DATA FUSION NOWCASTING AND NWP

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ABSTRACT

Our operational nowcasting products concerning thunderstorms nowcasting (CONO[1], SIGOONS[2]) or rainfall extrapolation have some limitations: extrapolation limited to one hour range, lagrangienne advection (rainfall intensities are kept constant during the displacement), orography effects not taken into account.

On the other hand, the progress of the numerical weather prediction (NWP) now allows to use the short-range outputs of models (from 0 to few hours) while these same ranges were previously predicted by more empirical methods of nowcasting (NWC). The phenomena description is closer to the last available observations with a more realistic representation even with possible offsets or timing issues. This brings us to analyse the various methods of blending mixing observations, and NWP data. Main goal is the dense prediction parameters and phenomena of sensitive weather and the filling of the gap between classical nowcasting extrapolations and first ranges of the NWP. Thus the seamless prediction from the latest observations to the first range of NWP is the main challenge of this data fusion.

The data fusion system Nowcasting - NWP is built around a configuration of our mesoscale model AROME named AROME Nowcasting (see also L. Auger presentation in WSN12 conference) which provide dense forecast of several parameters (wind, temperature, humidity, but also reflectivities, precipitation, hydrometeors type, etc.). Characteristics of this forecast are: high refreshing frequency (every hour); high density (for a given forecat, forecast fields are produced for each 15 minutes interval), FABEC[3] domain (aeronautical domain including France), high horizontal resolution (2.5km). These forecasts will be available within 30 minutes after the latest observations, and the maximum forecast range would be 3 or 6 hours..

This blending includes various approaches in nowcasting:

- The non-linear forecast of thunderstorms in object mode using the diagnosis of objects in the simulated reflectivities
- The improvement of rainfall forecasting by using simulated reflectivities and rainfall to diagnose fields of motion and trend of intensity
- The avaibility of hail, snow, low visibility diagnostics for forecasters and final users
- The update of AROME Nowcasting forecasts with the last available observations between time of the last run and time of the availability of the forecasts
- The development of a AROME-AIRPORT demonstrator (based on AROME Nowcasting), on a domain corresponding to the approach domain of an airport to forecast

[1] Convective NOwcasting Object
[2] SIGnificant weather Object Oriented Nowcasting System
[3] Functional Airspace Block Europe Central

every hour wind, temperature and humidity, at 500m horizontal resolution. These predictions are data input of wake vortex model that aims to optimise the laps time between aircrafts take off and thus improve the airport capacity (application in the R&D SESAR[4] aeronautical project).

We are at the beginning of the road. These blended diagnostics ar still under development. We plan to have the first version of this blending system operational by the end of 2014. The presentation will describe the first results obtained on convection or dense parameter prediction.

[4] Single European Sky ATM Research