Piotrowski, Jan A.[1,2]; Wysota, Wojciech[2]; Weckwerth, Piotr[2]; Hermanowski, Piotr[3]

Water at the ice-bed interface and below: processes, sediments and landforms

[1]*Department of Geoscience, Aarhus University, Aarhus, Denmark;*
[2]*Faculty of Earth Sciences and Spatial Management, Nicolaus Copernicus University, Toruń, Poland;*
[3]*Institute of Geology, Adam Mickiewicz University, Poznań, Poland;*
jan.piotrowski@geo.au.dk

Subglacial water is a critical element of the glacial system modulating the nature of interactions between ice sheets and their beds. Its impact can be deciphered using the sedimentary and geomorphological record of past glaciations coupled with numerical simulations. Water pressurized by the overlying ice reduces the strength of coupling between the glacier and the lithosphere below, which accelerates the flow of ice and reduces its stability. Modulated by the ice surface slope, the water will be driven to the ice margin either through distributed or channelized drainage systems at the ice-bed interface, or it will recharge the subglacial aquifers and drain to the ice margin as groundwater flow. Heavily pressurized porewater reduces the strength of the underlying sediment, which may lead to sediment advection in a mobile traction carpet and generate subglacial diamictons found in such landforms as drumlins, mega-scale glacial lineations and flutings. Here we present examples from the geological record indicative of specific meltwater-related processes including deeply incised tunnel valleys, glacial curvilineations, infilled meltwater channels, subglacial sheet-flow deposits, mega-scale glacial lineations, and subglacial traction tills. Taking into consideration also numerical experiments on groundwater flow under past ice sheets, we highlight possible genetic relationships between these elements and suggest the mechanisms driving them. Growing evidence points to ubiquity of pressurized meltwater under large continental ice sheets of the Pleistocene and its importance for the palaeoglaciological conditions.

Session: *Pangeo workshop: Glacial erosion and deposition*
Keywords: *Glacial erosion, meltwater channels, tunnel valleys, glacial landforms, sediment deformation, subglacial groundwater*