

# JOINT FINNISH-JAPANESE SEMINAR ON NORTHERN ENVIRONMENTAL RESEARCH

**Rovaniemi, Finland 3.-5.9.2008**

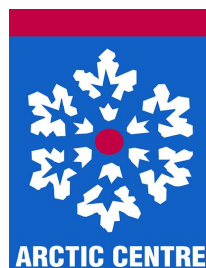
Arctic Centre, Arktikum building, Pohjoisranta 4



SUOMEN AKATEMIA  
FINLANDS AKADEMI • ACADEMY OF FINLAND



THE FINNISH INSTITUTE IN JAPAN



## Greeting from the Arctic Centre & the University of Lapland

### JOINT FINNISH-JAPANESE SEMINAR ON NORTHERN ENVIRONMENTAL RESEARCH

3-5. September 2008

Arctic Centre

Rovaniemi, Finland

Despite some major differences, there are also many ecological, social and economic similarities between the northern parts of Finland and Japan. This has provided us with a logical framework and a scope to seek scientific co-operation between the northern research stations of the Finnish universities and the corresponding Japanese organizations in Hokkaido, Japan.

Both Finland and Japan have four distinct seasons. Hokkaido is located at the 45° N latitude while Northern Finland starts from around 64 ° N latitude and stretches far beyond the Arctic Circle. The land area of Hokkaido is 83 000 km<sup>2</sup>, while Northern Finland is 134 000 km<sup>2</sup>, of which the vast majority, 94 000 km<sup>2</sup>, is comprised of the Lapland area. The average temperature in Hokkaido is well below freezing point during wintertime, with the average mean temperature of January sinking down to -4,6 °C. In Lapland, the mean average temperature of January is -13,6 °C. The average July temperatures in Hokkaido and Lapland are 20,2 °C and 14,4 °C, respectively. Both regions have snowfall and both the Sea of Okhotsk and the Baltic Sea freeze at least partly every winter. The annual average precipitation in Hokkaido is 1150 mm and in Lapland about 650 mm. The forests of both areas belong to the northern boreal forest zone.

There are 5,6 million people living in Hokkaido. In Northern Finland the population is only about 0,7 million, of which less than 200 000 people reside in Lapland. In Hokkaido, the indigenous Ainu minority alone has a population of about 150 000 people, about 3 % of the island's population. The population of our indigenous Sami people in Lapland is around 4 000, and it equals to about 2 % of the region's whole population. In fact, Northern Finland and Hokkaido are neighboring areas with the northern Russia between them. The climate change and increase of the use of natural resources create pressure to the sensitive cold climate environments and traditional cultures both in Hokkaido and in Northern Finland.

In 2005, the Finnish Institute in Japan made an active initiative to strengthen co-operation between Japanese and Finnish northern environmental research units. The initiative was followed quickly by an excursion of the Finnish northern research stations' directors to Hokkaido between the 22<sup>nd</sup> and 30<sup>th</sup> of November the same year. A delegation of six people visited and negotiated with the Hokkaido University; the University's Forest Research Stations and Experimental Forests in Tomakomai, Teshio, Nakagawa, and Uryu; the University's Northern Forestry Research and Development Office in Nayoro;

the Northern Regions Center; the Marine Science Center Abashiri; the Okhotsk Drift Ice Museum; and the Hokkaido Museum of Northern Peoples.

In turn, a delegation of six professors from Hokkaido visited Finland and made a tour in the northern research units between 29<sup>th</sup> of May and 7<sup>th</sup> of June the following year, 2006. The delegation visited the Thule Institute and the Oulanka Research Station of the University of Oulu, Värriö and Kilpisjärvi Research Stations of the University of Helsinki and the Arctic Centre of the University of Lapland. In the concluding meeting at the Arctic Centre, it was decided that a research seminar on the northern environment will be organized. Funding was applied from the Academy of Finland and the Japan Society for the Promotion of Science (JSPS). The Academy of Finland allocated funding for arrangements of this seminar, and travel funds of the Japanese delegation were secured by their home institutes. The Finnish Institute in Japan and the JSPS Stockholm Office kindly supported the travels of two Japanese participants. The City of Rovaniemi has also sponsored the meeting.

The purpose of this Joint Finnish-Japanese Seminar on Northern Environmental Research is to offer a forum for initiating concrete co-operation projects between Japanese and Finnish participants and to increase student and researcher exchange. The themes of the seminar are (i) Forest management and biodiversity, (ii) Landscape and land use changes, (iii) Cryosphere and (iv) Long term monitoring.

On behalf of the Arctic Centre of the University of Lapland, I wish the participants fruitful discussions and a nice stay in Rovaniemi, and hope that the seminar will lead to new interesting research projects.

Prof. Paula Kankaanpää

Director, Arctic Centre  
Vice-rector, University of Lapland

## Greeting from the Finnish Institute in Japan

Dear colleagues,

This Northern Regions seminar starts a new era on the research collaboration between Japan and Finland. Three years ago, the collaboration of the two northern regions, Lapland and Hokkaido, was initiated by the Finnish Institute in Japan. Many personal and institutional links have been established by individual researchers since then. The researchers' visits in Finnish Lapland and Hokkaido have deepened their shared wish to create concrete joint research projects between the two countries.

This kind of collaboration must be the next step forward. I'm looking forward to many joint projects in different fields of science and humanities in the future.

On behalf of the Finnish Institute in Japan and myself, I would like to express our deepest gratitude to all the people who made this seminar possible. Hopefully, the second Northern Regions seminar will be held in Hokkaido next year as an annual event.

Finally, I wish all the participants a very successful seminar.

Heikki Mäkipää, PhD

Director  
The Finnish Institute in Japan

## Greeting from the JSPS Alumni Club Finland

Ladies and gentlemen,

In connection of the Northern Regions Research seminar, JSPS Alumni Club in Finland (JSPS ACF) will have its meeting in Rovaniemi. This meeting takes place in 2-3 September, with some activities jointly operated with the Northern Regions seminar. JSPS ACF is the network for researchers who have been in Japan on research via the JSPS program. It was established by volunteers in October 2007. JSPS ACF holds interactive meetings and seminars to promote research cooperation between Finland and Japan.

Please feel free to visit the meeting and to contact with us if you are interested or need further information.

Prof. Matti Leppäranta

University of Helsinki

## **THEMES AND PRESENTERS:**

### **FOREST MANAGEMENT AND BIODIVERSITY**

#### **Responsible experts:**

*Prof. Veli Pohjonen* director (Varrio Subarctic Research Station, University of Helsinki)

*Dr. Toshiya Yoshida* (Field Science Center for Northern Biosphere, Hokkaido University)

#### **Other contributors:**

*D.Sc. (Agr. & For.) Ville Hallikainen* (Finnish Forest Research Institute)

*D.Sc. (Agr. & For.) Mikko Hyppönen* (Finnish Forest Research Institute)

*Prof. Kai T. Kokko* (University of Lapland)

*Dr. Jukka Similä* (Finnish Environment Institute)

### **LANDSCAPE AND LAND USE CHANGES**

#### **Responsible experts:**

*Dr. Jukka Jokimäki* (Arctic Centre, University of Lapland)

*Ass. Prof. Masashi Murakami* (Field Science Center for Northern Biosphere, Hokkaido University)

*Ass. Prof. Teiji Watanabe* (Faculty of Environmental Earth Science, Hokkaido University & Graduate School of Environmental Earth Science, Hokkaido University)

#### **Other contributors:**

*D.Sc. (Agr. & For.) Ville Hallikainen* (Finnish Forest Research Institute)

*PhD Toshihide Hirao* (Field Science Center for Northern Biosphere, Hokkaido University)

*PhD student Lee Yen Liang* (Faculty of Environmental Earth Science, Hokkaido University & Graduate School of Environmental Earth Science, Hokkaido University)

*Dr. Harri Silvennoinen* (Finnish Forest Research Institute)

*Prof. Liisa Tyrväinen* (Finnish Forest Research Institute)

### **CRYOSPHERE**

#### **Responsible experts:**

*Prof. Matti Leppäranta* (Department of Physics, University of Helsinki)

*Prof. John Moore* (Arctic Centre, University of Lapland & Thule Institute, University of Oulu)

*Ass. Prof. Kunio Shirasawa* (Institute of Low Temperature Science, Hokkaido University)

#### **Other contributors:**

*PhD student Venkata Gandikota* (Arctic Centre, University of Lapland)

*Dr. Aslak Grinsted* (Arctic Centre, University of Lapland)

*Dr. Masao Ishikawa* (Institute of Low Temperature Science, Hokkaido University)

*PhD student Juho Jakkila* (Department of Physics, University of Helsinki)

*PhD student Onni Järvinen* (Department of Physics, University of Helsinki)

*Dr. Anna Sinisalo* (Arctic Centre, University of Lapland & Department of Geosciences, University of Oslo)

*Dr. Toru Takatsuka* (Institute of Low Temperature Science, Hokkaido University)

## **LONG-TERM MONITORING**

### **Responsible experts:**

*Dr. Kentaro Takagi* (Field Science Center for Northern Biosphere, Hokkaido University)

*Prof. Antero Järvinen* director (Kilpisjärvi Biological Station, University of Helsinki)

### **Other contributors:**

*Dr. Jouko Inkeröinen* (Thule Institute & Oulanka Research Station, University of Oulu)

*Prof. Kari Laine* director (Thule Institute & Oulanka Research Station, University of Oulu)

*Dr. Miska Luoto*, programme director (Thule Institute & Department of Geography, University of Oulu)

*PhD (Chemistry) Jussi Paatero* (Finnish Meteorological Institute)

*Prof. Veli Pohjonen*, director (Varrio Subarctic Research Station, University of Helsinki)

*Dr. Osmo Rätti* (Arctic Centre, University of Lapland)

*Dr. Kari Saikkonen* (Kevo Subarctic Research Station, University of Turku)

*Dr. Kaichiro Sasa* (Field Science Center for Northern Biosphere, Hokkaido University)

*Dr. Pirkko Siikamäki* director (Thule Institute & Oulanka Research Station, University of Oulu)

## **OTHER PARTICIPANTS:**

*PhD student Emilie Beaudon* (Arctic Centre, University of Lapland)

*Dr. Mats Granskog* (Arctic Centre, University of Lapland)

*Prof. Paula Kankaanpää* director (Arctic Centre, Vice Rector, University of Lapland)

*MA Juhani Lillberg* Director of Administration (University of Lapland)

*Dr. Heikki Mäkipää* director (The Finnish Institute in Japan)

*Prof. Eija Timonen* (University of Lapland)

*M.Sc. Hanne Vaarala* (The Finnish Institute in Japan)

## **PROGRAM:**

Note: This seminar is held in parallel with the JSPS Alumni Club meeting and there are common activities with the JSPS Alumni Club.

### **Tuesday 2<sup>nd</sup> of September**

**2000–2100 Reception by the City Council of Rovaniemi (City Hall, Hallituskatu 5)**

### **Wednesday 3<sup>rd</sup> of September**

0900–1000	<b>Opening of the seminar (Aurora conference room)</b> (Cooperated with the JSPS Alumni Club meeting)
	<b>Presentation:</b> Director Paula Kankaanpää, Arctic Centre: “ <i>Finnish Arctic Research</i> ”
	<b>Greetings:</b>
	Director Heikki Mäkipää, the Finnish Institute in Japan
	Director Hiroshi Sano, JSPS
	Prof. Matti Leppäranta, JSPS Alumni Club Finland
	Prof. Kunio Shirasawa, Japanese delegation
	<b>Keynote presentation:</b> Prof. Eija Timonen (Faculty of Arts, University of Lapland): “ <i>Ghost Bridge</i> ”
1000–1030	<i>Coffee</i>
1030–1130	Visit to the Science Centre Exhibition (Arctic Centre)
	Chief Executive Producer Nicolas Gunsley
1130–1300	<i>Lunch</i>
	<b>Presentations: Forest management and biodiversity (Aurora conference room)</b>
1300–1330	Pohjonen, V.: Carbon dioxide capture of Scots pine ( <i>Pinus sylvestris</i> ) in Varrio Strict Nature Reserve
1330–1400	Yoshida, T.: Selection harvesting-induced changes in stand structure and composition of a northern Japanese mixed forest: a large-scale field observation during thirty years
1400–1415	<i>Coffee and tea</i>
1415–1445	Hyppönen, M. and Hallikainen, V. Sustainability of forestry in Finnish Lapland
1445–1615	Kokko, K. and Similä, J. The protection of biodiversity in forests: can regulation be effective by using voluntary policy instruments and standards?
1615–1645	Discussion
1830–2300	Boat trip and <i>dinner</i> (Cooperated with the JSPS Alumni Club meeting)

## Thursday 4<sup>th</sup> of September

<b><i>Presentations: Landscape and land use changes</i></b>	
<b>(Aurora conference room)</b>	
0900–0930	Murakami, M. and Hirao, T.: Bird and arthropod assemblages in natural ecotone and disturbed landscape
0930–1000	Tyrväinen, L., Silvennoinen, H. and Hallikainen, V. Forest landscape preferences of tourists in Northern Finland
1000–1030	Watanabe, T. and Liang, L. Y.: Soil erosion studies for management of mountain protected areas: long-term monitoring in Daisetsuzan National Park, Japan, and fast assessment in Shei-Pa National Park, Taiwan
1030–1100	Jokimäki, J. Tourist destinations as landscape laboratories: Land use and the nature
1100–1130	<b><i>Presentation:</i></b> Director of Administration Juhani Lillberg, University of Lapland: “ <i>Collaboration between University of Lapland and Universities in Japan</i> ”
1130–1300	<i>Lunch</i>
<b><i>Presentations: Cryosphere (Aurora conference room)</i></b>	
1300–1330	Leppäranta, M. and Shirasawa, K.: Sea ice climate in the Okhotsk and Baltic seas – a long-term research programme
1330–1400	Shirasawa, K., Leppäranta, M., Jakkila, J., Järvinen, O., Ishikawa, M. and Takatsuka, T.: Floating platform for automatic long-term measurements in freezing lakes and coastal waters
1400–1415	<i>Coffee and tea</i>
1415–1445	Leppäranta, M., Shirasawa, K., Jakkila, J. and Järvinen, O.: Observation series of the heat budget of lake Kilpisjärvi throughout the ice season 2007–2008
1445–1615	Moore, J. and Grinsted, A.: Changes in snow season in Lapland from 9 regional climate models
1615–1645	Sinisalo, A. and Moore, J.C. Antarctic blue areas (BIAs) – and their contribution in understanding the global climate system
1645–1715	Gandikota, V.: Identifying Factors That Help in the Modeling of Polythermal Glaciers in Svalbard
1715–1745	Discussion

## Friday 5<sup>th</sup> of September

<b><i>Presentations: Long-term monitoring (Aurora conference room)</i></b>	
0900–0930	Järvinen, A.: Breeding parameters of two northern Pied Flycatcher <i>Ficedula hypoleuca</i> populations
0930–1000	Takagi, K. and Sasa, K.: Change in the CO <sub>2</sub> balance under a series of forestry activities in a cool-temperate mixed forest with dense undergrowth
1000–1030	Rautio, P., Derome, J. and Lindgren, M.: Long-term monitoring of forest ecosystems in Finland
1030–1100	Laine, K., Järvinen, A., Luoto, M., Siikamäki, P., Pohjonen, V., Saikkonen, K., Inkeröinen, J. and Paatero, J. Northern Long-term Socio-ecological Research Platform (Northern LTSER Platform) -cooperation in Finland: possibilities and challenges for long-term socio-ecological research
1100–1130	Rätti, O.: Sindbis virus infection in grouse and humans in Finland
1130–1300	<i>Lunch</i>
1300–1400	Workshop
1400–1430	<b>Closing of the seminar &amp; coffee and tea</b>

## **FOREST MANAGEMENT AND BIODIVERSITY**

- Sustainable forestry
- Forests and carbon dioxide management
- Aerosol formation in boreal forests
- Impacts by reindeer and deer on ecosystems

# **CARBON DIOXIDE CAPTURE OF SCOTS PINE (*PINUS SYLVESTRIS*) IN VARRIO STRICT NATURE RESERVE**

Veli Pohjonen

Varrio Subarctic Research Station, University of Helsinki

E-mail: [veli.pohjonen@helsinki.fi](mailto:veli.pohjonen@helsinki.fi)

## **Abstract**

Carbon dioxide Capture and Storage (CCS) refers to techniques with which it is possible to remove excess carbon dioxide that in the atmosphere causes climatic warming. Growing forests is part of the CCS-techniques; the trees are the first storage of carbon dioxide. By combination of biological and technological means the principle of double capture of carbon dioxide was introduced. The intermediate energy carrier is wood pellet. For the second time the carbon dioxide is captured from the flue gases of a technologically advanced fully or partially wood-powered co-generation plant.

Carbon dioxide capture of 70 years old Scots pine trees was monitored with cuvette method throughout 2005 growing season, in the SMEAR Research Unit of Varrio Subarctic Research Station. In Midsummer a typical drop of 30 ppm of CO<sub>2</sub> during one minute was observed inside the cuvette. Bright and sunny late April weather caused drop of 3-5 ppm only, whereas cloudy autumn weather of early October could still drop the CO<sub>2</sub> concentration by 15 ppm. Annual pattern of carbon dioxide capture was analyzed by comparing five consecutive growing seasons 2001-2005. Midway of annual cumulative carbon dioxide capture was located in early July. This is later than the completion of annual shoot elongation (around 25 June), and coincides with the completion of annual stem diameter accumulation. Only about half of cumulative annual carbon dioxide capture was found to be used for the dimensional tree growth of the same year. Possible route of the missing half was discussed.

Based on theoretical considerations and in-situ measurements in Varrio Strict Nature Reserve an initial estimate for the potential of double capture of carbon dioxide in European (EU) forest belt was calculated. By utilizing the forests outside conservation areas only, by using wood pellet as energy carrier, by cofiring pellets in coal power plants, and by capturing the CO<sub>2</sub> for permanent storage and annual removal of 80 megatonnes of CO<sub>2</sub> from European forest is achievable.

# **SELECTION HARVESTING-INDUCED CHANGES IN STAND STRUCTURE AND COMPOSITION OF A NORTHERN JAPANESE MIXED FOREST: A LARGE-SCALE FIELD OBSERVATION OVER THIRTY YEARS**

Toshiya Yoshida

Field Science Center for Northern Biosphere, Hokkaido University

E-mail: [yoto@fsc.hokudai.ac.jp](mailto:yoto@fsc.hokudai.ac.jp)

## Abstract

Single-tree selection harvesting has been employed widely in northern Japanese mixed forest, but the long-term changes resulting from such management practice are rarely documented. A study by Yoshida et al. 2006 showed the trends in the demographic parameters of major tree species over 20 years in a 68 ha study stand. Selection harvesting had been conducted here at ten-year intervals since 1971. In the current study, we checked to see whether these trends were maintained in an extended 30 year period. The total basal area of trees with a diameter at breast height (dbh) larger than 12.5cm at the end of the third decade was roughly equal to that at the end of the second decade. The recovery in basal area, in terms of the difference between its increment by growth and new recruitment and its reduction by death, was highest in shade-intolerant broad-leaved species, mainly *Betula ermanii*, followed by conifers, largely *Abies sachalinensis* and shade-tolerant broad-leaved species such as *Acer mono* and *Tilia japonica*. The species group ranking was the same as that observed in the previous decades, although the recovery of both shade-tolerant and shade-intolerant broad-leaved species was increased probably due to the improved growth of retained individuals. Similarly, the rank of recruitment rate of retained trees was maintained and was highest in the shade-intolerant broad-leaved species and lowest in conifers, notwithstanding that the recruitment rate for conifers doubled when compared with the previous decades. As a result, we found the trends included a relative increase of shade-intolerant broad-leaved species under the current management regime. The relative decrease of conifers and shade-tolerant broad-leaved species was moderated but generally maintained in the third decade. We discuss possible reasons for the observed patterns and consider the implications for sustainable regional management with a selection system.

# **SUSTAINABILITY OF FORESTRY IN FINNISH LAPLAND**

Hyppönen Mikko and Hallikainen Ville  
Finnish Forest Research Institute, Rovaniemi unit  
E-mail: [mikko.hypponen@metla.fi](mailto:mikko.hypponen@metla.fi)

## Abstract

Finnish Lapland is one of the northernmost parts of the world with a forest cover. In spite of the extremely northern location, commercial forestry is practised in the area. Forest management has been based on certain principles and operating models: research and education, strong forest organization, intensive forest management, technology and infrastructure, modern legislation, state support, the national forest inventory, forest management planning, forest management recommendations and environment guidelines, even-aged forestry, and forest certification. The economic importance of the forests is not restricted only to wood production and wood processing; the forests are also utilized in reindeer husbandry, nature-based tourism, recreation, the collection of forest berries and mushrooms, and nature conservation. The northernmost part of Lapland forms the indigenous area of the Sami people. During the last few years, there have been conflicts in that area between forestry and reindeer husbandry. Nature tourism will increase in Lapland. The increasing use of the same forest resources for different purposes may cause more conflicts in the future. Finding and developing practices that promote the integration of reindeer husbandry, tourism and forestry is still a great challenge for the sustainability of forestry. Multi-objective forest planning can provide technical solutions, and the role of a participatory approach should be strengthened when decisions have to be made.

# **THE PROTECTION OF BIODIVERSITY IN FORESTS: CAN REGULATION BE EFFECTIVE BY USING VOLUNTARY POLICY INSTRUMENTS AND STANDARDS?**

Kai T. Kokko (Jukka Similä)

Acting professor of environmental law  
Faculty of Law, University of Lapland  
E-mail: [kai.kokko@ulapland.fi](mailto:kai.kokko@ulapland.fi)

## Abstract

In this presentation the aim is to identify some shortcomings in Finnish forestry legislation and to give some ideas how to make regulation more acceptable and effective than it is presently for the protection of biodiversity. The presentation is based on an article manuscript which I have written with senior researcher Jukka Similä. At the beginning of this article we introduce the tools for the evaluation of forestry regulation, and at the end we summarize the important conclusions about the evaluation for discussion of regulatory theory. The tools and conclusions can be used to assist evaluation of regulation in various countries.

## **LANDSCAPE AND LAND USE CHANGES**

- Protected area management
- Geodiversity and geoconservation (soil, geology, landform)
- Sustainable tourism management

# FOREST LANDSCAPE PREFERENCES OF TOURISTS IN NORTHERN FINLAND

Tyrväinen Liisa, Silvennoinen Harri and Hallikainen Ville  
Finnish Forest Research Institute (METLA)  
PL 16, 96301 Rovaniemi, Finland  
E-mail: [Liisa.tyrvainen@metla.fi](mailto:Liisa.tyrvainen@metla.fi)

## Abstract

In many rural regions in Finland the key development areas are forestry and tourism. In rural areas forestry as a large industry has significant impact on the quality of landscapes for nature tourism. In tourism attractive scenery becomes one of the most important reasons for the choice of destination. The previous research suggests that tourists' prefer mature forest stands, and their attitudes are negative towards final harvesting, in particular towards clear cuttings, which is a widely use method in commercial forests. There are significant differences, however, within the clientele regarding environmental expectations and what kind of environments are preferred for different nature tourism activities.

This presentation describes first results of a large survey studying at foreign visitors' motives for traveling to northern Finland, attitudes towards forestry and visitors' evaluation of impacts of different forest management's practices on landscapes. The data consisted of about 800 interviews conducted in Lapland, Finland during winter 2007-2008. In the survey, respondents were asked to assess the effects of forest management options on landscape quality from 28 colour photographs representing different forest landscapes. The results suggest that different nationalities have somewhat different environmental preferences. In general, they have less strict requirements for forest environments for recreational activities than Finns have. Moreover, suggestions for suitable forest management practices in nature tourism areas are discussed.

*Keywords: Forest management, landscape preferences, nature-based tourism, nature tourism entrepreneurship*

# **SOIL EROSION STUDIES FOR MANAGEMENT OF MOUNTAIN PROTECTED AREAS: LONG-TERM MONITORING IN DAISETSUZAN NATIONAL PARK, JAPAN, AND FAST ASSESSMENT IN SHEI-PA NATIONAL PARK, TAIWAN**

Teiji Watanabe and Lee Yen Liang

Faculty of Environmental Earth Science, Hokkaido University and Graduate School of Environmental Earth Science, Hokkaido University

E-mail: [twata@ees.hokudai.ac.jp](mailto:twata@ees.hokudai.ac.jp)

## **Abstract**

Mountain trails and campsites with heavy use often face severe soil erosion and vegetation loss. Mountain protected areas in Japan would be the best example to show such degradations. Better management of trails/campsites needs both accurate monitoring methodologies and fast assessment methodologies. This study first reviews the long-term monitoring studies on trail erosion in Daisetsuzan National Park (DNP), Japan, and then introduces fast assessment methodology used in Shei-Pa National Park (S-PNP), Taiwan. Trail erosion has been monitored by the conventional method of Cole et al. (1976) for a period of 10-13 years in DNP: the result is shown in the form of cross-sectional area of eroded trail surface. The soil erosion varied from 193 to 1,403 cm<sup>2</sup>/yr. Moreover, the rates varied from year to year even at the same site. This means that long-term monitoring is necessary to understand the status of soil erosion. A 3D-photogrammetry was also introduced to estimate the volume of erosion and sedimentation. Fast assessment method was applied mainly for national-park managers in Taiwan. They tend to prefer fast and easy methods with simple equipment. The thickness of unconsolidated materials in S-PNP seems to be much thinner than that in DNP, which partly creates great difference in the degradation status. A seismic analysis, electric resistivity analysis, and cone-penetrometer analysis can be utilized to detect future erosion depth. These methodologies can be applied to any areas with such land degradation issues; proposed is development of a joint study in the northern areas of Japan and Finland as a part of protected-area management studies.

## **TOURIST DESTINATIONS AS LANDSCAPE LABORATORIES: LAND USE AND THE NATURE**

Jokimäki Jukka<sup>\*</sup>, Kaisanlahti-Jokimäki Marja-Liisa, Huhta Esa, Helle Pekka, Ukkola Maarit, Siikamäki Pirkko & Ollila Tuomo

\*corresponding author: Arctic Centre, University of Lapland

E-mail: [jukka.jokimaki@ulapland.fi](mailto:jukka.jokimaki@ulapland.fi)

### Abstract

There is concern about the impacts of increased tourism on the environment and biodiversity, and whether sustainable tourism can be achieved. Understanding and predicting the likely consequences of tourist destinations on biodiversity is an important prerequisite to achieving the sustainable use of tourist destinations. The impact of the relatively small-scale seasonal tourist destinations in areas close to the wilderness end of the urban-rural-wildland gradient has not received attention before. We examined whether tourist destinations (ski resorts in our case) influence the nature across an urban gradient from uninhabited forests via tourist destinations to towns in northern Finland. The characteristic features of urban bird assemblages were already observed at the ski resorts even though these are relatively new. Our results indicate that the ski resorts induce urban sprawl to wilderness areas by supporting the colonization of urban bird species. Nest losses and the abundance of potential nest predators were intermediate in the tourist destinations when compared to the towns and forests. Ski resorts had a negative impact on the territory occupancy of disturbance-sensitive species, the Golden Eagle. The abundance of many species varied between ski resorts. The density of the Mountain hare and mustelids increased towards the ski resorts. Our results indicated that seasonal ski resorts may have negative impacts on the nature, and more attention should be paid to area planning in tourist destinations and their surroundings. These results have significant implications for improving land use planning of northern ski resorts and conserving nature at seasonal tourist towns. As nature-based tourism is a rapidly growing, it is also important for tourism operators to promote high biodiversity and the existence of wildlife species in the close vicinity of tourist destinations. In addition, negative impacts on wildlife might reduce the attractiveness of the entire tourist destination. Good land use planning and minimization of habitat modification would be the best way to minimize the negative impacts of urban sprawl on the nature.

## **CRYOSPHERE**

- Modeling ice sheets and ice caps
- Sea ice and lake ice, snow
- Ice core comparisons

## **SEA ICE CLIMATE IN THE OKHOTSK AND BALTIC SEAS – A LONG-TERM RESEARCH PROGRAMME**

Matti Leppäranta<sup>1</sup> and Kunio Shirasawa<sup>2</sup>

<sup>1</sup> Department of Physics, University of Helsinki,  
P.O. Box 64 (Gustaf Hällströmin katu 2a), Fi-00014 Helsinki, Finland  
Phone: +358-9-19151016, FAX: +358-9-19151000  
E-mail: [matti.lepparanta@helsinki.fi](mailto:matti.lepparanta@helsinki.fi)

<sup>2</sup> Institute of Low Temperature Science, Hokkaido University,  
Kita-19, Nishi-8, Kita-Ku, Sapporo 060-0819 Japan  
Phone/FAX: +81-11-706-5425  
E-mail: [kunio@lowtem.hokudai.ac.jp](mailto:kunio@lowtem.hokudai.ac.jp)

### Abstract

A long-term collaboration in sea ice research in the Okhotsk and Baltic Seas has been ongoing between the Department of Physics, University of Helsinki and the Institute of Low Temperature Science, Hokkaido University. Both these seas belong to the seasonal sea ice zone of the World Ocean with present for around six months annually. The main themes have been (1) Climatological variability of the ice seasons, (2) Modeling the thermodynamics of sea ice, and (3) Sea ice remote sensing. The programme was commenced in 1995, and since then the work has been ongoing based on mutual visits and field work in mutual experimental sites. Time-series analyses have been made on the ice conditions in both seas, with information back to more than 100 years from the present. The main field sites have been at the Hanko cape in the Gulf of Finland, Baltic Sea and Saroma-ko lagoon on the coast of Hokkaido, and results on sea ice structure, growth and melting, salinity, light conditions, and ice sediments were obtained. A thermodynamic sea ice model has been developed and calibrated for the seasonal sea ice zone. Remote sensing research has contained the use of radars in mapping sea ice, in particular sea ice kinematics. A joint Japanese–Finnish seminar has been arranged in 2001, and joint field courses have been given since 2006. The present focus on research has two topics. First, a coastal sea ice dynamics model is under development, and the simulations will be compared with ice flow observations by the Okhotsk Sea ice radar system. Secondly, the climatological ice investigations for the Baltic and Okhotsk Seas will be expanded to the global seasonal sea ice zone to examine the coupling between the sea ice and climate in this zone.

# FLOATING PLATFORM FOR AUTOMATIC LONG-TERM MEASUREMENTS IN FREEZING LAKES AND COASTAL WATERS

Kunio Shirasawa<sup>1</sup>, Matti Leppäranta<sup>2</sup>, Juho Jakkila<sup>2</sup>, Onni Järvinen<sup>2</sup>, Masao Ishikawa<sup>1</sup> and Toru Takatsuka<sup>1</sup>

<sup>1</sup> Institute of Low Temperature Science, Hokkaido University,  
Kita-19, Nishi-8, Kita-Ku, Sapporo 060-0819 Japan  
Phone/FAX: +81-11-706-5425  
E-mail: [kunio@lowtem.hokudai.ac.jp](mailto:kunio@lowtem.hokudai.ac.jp)

<sup>2</sup> Department of Physical Sciences, University of Helsinki,  
P.O. Box 64 (Gustaf Hällströmin katu 2a), Fi-00014 Helsinki, Finland  
Phone: +358-9-19151016, FAX: +358-9-19151000  
E-mail: [matti.lepparanta@helsinki.fi](mailto:matti.lepparanta@helsinki.fi)

## Abstract

An automatic observation float has been designed, tested and utilized for wintertime investigations in lakes and coastal waters. The float can be deployed in a lake or on the coast during the open water season, and it is capable of collecting data continuously throughout the period of freeze-up and further ice season. The float is anchored to the bottom to get stable during the freeze-up period. The instrumentation includes a 2-m mast for the atmospheric boundary layer and radiation balance, a thermistor string and PAR sensors down from the water surface for measurements in ice and water, and an independently anchored current meter and CTD sensors. The float has been used in Santala Bay in the Baltic Sea, Lake Pääjärvi in southern Finland and Lake Kilpisjärvi in northern Finland in 1999–2008 with very good results. The data has been used for investigations of the lake heat fluxes, ice formation and melting, and light transfer in the snow–ice–water system. The data has served as the calibration and validation data in the development of an advanced thermodynamic lake ice model including the layers of snow, slush, snow-ice and congelation ice, and it has also been utilized in the modelling the winter circulation in an ice-covered lake. This measurement system will be a basis in further collaborative physical – biological investigations of freezing lakes.

## **OBSERVATION SERIES OF THE HEAT BUDGET OF LAKE KILPISJÄRVI THROUGHOUT THE ICE SEASON 2007–2008**

Matti Leppäranta<sup>1</sup>, Kunio Shirasawa<sup>2</sup>, Juho Jakkila<sup>1</sup> and Onni Järvinen<sup>1</sup>

<sup>1</sup> Department of Physics, University of Helsinki,  
P.O. Box 64 (Gustaf Hällströmin katu 2a), Fi-00014 Helsinki, Finland  
Phone: +358-9-19151016, FAX: +358-9-19151000  
E-mail: [matti.lepparanta@helsinki.fi](mailto:matti.lepparanta@helsinki.fi)

<sup>2</sup> Institute of Low Temperature Science, Hokkaido University,  
Kita-19, Nishi-8, Kita-Ku, Sapporo 060-0819 Japan  
Phone/FAX: +81-11-706-5425  
E-mail: [kunio@lowtem.hokudai.ac.jp](mailto:kunio@lowtem.hokudai.ac.jp)

### Abstract

Lake Kilpisjärvi is located in the tundra zone in northwestern Finnish Lapland. It is annually frozen for 7–8 months. It is a medium-size, clear water lake, with the mean depth of 20 m. The maximum annual ice thickness is 70–100 cm, and snow accumulation amounts normally to about 100 cm. In 2007 an ice measurement station was established in the lake, based in the Kilpisjärvi Biological Station of the University of Helsinki. The measurement program consisted of an automatic measurement float manual measurements in visits to Kilpisjärvi by the field team members. The automatic measurements contain solar and terrestrial radiation, temperature, humidity and wind in the atmospheric surface layer, temperature and light level in ice and snow, and temperature and current velocity in the water body. These data are utilized to evaluate the heat flow and light transfer through the air–snow–ice–water system. In visiting the site, the automatic system was serviced and, ice and snow samples were taken and the thickness and quality of ice and snow were recorded. The ice station was active through mid-October 2007 – mid-June 2008. The data analysis is now ongoing, and the first results will be shown here. The measurement program will be repeated in the ice season 2007–2008. The data are further used to develop an all-year mathematical model for Lake Kilpisjärvi temperature and ice conditions.

# CHANGES IN SNOW SEASON IN LAPLAND FROM 9 REGIONAL CLIMATE MODELS

John Moore<sup>1,2</sup>, and Aslak Grinsted<sup>1</sup>

<sup>1</sup> Arctic centre, University of Lapland  
Rovaniemi, Finland  
Phone/FAX: +358-400194850  
E-mail: [jmoore@ulapland.fi](mailto:jmoore@ulapland.fi)

<sup>2</sup> Thule Institute, University of Oulu,  
P.O. Box 7300, 90014 University of Oulu, Finland

## Abstract

As part of the EU Northern Periphery Program CLIM-ATIC project we have analyzed the PRUDENCE climate data archive, for the Lapland region. The PRUDENCE dataset contains model statistics for the control period 1961-1990, and scenario runs generated by 9 regional climate models nested within the ECHAM4 global climate model forced by the IPCC A2 projections of greenhouse gas emissions. The CLIM-ATIC project focuses on adaptation to climate change at the business and municipality level, which most clearly in Lapland, involves changes in snow season. We have extracted parameters designed to measure the start, end, maximum and mean snow load, and the occurrence of snow at Christmas time from the different models. There are systematic differences between the models in their treatment of snow, and to eliminate these we consider differences from the control to the scenario. Analysing the variation in results across the models gives a reasonable indication of natural uncertainty. We use these data to produce easily interpreted climate change visuals that can be readily grasped by the target audience of CLIM-ATIC, e.g. recurrence interval of non-white Christmases. Over a 100 year period typical snow season length is reduced by about 60 days in Lapland, and Christmases without snow increase in frequency to about 1 year in 5. Snow depth is greatly reduced compared with present climate. Naturally local topography, ski slope maintenance, and adaptation strategies can ameliorate these climate forgings.

# **ANTARCTIC BLUE ICE AREAS (BIAS) – AND THEIR CONTRIBUTION IN UNDERSTANDING THE GLOBAL CLIMATE SYSTEM**

Anna Sinisalo<sup>1,2</sup> and John C. Moore<sup>1</sup>

<sup>1</sup> Arctic Centre, P.O.Box 122, 96101 Rovaniemi, Finland

<sup>2</sup> Dept. of Geosciences, University of Oslo, P.O.Box 1047, Blindern NO-0316 Oslo, Norway

E-mail: [aksinisalo@gmail.com](mailto:aksinisalo@gmail.com)

## Abstract

The Southern Ocean is a key player in global climate as the planet's ocean deep water is generated beneath the ice shelves surrounding the Antarctic continent. Climate changes in the southern hemisphere may have drastic impacts in north since they are linked through the global thermohaline circulation of the oceans. The Southern Ocean has been implicated in as a trigger for the transition from glacial to interglacial conditions 15000 years ago. Antarctic Blue Ice Areas (BIAs) are located in different sectors close to Southern Ocean, much closer than traditional deep coring sites. It is now clear that BIAs in different regions have quite different histories of formation and preservation, and that they are intimately linked to the response of their surrounding ice sheets to climate variability on glacial-interglacial time-scales. The paleoclimate records from BIAs are expected to provide information on climate variability, and thus variations in Southern Ocean processes and ice sheet evolution near to the thermal transition from cold based ice sheet to warm based sliding around the main Antarctic ice sheet.

## **IDENTIFYING FACTORS THAT HELP IN THE MODELING OF POLYTHERMAL GLACIERS IN SVALBARD**

Venkata Gandikota  
Arctic centre, University of Lapland  
Rovaniemi, Finland  
Phone : +358163412713  
Email: [vgandiko@ulapland.fi](mailto:vgandiko@ulapland.fi)

### **Abstract**

A model is a means of reducing a complex real situation to a simple closed system that represents the essential features and to which the appropriate governing laws and equations could be applied. In this paper I would like to identify and discuss how various physical factors could be used in the modeling of polythermal glaciers in the high Arctic in Svalbard. There will be discussion of approaches like the use of observations of the distribution of glacial landforms such as moraines, which provides information on the extent of a glacier, to constrain models of glaciers. The focus will be on a glacier in northwest Spitsbergen, Midre Lovénbreen, and to answer how modeling like this would relate to wider modeling of glaciers in the region. The advantages of the modeling technique of a finite element method that is used at the Ice and Climate Research Group at the Arctic Centre in Rovaniemi will also be discussed in this context.

## **LONG-TERM MONITORING**

- Trends, cycles, time series, climate
- Long range transportation of pollution

# **BREEDING PARAMETERS OF TWO NORTHERN PIED FLYCATCHER *FICEDULA HYPOLEUCA* POPULATIONS**

Antero Järvinen  
Kilpisjärvi Biological Station, University of Helsinki  
E-mail: [antero.jarvinen@helsinki.fi](mailto:antero.jarvinen@helsinki.fi)

## **Abstract**

In peripheral areas, such as in northern and alpine environments, ecologists have unique opportunities to study tolerances of organisms. Peripheral ecosystems may also provide ecologists with a deeper understanding of complex central (southern) ecosystems. In peripheral areas species are sensitive to slight fluctuations of climate and weather. Living on such a narrow margin, even a slight warming/cooling could be beneficial/harmful. Thus, for instance, global warming may cause great changes in the factors which limit peripheral populations. I have gathered long-term (1987–2008) population and breeding data of the pied flycatcher both in northern Finnish Lapland (Kilpisjärvi, 69°03'N) and northern Norway (Skibotn, 69°20'N). The areas lie close to each other (40 km apart) but in different environments. In fact, the “biological distance” between Kilpisjärvi and Skibotn is the same as the “biological distance” between Kilpisjärvi and Oulu (500 km). In spite of the short distance, flycatchers living in the two areas behave very differently. For instance, population sizes do not vary in synchrony. A clear message is borne out of the study: neighboring populations may differ from each other more than expected and it is difficult to make generalization of parameters based on only one or few populations (and one or few years). In contrast to most climate change models, only slight temperature changes and accompanying breeding parameter changes have occurred in northern Lapland so far.

# CHANGE IN THE CO<sub>2</sub> BALANCE UNDER A SERIES OF FORESTRY ACTIVITIES IN A COOL-TEMPERATE MIXED FOREST WITH DENSE UNDERGROWTH

Takagi Kentaro and Sasa Kaichiro

Field Science Center for Northern Biosphere, Hokkaido University

E-mail: [kentt@fsc.hokudai.ac.jp](mailto:kentt@fsc.hokudai.ac.jp)

## Abstract

To evaluate the effects on CO<sub>2</sub> exchange of clearcutting a mixed forest and replacing it with a plantation, 7 years of continuous eddy covariance measurements of CO<sub>2</sub> fluxes and soil respiration measurements were conducted in a conifer-broadleaf mixed forest in northern Hokkaido, Japan. The mixed forest was a weak carbon sink (net ecosystem exchange,  $-44 \text{ g C m}^{-2} \text{ yr}^{-1}$ ), and it became a large carbon source ( $569 \text{ g C m}^{-2} \text{ yr}^{-1}$ ) after clearcutting. However, the large emission in the harvest year rapidly decreased in the following 4 years (495, 153, 117, 4  $\text{g C m}^{-2} \text{ yr}^{-1}$ , respectively), and it took 5 years for this ecosystem to quit the net carbon emission. The rapid decrease in the emission was attributed to an increase in biomass and photosynthetic activity of Sasa dwarf bamboo, an understory species. Soil respiration increased in the 3 years following clearcutting, however there was no distinct change in the last 2 years, mainly owing to the dwarf bamboo root development and saturation. The ratio of soil to ecosystem respiration increased from 44% in the forest to nearly 100% after clearcutting and aboveground parts of the vegetation contributed little to the total ecosystem respiration, although the respiration chamber measurements showed heterogeneous soil condition after clearcutting. The total net carbon emission rate was  $1338 \text{ gC m}^{-2}$  during the 5 years after the disturbance and was ca. 70% of the carbon carried out from this ecosystem as timbers.

# **LONG-TERM MONITORING OF FOREST ECOSYSTEMS IN FINLAND**

Rautio Pasi, Derome John and Lindgren Martti

Finnish Forest Research Institute (Metla)

E-mail: [pasi.rautio@metla.fi](mailto:pasi.rautio@metla.fi), [john.derome@metla.fi](mailto:john.derome@metla.fi), [martti.lindgren@metla.fi](mailto:martti.lindgren@metla.fi)

## Abstract

Finland has been participating since 1985 in an international (UN-ECE and EU) forest monitoring programme. Metla is responsible for the monitoring of forest condition in Finland, and carries out the annual survey of tree condition (defoliation, discoloration, biotic and abiotic damage) on a nationwide network that currently comprises 11210 trees on 594 permanent sample plots (Level I). The network includes plots on mineral soil (497) and peatland (97) sites. The intensive forest ecosystem monitoring network (Level II) was established in 1995, and currently consists of 17 Scots pine, 12 Norway spruce and 2 birch monitoring plots. The main purpose of the network is to monitor forest ecosystem functioning, and to provide data explaining changes in forest condition. The main findings of the programme so far include: i) the forests in Finland are less defoliated than in most of the other European countries, ii) the main threats to the health and condition of Finland's forests are primarily abiotic factors, such as storms, drought, extreme winter conditions, as well as associated biotic factors such as insect pests and fungal pathogens, and iii) needle sulphur concentrations have decreased sharply from the levels reported in the late 1980's due to the major decrease in sulphur emissions and deposition. From 2009 onwards the programme is directed more to monitor also effects of climate change, carbon sequestration and changes in forest biodiversity.

# **NORTHERN LONG-TERM SOCIO-ECOLOGICAL RESEARCH PLATFORM (NORTHERN LTSER PLATFORM) -COOPERATION IN FINLAND: POSSIBILITIES AND CHALLENGES FOR LONG-TERM SOCIO-ECOLOGICAL RESEARCH**

Laine Kari<sup>1</sup>, Järvinen Antero<sup>3</sup>, Luoto Miska<sup>2</sup>, Siikamäki Pirkko<sup>1</sup>, Pohjonen Veli<sup>4</sup>, Saikkonen Kari<sup>5</sup>, Inkeröinen Jouko<sup>1</sup> and Jussi Paatero<sup>6</sup>

1) University of Oulu, Thule Institute and Oulanka Res. Station, P.O.Box 7300 FIN-90014 University of Oulu, E-mail: [kari.laine@oulu.fi](mailto:kari.laine@oulu.fi)

2) University of Oulu, Department of Geography, P.O.Box 3000 FIN-90014 University of Oulu

3) University of Helsinki, Kilpisjärvi Biological Station, FIN- 99490 KILPISJÄRVI

4) University of Helsinki, Värriö Research Station, FIN- 98800 SAVUKOSKI

5) University of Turku, Kevo Subarctic Research Station, FIN- 99980 UTSJOKI

6) Finnish Meteorological Institute, P.O.Box 503, FI-00101 Helsinki

## Abstract

Northern LTSER Platform, founded as a part of Finnish LTER Network in 2007, constitutes environmental transect from northern boreal forest landscapes to arctic tundra. The main aim of the Northern LTSER Platform is to pool long-term research activities and monitoring data of the northernmost university research stations in Finland under five research themes related to socio-ecological changes in northern nature and communities. The platform covers almost entirely northern parts of Finland and the study design of the platform operates as a sensitive instrument to assess drivers, pressures and the state of environment on multiple spatial scales both on nature and human systems and their interaction. The sites maintain high-quality infrastructures that enable research with a focus on complex interactions between environmental pressures (climate change, land use change, atmospheric pollution) and ecosystem functions and services. The sites cover a wide range of ecosystems and human induced pressures and serve as bases for socio-economic research. Well-developed network of university research stations (Oulanka, Kilpisjärvi, Kevo, Värriö) and northern units of research institutes (NorNet partners) offers the basic infrastructures for conducting collaborative research, basic laboratory facilities, competent personnel and office as well as accommodation facilities for visiting scientist. The Pallas-Sodankylä Long-Term Ecological Research (LTER) Observatory, a part of the Northern LTSER-platform, provides e.g. the weather and atmospheric parameter monitoring data, land cover characteristics, hydrological and surface water quality monitoring and modelling data, forest ecosystem monitoring data, and environmental radioactivity data. About 30 senior researchers or professors with their research groups are involved in the work of the platform. LTER in Finland has objectives similar to that of the international LTER network. Research themes of Northern LTSER Platform are the following: 1) Population dynamics and productivity of plant and animal populations living in the periphery of their distribution, 2) Effects of global change on northern ecosystems, 3) Changing society and livelihoods in rural and peripheral areas, 4) Human health and wellbeing in northern communities, and 5) Information management and research infrastructure for scientific collaboration.

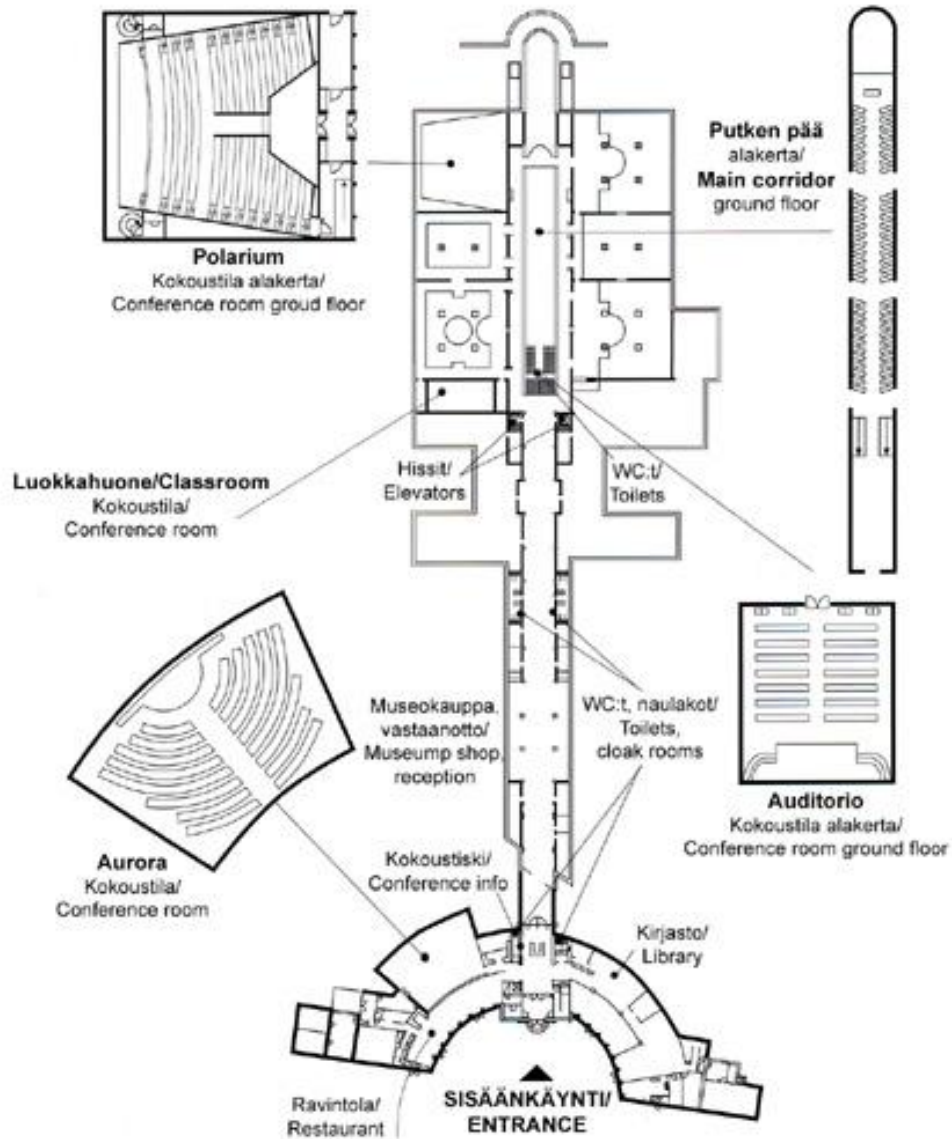
# **SINDBIS VIRUS INFECTION IN GROUSE AND HUMANS IN FINLAND**

Rätti, Osmo  
Arctic Centre, University of Lapland  
E-mail: [osmo.ratti@ulapland.fi](mailto:osmo.ratti@ulapland.fi)

## **Abstract**

Sindbis virus (SINV) is a mosquito-borne virus that commonly infects birds. Sometimes mosquitoes transmit it to humans and other mammals as well. In humans it causes rash and arthritis. In Finland there has been a larger outbreak in humans in every 7th year since 1974. Grouse populations show remarkable yearly density fluctuations and grouse species are known to be hosts of Sindbis virus. Here we study whether there is relationship between grouse population fluctuations and Sindbis virus outbreaks. The population dynamics of mosquitoes that transmits Sindbis virus are poorly known. Transmission cycle of Sindbis virus may be at least partly determined by climatic conditions which influence to its vectors. We attempt to identify weather variables which may play role in occurrence of outbreaks.

# ARKTIKUM



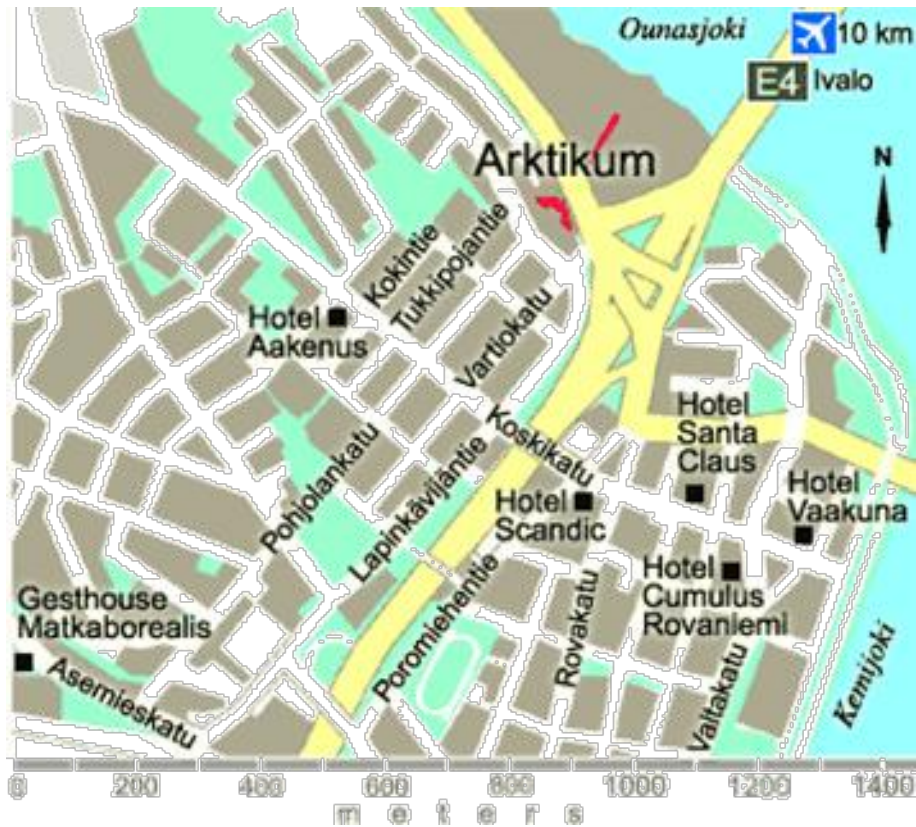
Homepage:

<http://www.arktikum.fi/jp/>

<http://www.arktikum.fi/en/>

<http://www.arktikum.fi/fi/>

## ROVANIEMI



Source: <http://www.metla.fi>

Homepage:

<http://www.rovaniemi.fi/?depid=21714> (in Japanese)

<http://www.rovaniemi.fi/?depid=17958> (in English)

<http://www.rovaniemi.fi/?depid=14329> (in Finnish)