



Intercomparison of three regional reanalysis datasets over Italy based on ERA5

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In the framework of the project CORINA (COMparison of Reanalysis for ItaliaN Area), three high-resolution atmospheric regional reanalyses were produced using different NWP models. The outputs are verified against observed data over one year (namely 2015). The global reanalysis data ERA5 provides the initial and boundary conditions to all the three datasets. In this way, the intercomparison study focuses only on the differences associated to the architecture of the reanalyses (i.e. BCs update, grid nesting configuration, NWP models, convection-permitting options, nudging techniques, etc ..).

The three regional reanalyses are:

- SPHERA (High Resolution REAnalysis over Italy). It has a horizontal resolution of 2.2 km and a hourly temporal frequency. It is based on the COSMO model using a continuous nudging scheme. It is currently in production at ARPAE-SIMC.
- MERIDA (MEteorological Reanalysis Italian DATaset). It has a horizontal resolution of 7 km and a hourly temporal frequency. It is based on the WRF model using spectral nudging and an observation nudging of 2m temperature. It is produced by RSE.
- BOLAM/MOLOCH. Two different mesoscale models are employed in cascade for this hindcast (i.e. no nudging or data assimilation method is used) experiment: the Bolam and Moloch models. The Bolam model, which is run over the Med-CORDEX domain, provides lateral boundary conditions to the Moloch. The temporal frequency of both datasets is one hour and the grid spacing is 7 km and 2.5 km for the Bolam and Moloch model respectively. These datasets are produced by Consorzio LaMMA.

The accuracy of the three datasets in simulating past weather is evaluated in terms of 2m temperature and daily total accumulated precipitation, which are verified against near surface observations over the Italian area. The statistical analysis outlines advantages/drawbacks of the three datasets in different conditions, the best accuracy that can be currently reached in regional reanalysis over Italy, the most difficult situations to be simulated.