ESF Network SEDIFLUX

Fourth ESF SEDIFLUX Science Meeting

Source-to-Sink-Fluxes and Sediment Budgets

in Cold Environments

October 29th – November 02nd, 2006,

Trondheim, Norway

- Third Circular (September 22nd, 2006) -

Fourth ESF SEDIFLUX Science Meeting and First Workshop of I.A.G./A.I.G. SEDIBUD:

Source-to-Sink–Fluxes and Sediment Budgets in Cold Environments

October 29th – November 02nd, 2006

Location:

Geological Survey of Norway (NGU)

Leiv Eirikssons vei 39

N-7491 Trondheim

NORWAY

http://www.ngu.no

Scientific Organizer:

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Introduction

This Fourth ESF SEDIFLUX Science Meeting and First I.A.G./A.I.G. SEDIBUD Workshop builds on three previous ESF SEDIFLUX Science Meetings held in Sauðarkrokur (Iceland) in June 2004, Clermont-Ferrand (France) in January 2005 and Durham (UK) in December 2005.

The theme of this Meeting is "Source-to-Sink-Fluxes and Sediment Budgets in Cold Environments". The Meeting will be split between scientific paper and poster presentations and workshop discussions focussed on the principle working groups of SEDIFLUX. The key aims of SEDIFLUX and SEDIBUD are to provide a framework for integrated, multidisciplinary research on sediment fluxes, sediment transfers, sediment budgets and climate change and to foster discussion, exchange and research collaboration between researchers in Europe and worldwide.

This Meeting will address the key aim of SEDIFLUX and SEDIBUD to discuss Sedimentary Source-to-Sink-Fluxes and Sediment Budgets in Cold Environments. Of special interest will be the discussion of consequences of climate change, temporal and spatial scale issues, source-to-sink correlations, exogenous-endogenous interactions, and of the potential to bridge among different geo-scientific fields as well as among geo- bio- and social sciences.

Central issues of the Meeting will be the discussion and further development of the SEDIFLUX Handbook, the development of further ideas to continue and to extend the scientific activities, which were started within SEDIFLUX within the I.A.G./A.I.G. Working Group SEDIBUD (definition of key test sites, etc.), and the development of contacts and collaborations between earth scientists in Europe and North America.

Scientific summary

Changes in climate have a major impact on Earth`s surface systems, especially in high-latitude and high-altitude cold environments. Such changes have a major impact on sediment transfer processes. However, until now quantitative analysis of sediment transfers have largely been confined to other climatic zones, therefore a properly integrated study of source-to-sink sediment fluxes and sediment budgets in cold environments is long overdue. There is a wide range of high-latitude and high-altitude cold environments that need to be studied, from high arctic/Antarctic to subarctic/subantarctic, alpine and upland sites. This provides a great opportunity to

investigate relationships between climate, vegetation cover and sedimentary transfer processes across a diverse range of cold environments, with the ability to model the effects of climate change and related vegetation cover adjustments through space-for-time substitution. There is now broad agreement among climatologists that global warming is occurring, the subject of the Science Meeting is therefore of vital interest for the whole world.

Climate change affects Earth surface systems all over the world but with arguable the greatest impact in high-latitude and high-altitude cold environments. In these areas climate change shapes earth surface processes not just by altering vegetation and human activities but also through its impact on frost penetration and duration within the ground surface layers. Climate change also exerts a strong control on cryospheric systems, influencing the nature and extent of glaciers and ice sheets, and the extent and severity of glacial and paraglacial processes. Changes within the cryosphere have major knock-on effects on glacifluvial, aeolian and marine sediment transfer systems. All of these factors influence patterns of erosion, transport and deposition of sediments. However it is a major challenge to develop a better understanding of how these factors combine to affect sedimentary transfer processes and sediment budgets in cold environments. As a starting point our baseline knowledge of the sedimentary transfer processes operating within our current climate and under given vegetation cover, as a basis for predicting the consequences of future climate changes and related vegetation cover changes needs to be extended. Only when we have these reliable models will we have fuller understanding. It is therefore necessary to collect and compare data from different cold environments, and use this to assess a range of models and approaches for researching the relationships between climate change, vegetation cover and sediment fluxes.

The primary aim is to provide an integrated quantitative analysis of sediment transfers, nutrient fluxes and sediment budgets across a range of key cold environments. Such an analysis has so far been lacking. The major focus is on the impact on sediment transfer processes in response to a variety of climate change scenarios at a scale, which incorporates sediment flux processes from source to sink. In order to perform a fully integrated study of source to sink sediment fluxes and sediment budgets in cold environments, the Science Meeting analyses the key components of weathering, chemical denudation, erosion, aeolian processes, mass movements, fluvial transfers/transport, glacial sediment transfers, and sedimentation

in lakes and coastal areas. Bringing these different weathering, erosion, transfer and sedimentation processes into one integrated study requires collaboration between a variety of specialists working on the respective subjects. The Science Meeting is bringing together both leading and young scientists in these fields, and creating a unified approach that will take the research forward within the specific focus of climate change impact on the Earth surface. One of the great strengths is the wide variety of scientific fields being harnessed, including physical geography, Quaternary geology, geology, oceanography, limnology, civil engineering, ecology, biodiversity research, social sciences. The Meeting is also considering the impact of human activity on the environmental sites being studied and how this might relate to climate change.

Meeting Programme

Sunday, October 29th, 2006

13:30 – 17:00
ESF SEDIFLUX Steering Committee Meeting (NGU Møterom 1)

17:00 – 19:00
Registration of Workshop participants (Registration desk at NGU Foyer)

18:00
Reception for Workshop participants (with pizza, beer and softdrinks) (NGU Foyer)

Monday, October 30th, 2006

08:00 – 09:00
Registration of Workshop participants (Registration desk at NGU Foyer)
(Morning Coffee will be served)

09:00 – 09:15
Opening of Fourth ESF SEDIFLUX and First I.A.G./A.I.G. SEDIBUD Workshop and Welcome to Trondheim (**Achim A. Beylich**) (NGU Møterom 2)

09:15 – 09:40
Overview of SEDIFLUX and SEDIBUD Objectives,
Report from ESF Steering Committee Meeting and
Aims for this Workshop (**Achim A. Beylich**) (NGU Møterom 2)

Paper Presentations (NGU Møterom 2):

09:40 – 10:20
Invited Keynote Lecture:
Olav Slaymaker (Vancouver): Source-to-Sink and Sediment Budget Studies in Cold Environments under the influence of Global Change

10:20 – 10:50
Review of the SEDIFLUX Process (2004 – 2006) by **Olav Slaymaker**

10:50 – 11:15
Coffee (Outside Møterom 2)

Paper Session 1
Chairs: Jukka Käyhkö and Karl-Heinz Schmidt

11:15 – 11:30
Thomas Geist (Innsbruck): Monitoring surface elevation and volume changes in glacial and periglacial environments with laser scanning technology

11:30 – 11:45
Niels Nygaard (Uppsala) & Else Kolstrup (Uppsala): Detailed geomorphological mapping: a potential with sediflux assessment

11:45 – 12:00
Vladimir R. Belyaev (Moscow): Impact of long-range pipeline construction and exploitation on geomorphic processes in cold environments

12:00 – 12:15
Andreas Kellerer-Pirklbauer (Graz), Gerhard Karl Lieb (Graz) & Michael Avian (Graz): Supraglacial debris entrainment by the Pasterze Glacier, Austria

12:15 – 12:30
Bernd Etzelmüller (Oslo): Permafrost as a governing factor for sediment availability and transport in mountainous regions – a conceptional frame work

12:30 – 12:45
Samuel Etienne (Clermont-Ferrand), Denis Mercier (Paris) & Olivier Voldoire (Clermont-Ferrand): Paraglacial evolution of Conway glacier complex foreland, Northwestern Spitsbergen, Svalbard

12:45 – 13:00
Emil M. Gachev: Starting a Programme for the analysis and monitoring of sediment transfer processes in the periglacial zone of Bulgaria (Bulgarian Periglacial Programme)

13:00 – 13:50
Lunch (NGU Kantine)

13:50 – 14:30
Invited Keynote Lecture:
Ulf Molau (Göteborg): On the interface between ecology and geomorphology

14:30 – 15:00
Experiences with ITEX and Comments on the SEDIFLUX Handbook by **Ulf Molau**

15:00 – 15:30
Coffee (Outside Møterom 2)

15:30 – 17:45
*Working Group Session 1 (*Møterom 1, 2, 3)

19:00
Dinner (Restaurant in central Trondheim)

Tuesday, October 31st, 2006

08:30 – 09:10
Invited Keynote Lecture:
Scott Lamoureux (Kingston): Watershed sediment and related fluxes: a perspective from the Canadian Arctic

09:10 – 09:45
Discussion on the development of contacts and collaborations between earth scientists in Europe and North America

Paper Session 2:
Chairs: Fiona S. Tweed and Jeff Warburton

09:45 – 10:00
Ilona Bärlund (Helsinki), J. Koskiaho (Helsinki), Sirkka Tattari (Helsinki), A. Lepistö (Helsinki) & T. Huttula (Helsinki): Utilising spatially distributed monitoring data in model based sediment transport studies – a case study from south-west Finland

10:00 – 10:15
Willibald Kerschbaumsteiner (Vienna), W. Gattermayr (Innsbruck) & H. Habersack (Vienna): Temporal and spatial variability of suspended and bedload transport and their relevance for monitoring in an highly glaciated alpine catchment in Tyrol, Austria

10:15 – 10:30
Geir Vatne (Trondheim), Øyvind Takøy Naas (Trondheim), Achim A. Beylich (Trondheim) & Ivar Berthling (Trondheim): Bed load transport in a steep mountain stream, Vinstradalen, Norway

10:30 – 11:00
Coffee (Outside Møterom 2)

11:00 – 11:15
Lena Rubensdotter (Trondheim) & Gunhild Rosqvist (Stockholm): The significance of geomorphological setting and fluvial redeposition on sediment accumulation and composition in pro-glacial lakes

11:15 – 11:30
Richard M. Johnson (Lancashire), Jeff Warburton (Durham) & Alona Armstrong (Leeds): Spatial and short-term sediment budget dynamics of a mountain torrent

11:30 – 11:45
Ivar Berthling (Trondheim), Espen Fadnes (Trondheim), Reidun Onsøien (Elverum), Achim A. Beylich (Trondheim) & Geir Vatne (Trondheim): Sediment fluxes from debris flows, Vinstradalen, Oppdal, Norway

11:45 – 12:00
Ola Magne Sæther (Trondheim), Tor Erik Finne (Trondheim), Belinda Flem (Trondheim), Eiliv Steinness (Trondheim) & Gøran Åberg (Kjeller): Estimation of anthropogenic and geogenic lead in podzolic soils using isotopes of lead

12:00 – 12:15
Marc-Henri Derron (Trondheim) & Achim A. Beylich (Trondheim): Chemical denudation in Erdalen (Nordfjord, Norway), first estimations and numerical modelling

12:15 – 12:30
John C. Dixon (Arkansas), Colin E. Thorn (Illinois), Robert G. Darmody (Illinois) & Charles E. Allen (Santa Cruz): Spatial scale and chemical weathering in Kärkevagge, Swedish Lapland: Influences on landscape evolution

12:30 – 13:15
Lunch (NGU Kantine)

13:15 – 14:00
Poster Session (Outside Møterom 2)
Chairs: Achim A. Beylich, Hugues Lantuit and Þorsteinn Sæmundsson

Achim A. Beylich (Trondheim): Sediment transfers and sediment budgets in five small catchments situated in different cold environments in Iceland, Swedish Lapland, Finnish Lapland and Norway

Achim A. Beylich (Trondheim), Samuel Etienne (Clermont-Ferrand), Bernd Etzelmüller (Oslo), Vyacheslav V. Gordeev (Moscow), Jukka Käyhkö (Turku), Hugues Lantuit (Potsdam), Andrew J. Russell (Newcastle), Þorsteinn Sæmundsson (Saudarkrokur), Karl-Heinz Schmidt (Halle/S.), Fiona S. Tweed (Stoke-on-Trend) & Jeff Warburton (Durham): The European Science Foundation (ESF) Network – Sedimentary Source-to-Sink-Fluxes in Cold Environments – (SEDIFLUX, 2004-2006)

Achim A. Beylich (Trondheim) and the SEDIBUD Team: The I.A.G./A.I.G. Working Group SEDIBUD – Sediment Budgets in Cold Environments: Introduction and Overview

Achim A. Beylich (Trondheim), Ulf Molau (Göteborg) & Carina Keskitalo (Umeå): Dynamics and Landscape Formation in Cold Environments

Robert G. Björk (Göteborg), Mats P. Björkman (Göteborg), Mats X. Andersson (Frederiksberg) & Leif Klemedtsson (Göteborg): Temporal pattern of CO_2, CH_4 and N_2O fluxes and soil microbial structure from snow-covered Alpine plant communities

Marie Chenet (Paris): The slope development in South-East of Iceland: a comparison between two recently deglaciated slopes around the Skaftafellsjökull Glacier

Armelle Decaulne (Clermont-Ferrand) & Þorsteinn Sæmundsson (Saudarkrokur): Reconstructing spatio-temporal patterns of snow-avalanche activity, and related debris transfer, using dendrogeomorphological analysis – preliminary results from northern Iceland

Regula Frauenfelder (Oslo): Debris transport by rockglaciers – a quantitative estimate for a small Alpine study site

Kari Grøsfjeld (Trondheim) & Jochen Knies (Trondheim): Modern dinocysts reflecting the influence of the Gulf Stream System in the Barents Sea, offshore Spitsbergen

Louise Hansen (Trondheim), Valentin Burki (Trondheim), Knut Stalsberg (Trondheim), Marc-Henri Derron (Trondheim), Raymond Eilertsen (Trondheim), Ola Fredin (Trondheim), Eiliv Larsen (Trondheim), Astrid Lysså (Trondheim), Atle Nesje (Bergen) & Jan Fredrik Tønnesen (Trondheim): Towards a quantification of long-term valley-fill accumulation of a deglaciated fjord-valley system, Nordfjord, Norway

Helgi Páll Jónsson (Turku): Annually laminated sediments studies from lake Pohjajärvi, Eastern Finland

Andrzej Kostrzewski (Poznan), Andrzej Mizgajski (Poznan) & Zbigniew Zwolinski (Poznan): Typology of cross-boundary fluxes of mineral matter between geoecosystems of Ebbadalen, Central Spitsbergen

Hugues Lantuit (Potsdam), N. Couture (Montréal) & Paul Overduin (Potsdam): ACD II – Arctic Coastal Dynamics II – New project, new ambitions and possible connections with SEDIFLUX

Malgorzata Mazurek (Poznan), Renata Paluszkiewicz (Poznan) & Zbigniew Zwolinski (Poznan): The geoecosystem of small tundra lakes on terrace levels of the Petunia Bay coast (Billefjorden, Central Spitsbergen)

Hanna Ridefelt (Uppsala): Spatial variability in solifluction processes in the Abisko region, northern Sweden

Erwan Roussel (Clermont-Ferrand): Post Little Ice Age changes in the proglacial fluvial pattern of the Morsarjökull (South of Iceland, Vatnjajökull)

Inger-Lise Solberg (Trondheim), Louise Hansen (Trondheim) & Marc-Henri Derron (Trondheim): Long-term erosion of a Norwegian fjord-valley dominated by marine deposits

Witold Szczucinski (Poznan), Georg Schettler (Potsdam) & Marek Zajaczkowski (Sopot): Sediment accumulation rates, geochemistry and provenance in a complex high Arctic fjord, Hornesund, Svalbard

Ola Magne Sæther (Trondheim) & Gøran Åberg (Kjeller): Strontium isotope systematics in the Oppstryn drainage basin, western Norway

Susan Wache (Halle/S.) & Achim A. Beylich (Trondheim): Investigations on the dynamics and sediment budget of a braided river system in Erdalen, Nordfjord, Western Norway

Paper Session 3
Chairs: Samuel Etienne and Bernd Etzelmüller

14:00 – 14:15
Etienne Cossart (Paris) & Monique Fort (Paris): Consequences of landslide dams on alpine river valleys: examples and typology from the French Southern Alps

14:15 – 14:30
Monique Fort (Paris): How does the scale of landslide dams affect the sediment budgets? A perspective from the Himalayas

14:30 – 14:45
Valentin Burki (Trondheim) & Eiliv Larsen (Trondheim): Glacially reworked sediments in Bødalen, western Norway

14:45 – 15:00
Witold Szczucinski (Poznan), Jan Scholten (Monaco) & Marek Zajaczkowski (Sopot): Impact of glaciers retreat on sediment accumulation rates in fjords – changes following "Little Ice Age" in Billefjorden, Svalbard

15:00 – 15:15
Jukka Käyhkö (Turku), Petteri Alho (Turku), Elina Haapala (Turku) & Eini Puoskari (Turku): Reconstruction of the largest Holocene jökulhlaup within Jökulsá á Fjöllum, NE Iceland, based on hydraulic modelling and sedimentary field evidence

15:15 – 15:30
Dag Ottesen (Trondheim) and Leif Rise (Trondheim): Volume calculations for glacial erosion in MidNorway during the last 3 million years and large-scale depositional pattern of the corresponding shelf

15:30 – 15:50
Coffee (Outside Møterom 2)

15:50 – 17:15
Working Group Session 2

17:15 – 18:15
Conclusions and discussion from the Fourth ESF SEDIFLUX and First I.A.G./A.I.G. SEDIBUD Workshop:
Comments and recommendations by ***Invited Guests, Experts and Keynote Speakers***

18:15 – 18:30
Closure of the Meeting by Steering Committee Chair (**Achim A. Beylich**)

20:00
Conference Dinner (Restaurant in central Trondheim)

Wednesday, November 01st, 2006

09:00 – 16:00
Excursion (including Lunch at 12:00 at Tyholt Tower):
Trondheim and Surrounding Areas

Field Guides:
Lars Olsen (Excursion Organiser) (NGU)
Harald Sveian (NGU)
Geir Vatne (NTNU, Department of Geography)

Guides: *Parts 1-3: Harald Sveian and Lars Olsen, NGU, and **Part 4: Geir Vatne, NTNU

The excursion is planned to include several topics from the late- and postglacial period. Thematically, the excursion will be separated in four parts, *i.e. (1) deglaciation history, (2) glacial rebound, (3) clay slide history and (4) recent fluvial environment.* The transportation during the excursion will be carried out by bus. The final selection of sites will be done when more is known about the expected weather conditions during the excursion.

Deglaciation history (1) and glacial rebound (2)

Ice marginal deposits from several lateglacial readvances are recorded in the Trondheim region. Some of these, both from the main Younger Dryas (YD) ice advance (10600 –10900 ^{14}C-yr BP) as well as younger YD ice advances will be visited during the excursion.
The glacial isostatic conditions lead to a high relative late-/postglacial sea level in the Trondheim region, and a mean altitude of c. 175 m asl is recorded for the lateglacial marine limit in this area. The glacial rebound slowed down during the considerable ice growth in the initial part of YD, and this lead to formation of distinct YD shore lines, both in unconsolidated sediments and in bedrock. The rebound gradient is supposed to be as high as 1.4 m/km since mid YD.
Examples of shore lines and deltaic terraces corresponding to high relative sea levels will be given.

Clay slide history (3)

Numerous scars form clay slides are recorded in this region, and some of the historic slides are well described in the literature. The huge clay slide in Verdalen (90 km to the northeast of Trondheim) in 1893 is perhaps the best known such slide, and was a catastrophy that lead to more than 100 human casualties.
Examples of old clay slide scars, both small and km-wide scars will be demonstrated during the excursion.

Fluvial environment (4)

The excursion will examine the river Nidelva, draining through central Trondheim, which has caused many of the historical quick clay slides in Trondheim. During the last years several deep scour hollows, extending well below sea level, has been discovered in the river bed, that may cause slope instabilities and has the potential to initiate quick clay slides. Department of Geography at NTNU has initiated a research project to study selected scour hollows. The excursion will visit the selected field sites in Nidelva, and field methods and preliminary results of the study will be presented and discussed.

Presentations

Talks should be 10-12 minutes (giving 3-5 minutes for discussion). Both Power Point (Version Office 2003) and Overhead will be available in the NGU Lecture Hall. It is also possible to show slides. Speakers are kindly asked to bring their presentations on a USB memory stick or a CD (no own laptops can be connected in the Lecture Hall).
Posters should not be larger than 80 cm in width and 120 cm in length.
All speakers and poster presenters are kindly asked to deliver their presentations (USB memory stick, CD, poster) when they register at the registration desk (NGU Foyer).

Publications

The accepted Abstracts of all accepted Paper and Poster Presentations will be published in the *NGU Reports Series.*

The two Journals *Zeitschrift für Geomorphologie* and *Norwegian Journal of Geography (Norsk Geografisk Tidsskrift)* have agreed in principle (given adequate numbers of peer reviewed and accepted full papers) to publish special issues arising from this Meeting.

The deadline for submission of full papers will be in February 2007 (more detailed information will be provided during the Meeting).

Travelling, Accommodation and Costs of the Meeting

Participants of the Meeting are kindly asked to book their accommodation in Trondheim by themselve.

Detailed information on travelling to Trondheim and accommodation (different price levels) in Trondheim is available at http://www.trondheim.no/engelsk (see: "How to get here" and "Tourist Info, Accommodation"). The Meeting will be sponsored by the European Science Foundation (ESF). There are no conference fees and all costs for the Reception, Coffee Breaks, Lunches and Dinners during the Meeting as well as for the Excursion (including Lunch) will be covered and therefore for free for Workshop Participants. After the Meeting part of the expenses for travelling and accommodation will be reimbursed to workshop participants. The final amount of reimbursement per participant will be dependent on the final total number of workshop participants (ESF is supporting the Meeting with a fixed total amount).

If you have questions related to travelling, accommodation and costs of the Meeting please contact Achim.Beylich@ngu.no (Phone: ++47 73 90 4117).

Further details of the ESF SEDIFLUX Network can be found at:
http://www.ngu.no/sediflux.

Further details of the I.A.G./A.I.G. Working Group SEDIBUD can be found at:
http://www.geomorph.org/wg/wgsb.html

We are looking forward to welcoming you in Trondheim.

On behalf of the SEDIFLUX and SEDIBUD Steering Committees and the local Organizing Committee

Yours sincerely,

Achim A. Beylich

Scientific Organizer of the Meeting
Coordinator of SEDIFLUX
Chair of SEDIBUD

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