Hydrological cycle in the Mediterranean experiment (HyMeX): The mesoscale modelling facets

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The Mediterranean basin has quite a unique character that results both from physiographic conditions and historical and societal development. The region features a near closed sea surrounded by very urbanized littorals and mountains from which numerous rivers originate. This results in a lot of interactions and feedbacks between oceanic-atmospheric-hydrological processes that play a predominant role on climate and its ecosystems. These processes frequently cause extreme events that produce heavy damages and human losses; heavy precipitation and flash-flooding during the fall season, severe cyclogeneses associated with strong winds and large swell or droughts accompanied by forest fires during summer are examples of Mediterranean high-impact weather events. The capability to predict such dramatic events remains weak because of the contribution of very fine-scale processes and their non-linear interactions with the larger scale processes. Progress in the understanding of the Mediterranean climate has thus important environmental, societal and economical implications.

There is a clear lack of an experimental project relying on up-to-date innovative instrumentation in order to go one step further in the understanding and predictability of the Mediterranean climate and associated weather events. The hydrological cycle in the Mediterranean region has been identified as a key scientific, environmental and socio-economic issue that has to be addressed within such experimental project. The HyMeX (HYdrological cycle in the Mediterranean EXperiment, http://www.cnrm.meteo.fr/hymex/) project aims at a better quantification and understanding of the hydrological cycle and related processes in the Mediterranean, with emphases put on high-impact weather events and regional impacts of the global change including that on ecosystems and the human activities. A 10-year Long Observation Period (LOP), starting in 2010 is envisaged to cover the whole Mediterranean basin. Within it, several Special Observation Periods (SOP) will be dedicated more specifically to heavy precipitation events and flash-flooding, intense air-sea exchanges during high-wind and dense water formation episode. A phasing of a special observing period with a THORPEX European Regional Campaign in 2011 in connection with the Medex Phase 2 is looked for.

Mesoscale numerical atmospheric modeling (including data assimilation) is: i) a necessary component during the preparatory phase of a field campaign to analyze representative meteorological situations, ii) during the field phase to forecast weather events and to plan the deployment of specific instrumentation (incl. targeting "sensi-

ble" areas), iii) during the analysis phase to put different high resoltution observations in their context. Coupled processes play a particularly significant role in Mediterranean high-impact events and ask for mesoscale coupled hydrometeorological and ocean-atmosphere modeling systems to study these processes. This point will be more specifically discussed at the conference through examples of mesoscale modeling of air-sea and atmosphere-hydrological interactions occuring during Mediterranean high-impact events.