



ESA DUE PERMAFROST: Evaluation of geophysical remote sensing products for permafrost applications

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Permafrost is a subsurface phenomenon whose ground thermal regime is mainly influenced by air temperature, land cover, soil and rock properties and snow parameters. Many spaceborne-derived parameters are potentially indicative of the thermal state of Permafrost, such as land surface temperature, surface moisture, surface frozen/thawed state, terrain displacement, vegetation cover, and changes in surface waters. The major task of the ESA DUE PERMAFROST project is to develop high-latitude Earth Observation services of these parameters with extensive involvement of the permafrost research community. Further information is available at www.ipf.tuwien.ac.at/permafrost.

In order to setup the required validation tasks and information services, a target area approach with specified case study regions is used. Most of the foreseen DUE PERMAFROST remote sensing applications are well established and can optimally become operational. A major component is the evaluation of the DUE PERMAFROST products to lend confidence in their scientific utility for high-latitude permafrost landscapes.

Ground measurements in the high-latitude landscapes involve challenging logistics and are networked on multidisciplinary and circum-arctic level by the Permafrost community (User group). The International Permafrost Association IPA has built up the Global Terrestrial Network for Permafrost (GTN-P) that is a network of the Circumpolar Active Layer Monitoring (CALM) and the Thermal State of Permafrost (TSP) projects. A major part of the DUE PERMAFROST users is contributing to GTN-P. Additional members of these programs and circum-arctic networks have also been involved in the consultation process and the provision of ground-based data.

Match-up data sets of ground data and remote sensing products coincident in time and location are being built up. The test regions are the West Siberian transect (RU) (continuous to discontinuous/ taiga-tundra) including Yamal Peninsula and Ob Region, the Laptev Sea Region (RU) (continuous very cold permafrost/tundra), the Yakutsk Region (RU) (continuous cold permafrost/taiga), the Alaska Highway Transect (US) (continuous to discontinuous/ taiga-tundra), and the Mackenzie Delta and valley Transect (CA) (continuous to discontinuous/taiga-tundra).

There are no standard evaluation methods for all the diverse remote sensing products, specifically not for these latitudes. Evaluation experiments and intercomparison is done on a case-by-case basis, adding value and experience in validating products for these regions.