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LATICE MIP evapotranspiration – A model intercomparison project for evapotranspiration estimates at high latitudes

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We present a new initiative, LATICE MIP-ET, with the aim to compare model estimates of evapotranspiration (ET) in a high latitude environment. The study is part of the LATICE (Land-ATmosphere Interactions in Cold Environments) strategic research initiative at the University of Oslo.

The main motivation for LATICE MIP-ET is the need to improve knowledge about the actual evapotranspiration in cold environments. Recent estimates of mean annual evapotranspiration for Norway summarized in Erlandsen et al (2021) range from 175 – 500 mm/year, i.e. between 13 and 31% of mean annual precipitation. These estimates are based on different gridded versions of the hydrological, water balance model HBV, where the estimated evapotranspiration depends on precipitation inputs and streamflow measurements included in the model calibration. No reference measurements of evapotranspiration are used to benchmark the model estimates.

The aim of this MIP is to constrain the range of the estimated mean annual evapotranspiration by (i) introducing local observations of evapotranspiration and (ii) compare model estimates from two land surface models (CLM and SURFEX) and two hydrological models (SHYFT and HBV). Model estimates are compared at three scales, namely point, catchment, and regional. At the point scale, field observations of evapotranspiration are available at five eddy covariance flux sites covering a gradient in climate across Norway, from low altitude forested and grassland sites to high mountain and high latitude sites. At these sites we compare the models' ability to capture diurnal and seasonal variations in evapotranspiration and compare to the observations. We will also compare how models simulate the relationship between potential and actual evapotranspiration and assess the models' sensitivity to the choice of vegetation-and soil parameters. The second scale is the river catchment scale. For a selected set of catchments, we compare simulated water balance to observed discharge and evaluate the sensitivity to atmospheric forcing and land cover. The third scale is the regional scale. At this scale we compare mean annual estimates of evapotranspiration for the whole of Norway. The comparison will include mapping the spatial and temporal distribution of evapotranspiration fractions (transpiration, soil evaporation, and canopy

evaporation).

The presentation will focus on the design of the LATICE MIP-ET, including the choice of regional and local forcing and land cover data, and the first results of the model intercomparison at the local scale. In a follow-up study we aim to invite the scientific community to join the MIP.

This work is a contribution to the Strategic Research Initiative 'Land Atmosphere Interaction in Cold Environments' (LATICE) of the University of Oslo and the EMERALD research project.

References:

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