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Estimating uncertainties in surface variables reanalyses in the framework of UERRA project

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The Uncertainties in Ensembles of Regional ReAnalyses (UERRA,http://www.uerra.eu) is a 4-year project funded by the European Union under its 7th Framework Programme SPACE. One of its main objectives is to provide a 50-year fine-scale regional reanalysis dataset of surface essential climate variables over Europe at the spatial resolution of 5.5km, together with an estimate of the associated uncertainties.

This work aims primarily in estimating the uncertainties in the surface variables from an ensemble of high-resolution reanalyses at the European scale for the period 2006-2010. The finer-scale reanalyses (5.5km) are computed with the MESCAN optimum interpolation system. Observations for 2-m temperature (T2m) and 2-m relative humidity (RH2m) are taken from Global Telecommunication System, whereas those for 24-h accumulated precipitation (RR24) are from some national data base and the ECA&D one.

The ensemble of reanalyses is based on an ensemble of model backgrounds, and by using different densities of the observation network reflecting its evolution during the last 50 years. The ensemble of backgrounds is generated through a multi-model approach: by using two numerical models (ALADIN and ALARO) used by SMHI for the 3Dvar re-analyses at 11km and downscaled at 5.5km. In addition both ALADIN and ALARO models have been integrated at 5.5 km to provide a “real” background at this fine scale especially for the precipitation (Soci et al, 2016) and to enlarge ensemble background size. It’s worth noting that, the background used for the daily precipitation analysis is obtained by summing up the accumulated fields from four successive 6-h forecasts, started respectively at 06 UTC, 12 UTC, 18 UTC, and 24 UTC. Accordingly, the ensemble of the high-resolutions reanalyses is produced by incorporating the ensemble of the backgrounds with three characteristic observation network configurations to account for the effect of observation density on the subsequent reanalyses. Furthermore, in order to increase the sampling error of the ensemble of reanalyses, perturbed observations are used. The perturbation are drawn from a normal observation error distribution with zero mean and an estimated error standard deviation. The reliability of the ensemble of backgrounds and reanalyses, is explored using rank histograms, and the distribution for each leading ensemble member will be shown and discussed.