

ERA5-Land: a new state-of-the-art global land surface reanalysis dataset

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Abstract

Within the European Earth observation programme Copernicus, the Copernicus Climate Change Service (C3S, <http://climate.copernicus.eu/>) is developing the ERA5-Land dataset, a new, state-of-the-art, high-resolution, global, hourly land-surface reanalysis dataset from 1979 (beginning of the satellite era) and planned to be continued in Near-Real-Time through the C3S operational service.

ERA5-Land will be the result of a single simulation driven by near-surface atmospheric fields from ERA5 atmospheric reanalysis, with precipitation and lapse-rate adjustments. One of the added values of ERA5-Land with respect to the ERA5 atmospheric reanalysis is a global projected horizontal resolution of approximately 9 km (around 4 times finer resolution than ERA5), matching the recently implemented ECMWF TCo1279 operational grid, and therefore providing consistent input for Numerical Weather Prediction and climate studies involving land water resources, but also for accurate hydrological and agricultural modeling. It will also include, for the first time, an estimation of key land-variables error based on meteorological forcing and model parameters uncertainties supplied by a 10-member ensemble parallel run, thus providing vital information to land-surface data assimilation systems. The offline nature of land reanalysis allows to incorporate forefront model developments before the production phase. For example, ERA5-Land could benefit from a larger discretization of the soil layer permitting better propagation of the energy and water fluxes through the vertical dimension of the soil layer (currently under development).

This paper presents the methodology that will be used to produce the ERA5-Land dataset, as well as its main strengths and weaknesses. Preliminary results obtained from the recent integration of demonstrative scout-runs will be shown and discussed, and their performance will be assessed by comparison to in-situ data and other long-term available datasets.