EU INTAS PROJECT: SNOW AND LANDSCAPE

INFLUENCE OF SNOW VERTICAL STRUCTURE ON HYDROTHERMAL REGIME AND SNOW RELATED ECONOMICAL ASPECTS IN NORTHERN EURASIA

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NEESPI
Northern Eurasia
Earth Science
Partnership Initiative

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Project outline

Seven teams from five countries (RU, US, SK, CH, AT) with 32 project participants with different backgrounds in economical modelling, geography, geology, hydrology, meteorology, mathematics, physics, social sciences and landscape planning work jointly on the project.
The first workshops were held in Kaprun, Austria and Zvenigorod, Russia. The next meeting is scheduled for November 2006 in Liptovsky Mikulas.
Project duration: May 2004 to April 2007.

Fig. 1: Area around Vladivostok

Expectations of Project

Expectations are high to discover new findings in the relation snow and climate change. Numerous studies have demonstrated that the climate models are in particular sensitive to snow cover parameters, primarily due to its high albedo and the ability to store water seasonally. Due to data availability reasons, snow cover is described in a simplified way by snow height, variable snow water equivalent and a constant albedo. It is believed that more snow properties are necessary to describe snow cover in a satisfying way.
Furthermore the complex pattern of different kinds of snow with a manifold of different and

Fig. 2: Melting ice surface at Lake Bajkal (Source: www.bajkal.irkutsk.com)

inhomogeneous snow layers should be classified according to more practical major snow types. Having major snow types better scenarios for future appearance of snow cover in the landscape can be anticipated.
However, we do not know the pace and magnitude of change and the project shall bring upon new ideas in what way this change is likely to go. A major effort is to explore in how far human life patterns and land uses in Northern Eurasia - our region of concern , which is the entire former Soviet Union with 15 nations and perhaps 50 ethnical groups amounting for more than 280 million inhabitants and stretching over 22 million km² - depends on snow. The region includes some of the highest settlement areas of the world with mountain peaks higher than 7,000 m altitude and huge lowland planes and deserts. The current and future availability of snow and water is crucial for many economic activities and any change in the pattern will modify the economic situation as well.

Tasks

The project is divided into seven tasks:

1) Observed data set creation. This includes the creation of a data base with the observed characteristics of snow cover and meteorological conditions during several decades. The regularly observed data from stations and special data from field campaigns will be systematized and organized. Special attention will be paid to the difference of natural conditions in which the snow has been formed. Coordination by Institute of Geography, Russian Academy of Sciences.

2) Snow cover types classification. This includes the development of snow cover types determined by its vertical structure. Analysis of the observed data on snow stratigraphy, structure and properties at key sides in combination with snow cover modelling. Coordination by Moscow State University.

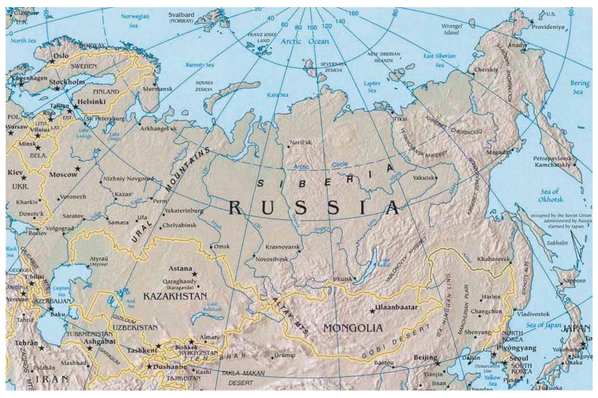

Fig. 3: Map of project region (Source: www.lib.utexas.edu)

3) Considering snow vertical structure in parameterisation scheme. The results of task 1 and 2 will become inputs to major global circulation models (GCM). This requires testing of the parameterisation scheme against the created data set of snow cover physical characteristics. Coordination by Russian Hydro Meteorological Centre, Moscow.

4) Climate model control running. The impacts of snow structure characteristics onto simulated contemporary climate will be discovered. The experiments with GCM realisations for contemporary climate conditions are planned to estimate the effects of snow cover structural features onto the hydrothermal regime in Northern Eurasia. Local models will be used for more detailed studies in snow-related and other cryospheric processes such as soil and permafrost freezing/thawing. Coordination by Russian Hydro Meteorological Centre, Moscow.

5) Scenario experiments with climate models. The transformation of the snow cover properties under certain scenarios of climate change will be analysed. Several series of scenario experiments associated with greenhouse gases concentration increase will be carried out with global and local climate models to study the climatic processes connected with snow cover. Coordination by Institute of Geography, Russian Academy of Sciences.

6) Estimates of snow extreme events. The probability of extreme events, floods, permafrost thaw and the related avalanche activity in dependence of snow cover characteristics will be explored. It is expected that geographical distribution and seasonality, as well as occurrence and intensities of extreme events will change

Fig. 4: Sibirian farm house (Source: www.bajkal.irkutsk.com)

considerably. Coordination by Swiss Federal Institute of Snow and Avalanche Research, Davos.

7) Snow related economical aspects. This task includes an estimation of economic effects of the snow cover spatial and temporal variability in Northern Eurasia and its projection related to a certain future climate change. How much snow melt water will be available for agriculture and irrigation purposes? Vast territories are forest and a change in water supply will show certain impacts. Transportation in swampy territories in the Northern part of our region is only possible when soils are frozen. Alternative ways of transport should be developed. What are the likely costs of an increase in extreme climate events? The region consists of higher altitudes than Western Europe with the Alps. Could winter tourism shift towards these regions in future and what would be the economic benefits?

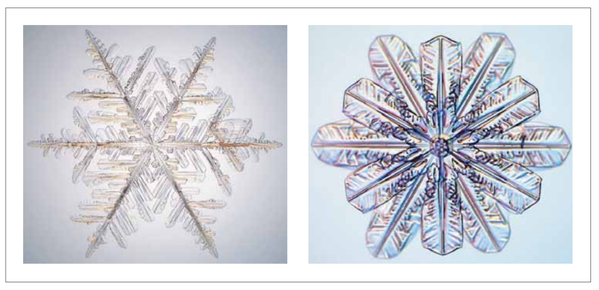

Fig. 5: Snowflakes under different environment conditions (Source: www.snowcrystals.com)

The overall coordination is undertaken by the Department of Landscape Architecture at Vienna University of Technology (TU Wien). The teams of Institute of Geology and Geophysics, Uzbekistan Academy of Sciences and the Institute of Hydrology of the Slovak Academy of Sciences are supporting various coordination tasks.

Coordination and dissemination of results

Find basic information about the participating partners, the project outline and administrative routinesproject on the project website. It is planned to invite more teams not only from Western Europe, but also from Japan and other Asian countries. *Call Identifier: 03-51-5296*
Website: www.landscape.tuwien.ac.at/intas

Photo 1: Kyrgyzstan Memorial of Salomon

Photo 2: Russian Railways

Photo 3: Estonian lake

Photo 4: Fish from Lake Bajkal

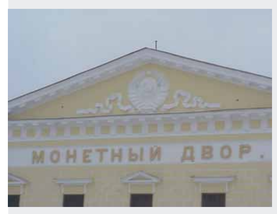

Photo 5: St. Petersburg impression

Photo 6: Symbol of Russian emperors

Photo 7: Open Landscape near St. Petersburg

Photo 8: Milk supply for urban people

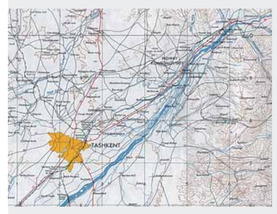

Photo 9: Area map of Tashkent

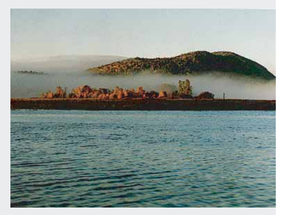

Photo 10: Forest dynamics in relation to snow

Photo 11: Land use (Turkmenistan)

Photo 12: Irrigation system in Uzbekistan

Photo 13: Member of environmental scientists network

Photo 14: Map of the Russian Empire 1820

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