

# Assimilation of OPERA radars data in AROME-France NWP model: a challenge

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National Weather Services need to issue accurate forecasts of high impact weather at small scale (severe thunderstorms, wind gusts, fog,...). AROME-France is a convective-scale numerical weather prediction system which has been running operationally at Météo-France since the end of 2008. In order to determine its initial conditions, radar observations (radial winds and reflectivities) are used in the 3D-Var assimilation system, in addition to conventional and satellite observations. Due to their high temporal and spatial resolution, radar data have a significant impact on rain forecast performance (Wattrelot et al, 2014).

The European weather radar programme OPERA support the NWP community by sharing partially homogenized single-radar data, by providing the associated metadata and by improving the quality of the data through different processing performed in its data hubs. To date, observations from 160 radars coming from 25 countries are available and can be potentially considered in the AROME-France assimilation system. The biggest challenge is to be able to deal with various resolutions, various scan strategies (elevations and PRF), various frequencies (S, C and X band radars) and various radar models (with differences on sensitivity). OPERA provides an homogeneous quality indicator which is crucial in order to efficiently assimilate such different radar data.

In addition to the 30 Météo-France radars, observations from 62 OPERA radars from neighbouring countries are considered in the assimilation process. In order to efficiently assimilate these observations, a first step is to remove non meteorological echoes by applying a threshold to the quality index associated to reflectivity . Then, a monitoring is performed in order to determine whether data are biased. Finally, assimilation experiments are conducted.

Overall, active assimilation of OPERA radars data allows to improve forecasts quality in the AROME-France 3D-Var system. These results have been observed in a one-month experiment characterized by North-Western and Eastern fluxes over France, where the contribution of neighbouring radars is potentially valuable.

Keywords: Radar data assimilation, OPERA program, Convective-scale numerical weather prediction system