



Sensitivity of COSMO-1 to vertical levels distribution

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ARPA Piemonte

thanks to Guy de Morsier and Oliver Fuhrer



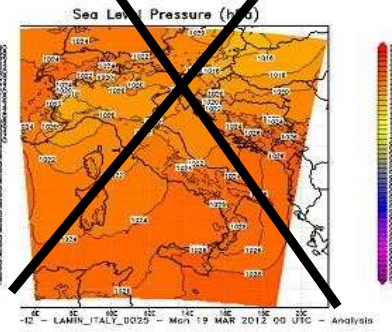
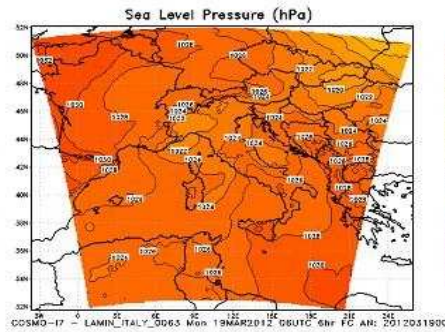
Lugano, 11/09/2012 - 14th COSMO General Meeting



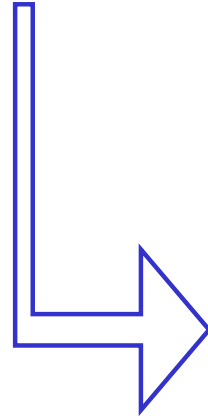
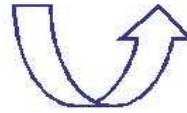
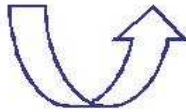
ECMWF-IFS

COSMO-I7

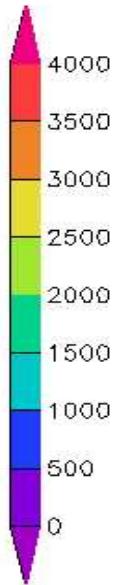
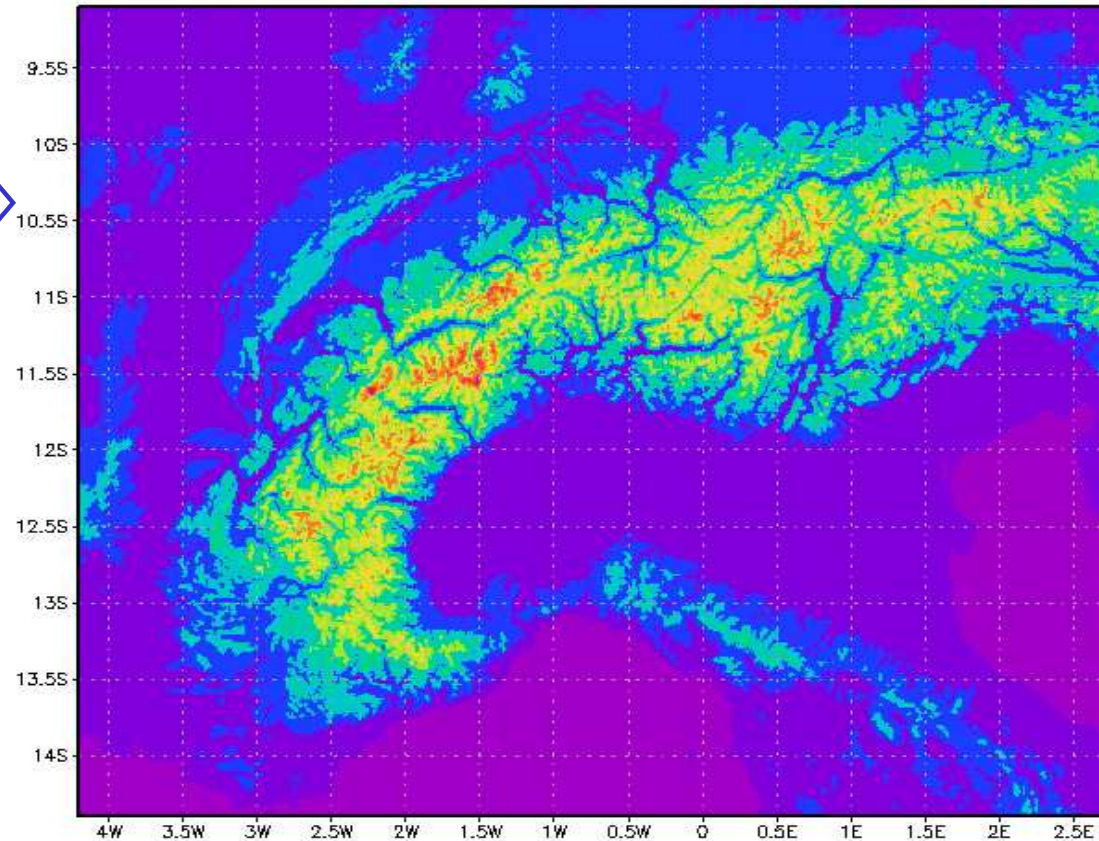
~~COSMO-I2~~



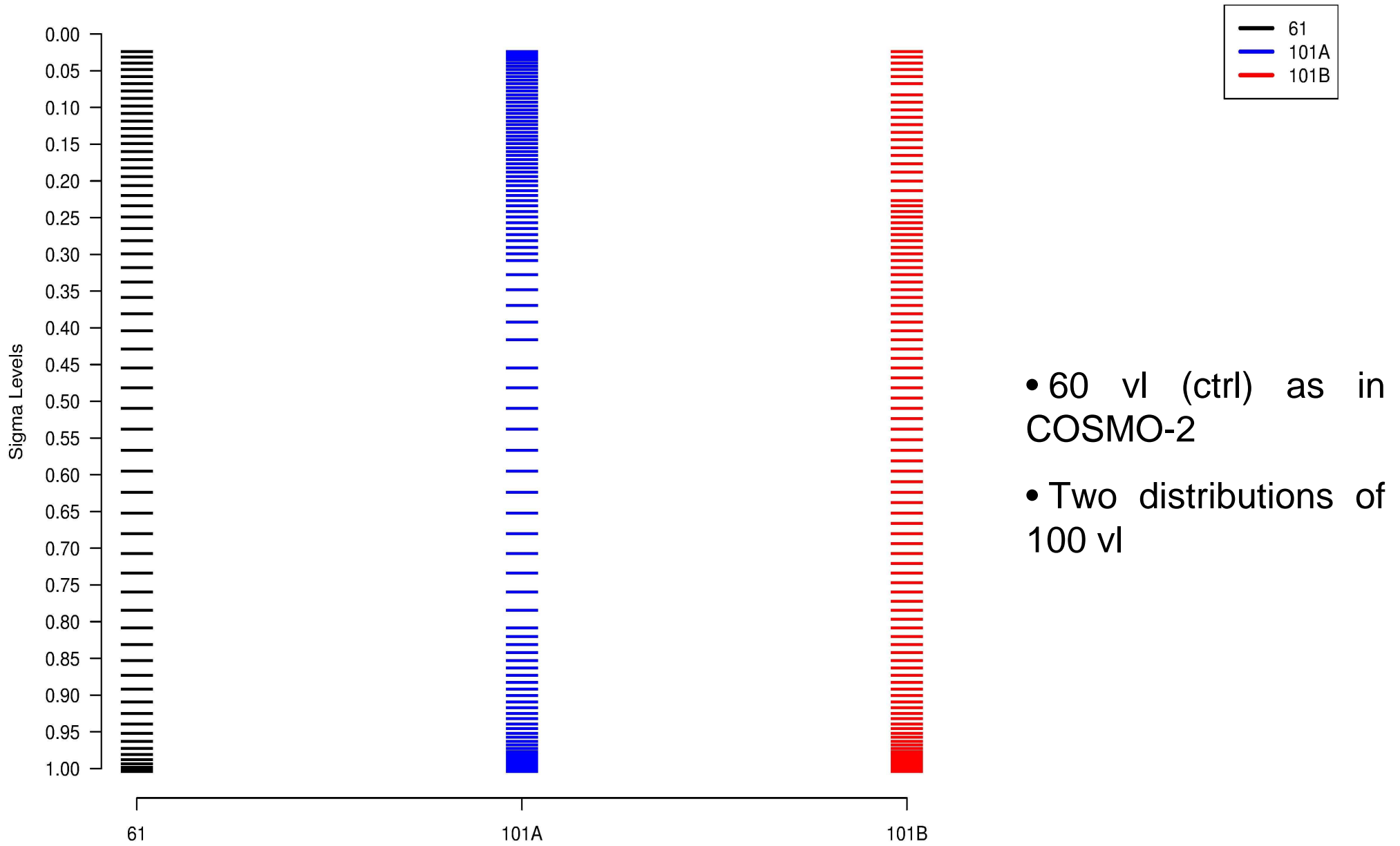
- run 20111104 00UTC (Genua flood)
- from IFS analysis
- up to +18h



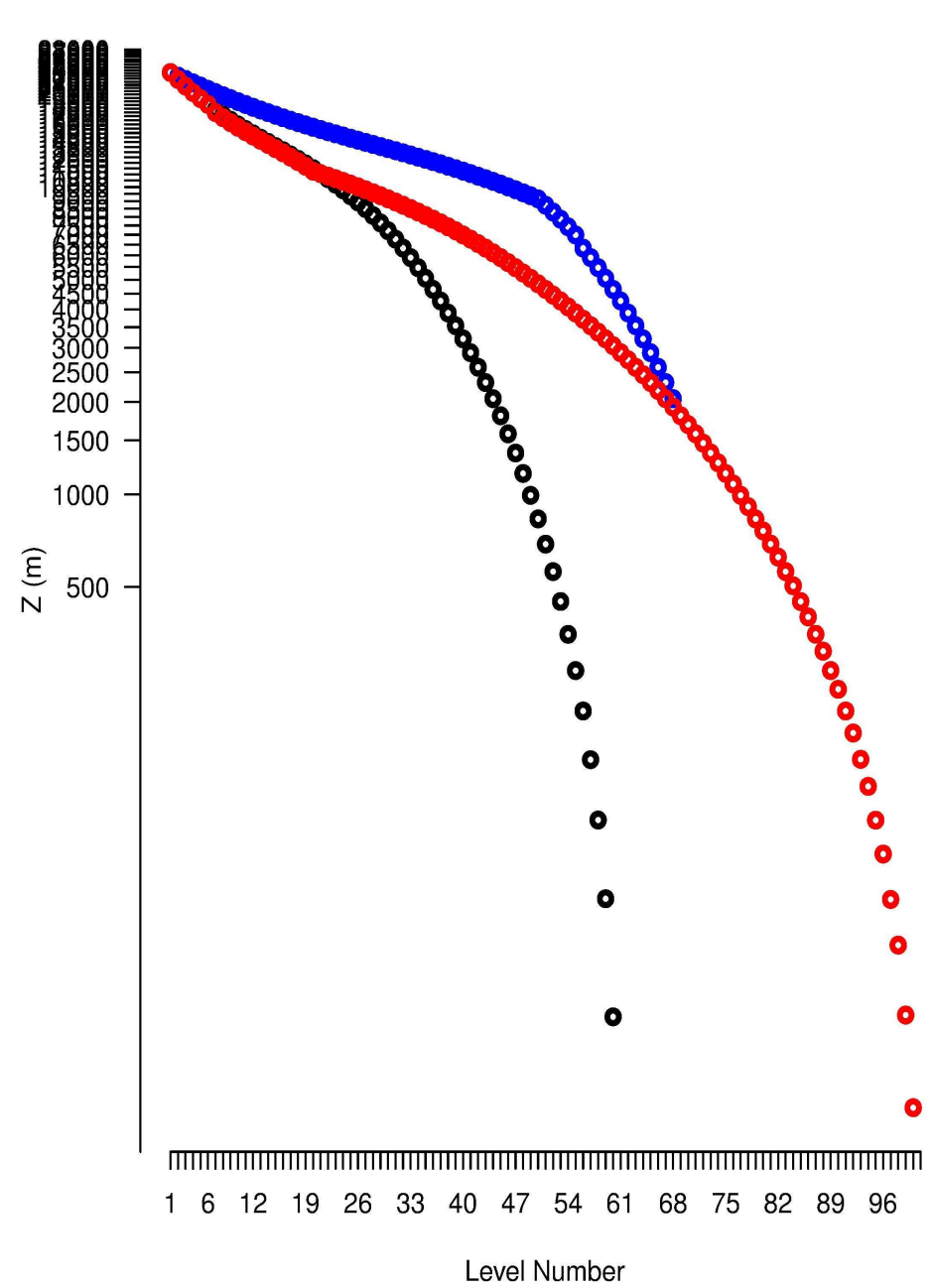
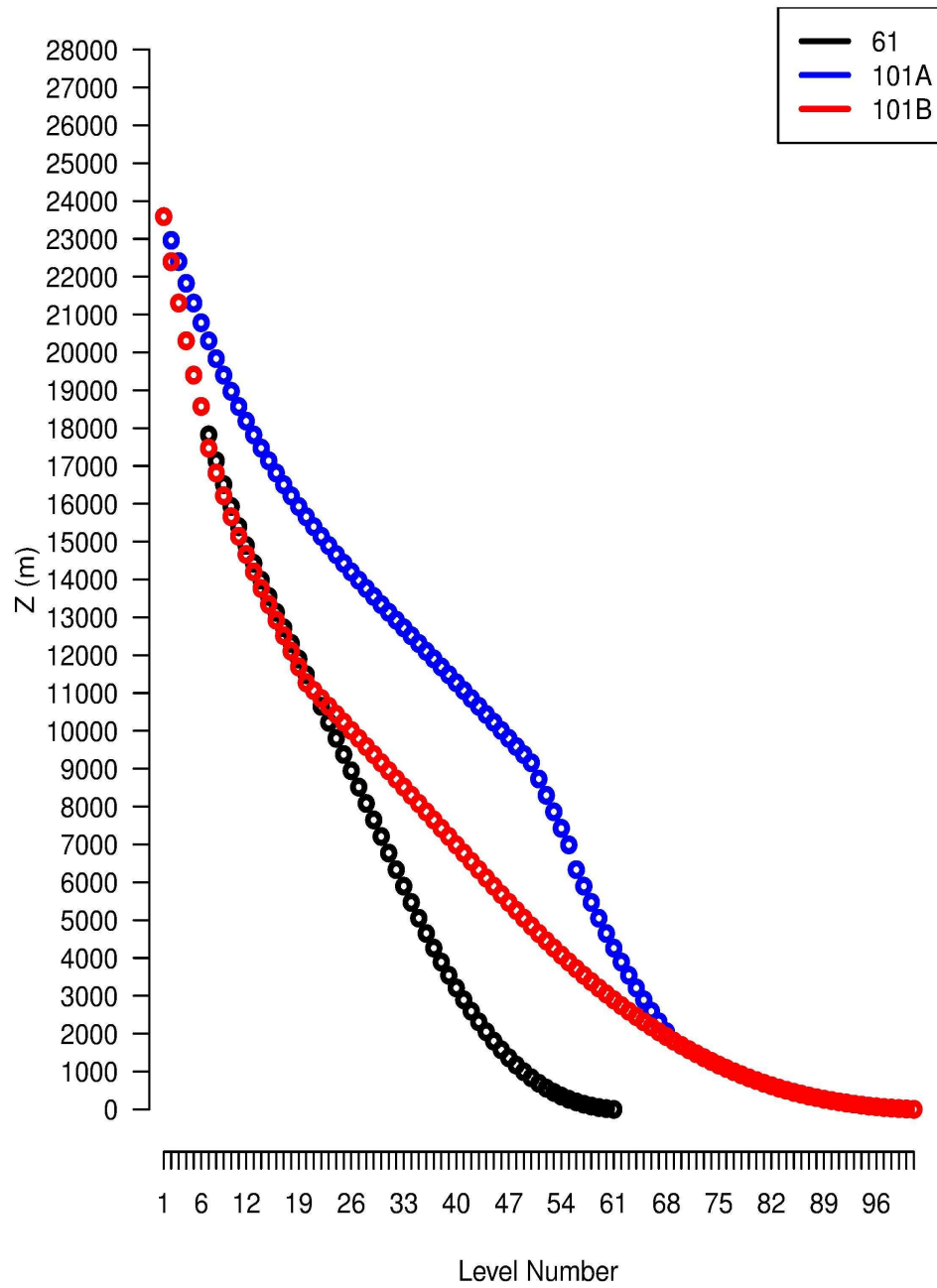
- for 100 vl -> dt=5s
- for 60 vl -> dt=10s
- COSMO 4.21
- using MeteoSwiss namelist (Wiki) and new fast wave solver (Guy/Oliver)



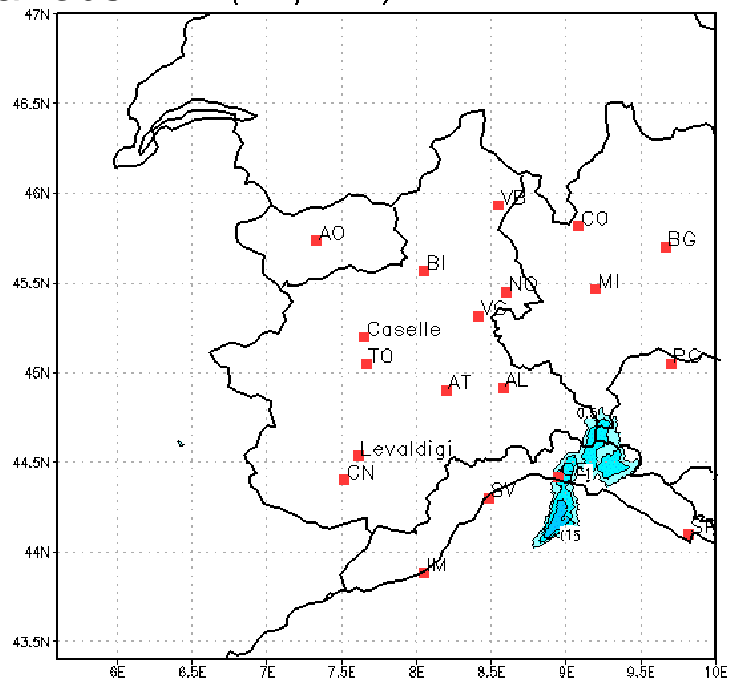
Distribution of vertical coordinates in COSMO experiments



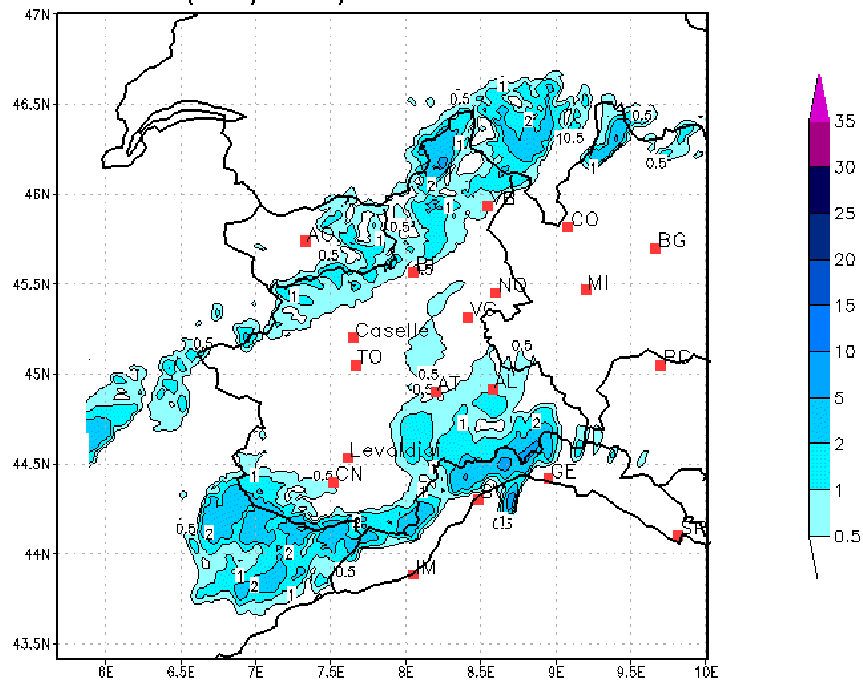
Distribution of vertical coordinates in COSMO experiments (y-x scale: left, logy-x scale: right)



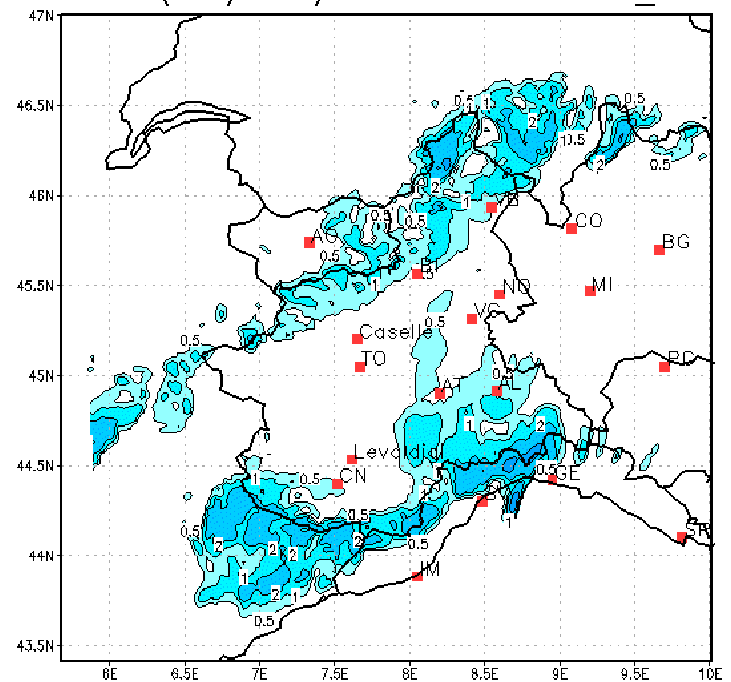
radar obs Prec (mm/01hr) at 01:00 UTC



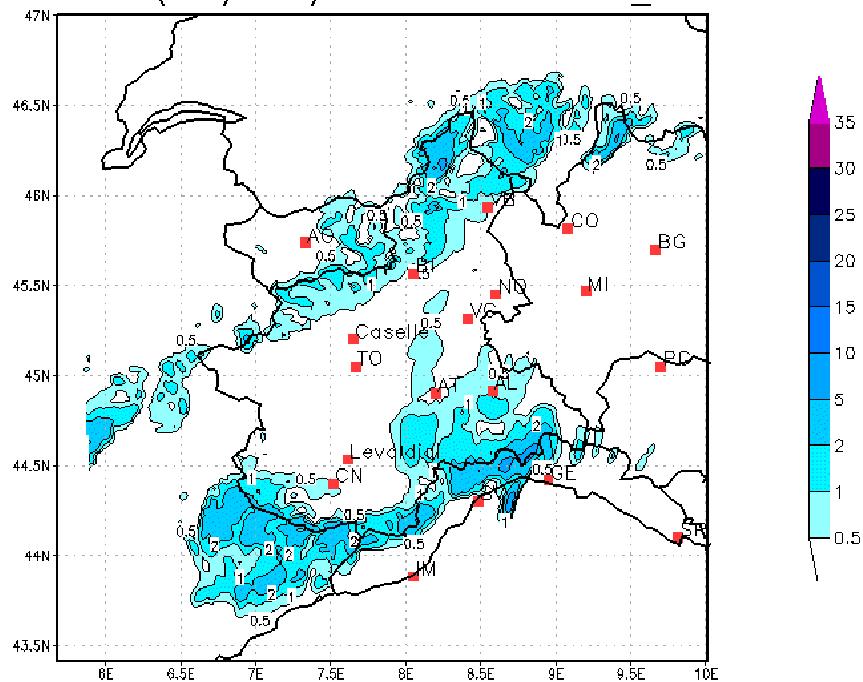
Prec (mm/01hr) at 1:00 UTC - 60vl



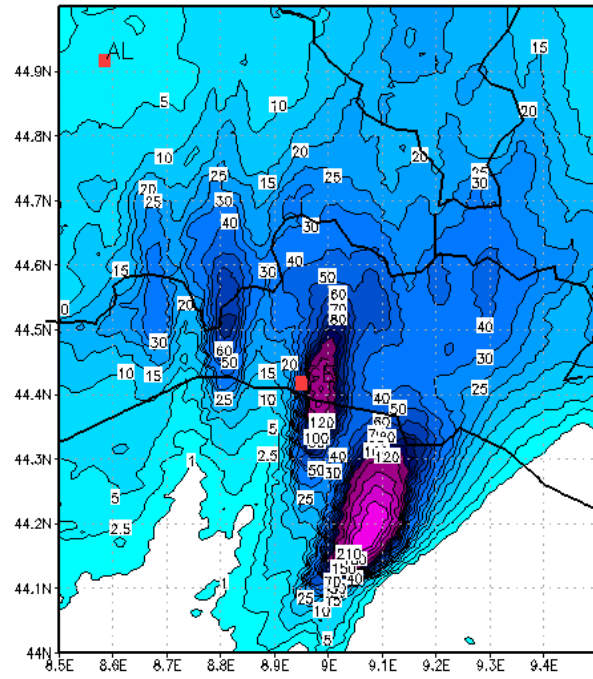
Prec (mm/01hr) at 1:00 UTC - 100_1vl



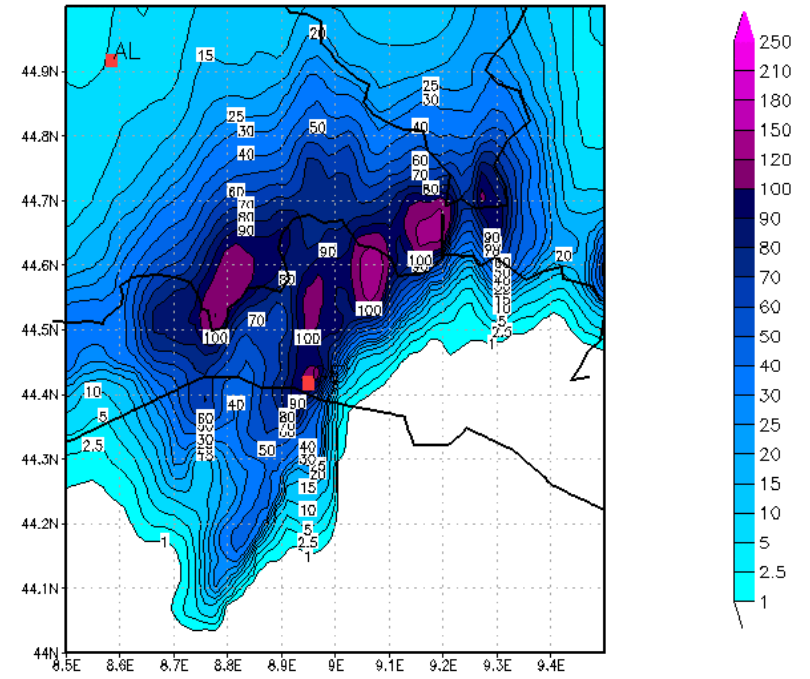
Prec (mm/01hr) at 1:00 UTC - 100_2vl



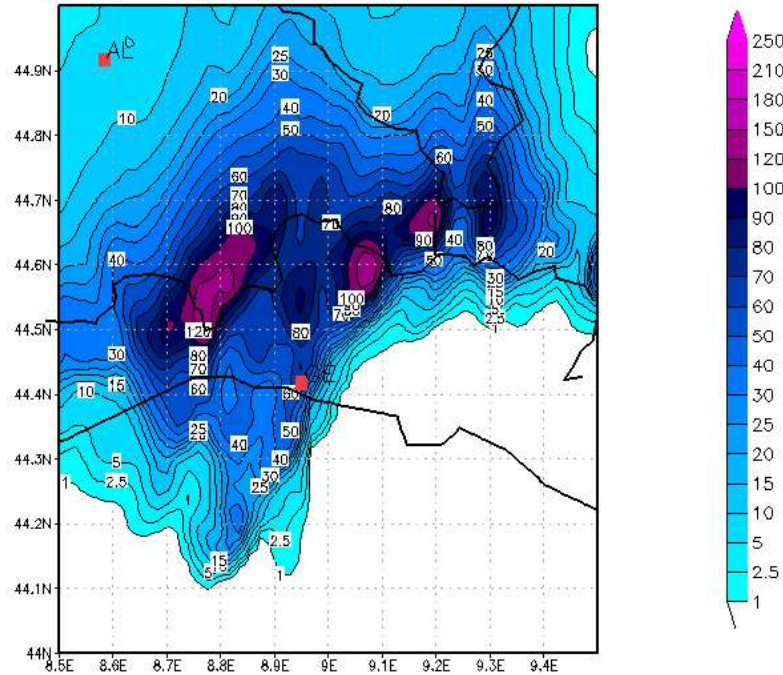
radar obs Prec (mm/18hr) at 00-18:00 UTC



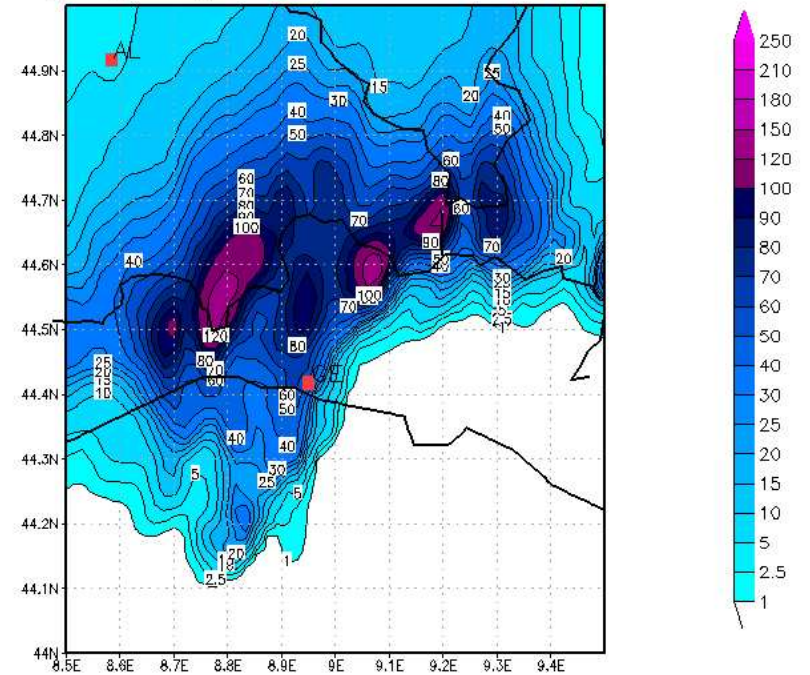
Precipitation (mm/18hr) at Fri 04NOV2011 18:00 UTC - 60vl



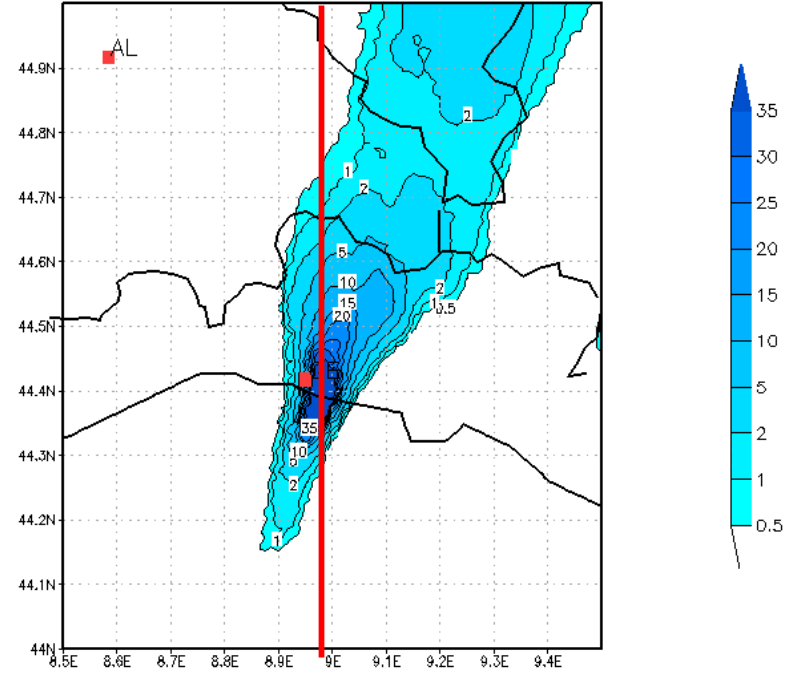
recipitation (mm/18hr) at Fri 04NOV2011 18:00 UTC - A100vl



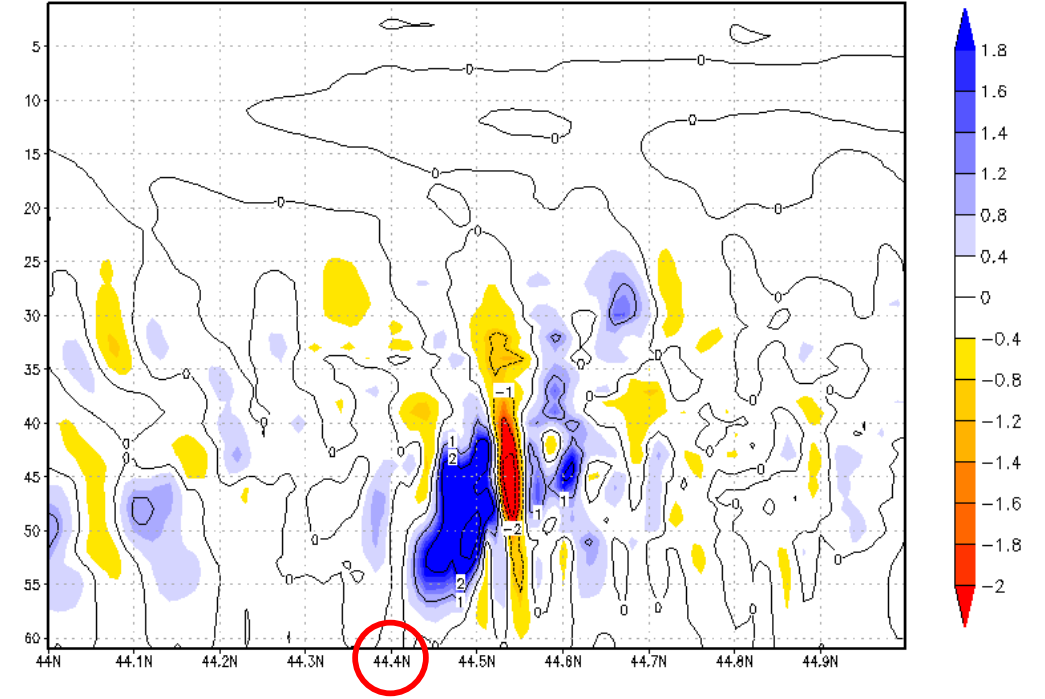
recipitation (mm/18hr) at Fri 04NOV2011 18:00 UTC - B100vl



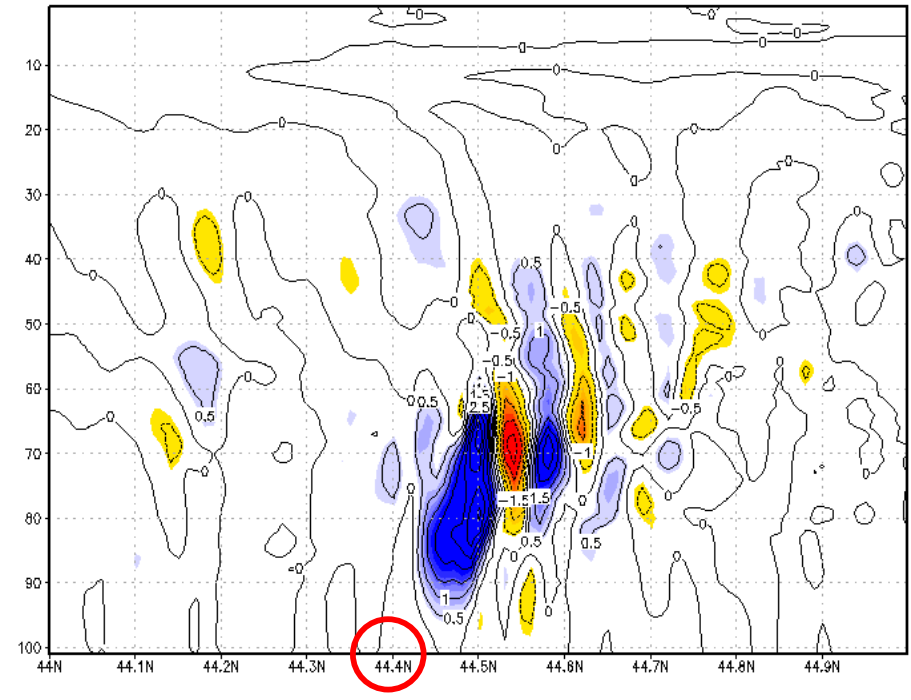
Prec (mm/01hr) at 12:00 UTC



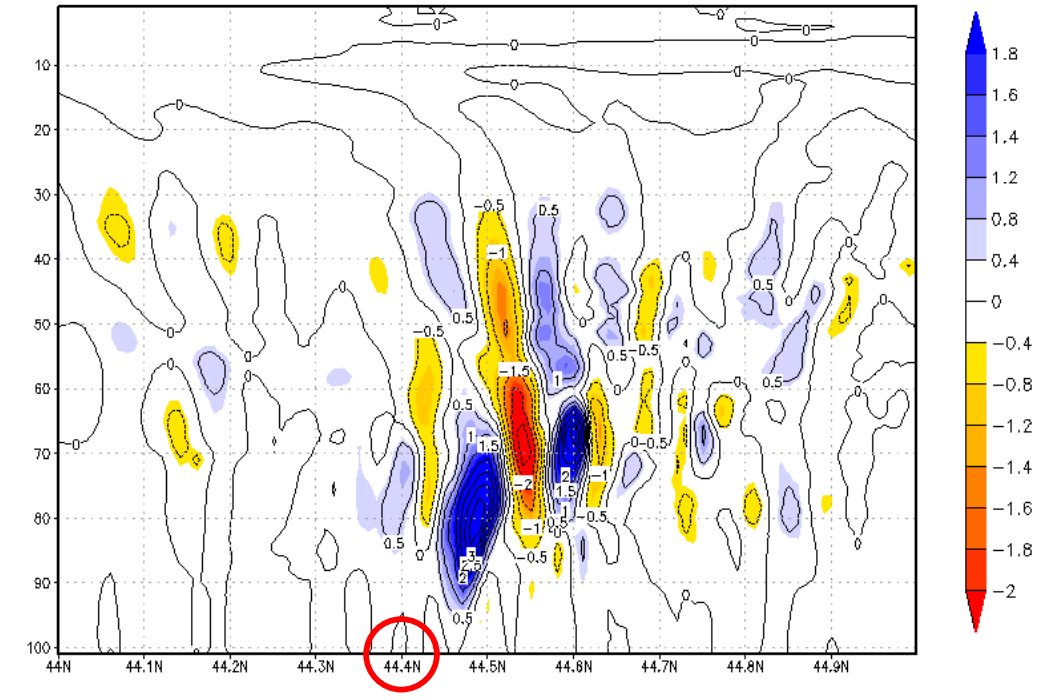
Vertical Velocity(m/s) at 12UTC for 60vI



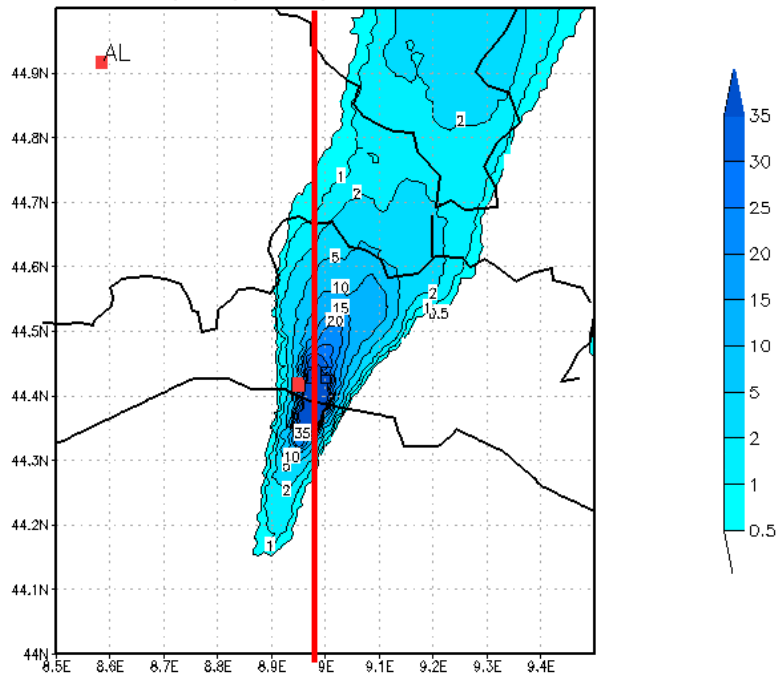
Vertical Velocity(m/s) at 12UTC for 100vIA



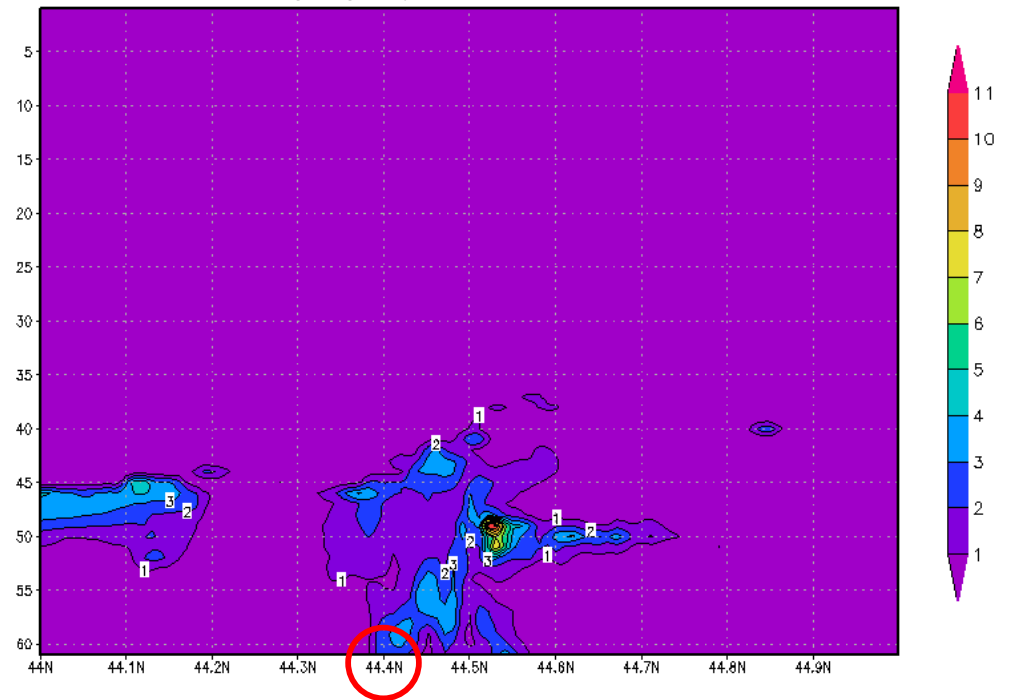
Vertical Velocity(m/s) at 12UTC for 100vIB



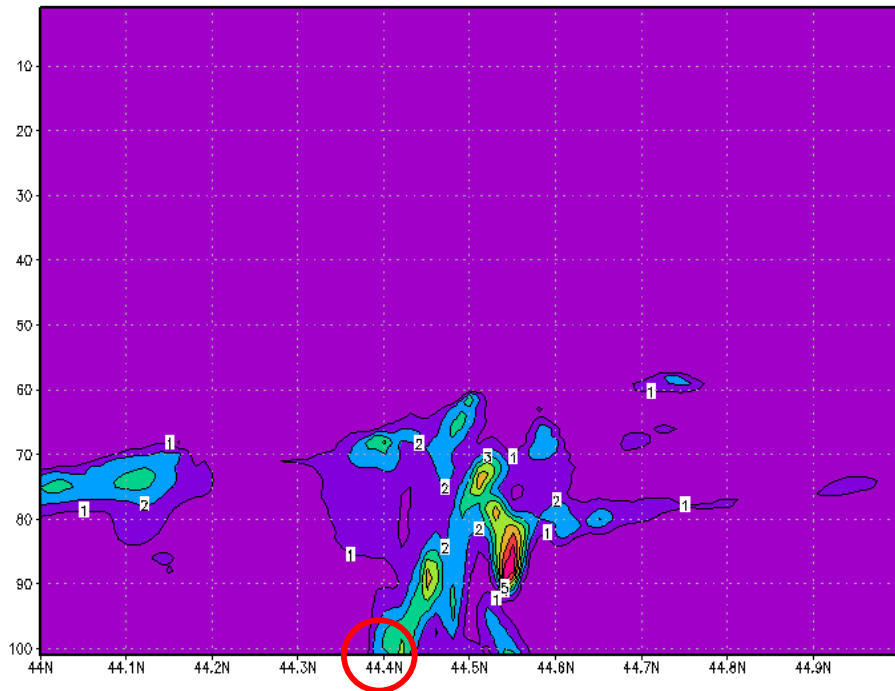
Prec (mm/01hr) at 12:00 UTC



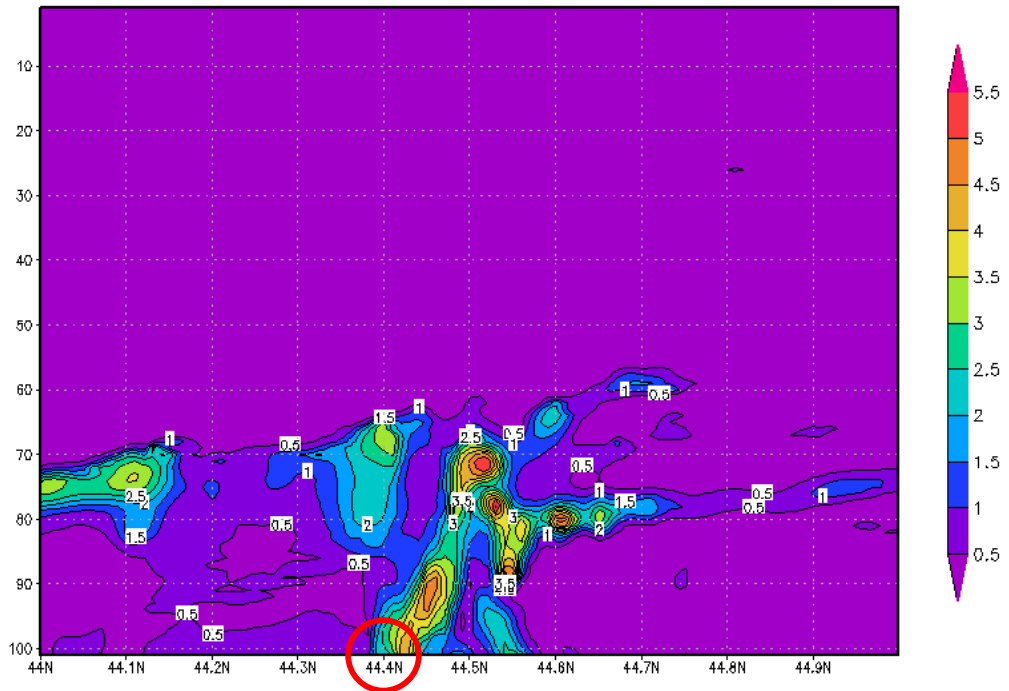
TKE(m2/s2) at 12UTC for 60vI



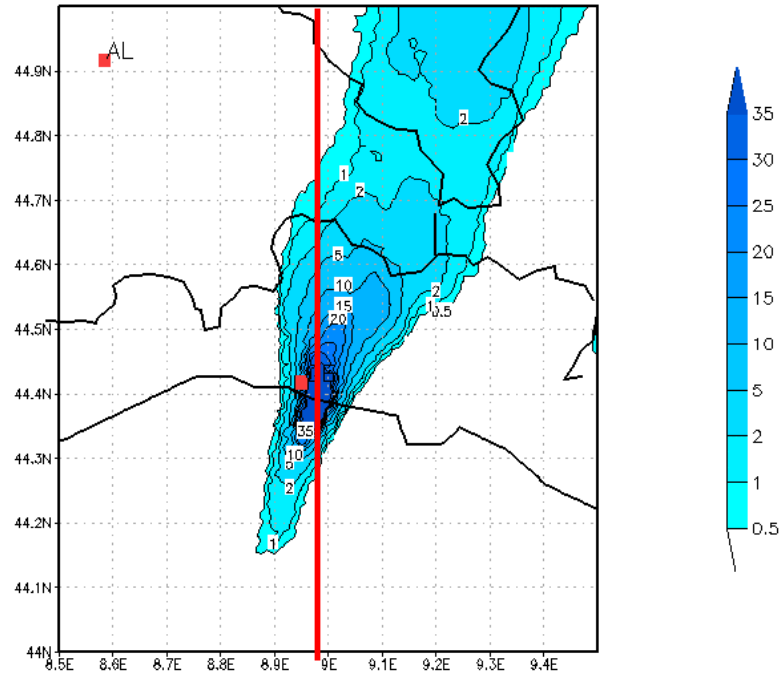
TKE(m2/s2) at 12UTC for 100vIA



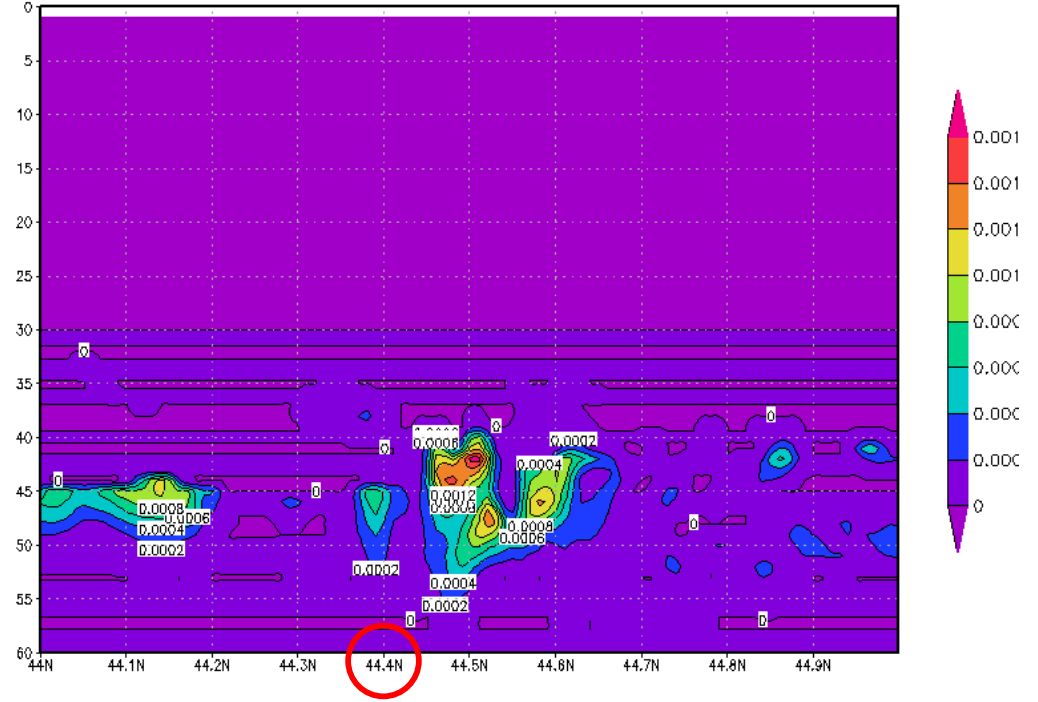
TKE(m2/s2) at 12UTC for 100vIB



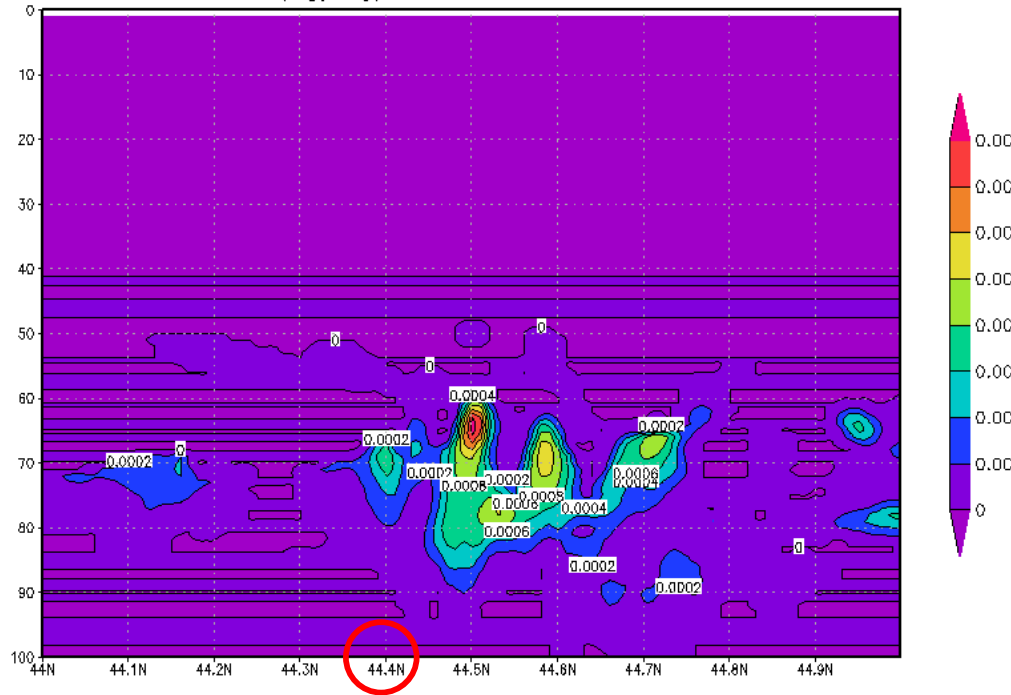
Prec (mm/01hr) at 12:00 UTC



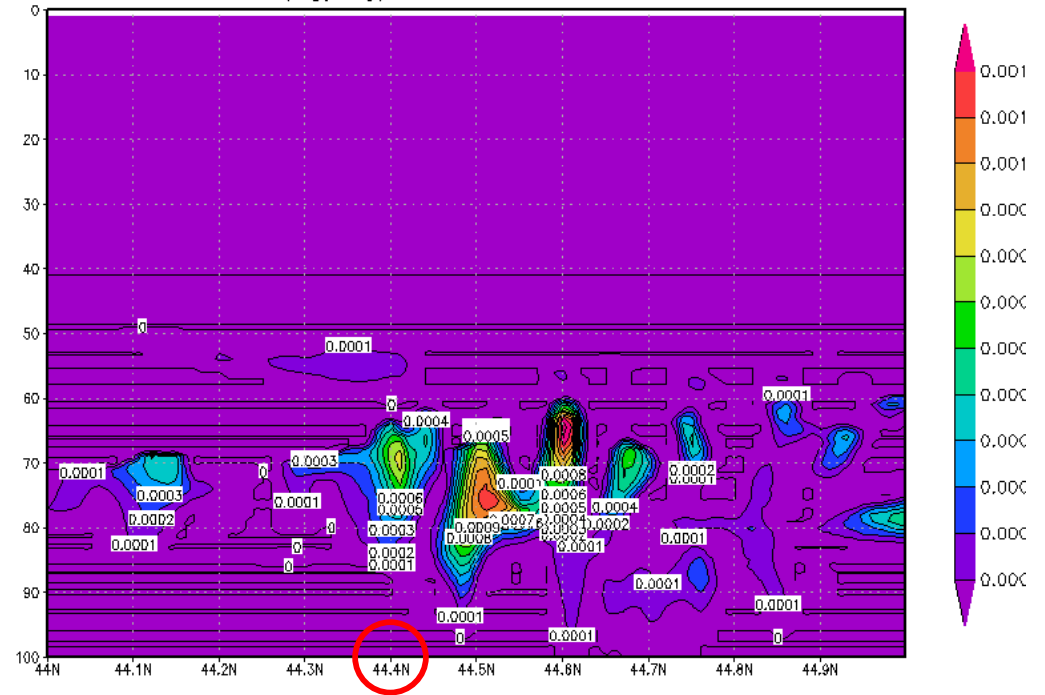
QC(kg/kg) at 12UTC for 60vl



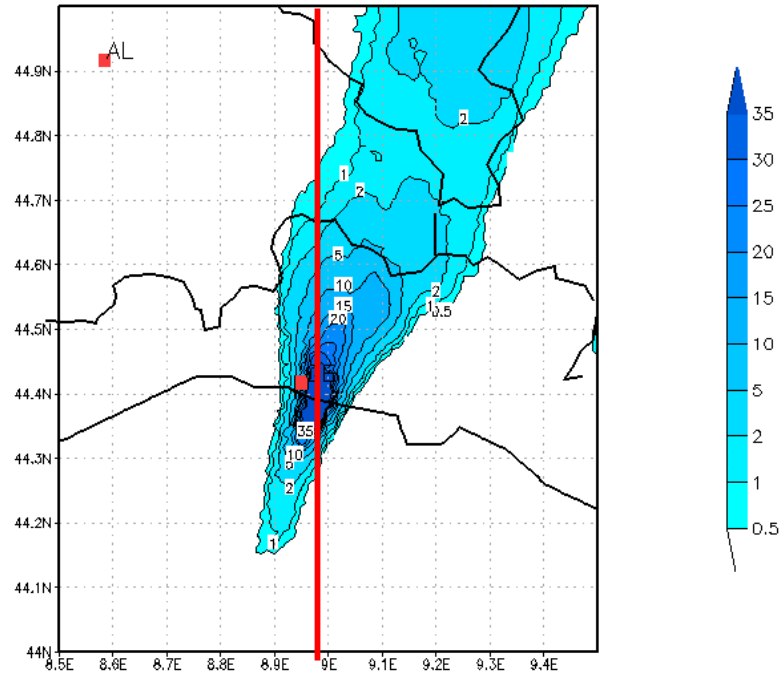
QC(kg/kg) at 12UTC for 100vIA



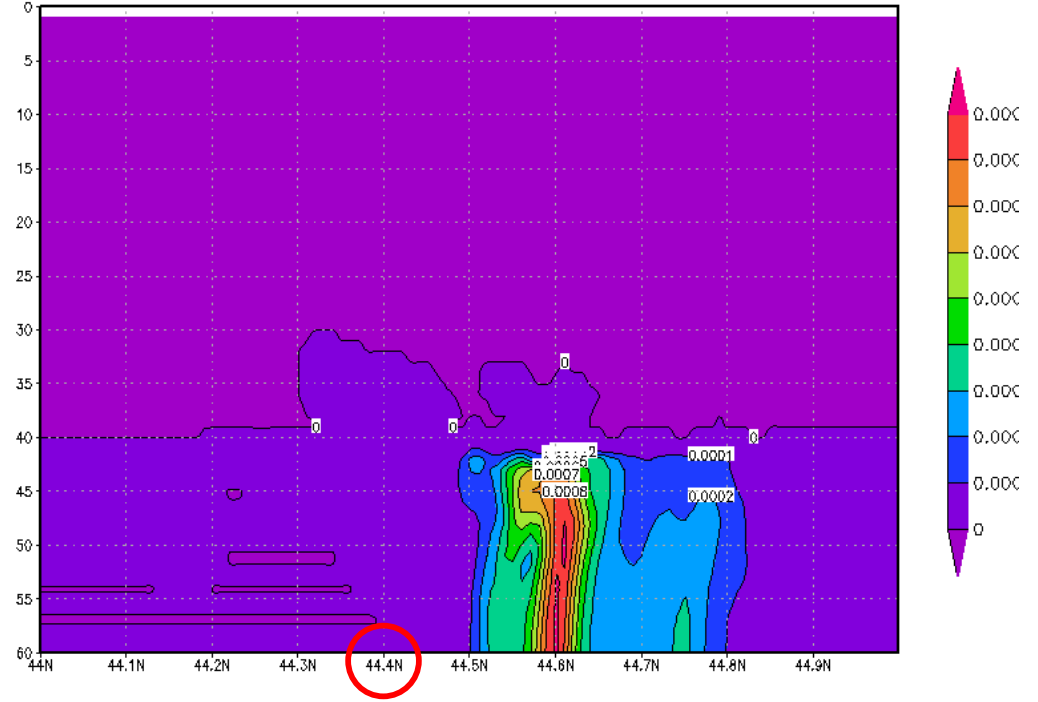
QC(kg/kg) at 12UTC for 100vIB



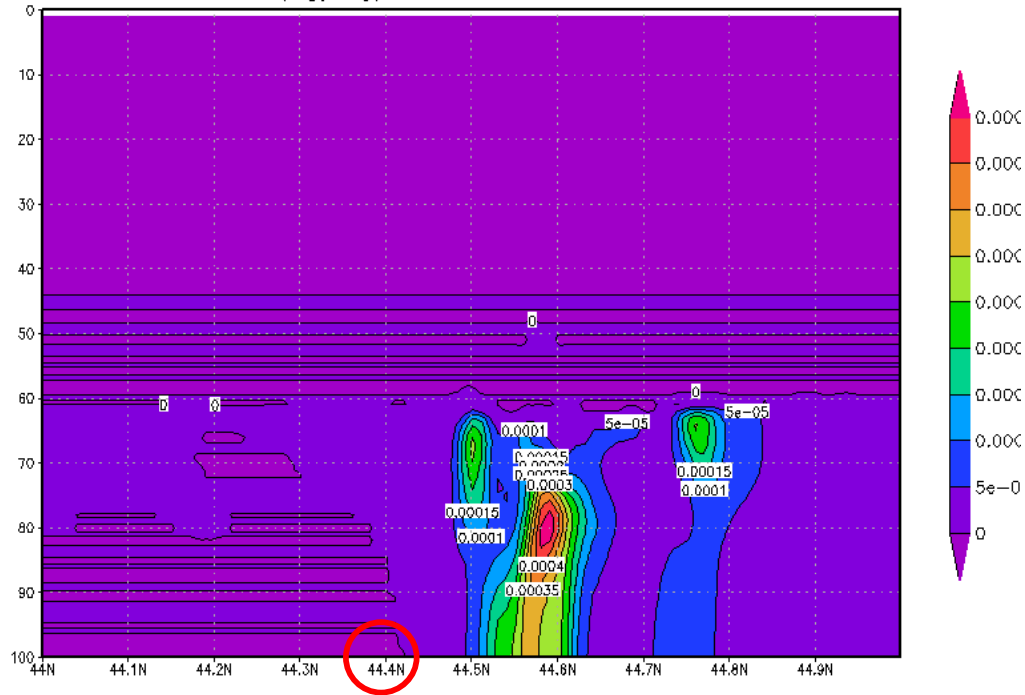
Prec (mm/01hr) at 12:00 UTC



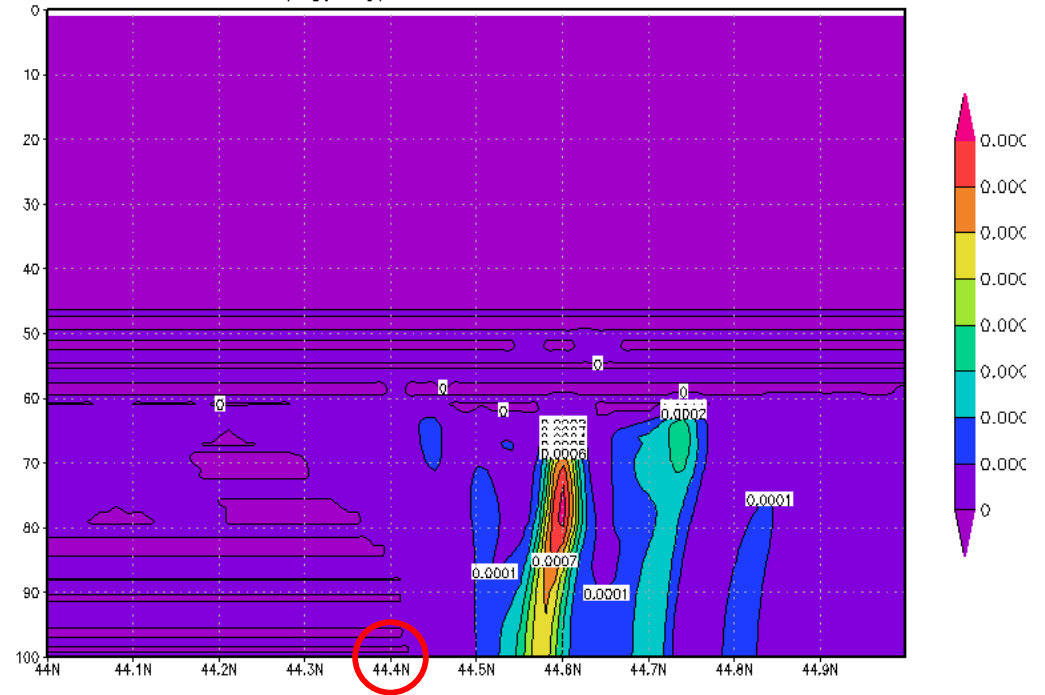
QR(kg/kg) at 12UTC for 60vl



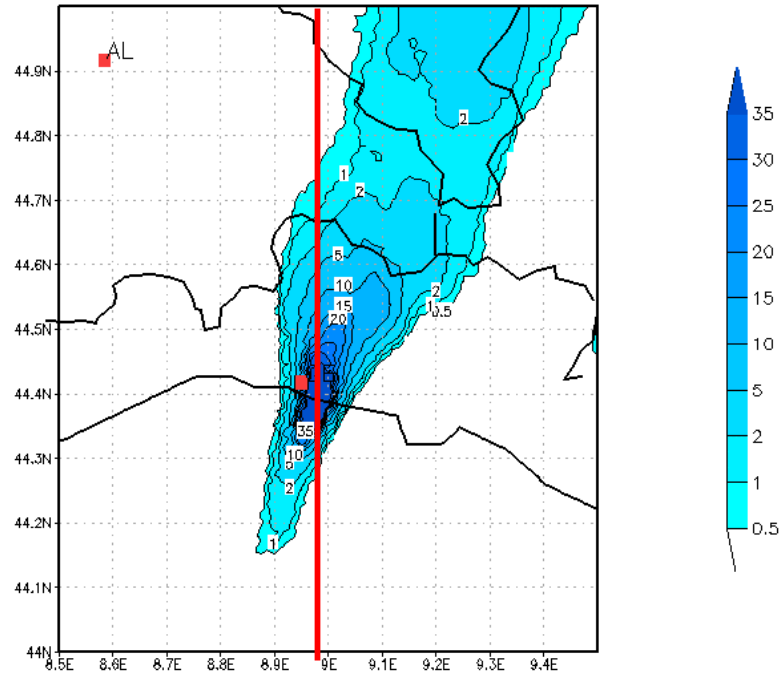
QR(kg/kg) at 12UTC for 100vlA



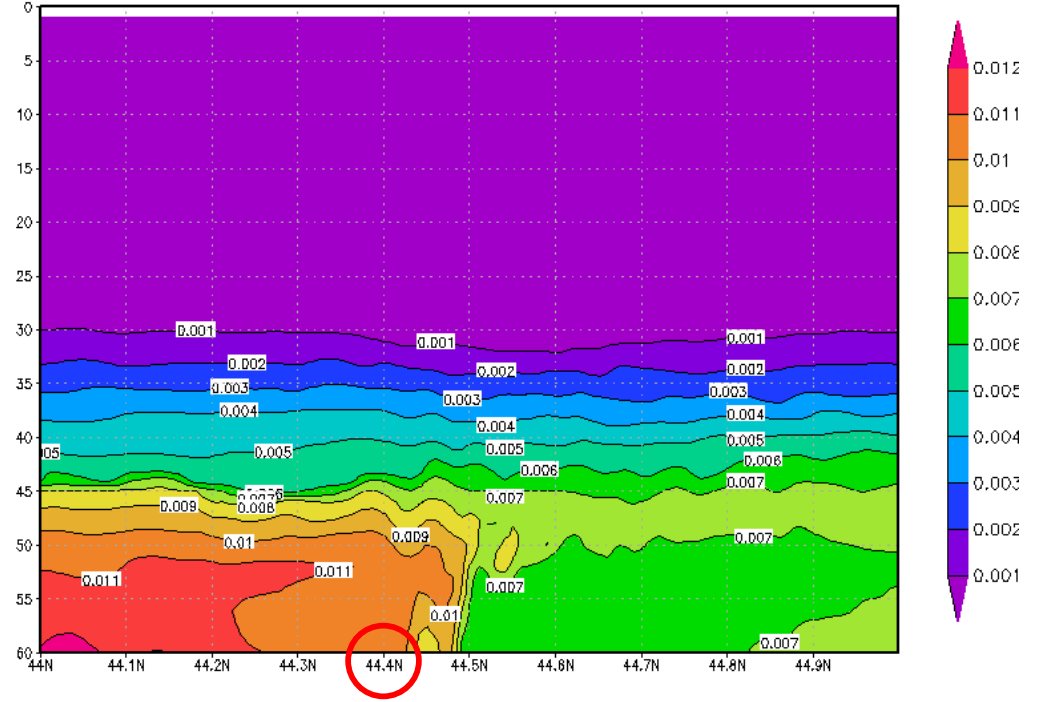
QR(kg/kg) at 12UTC for 100vlB



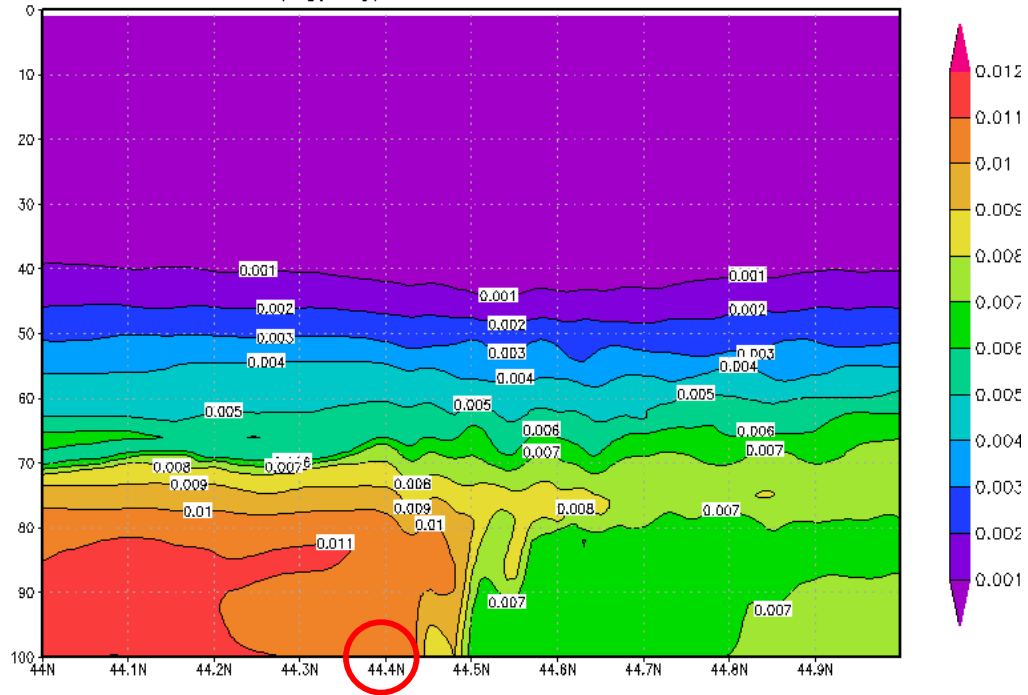
Prec (mm/01hr) at 12:00 UTC



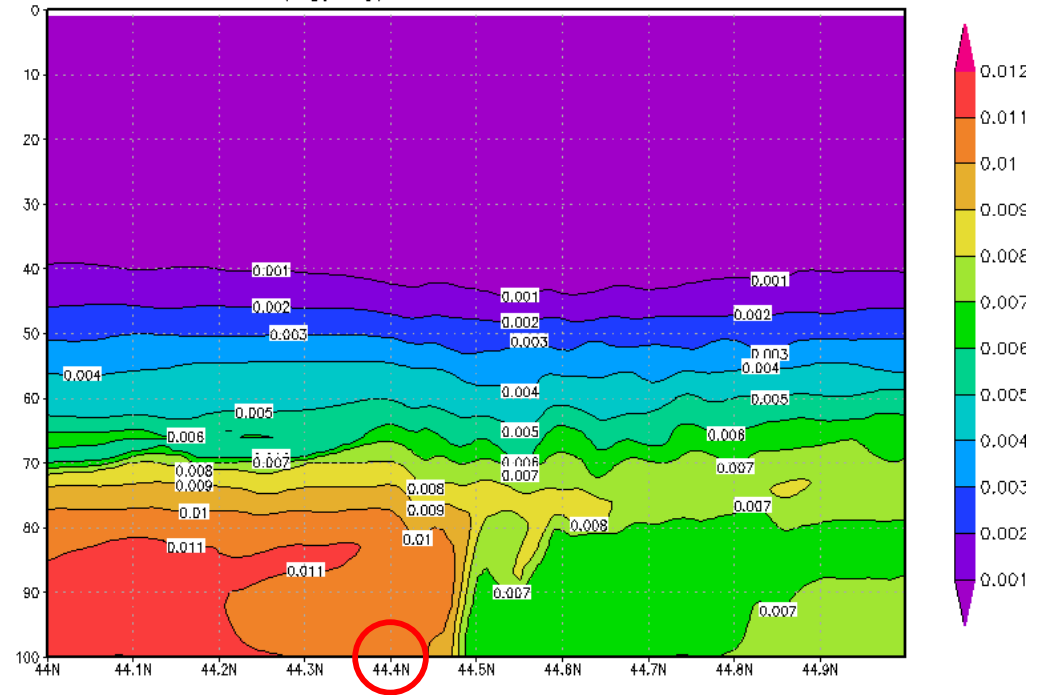
QV(kg/kg) at 12UTC for 60vl



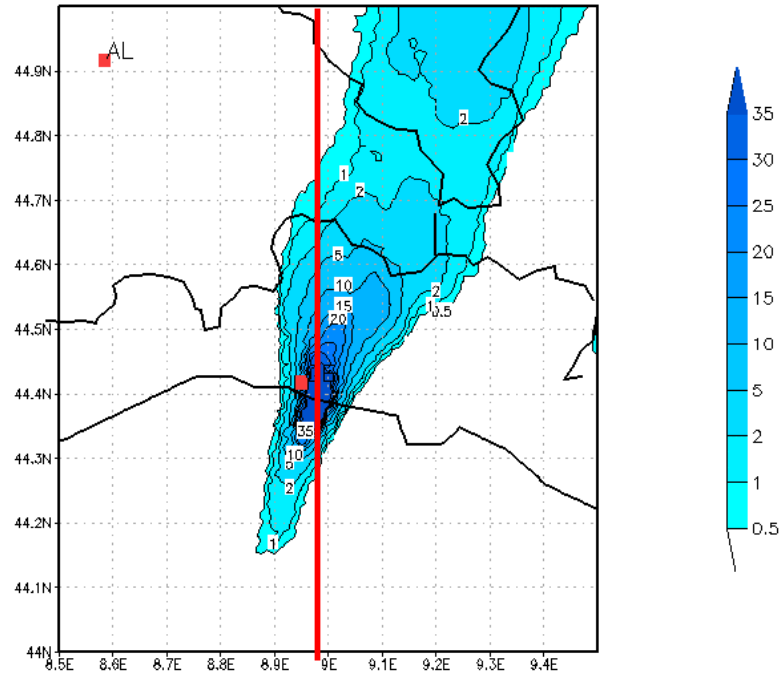
QV(kg/kg) at 12UTC for 100vIA



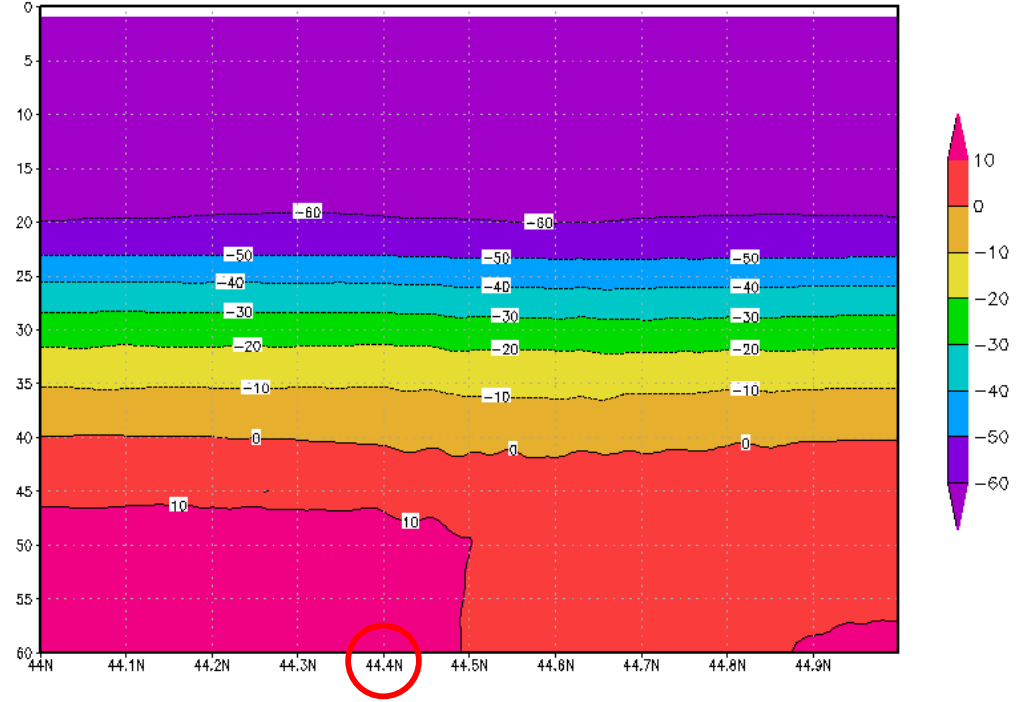
QV(kg/kg) at 12UTC for 100vIB



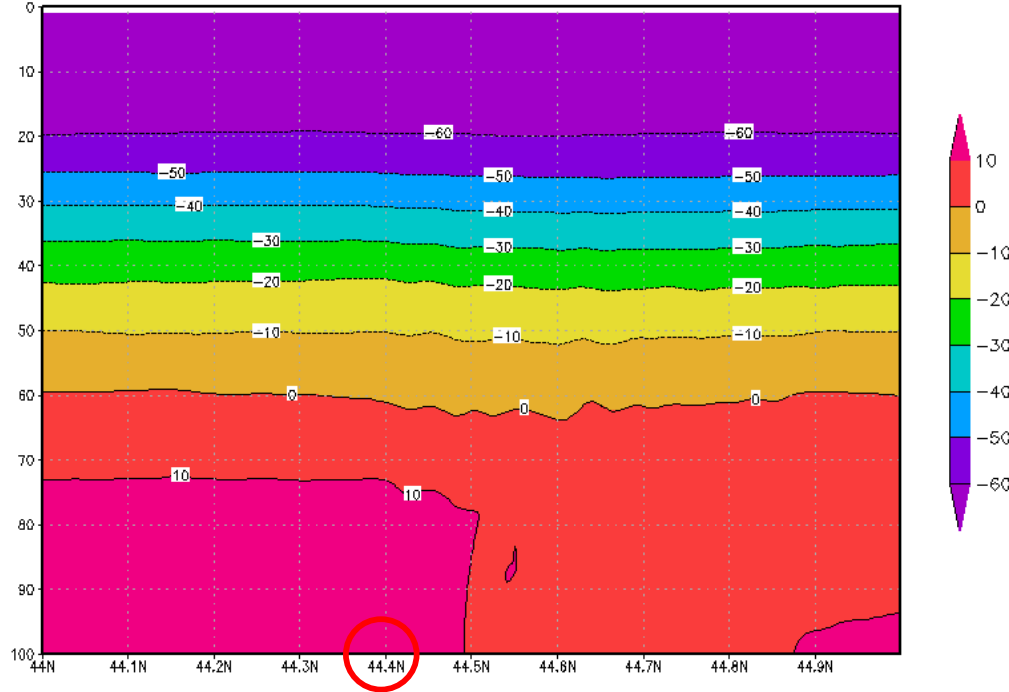
Prec (mm/01hr) at 12:00 UTC



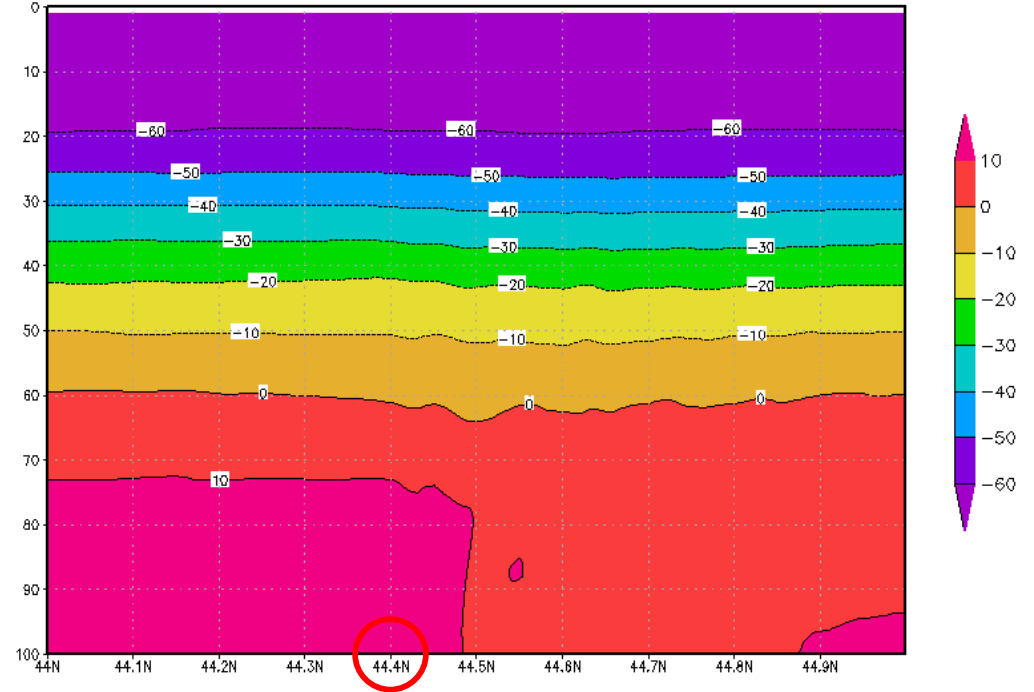
Temperature(°C) at 12UTC for 60vI



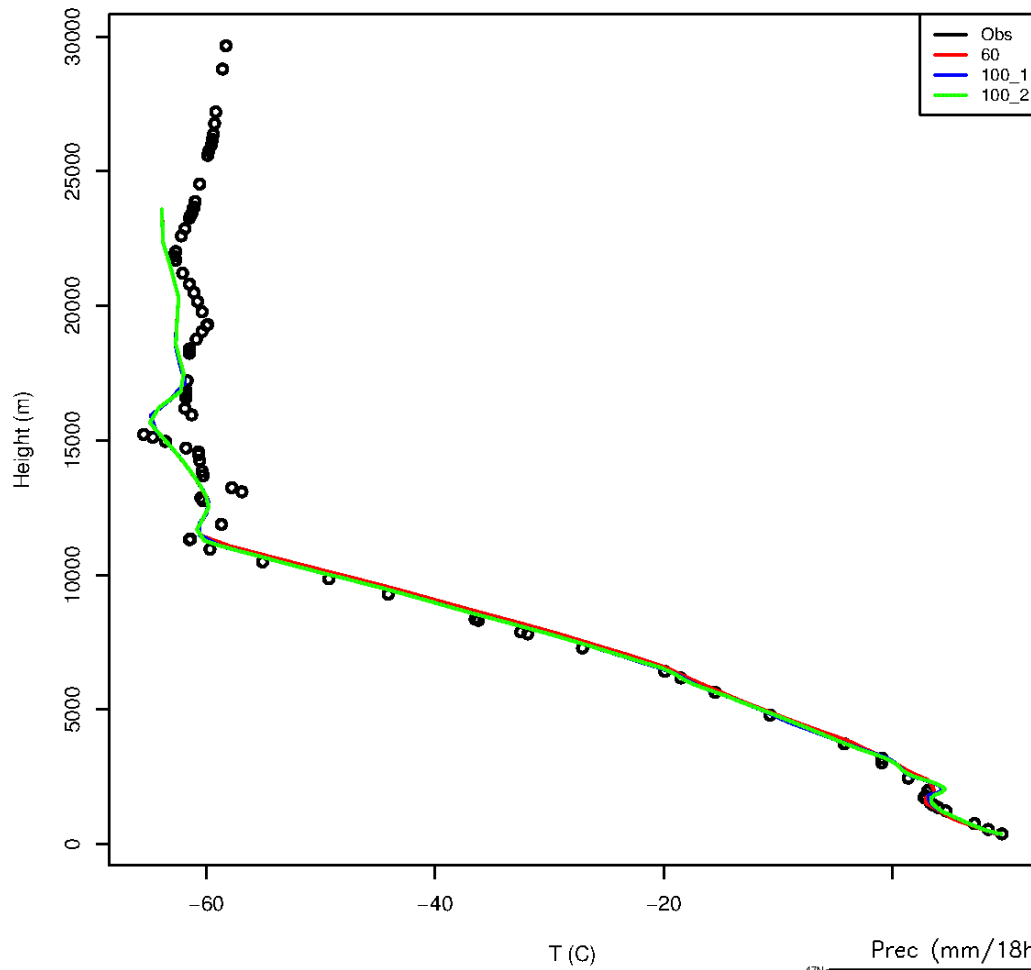
Temperature(°C) at 12UTC for 100vIA



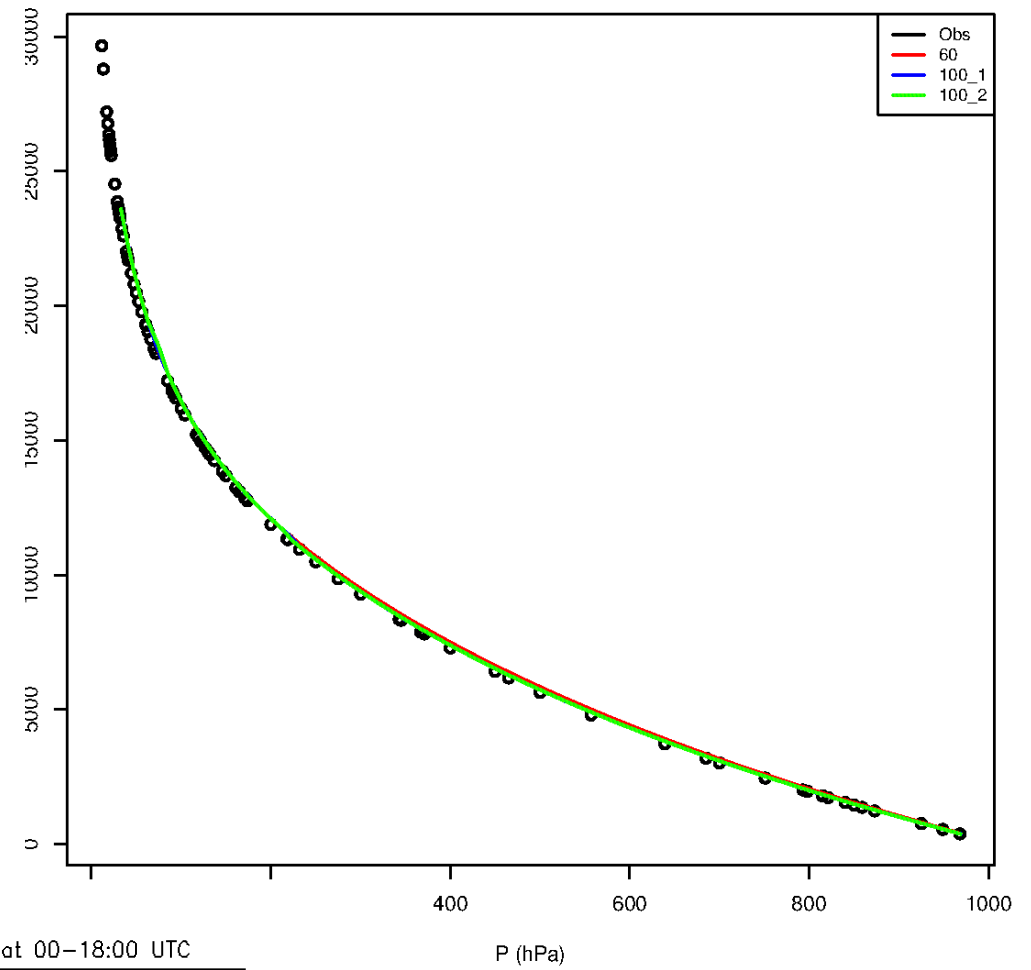
Temperature(°C) at 12UTC for 100vIB



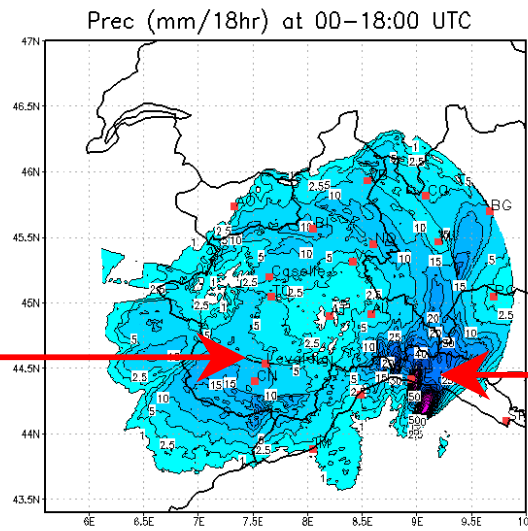
Vertical profile of T at Cuneo 12UTC



Vertical profile of P at Cuneo 12UTC

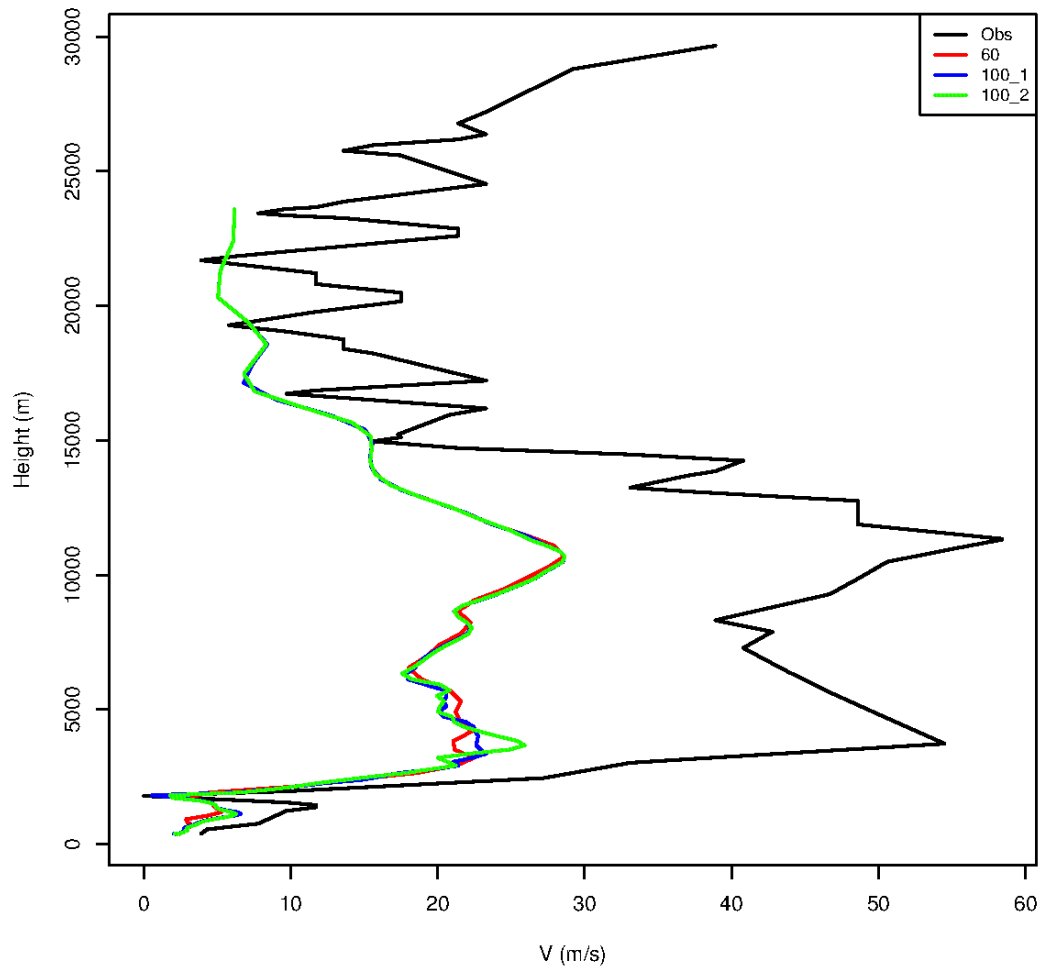


Cuneo

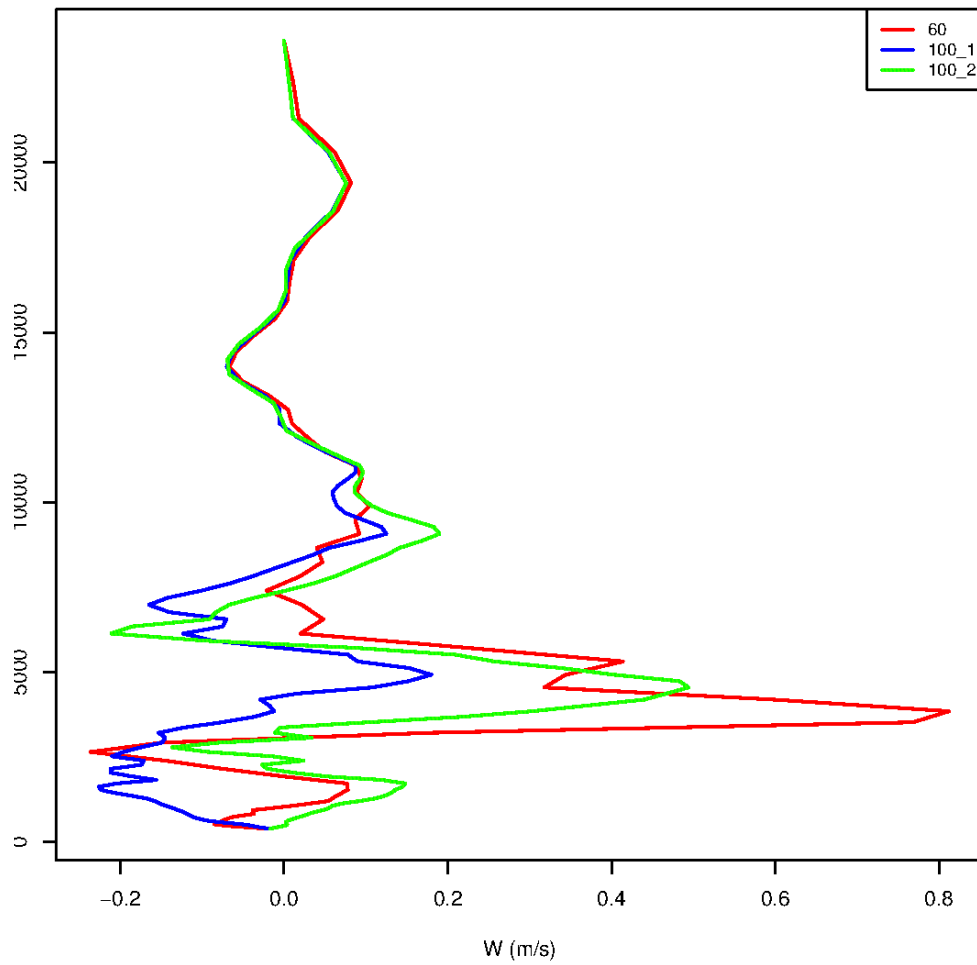


Genova

Vertical profile of V at Cuneo 12UTC



Vertical profile of W at Cuneo 12UTC



General considerations

- the precipitation is underestimated, in particular the first part of the event (in the morning over the sea)
- the precipitation looks more triggered by the mountains behind Genova (orography effect)
- the wind intensity is underestimated (over Cuneo, compared to the radiosounding)
- there is no statistical difference among the runs as far as the surface variables are concerned (T2m, rh2m, w10m, not shown here)
- only few differences over Genova in TKE, QR, QV, W
- it is not clear if there is an added value in increasing the vertical levels (probably not)
- any comment and or suggestion is welcome