Geophysical Research Abstracts
Vol. 20, EGU2018-8723, 2018
EGU General Assembly 2018

1DVAR+3DVAR approach to assimilate radar quantitative precipitation estimate in high-resolution limited-area AROME model

Zahra Sahlaoui (1,2), Soumia Mordane (1), and Eric Wattrelot (3)

(1) University Hassan II, Faculty Ben M'Sik, Physics Department, Casablanca, Morocco (zahrasahlaoui@gmail.com), (2) CNRMSI, Direction de la Météorologie Nationale, Casablanca, Morocco, (3) Centre National de Recherche Météorologique, Toulouse, France

Precipitation measurement and forecast are from big interest to human safety and many economic activities. Therefore, in one hand, radar QPE (Quantitative Precipitation Estimate) is continuously enhanced to better represent precipitation structure and amounts. In the other hand, many efforts are undertaken in numerical weather prediction to improve the quality of the model forecast in case of heavy rain events, especially by assimilating rainfall measurements (Lopez 2013).
The aim of this work is to assimilate pseudo-observation derived from radar QPE in the non hydrostatic limited-area model AROME (Siety et al, 2011). Thus, a two step approach was adopted. First, precipitation measurements and model background are used to retrieve temperature and humidity profiles. This is allowed by the 1DVAR assimilation procedure, based on a simple precipitation scheme. The input precipitation measurements are 1 hour cumulated amount extracted from Antillope (Laurantin, 2018) product: Météo-France analysed precipitation amounts, based on radar and rain gauges data, with a spatial resolution of 1km and a time resolution of 1hour. In the second step, The pseudo-observation are assimilated in AROME through the 3DVAR data assimilation procedure.
This method was tested in a heavy rain event over Cevenne-France. In fact, this region is often affected by convective precipitation generating flash floods, especially in the autumn. Two assimilation experiments are run with and without the pseudo-observation retrieved from radar QPE. The comparison of the two simulations shows a noticeable and widespread impact on temperature, humidity and precipitation fields. Detailed results will be shown and discussed.

References:
Laurantin O. 2008. ANTILOPE: Hourly rainfall analysis merging radar and rain gauge data. In: Proceedings of the International Symposium on Weather Radar and Hydrology, Grenoble, France, 10– 12 March 2008, pp. 2–8.
Lopez P. 2013. Experimental 4D-VAR Assimilation of SYNOP Rain Gauge Data at ECMWF. Montly Weather Review. 141, pp. 1527-1544.
Seity Y, Brousseau P, Malardel S, Hello G, Bénard P, Bouttier F, Lac C, Masson V. 2011. The AROME-France Convective-Scale Operational Model. Montly Weather Review. 139, pp. 976-991.