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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Estimating Mediterranean river discharge from modelled runoff data: a multi-model approach

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Earth's hydrological cycle has gained more and more attention from scientists, as it both determines water resources availability and provides information of a variety of key atmospheric processes and feedbacks. The Synthesis Report from the Climate Change congress (Copenhagen, March 2009) has recently reiterated the apprehension that impacts on water resources represent a serious threat to a number of crucial systems, such as biological ecosystems and economic communities. In particular the Mediterranean region has been recognized as a hot spot by the last IPCC report. Exhaustive data for the Mediterranean discharge are still lacking, especially for rivers in the south-eastern part of the basin, thus fostering attempts to estimate large scale budgets for present and future climate conditions from numerical simulations.

We estimate monthly mean river discharge by spatially integrating modelled runoff fields over the Mediterranean river catchments. The runoff fields used for this study are those provided by the present climate regional hindcast simulations of the EU project ENSEMBLES.

The fulfilment of the vertical balance of precipitation, evaporation, runoff and water storage has been verified for both single ensemble members and ensemble means, in the perspective of model inter-comparison.

Ensemble means of monthly river discharge series have been computed and the results for the four major Mediterranean catchments have been compared to observations. The quality of the reconstructed discharge series is assessed as to both mean value and time scales of variability, including the annual anomalies during the whole period 1960-2000. Ensemble estimates of river discharge show a remarkable agreement with the observations available in the same period, and give an indirect evaluation of the modelled atmospheric branch of the hydrological cycle integrated over medium-size catchments.

Total Mediterranean river discharge has also been computed and an assessment of the Mediterranean Hydrological budget has been attempted by using the correspondent ensemble means of evaporation and precipitation fields over sea.