Regional Downscaling of ERA-Interim for EURO4M

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The European Reanalysis and Observations for Monitoring project (EURO4M) is a EU funded project "*that provides timely and reliable information about the state and evolution of the European climate. It combines observations from satellites, ground-based stations and results from comprehensive model-based regional reanalyses.*"

SMHI participates in the work with two phases. The first is a regional downscaling of the ECMWF Interim reanalyses (ERA-Interim) which have a resolution of about 80km to a finer resolution of about 20km over Europe and the North Atlantic. This is done in a new data assimilation using the HIRLAM variational (3D-Var) system and with ERA-Interim as lateral boundary conditions. Only so called 'conventional' observations (SYNOP, SHIP, TEMP, PILOT and aircraft data) are used. Limited manpower resources at SMHI prevent us from doing a comprehensive assimilation of remotely sensed satellite radiances and cloud motion vectors. The large scale flow is however taken into account indirectly by using the ERA-Interim upper air vorticity fields as an additional weak constraint (J in the variational minimization. This is particularly important over the North Atlantic with its very sparse coverage of TEMP soundings.

In a second phase these 3D-Var analyses serve as background for a more detailed (approx. 5-7km) univariate analysis of near-surface parameters, e.g. screen temperature, 10-metre wind and precipitation. This is done with an optimum interpolation scheme ('ERA-Mesan') which is characterized by geographically varying structure functions that take features like coastlines and mountains into account. An enhanced collection of European surface observations will add details to the analyses.

The poster summarizes the designs of and the techniques used in the two phases. Some examples and comparisons with the low resolution global ERA analyses are shown. It is seen that the HIRLAM analyses retain the ERA large scale synoptic patterns very well, but with added detail in e.g. mountainous areas. Still more detail is added in the second phase, where for instance coastal temperature gradients are well captured.

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