European Reanalysis and Observations for Monitoring (EURO4M)

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The EU-FP7 project EURO4M (see www.euro4m.eu) develops regional reanalyses of past weather and user-oriented data products for monitoring climate variability and change in Europe.
EURO4M addresses the situation of fragmentation and scarcity of long-term climate change monitoring information. It does so by combining seamlessly the comprehensive data sets from model-based regional reanalyses and the Essential Climate Variable (ECV) data sets from satellites and ground-based stations.

EURO4M delivers high-resolution regional reanalyses over Europe. The great benefit of a reanalysis is that it provides a complete and consistent picture of the atmosphere, covering the whole of the 3-dimensional domain, not only of the observed variables, but also of those that are not directly measured. The Met Office Hadley Centre's North Atlantic and Europe (NAE) regional climate model uses 4D-Var assimilation with a 12/36 km resolution for a limited demonstration period of 1-2 years. SMHI employs the HIRLAM 3D variational analysis and the HIRLAM grid point model to produce reanalyses downscaled to 22 km resolution. In order to further enhance the resolution of the regional reanalyses to the local scale, 2-dimensional downscaling is performed using the systems MESAN and SAFRAN. These high-resolution analysis systems employ regional variations given by observational statistics and physiographic factors such as land-sea mask and orography. This results in downscaled gridded climate time series of surface variables at 3-km resolution.

Due to computational constraints and input data limitations, the regional reanalyses and downscaled data sets typically cover a time period up to 20 years. For climate change applications in risk management and science-based adaptation most users need information about longer-term changes. In particular, information about climate trends and changing probabilities of high impact extremes (such as flooding or heat waves) cannot be derived from relatively short reanalyses data sets only. Therefore, the reanalyses will be combined with multi-decadal satellite data sets and century scale in situ observations.

Long-term gridded climate time series based on satellite data and interpolated station observations include the updated and extended versions of the monthly GPCC precipitation data set, the monthly CRU temperature and humidity data set, and the daily ECA&D data sets of multiple ECVs. These additional data sets enable us to put the observed high-impact weather and climate extremes described on the basis of the regional reanalyses in a long-term historical context. To guide this process, so-called Climate Indicator Bulletins (CIBs) are being developed which consist of user-oriented knowledge abstractions from different data sets including associated uncertainty estimates. By integrating the different data sources, these bulletins improve the climate change services for society. CIBs will also be issued in near-real-time during emerging extreme events.

The EURO4M consortium consists of 9 members: KNMI (coord., Netherlands), Met Office (UK), Univ. Rovira I Virgili (Spain), NMA (Romania), MeteoSwiss (Switzerland), DWD (Germany), SMHI (Sweden), Univ. East Anglia (UK), MF (France). In this presentation examples from ongoing work and some early results of the EURO4M project will be presented. Links with global reanalyses activities as well as links with ongoing data archaeology and data recovery work will be identified.

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