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# Sediment Budgets in Cold Environments—The SEDIBUD Program. Introduction

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Projected climate change in cold regions is predicted to alter melt season duration and intensity, total precipitation, and the balance between snowfall and rainfall (ACIA, 2005). Similarly, changes to the thermal balance are expected to reduce the extent of permafrost and increase active layer depth (Lawrence and Slater, 2005). These effects will undoubtedly change surface water environments in cold regions and alter the flux of sediment, nutrients, and solutes, but the absence of data and analysis to understand the sensitivity of surface water environments are acute in cold regions.

The SEDIBUD (Sediment Budgets in Cold Environments) working group of the International Association of Geomorphologists (I.A.G./A.I.G.) has been formed to address this key knowledge gap (<http://www.geomorph.org/wg/wgsb.html>). The Steering Committee of this international program is composed of scientists from eight countries: Achim A. Beylich (Chair) (Norway), Armelle Decaulne (Secretary) (France), John C. Dixon (U.S.A.), Scott F. Lamoureux (Vice-Chair) (Canada), John F. Orwin (New Zealand), Irina Overeem (U.S.A.), Þorsteinn Sæmundsson (Iceland), Jeff Warburton (U.K.), and Zbigniew Zwolinski (Poland).

The central research objective of this global program is to *assess the contemporary sediment fluxes in cold climates, with emphasis on both particulate and dissolved components*. Initially formed as European Science Foundation (ESF) Project SEDIFLUX (2004–2006), SEDIBUD has expanded to include a global group of researchers with a network of field research sites in polar and alpine regions in the northern and southern hemispheres. SEDIBUD has developed a standard set of primary research data requirements intended to allow data analysis across the network of

sites. Sites must report annual climate conditions as well as total discharge and particulate and dissolved fluxes in combination with relevant catchment parameters. To support these efforts, the First Edition of the SEDIFLUX Manual (Beylich and Warburton, 2007; <http://www.geomorph.org/wg/wgsb.html>) was produced to establish common methods and data standards. Ongoing revision continues to improve the manual so that it facilitates inter-comparison of research results. SEDIBUD currently has identified 38 Key Test Sites described in a SEDIBUD Key Test Sites Database (available at <http://www.geomorph.org/wg/wgsb.html>) and a SEDIBUD Key Sites Fact Sheets Volume (Lamoureux et al., 2008; <http://www.geomorph.org/wg/wgsb.html>) with a goal to extend the network to at least 40–45 sites that cover the widest range of cold environments possible. Additionally, it is expected that collaboration within the group will act as a catalyst to develop new sites in underrepresented regions.

This special issue of *Arctic, Antarctic, and Alpine Research* produced by the SEDIBUD group includes selected presentations from the Second SEDIBUD workshop that was held in Abisko, Sweden, 15–19 September 2007 (Beylich et al., 2007). These contributions represent different approaches to sediment budget work and represent a wide range of cold region environments. The paper by Beylich and Kneisel presents an analysis of Holocene and contemporary sedimentary fluxes and budget for a catchment in Eastern Iceland. Carrivick and Rushmer investigate proglacial geomorphology and sediment assemblages at Franz Josef Glacier and Fox Glacier in New Zealand. The paper by Decaulne et al. presents postglacial sediment records from colluvial accumulations in northwestern and northern Iceland. Etzelmüller et al. discuss in their paper the distribution of mountain permafrost and



Participants of the Second SEDIBUD Workshop in Abisko (Swedish Lapland), 15–19 September 2007. From left to right: Jukka Käyhkö, Ola Fredin, Grzegorz Rachlewicz, Fiona S. Tweed, Bernd Etzelmüller, John F. Orwin, Nikita I. Tananaev, Dorothea Gintz, Scott F. Lamoureux, Hanna Ridefelt, Ulf Molau, Jeff Warburton, Achim A. Beylich, John C. Dixon, Thorsteinn Sæmundsson, Armelle Decaulne, Helgi P. Jonsson (photo by Katja Laute).

its influence over sedimentary fluxes and budgets in steep environments of the northern hemisphere. The role of permafrost disruption on sediment fluxes is investigated by Lamoureux and Lafrenière, who report on the fluvial impact of extensive recent permafrost active layer detachments in a Canadian High Arctic watershed. The paper by Morche and Laute focuses on channel response to a dam-break flood event in an Alpine river in the Bavarian Alps, Germany, while the paper by Streletskaya et al. provides results from studies on erosion of sediment and organic carbon from the Kara Sea coast.

These SEDIBUD papers represent a cross section of the SEDIBUD research underway in diverse cold regions, with an emphasis on quantifying particulate and solute fluxes in river systems, and integrating sediment sources and sinks to produce sediment budgets suitable for comparison among sites. Similarly, efforts to document the impact of changing river and landscape conditions contribute to improving the understanding of how cold regions will respond to current and projected environmental change.

We would like to express our thanks to the authors and reviewers for their efforts and valuable contributions.

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