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Evaluation of a new 1-km MODIS land surface temperature product, Mackenzie River Basin, Canada

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The Data User Element (DUE) Permafrost project, currently sponsored by the European Space Agency (ESA), is aimed at producing maps of permafrost-related parameters from satellite remote sensing at various spatial and temporal scales in consultation with the user community (i.e. permafrost specialists), in order to monitor the state of permafrost over the pan-Arctic. In the context of this project, land surface temperature (LST) is one of the primary parameters to map. Our research group is responsible for the development of weekly and monthly LST map products covering the full pan-Arctic domain (above 60°N at 25 km resolution) and more specific regions of interest to the permafrost community at the 1 km grid resolution.

In this paper, we present the results from the evaluation of a new 1 km product (UW Level 3 LST product) over the Mackenzie River Basin (MRB), northwest Canada. The product is generated through the computation of daily mean values using MODIS Level 2 LST (day and night) data from both NASA's Aqua and Terra satellites. Within the MRB, Environment Canada operates 11 meteorological stations. Mean weekly and monthly near-surface air temperature measurements from these stations are evaluated against satellite-derived LST values at corresponding locations (pixels) for the period 2007-2010. Ten stations from the Circumpolar Active Layer Monitoring (CALM) program are also located along the Mackenzie River Valley where active layer thickness (ALT) measurements are available for two years (2007 and 2008). Results from a preliminary examination of the relation between the seasonal evolution of the ALT and MODIS-derived monthly LST will also be presented.