First results from Meso-NH simulations for the COPS-IOP9 (18-20 July 2007)

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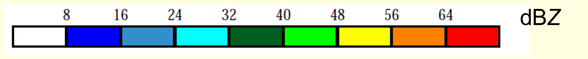
Motivation

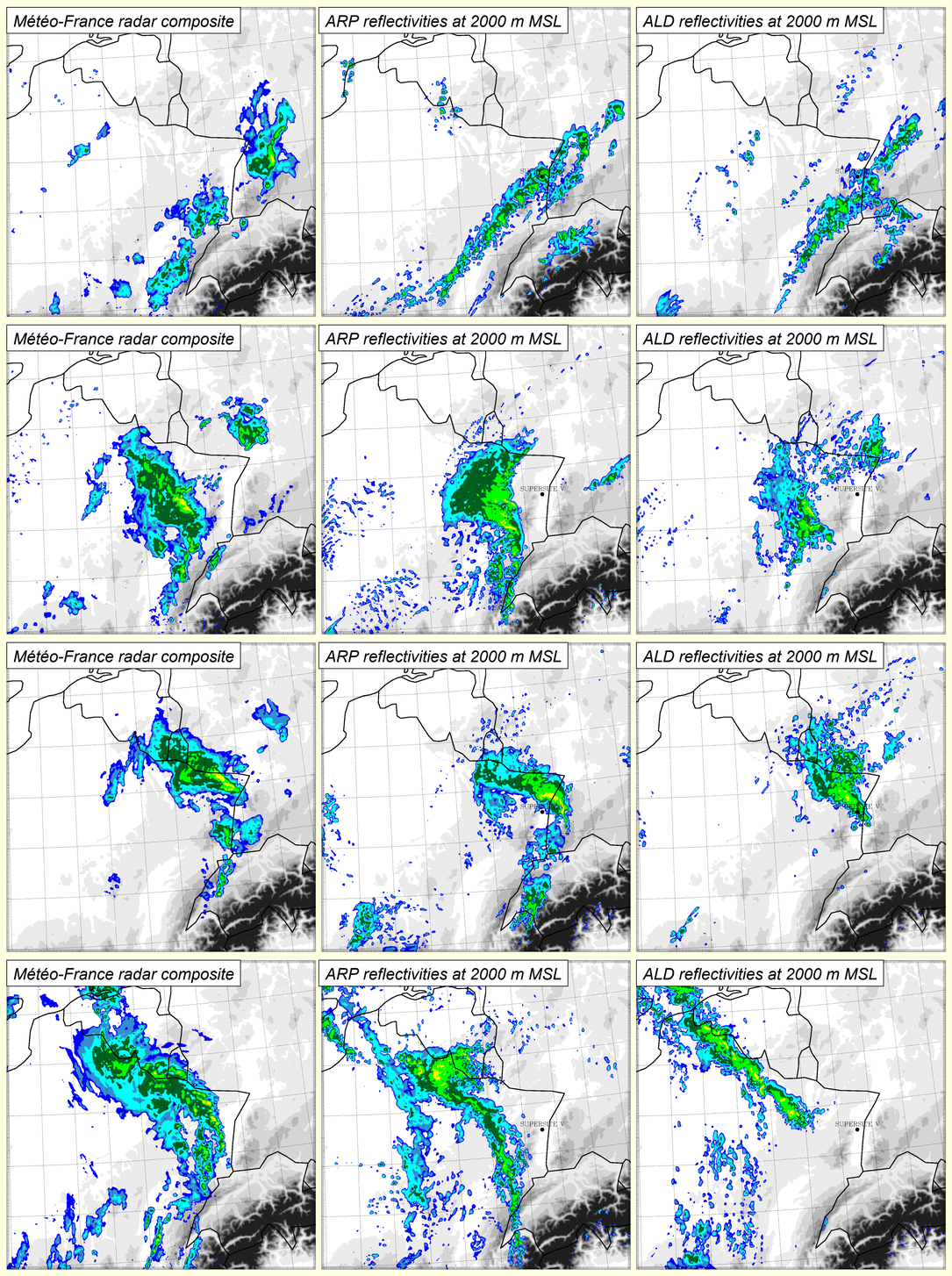
IOP9 covered three days (18-20 July 2007) during which a frontal zone oriented from southwest to northeast developed over the COPS region and was associated with deep convection. This IOP constitutes one of the most interesting IOPs because on the one hand, predictions of convection varied from one limited-area model to another, while on the other hand, COPS and ETReC07 resources were exploited and coordinated in a most efficient way.

During the IOP, daily forecasts were performed with the Meso-NH model initialized and coupled with ECMWF integrated forecast system (IFS) analyses. Some comparisons with satellite observations in particular have already been carried out (see poster by J.-P. Chaboureau).

Here, we present some early comparisons between observations and model outputs from Meso-NH simulations initialized and coupled with Arpege and Aladin analyses. In the future, we plan *i)* to examine further these simulations with the help of additional observations and *ii)* to assimilate non-conventional observations like GPS and radar data to investigate how such mesoscale data assimilation can improve quantitative precipitation forecast.

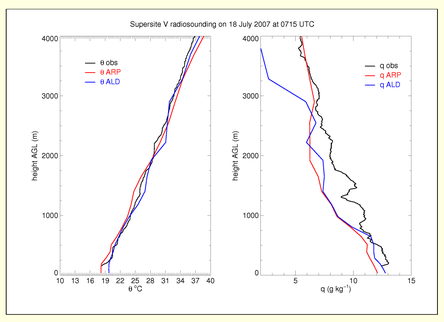
Reflectivities

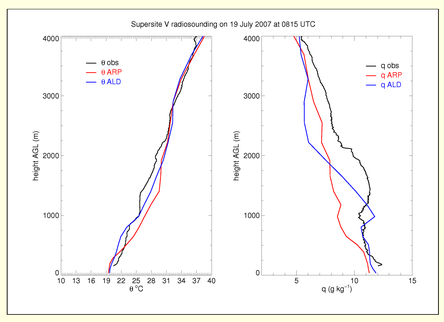


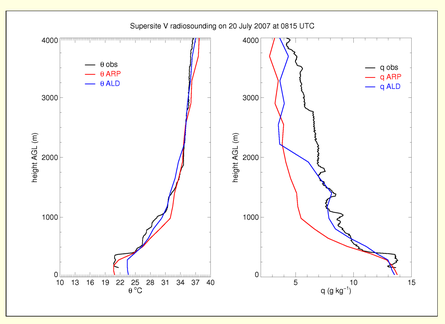


- Relatively good skill to forecast convective patterns for both simulations (except for some isolated cells on 18 July late in the afternoon which are not reproduced by ARP nor ALD, not shown);
- ARP seems to be superior to ALD, especially for 19 July at 0815 UTC and 20 July at 0900 UTC.

Comparisons with radiosoundings at Supersite V

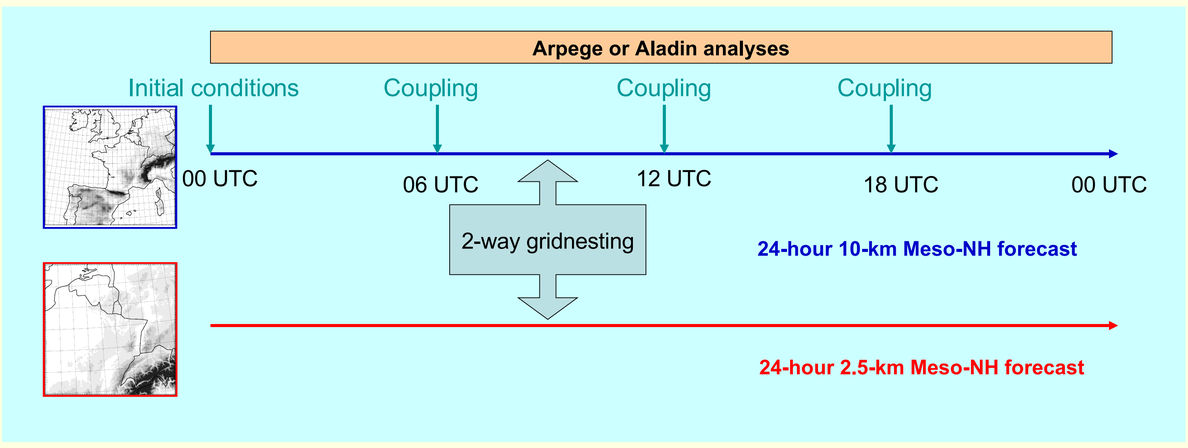






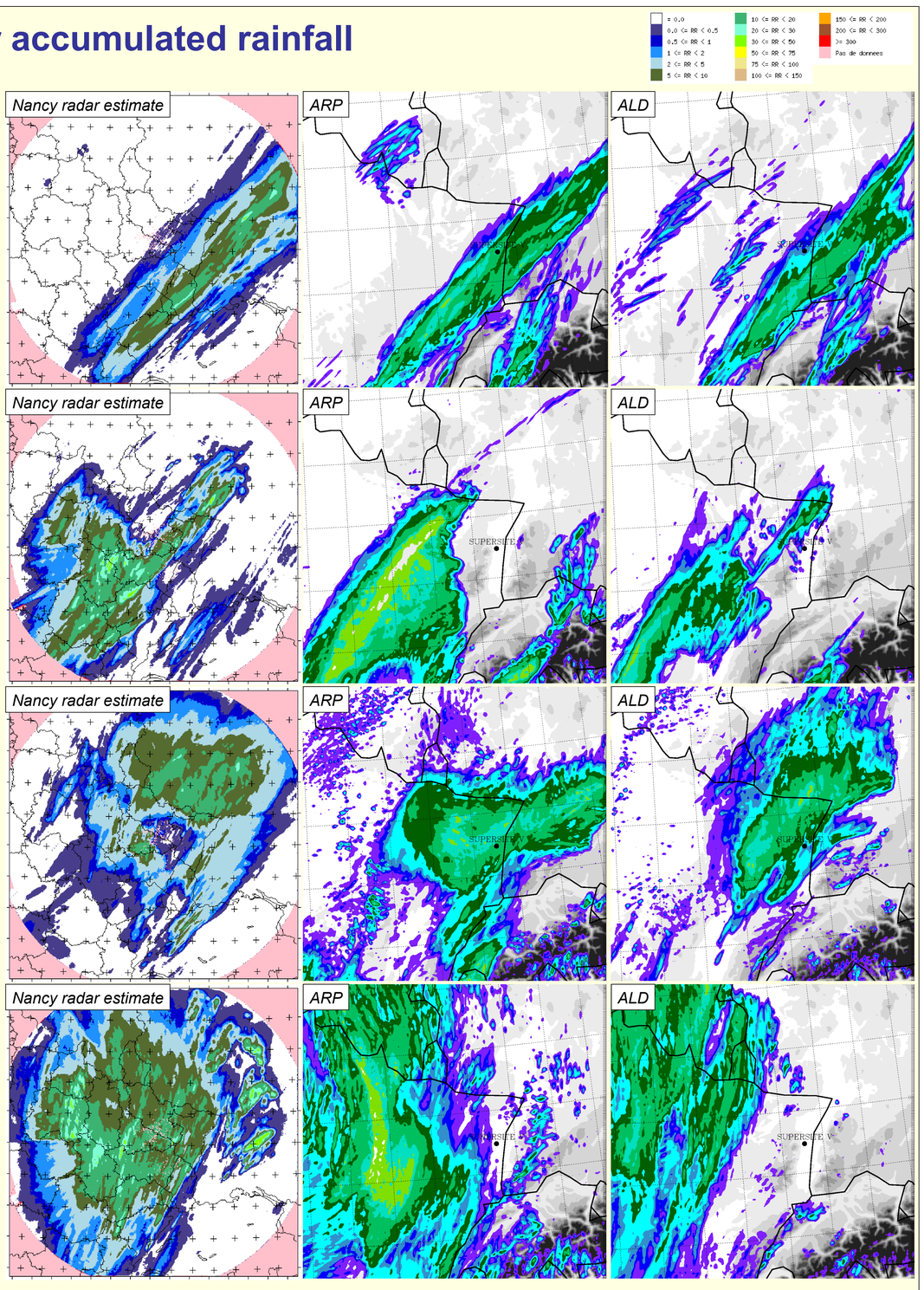
- Potential temperature (θ) vertical profiles simulated by both ARP and ALD are fairly correct in comparison with observed radiosoundings;
- Specific humidity (q) vertical profiles seem on average to be moderately underestimated in both simulations, except for the first 500 m, where it is very close to observations (see ALD in the first 2 km on 20 July at 0815 UTC).

Experimental set-up



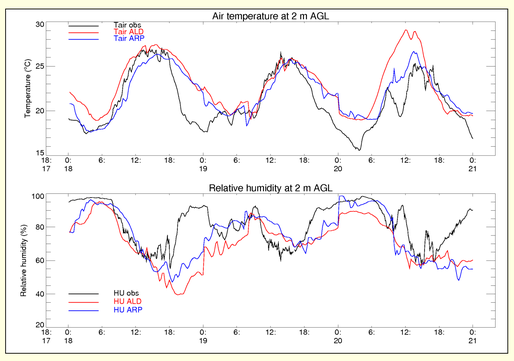
For each POI9 day, two Meso-NH simulations start at 00 UTC. One is initialised and coupled with the Arpege analyses, and the other is initialised with the Aladin analyses. Corresponding Meso-NH simulations are called ARP and ALD, respectively.

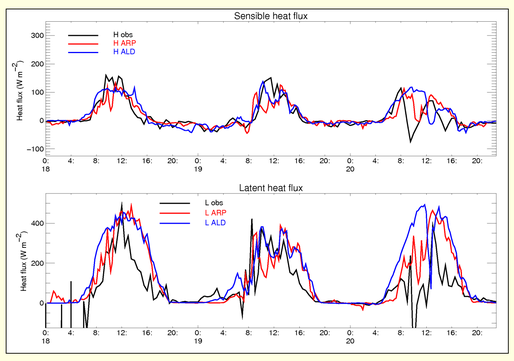
Six-hour accumulated rainfall



- ALD and ARP simulations reproduce roughly the observed precipitation patterns (especially well for 18 July 00-06 UTC);
- ARP tends to overestimate rainfall amounts (for 19 July 00-06 UTC and 20 July 06-12 UTC);
- ALD outperforms ARP for 19 July 00-06 UTC.

Ground comparisons at Supersite V





Simulated 2-m temperature, relative humidity, and sensible and latent heat fluxes compare reasonably well with observations. However, discrepancies can be noticed:
- systematically in the second half of the day: a steeper drop in observed latent heat fluxes between 12 UTC and 18 UTC is followed by a steeper drop in 2-m temperatures from 18 UTC on;
- when convective cells, which are not predicted by both simulations, pass over Supersite V (between 18 UTC on 18 July and 00 UTC on 19 July; between 09 UTC and 19 UTC on 20 July): observed temperature and heat fluxes drop while relative humidity increases.

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