

Annual Report 2009

I.A.G./A.I.G. SEDIBUD Sediment Budgets in Cold Environments Working Group (2005-2013)

*I.A.G./A.I.G. Working Group SEDIBUD –
Sediment Budgets in Cold Environments*
<http://www.geomorph.org/wg/wgsb.html>

SEDIBUD Steering Committee

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Focus of the SEDIBUD Working Group:

Projected climate change in cold regions is expected to alter melt season duration and intensity, along with total precipitation, the frequency of extreme events and the balance between snowfall and rainfall. Similarly, changes to the thermal balance are expected to reduce the extent of permafrost and seasonal ground frost and increase active layer depths. These effects will change surface environments in cold environments and alter the flux of sediment, solutes and nutrients, but the absence of quantitative data and analysis to understand the sensitivity of surface environments are acute in cold regions.

The I.A.G./A.I.G. SEDIBUD programme (founded in 2005) is addressing this key knowledge gap. The central research question of this global programme is to

Assess the contemporary sediment fluxes in cold environments, with emphasis on both particulate and dissolved components.

Building on the ESF Network SEDIFLUX, SEDIBUD has developed to a global group of researchers with defined field research sites located in polar and alpine regions in the northern and southern hemisphere.

SEDIBUD has successfully developed a key set of primary research data requirements intended incorporate results from these varied projects and allow quantitative analysis across the network. Defined SEDIBUD Key Test Sites (catchments) report annual climate conditions as well as total annual runoff, annual yield of suspended sediments and annual solute yields corrected by atmospheric inputs as well as information on other relevant surface processes. To support these efforts, the SEDIFLUX Manual and key Protocol have been produced to establish common methods and data standards.

SEDIBUD currently (by January 20, 2010) has identified 38 Key Test Sites (see list of Sites at <http://www.geomorph.org/wg/wgsb.html>) with the goal to extend this network to about 40-45 sites that cover the widest range of cold environments possible. Collected annual data from currently 28 of these Sites (see list of Sites and Table 1 below) are integrated in the SEDIBUD Metadata Database.

SEDIBUD Key Test Sites providing Annual Data (according to Table 1, see below) for the SEDIBUD Metadata Database (List of SEDIBUD Key Test Sites by January 20, 2010)

Laguna Potrok Aike (Argentina)
Pasterze (Austria)
Musala area (Bulgaria)
Cape Bounty (Canada)
Kidisjoki (Finland)
Tana catchment (Finland/Norway)
Reintal (Germany)
Kangerlussuaq (Greenland)
Mittivakkat glacier catchment (Greenland)
Zackenbergl (Greenland)
Austdalur (Iceland)
Hrafnadalur (Iceland)
Bleiksmýrardalur (Iceland)
Botn in Dyrafjörður (Iceland)
Fnjóskadalur (Iceland)
Orravatnsrustnir (Iceland)
Tindastoll (Iceland)

East Dabka Watershed (Kumaon Himalaya) (India)

Godley Valley (New Zealand)

Erdalen (Norway)

Bødalen (Norway)

Vinstradalen (Norway)

Scottelva (Svalbard) (Norway)

Mezen (Russia)

Petuniabukta (Svalbard) (Norway)

Kärkevagne (Sweden)

Latnjavagge (Sweden)

Moore House (UK)

Table 1. Required Annual Data from SEDIBUD Key Test Sites.

| <u>Name of SEDIBUD Key Test Site:</u> | <u>Period of investigations (years):</u> (Hydrological Year (HY) or Calendar Year (CY); Published Data (PD) or Unpublished Data (UPD)) |
|---|---|
| Mean annual temperature (°C): | |
| Total annual precipitation [mm]: | |
| Total annual runoff [mm]: | |
| Annual suspended sediment yield [$t\ km^{-2}$]: | |
| Annual solute yield (atmospherically corrected) [$t\ km^{-2}$]: | |

SEDIBUD Session on SEDIMENT BUDGETS at the 7th International Conference on Geomorphology (ANZIAG), 6-11 July 2009, Melbourne, Australia (find details at <http://www.geomorphology2009.com>)

SEDIBUD Workshop Report 2009 (including information on further steps)

Quantitative analysis of sedimentary fluxes and budgets in changing cold climate environments: Scaling issues, new techniques, modelling and data management

**SEDiment BUDgets in cold environments (SEDIBUD) Fourth Workshop;
Queen`s University, Biological Station, Kingston, Ontario, Canada, 13-16
October 2009**

Achim A. Beylich, Geological Survey of Norway (NGU), Quaternary Geology & Climate group & Norwegian University of Science and Technology (NTNU), Department of Geography, Trondheim, Norway (achim.beylich@NGU.NO)
Scott F. Lamoureux, Queen`s University, Department of Geography, Kingston, Canada (scott.lamoureux@queensu.ca)

The I.A.G./A.I.G. Working Group SEDIBUD (SEDiment BUDgets in cold environments), founded in 2005, includes currently about 400 scientists worldwide interested in high-latitude and high-altitude sedimentary fluxes and budgets and Holocene environmental change. The major aim of SEDIBUD is to better understand Earth surface systems processes and modification in relation with climate change, through the observation and quantification of past and contemporary weathering, erosion, transport and deposition of sediments and fluxes.

From October 13 to 16, 2009, 18 scientists from 8 different countries met during a Workshop held at the Biological Station of Queen`s University, Kingston, Canada. The Workshop was hosted by Queen`s University, Department of Geography and organised by Scott F. Lamoureux. It was composed of paper and poster sessions covering studies on sedimentary fluxes and budgets in a wide range of different cold climate environments as well as extended working group discussions and a field excursion. The following central issues were addressed during the workshop discussions:

- (i) Scaling issues within sediment budget studies,
- (ii) The application of new techniques within sediment budget studies,
- (iii) Modelling, and
- (iv) Data management.

Decisions on a number of forthcoming activities were taken:

- The SEDIBUD Hypotheses will be critically reviewed and, if needed, revised
- A Second Edition of the SEDIBUD Fact Sheets Volume will be prepared and published (first edition June, 2008)
- The SEDIBUD Key Test Site Database will be updated and extended
- A Database with SEDIBUD related publications by SEDIBUD members will be established
- In addition to annual data, high-resolution data (precipitation, temperature, runoff, solute and suspended sediment concentrations and yields) will be collected and compiled from selected SEDIBUD Key Test Sites
- Individual projects and scientific papers developed within SEDIBUD (using datasets from SEDIBUD Key Test Sites and aiming at SEDIBUD key questions will be encouraged
- A Special Issue to ESPL with contributions from the Fourth SEDIBUD Workshop in Kingston will be published
- The Fifth SEDIBUD Workshop will take place in Iceland in the second half of September 2010

Further information on the Workshop (Abstract Volume) is found at <http://www.geomorph.org/wg/wgsb.html>.



Participants of the Fourth SEDIBUD Workshop in Kingston, Canada, October 13-16, 2009.

Expenditure of funds

The funding provided by I.A.G./A.I.G. in 2009 was spent for the organisation of the Fourth SEDIBUD Workshop in Kingston, Ontario, Canada, October 13-16, 2009.

SEDIBUD Website

The SEDIBUD Website (<http://www.geomorph.org/wg/wgsb.html>) is frequently updated and provides detailed information on SEDIBUD Activities as well as relevant SEDIBUD Documents (SEDIBUD Objective, SEDIBUD Newsletters, Protocols, Database, etc.). All activities in 2009 are listed there.

SEDIBUD Publications (including all SEDIBUD Special Issues and SEDIBUD framework papers), Reports and Material (by January 20, 2010):

Beylich, A.A. (Ed.) (2006): Fourth ESF SEDIFLUX Science Meeting & First Workshop of I.A.G./A.I.G. SEDIBUD: Source-to-Sink-Fluxes and Sediment Budgets in Cold Environments. October 29 – November 2, 2006, Trondheim, Norway. *NGF Abstracts and Proceedings of the Geological Society of Norway*, 4, 2006. 85pp.

Beylich, A.A. (Ed.) (2006): Fourth ESF SEDIFLUX Science Meeting & First Workshop of I.A.G./A.I.G. SEDIBUD. *NGU Report 2006.069*. 85pp.

Beylich, A.A. (2008): Sediment Budgets in Cold Environments. EDITORIAL. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, **62**(2): 49.

Beylich, A.A. (Ed.) (2008): Sediment Budgets in Cold Environments. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, **62**(2).

Beylich, A.A. (2008): Sediment budgets in cold environments: The global SEDIBUD programme. *33rd International Geological Congress 2008, Oslo, Norway. Abstracts*.

Beylich, A.A. and the SEDIBUD Team (2006): The I.A.G./A.I.G. Working Group SEDIBUD – Sediment Budgets in Cold Environments: Introduction and Overview. *NGF Abstracts and Proceedings of the Geological Society of Norway*, **4**: 26-27.

Beylich, A.A. and the SEDIBUD Team (2008): The global SEDIBUD program: Sediment budgets in cold environments. *Náttúrustofa Norðurlands vestra NNV-2008-002, April 2008*: 79-80.

Beylich, A.A. and the SEDIBUD Team (2006): The I.A.G./A.I.G. Working Group SEDIBUD – Sediment Budgets in Cold Environments: Introduction and Overview. *NGU Report 2006.069*: 26-27.

Beylich A.A. and the SEDIBUD Team (2008): Sediment Budgets in Cold Environments: The global SEDIBUD programme. *3. Mitteleuropäische Geomorphologietagung, Salzburg, 23.-28.09.2008. Abstracts*.

Beylich, A.A. and the SEDIBUD Team (2009): Sediment Budgets in Cold Environments – the SEDIBUD programme. *NGF Abstracts and Proceedings*, **1**, 2009: 8-9.

Beylich, A.A. and the SEDIBUD Team (2009): Quantitative analysis of sediment budgets in cold environments: The global SEDIBUD programme. *Geophysical Research Abstracts*, Vol. **11**, EGU2009, 2009.

Beylich, A.A. and the SEDIBUD Team (2009): Sediment Budgets in Cold Environments – The SEDIBUD Programme. *Turku University Department of Geography Publications B 14*: 192.

Beylich, A.A. & S.F. Lamoureux (Eds.) (2010): Sedimentary Fluxes and Budgets in Changing Cold Environments: Quantitative Analysis and Scaling Issues. *Geografiska Annaler, A. Special Issue* (in press).

Beylich, A.A. & S.F. Lamoureux (2010): The Third Workshop of the I.A.G./A.I.G. SEDIBUD Programme – Sediment Budgets in Cold Environments: Sediment Fluxes and Sediment Budgets in Changing High-

Latitude and High-Altitude Cold Environments. Editorial. *Geografiska Annaler, A. Special Issue* (in press).

Beylich, A.A. & S.F. Lamoureux (2010): Coordinated analysis and quantification of sedimentary fluxes and budgets in cold environments: The SEDIBUD Programme. *Geophysical Research Abstracts*, Vol. **12**, EGU2010.

Beylich, A.A. & S.F. Lamoureux (2010): The Global SEDIBUD Programme: Coordinated Study and Quantification of Sedimentary Fluxes and Budgets in Changing Cold Climate Environments. *International Polar Year Oslo Science Conference, Polar Science – Global Impact, 8-12 June 2010, Oslo, Norway*. Abstracts.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2007): Coordinated quantitative studies on sediment fluxes and sediment budgets in changing cold environments – examples from three SEDIBUD key test areas in Canada, Iceland and Norway. *Landform Analysis*, Vol. **5**: 11-12.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2007): Sediment fluxes and sediment budgets in changing cold environments – examples from coordinated quantitative studies in three SEDIBUD key test areas in Canada, Iceland and Norway. *NGU Report*, **2007.052**: 26-27.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (Eds.) (2007): Second Workshop of I.A.G./A.I.G. SEDIBUD – Sediment Budgets in Cold Environments: Sediment Fluxes and Sediment Budgets in Changing High-Latitude & High-Altitude Cold Environments. *NGU Report*, **2007.052**. 57pp.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2008): SEDIBUD – Sediment budgets in cold environments: Introduction. *Zeitschrift für Geomorphologie N.F.*, **52** (1): 1-2.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2008): Quantitative analysis of source-to-sink-fluxes and sediment budgets in changing cold environments – the global SEDIBUD program. *Geophysical Research Abstracts*, Vol. **10**, EGU2008-A-01652, 2008.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2008): The global I.A.G./A.I.G. SEDIBUD (Sediment Budgets in Cold Environments) programme: Introduction and overview. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, **62**(2): 50-51.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (Eds) (2008): Third I.A.G. / A.I.G. SEDIBUD Workshop, Boulder, U.S.A.: Sediment Fluxes and Sediment budgets in Changing High-Latitude and High-Altitude Cold Environments. *NGU Report*, **2008.058**: 41pp.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (Eds.) (2009): Special Section – Including Selected Presentations from the Second SEDIBUD

Workshop, Abisko, Sweden, September 2007. *Arctic, Antarctic and Alpine Research*, **41(1)**: 1-87.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2009): Sediment budgets in cold environments – The SEDIBUD Program. Introduction. *Arctic, Antarctic and Alpine Research*, **41(1)**: 1-2.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (accepted): Developing quantitative frameworks for studies on sedimentary fluxes and budgets in changing cold environments. *Polish Polar Research*.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (2009): Quantitative analysis of sediment budgets in cold environments: The I.A.G./A.I.G. SEDIBUD programme. *7th International Conference on Geomorphology, 6 – 11 July 2009, Melbourne, Australia. Conference Abstracts*.

Beylich, A.A., Lamoureux, S.F. & A. Decaulne (Eds.) (2009): Fourth I.A.G./A.I.G. SEDIBUD Workshop, Kingston, Ontario, Canada: Quantitative analysis of sedimentary fluxes and budgets in changing cold environments: Scaling issues, new techniques, modelling and data management. *NGU Report 2009.050*. 41pp.

Beylich, A.A., Lamoureux, S.F., Decaulne, A., Dixon, J.C., Orwin, J.F., Otto, J.-Ch., Overeem, I., Sæmundsson, Th, Warburton, J. & Z. Zwolinski (2009): Sediment Budgets in Cold Environments: The I.A.G./A.I.G. SEDIBUD programme. *NGU Report 2009.050*: 20-21.

Beylich, A.A., Lamoureux, S.F., Decaulne, A., Dixon, J.C., Orwin, J.F., Otto, J.-Ch., Overeem, I., Sæmundsson, Th., Warburton, J. & Z. Zwolinski (2010): Sedimentary fluxes and budgets in changing cold environments: The global I.A.G./A.I.G. Sediment Budgets in Cold Environments (SEDIBUD) Programme. *Geografiska Annaler, A. Special Issue* (in press).

Beylich, A.A., Lamoureux, S.F., Decaulne, A., Dixon, J.C., Orwin, J.F., Overeem, I., Sæmundsson, P., Warburton, J. & Z. Zwolinski (2008): Sediment Budgets in Cold Environments: The I.A.G. / A.I.G. SEDIBUD programme. *NGU Report, 2008.058*: 19-20

Beylich, A.A. & K.-H. Schmidt (Eds.) (2008): Sedimentary source-to-sink-fluxes and sediment budgets in changing cold environments. *Zeitschrift für Geomorphologie N.F.*, **52** (1).

Beylich A.A. & J. Warburton (Eds.) (2007): Analysis of Source-to-Sink-Fluxes and Sediment Budgets in Changing High-Latitude and High-Altitude Cold Environments. SEDIFLUX Manual. First Edition. *NGU Report, 2007.053*. 158pp.

Decaulne, A., Beylich, A.A., Lamoureux, S.F., Caine, N.T. & I. Overeem (2008): Sediment fluxes and sediment budgets in changing high-latitude and high-altitude cold environments. *Sediment Budgets in Cold Environments*

(SEDIBUD) Third Workshop; Mountain Research Station, INSTAAR, Boulder, Colorado, 9-13 September 2008. *IAG/AIG Newsletter* No. **24** (3/2008).

Lamoureux, S.F., Beylich, A.A. & A. Decaulne (2007): Sediment Fluxes and Budgets in Changing High-Latitude and High-Altitude Cold Environments. Sediment Budgets in Cold Environments (SEDIBUD) Second Workshop; Abisko, Sweden, 15-19 September 2007. *EOS, Transactions, American Geophysical Union, Volume 88 (52), 25 December 2007*: 580.

Lamoureux, S.F., Decaulne, A. & A.A. Beylich (Eds.) (2008): SEDIBUD Test Sites: Fact Sheets. 1st Edition, June 2008. *ID 3111308, www.lulu.com*.

Lantuit, H., Beylich, A.A. & S.F. Lamoureux (2007): Sediment budgets in coastal settings: On the necessity to create a common framework for SEDIBUD and ACCO / Net activities during the International Polar Year (IPY). *NGU Report, 2007.052*: 41.

Orwin, J.F., Lamoureux, S.F., Warburton, J. & A.A. Beylich (2010): A framework for characterising fluvial sediment fluxes from source to sink in cold environments. *Geografiska Annaler, A. Special Issue* (in press)

On behalf of the SEDIBUD Steering Committee,

Achim A. Beylich
Chair of SEDIBUD

Trondheim, January 20, 2010