
Data assimilation impact studies with the AROME-WMED reanalysis during HyMeX SOP1

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Abstract

The Hydrological cycle in the Mediterranean Experiment (HyMeX) aimed to study the heavy precipitation that regularly affects the Mediterranean area. A reanalysis with a convective-scale model AROME-WMED (Application of Research to Operations at MESoscale western Mediterranean) was performed, which assimilated most of the available data for a 2-month period corresponding to the first special observation period of the field campaign in September-November 2012 (Fourrié et al., 2019). Among them, observations related to the low-level humidity flow were assimilated : a dense reprocessed network of high-quality Global Navigation Satellite System (GNSS) zenithal total delay (ZTD) observations, reprocessed data from wind profilers and Spanish radar data. The aim of this study is to assess the impact of the assimilation of these observation types on the analyses and the forecasts through several observing system experiments by removing one single data set from the observation data set assimilated in the reanalysis.

Ground-based GNSS ZTD data set provides the largest impact on the analyses and the forecasts, as it represents an evenly spread and frequent data set providing information at each analysis time over the AROME-WMED domain. The impact of the reprocessing of GNSS ZTD data also improves the forecast quality, but significantly. The assimilation of the Spanish radar data improves the 3h precipitation forecast quality as well as the short-term (30h) precipitation forecasts, but this impact remains located over Spain. In addition, marginal impact from wind profilers was observed on wind background quality.

Keywords: observation impact, convective scale model, numerical weather prediction

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