

How well are mesoscale structures captured by ALADIN simulation with the MAP re-analysis

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Motivation

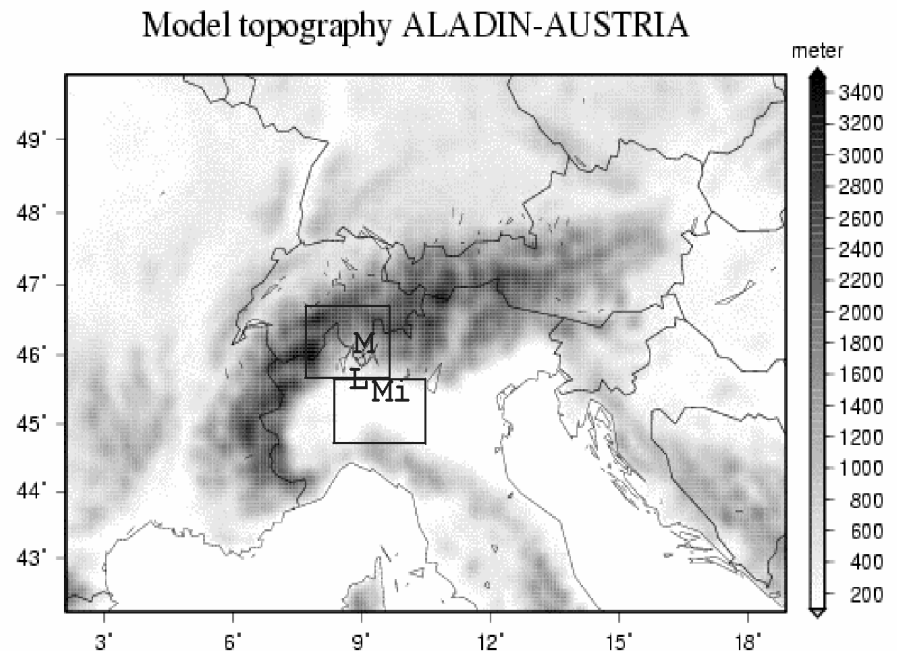
- MAP re-analysis is the most comprehensive analysis of the atmosphere at high resolution over the Alpine.
- Many studies are being carried on with MAP re-analysis, e.g. in ALADIN community.
- Question should be raised, how well is the simulation?
- A lot of additional observations during the MAP field experiment make a direct verification possible.

MAP IOP2B case

- MAP IOP2B is the most intense rainfall case observed during the MAP SOP.
- From 00UTC,19 – 06UTC,20. 09.1999
- Meteorological situation: A baroclinic trough associated with cold front was approaching Alps from the west, low level moist Mediterranean air was advected toward the southern Alps.

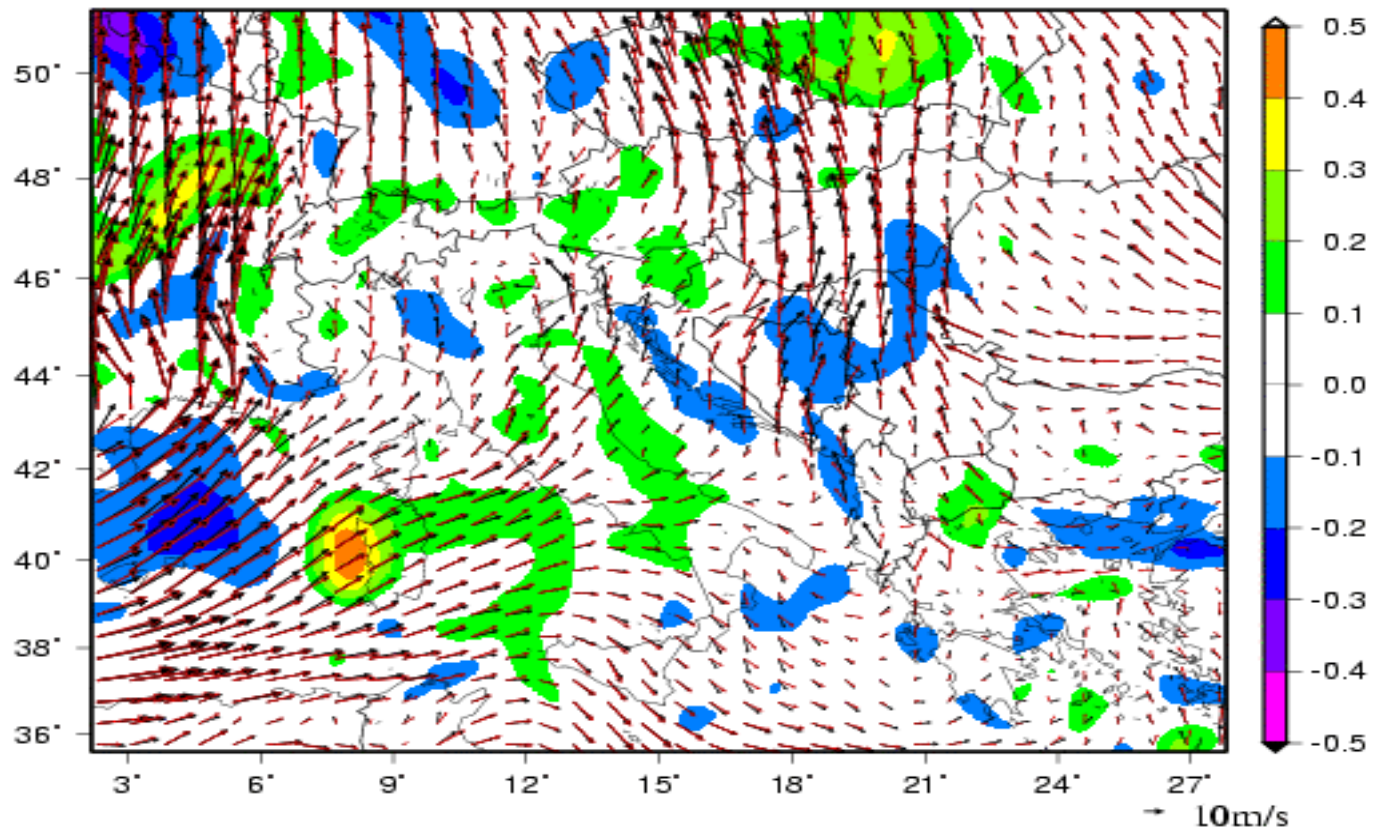
MAP simulation with ALADIN

- **ALADIN-AUSTRIA**
9.6km/41 levels
- **IC and LBC provided by the MAP re-analysis**
- **Model started at 00utc, 19/09/99, and integrated to 54 hours, 06utc, 21/09/99**



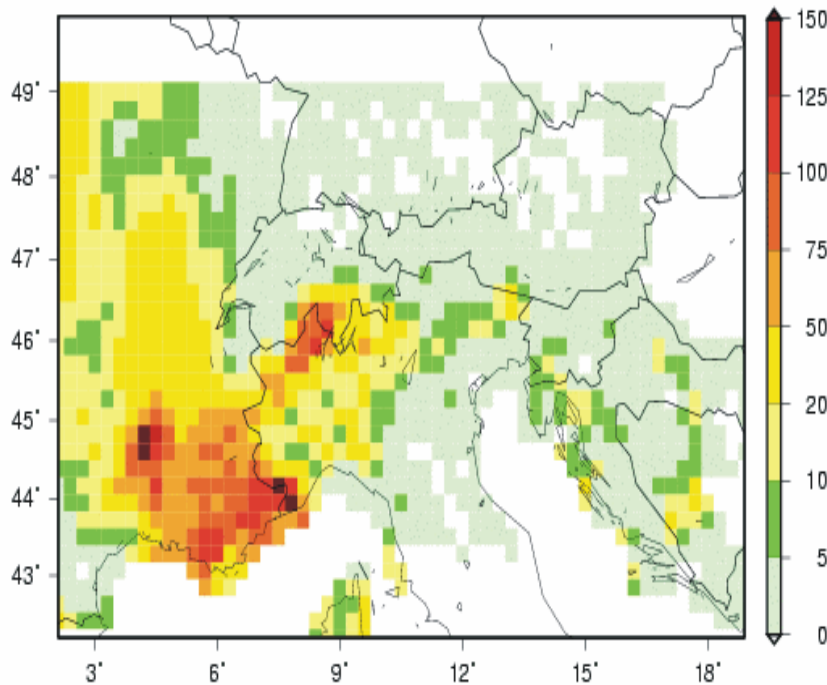
Impact on the initial condition

RQ&wind difference e9ex-e9mi, 850hPa, 00utc, 19/09/1999

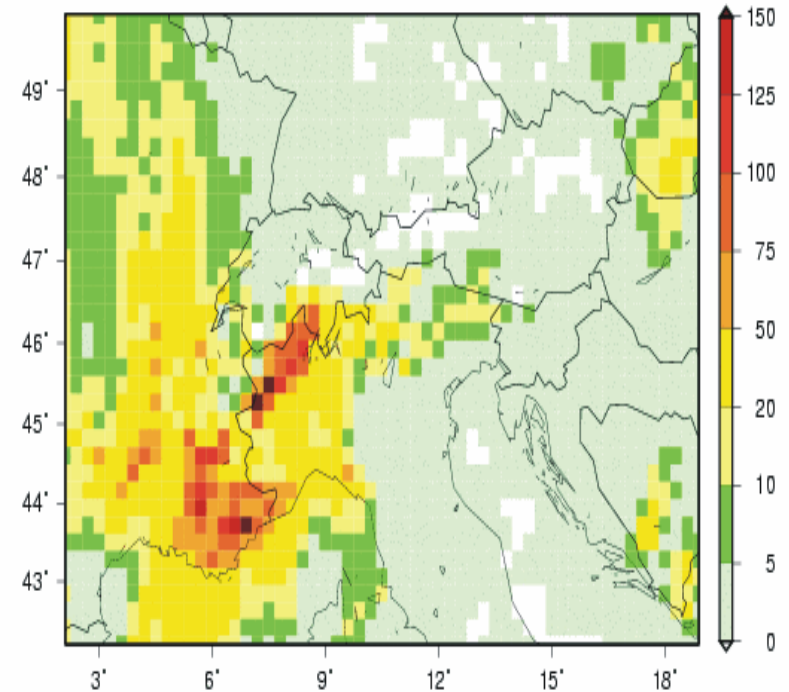


Accumulated precipitation 19/09

24h precipitation [mm]: 19 Sep 1999, Observation

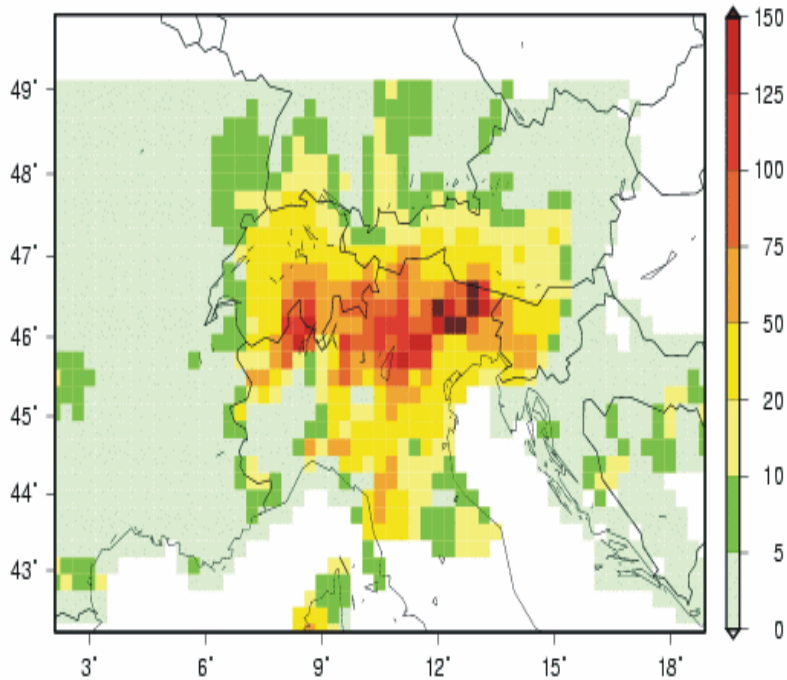


24h precipitation [mm]: 19 Sep 1999, E9MI

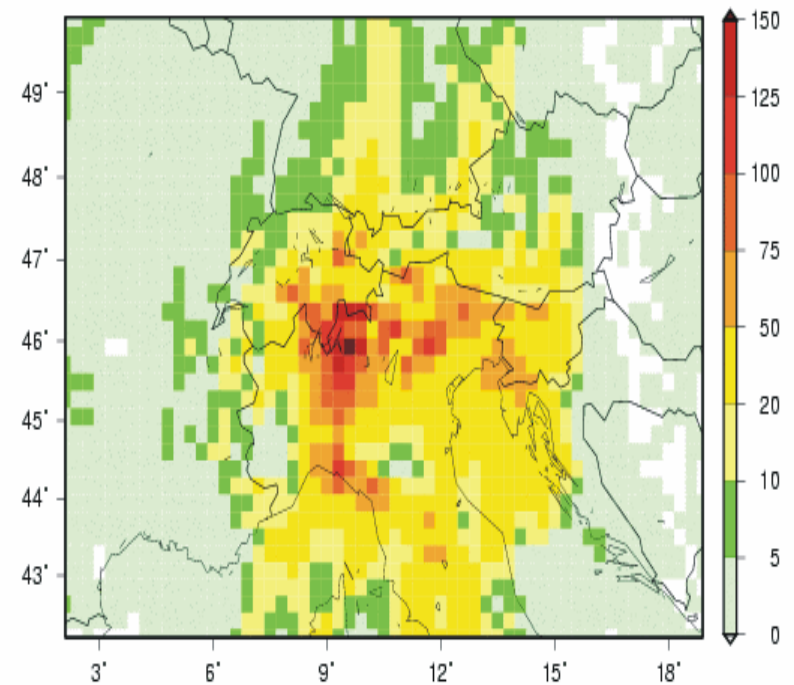


Accumulated precipitation 20/09

24h precipitation [mm]: 20 Sep 1999, Observation

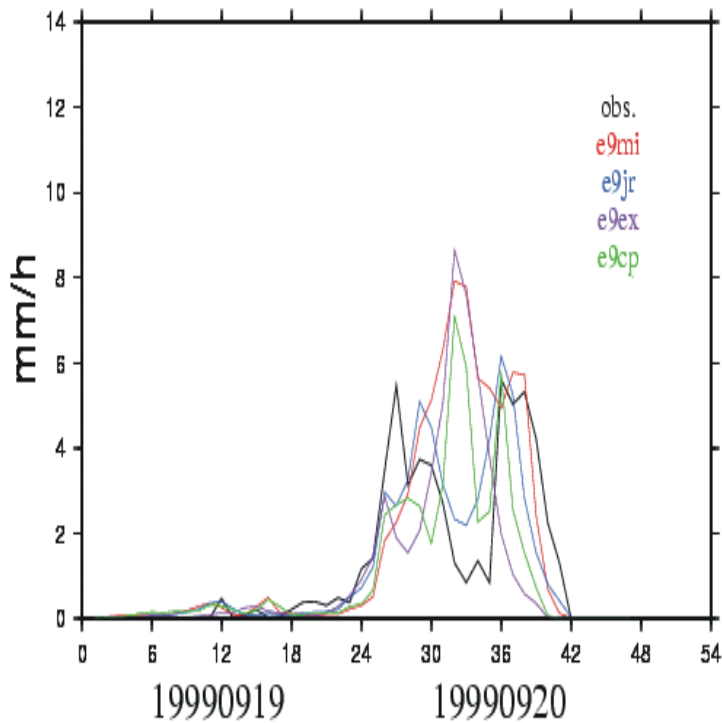


24h precipitation [mm]: 20 Sep 1999, E9MI

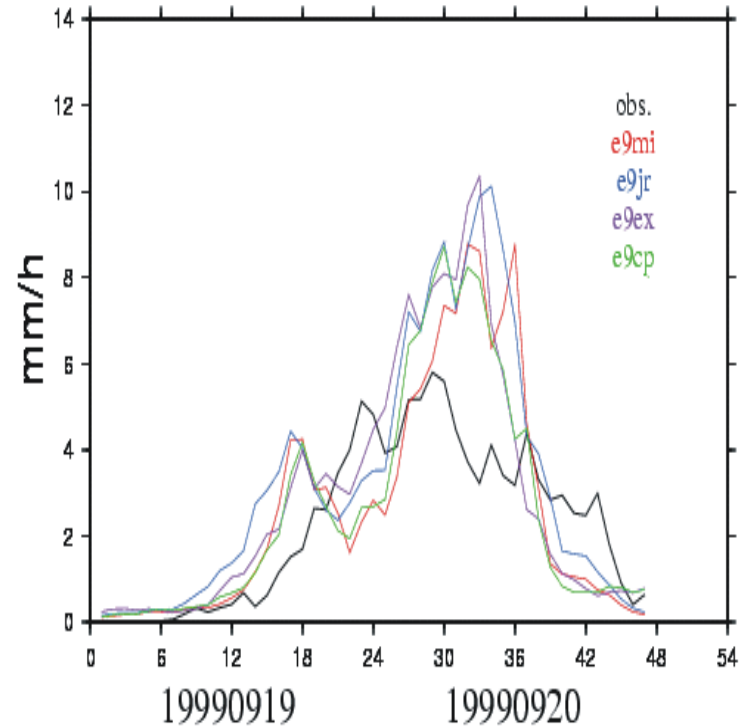


Time evolution of the rainfall

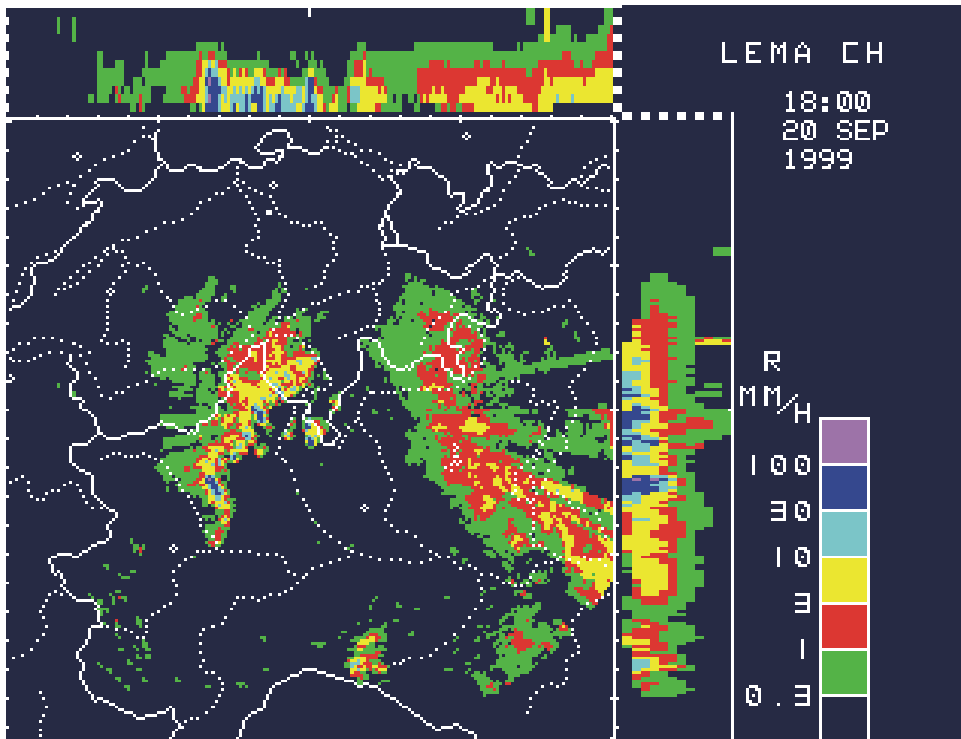
Central Po Valley Area



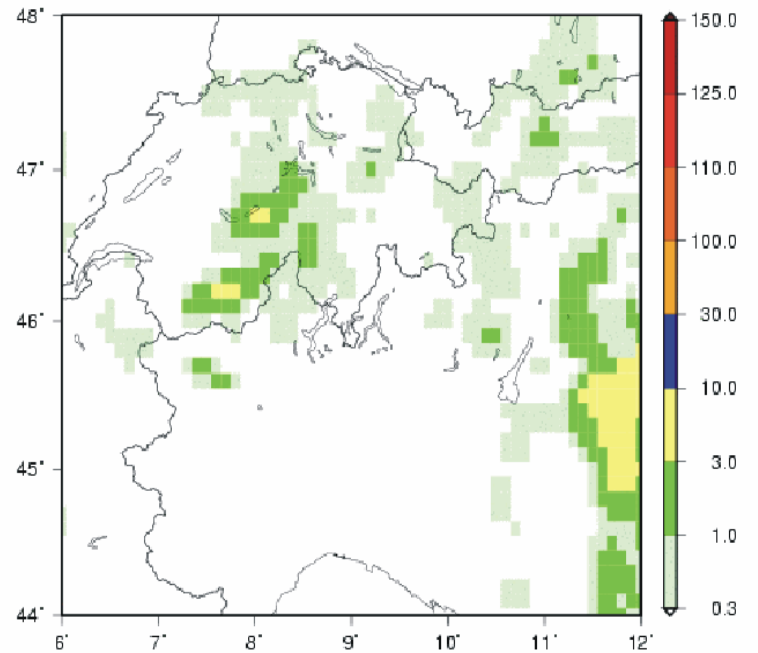
Lago Maggiore Area



Convection

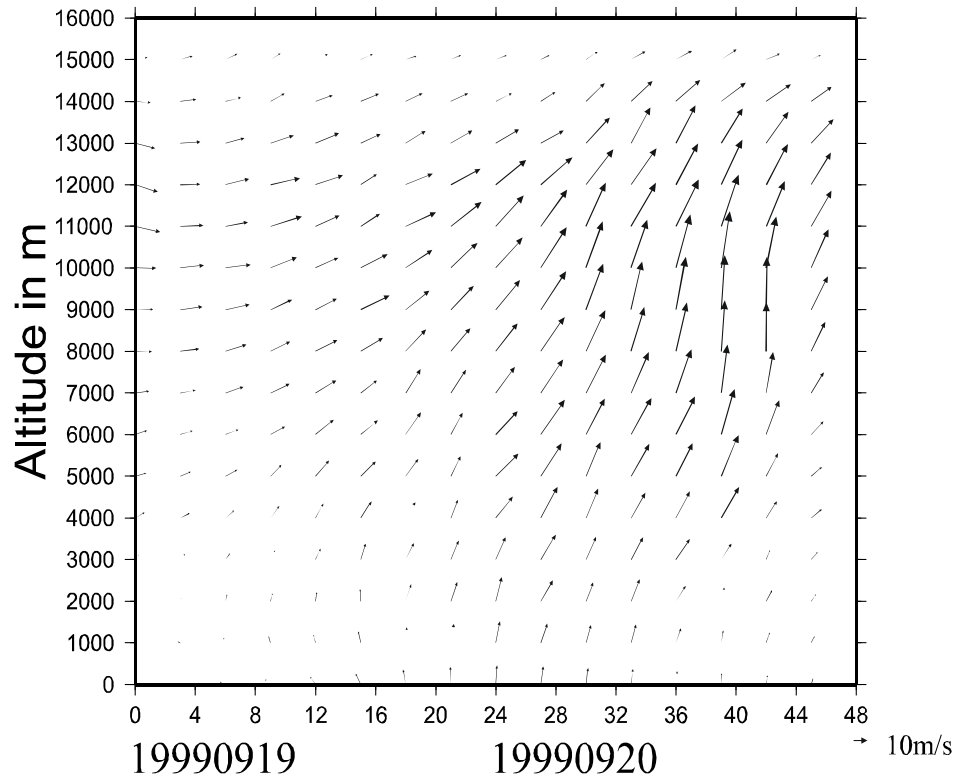


Con. rain rate [mm/h]: 18utc, 20/09/1999, E9MI

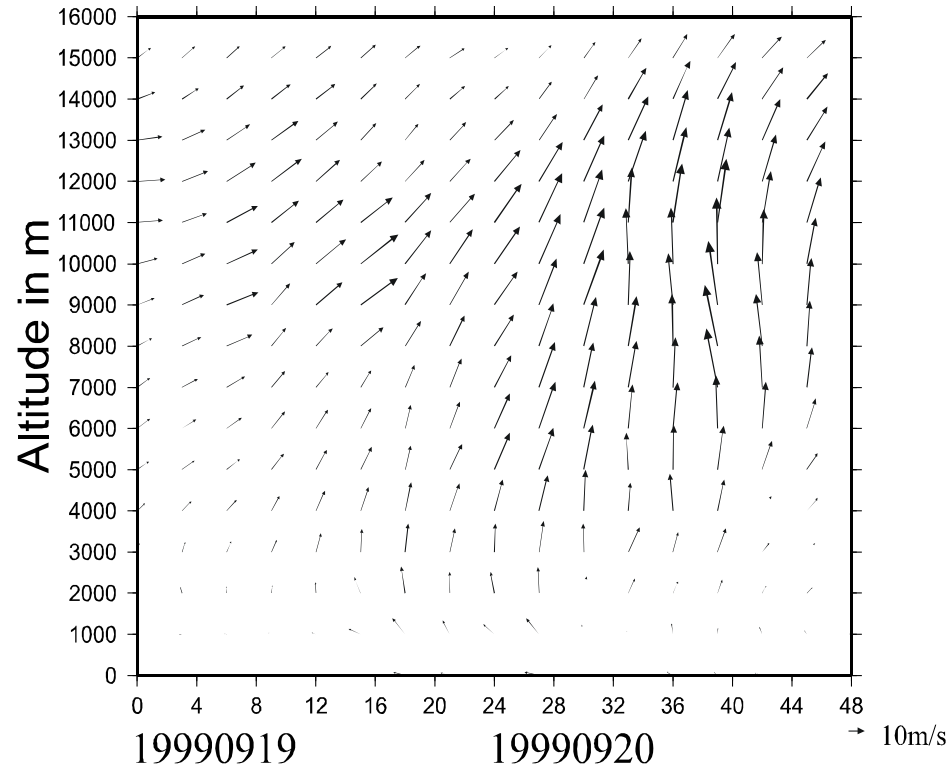


Wind

Radar VHF, Observation, Lonate

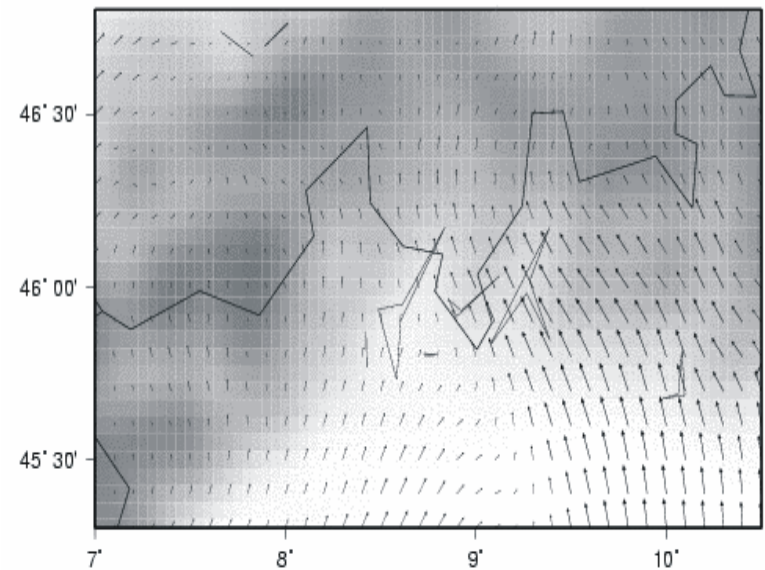
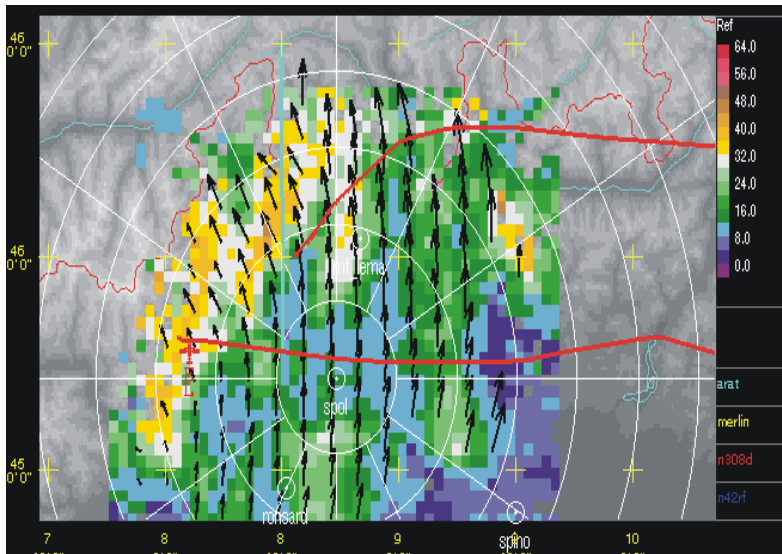


Simulation, MAP re-analysis, Lonate



Orographic flow

Wind 09utc 20 Sep 1999, e9mi



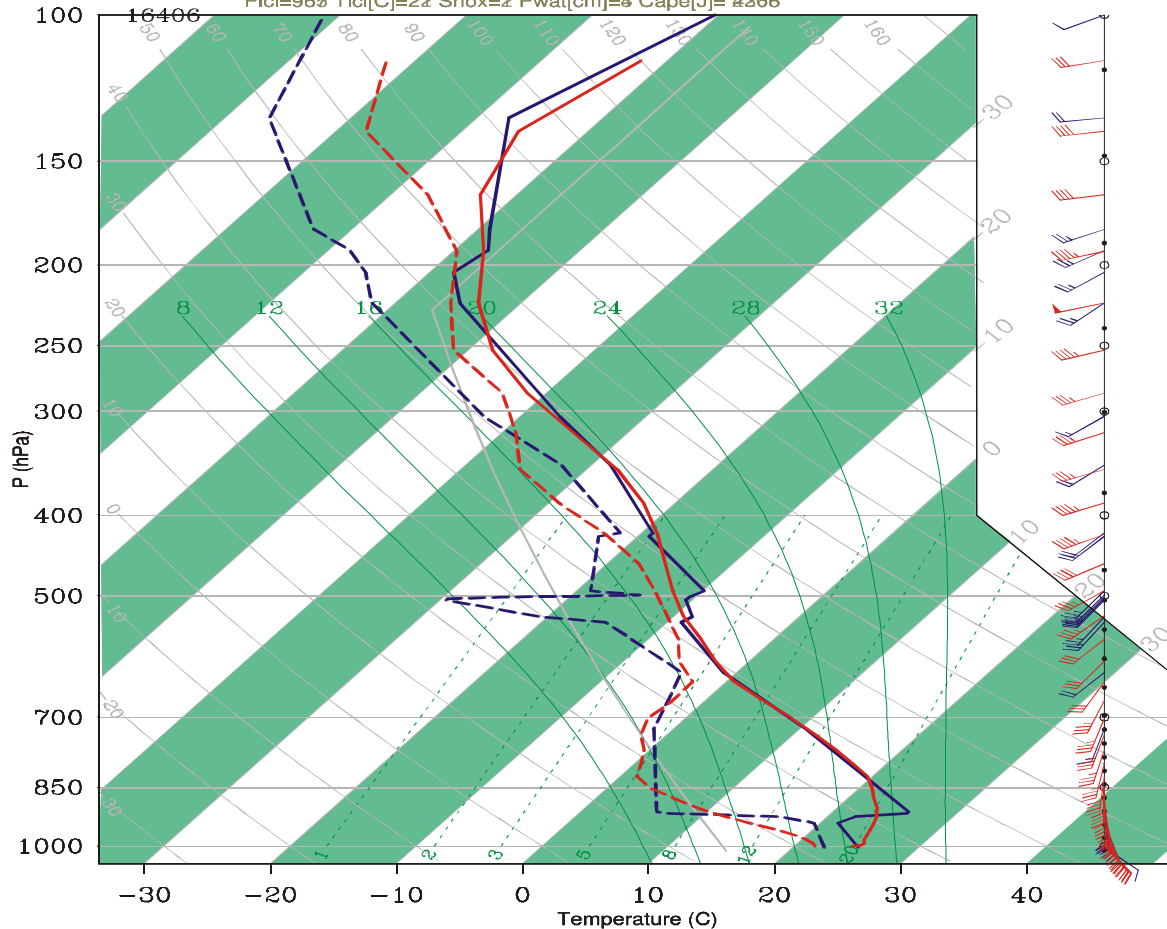
Thermodynamic structure, Sardinia

00UTC, 20.Sept.1999

ALADIN - ICMSHE9MI + RASO

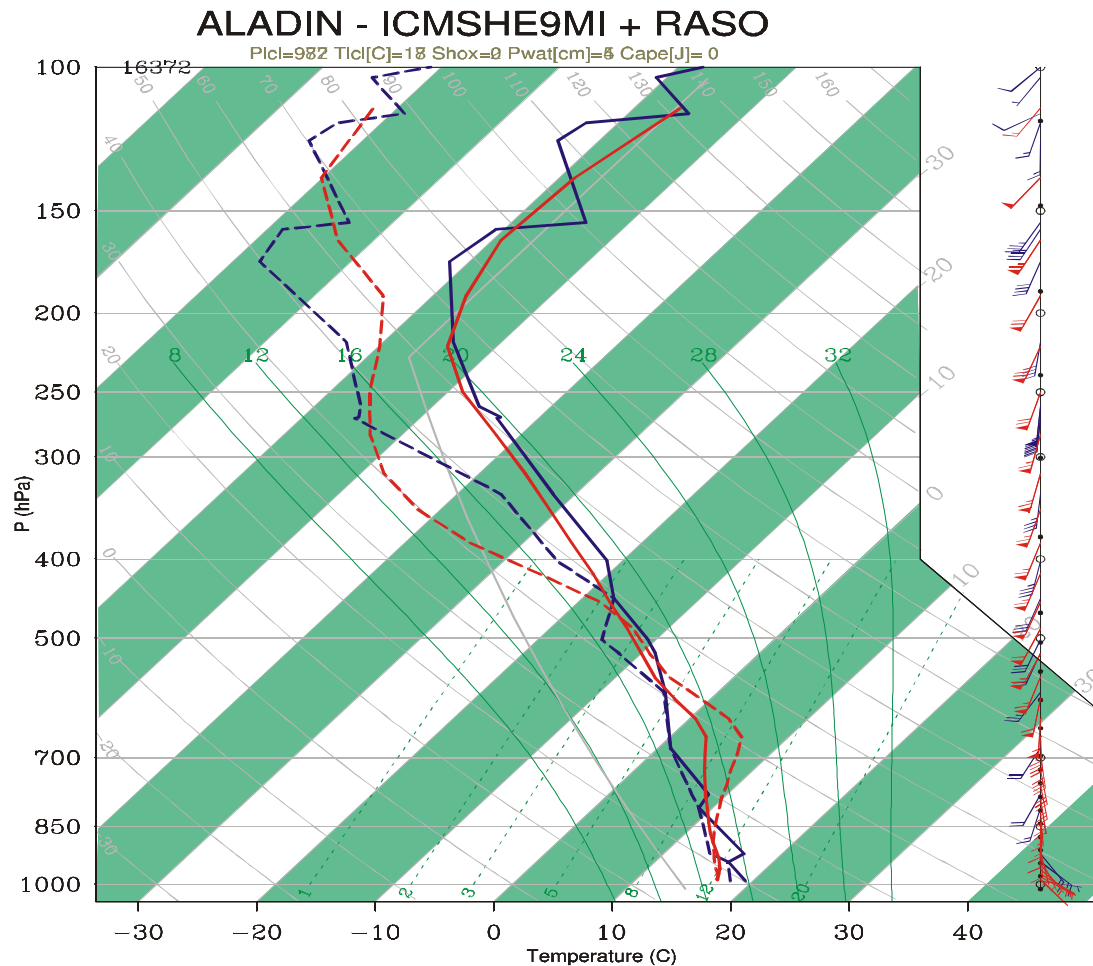
P1cl=963 T1cl[C]=22 Shox=2 Pwat[cm]=3 Cape[J]= 2206

CAPE in J/kg
OBS=1163
MAP=1254



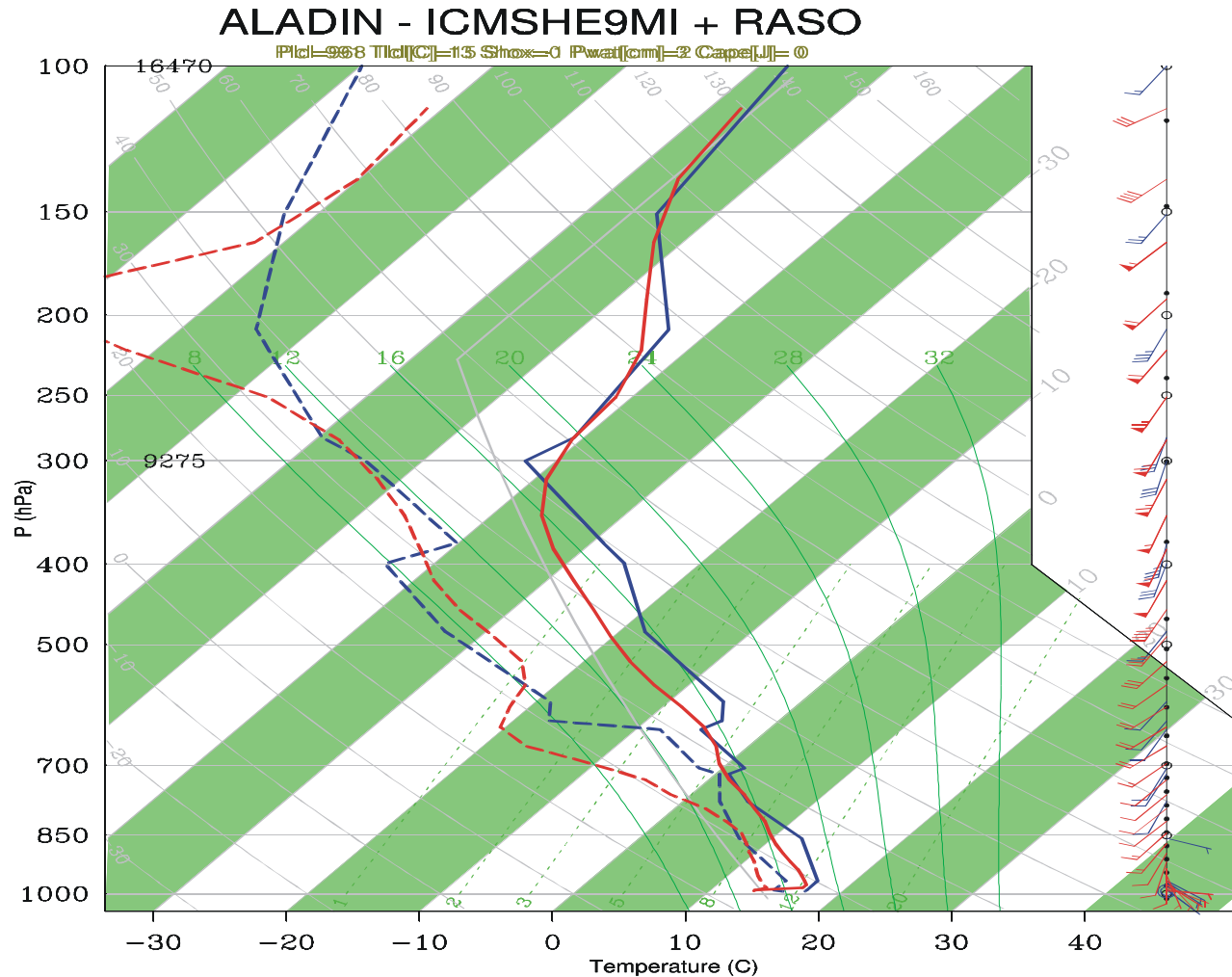
Thermodynamic structure, Milan

12UTC, 20.Sept.1999



Thermodynamic structure, Milan

00UTC, 21.Sept. 1999



Conclusion

We have studied the meso-scale numerical simulation of ALADIN with MAP re-analysis. MAP IOP2B, the most intense rainfall case during SOP was chosen for the investigation. Accumulated precipitation, time evolution of the area averaged precipitation, wind, orographic flow, thermodynamic structure are compared with the radar, radiosounding observations.

Conclusion

- The basic mesoscale features has been captured by the ALADIN simulation with MAP re-analysis.
- Detailed investigation shows problems related complex topography in the simulation of the precipitation.
- Low level orographic flow, deep convection in the mountainous area remain as a difficulty in the simulation.
- Simulated thermodynamic structure can not always recover the reality.