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Monitoring of Sedimentary Fluxes in Cold Environments: The SEDIBUD (Sediment Budgets in Cold Environments) Programme

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Projected climate change in 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 effects will undoubtedly change surface environments in cold regions and alter the fluxes of sediments, nutrients and solutes, but the absence of quantitative data and coordinated geomorphic process monitoring and analysis to understand the sensitivity of the Earth surface environment is acute in cold climate environments.

The International Association of Geomorphologists‘ (I.A.G. / A.I.G.) SEDIBUD (Sediment Budgets in Cold Environments) Program (2005 - 2017) is addressing this existing key knowledge gap. The central research question of this global group of scientists is to:

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

Research carried out at each of the ca. 50 defined SEDIBUD key test sites varies by program, logistics and available resources, but typically represent interdisciplinary collaborations of geomorphologists, hydrologists, ecologists, permafrost scientists and glaciologists. SEDIBUD has developed manuals and protocols (SEDIFLUX Manual) with a key set of primary surface process monitoring and research data requirements to incorporate results from these diverse projects and allow coordinated quantitative analysis across the program.

Defined SEDIBUD key tasks for the coming years include
(i) The continued generation and compilation of comparable longer-term datasets on contemporary sedimentary fluxes and sediment yields from SEDIBUD key test sites worldwide,
(ii) The continued extension of the SEDIBUD metadata database with these datasets,
(iii) The testing of defined SEDIBUD hypotheses (available online, see below) by using datasets continuously compiled in the SEDIBUD metadata database,
(iv) The publication of a SEDIBUD book (synthesis book).

The title of the currently prepared SEDIBUD book is Source-to-sink fluxes in undisturbed cold environments. The synthesis book will compile results from longer-term studies conducted at undisturbed Arctic, Antarctic and Alpine SEDIBUD key test sites. A synthesis chapter will integrate field data from the different study sites and shall provide a better understanding of
(i) The key environmental drivers and rates of contemporary solute and sedimentary fluxes in largely undisturbed cold climate environments and (ii) Possible effects of projected climate change on solute and sedimentary fluxes in cold climate environments.

Detailed information on the SEDIBUD Program, SEDIBUD meetings, publications and online documents and databases is available at the SEDIBUD website under http://www.geomorph.org/wg/wgsb.html.