REKLIM evaluation case studies and inter-comparison with regional climate model simulations using climate-scale remote sensing data from Remote Sensing Services such as the Permafrost DUE PERMAFROST dataset (2009-2012)

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Climate-scale remote sensing parameters (around 1 to 30 km spatial resolution) may provide means for bridging the gap between the site-scale ground measurements and coarse-scale gridded simulated parameters. The spatial scale discrepancies and the parameter inconsistencies between operational remote sensing products and the site-scale ground measurements are also a challenge for the evaluation of the satellite-based observations. For most terrestrial parameters (satellite-derived and model-simulated) there is a lack of standard evaluation and scaling protocols.

However – climate-scale fields of satellite-derived parameters provide spatio-temporal databases for the evaluation of models. Case studies of model evaluation using satellite-derived surface parameters from the ESA DUE Permafrost dataset (www.geo.tuwien.ac.at/permafrost/) and climate model runs from the Helmholtz Climate Initiative REKLIM (Regionale Klimaänderungen/ Regional climate change) (www.reklim.de/en/home/) have been initiated.

The objective of the ESA Data User Element DUE Permafrost project (2009-2012) has been to establish a Remote Sensing Service for permafrost applications. The project team developed a suite of remote sensing products indicative for the subsurface phenomenon permafrost: Land Surface Temperature (LST), Surface Soil Moisture (SSM), Surface Frozen and Thawed State (Freeze/Thaw), Terrain, Land Cover, and Surface Waters (doi.pangaea.de/10.1594/PANGAEA.780111). Snow parameters (Snow Extent and Snow Water Equivalent) are being developed through the DUE GlobSnow project (Global Snow Monitoring for Climate Research, 2008-2011). The final DUE Permafrost remote sensing products cover the years 2007 to 2011 with a circumpolar coverage north of 50°N. The products were released in 2012, to be used to analyze the temporal dynamics and map the spatial patterns of permafrost indicators. The remote sensing service also supports the EU FP7 project PAGE21 - Changing Permafrost in the Arctic and its Global Effects in the 21st Century (www.page21.eu/). under the frame of "Vulnerability of Arctic permafrost to climate change and implications for global GHG emissions and future climate"

A primary program providing various ground data for the evaluation of operational satellite-derived data sets is the Global Terrestrial Network for Permafrost (GTN-P) initiated by the International Permafrost Association (IPA) Ground data ranges from air-, ground-, and borehole temperature data to active layer- and snow depths, as well as soil moisture measurements and the description of landform and vegetation.

Within the REKLIM framework we spatio-temporally compare the geophysical surface parameters simulated by regional climate models with the spatio-temporal variability of Earth Observational remote sensing products. We discuss the outcome of intercomparison substudies on simulated fields of surface temperature and ground frozen, non-frozen state simulated by the regional climate models HIRHAM.