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Examining Environmental Gradients with Remotely Sensed Data – the ESA GlobPermafrost project

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Permafrost cannot be directly detected from space, but many surface features of permafrost terrains and typical periglacial landforms are observable with a variety of EO sensors ranging from very high to medium resolution at various wavelengths. In addition, landscape dynamics associated with permafrost changes and geophysical variables relevant for characterizing the state of permafrost, such as land surface temperature or freeze-thaw state can be observed with space-based Earth Observation. Suitable regions to examine environmental gradients across the Arctic have been defined in a community white paper (Bartsch et al. 2014). These transects have been updated within the ESA DUE GlobPermafrost project.

The ESA DUE GlobPermafrost project develops, validates and implements Earth Observation (EO) products to support research communities and international organisations in their work on better understanding permafrost characteristics and dynamics. Prototype product cases will cover different aspects of permafrost by integrating in situ measurements of subsurface properties and surface properties, Earth Observation, and modelling to provide a better understanding of permafrost today. The project will extend local process and permafrost monitoring to broader spatial domains, support permafrost distribution modelling, and help to implement permafrost landscape and feature mapping in a GIS framework. It will also complement active layer and thermal observing networks. Both lowland (latitudinal) and mountain (altitudinal) permafrost issues are addressed.

The selected transects and first results will be presented. This includes identified needs from the user requirements survey, a review of existing land surface products available for the Arctic as well as prototypes of GlobPermafrost datasets, and the permafrost information system through which they can be accessed.

Bartsch, Annett; Allard, Michel; Biskaborn, Boris Kolumban; Burba, George; Christiansen, Hanne H; Duguay, Claude R; Grosse, Guido; Günther, Frank; Heim, Birgit; Högström, Elin; Kääb, Andreas; Keuper, Frida; Lanckman, Jean-Pierre; Lantuit, Hugues; Lauknes, Tom Rune; Leibman, Marina O; Liu, Lin; Morgenstern, Anne; Necsoiu, Marius; Overduin, Pier Paul; Pope, Allen; Sachs, Torsten; Séjourné, Antoine; Streletskiy, Dmitry A; Strozzi, Tazio; Ullmann, Tobias; Ullrich, Matthias S; Vieira, Goncalo; Widhalm, Barbara (2014): Requirements for monitoring of permafrost in polar regions - A community white paper in response to the WMO Polar Space Task Group (PSTG), Version 4, 2014-10-09. Austrian Polar Research Institute, Vienna, Austria, 20 pp, hdl:10013/epic.45648.d001