avalanche transported boulders from classes 1 (newer) to 6 (older).

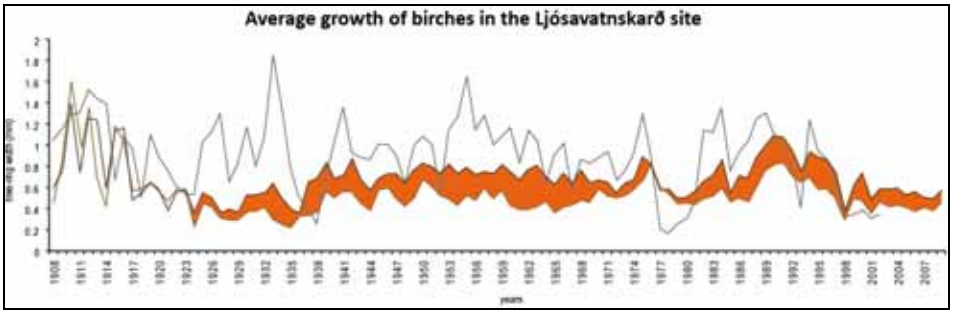

Figure 3: Reaction growth distribution in N. Iceland resulting from the asymmetric growth of birches recurrently strained by snow avalanches.

Water in Mind: Exploring Narratives, Perceptions and Responses to Unprecedented Climate Change for Sakha of northeastern Siberia, Russia

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One main effect of contemporary global climate change is increasingly uncertain world water regimes, with effects amplified in the Arctic and other climate-sensitive world areas. Most of these climate-sensitive areas are predominantly inhabited by place-based peoples, human populations that depend directly and daily upon their local environment for their physical, cultural and spiritual sustenance. Since many place-based peoples perceive and understand their world on the basis of a situated knowledge, grounded in their histories, cosmologies and management practices, it follows that their perceptions of and responses to changing water regimes due to climate change would be framed by these past and evolving narratives of water and also by new narratives introduced via the media, and other outside sources. To this extent, local peoples have 'water in mind.'

This paper explores 'water in mind' for Viliui Sakha, Turkic-speaking agropastoralists practicing horse and cattle breeding in northeastern Siberia, Russia. For Viliui Sakha global climate change means a highly altered water regime. Inhabitants report warmer winters, increased snowfall, excessive precipitation, changed seasonality, and the transformation of their ancestral landscape due to degrading permafrost. One clear change is water on the land turning hayfields into lakes and ruining transportation networks. Beyond these physical changes, what does the increased water on the land mean to Viliui Sakha? Water has visceral meaning to Sakha, based on their historically-based belief system, their adaptation the their environment, and knowledge system. Moreover, what interdisciplinary and cross-sector strategies can help translate these cultural implications to all stakeholders and into robust policy. With more and more emphasis on and funding for transdisciplinary collaborative projects to facilitate adaptation to climate change, one crucial area to explore is how the truing of such efforts via a process of reframing the dominant paradigms of water resources management by integrating an affected people's situated knowledge can inform the research process and its policy applications.

Séance plénière 3 / Plenary 3

Faune polaire : adaptation, représentations

Polar fauna: adaptation and representations

(modérateur Emmanuelle GAUTIER, Labo Geographie Physique, CNRS, Meudon, France)

Climate Change and Arctic Marine Mammals

Mads-Peter HEIDE-JØRGENSEN

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Seven arctic marine mammals occur north of the Arctic Circle for most of the year and depend on arctic ecosystems for all aspects of their life; the narwhal, the beluga, the bowhead whale, the ringed seal, the bearded seal, the walrus, and the polar bear. The arctic amplification of continued global warming will primarily affect these animals by the loss of sea ice as a habitat for feeding, breeding, molting, mating and as a substrate or barrier for migrations and movements.

The seven arctic marine mammals will be affected differently by the loss of sea ice depending on their degree of specialized feeding habits, their dependence on sea ice for life history events and their restrictedness in distribution. None of the seven mammals are currently endangered globally but they vary widely in abundance and this will eventually also affect their population resilience to climate change. The polar bear and the narwhal are considered the most sensitive to climate change due to their reliance on sea ice and specialized feeding. The least sensitive species were the ringed seal and bearded seal, primarily due to large circumpolar distributions, large population sizes, and flexible habitat requirements. Recent studies of three of the arctic marine mammals may throw some light on how they will thrive with reduced sea ice. The narwhal is narrow in its habitat selection and it undertakes well defined annual migrations from coastal summering grounds usually near glaciers to specific wintering areas in heavy pack-ice.

The purpose of these restricted migrations is not fully understood, but a major part of the feeding occur in winter when they make dives targeting prey at depths often exceeding 1500 m. The genetic diversity in narwhal is low and resembles the diversity found in populations that has through dramatic declines, but no such events are known from the recent history of exploitation and trends in abundance. However, narwhals very likely have limited resilience to rapid changes in North Atlantic sea ice coverage and they may have been severely affected by the sudden temperature changes that occurred towards the end of last glaciation.

The bowhead whale was probably never as abundant as the narwhal but it is more plastic in movement patterns and more flexible in its habitat utilization. A recovering population of bowhead whales in West Greenland has shown an increase in abundance that exceeds what can be explained by regular population growth. More likely the whales take advantage of the receding sea ice in spring and utilize new habitats for feeding. In West Greenland they seem to operate with a dual feeding mode by feeding both on pelagic concentrations of copepods and on benthic decapods. This allows them to sustain possible mis-matches between primary and secondary production caused by changes in sea ice recession in the critical spring months. Finally the polar bear is a convincing example of how this predator relies heavily on sea ice for quick access to their preferred prey in spring when their hibernation ends.

Maîtres de la vie et de la mort, les qupirruit des Inuit de l'Arctique canadien
Masters of life and death: *qupirruit* and the Canadian Arctic Inuit

Frédéric LAUGRAND

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Whereas big Arctic predators and mammals have been studied extensively by specialists from various disciplines working in the Polar Regions, tiny creatures known as qupirruit by the Inuit have been neglected. Although Arctic peoples are not great insects eaters compared to other groups, this situation is however paradoxical since many species of insects live in the Arctic and since these creatures play an important role in shamanic traditions. As there are hardly any academic papers dealing with qupirruit, I will here survey some classic ethnographical sources as well as interviews conducted with Inuit elders from Nunavut in the pas ten years and address some contemporary anthropological theories. I will show how, with their small size, their capacity to reproduce, to move and transform themselves, these tiny creatures are often encompassing categories and remain between and betwixt. They are still key operators at the ontological and cosmological level and operate at the level of the tarniq, this miniature image of a being. They connect different scales and escape death.

Alors que les grands prédateurs et les mammifères ont fait l'objet de nombreuses recherches par les spécialistes de diverses disciplines qui travaillent dans les régions polaires, les « petites bestioles » que les Inuit désignent par le terme de qupirruit ont été négligées. Même si les peuples de l'Arctique ne sont pas entomophages, cette situation paraît d'autant plus paradoxale que les régions polaires figurent parmi les plus riches pour leurs populations d'insectes et que ces derniers occupent une place primordiale dans les traditions chamaniques. Comme les qupirruit ont encore fait l'objet de peu de travaux, j'utiliserai ici des données tirées de l'ethnographie classique, des entrevues faites avec des aînés inuit du Nunavut au cours des dix dernières années et traiterai de quelques théories anthropologiques contemporaines. Je propose de montrer comment de par leur petite taille, leur capacité à se reproduire, à se déplacer et à se transformer, ces petites bestioles qui chevauchent souvent plusieurs catégories demeurent aujourd'hui encore, des opérateurs majeurs dans le domaine ontologique et cosmologique. Ces qupirruit agissent à l'échelle de l'âme-tarniq, cette image miniature du corps qui l'abrite. Ils connectent différentes échelles et échappent à la mort.

The Co-Management of Wabusk (Polar bear) in Northern Ontario: A Perspective from the Washaho Cree Nation at Fort Severn

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This presentation highlights a four year collaborative study conducted with the Muskekowuck Athinuwick, the original Cree people of the Omushkegouk, (muskeg) of the Hudson Bay Lowlands (Wînipekw) of northern Ontario and the Washaho Cree Nation at Fort Severn, the Keewaytinook Okimakanak Research Institute (KORI), and researchers from the Centre for Northern Studies at Lakehead University.

The goal of the project is to acquire a greater understanding of Cree Kiskayndamowin/Knowledge (CK) regarding the behaviour and interactions of Wabusk (polar bear, Ursus maritimus) with humans in this area of the country, and to develop a polar bear management strategy founded upon Cree worldviews. The findings revealed that Cree knowledge supports previously published information on polar bears, while adding its own contextual findings: Wabusk travelling greater distances into the muskeg than previously recorded, Wabusk preying on beavers (Amisk), Wabusk interactions with black bears (Muskwa), and human-Wabusk interactions in this region of northern Canada.

Considering that Cree knowledge has been recognized in wildlife management strategies (i.e., beaver, caribou and moose) elsewhere in Canada, this particular body of information is timely considering that the province of Ontario is developing a polar bear management strategy in Ontario (as a result of the polar bears being considered threatened under the provincial Endangered Species Act). The Canadian government is also contemplating listing the polar bears as threatened under federal legislation.

While it is unclear as to how these decisions will impact the Cree harvest of polar bears, the listing of polar bears by both governments, but especially the provincial government, disregards treaty and Aboriginal rights, overlooks the province's duty to consult with Aboriginal people, and largely ignores Cree *Kiskayndamowin* / knowledge of Wabusk. The development of a new management plan does however provide an opportunity for the provincial wildlife management agency to engaged Cree communities in the management of polar bears in Ontario.

The presentation will highlight current Cree understanding of polar bears, and how the Washaho Cree Nation at Fort Severn is implementing a polar bear management strategy in its traditional territory.

La participation des peuples autochtones du Nord à la réflexion écologique et à l'élaboration de stratégies alternatives
The participation of Native People in the ecological debate and the elaboration of alternate strategies

Karen HOFFMANN-SCHICKEl et Éric NAVET
CRESS, université de Strasbourg, France

The indigenous discourse, whether oral or written, ancient or contemporary, constantly associates human problems and ecological problems. In this manner, it is in contradiction with a certain developpmental discourse which still ignores largely the ties between human beings and environment, constitutive of a way of being and thinking, claimed and activated par the First People. Confronted to the problems of the modern world, in having recourse to numerous medias, they propose an alternate way aiming to guarantee a future as culture and people and to be a source of inspiration in a general reflection about the future of life on this planet. The missed meeting between Western people and Native People is possible today on the basis of a global claim for the preservation of ecodiversity and ethnodiversity.
We propose to analyse this discourse on the basis of our fieldwork notes and specialists quotations, taking as examples the Subartic Amerindians and the Saami People of Fennoscandia.

Le discours autochtone, qu'il soit oral ou écrit, ancien ou contemporain, associe constamment les problématiques humaines aux problématiques écologiques. En cela, il s'inscrit en contradiction avec un certain discours développementaliste qui ignore encore largement ce lien « êtres humains/milieux », constitutif d'un mode d'être et de penser, revendiqué et mise en pratique par les peuples premiers. Ceux-ci, face aux problèmes du monde moderne, et en recourant à de nombreux médias, proposent une alternative susceptible non seulement de leur garantir un avenir comme culture et comme peuple mais qui doit être aussi source d'inspiration dans une réflexion générale sur l'avenir de la vie de cette planète. La rencontre manquée entre l'Occident et les peuples premiers est aujourd'hui possible autour d'une revendication globale pour la préservation de l'écodiversité et de l'ethnodiversité.
Nous proposons d'analyser ce discours à partir des données recueillies par nous-mêmes ou par d'autres auteurs, en prenant pour exemple des Amérindiens du Canada et des Sâmes de Fennoscandie.

Séance plénière 4 / Plenary 4
Permafrost et environnement
Permafrost and environment
(modérateur Marie-Françoise ANDRÉ, Géolab, université de Clermont-Ferrand, France)

KEY-NOTE

Permafrost Stability and the Northern Polar World

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Permafrost is ground that remains at or below 0ºC for two or more years. It is a geologic condition controlled by climate. Geocryology is the discipline that studies permafrost. Cryostratigraphy is the branch of geocryology that examines the frozen layers in the Earth's crust. The majority of permafrost occurs in the higher latitudes of the northern hemisphere, in Russia, Canada, Alaska and China. Permafrost is one of the components of the cryosphere. Today, certain elements of the cryosphere, including permafrost, show clear signs of climate warming. As a result of climate warming, permafrost is expected to degrade in the coming decades and/or millennia. Permafrost provides not only a visible expression of current climate change but also represents a climate archive.
Ground ice is an important component of permafrost and is largely responsible for the terrain instability, or thermokarst activity, that accompanies the thaw-degradation of permafrost.
Many other permafrost-related geomorphic processes are climate-driven. Their magnitude and/or frequency of operation will change with climate warming. Man-induced disturbances to permafrost terrain, and ecological changes, will complicate longer-term climate-driven changes. There are also several important feedback mechanisms involved. A variety of engineering and geotechnical problems associated with thawing permafrost are encountered in many parts of the permafrost regions of North America and Eurasia.

Changes in the dynamics of the cryospheric system have broader implications for the management, development and social organization of Polar Regions. These include Arctic sovereignty issues and concerns related to the use and sustainability of natural resources.

Hydrological and morphodynamic response of the Lena River to the hydro-climatic change

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In Siberia, the Lena River crosses several latitudinal belts because of its huge basin (2.49 million km²) and its South-North orientation (exceeding 4,000 km). In the middle and lower valley, the fluvial dynamics of the Lena River is controlled by a periglacial environment, characterized by a very cold and dry climate (with mean temperature of 9°C and mean precipitation of 190 mm yr-1) and by a very deep permafrost (1,500 m). For these reasons, the hydrology of the Lena and its tributaries is characterised by an excessive fluvial regime and exhibits a spectacular flood in May and June. During the annual flood, the joined increase of river water temperature and water discharge induces the propagation of a thawing line within the frozen riverbank. The interaction between thermal erosion and fluvial erosion during the flood creates specific forms on the banks ("thermo erosive niches") and locally causes important bank retreat, mainly on island heads. This study, that examines the current climatic change and its impacts on the middle Lena River dynamics, is conducted at different spatial and temporal scales. The study is based on the combined analyse of climatic and hydrological data of the Lena River in Central Siberia, in order to evaluate a possible effect on the fluvial bed behaviour.
We firstly analyse the hydro-climatic change in Siberia, this part highlights the joined increase of air and water temperatures. The increase of water temperature during winter and spring is particularly pronounced. The water discharge at Tabaga gauging station (near Yakutsk) does not show a very clear evolution, because of the irregularity of the river discharge, but a slight increase of the main discharge accompanied by higher spring water discharge are observed for the two last decades. The main evolution concerns the frequency of great floods. The coupled evolution of water temperature and discharge seems to be responsible for an increasing instability of the fluvial bed. A meso-scale analysis based on aerial photographs and satellite images has revealed a strong acceleration of frozen banks retreat since the end of the 1980's. The stream temperature and the water discharge changes are probably the main factors of an observed increasing erosion of the islands: the vegetated islands appear to be very sensitive, showing an acceleration of their head retreat (+21-29%; Costard et al., 2007). In order to determine at a fine spatial scale interactions between flood intensity and duration, water temperature and island erosion and deposition processes, several sites have been chosen. Islands of various ages have been equipped: i) data loggers are installed at different depths in the permafrost; ii) annual topographic surveys associated with sediment trapping system precisely inform on erosion and deposition of the different parts of the islands iii) captors inform on the height of the water level on the islands during the flood. All these data are correlated with water discharge and water temperature at Tabaga gauging site.

Acknowledgment: this study is supported by ANR Climaflu program.

Coevolution of man-environment and settlement of Yakutia Contribution of frozen tombs and paleogenetics

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The population settlement history of Yakutia, from central Yakutia, Vilyuy and the Verkhoyansk region, has been studied within the framework of a French-Russian collaboration ; funded on the French side by the Ministry of Foreign Affairs (French Archaeological Mission in Eastern Siberia) since 2002, and by the French Polar Institute Paul-Emile Victor since 2010.

The Yakuts (present-day population 500,000) are cow and horse breeders, who live in one of the coldest regions of the world and who speak a language of Turk-Mongol origin, totally different from that of the reindeer breeders who surround them. The aims of the collaboration were to determine the origins of the Yakuts and to understand the settlement patterns in this region, by taking into account the coevolution of man-environment (notably infectious and parasitic diseases), and archaeological, historic, ethnological and biological data.

We have excavated more than one hundred, perfectly preserved frozen graves, dating from the 15th (arrival of the Yakuts) to the 19th century AD, and taken biological samples from contemporary populations in the same regions. We compare the past and present populations with similar biological markers, which are capable of tracing paternal and maternal lineages, in order to generate a dynamic history of the settlement patterns. At the same time, during autopsies, samples were collected and analysed with regards to infectious (tuberculosis) and parasitic diseases.

Historic (archives), ethnological (field-based) and cultural (graves and their objects) studies were also realised.

Our main results are: 1/ The settlement patterns, with a striking importance of two male lineages, which spread over time, and which are found today in 50% of men of Yakut origin; 2/ The patterns of cultural contacts with the West, which are similar to those described in Canada under the term the 'middle ground'; 3/ The impact of tuberculosis with the arrival of Westerners and the selection that it enforced; 4/ The current studies also reveal diseases, which until now have not been described in this region, thus, the relation with climate change is discussed.

L'histoire du peuplement de la Iakoutie, depuis la Iakoutie centrale, la Viliouï et la région de Verkhoïansk, est étudiée dans le cadre d'une collaboration franco-russe depuis 2002, soutenue côté français par le Ministère des Affaires Etrangères (Mission Archéologique Française en Sibérie Orientale) et depuis 2010, par l'Institut polaire français Paul-Emile Victor.

Les Iakoutes (500 000 personnes aujourd'hui) sont des éleveurs de vaches et de chevaux qui vivent au pôle mondial du froid et qui parlent une langue d'origine turco-mongole totalement différente de celles des éleveurs de rennes qui les entourent. Les buts de cette coopération sont de saisir les origines des Iakoutes, et de comprendre les modalités de peuplement de cette région du monde en tenant compte de la coévolution homme-milieu (notamment des maladies infectieuses et parasitaires), des données archéologiques, historiques, ethnologiques et biologiques.

Nous avons fouillé plus d'une centaine de tombes gelées, parfaitement bien préservées, datées du 15e (arrivée des Iakoutes) au 19e siècle de notre ère et nous avons effectué des prélèvements biologiques sur les populations contemporaines des mêmes régions. Nous comparons les populations du passé et du présent avec des marqueurs biologiques semblables, capables de suivre notamment les lignées paternelles et maternelles, afin de fournir une histoire dynamique des modalités de peuplement. Dans le même temps, lors des autopsies, des prélèvements intéressant les maladies infectieuses (tuberculose) et parasitaires sont effectués et analysés. Des études historiques (archives), ethnologiques (sur le terrain) et culturelles (sur les tombes et leur mobilier) sont réalisées.

Nos principaux résultats intéressent : 1/ les modalités du peuplement avec notamment l'importance de deux lignées masculines qui se sont imposées au cours du temps et qui représentent actuellement 50% des hommes d'origine iakoute ; 2/ les modalités de contact culturel avec les occidentaux qui rappellent celles parfois décrites au Canada sous le nom de « middle ground » ; 3/ l'impact de la tuberculose lors de l'arrivée des occidentaux et la sélection qu'elle a opérée. 4/ Par ailleurs, les études actuelles révèlent aussi des maladies, non recensées jusqu'à ce jour dans cette zone, dont la relation avec les changements climatiques est discutée.

Climate change, permafrost thaw and lake-side debris flows at Eskimo Lakes, Tuktoyaktuk Coastlands, Canada

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In mid-June 2007 and 2009 we observed numerous debris-flows, hitherto unreported in the literature, on the hillslopes surrounding Eskimo Lakes, Tuktoyaktuk Coastlands (68o 52' N, 133o19 W).
Regionally, the permafrost is continuous, ice-rich and deep, ranging from □400–600 m to □200 m on the lake margins. The near-surface stratigraphy shows characteristics of basal glacier-ice (massive ice) and intrasedimental ice (pore and segregated ice), both of which are thought to be artefacts of the Laurentide Ice Sheet. Overlying the basal and intrasedimental ice is fine-grained aeolian sand (~2 m thick) and an organic active layer (~ 50 cm thick). At the surface, landforms rooted in the thaw-freeze cycling of ice-rich permafrost dominate the landscape: ice-wedge polygons, thermokarst lakes and alases (drained thermokarst lakes) and pingos (perennially ice-cored mounds). Ice-rich landscapes are particularly sensitive to mean-temperature rises. It is a matter of some concern that the Tuktoyaktuk Coastlands are located in a poleward belt where mean temperatures are expected to be rise much more substantially than in regions to the south (Fig. 1). We suggest that the debris flows at Eskimo Lakes are a product of ongoing permafrost thaw and a temperature-induced deepening of the active layer.
Slope morphometry
The debris-flow hillslopes (Fig. 2) are characterised by three disparate morphometries. Steep headwalls (~620-~850) comprise the active layer and near-surface sands. Between the headwalls and slope floors or footslsope, where massive ice is exposed, slopes measure ~400. Combined, the headwalls and massive-ice exposures are ~7m in height. Footslopes, extending from the massive-ice exposures to the lakefront, show slopes of ~200.
Climate change and debris-flow origin
In general, active-layer thickness is determined by the depth of seasonal thermal-waves. As mean air temperatures rise, active layers deepen. Where ice-rich permafrost underlies the active layer in or around a hillslope, such deepening may engender three related consequences: 1. excess meltwater in the near-surface hydrological system; 2. run-off; and, 3. mass movements, i.e. active layer detachments or retrogressive thaw slumps.
The lake-side debris-flow observed by us are interesting in a number of ways. First, unlike many of the retrogressive thaw slumps reported in the region, they seem not to have been initiated at the shoreline and then retrogressed into the adjacent undisturbed tundra. Here, retrogression does take place but as a function of active-layer deepening within the tundra that is marginal to the headwalls. We note that temperature-related activation of mass movements is a trait consistent with active layer detachments, which usually occur inland. Second, and once again unlike many of the retrogressive thaw-slumps otherwise reported in the region, headwall exposure is highly localised and does not occur over a broad or wide front.
As a landform whose origin and development could be related to climate change but has not been previously reported or discussed in the literature, further study of the Eskimo Lake debris flows is well warranted.

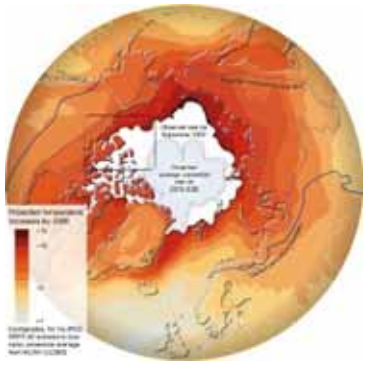

Figure 1. The Tuktoyaktuk Coastlands (highlighted in the box) are in a region that shows the greatest predicted rise of mean temperatures on Earth. (http://nordpil.com/static/images/arctic_ice_and_temperature_climate_projections_full.png)

Figure 2. Debris-flow hillslope, Eskimo Lakes

Modelling growing degree days in the Arctic: an example from Svalbard in the European Arctic

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It is known that temperature is a key component for the spatial distribution of vegetation. In order to understand distributional patterns of plant species it is of great interest to know how temperature varies in space, especially through the specific index called "growing degree days" (Gdd), here defined as the cumulative sum of positive mean daily temperature in the three summer months June, July and August. Because only six long term meteorological stations are running on Svalbard archipelago, temperature data cannot be interpolated to restore continuous fields. So, the aim of the presentation is to present an indirect method used to palliate this lack of data.

First, a local model of Gdd is built on the base of temperature recorded in the small scale study area around the Kongsfjorden. Daily means of temperature (460 for the five summers 2001 to 2005) are interpolated and constitute the data base to calculate the Gdd values. Then statistical tests are implemented to identify the best explanatory variables choosen among a pool of 11 topographical variables and 3 variables related to land cover. Three of them are significant at 5 % threshold (elevation, aspect of the slope and distance to the ocean) and are combined in a multiple regression model. The application of this model on the entire studied area allows to build the Svalbard Gdd at 100 m resolution.

Because the local Gdd is only valid for the Kongsfjorden area, three regional factors are introduced to improve the Svalbard Gdd.

- To assess the effect of the North East Atlantic current, data on "sea surface temperature" were acquired from AVHRR. The resulting trend surface images were applied to the land pixels.
- Ground surface heating potential index was modelized using "land surface temperature" and "cloud fraction" which are both provided by MODIS imagery.
- Number of "snowfree days".

The resulting map is ostensibly close to what we know on the spatial variation of temperature in Svalbard. Gdd values are high along the west coast and in the central part of Spitsbergen whereas low values are found above 200 m elevation, along the eastern coast of Spitsbergen and on the eastern islands. The model is compared to the Gdd values obtained from the six long term stations (normal values) and seven stations working in year 2007.

Sessions parallèles 2 / Parallel sessions 2

2a – Art autochtone: collections de musées et formes contemporaines / Indigenous art: museum collections and contemporary forms

(Modérateur Claire ALIX, UMR 8096 Archéologie des Amériques, CNRS-University Paris 1, France)

Between Past and Present: The Archaeological Collections from the Unga Cave (Alaska)

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The Aknañh Cave collection was assembled by the French explorer Alphonse Pinart and the American hydrologist William Dall, who visited Aknañh Cave, a burial cave on Unga island, in the eastern Aleutians, Alaska, in 1871 and 1873 respectively to collect Unangan (Aleut) artifacts. Today, Pinart's collection resides in the Château Musée de Boulogne-sur-Mer, France, and Dall's collection may be found in National Museum of Natural History Anthropology department collections, Washington, DC. Although some of the objects have been published, the collection has never been described or analyzed in its entirety and has never been examined by the contemporary Unangan community.

This paper will discuss our research project which integrates archaeological, ethnographic, and historic methodologies to address research questions related to the original production and use of the Aknañh Cave masks and associated objects, their discovery in the 19th century, and their importance in today's Unangan community. Then, in the light of the notion of trace as showing the "past of the passage" (Ricoeur), we will consider the project research questions devoted to the legacy of a distant past raise in terms of memory issues, especially in regards to the elaboration of contemporary Native heritage and its commemoration through which self-identification is asserted.

Les collections arctiques dans les collections nationales françaises : un patrimoine en cours de redécouverte
Arctic collections in the national French patrimonial : a cultural heritage being rediscovered

Gwénaële GUIGON

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Thousands of items pertaining to Arctic Peoples can currently be found in French museum collections. While some of them were already known about, others were recently re-discovered and studied from a different perspective based on social anthropology, ethnology, archeology as well as museology. In addition, this data was compared with the local history of the institutions where these items were placed.

As an example, we will discuss the case of the musée du quai Branly where the largest French Arctic collection is retained. The most ancient material evidence of this collection was originally conserved at the musée d'ethnographie du Trocadéro and then at the musée de l'Homme.

As part of its collection management strategy, the musée du quai Branly launched a specific mission about the collection previously retained by the Département des arctiques du musée de l'Homme. It was then possible to identify, re-allocate and study thousands of items, based on available resources (inventory registers, log books, etc).

This presentation offers an overview of this ongoing patrimonial research. When the Muséothèque with be opened in 2012, international researchers will be given the opportunity to study the collections recently revised within the framework of this research.

Il existe dans les collections muséales françaises, des milliers d'objets provenant des peuples de l'Arctique. Si certains d'entre eux étaient déjà connus, d'autres au contraire furent redécouverts et étudiés sous un jour nouveau, par le recours à des disciplines telles que, l'anthropologie sociale, l'ethnologie, l'archéologie et la muséologie mais également par la mise en perspective des données avec l'histoire locale des institutions où furent déposés ces objets.

Nous prendrons le cas du musée du quai Branly à Paris, qui conserve en ses murs la plus vaste collection arctique de France, dont les plus vieux témoignages matériels furent conservés au musée d'ethnographie du

Trocadéro puis au musée de l'Homme. Dans le cadre du chantier des collections du musée du quai Branly, une mission spécifique m'a été confiée pour les collections de l'ancien département des Arctiques du musée de l'Homme. Il a ainsi été possible de répertorier, réattribuer et étudier des milliers d'items par la mobilisation des diverses des sources à disposition (documents originaux, inventaires, etc).
Cette communication propose de se pencher sur ce travail patrimonial toujours en cours qui offrira aux chercheurs du monde entier la possibilité d'étudier les collections lors de l'ouverture de la muséothèque en 2012.

Déplacements géographiques et imaginaires : l'exploration de nouveaux territoires par les artistes inuit contemporains
Mental and Physical Travels: the Exploration of New Territories by Contemporary Inuit Artists

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The Inuit contemporary creation has been promoted as the untouched survival of a millenary practice. The geographical distance as well as the cultural difference strengthened the Western world in its vision of otherness, its taste for the remote. Yet, Inuit art was fashioned by the hands of several Western figures drawing guiding lines and intertwined contours. It should be underlined that those boundaries rapidly turned out to be flexible: talent and affirmation of their individualities by the artists offered openness to foreign visual fields such as comic books.
According to several scholars, in the 1980's Inuit art enters a Post-Modern era corresponding to an iconographic renewal, a higher degree of complexity and the integration of non-Inuit elements in the formal vocabulary of the artists. Even though modernity and the increasing number of technologies coming from the South were obviously the driving forces behind this change, it should be recalled that the artists also had the opportunity to travel. Such journeys enabled the expansion of the visual horizons and the election of new territories of creation. This paper will focus on the physical and mental journeys of the artists – be it the discovery of other worlds or the stimulation of the imaginary through new medias. The multidirectionality of the travels shall be considered: vertical and horizontal axes are now taking shape in the Inuit worlds. In the frame of a North/South circulation, the settling of Abraham Anghik Ruben in British Columbia, the journey of David Ruben Piqtoukun in Africa and the meeting of ArnaquAshevak with artists of various nationalities allowed the reassessment of their work by these artists. A quest of the origins, from Canada to China through Alaska, and the several "Norths" was also undertaken by the Ruben brothers. In a different way, the case of Michael Massie, a half-blooded artist who never lived in the North, is particularly interesting. The latter has lately been in the quest of his Inuit affiliation, departing from an aesthetic that was initially Western.

La création inuit contemporaine fut longtemps promue comme la survivance intouchée d'une pratique millénaire. L'éloignement, tant géographique que culturel, des Inuit conforta le monde occidental dans sa représentation absolue de l'altérité, son goût pour l'originel, ne laissant que peu de place au doute. L'art inuit s'est pourtant avéré façonné par la main de multiples acteurs occidentaux, traçant à leur envie lignes directives et contours intriqués. Force est de constater que les frontières n'ont pas tenu et qu'elles se sont rapidement révélées malléables : le talent et l'affirmation de leur individualité par les artistes ont dès les premières décennies offert une perméabilité aux champs visuels allochtones tels que la bande dessinée.
Les années 1980 marquent, selon plusieurs auteurs, l'entrée de l'art inuit dans une ère post-moderne, correspondant au renouvellement iconographique des formes, à une complexité accrue des compositions et à l'intégration d'éléments étrangers à la culture inuit au vocabulaire formel des artistes. La modernité et la multiplication des technologies importées du Sud se sont évidemment révélées les moteurs de cette mutation mais il faut rappeler que les plasticiens se sont également vu offrir la possibilité de s'initier au voyage formateur : celui-ci a permis l'élargissement des horizons visuels et l'élection de nouveaux terrains de création. Cette communication sera l'occasion d'envisager le déplacement des artistes tant sur le plan physique que mental – soit la découverte de mondes autres et la stimulation de l'imaginaire par le biais de nouveaux médias. La multidirectionnalité des voyages sera ainsi prise en compte : des axes horizontaux et verticaux se dessinent aujourd'hui dans les mondes inuit. L'installation d'Abraham Anghik Ruben en Colombie britannique, le séjour de David Ruben Piqtoukun en Afrique ou la rencontre d'Arnaqu Ashevak avec des artistes de diverses nationalités ont permis, dans le cadre d'une circulation nord-sud, la remise en question par ces artistes de leur travail. Une quête des origines, du Canada à la Chine, en passant par l'Alaska, et des multiples nords a également été entreprise par les frères Ruben. Dans la perspective d'un cheminement inverse, le cas de Michael Massie, artiste métissé n'ayant jamais vécu dans le Nord, se révèlera particulièrement intéressant. Ce dernier pose la question de la quête d'une appartenance inuit au travers d'une esthétique initialement occidentale.

Tarsaq : l'ombre et la trace. Approche ethno-graphique des techniques de marquages corporels chez les Inuit de l'Arctique canadien
Tarsaq: shadow and trace. Ethno-graphical approach of body markings among the Canadian Arctic Inuit

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Ethnographies dedicated to Inuit body markings and their evolutions emphasize the social, ritual and ontological importance of tattoo practices. While an Inuit women group from Iqaluit (Nunavut) works on the recovery of facial tattoos, new practises are emerging in Canadian Arctic regions, which are meaningful in the construction of social networks.
This presentation will aim at considering the notions of body "trace" and "markings" from the wider perspective of graphic process (tattoos and drawings) and their different media. The provided data comes from two distinct Ph.D. researches and analyses: one is devoted to the contemporary Inuit kinship practices in Hudson Bay (Florence Dupré), the other is focused on the Inuit graphic art on Baffin Island (Aurélie Maire). We will draw a parallel between a corpus of iconographic drawings and different kinds of body tattoos, in order to develop the joint construction of these practices in the current definition of social relationships, ontological discourse and relations with ancestor's world.

Les ethnographies consacrées aux marquages corporels inuit et à leurs évolutions soulignent l'importance sociale, rituelle et ontologique des différentes pratiques de tatouage. Alors que l'on assiste depuis quelques années aux démarches inédites d'un collectif de femmes inuit en processus de réappropriation des tatouages faciaux à Iqaluit (Nunavut), de nouvelles pratiques voient le jour dans l'Arctique canadien, véritables mises en scène des corps et des réseaux sociaux complexes dans lesquels ils s'insèrent.
Cette présentation aura pour objectif de réfléchir à la notion de « trace » et de « marquage » corporels en relation aux pratiques graphiques (tatouages et dessins) sur différents supports, dans les sociétés inuit contemporaines de l'Arctique canadien. Les données que nous développerons relèvent de deux recherches de doctorat et de deux perspectives analytiques distinctes : l'une consacrée à l'exercice contemporain des relations de parenté inuit dans la baie d'Hudson (Florence Dupré), l'autre à l'art graphique inuit dans l'île de Baffin (Aurélie Maire). Nous mettrons en relation deux corpus iconographiques composés de dessins et de tatouages afin de réfléchir à la construction commune de ces pratiques dans la définition contemporaine de la relation sociale, du discours ontologique et du rapport aux défunts.

2b – Permafrost et environnement periglaciaire / Permafrost and periglacial environment

(Modérateur Florian TOLLE, ThéMA, Bsançon, France)

A proposed geophysical investigation of debris-flow origin at Eskimo Lakes, Tuktoyaktuk Coastlands, Canada

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Introduction

The geophysical study of periglacial landscapes in the Canadian Arctic has been ongoing for a number of years. Ground-penetrating radar (GPR) has shown itself to be particularly useful in mapping near-surface deposits of massive ice as well as ice-rich permafrost tables and frozen-active layers. Here, we describe the possible use of GPR to map a periglacial column of material comprising an organic active layer, ice-rich permafrost and massive ice at debris flow-sites in the Canadian low arctic. Within the periglacial literature, these sites have not been reported let alone studied.

The Field Site

During the course of a late spring visit to Eskimo Lakes, near the Beaufort Sea (680 52' N, 1330 19' W), we observed a number of lake marginal debris-flows (~25 m in length) (Fig. 1). Interestingly, and unlike many of the retrogressive thaw-slumps reported in the region, the debris flows seem not to have been initiated at the shoreline and then retrogressed into the adjacent undisturbed tundra. Retrogression does occur; however, could this be the result of heightened spring-summer mean temperatures in the region and, subsequently, of active-layer deepening within permafrost that is ice-rich and distal from the headwall exposures of ice. If so, then two subordinate questions arise. 1. Is the run-off a product of an increasingly deep active-layer enriched with meltwater derived from thawed ice-rich permafrost; or, 2. Is the run-off fed by meltwater produced by the thermal interception of the massive ice table by the active layer itself? These are the types of field-based periglacial questions that GPR is quite useful in addressing.

Massive-ice exposed by lake-margin debris flow
(Eskimo Lakes, Tuktoyaktuk Coastlands, June 2007)

GPR uses electromagnetic (EM) waves sensitive to variations in dielectric permittivity and electrical resistivity. Dielectric permittivity governs EM wave velocity; a sharp contrast in dielectric permittivity within the ground controls the reflection of energy back to the surface and the amount of transmitted energy further in the ground. Electrical resistivity has a role in the attenuation of radar-wave amplitude. As the high electrical resistivity of frozen soil is favourable to the penetration of radar waves to depth, our investigation will take place during the late spring (early June), when the active layer is still frozen. We will frame our research in terms of two near-surface interfaces or boundaries and associated electromagnetic parameters identified in the literature. The boundaries occur at the 1. dry active-layer/ice-rich permafrost table (~0.5-1.0 m depth?); and, 2. ice-rich permafrost floor/massive ice table (~1.0-2.0 m depth?). Identifying these boundaries clearly will be an important step towards constraining the hydrological system responsible for the Eskimo Lakes debris flows and, more broadly, understanding the regional impact of global climate change on ice-rich periglacial landscapes.

Formation of thermokarst lakes in Arctic regions on Earth: application to thermokarst-like depressions on Mars

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The periglacial environments on Earth underlined by a continuous and ice-rich permafrost show a unique assemblage of landforms: thermokarst lakes, ice-wedge polygons, and polygon-junction ponds [1-3]. The thermokarst lakes are one of the most common landforms in the Arctic regions and are due to thawing of ground-ice.

On Mars, possible periglacial landforms dot the region of Utopia Planitia: depressions with scalloped-shapes, polygonal patterned-ground and polygon-junction pits [4-8]. The depressions with scalloped-shapes attract much attention in the planetary community due to a possible periglacial origin indicative of an ice-rich ground on Mars.

• Initiation and development of thermokarst lakes on Earth

Thermokarst lakes are the result of the ground subsidence following the localized thawing of excess-ice (fig. 1a) [3]. The term thermokarst denotes the processes and landforms associated with degradation, of excess-ice in permafrost (amount of ice exceeds the natural pore water content in a non-frozen state) [1]. The development of thermokarst results from the localized disruption of the thermal equilibrium of the permafrost consequently of an increase in surface temperature and a deepening of the active-layer [1-3].

The lakes are roughly circular to elongate with a flat floor and smooth margins, their diameter ranges from a few hundred meters to several km with a depth of a few meters (fig. 1a) [1, 2]. Most of the lakes are connected by small creeks created by fluvio-thermal erosion of the ice-wedge network [2, 3].

• Analogy with thermokarst-like depressions on Mars

Flat-floored depressions with scalloped shape are ubiquitous over the regions of Utopia Planitia (fig. 1b). The depressions generally have circular to elliptical shapes with diameters ranging from tens of meters to several kilometers and depths extending to tens of meters [4-8]. They are flat-floored showing polygonal patterned ground inside and are characterized by a NS asymmetric profile.

Because Martian landforms are beyond our reach, the comparative planetology is a powerful tool to help comprehend Martian surface processes. Here, we investigate the formation processes of the thermokarst lakes on Earth and compare their morphologies to the Martian depressions to interpret the origin of the latter.

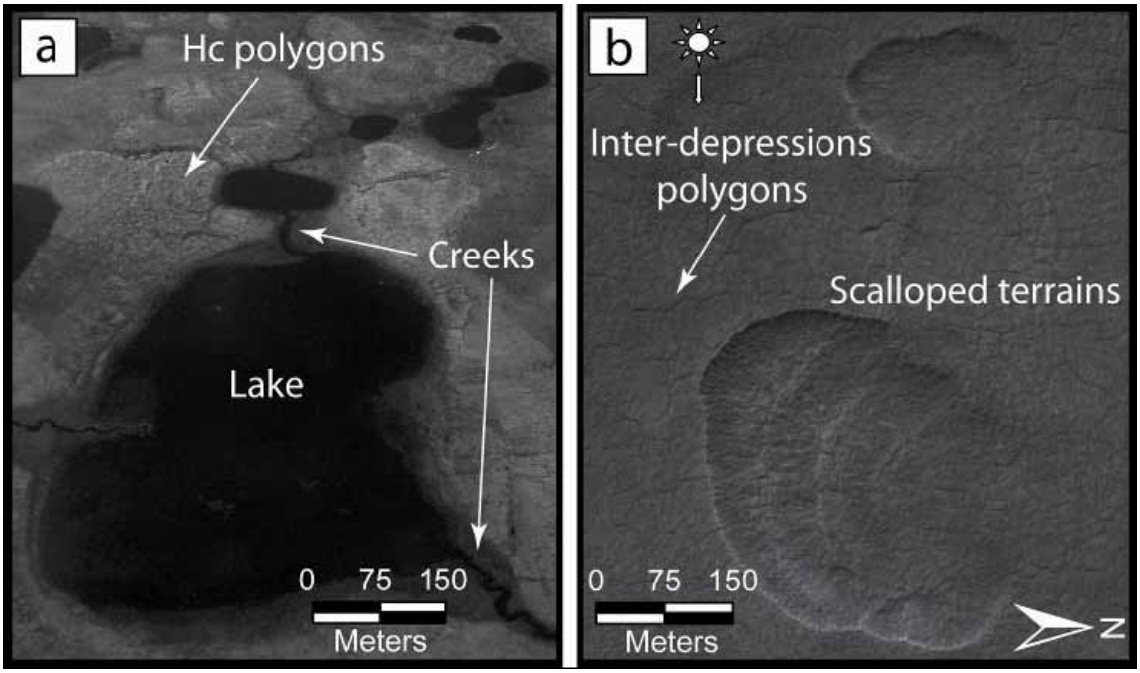

Figure 1: Comparison between (a) thermokarst lakes in the Tuktoyaktuk Coastlands, Canada and (b) depressions with scalloped shapes in Utopia Planitia, Mars

Acknowledgments
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References
[1] French, H. M., 2007. The Periglacial Environment, 3rd ed., 458 pp.. John Wiley, Chichester, U. K.
[2] Soloviev, P. A., 1973. Peryglacialny Biuletyn 23:135–155.
[3] Washburn, A.L., 1973. New York: St Martin's Press. 318 pp..
[4] Costard, F. M., and J. S. Kargel, 1995. Icarus, 114, 93–112.
[5] Lefort, A., P. S. Russell, N. Thomas, A. S. McEwen, C. M. Dundas, and R. L. Kirk, 2009. J. Geophys. Res., 114, E04005.
[6] Morgenstern, A., E. Hauber, D. Reiss, S. van Gasselt, G. Grosse, Schirrmeister, L., 2007. J. Geophys. Res., 112, E06010.
[7] Sejourne, A., Costard, F., Gargani, J., Marmo, C., Forget, F., Madeleine, J-B., Soare, R.J., 2009. 40th Lunar and Planet. Sci. Conference, no 1733.
[8] Soare, R. J., G. R. Osinski, Roehm C. L., 2008. Earth Planet. Sci. Lett., 272(1– 2), 382– 393.

Thermal contraction polygons on a glacial moraine at Axel Heiberg Island, northern Canada

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Here we present, for the first time, observations of thermal-contraction polygons on a glacial moraine in the Canadian High Arctic. The polygons are in a proglacial landscape within a fjord at western Axel Heiberg Island (79°N, 90°W); they are set in glacial till and glacio-fluvial sediments (Fig. 1). The moraine is cut at several locations by sharply incised and linear channels with some sections of these channels filled with snow or ice. The polygons are ~5-20 m in diameter and fit roughly into three morphological classes: 1) flat-surfaced with shallow troughs, 2) flat-surfaced with deep troughs, and 3) high-centered with deep and wide troughs (Fig. 2 a-c). The close spatial association of these polygon types suggests that they could represent different stages of an evolutionary sequence. A number of workers have suggested that in "wet" Arctic environments dominated by thaw-freeze cycling and ice-rich permafrost, high-centred polygons are modified from low-centred (ice-wedge) polygons. The modification occurs as the result of ice-wedge thaw and the subsequent deflation or loss of elevation, relative to the polygon centre, in the ground (troughs), above the thawing wedge [1]. Accordingly, the type 2 and 3 polygons may have been degraded by thermal erosion. The effect of thaw on the landscape is evidenced by the presence of a debris flow located at the bottom of a valley wall to the northwest of the moraine (Fig 2d).

Thermal contraction polygons similar in morphology to the Axel Heiberg polygons also have been identified in the till that resides above a Miocene glacier in Beacon Valley, a Dry Antarctic Valley [2,3]. In the Dry Valleys mean temperatures are so low and atmospheric aridity is so high, that the thaw-freeze cycling of ice-rich permafrost is rare. Sublimation dominates the phase change of water between frozen ground and the atmosphere. For this reason, a number of workers have suggested that the Dry Valley polygons are interesting possible analogues of small-sized polygons on Mars.

Interestingly, the Axel Heiberg and the Dry Valley polygons reside in glacial till and are underlain by extant glaciers. As many Martian polygons seem to occur in regions where glaciation is thought to have been widespread, we suggest that the Axel Heiberg polygons could be as relevant to understanding landscape modification processes in these regions as are the Dry Valley polygons. Moreover, the fact that the Axel Heiberg polygons have formed in a glacial environment tolerant of thaw-freeze cycling perhaps should give pause to the assumption that sublimation is the sole possible driver of pro-glacial polygon evolution on Mars. [431]

References
[1] French, H.M. 2007. The periglacial environment, 3rd ed., England, John Wiley & Sons. [2] Marchant, D.R., Head, J.W., 2007. Antarctic Dry Valleys: Microclimate zonation, variable geomorphic processes, and implications for assessing climate change on Mars. Icarus 192, 187–222. [3] Levy, J.S., Head, J.W., Marchant, D.R., Dickson, J.L., and Morgan, G.A., 2009b. Geologically recent gully–polygon relationships on Mars: Insights from the Antarctic Dry Valleys on the roles of permafrost, microclimates, and water sources for surface flow.

Figure 1: a) map showing location of Axel Heiberg Island b) Oblique view of moraine material with thermal contraction polygons and cross-cutting channels

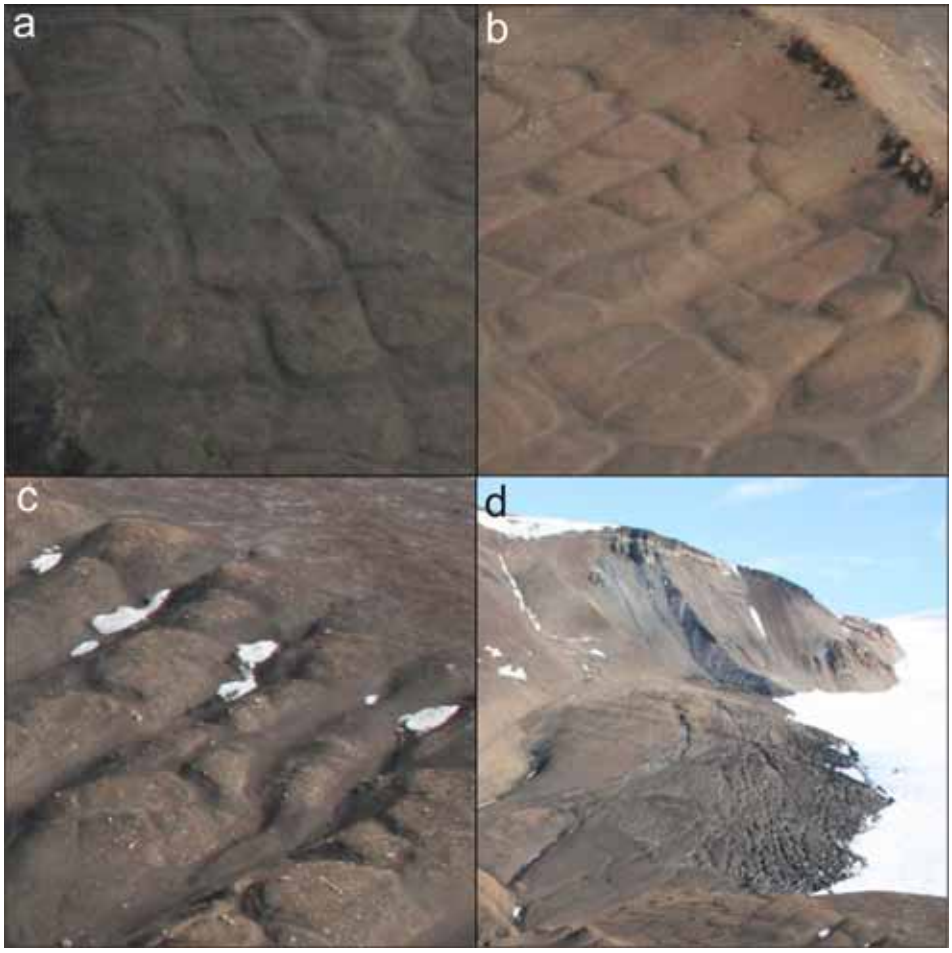

Figure 2: a) Flat-surfaced polygons with shallow troughs b) Flat surfaced polygons with deep troughs c) High-centered polygons with deep troughs d) Debris flow up-valley from moraine.

2c – Tourisme polaire et parcs naturels / Polar Tourism and Natural Parks

(Modérateur Véronique ANTOMARCHI, CERLOM, Inalco, Paris)

Une imagerie des paysages pour l'aménagement du parc Tursujuq au Nunavik

The interest of landscape imagery in the creation of the Nunavik Tursujuq Park (Canada)

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Left to its Arctic isolation for many years, Nunavik, i.e. Northern Quebec, has now become the object of unprecedented attention. This is due not only to its energetic potential but also to global warming consequences –causing the area to undergo major physical mutations– and to the rapidly-increasing pace of ethno-cultural transformations.

The Tursujuq National Park Project (aka Guillaume Delisle-Lac-à-L'Eau Claire) is at the crossroads of these preoccupations. Beyond the preliminary regulatory studies carried out since 2002 by both the Quebec government (Minister of Sustainable Development, Environment and Parks) and the Inuit co-governance institutions, the research focuses on the analysis of the Tursujuq park landscape perceptions as a mean to complement and adjust the park's conception. The analysis concentrates on the iconographic representations of landscape and their related practices.

The analysis will be carried out on a double basis: first the gathering of existing "landscape" images (archives, National Park websites) of the park's perimeter or vicinity produced by Westerners; and secondly the creation of an Inuit iconographic landscape corpus where oral tradition usually prevails.

The fact of choosing a common landscape representations vector for the study has made possible the creation of an Inuit Landcape Imagery via a Landcape Photography Contest and a Children's Landscape Drawing Workshop in the local village of Umiujaq. Analysing the choices of location, composition and angles of all pictures will reveal essential landscape selections in relation to travelled places and emblematic features that will be represented.

The results will underline the interest of using such expressions of landscape preferences as a helpful tool in the decision-making process of the perimeter, zoning and routing of the future Tursujuq National Park.

Le Nunavik, c'est-à-dire le Québec septentrional, est longtemps resté dans l'ombre. Il suscite à l'heure actuelle un regain d'intérêt sans précédent pour ses promesses énergétiques, ses mutations physiques liées au réchauffement climatique, et ses transformations ethno-culturelles accélérées.

Le projet de Parc National Tursujuq s'inscrit au cœur de ces préoccupations. Au-delà des études réglementaires préalables menées conjointement par le gouvernement Québécois (Ministère du développement Durable, de l'Ecologie et des Parcs) et les institutions de co-gouvernance Inuites (Parcs Nunavik, Kativik, Makivik), cette recherche porte sur comment l'analyse des perceptions des paysages du parc Tursujuq permettrait d'en compléter et d'en ajuster la conception. Cette analyse est focalisée sur les représentations iconographiques paysagères et les pratiques qui lui sont associées.

En effet, il s'agit ici de rassembler et d'analyser les images « paysage » existantes (archives, sites Web des Parcs Nationaux) produites à proximité ou dans le périmètre du parc par les occidentaux d'une part, et de créer un corpus iconographique paysage pour les Inuits d'autre part, de tradition orale.

La volonté de choisir un vecteur de représentations paysagères commun pour cette étude a en effet initié la création d'une imagerie paysagère inuite par le biais d'un concours photographique « paysage » et d'un atelier « paysage » de dessins d'enfants dans le village riverain d'Umiujaq. L'analyse des choix de localisation et de composition de l'ensemble des clichés montrera les sélections paysagères qui en découlent, sur le plan des lieux fréquentés et des motifs emblématiques représentés.

Les résultats attendus sont la traduction possible de ces expressions paysagères comme outil d'aide à la décision pour le périmètre, le zonage, les circuits du futur Parc National Tursujuq.

Collaborative Management Approaches to Transboundary Protected Areas in Northern Canada: Torngat Mountains National Park (Newfoundland and Labrador) and Quebec Parc national Kuururjuaq (Quebec)

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The creation of Torngat Mountains National Park (TMNP), a national park located in northern Labrador and the newly created Quebec Parc national Kuururjuaq (QPNK) in Northern Quebec have essentially established Canada's newest polar transboundary protected area (TPA) along the Labrador Peninsula. Established in 2005, TMNP extends from Saglek Fjord in the south, to the northern tip of Labrador; and from the watershed boundary in the west, to the waters of the Labrador Sea in the east (roughly 9,700 km2). QPNK, established in May 2009, encompasses 4273 km2 of the Québec-Labrador Peninsula while protecting the watershed of the Koroc River, from its source in the Torngat mountains to its estuary at Ungava Bay.
This paper addresses how a regional collaborative approach between a national protected area in Newfoundland and Labrador and a provincially protected area in Quebec have resulted in collaborative approaches to tourism and repatriation strategies (i.e., Inuktitut place names). Key events and contextual cues resulting in the success of this particular TBP include:
Timing - the creation of a new national park; the creation of a new provincial park within a couple of years of each other;
Context - both parks are within Inuit traditional territories;
Cooperative Management Approaches – the regional management board is composed of all Inuit, including Inuit from Nunavik and Nunatsiavut; and,
Ecosystem Protection - a willingness on the part of KRG and Parks Canada to take a larger worldview of protection and tourism development that better reflect Inuit perspectives.

These initiatives are facilitated through a seven member Co-operative Management Board for the Torngat Mountains National Park (CMB). The board, which is currently an all Inuit Board, consists of:
– Two members appointed by the Nunatsiavut Government
– Two members appointed by Makivik Corporation (representing Nunavik Inuit)
– Two members appointed by Parks Canada
– An independent chair jointly appointed by the three parties

Although the mandate of the CMB is to provide advice and guidance to Parks Canada on park management issues it has also become an important forum for facilitating a more regional based approach to management of adjacent protected areas.
According to 2002 Sanarrutik declaration and other guiding policies, the development and subsequent management of parks like QPNK in Nunavik is the responsibility of the Kativik Regional Government (KRG) in co-operation with elected municipal representatives and local residents from the Kangiqsualujjuaq Inuit community, and agency personnel from the "Ministère du Développement durable, de l'Environnement et des Parcs" du Québec (Quebec's provincial ministry of sustainable development, environment and parks).

This presentation highlights how effective governance and economic benefits for Inuit people arose in this context, and then discusses how this particular TPA can provide insights into other (existing or proposed) polar TPAs managed partially or wholly with Indigenous partners.

Between Tourism and Conservation: the National Park of Greenland

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NORS- Roskilde University, Dk

This paper seeks to analyze the National Park of Greenland as a resource for tourism activities, and its potential impact on the neighboring community of Ittoqqortoormiit.
Quite isolated, peripheral and small, the community Ittoqqortoormiit, on the East Coast of Greenland, has very limited possibilities of development, few economic opportunities and faces a number of social issues. Subsistence hunting and governmental subsidies play an important role in the local economy.

The community sees the development of tourism as a possibility to increase its revenues, but so far tourism activities have remained limited: some cruise ship do harbor in the summer but they do not usually require the involvement of the local population like activities such as dog sledding or local boating would.
The community sees the National Park as an opportunity to increase tourism activities. But the park regulations, where recreational activities are not contemplated, do not encourage such development. Presently the image of the park is that of the biggest park in the world, a huge protected area where almost nothing is allowed except for some mineral exploitation. Authorizing limited and regulated leisure activities in the Park would give a significant possibility for the socio- economic enhancement of the small community.
How can Ittoqqortoormiit, inspired by experiences such as that of Ilulissat on Greenland's Western coast, try to revitalize its economic and social situation? How can the National Park become a resource to enhance tourism activities and promote its adjacent zones, creating stable jobs, although seasonal, and small businesses related to tourism, thus increasing and diversifying local revenues?

2d –Sensibilité et adapation de la faune aux changements / Fauna: sensitivity and adaptation to changes

(Modérateur Vladimir RANDA, Paris, France)

Biochemical mechanisms of adaptation of *Mytilus edulis* from the White Sea to environmental factors

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Mytilus edulis - one of the most important species in mariculture in the White Sea and favorable object in research work because of fixed to one habitat life and biofiltration role. We studied the complex of biochemical parameters (45-60 parameters) of metabolism to obtain results testify high rate of protein and peptides, carbohydrates, lipids, nucleinec acid metabolisms and features in modification of fatty acids profiles of *Mytilus edulis* from the White Sea in relation to effect of some environmental factors such as salinity, anoxia, temperature, accumulation of heavy metals, organic pollutants (petroleum derivatives, drilling wastewater), allelopathy etc.
Obtained results have shown adaptive reconstruction and reorganization in metabolism of blue mussels, consequences of that are changes in amount of membrane and storage lipids, changes in levels of proteins, MUFA and PUFA ratio, changes in activity rate of lizosomal and cytoplasmal hydrolases, enzymes of carbohydrate metabolisms. Disposition of changes in relation to salinity decrease indicate defects in osmoregulation. Main results show adaptive capacity of cell metabolism (lipid, protein, carbohydrate and nucleonic acids metabolisms) in relation to salinity. Considerable water desalinization threatens to stability of metabolism pathways in cell and as sequence to well-being of aquatic organisms, more than high salinity. Salinity value as 5‰, probably, exceeds adaptation of M. edulis and pulls negative modification in tissues. Adaptive modification in lipid and carbohydrate metabolism obtained in tissues of littoral and sub-littoral blue mussels obtained in relation to short hypoxia. Littoral zone mussels well adapted to possible anaerobiosis compare to sub-littoral. Pre-adaptation of littoral M. edulis to settle in littoral zone (unstable temperature, salinity and oxygen regime) represent as advanced resistance to hypoxia and anaerobiosis associated response to environmental factors oscillation.

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Seasonal and age-specific lipid profile of *Calanus glacialis* from the White Sea

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The White Sea is considered as sub-Arctic sea with Arctic flora and fauna. *Calanus glacialis* – one of the most important Arctic species in the White Sea. In the era of rapid climate change, the life cycle and adaptations of *C. glacialis* from the White sea remains largely unstudied compare to copepod species from high Arctic region (such as, Svalbard), thereby the most scientists apply the schemes described high Arctic copepods life cycle and strategy to C. glacialis from the White sea.
While such type of studies might be useful not only for theoretical science as in practice because of high importance of copepods as food for commercial fish and larvae and other organisms (birds). *C. glacialis* accumulates energy in form of lipids where the dominant group is neutral lipids (triacylglicerols (TAG) and wax esters (WE)), these lipids are used during life activity for development, growth, reproduction process and diapause. Lipids and lipid metabolism play significant role for Arctic and Sub-Arctic organisms due to essential energetic consumption and cell structural modifications.
We investigated seasonal lipid and fatty acids (FA) spectrum of *C. glacialis* (CIV-CV) from the White Sea, Kandalaksha Bay. Seasonal dynamic of lipid amount was clearly detected in C. glacialis CIV-CV stage and females. Total lipid amount was the highest of *C. glacialis* in autumn (October, 58.0-86.0% DW) before diapause, in summer (July) – 29.0% DW while in August the level of total lipids increased to 44.0% DW. Thus, copepods rapidly accumulate lipids during short phytoplankton vegetation period in the White Sea. In the end of winter (March) total amount of lipids decreased to 28.0% DW because of slow utilization of lipids as component to get energy during diapause. Furthermore, we observed seasonal dynamic of lipid classes. TAG and WE were dominant lipid classes in *C. glacialis* in winter and autumn while phospholipids (PL) were major in summer.
These differences might be explained due to the role which each class of lipids take in different periods of *C. glacialis* life and adaptation to seasonal changes of environmental conditions in the White Sea. Monoenic fatty acids (MUFA) were dominant in fatty acids spectrum of *C. glacialis*. 16:1(n-7) MUFA was prevalent and derived from diatom diet. More than this, 20:1(n-9) and 22:1(n-11) FA levels were high, these FA are synthesized de novo only by phytophagous Calanus ssp. 14:0 and 16:0 FA were dominant among saturated fatty acids (SFA); 18:3(n-3) and 20:4(n-6) FA – among polyenic fatty acids (PUFA). Most PUFAs derived from phytoplankton diet and use to syntheses SFA and MUFA de novo by copepods. We suppose that *C. glacialis* population from the White Sea and in high Arctic apply and adapt the same strategy of lipid dynamic associated with features of phytoplankton seasonal dynamic.

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The ecotoxicological risk in sub-Antarctic regions: PCBs and organochlorine pesticides contamination of trout from Kerguelen Islands (48° 35'S-49° 54'S and 68° 43'E-70° 35'E)

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The polar and subpolar ecosystems receive persistent organic pollutants (POP) by atmospheric transfer. PCBs (polychlorinated biphenyls) and other ubiquitous organochlorines were detected from the late sixties. In subpolar areas, the snow acts as a dynamic reservoir. A multidisciplinary study funded by the French National Research Agency (ANR Risker program) in collaboration with the French Polar Institute (Immunotoxker program 409) began in 2009 to participate in the assessment of the global contamination, among others. In this objective, the Kerguelen Islands constitute a model of area not directly exposed to industrial, agricultural or urban pollution. This archipelago in the Southern Ocean possesses a complex hydrological network, with an ichthyofauna composed of salmonids introduced in the fifties. This first study relates to the contamination of trout *(Salmo trutta)* with organochlorine pollutants. These chemicals were widely used for over 50 years and are highly

persistent and responsible for (eco)toxicological concerns. Also, the bioaccumulation assessment is concomitant to the measurement of hepatic enzymatic biomarkers involved in biotransformation process and protection against oxidative stress.
The PCBs bioaccumulation shows a large heterogeneity, which results in average concentrations close to 250 ng per g dry weight, including optimal values in some individuals, reaching 5 µg.g-1 dw. Moreover, we describe seasonal variations, with contamination level increased during summer, and inter-site differences in connection with the habitat. So, trout from the lake ecosystems are more impacted than river fish. Furthermore, lower levels of organochlorine pesticides were detected. The liver biomarkers respond to the contamination by a large variability. However statistical correlations indicate a relationship between biomarkers and bioaccumulation, particularly between the liver catalase and the concentration of prioritary PCBs, suggesting an immunotoxic effect. The continuation of the program will be devoted to the search of integrative indicators, associated to the measurement of immunotoxic and reprotoxic alterations in Kerguelen's trout.

2e – Dynamique sédimentaire dans les environnements côtiers et lacustres / Coastal and lacustrine environments: sedimentary dynamics

(*Modérateur Armelle DECAULNE Géolab, CNRS université de Clermont-Ferrand, France)*

Glacial, fluvial, coastal and offshore cascading-system to assess deglaciation in a polar environment, a case study in the Kongsfjorden area, Svalbard

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This research was carried out in the Kongsfjorden area, northwest Spitsbergen, Svalbard (79°N 12°E). In western part of Spitsbergen, cold-based valley glaciers (vestre, midre and autre Lovenbreen) have retreated more than one kilometre from their Little Ice Age limits, and glacial meltwater has extensively reworked glacigenic sediments on exposed glacier forelands and deposit sedimentary lobes in subtidal areas. In such environments, a paraglacial sediment transport regime has become predominant, with runoff as the dominant process.
A combination of GIS, DEM, aerial photographic, satellites imagery and sonar data were employed to estimate glacial retreat, sandurs evolution, shoreline progradation and offshore deposits. Average shoreline progradation will be estimated from 1936 to 2009, a period of uninterrupted sediment provision from the glacial runoff cascading system. The retreat of valley glaciers began in the early 20th century, but initial retreat was slow: 1936 aerial photographs depict glacier margins still close to Little Ice Age terminal moraines. Glacier retreat subsequently accelerated, indicating that the glaciers were out of equilibrium with the changing climate. As the glaciers retreated, paraglacial reworking of glacigenic sediments by meltwater streams increased.
According to the general model of paraglacial landscape response, this situation represents the onset of sediment reworking, when sediment availability and thus sediment fluxes reach their maximum.

Contribution to North Atlantic climate history from Lake Igaliku, South Greenland

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Lacustrine deposits from Lake Igaliku, South Greenland (N61°00'22", W45°26'28") were studied to investigate subarctic Holocene climate history. Analyses of the well-dated sediment sequence used high-resolution grain size analysis, high-resolution geophysical (MSCL) and geochemical core scanning (XRF core scanner), X-ray radiography, DRX mineralogy, and organic geochemistry. The 4 meter long sequence recovered from Lake Igaliku comprises the entire lake history (last 10 000 years) following the last glaciation of the area, indicated by a succession from glacio-lacustrine to lacustrine sediment.
The combination of the different proxies provides detailed information about the evolution of the lake system and documents changes in lake temperature and wind activity in South Greenland from 9500 BP to the present. The intermediate geographical setting of Lake Igaliku, between the Greenland ice sheet and the Atlantic Ocean, also provides an important opportunity to explore the link between the lake sediment record and ice core records, marine records from the Greenland fjord and shelf, and deep Atlantic marine records in the wider context of oceanic and atmospheric circulation in the North Atlantic area during the Holocene.

Recent warming chronicled in the world's northernmost lake

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Polar amplification of recent climate warming has resulted in marked biological reorganizations in lakes. However, the degree to which atmospheric pollution, specifically the long distance deposition of N fertilizers, has amended the biology of arctic lakes is thought to be significant but not yet fully known.
Here, we present a record of sedimentary diatoms and isotopes from Kaffe Klubben Sø, N. Greenland, the northernmost lake in the world (83º 37' N, 30º 46' W). Diatoms are present in low concentrations and diversity between ~4000 years ago to ~2500 years ago, after which diatoms disappear entirely from the record. However, beginning ~1967 AD, diatoms reappear and reach unprecedented concentrations and diversity towards the present. The isotopic records, on the other hand, show no clear trends throughout the lake history, nor, most importantly, in the most recent decades.
These results demonstrate that a) current algal production is unprecedented in the context of the last 4 millennia and b) there is no evidence for recent atmospheric deposition of N. From these facts, we conclude that climate change alone is responsible for the changes to the biology of this northerly lake and that it should be considered as a benchmark for resolving the often confounding influences of climate change and atmospheric pollution on lacustrine ecology at northern latitudes.

28 janvier / January 28

Séance plénière 5 / Plenary 5

Peuples, politique, développement
Peoples, Politics and Development

(modérateur Michèle THERRIEN, CERLOM, INALCO, Paris, France)

KEY-NOTE

Indigenous and local perspectives on Community development in a globalized North

Dr Rasmus Ole RASMUSSEN
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Development in the North has undergone marked changes during the last decades. From a situation where pre-industrial characteristics were implying limited communication with the rest of the world and the main livelihoods obtained by harvesting the region's natural resources, communities today are experience the influence of large-scale renewable resource exploitation, and the increased role of services and a knowledge based economy. In this connection there are two issues that have become crucial for the future of the communities.
On one hand the fact that they are experiencing growing national and international interdependencies. They are opening up the global relations, but at the same time requiring the awareness of the need of the communities being not only bystanders, but actively involved in decisions that may become decisive for their future.
On the other hand the emergence of a situation where the changes are impacting the economic and social behaviour of individuals, families and communities. Customary hunting, fishing and herding activities have by and large been transformed through intensified harvesting for commercial purposes. Simultaneously new technologies, satellite dishes, snowmobiles and welfare societies have altered the focus towards availability of public and private services, and the role of education and knowledge in the future development.

Sustainability, Resilience, and the Redefinition of Natural Resources on the Bering Sea: Local and Regional Indigenous Politics in a Changing Global Economy

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In a number of recent cases, indigenous communities in the north are turning to alternative economic strategies to maintain village sustainability and to supplement economic opportunities for community members. In Alaska this has resulted in major mining developments and offshore drilling programs purported to give local villages access to jobs, income, infrastructure, and thus, providing long-term village sustainability.
Many see these developments as creating the external resources critical for sustaining a subsistence lifestyle. Some go so far as to argue that oil, natural gas, coal, gold and other products are “our other natural resources,” claiming that they are equal to salmon, cod, and other harvested commodities. The concerns raised by this approach are critical to understanding modern Aleut (Unangan) politics on the southern Bering Sea, and indeed among peoples throughout the western Arctic. The creation of a north Aleutian Basin oil and gas lease district in the heart of the world’s last great fishery, and the construction of the massive Pebble Mine at the headwaters of critical salmon spawning grounds, has created a modern dialogue on the relationship between traditional resources, local development, and western economic production. Some people, especially those in local and regional governments, argue that all natural resources should be developed if they bring income to peoples and communities, and contribute to village resilience. Others argue that these developments strike at the heart of the fisheries that form the foundation for Aleut identity and a single accident, much like the recent disaster off the Louisiana coast, would destroy an ancient Aleut lifestyle forever. Here we describe a series of events that shaped this discussion, and provide a number of key examples of the relationship between traditional landuse, economic development, and community survival. We show that even with a strong financial foundation, the problems facing northern communities are greater than any immediate return gained from these forms of economic development.

Les activités de subsistance des Inuit du Nunavut (Arctique oriental canadien) face aux changements climatiques : enjeux et attitudes
Nunavut Inuit subsistence activities facing with climate changes: issues and attitudes

Vladimir RANDA
LACITO-CNRS/INALCO, Paris, France

Ongoing alarming data in regard to the negative consequences of climate changes (climate greater instability, sea ice decrease) observed in Arctic regions sustain the debate about the necessity of a reinforced protection of animal populations. In this context, the question whether Inuit should continue or not hunting such exposed species as the polar bear may arise sooner or later, under the pressure from both public opinion and various international agencies.
In this respect, Inuit claim their expertise and legitimacy as longtime users of fauna resources. The position of many elders is still based on a specific conception of the relationship between humans and animals which makes them partners involved in a system of exchanges and reciprocity. On the other hand, the integration of Inuit societies into globalization processes is challenging that singular point of view, especially among young generations.

Les informations de plus en plus alarmantes sur les effets négatifs des changements climatiques (instabilité accrue du climat, diminution de la banquise…) observés dans les regions arctiques alimentent le débat sur la nécessité d'une protection renforcée des populations animales. Dans ce contexte, la question de la poursuite par les Inuit de la chasse à des espèces aussi exposées que l'ours polaire risque de se poser à plus ou moins brève échéance, sous la pression de l'opinion publique ainsi que des diverses instances internationales.
Face à de telles pressions, les Inuit font valoir leur expertise et leur légitimité d'utilisateurs plurimillénaires des ressources fauniques et s'appuient, pour certains d'entre eux, sur une conception singulière des relations entre les humains et les animaux qui fait d'eux des partenaires impliqués dans un système d'échanges et de réciprocité. Cela étant, l'intégration de leurs sociétés dans les processus de mondialisation n'est pas sans influer sur leur façon de concevoir cette relation, notamment chez les plus jeunes.

Climate change among nomadic and settled Tungus of Siberia: Comparison of economic, social and religious consequences and research perspectives

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Living in close relationship with the natural environment of the Siberian taiga and the tundra, the Evenks and the Evens (globally called Tungus) have, over a long period of time, been noticing numerous deteriorations and shifts in climate, in flora and in wild and domestic fauna. During the last five years, this process was noticeably accelerated. This paper is based on six years of field work (between 1994 and 2009) among nomadic Tungusic reindeer herders, hunters and fishers in Sakha Republic, in Amur region and in Kamchatka. This paper will comparatively explore how Climate change seems to modify the economical and religious relationship of humans with the natural environment.
Firstly, the paper will compare the attention paid by Tungusic peoples to the debate on Climate change and will compare their own observations of the shifts in their immediate natural environment. It will also study the nomads', villagers' and townspeople's interpretations of these observed mutations, as well as the economical and political adaptive reactions. In addition, the paper will propose an analysis of the religious shifts implied by the environmental changes in relation to their links to shamanism and collective representations.
Secondly, it will evaluate the importance of the role and place of the Climate change as a cause of shifts in comparison with the other contemporary factors causing changes among the Siberian peoples.
Finally, one of the questions raised by this paper concerns projects of cooperative anthropology that Tungusic peoples would like to build with social and environmental sciences. Despite this perspective being quite well developed in the Western Artic, it is not the case in Eastern Siberia.

Séance plénière 6 / Plenary 6

Coévolution sociétés et environnements
Society and Environments, coevolution

(modérateur Daniel JOLY, UMR ThéMA, CNRS, Besançon, France)

Wood at Work in Arctic Prehistory: Continuity and Change in Northwestern Alaska, AD 500-1500

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Along the treeless coast of northwestern Alaska, settlements of the Ipiutak, Birnirk and Thule cultures show ample evidence of the use of wood as a prime raw material in house construction and the making of implements. In addition, a few sites show at times, strong evidence of wood also used as fuel. Driftwood, the main source of building material (and potentially fuel) in these areas, comes mainly from interior Alaska. The main river drainages (especially the Yukon) carry fallen trees downriver and out to sea to end up irregularly stranded along riverbanks and coastlines. The abundance of driftwwood at these stranding points may be correlated with interior Alaska spring river break-up conditions. These are in turn related to winter precipitation, ice thickness and spring temperatures in the headwaters of the Yukon River and its tributaries.

Detailed analyses of wooden artifacts and remains from sites at Uivvaq, Deering, Cape Espenberg and Qitchauvik with special focus on wood selection and technology raise questions about the availability of local driftwood at different times. How did people make use of other wood resources (i.e., local shrubs or timber from inland areas) for specific tasks or to make due when faced with decreasing and unreliable wood arrival events? The analyses show that Ipiutak and Birnirk/Thule carvers had a deep knowledge of the intrinsic qualities of the raw material and followed similar patterns of wood selection. However, tools used, items made and the presence of other non timber products such as bark, are objects of changes, especially between the Ipiutak and Birnirk/Thule cultural traditions. The use of metal is attested in both traditions although ease of access within the region at a given place and time should still be assessed. At the same time, the use of beaver teeth as carving/whittling knives is also a shared technological trait, although its use is very distinctive. While in both traditions the beaver tooth was used as a gouge, only the Ipiutak carver used it to groove holes. To make a hole, the Thule carver distinctively drilled.

This paper presents key elements of these two wood working traditions in Northwestern Alaska. It then discusses the significance of the differences observed in light of the cultural and climatic history of the region. Finally, it proposes future directions for the development of wood studies in the Arctic.

History and impacts of South Greenland farming activities: a new insight from lake deposits

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Lake deposits are widely used to study climate changes and human impact on landscapes for the second half of the Holocene in mid-latitude areas; however, studies on the historical period in the sub-arctic area are scarce.

A suite of biological and physical proxies (pollen, non-pollen palynomorphs, diatoms, chironomids, magnetic susceptibility, grain size distribution, C and N isotopes) and radiocarbon dates from the sediments of Lake Igaliku (N61°00'22", W45°26'28") were used to examine the environmental legacy of Norse farming activities (985-1450 A.D. – Medieval Warm Period) in South Greenland. Unlike its continental counterparts, agricultural activities in Greenland are restricted to four centuries of Norse agriculture and the limited reestablishment of farms along the southern coast in the late 20th century. This enables an in-depth study of the comparative effects of medieval and modern agricultural activities upon an otherwise pristine sub-arctic landscape.

Results show that the first phase of clearance and grazing pressure could have occurred in the 9th-10th century A.D.. The presence of Norse settlers and livestock is clearly recorded from the 11-12th century A.D.. This colonization phase is followed by a period of lower grazing pressure and decreasing human impact by the end of the 13th century. The reforestation and the disappearance of anthropogenic indicators between the 15th century and the 18th century demonstrate the abandonment of the settlement, until the development of contemporaneous agriculture in the 20th century.

This study is the first multi-proxy, continuous analysis of lake sediments at a Norse site in Greenland. It suggests that, although farming activities of the Norse are well registered in the sedimentary sequence at Igaliku, the

magnitude of the impact of the 4 centuries of agriculture is considerably less than several decades of modern farming in the catchment, using industrial fertilizers.
In view of the current global warming and the likely increase in farming activities, this new insight on past and modern agricultural impacts recorded by lake sediments provides a first reference for sub-arctic Greenland.

Climate change in a changing world: the Sami of Northern Sweden

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Indigenous peoples are particularly vulnerable to climate change impacts due to their reliance on resource-based livelihoods. At the same time, they have a great adaptive capacity that is rooted in their knowledge of the environment and their practical know-how. It is the case for the Sami, who migrate in accordance with the needs of their reindeer herds and exploit different parts of their territory from season to season. In this presentation we will investigate how they may be able to adapt to change, taking into consideration the many other challenges they face. Today there are numerous competing forms of land use. While Norbotten is part of the homeland of the Sami, this has not sheltered it from industrial development. Its rich natural resources play a key role in the industrial development of Sweden as a whole. Since this industrialisation of the North reindeer herding suffers, particularly on its winter territories, from the competition with hydroelectric development, mining, roads, railways and urbanization.
In winter, reindeer herds feed almost exclusively on lichens that they attain by digging through a covering layer of snow. Under specific meterorological conditions, an ice layer may form over the snow, so thick that the animals cannot break through it to access their winter forage. Such conditions occur in spring when a warm spell is followed by a period of severe cold, or early in winter, when rain on the snow cover is transformed into ice when temperatures drop. If an impenetrable ice crust extends over the majority of pastures, animals die from hunger. Nielsen's dictionary defines the Sami term for this phenomenon, čuokke, as: « ice-crust on pasture ». When čuokke occurs today, two main strategies are applied. The first is to ressort to artificial feeding. It ensures that most of the herd will survive, but it also creates numerous new problems. The second strategy used in the event of a bad winter is to keep the reindeers on the summer mountain pastures.
The Swedish government called the winter of 2007 in Sapmi a « climate disaster ». 37 million kroner were given to the Sami Parliament to assist reindeer herders in the face of this crisis. Was this catastrophic year just an isolated event ? Snow and ice conditions that threaten caribou and reindeer herds in winter have been recorded across the Arctic since the early 19th century, and have probably always existed. What is essential, however, is the frequency of such events. Do the experiences of recent years suggest that we are dealing with isolated and unrelated events, or is it time to recognise a shift from the exceptional to an emerging trend? It seems that these dramatic events, that have occurred from time to time in the past are happening with increasing frequency. According to climate scenarios developed by the Swedish government (SOU 2007), there is a high risk that this phenomenon will increase in frequency and intensity during the coming decades.

Inuvialuit Food Security in Comparative Historical Context

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Objectives
To develop a model for adaptation to environmentally driven change in the regional food economy of the Inuvialuit Settlement Region by tracing the evolving relationship between food, the changing environment and traditional culture in the epistemic community of the Inuvialuit in the Western Canadian Arctic.
Methodology
This is a comparative historical analysis applied to current environmental and social trends in the study population in the Inuvialuit Settlement Region. The cases of the Japanese Ainu and other circumpolar Inuit populations have been compared with the data from our ongoing studies of diet and lifestyle among the Inuvialuit. These have been used to construct a narrative model for adaptation to the decline of traditional food security in Inuvialuit communities.
Results
Options, including diversification of the economic base and dietary adaptation, may be adopted to adjust to changes of food availability in the region. The experiences of the Ainu and Nunavik Inuit suggest that substitution of traditional foods with a combination of market foods and alternative traditional foods offers a means of retaining epistemological integrity within the cultural and social context, while incorporating aspects of the modern food economy.
Conclusions

Inuvialuit epistemology emphasizes a close relationship with the environment, which is mediated in part through consumption of traditional food, in traditional ways. "Tradition" is, however, a historically mutable concept, what Hacking refers to as a human kind. The Inuvialuit have changed their food traditions over time in response to environmental and social conditions, without altering either their own identity as Inuvialuit, or the distinctively Inuit nature of their food consumption practices. As the Arctic continues to experience environmental and social change the Inuit way of life will continue to evolve, as will the Inuvialuit diet. With attention to cultural and social traditions, coupled with the introduction of both market and local alternatives to traditional foods, the Inuvialuit can preserve their epistemological integrity as a cultural and social group, while maintaining both community and individual health.

Séance plénière 7 / Plenary 7
Devenirs
New ways

(modérateur Béatrice COLLIGNON, Université Paris 1 / UMR Géographie-cités, France)

Community ties and Evangelical Christianity in the Bering Strait Region

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In the Siberian part of the Arctic, an intensifying process of conversion to Evangelical Christianity has unfolded since the 1990s, « challenging the problematic notion that religious life after socialism can be characterized as a revival of repressed religious traditions » (Pelkmans 2009 : 2). It is difficult to quantify the success of the Evangelical churches, but, being in the field, one cannot fail to note their impact on people's lives – including even non-converts. On the basis of research done in Chukotka, this paper will analyse the consequences of the recent Protestant presence for social interactions at different levels (family, village, region, international connections), emphasizing both disruptive and cohesive effects.

De la coopérative au marché. Vers une transformation de l'économie des communautés inuit du Canada
From Cooperatives to the Market: Towards a Transformation of the Economy of Inuit Communities in Canada

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The cooperative system has, until now, played a fundamental role in the social and economic development of Aboriginal people, especially within Inuit communities. While we like to believe that cooperatives were the response of Aboriginals towards the rise of modernity, they were actually introduced in the Canadian Arctic by officers of the Department of Indian and Northern Affairs Canada, who saw in the cooperatives a culturally adapted way to introduce Aboriginals to the market's economy. However, they did not have the desired effect because they did not play the intermediary role between traditional and modern development models. Indeed, Inuit peoples used cooperatives as a tool for economico-political emancipation and as a means of transmitting reciprocal values, inherent to their way of life.

The success of Inuit cooperatives lies on various echelons. First, there is a sociological element: individualism and the quest for gains were, until recently, notions which were not embraced, although not entirely dismissed, and so, the labour or sense of entrepreneurship were not considered as means to reach personal ends but rather as instruments inclined to improve the collective fate. The other reason resides in the fact that there was until recently few economic opportunities and a lack of capital that could have made possible the development of private enterprises.

However, in the last decade, cooperative organizations have been losing ground because municipalities and public institutions, the Nunavuut Government, Kativik – amongst others – got involved in the creation of jobs and in the development of community services (childcare centres, leisure activities, technical and health services, etc.) that, in the past, were acquired through informal networks. But we have also been witnesses, in the last fifteen years, to an important reversal of social dynamics. Indeed, if the will of entrepreneurship and leadership had been, until now, leading Aboriginals of the North to get essentially involved in cooperatives – as it has throughout aboriginal communities in Canada - today, this spirit is getting them to start their own commercial enterprises. In this domain, northern communities are quite surprising. Indeed, Aboriginals today create more industries proportionally than the rest of the Canadian population, and this is even more apparent in the Province

of Quebec, where Aboriginal groups signatory of political treaties, such as the James Bay and Northern Quebec Agreement and others, have access to investment funds and are now at the head of prosperous businesses in various domains, notably in the sectors of air transport and tourism.
Numerous reasons explain this infatuation for private entrepreneurship (to the detriment of collective entrepreneurship) – a change in values for instance – but also the Government's impulsion to stimulate the creation of individual businesses within Aboriginal communities with the help of loans (such as the Aboriginal Business Canada programs and the Aboriginal Initiatives Fund of the Quebec Government). The goal of this communication will be to extend the study of processes that produce this transformation in the spirit of entrepreneurship and, more specifically, to understand what the social repercussions might be.

Le système coopératif a jusqu'à présent joué un rôle central dans le développement social et économique des communautés autochtones, particulièrement chez les Inuit. Bien que l'on aime à croire que les coopératives furent une réponse des Autochtones relativement à la montée de la modernité, elles furent introduites dans l'Arctique canadien par les agents du ministère des Affaires indiennes qui voyaient en elles un moyen naturel d'initier les Autochtones à l'économie de marché. Cela dit, elles n'eurent pas l'effet escompté, car elles ne jouèrent pas ce rôle d'intermédiaire entre le modèle de développement traditionnel et moderne. En effet, les Inuit utilisèrent les coopératives comme un instrument d'émancipation économico-politique et un outil de transmission des valeurs réciprocitaires propres à leur mode de vie.
Le succès des coopératives inuit repose sur plusieurs pivots. D'abord, il y a un élément sociologique : l'individualisme et la quête du profit étaient, jusqu'à récemment, des notions qui, sans être inconnues, n'étaient pas encouragées. Ainsi, le travail ou l'esprit d'entreprise n'étaient pas vus comme des moyens d'atteindre des fins personnelles, mais plutôt des instruments susceptibles d'améliorer le sort collectif. L'autre raison réside dans le fait que l'économie de marché était et reste peu développée dans les communautés arctiques.
Toutefois, depuis une dizaine d'années les entreprises coopératives perdent du terrain, à la fois parce que les municipalités ou les institutions publiques inuit, gouvernement du Nunavut, Administration régionale Kativik, entre autres, se sont impliquées dans la création d'emplois et dans la mise en place de services aux communautés (garderie, activités de loisir, services techniques et de santé, etc.) autrefois obtenus à travers des canaux informels. Mais surtout, on assiste, depuis une quinzaine d'années, à un renversement important dans la dynamique sociale. En effet, si jusqu'à présent l'esprit d'entreprise et de leadership avait conduit les Autochtones de l'Arctique, comme ceux du reste du Canada, à s'impliquer essentiellement dans les coopératives, aujourd'hui ce même esprit d'entreprise les pousse à se lancer en affaires en créant des entreprises commerciales. Or, dans ce domaine, ils s'avèrent particulièrement surprenants. En effet, aujourd'hui les Autochtones créent proportionnellement plus d'entreprises que le reste de la population canadienne, et ceci est encore plus flagrant au Québec où les groupes Autochtones signataires des ententes politiques, notamment la Convention de la Baie James et du Nord québécois ont accès à des fonds d'investissement et dirigent maintenant des entreprises prospères dans divers domaines tels le transport aérien, et le tourisme.
Plusieurs raisons expliquent cet engouement pour l'entrepreneuriat privé (au détriment de l'entrepreneuriat collectif), notamment un changement dans les valeurs, mais aussi l'impulsion de l'État qui stimulent à l'aide de prêts (notamment le programme Entreprise Autochtone Canada et le Fond Initiative Autochtone du gouvernement du Québec) la création d'entreprises individuelles en milieux autochtones. L'objet de cette communication sera d'approfondir l'étude des processus produisant ce basculement dans le mode d'organisation du travail et surtout de comprendre quelles pourraient en être les répercussions sociales pour les communautés inuit.

Development of Human Activities in Antarctica Peninsula: A Focus on the Vernadsky area

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This piece of research describes how environmental and management changes affect to the spatial extent and diversification of human activities in certain area in Antarctica using science and mapping databases. The activities in the area under the influence of Ukrainian Vernadsky station (former British Faraday station) are shown as an example.
The first explorers in the research area appeared here as far back as the end of the 19th century. There are features of the relics of the British, Argentine and French Antarctic Expeditions in the area. The scientific station on Argentine Islands is the oldest operational station in the Antarctic Peninsula and possesses inter alia valuable continuous meteorological data, which have been collected since 1947 till present. Geographic location, configuration and accessibility of nearby islands, as well as availability of emergency stores and huts within the radius of 25-30 km from the station allowed to commence extensive research activities at representative sites which play a key role in regional ecosystem processes in the Antarctic Peninsula.
Moreover, Faraday/Vernadsky station may be considered representative in touristic term because it has been regularly visited by seaborne tourists since 1968. The visitor sites in the station area became tourist destinations as a result of varies factors, including its natural and historic attractions as well as annual sea ice conditions with a tendency to improve accessibility of the Argentine Islands due to regional climate warming. Based on the Faraday/Vernadsky station meteorological reports, annual mean temperature increased by 2,5°C between 1947 and 2000. As a result, the southward deviation of fast ice edges, reducing of the sea ice cover duration and later freezing of the ice extend the season for cruise-ship tourism in the area.
The increase in the number of visitors is also due to the fact that the station has changed its governance since 1996. In the period when Faraday station was operated by the British Antarctic Survey, the tour ship visits were strictly limited. However, visits to the station have not been restricted since the station was transferred to Ukraine in 1996. As a result, in the period 1995-2008 both visits of cruise ships and yachts have increased considerably. Hence, this area is multiple-used includes the scientific activity and subsidiary logistic support that have widened and the continuing growth of tourist visits that is also registered particularly in the last two decades. This necessitates of the elaboration of a broad-scale management system for the whole area which is under the influence of Vernadsky station.

Projet NUNAGA : "Discours inuit sur les liens entre territoire, art graphique et gouvernance"
NUNAGA Project: "Inuit discourses on connections between landscape, graphic art and governance"

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The NUNAGA project - "Identity reaffirmation in Nunavut (Canadian Arctic): Inuit discourses on connections between landscape, graphic art and governance" - is a multidisciplinary study of the notions of arts and politics in the Eastern Canadian Arctic, with a focus on the political dimension of Nunavummiut Inuit (Nunavut) contemporary graphic creation. This research analyses discourses collected *in situ* during fieldwork conducted in Iqaluit, Kinngait (Cape Dorset) and Pangnituuq (Pangnirtung) with people involved in the artistic and local political spheres which contribute in various ways to the process of identity reaffirmation for the Inuit of Nunavut (Nunavummiut).
This paper will present some results of the research, analyzing interview excerpts and iconographic data in connection with the political domain. We will discuss the recurrence of the theme of the territory in artistic representations in relation with the political sphere and the context of the land claims during which the theme of the political dimension of contemporary artistic creation arose. We will present a selection of drawings created in this context by Inuit and non-Inuit artists, showing the socio-cultural, economic and political concerns and relaying politically committed messages. We will also discuss political discourses that revolve around the issue of the status of Inuit art and Inuit artists both in Nunavut and at the international level.
This project was granted financial support by the Institut Paul Émile Victor (IPEV), the Inalco Institute (school of doctoral studies and CERLOM research center), the GDR "Mutations Polaires" and Laval University.

Le projet NUNAGA, « Réassurance identitaire au Nunavut (Arctique canadien) : discours inuit sur les liens entre territoire, art graphique et gouvernance », engage une réflexion pluridisciplinaire sur la notion d'art et de politique dans l'Arctique oriental canadien, et plus spécifiquement sur la dimension politique de la création graphique contemporaine chez les Inuit Nunavummiut (Nunavut). La recherche consiste en l'examen des

discours collectés in situ au cours de missions menées à Iqaluit, Kinngait (Cape Dorset) et Pangnituuq (Pangnirtung) auprès des acteurs des sphères artistiques et politiques locales, lesquelles participent, à divers degrés, au processus de réassurance identitaire des Inuit du Nunavut.
Cette communication présentera un aperçu des résultats de ce projet, à partir de l'analyse d'extraits d'entretiens et de données iconographiques liées au domaine politique. On traitera en particulier de la récurrence du thème du territoire dans les représentations artistiques, en relation avec la sphère politique et le contexte des revendications territoriales au cours duquel apparaît le thème de la dimension politique de la création artistique contemporaine. Nous présenterons une sélection de dessins réalisés dans ce contexte par des artistes inuit et non inuit, qui témoignent des préoccupations socioculturelles, économiques et politiques et véhiculent des messages politiquement engagés. On traitera parallèlement des discours politiques qui gravitent autour de la question du statut de l'art inuit et de l'artiste, au Nunavut mais aussi sur la scène internationale.
Ce projet a reçu le soutien financier de l'Institut Paul Émile Victor (IPEV), de l'Inalco (École doctorale et CERLOM) du GDR Mutations Polaires et de l'université Laval.

Art contemporain, recherches polaires : experiences
Contemporary Art, Polar Research: Experiences

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In 2004 we took part in an oceanographic campaign at the Weddell Sea and in the Antarctic. From that time, we, artists and research professors at the university, work on the introduction of the environmental question into the "visual arts" field from both theoretical and practical points of view. This experiment seeks to weave links between art and science.
This leaded us in 2006 to take part in the program of the IPY - EOC Workshop in Brussels and then, to contribute to the fourth IPY as art directors of the program "Arts at the Poles" founded by the French Polar Institute Paul Emile Victor (IPEV). This program of residence has received numerous candidatures (249) and hosted six artists to the North Pole (Ny-Alesund Base, Svalbard) and to South Pole (Dumont d'Urville Base).
In parallel, we introduced an axis of reflex ion -into the university context on the following topics : Art and Environment, Polar zones and Artistic Research. As a result, a publication was born under the name of extrapolations (6 numbers already published) edited by Rennes 2 University, a website and various workshops, and allowed the participation of students to the international polar Forum (Berlin, 2008; Paris, 2009).
As artists, we took part in several exhibitions and published in 2007 Areas of Research, Antarctic Perspective 2003 – 2041 (2007), Post Post Antarctica. Performatives Situations (june 2010.)
We propose to present various experimental actions ¨experiments¨ and projects by artists, as well as their consciousness about environmental issues, and their reflexion on the possibility of building perennial and interdisciplinary relations.
It will be a question of building and establishing a partners' network which would enable us to exchange and consolidate these works, to register them in a sustainable developpement beyond the International Polar Year.

En 2004, nous participons à une campagne océanographique en mer de Weddell et en Antarctique. Artistes, enseignants chercheurs à l'université, nous travaillons depuis à l'introduction de la question environnementale dans le champ des arts plastiques tant du point de vue théorique que pratique. Cette expérience avait pour objectif de tisser des liens entre art et science.
Ceci nous amène à participer en 2006 au workshop IPY – EOC (Education – Outreach – Communication) à Bruxelles puis à contribuer à la IVe API en pilotant le programme "Arts aux pôles" mis en œuvre par l'Institut polaire français Paul Emile Victor (IPEV). Ce programme de résidence au pôle Nord (base Ny-Alesund) et pôle Sud (Dumont d'Urville) a reçu de très nombreuses candidatures (249) et a accueilli six artistes.
Parallèlement, dans le contexte universitaire, nous introduisons un axe de reflexion sur les problématiques : art et environnement, zones polaires et recherche artistique. Ceci a donné lieu à une publication extrapolations (6 numéros publiés), université Rennes 2, un site internet et diverses journées d'études, et a permis la participation d'étudiants au Forum polaire international (Office franco-allemand-canadien, Berlin, 2008 ; Paris, 2009).
En tant qu'artistes, nous avons participé à plusieurs expositions et publié en 2007 Zones de recherches. Perspective antarctique 2003_2041, et en 2010 Post Post Antarctica. Situations performatives. Au cours de notre intervention nous présenterons diverses expériences et projets artistiques, leur prise en compte de la question environnementale, et interrogerons leur capacité à construire des relations pérennes et transdisciplinaires.
Il s'agira d'envisager la création d'un réseau de partenaires qui nous permettrait d'échanger et consolider ces travaux, de les inscrire de manière durable au-delà de l'année polaire internationale, et d'être parties prenantes dans les changements observés.

Séance plénière 8 / *Plenary 8*
Posters / *Posters session*

Transsibérien et lac Baïkal : quel passé et quel avenir pour ce couple mythique ?
Transiberian & lake Baikal: what lies in the future for this mythical couple?

Morgane MAZERON
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Crossing nearly a quarter of the world (seven time zones) at an average speed of sixty kilometers an hour, the Trans-Siberian Railway pushes the boundaries of space and time. In Siberia, the track follows the banks of Lake Baikal, the largest freshwater reserve in the world, for some 200 kilometers. Lake Baikal, because of its width, depth and the mountains that surround it, was the main obstacle to the construction of the Trans-Siberian Railway (the planners had to double their ingenuity to cross it, either placing tracks on the frozen lake or using icebreakers).
Lake Baikal and the railway have become so intertwined over the last century that their fates now seem inseparable. Moreover, in the second half of the twentieth century, industrial development in the region has largely been due to the presence of water, the abundance of wood and the railway. Today, factories are facing environmental issues. Thus, Lake Baikal, a world heritage site, is divided between a "utilitarian" and a "conservationist" conception. Can tourism unite these two apparently incompatible conceptions? Despite the presence of the Trans-Siberian Railway and of the lake, the south Baikal area remains more industrial than touristic. However, tourism is growing at the edge of Lake Baikal, notably in Lystvianka, Olkhon and along the old Trans-Siberian railway. Boosted by increased leisure time and the appeal of myth surrounding the Trans-Siberian Railway and the Lake Baikal, will tourism replace industrial activity? What would be the economic, social and environmental consequences of such a mutation? Will seasonality have a role to play?

En parcourant près d'un quart du globe (sept fuseaux horaires) à la vitesse moyenne de soixante kilomètres à l'heure, le Transsibérien pousse la dyade espace-temps à l'extrême et brouille les repères. En Sibérie, la voie ferrée suit les contours du lac Baïkal, la plus grande réserve d'eau douce de la planète, sur quelque 200 kilomètres. Si le Baïkal, à cause de sa largeur, de sa profondeur et des montagnes qui l'entourent, a constitué le principal obstacle à la construction du Transsibérien (les architectes du Transsibérien ont dû redoubler d'ingéniosité pour parvenir à le traverser, en posant les rails sur le lac gelé, en utilisant des brise-glace…), le couple Baïkal-train, uni depuis plus d'un siècle, semble aujourd'hui inséparable, tant le devenir de l'un est lié au devenir de l'autre. D'ailleurs, dans la seconde partie du XXe siècle, le développement industriel de la région s'est fait grâce à la présence d'eau, à la profusion de bois et au passage de la voie ferrée. Aujourd'hui, les usines sont confrontées aux questions environnementales. Pourtant, le lac Baïkal, classé au Patrimoine mondial de l'humanité, reste partagé entre une conception « utilitariste » et une conception « conservationniste » de la nature.
Le tourisme peut-il réunir ces deux conceptions a priori incompatibles ?
Malgré la présence cumulée du Transsibérien et du lac, le sud baïkalien demeure plus industriel que touristique. Cependant, l'activité touristique ne cesse de croître au bord du lac Baïkal, notamment à Listvianka, Olkhon, le long de l'ancienne voie transsibérienne… Favorisé par l'augmentation du temps libre, l'attrait pour les mythes du Transsibérien et du Baïkal, le tourisme viendra-t-il remplacer l'activité industrielle ? Quelles seraient alors les conséquences – positives et négatives – économiques, sociales et environnementales d'une telle mutation ? En quoi la saisonnalité (du tourisme et de la Sibérie) a-t-elle un rôle à jouer ?

Environment, economy, and community of Upper Angara and Middle Enisey regions: impact of climate change and of water reservoir cascades on Angara and Enisey rivers

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In July of 2003 when the weather in several western European countries was abnormally hot and dry, Bratsk water reservoir on Angara river, one of the biggest in Russia, grew shallow because of the increase of evaporation. The navigation stopped. Large wood enterprises of Lesosibirsk, one of the most significant lumber industry centers on Krasnoyarsk Territory, were under the danger of pausing production because they could loose the connection with logging sites of lower Angara region in August already (due to a navigation suspension on Angara river). It didn't happen after all: the water from Baikal and Angara tributaries saved the situation.
In January of 2007 the length of winter ice opening on Enisey river exceeded 400 km even though usually it extended for maximum of 280 km downstream from the lock of Krasnoyarsk hydropower plant. And that happened on one of the biggest rivers of North Eurasia!
It is representative that the global climate warming in the southern and western parts of Central Siberian Plateau associates, as everywhere else, with the increase of climate instability, contrast of weather conditions, and rise in number of extreme events. In relation to the examined region all of the abovementioned events can be detected by the means of monthly and annual average temperature and precipitation data only to some extent. However all of it is perfectly detected by the environmental responses observed by specialists. Long-term mean temperatures increased 1-2oC and more starting from 1980-s in comparison to the previous cooling period of 1950-1979. Winters became warmer, springs and autumns became longer. Summer periods of some years became shorter. Changes is season duration as well as in hydrothermal and permafrost conditions had, among others, negative impacts on a natural system functioning in Middle Enisey region.
Central Siberia is the middle part of Russia; more exactly it is a vast core within the ecological carcass of the country. It plays an important role in maintaining the global biosphere. This region with an area of 1255000 sq. km is a large refugium of wildlife. Its territory is only slightly transformed by human activities, and it is much less developed and populated than the neighboring regions. Last wave of climate warming has been observed in Central Siberia since the 1980-s. This segment of the biosphere has responded to the global warming of the climate by destabilisation of the quasi-stationary state that was typical for more severe climatic conditions during 1950-70-s.

Aboriginal Tourism in Northern Canada: The Cree Village Ecolodge, A Case Study

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Despite marketing campaigns, numerous reports and research, Aboriginal tourism initiatives in polar regions of Canada and elsewhere remain somewhat of an enigma. Given the growth in Aboriginal tourism and its potential impacts in Northern Canada and other tourism destinations, it is important that we assess the current state of knowledge regarding these activities and enterprises. In this presentation, we explore key components of Aboriginal tourism, provide a definition of Aboriginal tourism, examine the nature of Aboriginal tourism enterprises located in Canada and other polar areas, and provide a case study of one Aboriginal tourism establishment, the Cree Village Ecolodge (CVE) in Northern Ontario.
Established in 2000, the CVE is one of the most environmentally advanced ecotourism facility in Canada. The goal of the management board when developing the CVE was to create an not-for-profit tourism establishment which would embody and reflect the cultural values of the MoCreebec Council of the Cree Nation , create capacity, generate equity, and institute empowerment. Thus, energy-efficiency, durability, low environmental impacts, environmentally friendly designs, and social justice were guiding elements for the selection of materials chosen for the construction and furnishings of the lodge.
The results are a 21st century facility featuring twenty guest rooms and a 66-seat restaurant modeled on a traditional Cree dwelling called Shabatwon meaning "long teepee with doors at each end." The CVE has received a number of awards and is recognized as one of Canada's Significant 28 Aboriginal Tourism Destination by Aboriginal Tourism Canada. This particular case study provides an illustration of how traditional philosophies and modern technologies have been incorporated into Aboriginal tourism initiatives and how such a facility can support community development while providing the impetus for local and regional tourism strategies in Northern Canada.

Protecting Traditional Aboriginal Rights and The Environment: The Proposed Creation of Thaidene Nene in the NWT of Canada

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Lutsel K'e, Northwest Territories (NWT), is a rural Aboriginal (Dene) community (pop. 400) that could soon become the gateway community to Canada's newest federally protected area. Called Thaidene Nene, or "Land of the Ancestors" in the native Chipewyan language, this protected area will conserve important ecological areas in the northern boreal forest and the barren-ground tundra located in the NWT. More importantly, this conservation strategy will protect the homeland of the indigenous Dene people who depend upon the integrity of the land and water for their subsistence and cultural survival. The establishment of this protected area will also for all intent and purposes create a massive conservation corridor extending from Great Slave Lake eastward to the Thelon Wildlife Sanctuary in the west.
The management of the proposed protected area will ensure that traditional Aboriginal rights are respected, regional-based approaches to protected areas management is promoted, and regional economic strategies are implemented. A joint-management board is expected, as are the development of a: (i) aboriginal stewardship and patrol program called Ni hat'ni Dene ("Dene Watching the Land"), (ii) a tourism trust fund for local initiatives, and, (iii) the establishment of a tourism cooperative. This presentation outlines a four-year collaborative research project undertaken with the Lutsel K'e Dene First Nation and the School of Outdoor Recreation, Parks and Tourism at Lakehead University, while also providing a description of on-going proactive strategies which have been implemented by the First Nation and its partners as a result of the proposed protected area. Special emphasis will also be placed on discussing the issues of effective Indigenous involvement in governance and ensuring local economic benefit from employment opportunities and new tourism strategies.

Empowerment evaluation amongst social workers in Greenland

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The focus of a newly started ph.d.-project is on the resources, the professional knowledge and the personal knowledge amongst social workers whom are working with marginalized children and their families in the welfare department of Greenland's biggest municipality Nuuk.
The research has two apparent purposes. One is to create an empirical foundation for the obtaining of knowledge of the ongoing social work with marginalized families. This is a very new topic within the social studies in Greenland and the polar areas as well. The other purpose is to develop a model for evaluating the social work with these families. Greenland has experienced many social problems to name a few alcoholism, unemployment and domestic abuse which in some ways can be explained by a very fast forwarded modernization process. Earlier scientific reports have shown the consequences of these problems on an individual level but none of the current research deals with issues of alcoholism, unemployment and domestic abuse from the perspective of the social workers. And this is essential because this particular profession has the mandate to get directly involved with the improvement of the welfare for marginalized families.
Evaluation in the project is empowerment based. The focus is therefore on "development and learning" instead of "control and impact measuring". The agenda of empowerment is to rely on the social workers as the primary source of information. The analytic perspective is the experienced created in everyday work life. The experts of the project are the social workers. This approach is parallel to when Paulo Freire worked with the pedagogy of the oppressed during the 1970´s in Brazil. The liberating or emmancipatorical (with connotations to critical theory) in this approach is the perspective on social work as a disempowert area. The argument is that we know very little, from a scientific and professional perspective, about the conditions under which social work is conducted in Greenland today.
The ambition is to develop and empirical based evaluation model which is founded upon studies situated in Greenland. This will bring the themes of the evaluation closer to that reality which the Greenlandic social workers experience.

The project is funded by the ministry of social affairs and Ilisimatusarfik – the University of Greenland.

Climate change, wave action and pingo degradation in the Tuktoyaktuk Coastlands, Canada

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• Introduction
Closed-system (hydrostatic) pingos are perennially ice-cored mounds found in regions of ice-rich permafrost such as the Tuktoyaktuk Coastlands (TC), in northern Canada. Most closed-system pingos grow on the floor of thermokarst lakes whose water has been/is being lost by evaporation or drainage, where underlying and previously saturated sediments undergo permafrost aggradation, freezing and uplift by pore-water pressure. Current climate projections suggest that the Tuktoyaktuk Coastlands lie in a poleward belt that will be subject to extremely high rises of mean temperature. The impact of elevated temperature on the thermal stability of the pingos in the TC could be substantial.
• Climate-induced pingo degradation
The periglacial literature is replete with discussions about the relationship between increasingly thin pingo overburdens, a natural product of pingo growth, and the susceptibility of the underlying cores to thaw, i.e. [1][2][3]. Relatively little attention has been paid to the potential affect of heightened wave-action (due to climate change and the related increase of annual open-water days) on the recession, decay and eventual disappearance of coastal or lake-marginal pingos in the TC.
The recession of Peninsula Point pingo (57°19' W, 77°05' N) (Fig. 1a), ~6 km southwest of Tuktoyaktuk and on the Beaufort sea coast, has been well documented. By 1954, one-third of the seaward diameter of the pingo had eroded and the sea-bluff had not yet reached the pingo summit [1]. Today, roughly two-thirds of the seaward diameter has been lost. Interestingly, the structural or mechanical integrity of the pingo seems to have been maintained; there are no apparent signs of imminent collapse. Here we present two other pingos (Fig. 1b), hitherto unreported and on the margin of Eskimo Lakes (69°01 W, 82° 05'N), that show recession equal in magnitude to the Peninsula Point pingo. They too exhibit no apparent loss of structural integrity or signs of imminent collapse.

Unlike the collapse of a pingo that follows from the exposure and thaw of its ice core, we suggest that the retreat of a seaside or lakeside pingo by wave action is retrogressive and slump-like but self-healing. As wave action undercuts pingo bases and induces slumping, slump materials blanket the pingo facade and protect the underlying ice-core from ongoing exposure. For example, despite Peninsula Point pingo having receded substantially between 1954 and 1996, pingo ice was observed only rarely. This contrasts with the numerous pingos in the region that collapsed and whose ice cores were observed hitherto, if only briefly.
Currently, we are developing a geomorphological model that explains the self-healing character of wave-induced pingo slumping. At the same time, we are building a thermo-physical model of pingo/wave-action interaction in order to evaluate the potential affect of increased (annual) open-water days on the recession of seaside and lakeside pingos.

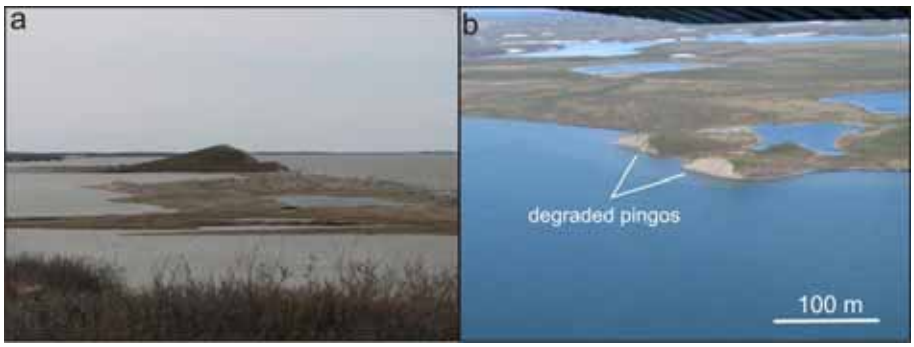

Figure 1. Wave-cut pingos - a: Peninsula Point Pingo ; b:. Eskimo Lakes pingos

• References

[1] Mackay, J.R. 1987. Canadian journal of earth sciences 25, 495-511. [2] Mackay, J.R. 1998. Géographie physique et quaternaire 52, 3, 1-53. [3] French, H.M. 2007. The periglacial environment, 3rd ed., England, John Wiley & Sons.

Geomorphic study of debris flows in context of global warming

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Debris flow is defined as the downslope flow of debris mixed with a minor, yet significant amount of water. Because of the present global warming on Earth, changes of temperatures and precipation rates in alpine environments may have a significant impact on debris flows occurrences.
Based on field works in French Alps (Modane, massif des Ecrins) and in the Apennines, the aim of this study is to understand the different processes of flow initiation (meltwater in permafrost, snowmelt, torrential rain) in periglacial alpine area in context of global warming, as well as the debris flow morphology (length and width of the channel, long profil…). Many data are available for this study : weather forecasts, debris flows occurence maps, aerial and satellite photos allow us to follow the debris flows appearance over time and seasons.
In addition to the field work, measurements on debris flows are made with a GIS software, thus we can quantify many parameters (length and width of the channel, sinuosity, area of the fan deposit and alcove…) and better understand the rheology of theses flows.
Later, results of this study could be use as terrestrial analogue to study the martian debris flows and be seen as the most youthful features on Mars. Debris flows could be an evidence for significant amounts of liquid water in the recent past. The comparison between these two morphology (terrestrial and martian) will help us to answer these two questions : did liquid water recently flow on the surface of Mars and can debris flows help us to investigate climatic changes on Earth and on Mars ?

Future melting of this snow pack accumulation at the bottom of a cliff could initiate a possible flow(Massif des Ecrins, Hautes Alpes)

Debris flows in the French Alps (Vallée de la Clarée, Hautes Alpes)

Understanding the thawing of permafrost : physical modeling approach

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In the Northern Hemisphere permafrost occupies approximately 25% (23 million km²) of the land area. In many regions of Alaska, Canada and Siberia, many features develop in response to freeze/thaw cycles (i.e. sorted and unsorted polygons, ice-wedges). A periglacial environment is cold but non-glacial. Frost-induced conditions, geomorphical processes and landforms typify a periglacial environments. Formation of some periglacial features are also accelerated by ice-rich permafrost thawing (i.e. thermokarst lakes and retrogressive thaw slumps) under the influence of global warming.

The objective of this work is to (i) identify the effect of global warming on the evolution of permafrost thermal state, and (ii) examine the relationship between the thermal state, the thaw-settlement and the active layer thickness. This could have implications for thermokarst lakes formation.

This is done by means of a physical model using blocks made of experimental permafrost. Several sets of experiments have been conducted in a cold room to recreate a periglacial environment. The experimental devices consist of small size blocks (57 x 37 cm wide and 20 cm high) and can test the influence of many parameters, such as:

i) lithology: permafrost blocks are made of fine sand and loess mixed in different proportions,

ii) sediment moisture content: sediments are saturated with water to make a water-rich permafrost. The water content is adjusted to the mixing of sediment. One model has also been supersaturated,

iii) ice content: ice flakes are added into the wet-sediment mixture. Different percentages of ice (30, 50, 80%) are tested to simulate a more or less ice-rich permafrost,

iv) ice layer in sub-surface: some models also contain an ice layer in sub-surface to simulate the impact of massive ice during permafrost melting,

iv) thermal regime: freeze/thaw cycles were performed during one day, simulating a one-year period. As a representation of a thaw period, the cold room is off and an external infrared heat source allows a quick thawing of permafrost blocks. The devices of infrared radiant emitters can be coupled to obtain a local or a uniform heat distribution on the model surface. A heat monitoring system provides a temperature control. The number of freeze/thaw cycles could be variable to simulate a shorter or longer study period.

For each cycle, surface thaw-settlement (Fig.1) and active layer thickness are monitored (Fig.2). Also, thermal profiles are obtained using 12 thermal sensors included on one vertical pipe near the model center.

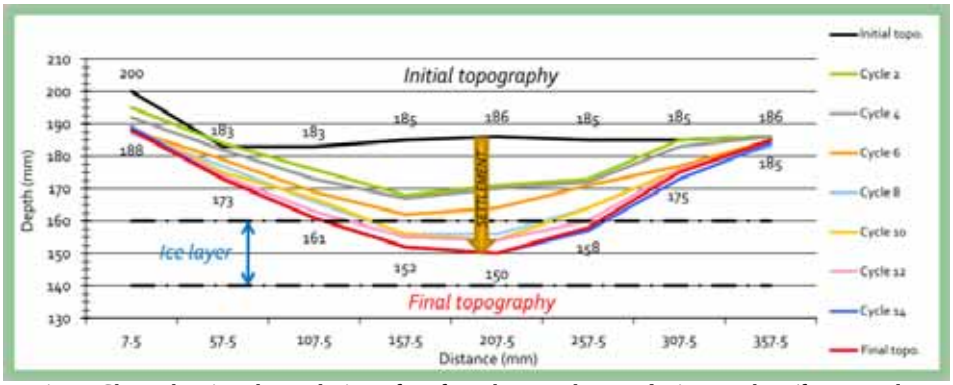

Fig.1: Chart showing the evolution of surface thaw settlement during 14 thaw/freeze cycles

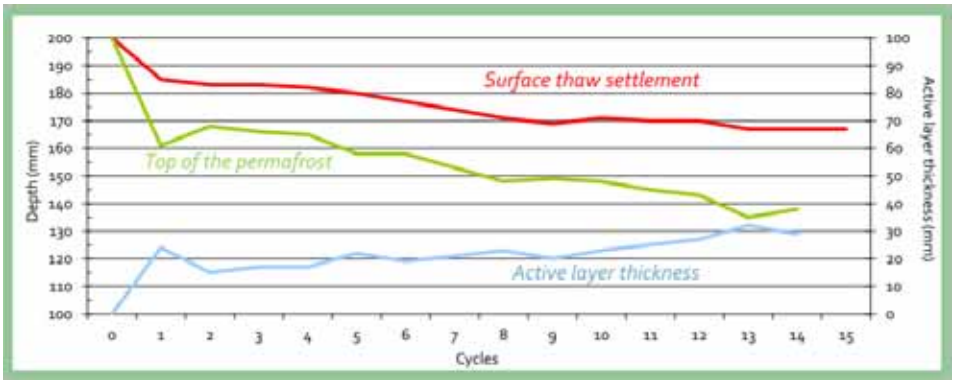

Fig.2: Chart showing the medium point evolution for surface thaw settlement, active layer thickness and position of the top of the permafrost

Results about 20 trials already made, show the predominant role of ice content, of ice layer, of sediment moisture content and lithology. The number of freeze-thaw cycles is not an influential factor in the collapse or the thermal state of the soil. Further experiments are being conducted in order to evaluate this observation.

In conclusion, our preliminary experiments should help to better constrain the parameters that control the permafrost evolution during freeze/thaw cycles in a context of climate warming. Many questions remain, for example, about the distribution of ice in ice-rich permafrost.

Erosion-Thermokarst Processes on Southwestern Coast of Yamal Peninsula, Kara Sea, Russia

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Stepped flat plains of Yamal region are often interpreted as series of different aged marine terraces. But widely spread thermokarst and thermoerosion processes have been underestimated as ones of the main geomorphologic agents on this territory. The right assessment of the role of these processes in transformation of relief in postglacial time can provide a new sight on the whole history of environmental changes in the region.
Detailed fieldworks on the southwestern coast of Yamal peninsula (near the mouth of Yarayakha river) revealed fragmentariness and variability of heights of plots jointed into each of these levels. In addition to data from different analysis of sediments it yields new insight on the origin and age of geomorphologic stages.
Primary sandy plain 30-40 m a.s.l. originated as result of abundant fluvial and lacustrine deposition in relatively cold climate conditions in the Late Pleistocene (12-35 ka). It was greatly dissected by erosion and termokarst processes due to climate warming in the Holocene. Melting of permafrost led to the unequal lowering of the ground surface and forming specific thaw depressions called khasyreys. They have tens to thousands meters wide and 0.5-15 m depth. Besides younger depressions embed into older ones, some hollows merge together, so up to four generations of khasyreys can be determined. Radiocarbon dates from bottom of peat lenses filling depressions identify several peaks of thaw intensification in Holocene. Thermoerosion flat-bottomed gullies often begin in thermokarst systems, link thaw depressions with sea and maintain or activate their lowering. They have series of terraces 3-4 m height and small erosion channels bounded to them. Terraces were created by regressive downcutting in periods of fast reduction of stream's length by seashore abrasion or because of differential neotectonical movements.
Thereby the revealed connection between dynamics of thermokarst, thermoerosion, seashore abrasion and neotectonic can subsequently help correlating different geomorphologic levels and detecting their age. The prevailing role of those processes in morphogenesis of Yamal peninsula is important for correct understanding of recent development of its relief. And it can be effective to estimate real rates of surface lowering, height's differentiation and environmental changes in Holocene and at present.

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