

NWP preparations at Météo-France for the Concordiasi project

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Concordiasi is an international project, currently supported by the following agencies: Météo-France, CNES, IPEV, PNRA, CNRS/INSU, NSF, NCAR, Concordia consortium, University of Wyoming, Purdue University and University of Colorado. ECMWF also contributes to the project through computer resources and support, and scientific expertise. Concordiasi is part of the THORPEX-IPY cluster within the International Polar Year effort (<http://www.cnrm-meteo.fr/concordiasi/>, Rabier et al., 2007). One of the main goals of this experiment is to improve the polar assimilation of IASI radiances. IASI is an advanced infrared sounder on board the European Polar orbiting satellite MetOp. From September 2008, additional conventional observations will be operated over Antarctica such as radiosoundings at the Concordia and Dumont d'Urville stations. Moreover, 600 dropsoundings will be dropped by twelve stratospheric pressurised balloons (SPB). These SPBs will be deployed from McMurdo station during two months similarly to the VORCORE campaign (Hertzog et al 2007). Figure 1 shows the trajectory of one balloon during VORCORE. During the experiment, both flight-level data (pressure, winds and temperature at 60hPa) and dropsonde data will be made available in real-time.

A daily trial will decide the deployments of sondes. Each dropsonde launch will be predicted as a function of IASI's swath, and/or the predicted meteorological sensitive area valid for that day. Figure 2 shows an example of the track of IASI over Antarctica the 7th October 2007. A sensitive area valid at 18Z that day and based on the 00Z analysis is shown in Figure 3. The verification is set on the 9th October at 00Z in the green circle. Some back-trajectories (using a simple lagrangian computation at constant pressure level) mimic the drift of some kind of SPB that would end above the main sensitive node (actually defined in the troposphere) by the targeting time (18Z). During the field phase a more realistic SPB drift model ought to be used in order to predict which SPB is likely to drop in the vicinity of a IASI swath or of a sensitive area.

As a preliminary work, the meteorological French model ARPEGE has been changed in order to have a better precision over the south polar area. This is a spectral model with a variable resolution on a stretched grid. The centre of this model has been moved southward to the Dome C station (75,12S; 123,37 E). Current resolution is then less than 35km over Antarctica. An illustration of this new geometry is shown in figure 4. An impact of this modification has been tested by estimating the difference of the observations and the guess of the model over fifteen days of simulation. A positive impact has been noted for the radiosounding observations, for the profile of temperature or zonal winds, mainly in the lower troposphere. Present and future work focuses on the polar assimilation of the infrared and micro-wave sensors (emissivity parametrisations for snow-covered areas).

References

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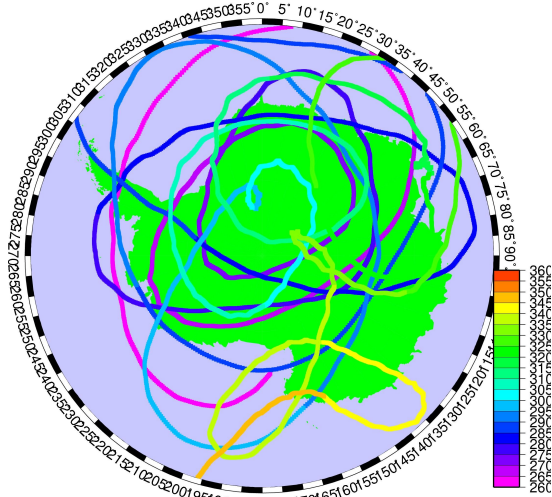


Figure 1: Trajectory of the 17th balloon during VORCORE from September to December 2005. The colour shows the trajectory for one day.

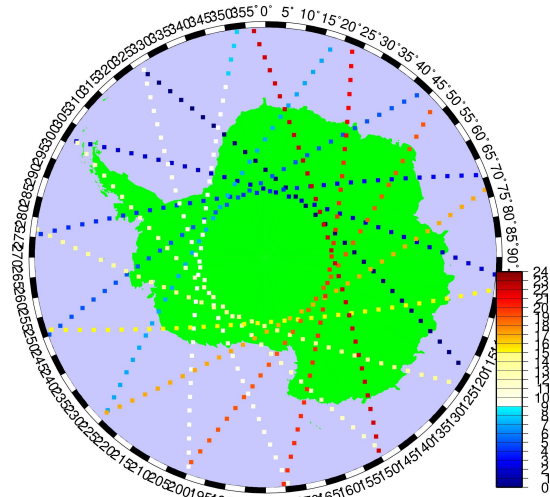


Figure 2: Track of IASI the 7th October 2007. The colour gives the hour of the passage.

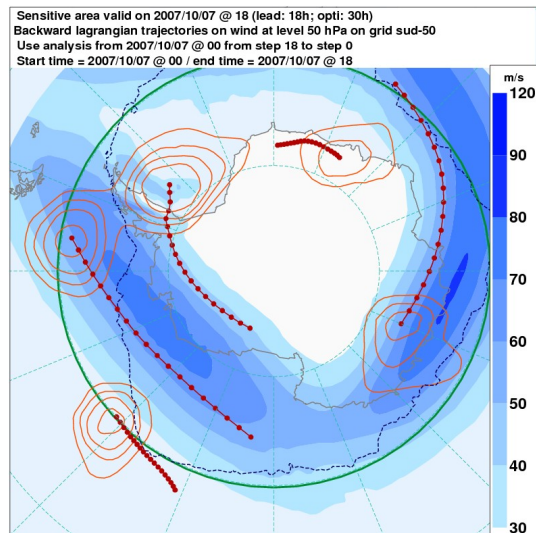


Figure 3: Predicted sensitive area valid on the 2007/10/07 at 18Z, initialized at 00Z and optimized for the 2007/10/09 at 00Z.

Balloon trajectories start on the 2007/10/07 at 00Z and reach sensitive areas at 18Z. The blue shading shows mean wind speed at 50 hPa on that period (ECMWF operational forecast). The navy dashed curve shows the limits of sea ice as in ECMWF system.

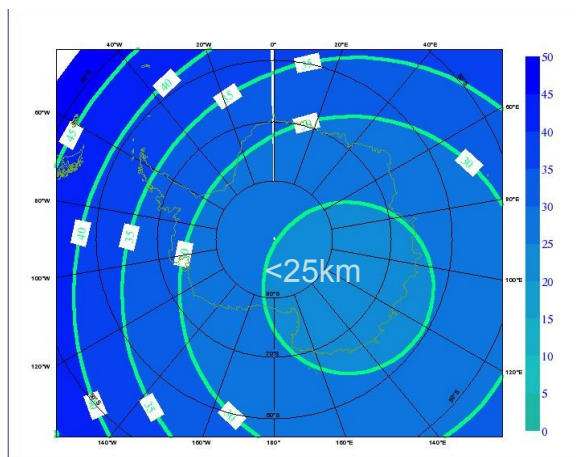


Figure 4: Horizontal resolution of the recentered model (km). A contour each 5km.