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Integrated Land Data Assimilation System for Numerical Weather Prediction at the European Center for Medium-Range Weather Forecasts

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The European Centre for Medium-Range Weather Forecasts (ECMWF) system relies on an Earth System approach focusing on atmosphere, ocean, waves, land, and sea ice. Different data assimilation methods are used for the each component of the Earth System. A hybrid 4D-Var is used for the atmosphere, a simplified sea-surface temperature (SST) and sea ice analysis is used for medium-range forecasts and for the reanalyses (ERA-Interim and ERA5). The ECMWF land and atmosphere data assimilation systems are weakly coupled, using a coupled land-atmosphere background forecast and separate analyses for the atmosphere and for the surface (soil moisture and snow). Conventional and satellite observations that inform on the state of both subsystems are assimilated. They are located at the land-atmosphere interface and include two-metre temperature and relative humidity, snow depth, and
soil moisture. In this presentation we present the land-atmosphere weakly coupled assimilation currently used at ECMWF for Numerical Weather Prediction (NWP) purpose. Perspectives of coupling enhancement using Ensemble Data Assimilaton (EDA) and EDA-based cross correlation estimates with coupling at the outer loop level of the atmospheric 4D-Var are discussed.