Impact of physics perturbations applied to the COSMO-IT-EPS ensemble on the recent flood events occurred over Italy

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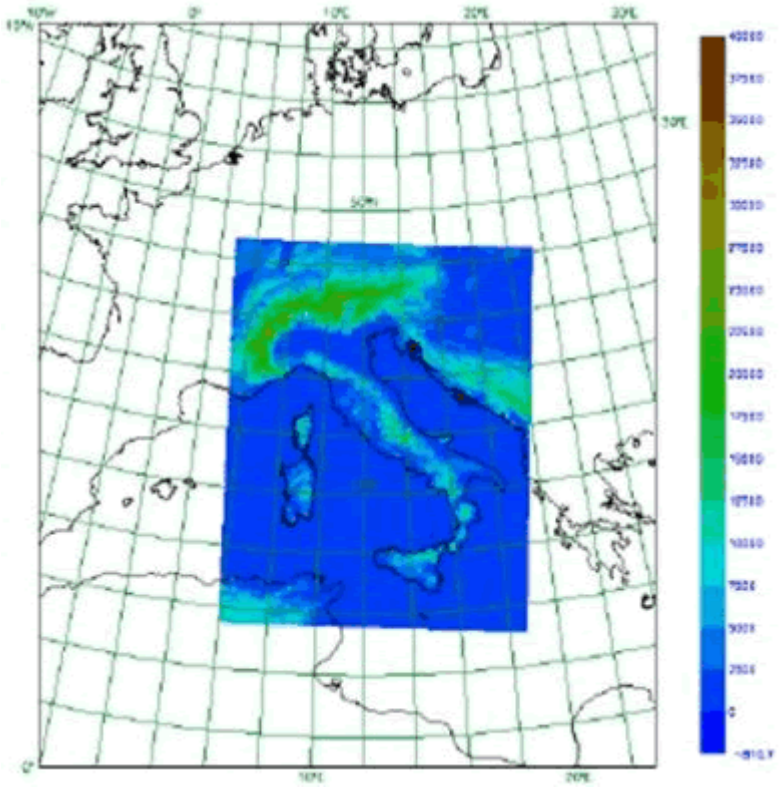
Aim of this work

- testing COSMO-IT-EPS for the definition of the set-up of the pre-operational phase

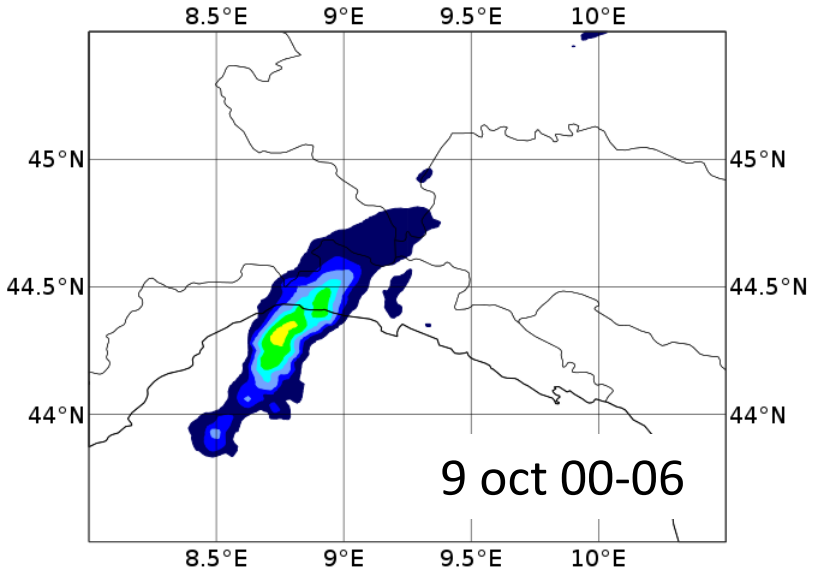
- some severe flood events hit Italy last Autumn
- check the behaviour of the ensemble for these events
- test:
  - Impact of initial condition perturbations
  - Impact of physics perturbation
  - Impact of soil perturbation
  - Impact of Lateral Boundary Condition perturbations

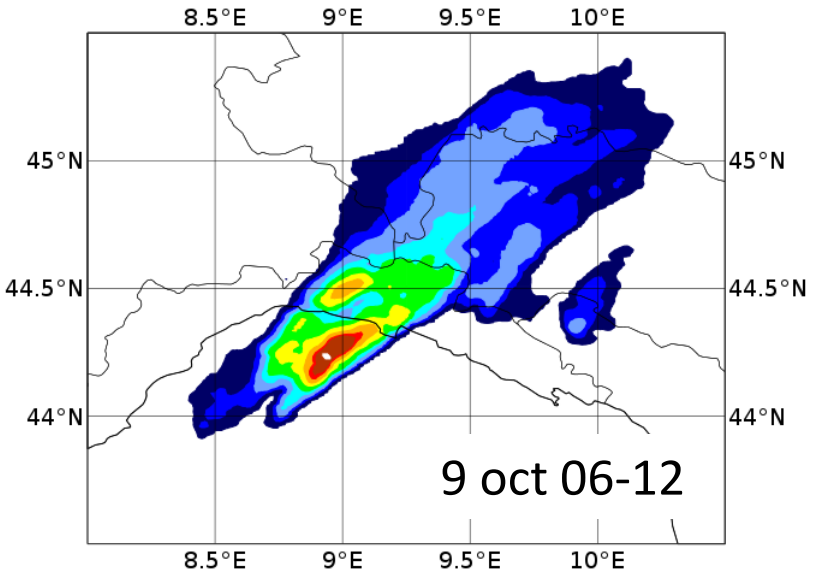
COSMO-IT-EPS

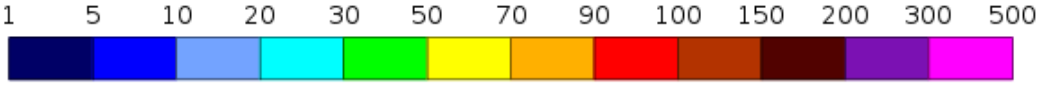
- COSMO 2.8 km, 50 levels (nr. points 447 x 532)
- 16 members
- ICs and BCs from the 16 members of COSMO-LEPS
- model perturbations:
  - downscaling
  - SPPT
  - Parameter Perturbation

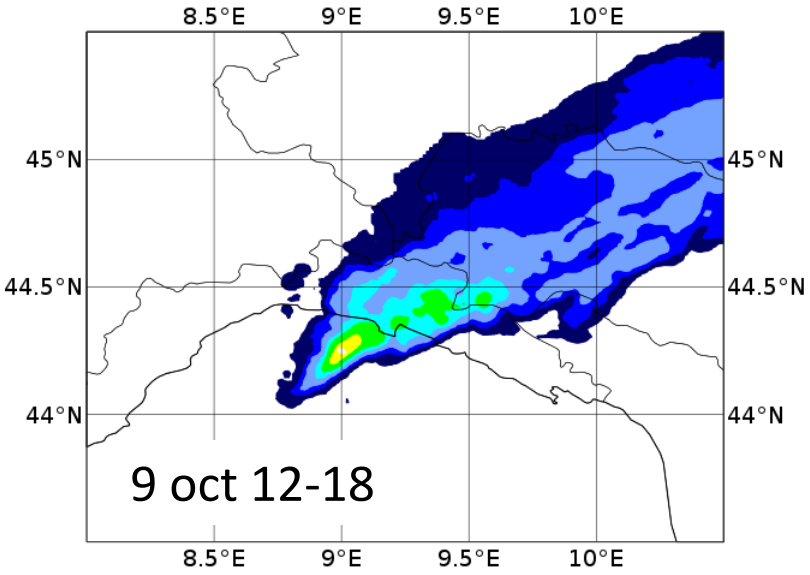


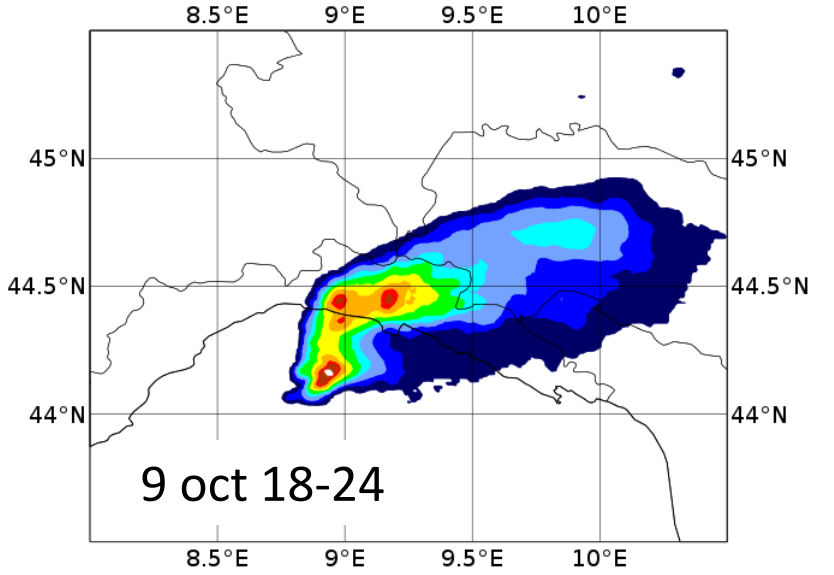
Genova - radar estimated precipitation (6h)





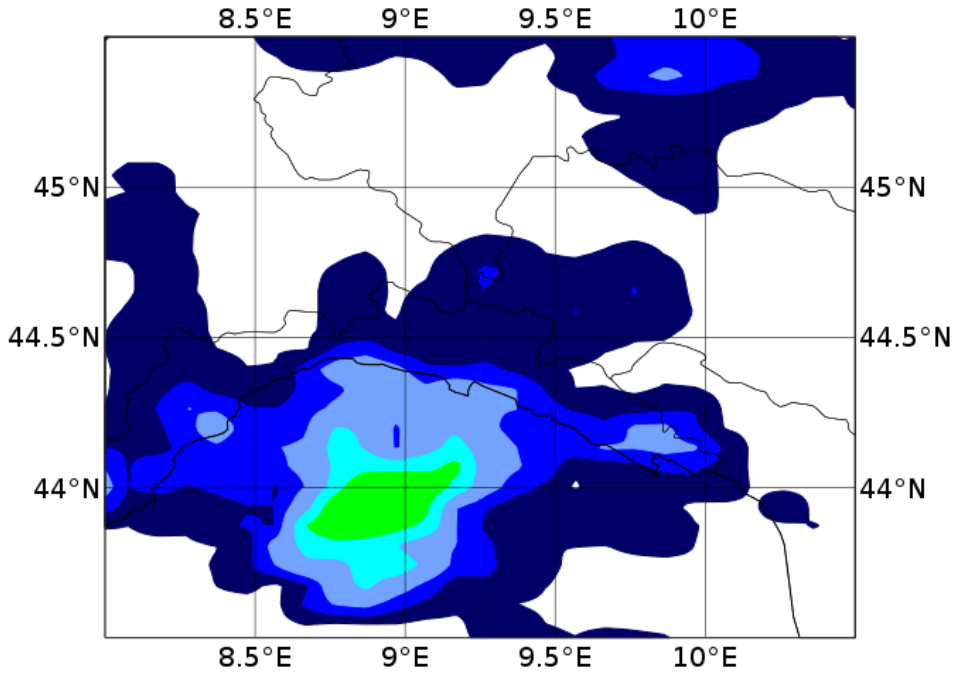




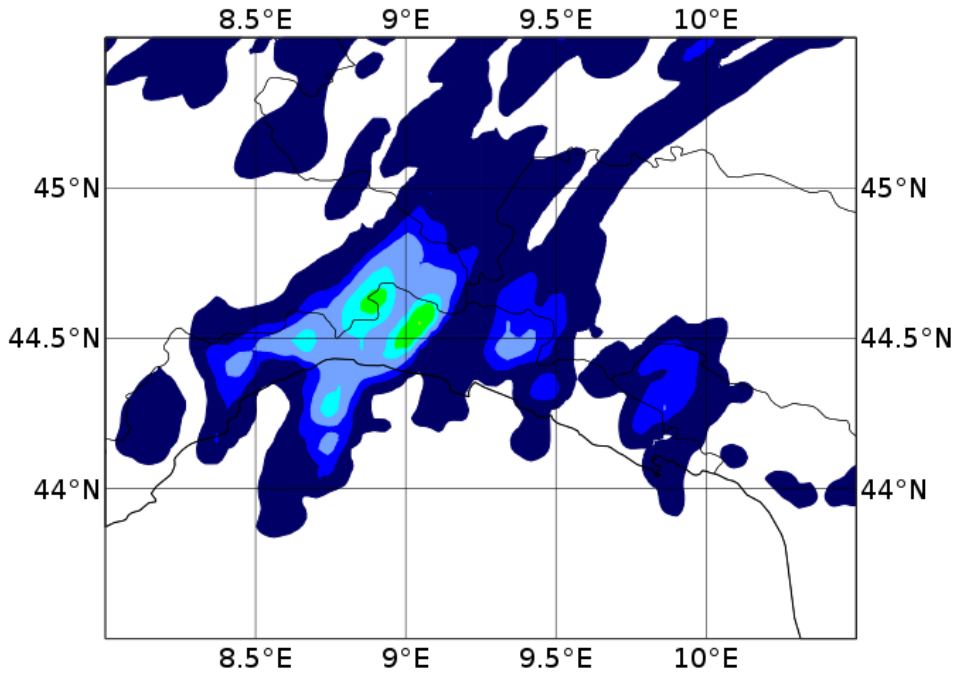


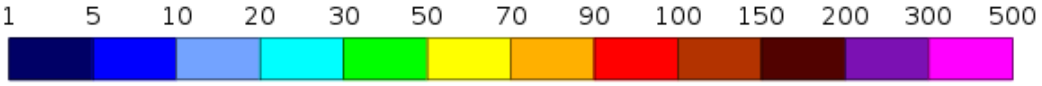
deterministic forecast (24h)

COSMO-I7 - 09 00UTC - +00-24



COSMO-I2 - 09 00UTC - +00-24



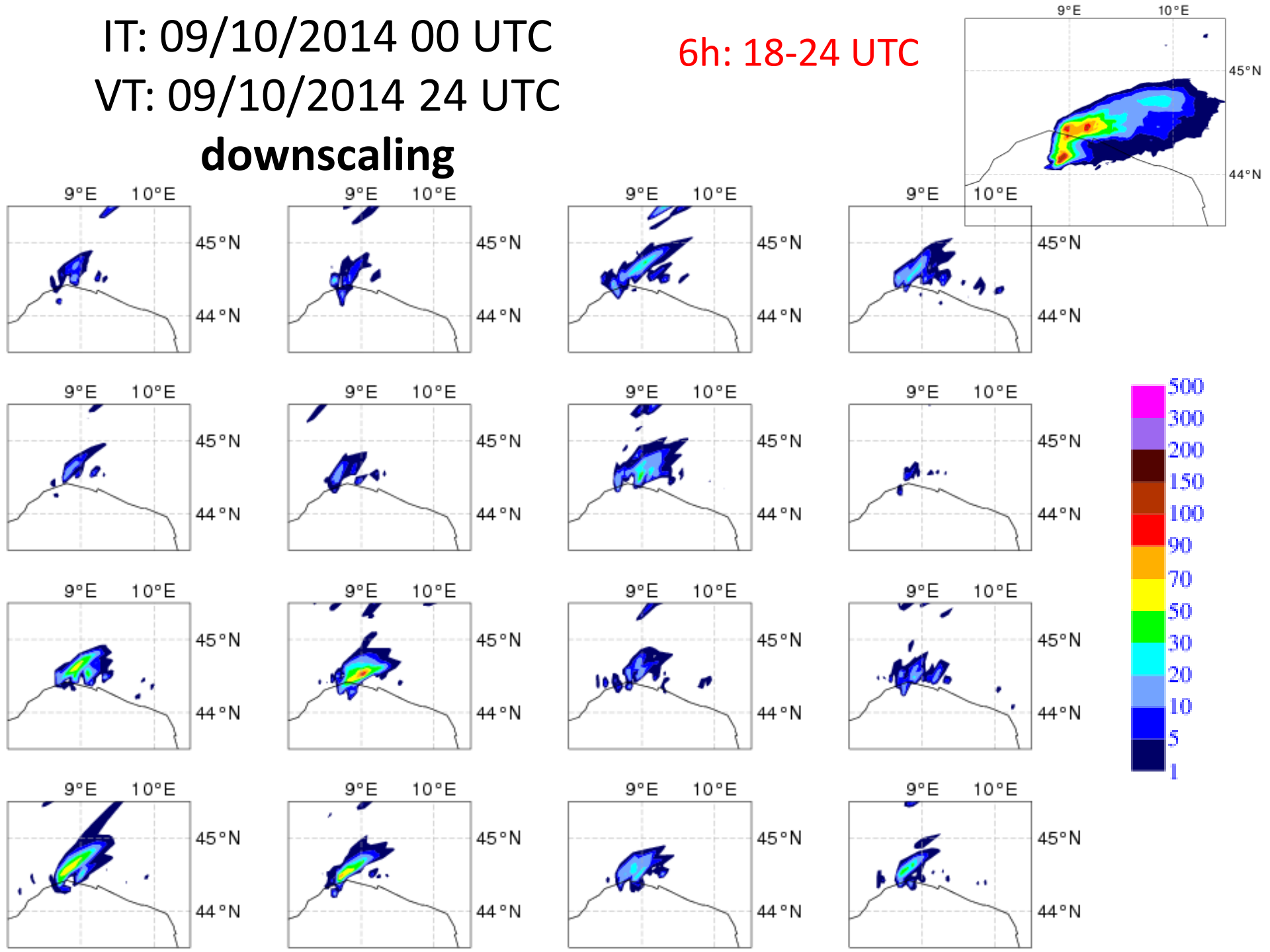


IT: 09/10/2014 00 UTC

VT: 09/10/2014 24 UTC

downscaling

6h: 18-24 UTC



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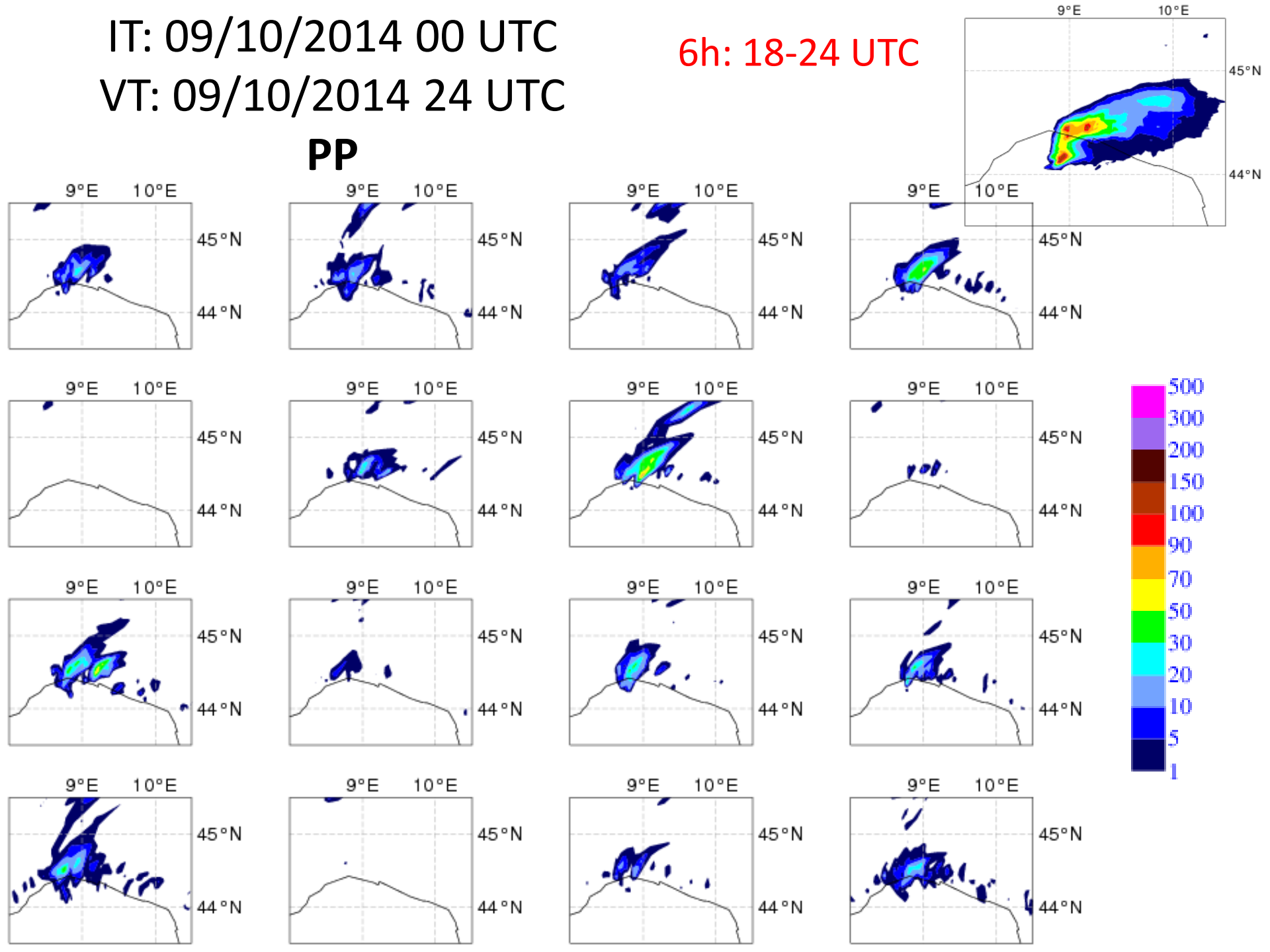
6h: 18-24 UTC

PP



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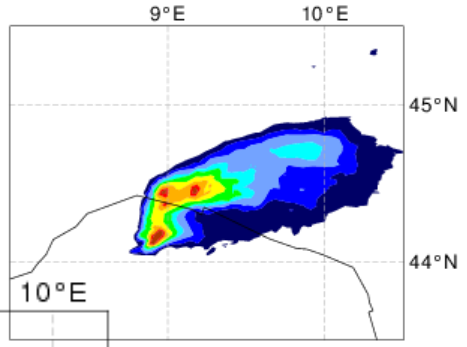
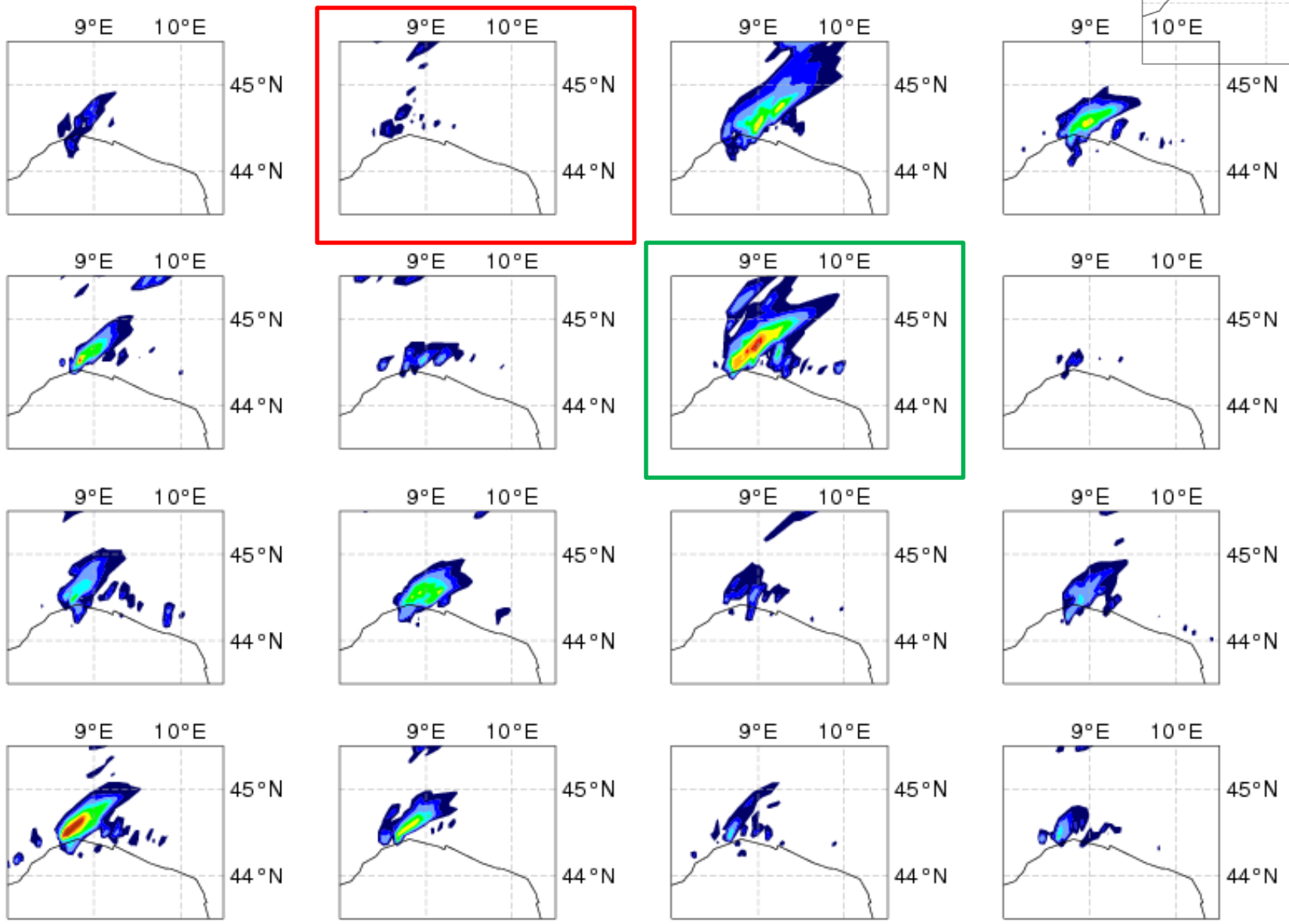
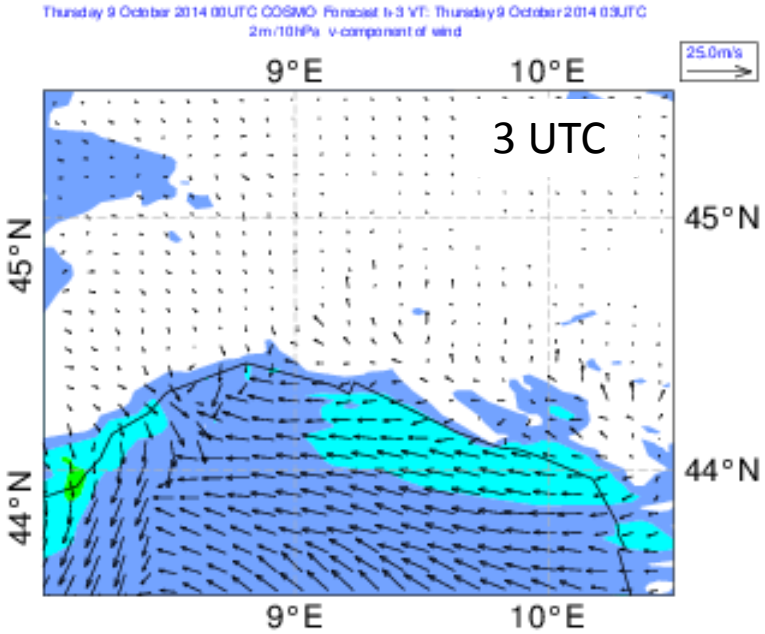
6h: 18-24 UTC

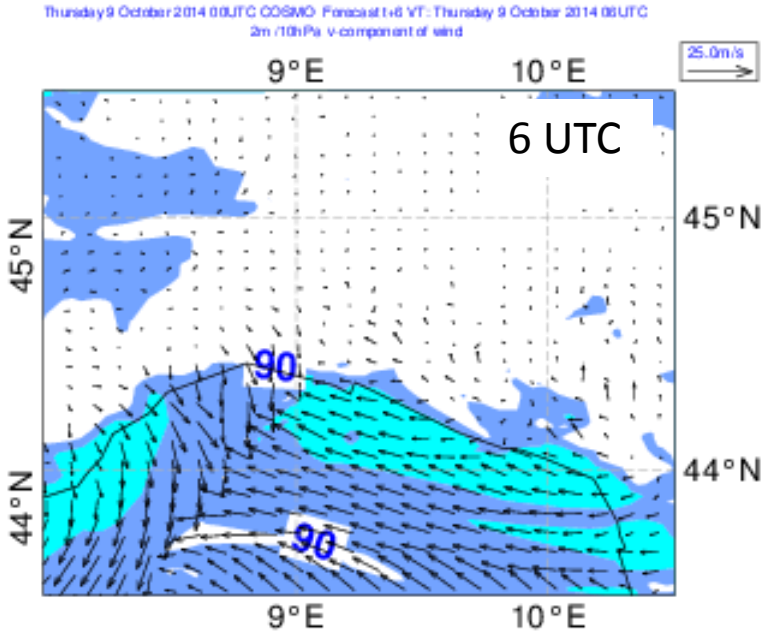


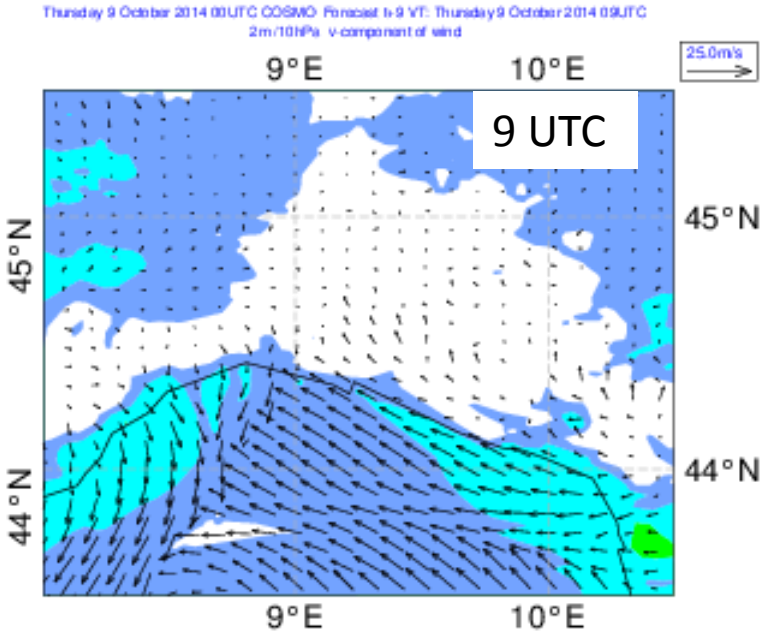
SPPT

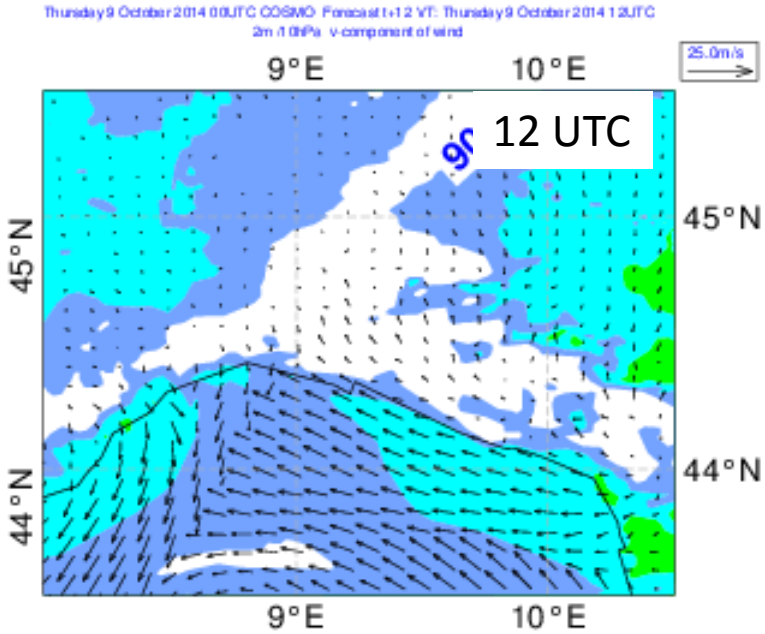


10 wind and 2m relative humidity - member 2

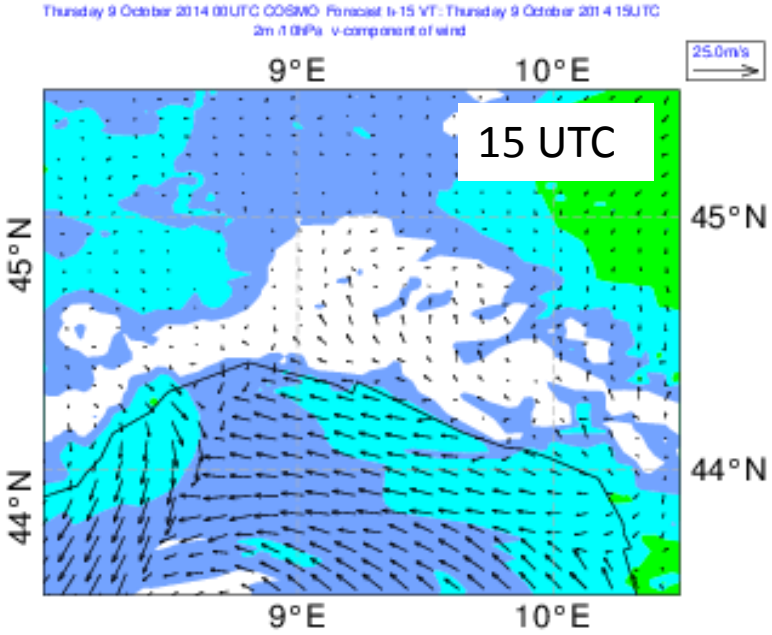


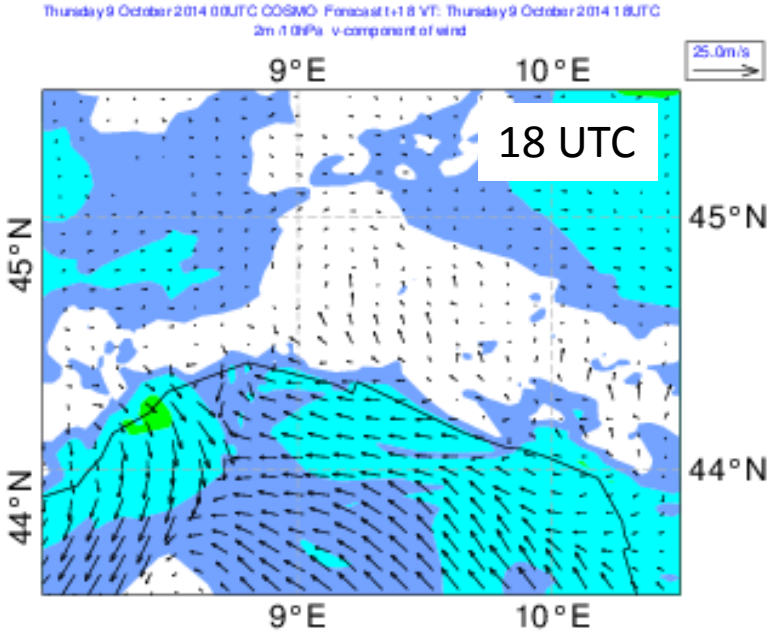


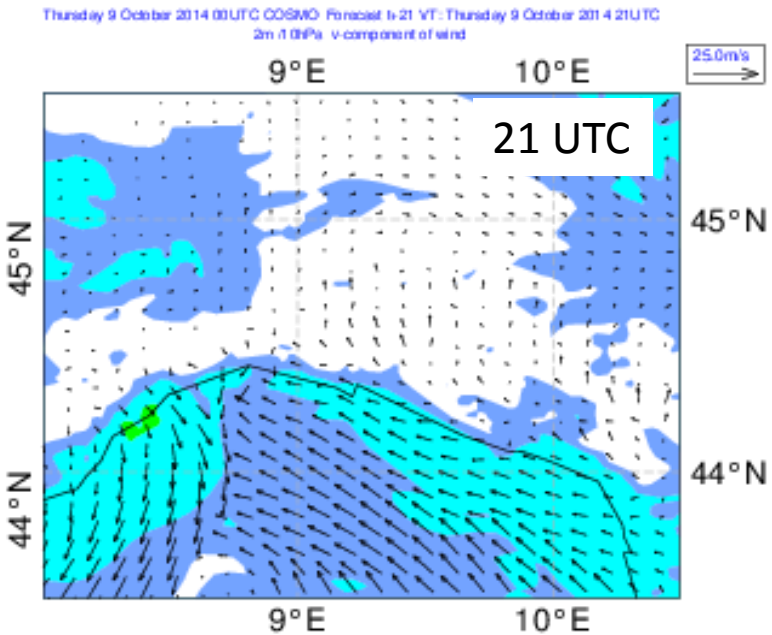


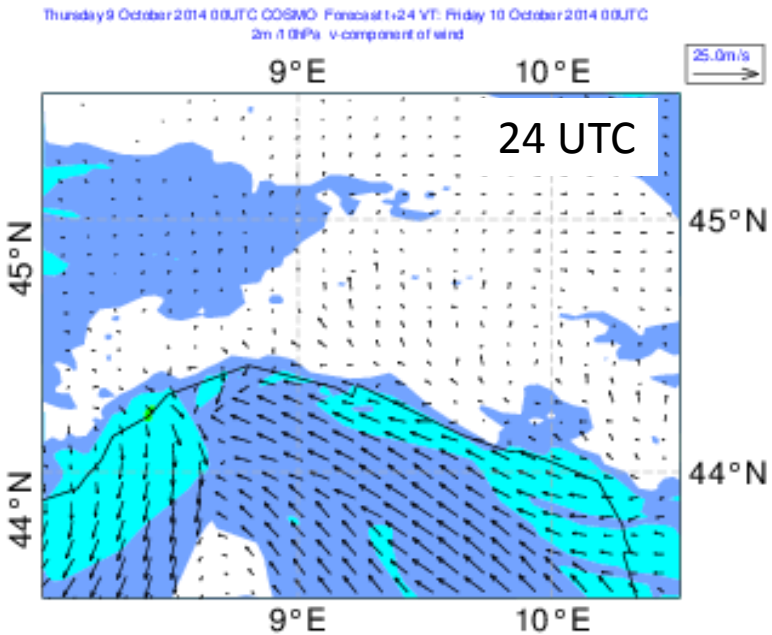


10 wind and 2m relative humidity - member 2

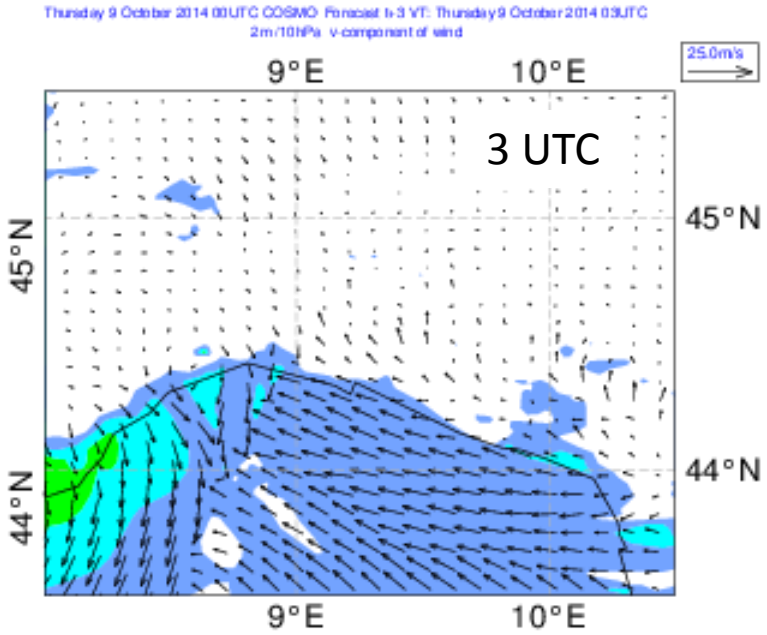


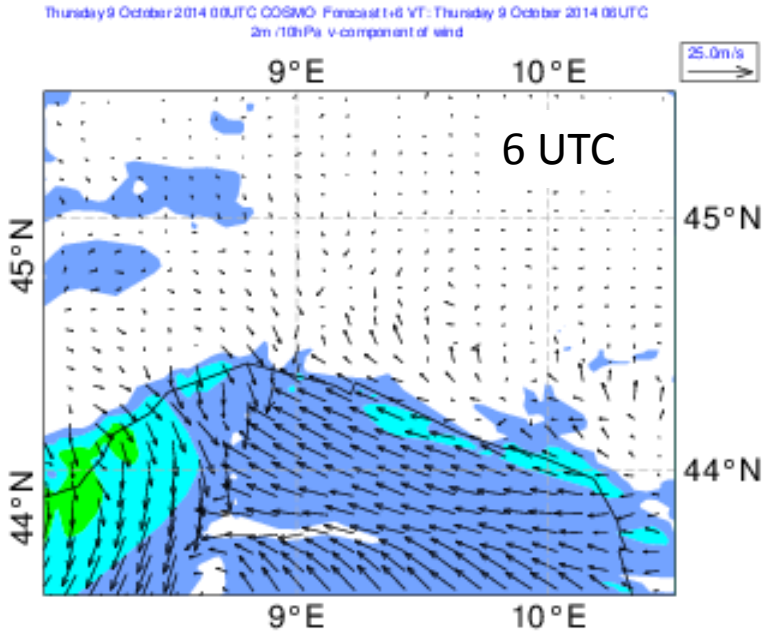


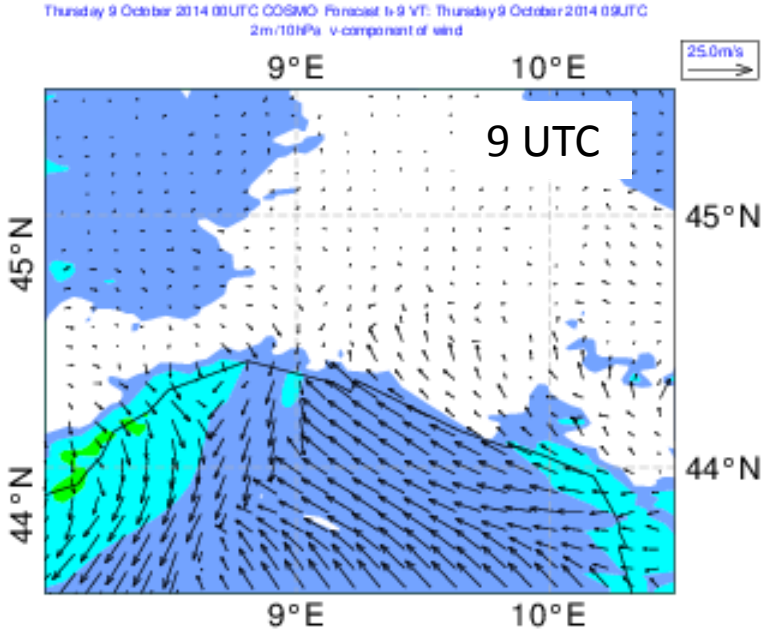


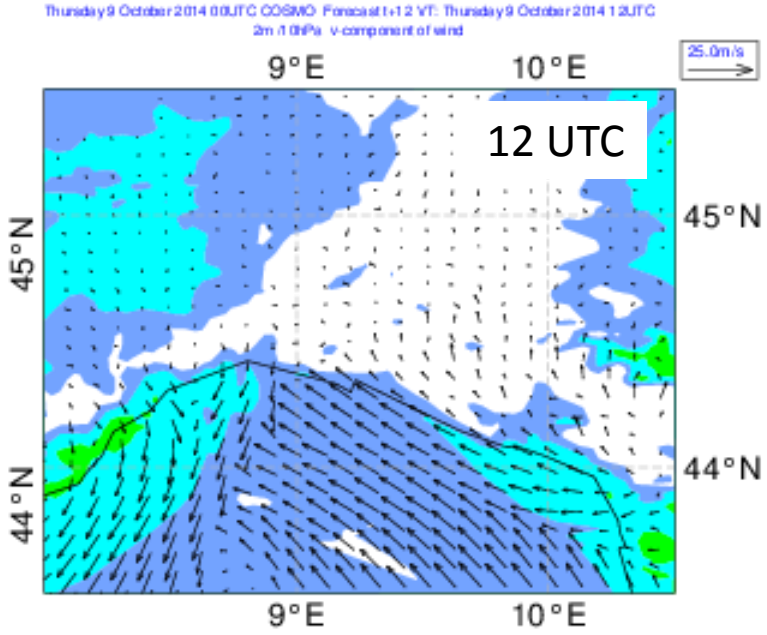


10 wind and 2m relative humidity - member 7









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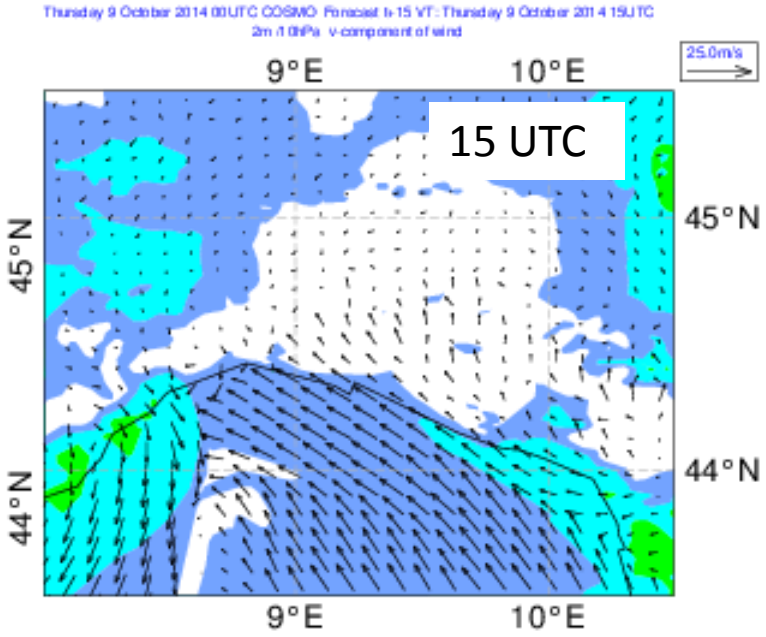
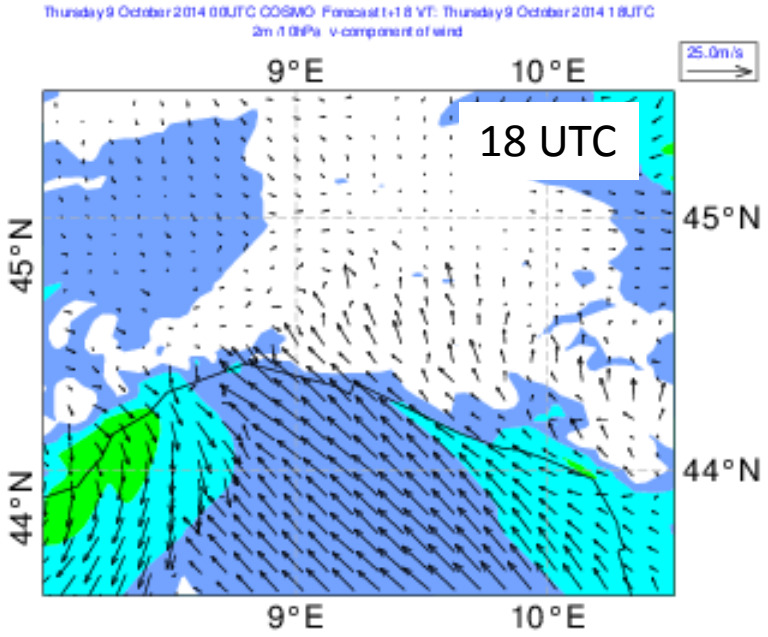
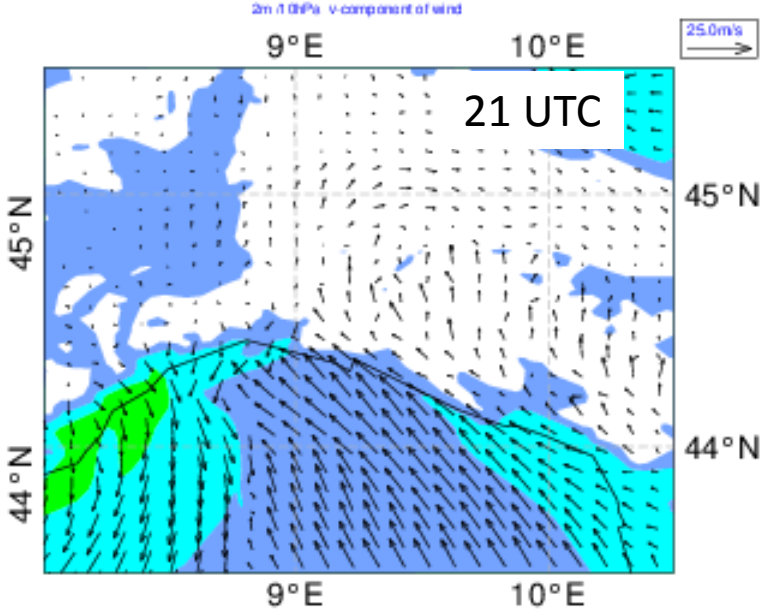
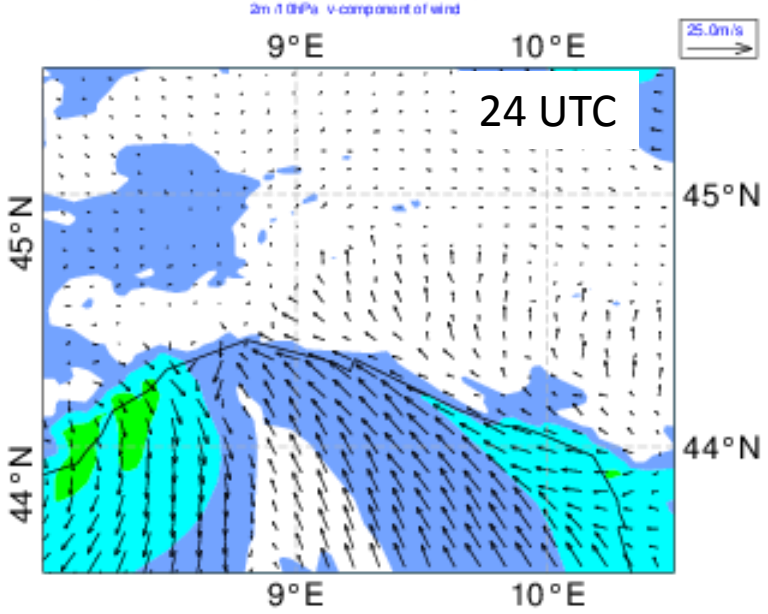
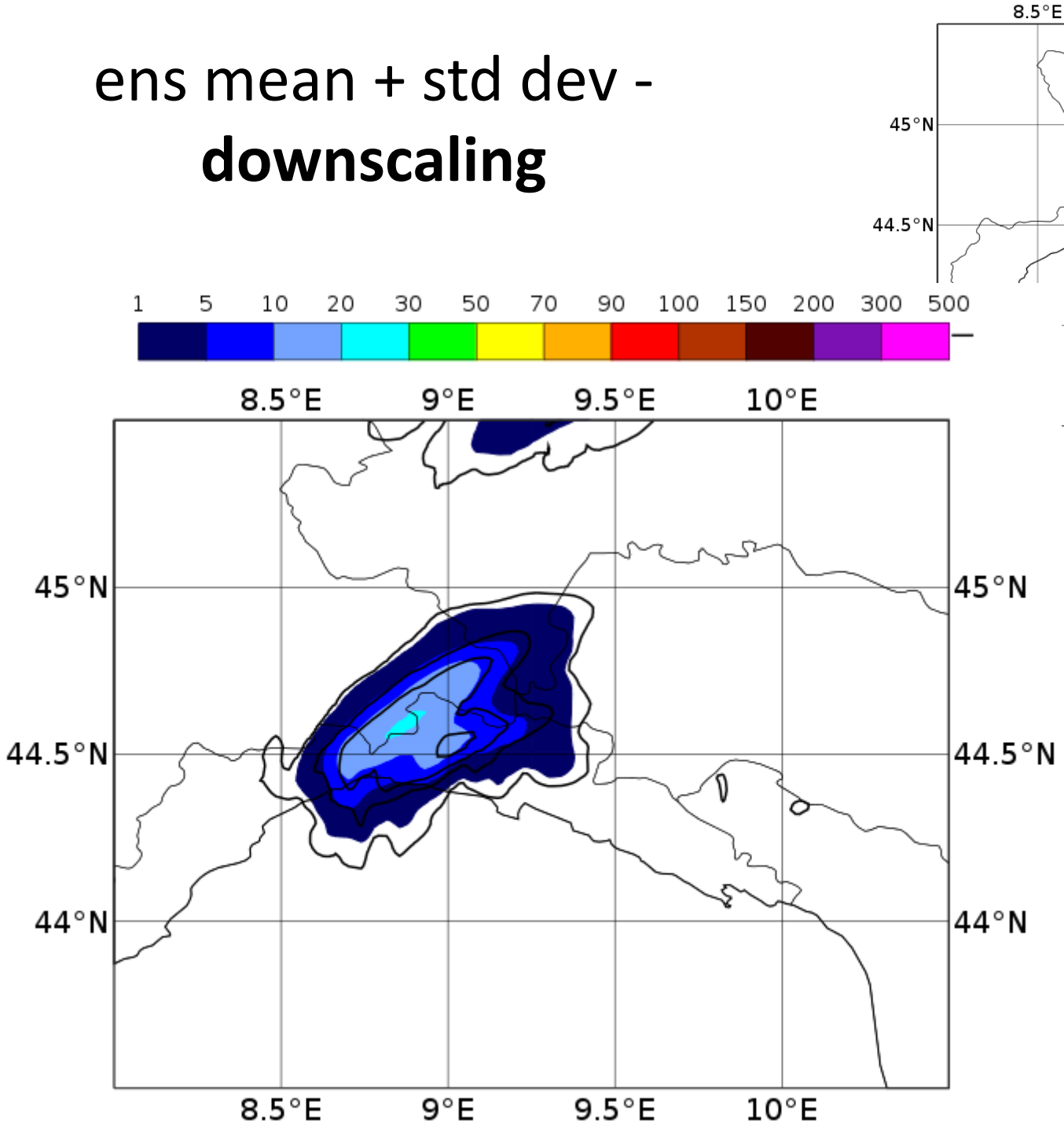


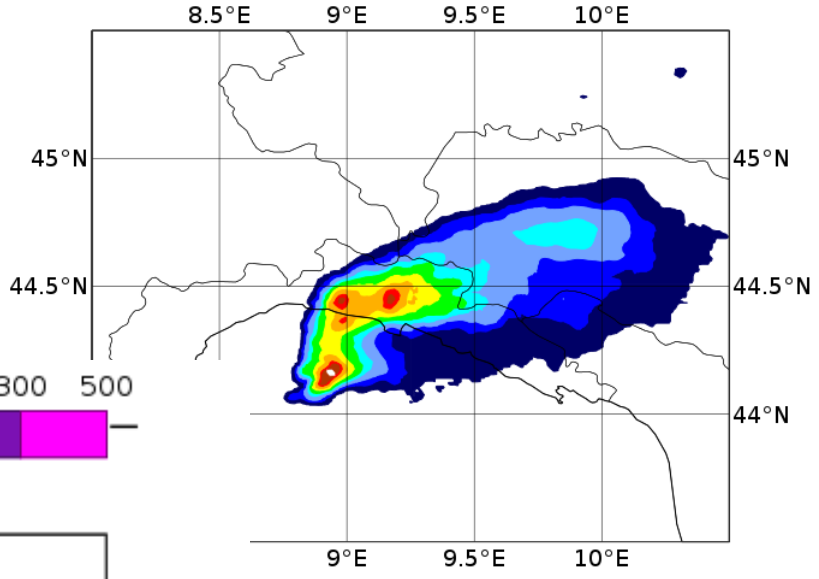




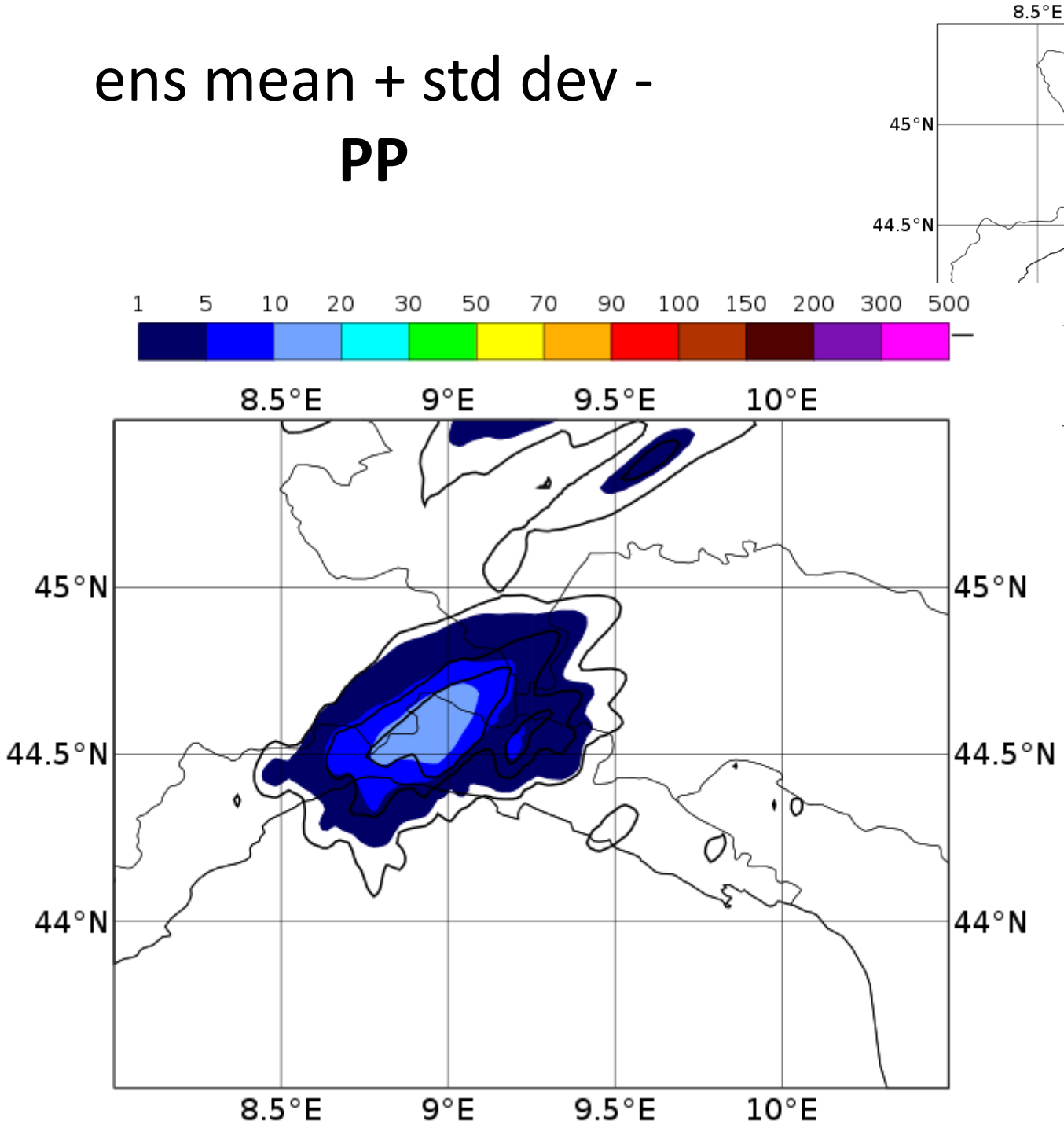


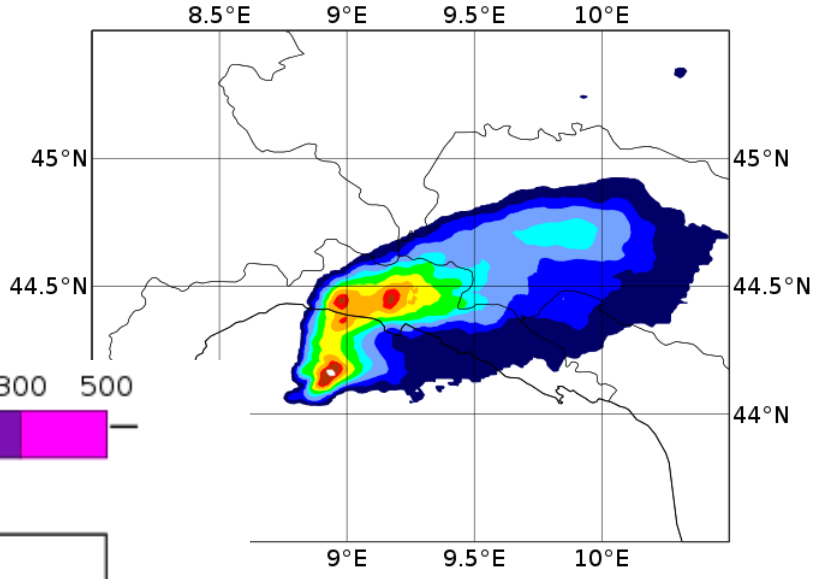
ens mean + std dev - **downscaling**



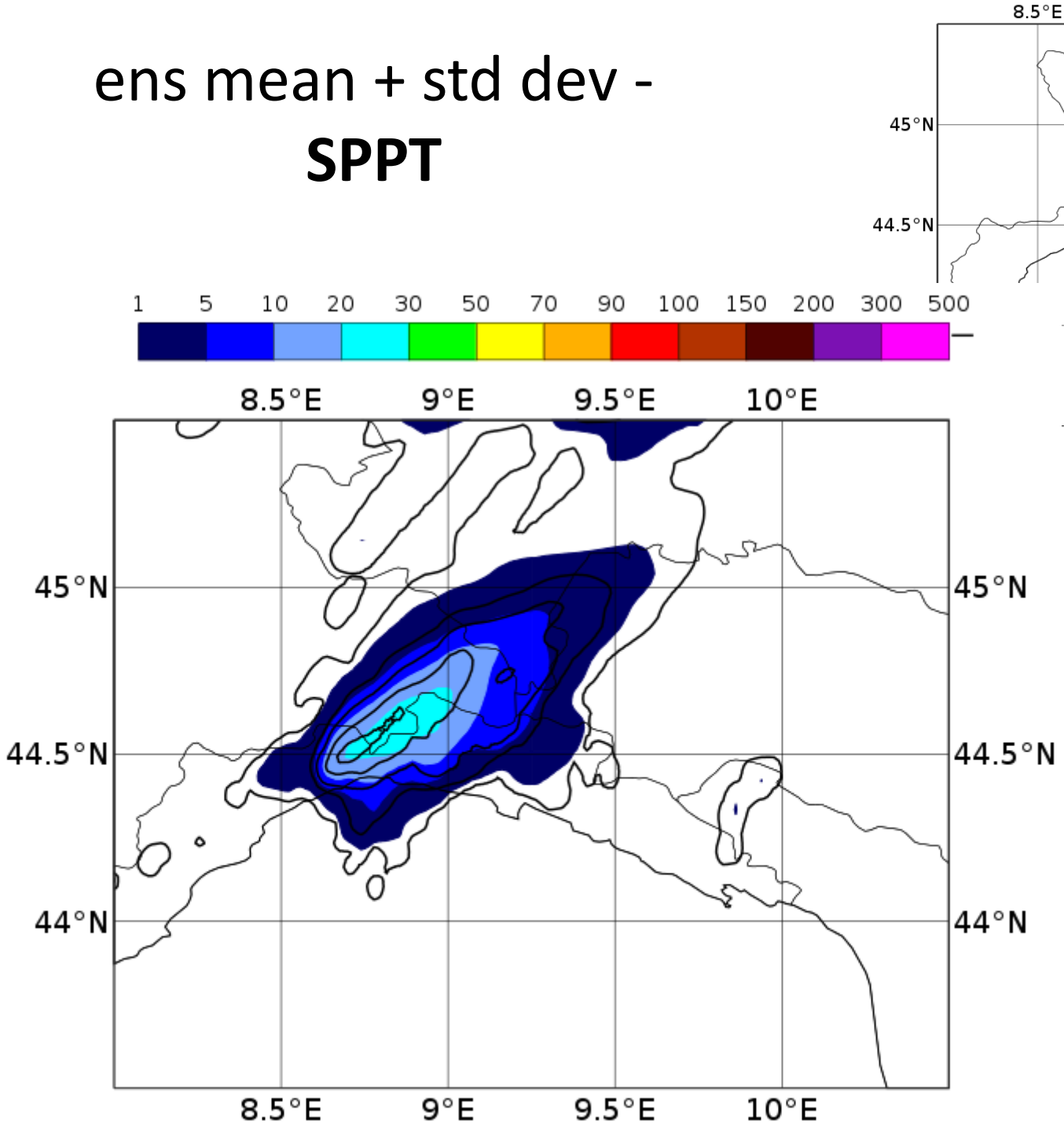


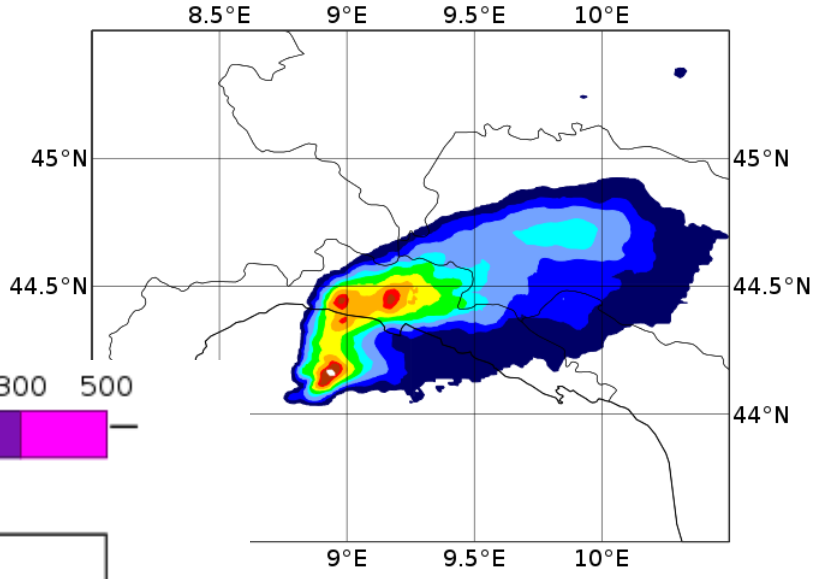
ens mean + std dev - **PP**





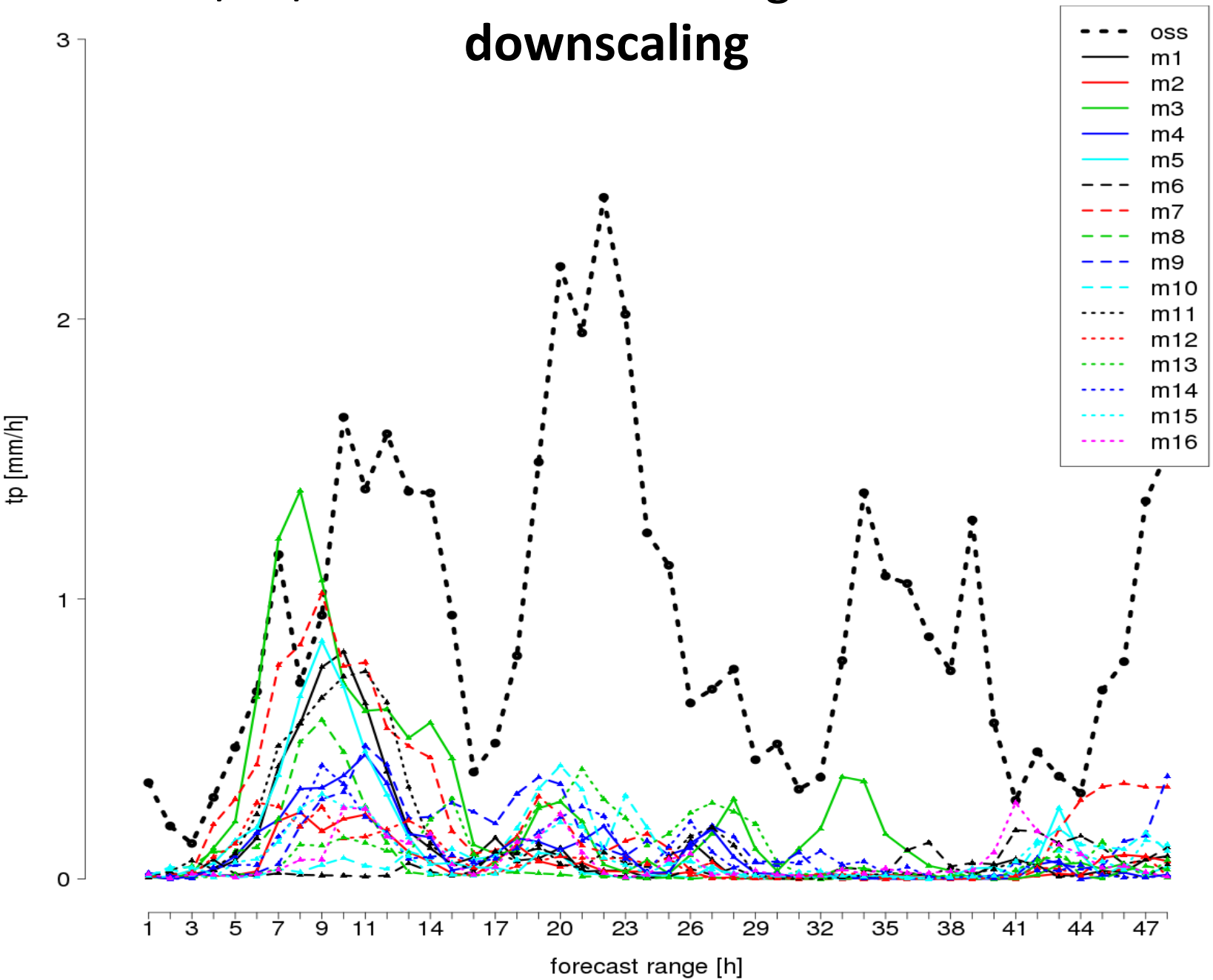
ens mean + std dev - **SPPT**



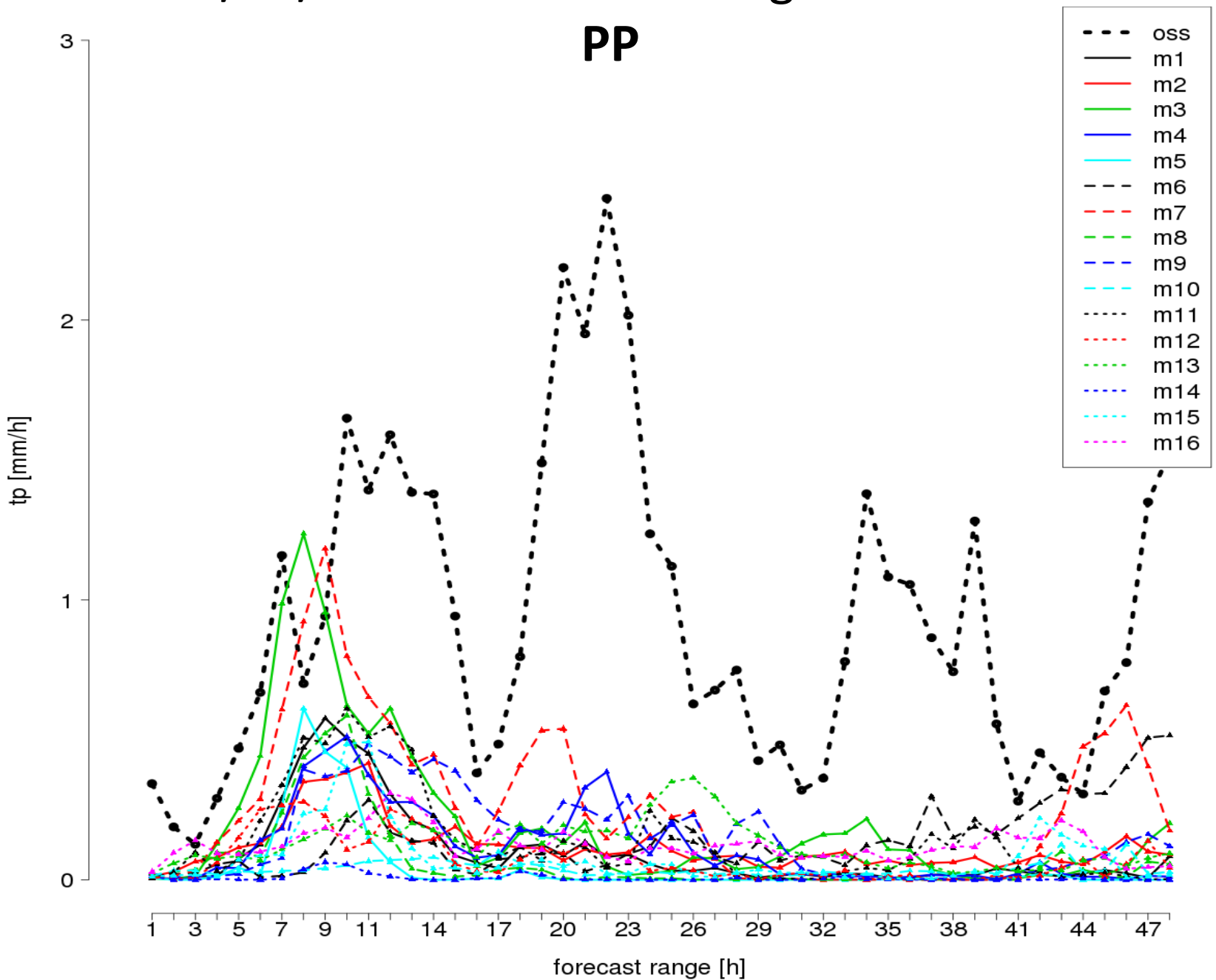


IT: 09/10/2014 00 UTC - average over GE area

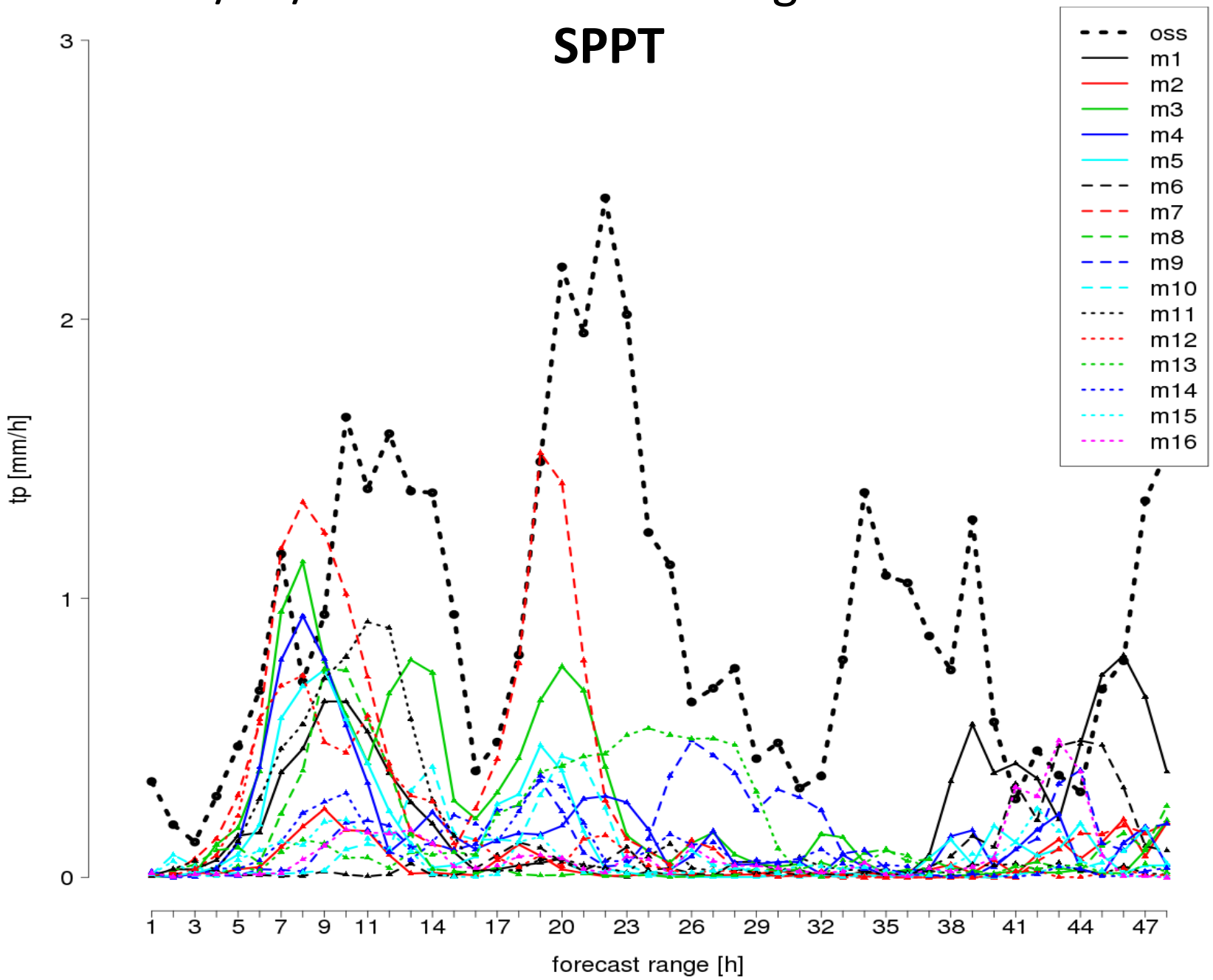
downscaling



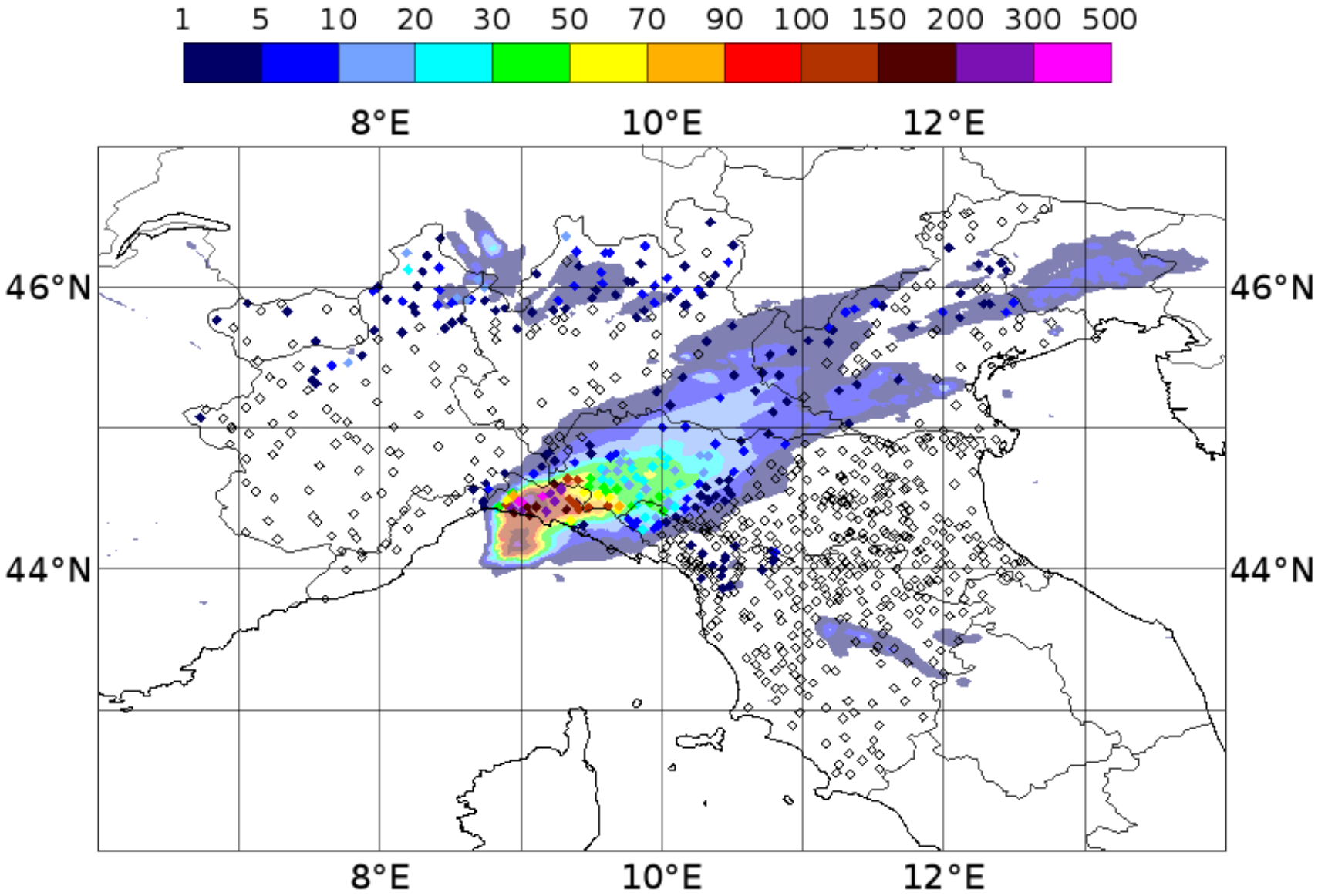
IT: 09/10/2014 00 UTC - average over GE area



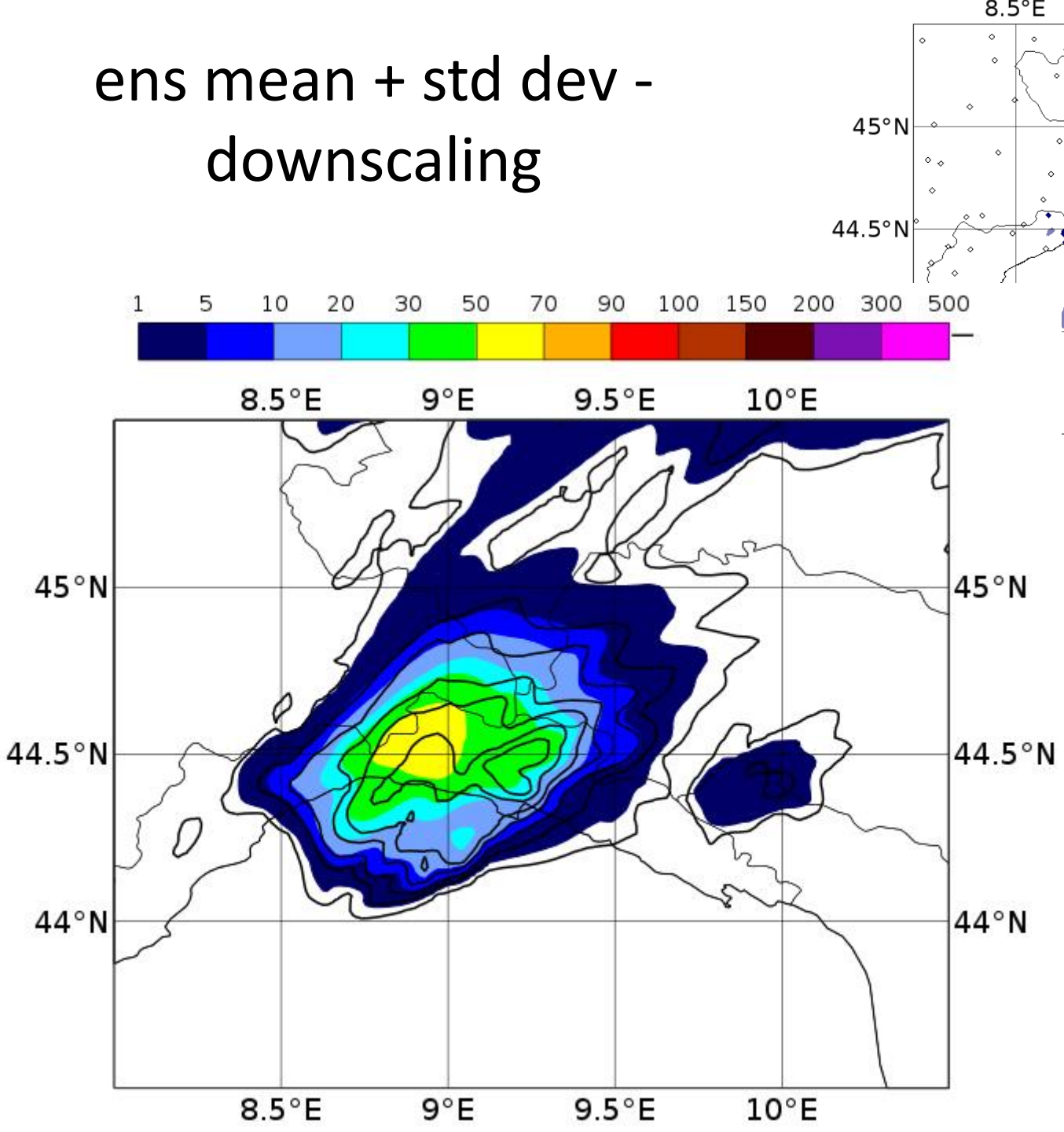
IT: 09/10/2014 00 UTC – average over GE area

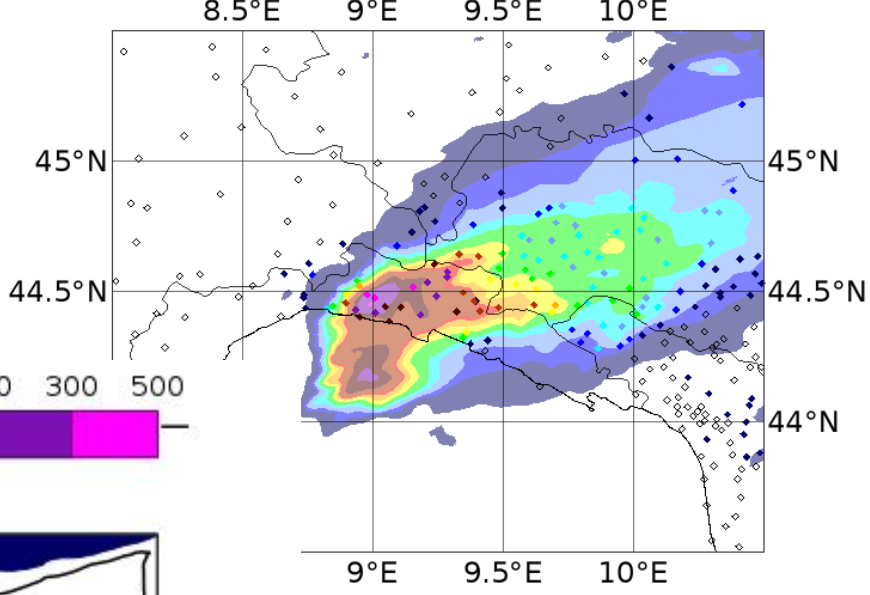


24 h precipitation – radar + raingauges
09/10/14 12 UTC – 10/10/14 12 UTC

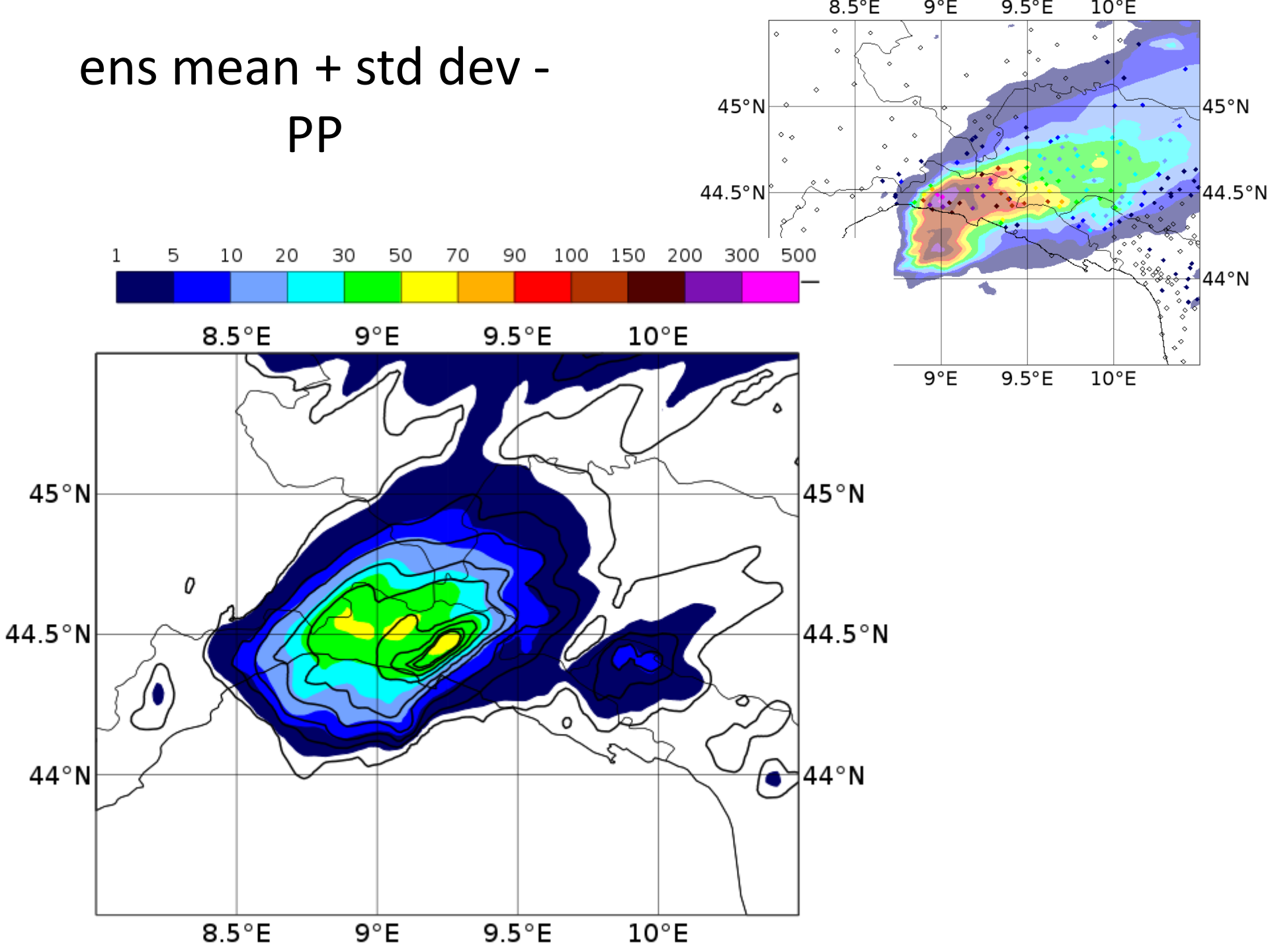


ens mean + std dev - downscaling

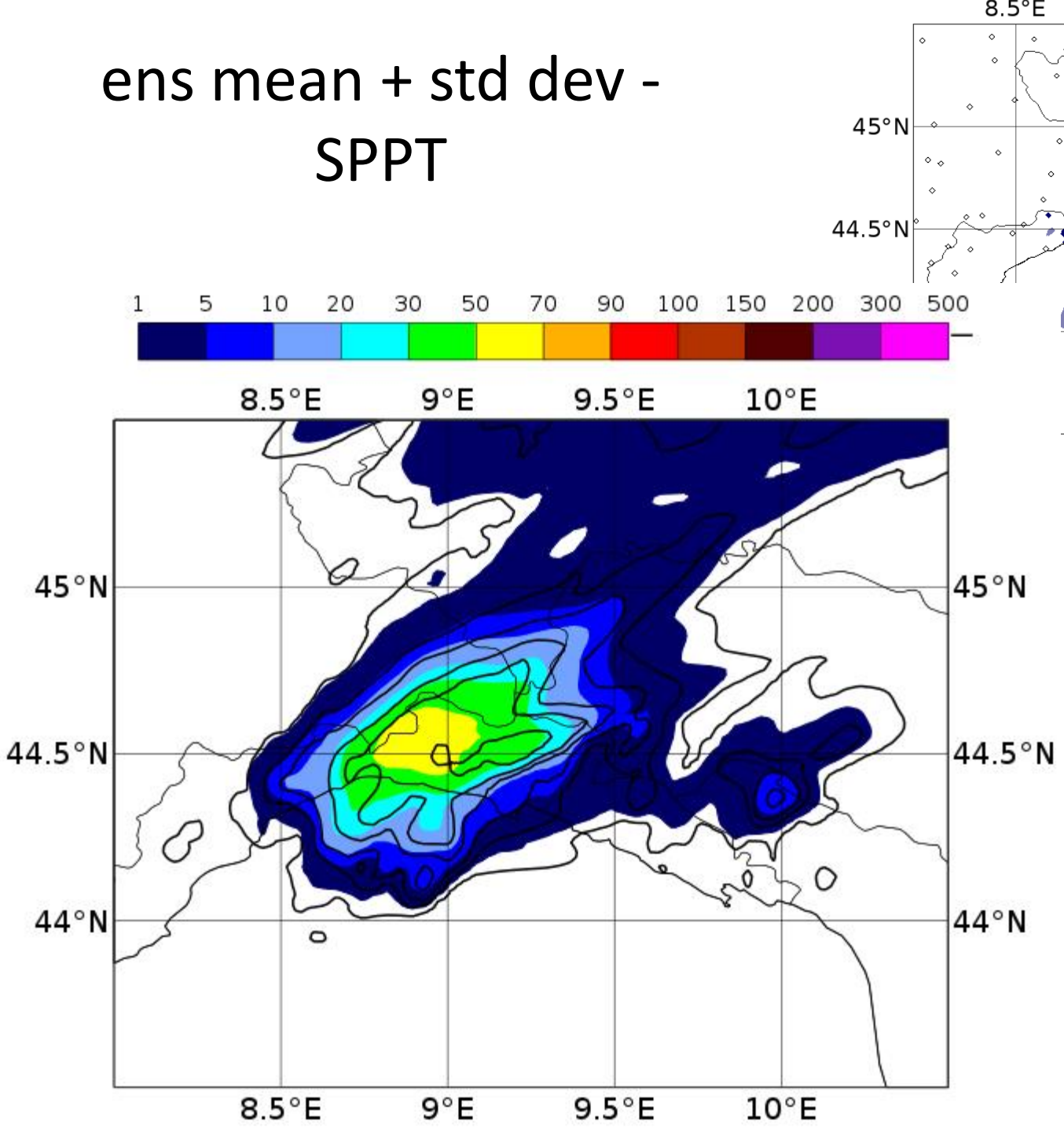


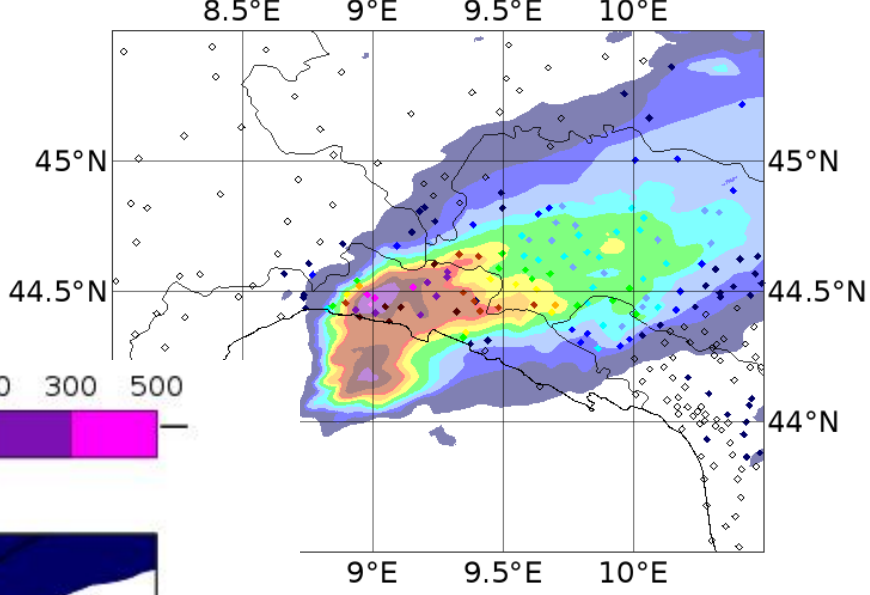


ens mean + std dev - PP

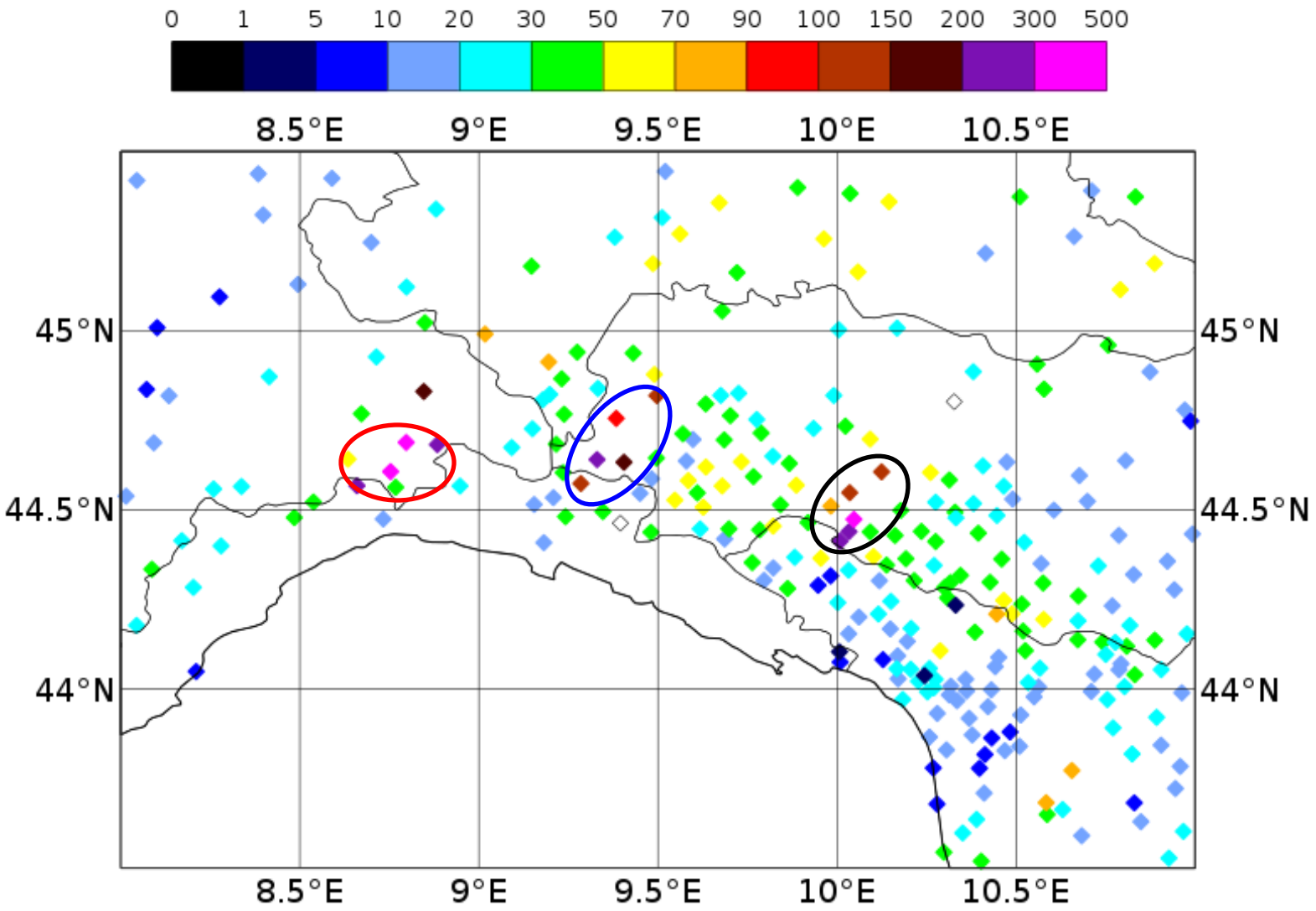


ens mean + std dev - SPPT



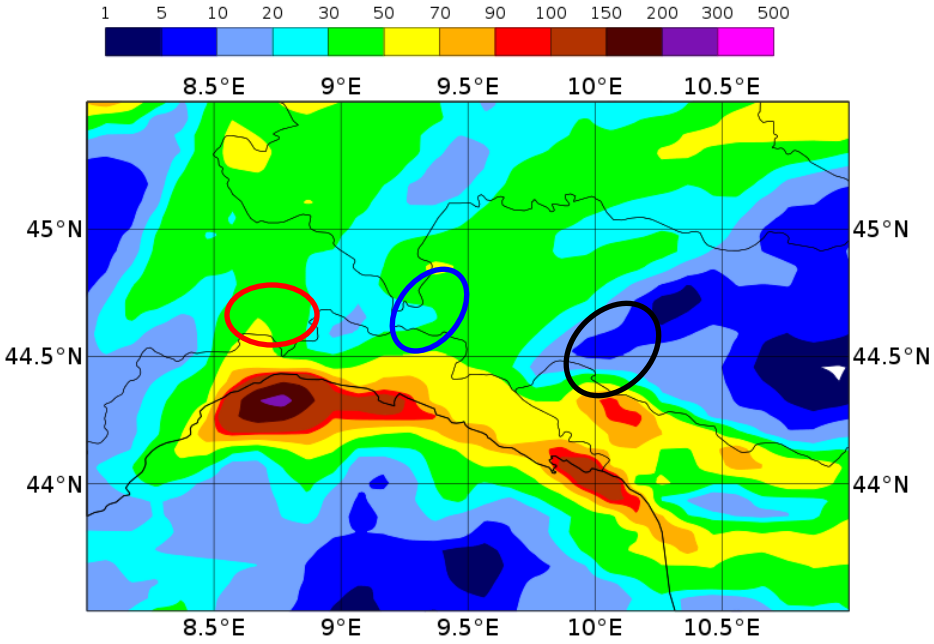


Parma - 24h accumulated observed precipitation 09/10/14 12 UTC – 10/10/14 12 UTC

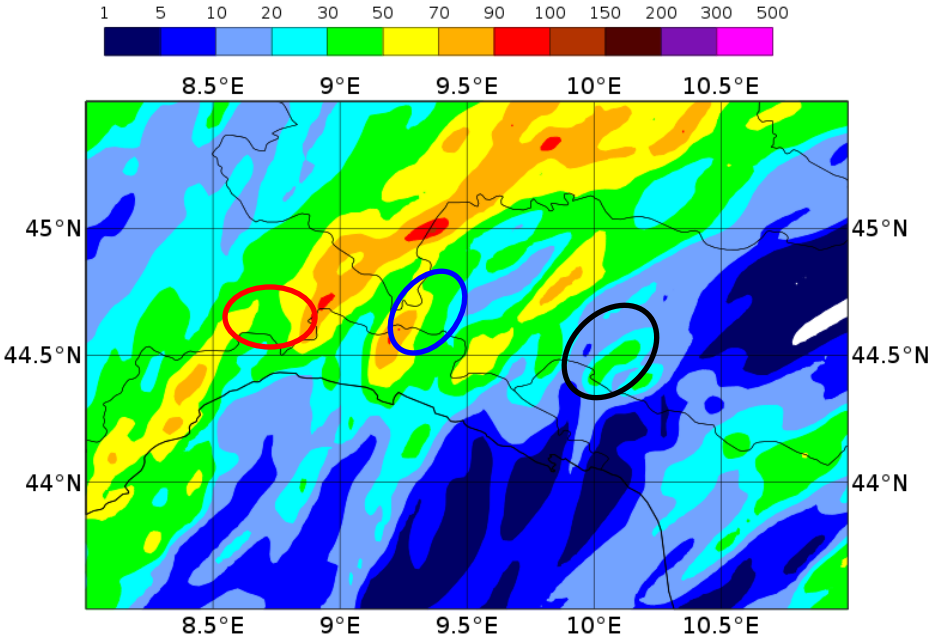


deterministic forecast (24h)

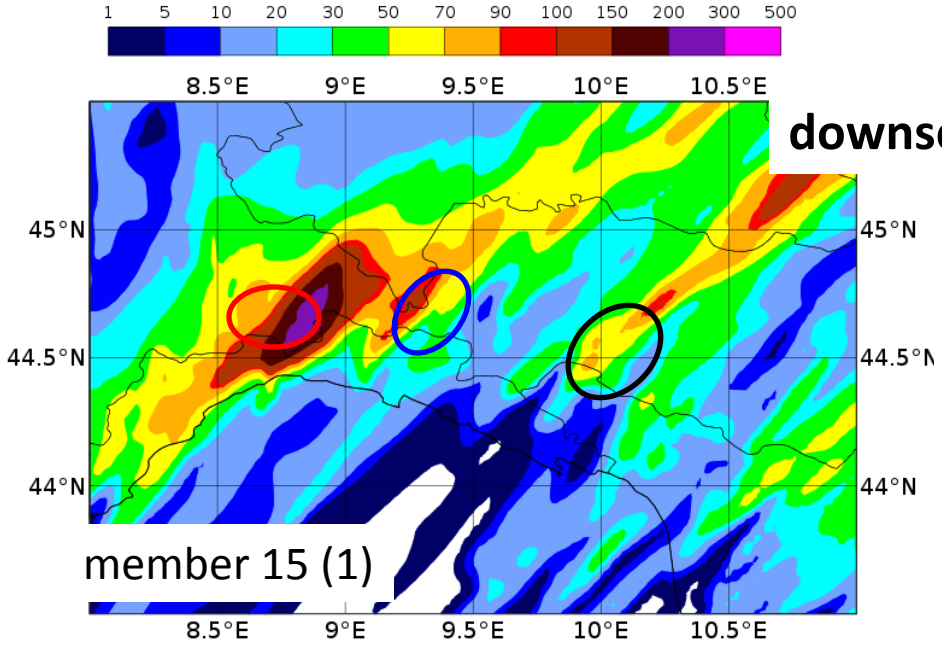
COSMO-I7 - 13 00UTC - +00-24



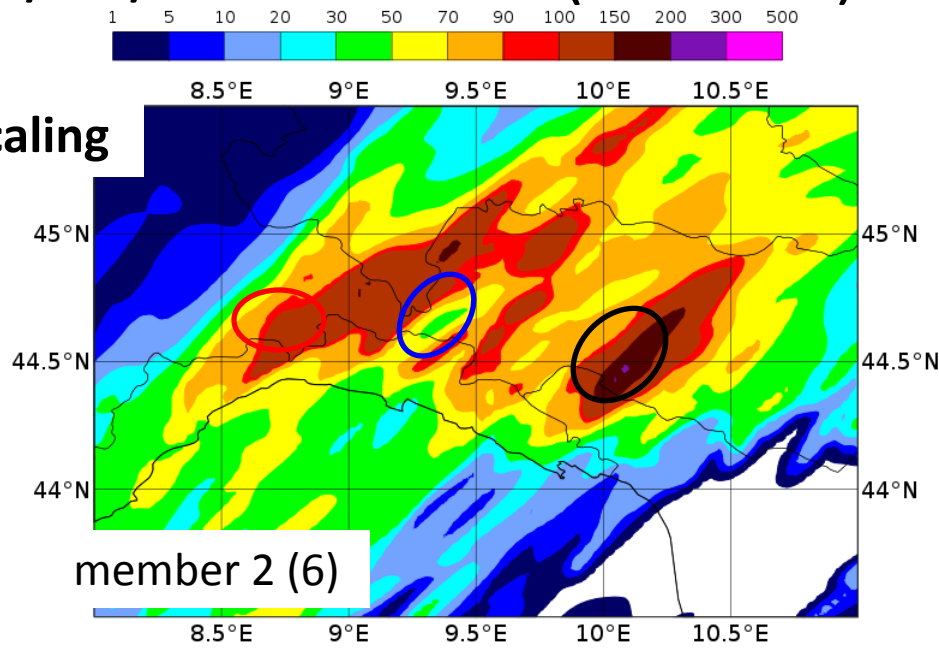
COSMO-I2 - 13 00UTC - +00-24

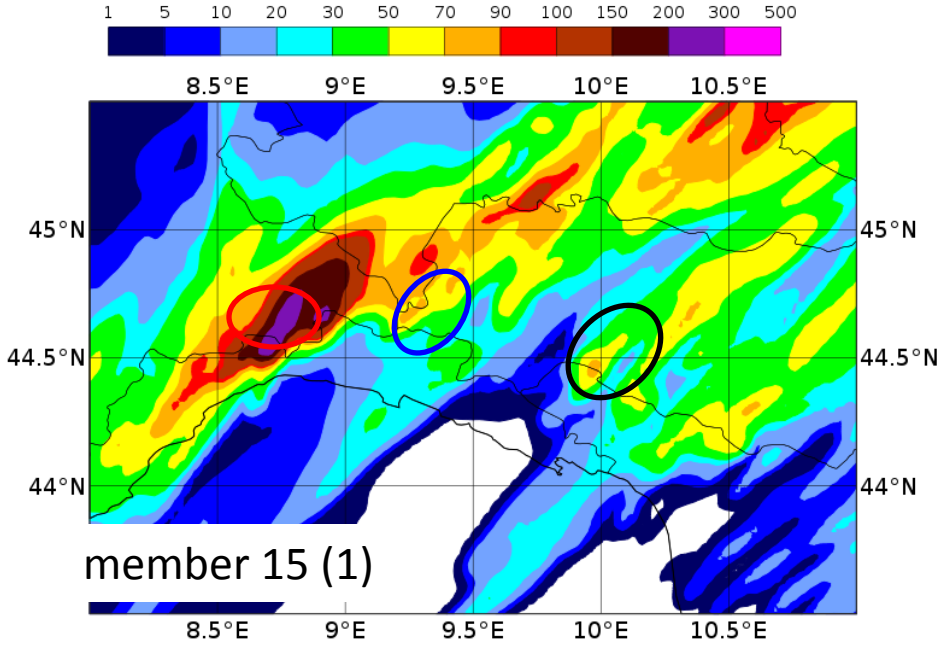


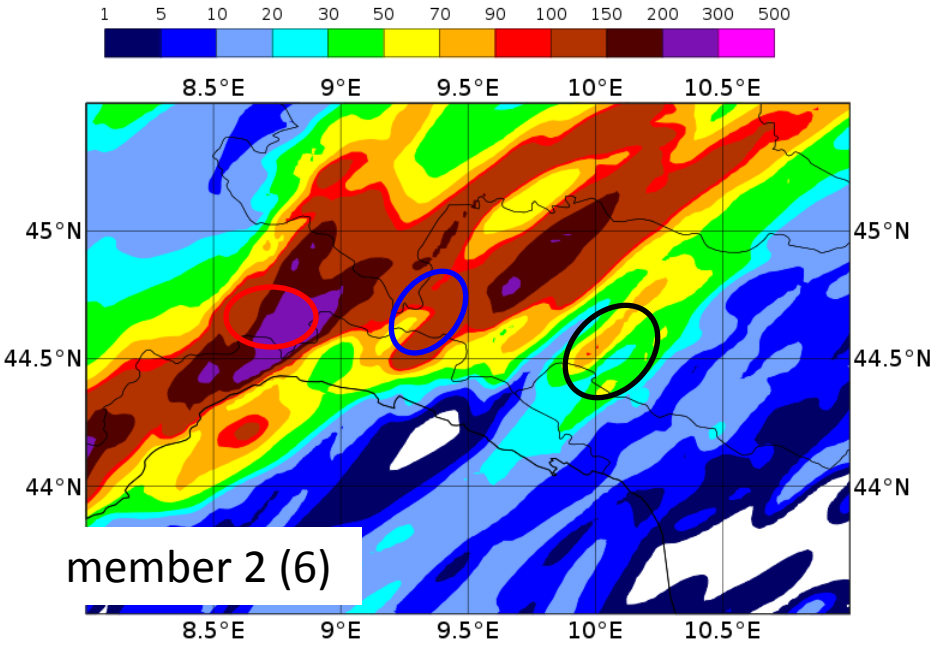
IT: 13/10/2014 00 UTC - VT: 14/10/2014 00 UTC (+00-24h)



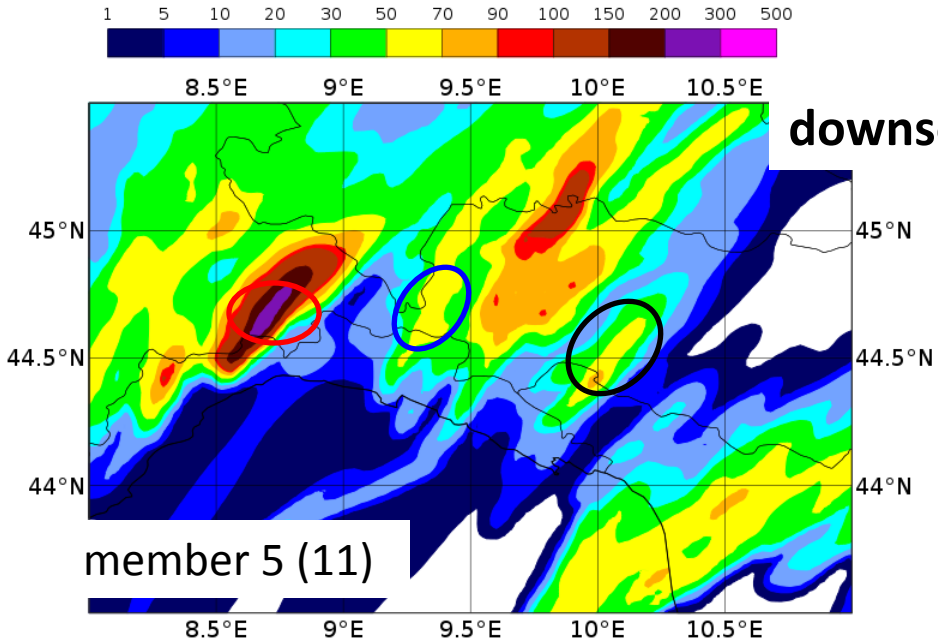
downscaling



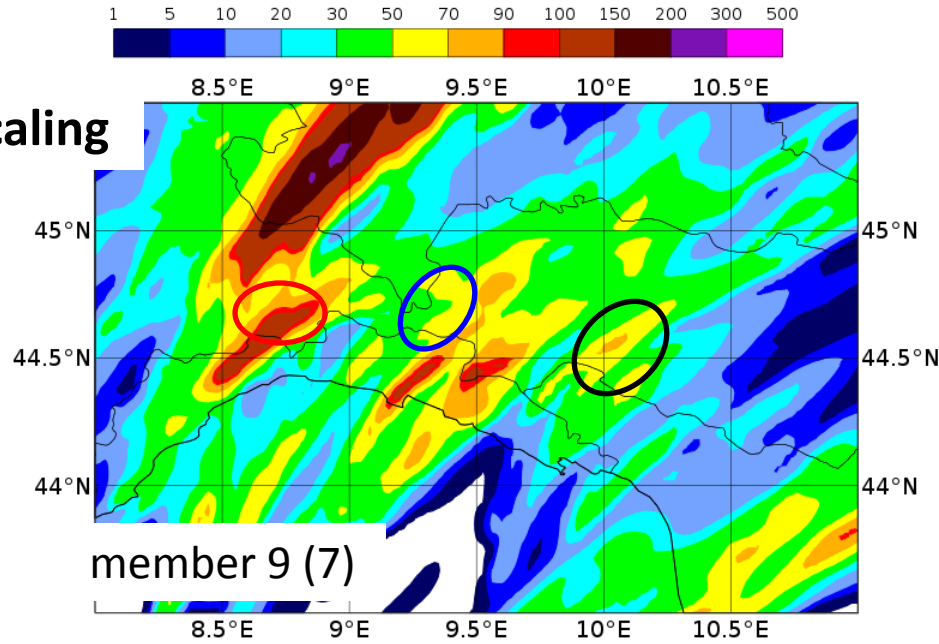


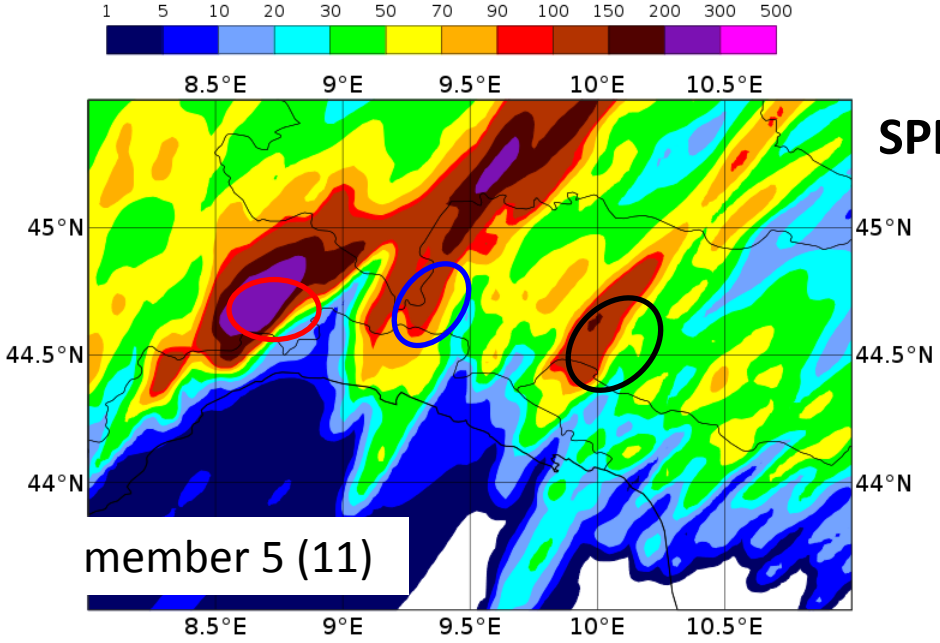


IT: 13/10/2014 00 UTC - VT: 14/10/2014 12 UTC (+00-24h)

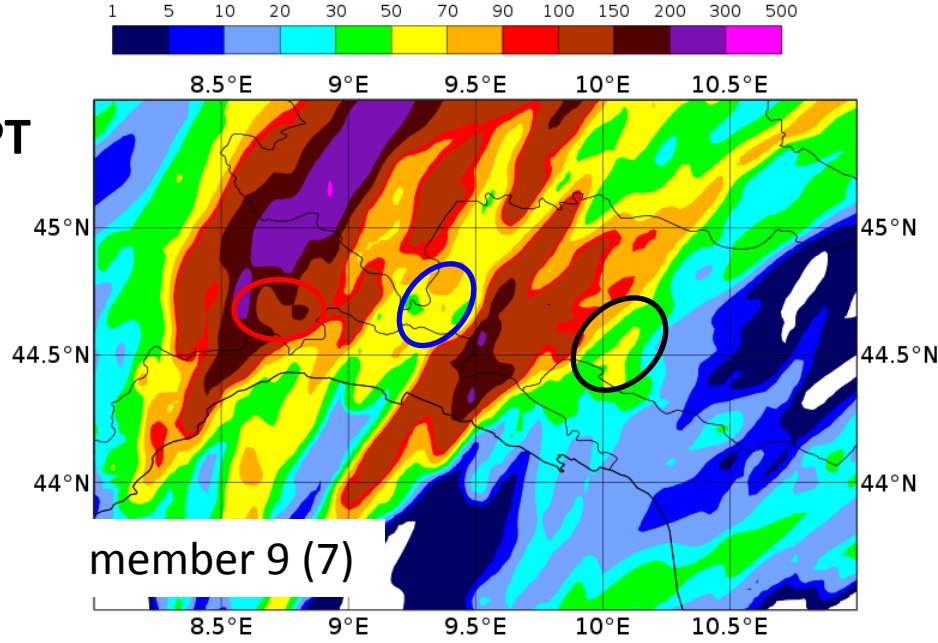


downscaling





SPPT



Conclusions

- In both cases, the 2.8 km ensemble provides scenarios different from the deterministic run, with few good members
- Localisation problem addressed by some model perturbations, but mostly related to IC/BCs
- In both cases the SPPT-perturbed runs have a tendency towards more intense precipitation (which here is better because there was underestimation of the amounts)
- Check also false alert cases (one done, not false alert)

- Pre-operational in Autumn 2015

Thank you for your attention!