



Influence of the Alps on two troughs affecting WRF forecasts of convection in the Po Valley during HyMeX

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Two Intensive Observation Periods (IOPs) from the HYdrological cycle in Mediterranean Experiment (HyMeX) have been studied here. IOP6 and IOP13 were dedicated to the documentation of heavy precipitation events over target areas in northern Italy. In both cases convection in the Po Valley was also observed, but in each case there was a distinct difference in the ability to reproduce the observations by most of the models available during the campaign. In particular the WRF model was able to reproduce correctly IOP13, whereas it failed in maintaining the squall line moving west to east along the Po Valley during IOP6. A parallel analysis of the two events highlights differences in the dynamics that are critical in determining conditions favorable for convection along the Po Valley. A basic difference is that the trough in IOP6 produced much stronger downslope winds in the lee of the Alpine barrier than it did in IOP13. A comparison with observations from different sources allowed the identification of the models overestimation of the zonal wind in the Po Valley as the main cause of convection suppression during IOP6. Sensitivity tests to the planetary boundary layer (PBL) parameterization show similar results for most of the WRF PBL schemes. However, an improvement in the wind forecast is produced if the Bougeault–Lacarrère scheme is used, thus restoring realistic conditions along the Po Valley that allow for a better simulation of the convective system in IOP6.