Global Energy and Water Cycle Experiment

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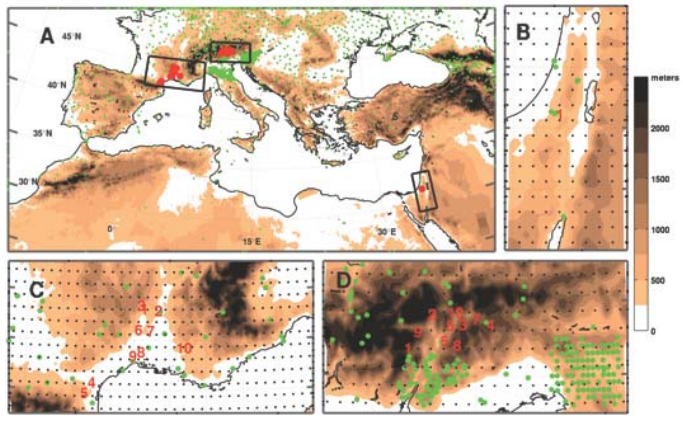
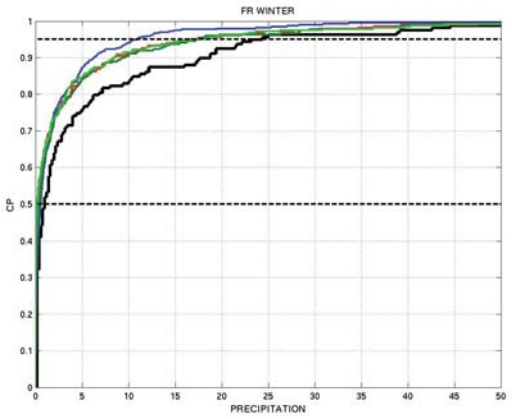
First Results From HyMeX, the Newest GEWEX Regional Hydroclimate Project





Left: *HyMeX stations (red numbers) used for the uncertainties assessment of the European Climate Assessment (ECA) data set (grid in black dots), and stations used for the ECA data set construction (green dots). (A) Mediterranean domain used for CORDEX climate simulations. Enlarged areas show stations in Israel (B), France (C), and Italy (D).* ***Right:*** *Rainfall from the regional dynamical Weather Research and Forecasting Model (WRF; colors) and the statistical Common Data Format Model (CDF-t; black), both forced by the ECMWF Reanalysis-I (ERA-I; blue), are compared to observations of HyMeX and High Elevation sites in Italy. For more comparisons, see article by P. Drobinsk et al. on page 10.*

Preliminary Results Show COSMOS Provides Reliable Method for Area Average Continental-Scale Soil Moisture Data

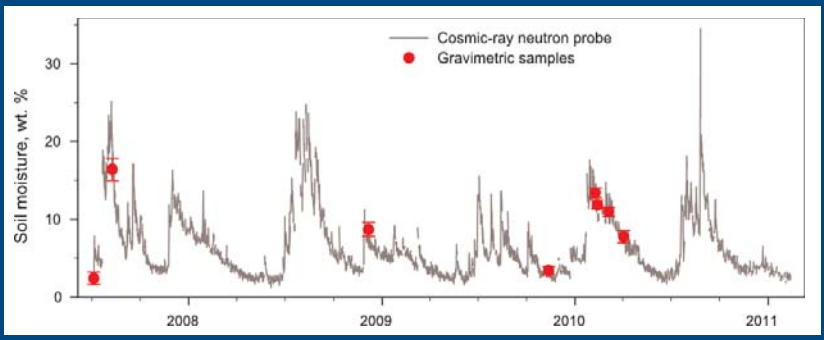


Figure 3. Soil moisture from cosmic-ray neutron measurements (line) compared to that of gravimetric samples collected within the cosmic-ray footprint (symbols; each symbol is an average of several tens of soil samples), San Pedro River Valley, Arizona. The mean of eight absolute differences between the two is 1.1 percent. See article by M. Zreda et al. on page 6.

Also Inside

4th WCRP International Conference on Reanalyses

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HyMeX, the Newest GEWEX Regional Hydroclimate Project

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The Hydrological Cycle in the Mediterranean Experiment (HyMeX) was approved as a GEWEX Regional Hydroclimate Project (RHP) at the 23rd Session of the GEWEX Scientific Steering Group in August 2010. HyMeX will contribute to the GEWEX objectives of improving our understanding of the global hydrological cycle and the prediction of its evolution through a coordinated set of studies in the Mediterranean Sea Basin.

There are three HyMeX target areas (TAs) of study:

1. *Northwestern Mediterranean*—concentrates all the intense hydrometeorological phenomena of interest for HyMeX. Heavy precipitation systems and flash-flooding occur over the Spanish, French, and Italian coasts during the autumn, and the Gulf of Lions is one of the four major sites of dense water formation and deep ocean convection at the end of winter under the influence of the Mistral and Tramontana regional winds, and of the Gulf of Genoa cyclogenesis.

2. *Southeastern Mediterranean*—covers the Eastern and Southeastern Mediterranean area and consists of the western part of Crete Island, the transboundary river basin of the Evros River and three basins in Israel. The Crete site is proposed as a site for the study of heavy precipitation events and flash-flooding. In addition, this target area will allow the study of intense rainstorms and flash floods in the dryer climate areas of the Mediterranean.

3. *Adriatic*—comprised of the Friuli and Veneto regions in Italy, and the Dinaric Alps in Slovenia and Croatia, which are proposed as a target area for the study of heavy precipitation events and flash-flooding. This region is affected by strong regional Bora winds over the Dinaric Alps. Dense water also forms in the North and South of the Adriatic sub-basin.

HyMeX Observation Strategy

The HyMeX observation strategy is based on a three-level nested observation scheme. The Long-term Observation Period (LOP) began in September 2010 and will continue until 2020. It includes the whole Mediterranean Sea region, and the data will be used in developing a long-term time series required to study seasonal and interannual variability.

An Enhanced Observation Period (EOP) for both budget and process studies is planned for at least four years (2011–2015). EOP observations may only include specific parts of a year (e.g., autumns for heavy precipitation, extending to winter for severe cyclogenesis and strong winds).

Special Observation Periods (SOPs) will last for several months to provide detailed and specific observations for studying key processes of the water cycle in the HyMeX target areas. In addition to the EOP observation framework, dedicated ground-based, shipborne, and airborne means will be deployed during the SOPs. The first SOP is planned for the autumn of 2012 over the Northwestern Mediterranean target area.

HyMeX Modeling Plans

The HyMeX observation strategy is designed to serve the objectives of the modeling strategy, which includes: (1) the development of regional coupled systems (ocean-atmosphere, land-atmosphere, ocean-land-atmosphere) to reduce uncertainties of the regional projections of future climate; (2) the improvement of convective-scale deterministic forecast systems to improve the capability to predict Mediterranean high-impact weather events; and (3) the design of high-resolution ensemble modeling systems dedicated to the study of the predictability of Mediterranean heavy precipitation and severe cyclogenesis.

These ensemble forecast systems will be coupled with hydrological models to issue probabilistic forecasts of the impact in terms of hydrological response. Advances in the knowledge of the hydrological and hydraulic responses, as well as of the soil water content state before and during precipitation events should help to improve the initialization and process representation within the hydrological models used.

5th International HyMeX Workshop

The 5th HyMeX Workshop was held in Punta Prima, Menorca, Spain on 17–19 May 2011, prior to the start of the HyMeX EOP. The Workshop was preceded by a meeting of the working group and task team leaders in charge of coordinating the HyMeX international implementation phase. The HyMeX International Scientific Steering Committee met after the Workshop. At the same time, the French, Spanish, Italian, German and Croatian coordination groups met to strengthen intra-national links and discuss plans for improving the coordination and visibility of HyMeX at the national level.

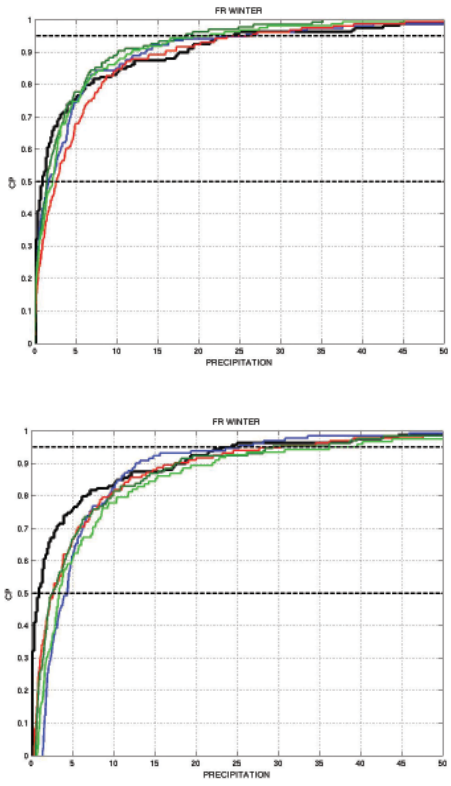
More than 150 participants from France, Spain, Italy, Croatia, Germany, Greece, the United States, Austria, Switzerland, The Netherlands, and Serbia attended the Workshop. Forty-eight talks and 82 posters presented scientific results on the main HyMeX topics, including the water budget of the Mediterranean hydrological cycle, precipitating events and floods, air-sea interaction processes, and socio-economic impacts. Plenary sessions were devoted to open interdisciplinary discussions about key scientific challenges and to further disseminate the experimental set-up plans for each of the three target areas. Nine parallel working sessions promoted discussions on the three observation periods, and on the hydrological, meteorological and climatological modeling strategies.

HyMeX First Results

First results from the HyMeX Long Observation Period data were also presented. Several heavy precipitation cases are being analyzed and many simulations have been performed both for process studies and regional climate investigations related to the Mediterranean Coordinated Regional Climate Downscaling Experiment (MED-CORDEX).

In the context of GEWEX, the first analysis of the data collected at the HyMeX sites in France, Italy and Israel and High Elevation (HE) areas (see top left figure on page 1) was presented. The objective of the study is the assessment of uncertainties for both dynamical and statistical downscaling techniques. Rainfall from the regional dynamical Weather Research and Forecasting (WRF) Model and the statistical Common Data Format (CDF-t) Model, both forced by the European Centre for Weather-Forecasts Reanalysis-Interim (ERA-I), were compared to observations of the HyMeX and HE sites. Results (for French sites only) are displayed in the top right figure on page 1 (and in the figure below) and show an underestimation of the median and the extreme values for all WRF simulations and ERA-I (with WRF performing better than ERA-I). The CDF-t model showed a robust good skill on downscaling rainfall regardless of the inputs. Applying a threshold value on the WRF and ERA-I rainfall to discriminate no rainfall versus rainfall events results closely agrees with the station measurements.

The Workshop program, presentations and more information about HyMex are available at: *http://www.hymex.org*.



CDF of observations (black), WRF simulations (colors), and ERA-I (blue). Top: rainfall with threshold set to have the same occurrence of rainy days in both the observations and the model/reanalyses. Bottom: CDF-t applied on all time series as shown at the top of page 1.