

Title: High-resolution simulations of ecosystem CO₂ fluxes in Scandinavia using the Community Land Model

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The ICOS Norway infrastructure will estimate the origin of atmospheric CO₂ fluxes using an inversion algorithm (FlexInvert, by NILU). This requires, among other things, a prior for terrestrial ecosystem sources. We simulate these fluxes by using the Community Land Model (CLM 5.0) – part of the Community Earth System Model (CESM 2.1.1) – to calculate the terrestrial carbon sink through primary productivity and carbon flux sources through metabolic/decay processes and fires. We construct a grid over Scandinavia with 10-20 km resolution combined with 1-degree resolution over the rest of the world, to obtain high-resolution local flux estimates from the global model. Results are compared to eddy-covariance measurements from FLUXNET stations and to GPP, NPP and NEE estimates from NASA/MODIS satellite-based products. The magnitude of fluxes and the diurnal profile show good agreement with observations, although inter- and intraday variability is less pronounced than in the FLUXNET tower measurements, as would be expected from the limitations in spatial and temporal resolution. The model results combined with the differences to the observation results are used as the basis for constructing a prior distribution for the FlexInvert algorithm.