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The I.A.G./A.I.G. SEDIBUD (Sediment Budgets in Cold Environments) Program (2005 - 2017): Key activities and outcomes

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Amplified climate change and ecological sensitivity of high-latitude and high-altitude cold climate environments has been highlighted as a key global environmental issue. Projected climate change in largely undisturbed cold regions is expected to alter melt-season duration and intensity, along with the number of extreme rainfall events, total annual precipitation 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 combined effects will undoubtedly change Earth surface environments in cold regions and will alter the fluxes of sediments, solutes and nutrients. However, the absence of quantitative data and coordinated analysis to understand the sensitivity of the Earth surface environment are acute in cold regions. Contemporary cold climate environments generally provide the opportunity to identify solute and sedimentary systems where anthropogenic impacts are still less important than the effects of climate change. Accordingly, it is still possible to develop a library of baseline fluvial yields and sedimentary budgets before the natural environment is completely transformed.

The SEDIBUD (Sediment Budgets in Cold Environments) Program, building on the European Science Foundation (ESF) Network SEDIFLUX (Sedimentary Source-to-Sink Fluxes in Cold Environments, since 2004) was formed in 2005 as a new Program (Working Group) of the International Association of Geomorphologists (I.A.G./A.I.G.) to address this still existing key knowledge gap. SEDIBUD (2005-2017) has currently about 400 members worldwide and the Steering Committee of this international program is composed of eleven scientists from ten different countries.
The central research question of this global program is to:

Assess and model the contemporary sedimentary fluxes in cold climates, with emphasis on both particulate and dissolved components.

Research carried out at 56 defined SEDIBUD key test sites (selected catchment systems) varies by scientific program, logistics and available resources, but typically represent interdisciplinary collaborations of geomorphologists, hydrologists, ecologists, permafrost scientists and glaciologists with different levels of detail. SEDIBUD has developed a key set of primary research data requirements intended to incorporate results from these varied projects and allow quantitative analysis across the program. Defined SEDIBUD key test sites provide field data on annual climatic conditions, total discharge and particulate and dissolved fluxes and yields as well as information on other relevant denudational Earth surface processes. A number of selected key test sites are providing high-resolution data on climatic conditions, runoff and solute and sedimentary fluxes and yields, which - in addition to the annual data - contribute to the SEDIBUD metadata database.

To support these coordinated efforts, the SEDIFLUX manual and a set of framework papers and book chapters have been produced to establish the integrative approach and common methods and data standards. Comparable field-datasets from different SEDIBUD key test sites are analyzed and integrated to address key research questions of the SEDIBUD program as defined in the SEDIBUD working group objective.

A key SEDIBUD synthesis book was published in 2016 by the group and a synthesis key paper is currently in preparation. Detailed information on all SEDIBUD activities, outcomes and published products is found at http://www.geomorph.org/sedibud-working-group/.