Intercomparisons of 3D wind fields derived from airborne and operational ground-based radars during HyMeX

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TThe ability to perform multiple-Doppler wind (MDW) synthesis from operational weather radars on an operational basis has been investigated by the French Weather Service since 2006 using a sub-ensemble of the French radar network in the greater Paris area. This award winning capability has been recently extended to the entire French radar network so as to eventually implement a nationwide, three-dimensional, reflectivity and wind field mosaic to be delivered to forecasters and automatic nowcasting systems for air traffic management purposes. Although wind fields produced in this operational framework appear quite robust, their validation however remains extremely difficult since there is currently no observation mean able to provide wind measurements at the space–time resolution achieved by Doppler radars.

During the field phase of the Hydrometeorological Cycle in the Mediterranean experiment (HyMeX), an advanced version of this real-time radar product was used in the field to guide research aircrafts through observed mesoscale convective systems, including a fast jet equipped with the airborne Doppler radar RASTA. The availability of independent 3D wind measurements from RASTA allows, for the first time, to thoroughly evaluate the performance of operational MDW produced over the plain and high terrain of Southern France. After a brief description of the methods used to retrieved wind fields from airborne and ground-based radars, a intercomparison of MDW and RASTA-derived winds produced in a variety of weather situations is presented using data collected during seven RASTA flights.