

A numerical study of the Vaia storm over northern Italy in October 2018 with COSMO and ICON models

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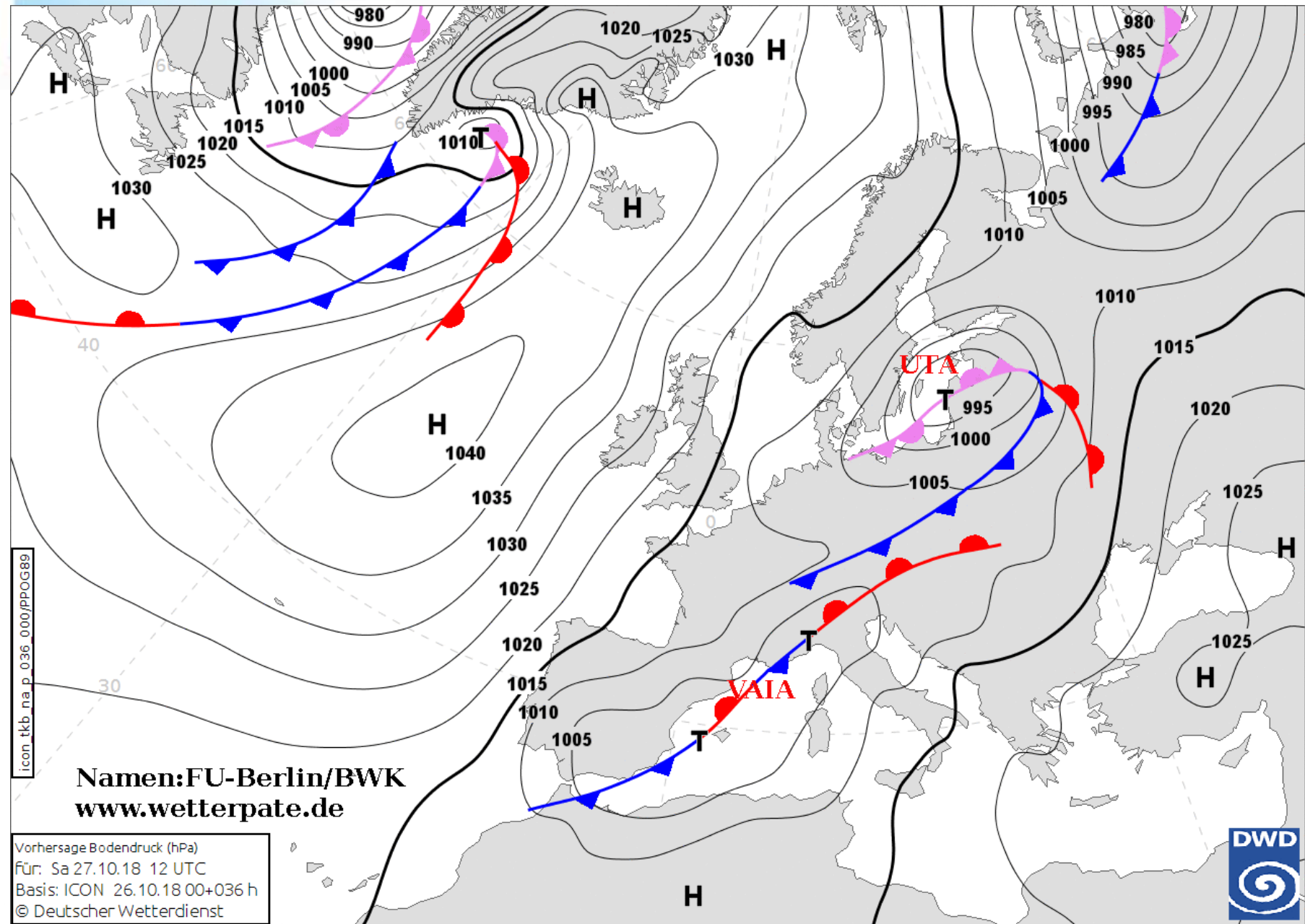
Arpa Piemonte

Outlook

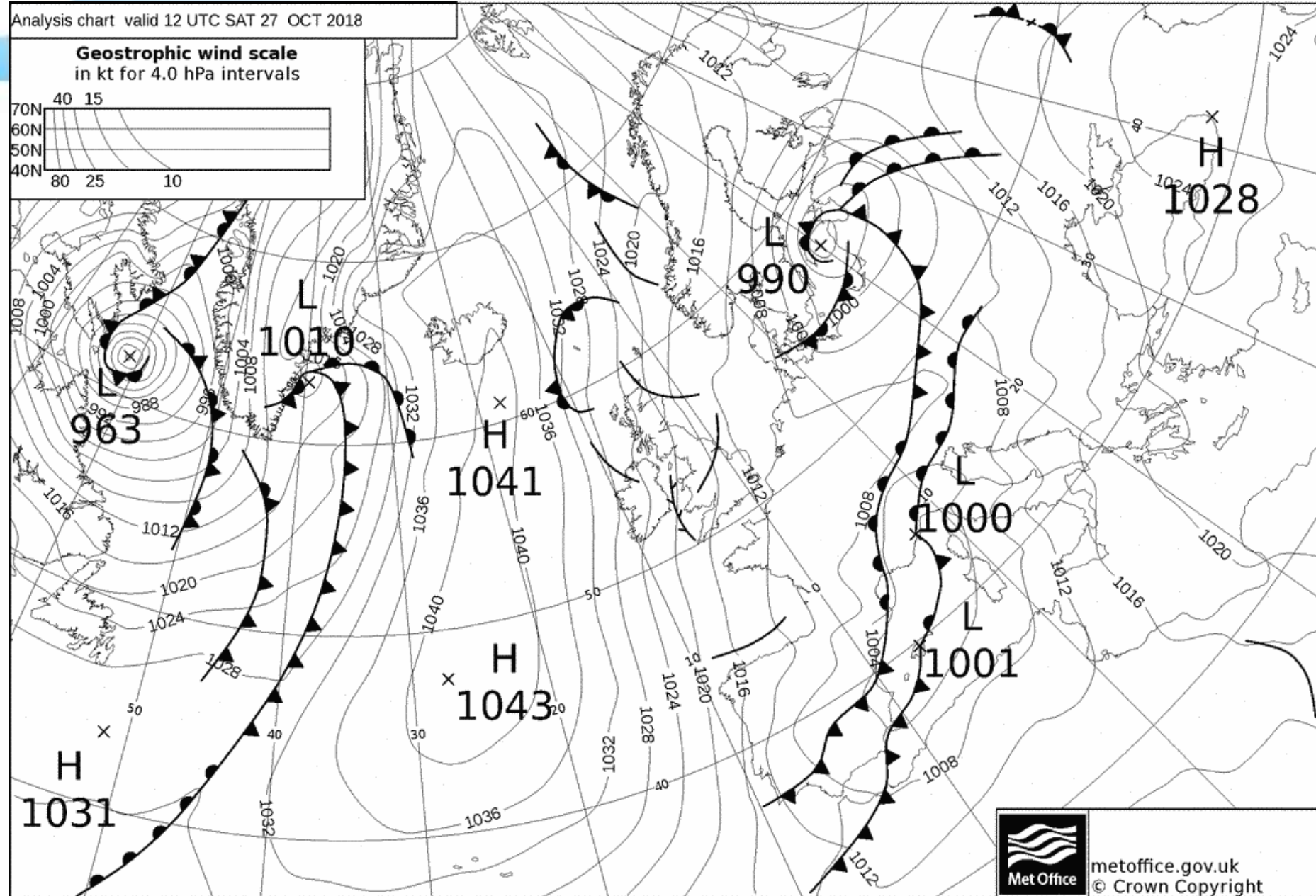
- The VAIA storm
- Simulations setup (COSMO)
- Simulations setup (ICON)
- Wind verification results
- Precipitation verification results
- Conclusions and next steps

The VAIA storm

ICON
+36h forecast
for 27
October 2018
12UTC

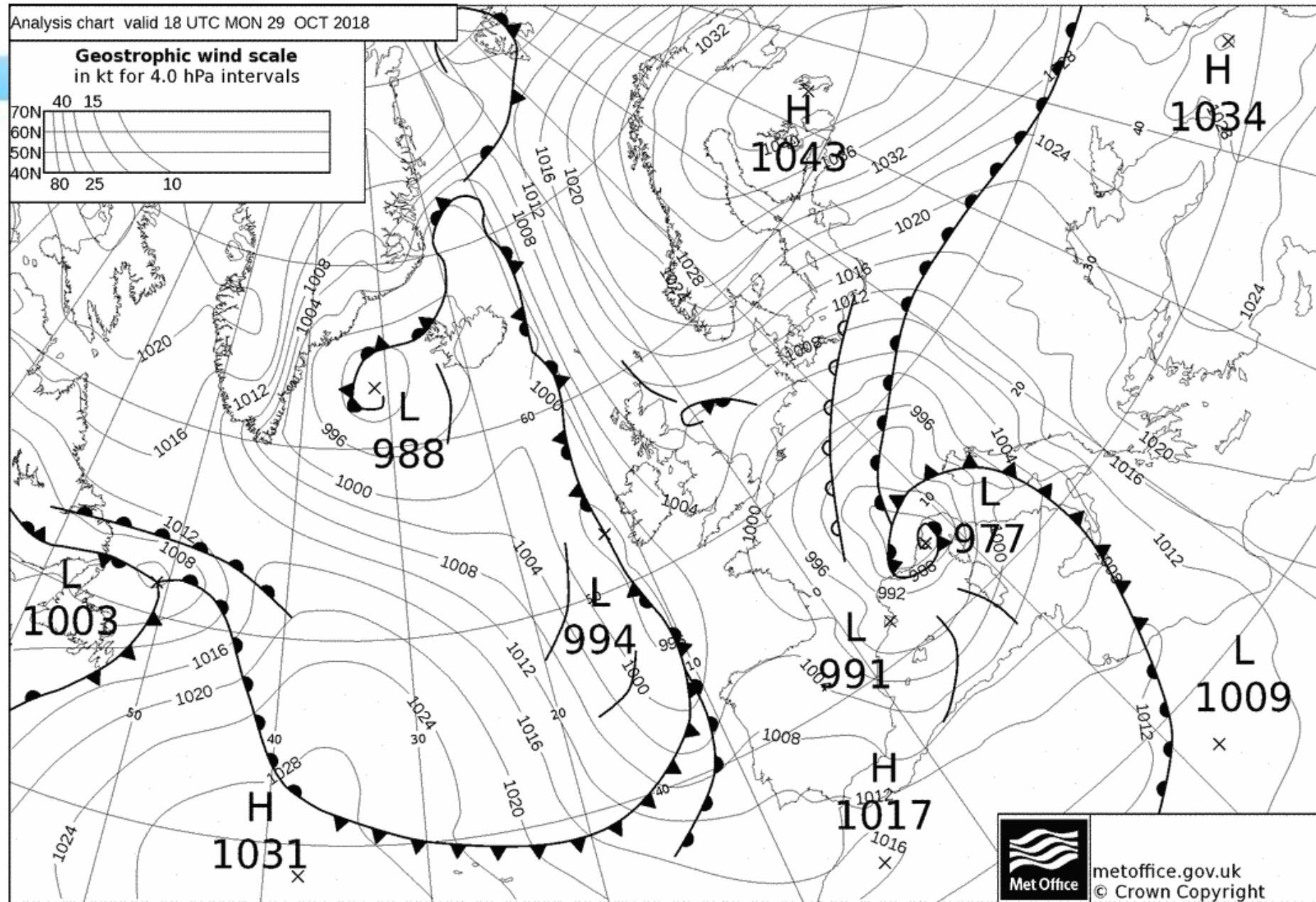


The VAIA storm



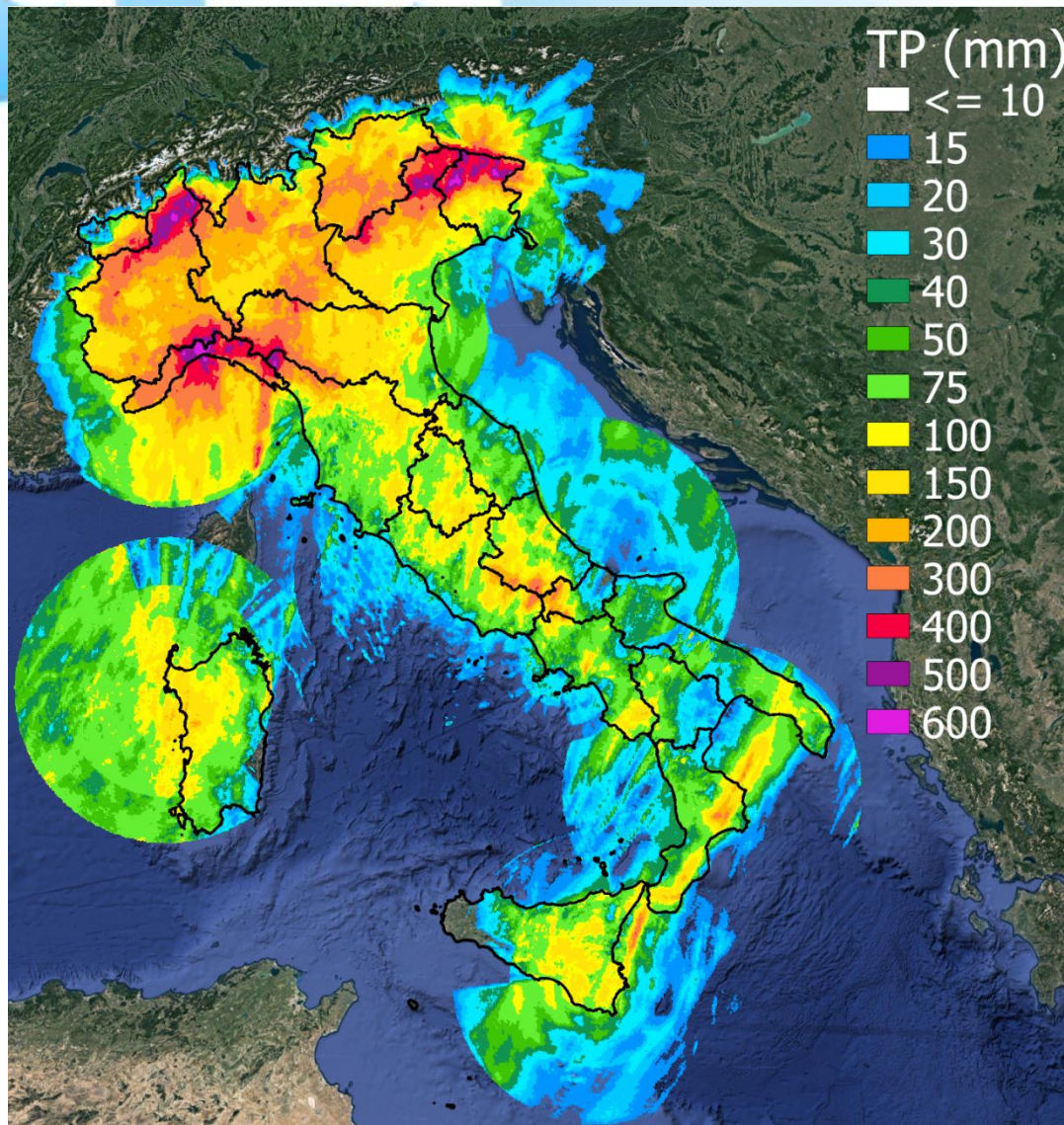
Analysis
chart 27
October 2018
12UTC

The VAIA storm



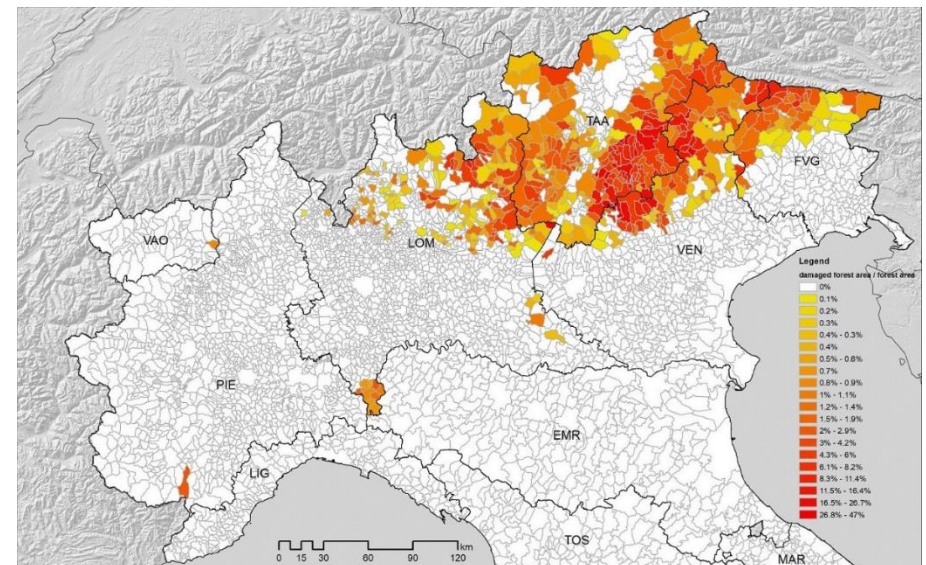
Analysis
chart 29
October 2018
18UTC

The VAIA storm



Total cumulated precipitation recorded by the National radar mosaic
from 26 to 31 October 2018

Percentage of forests destroyed in the event¹



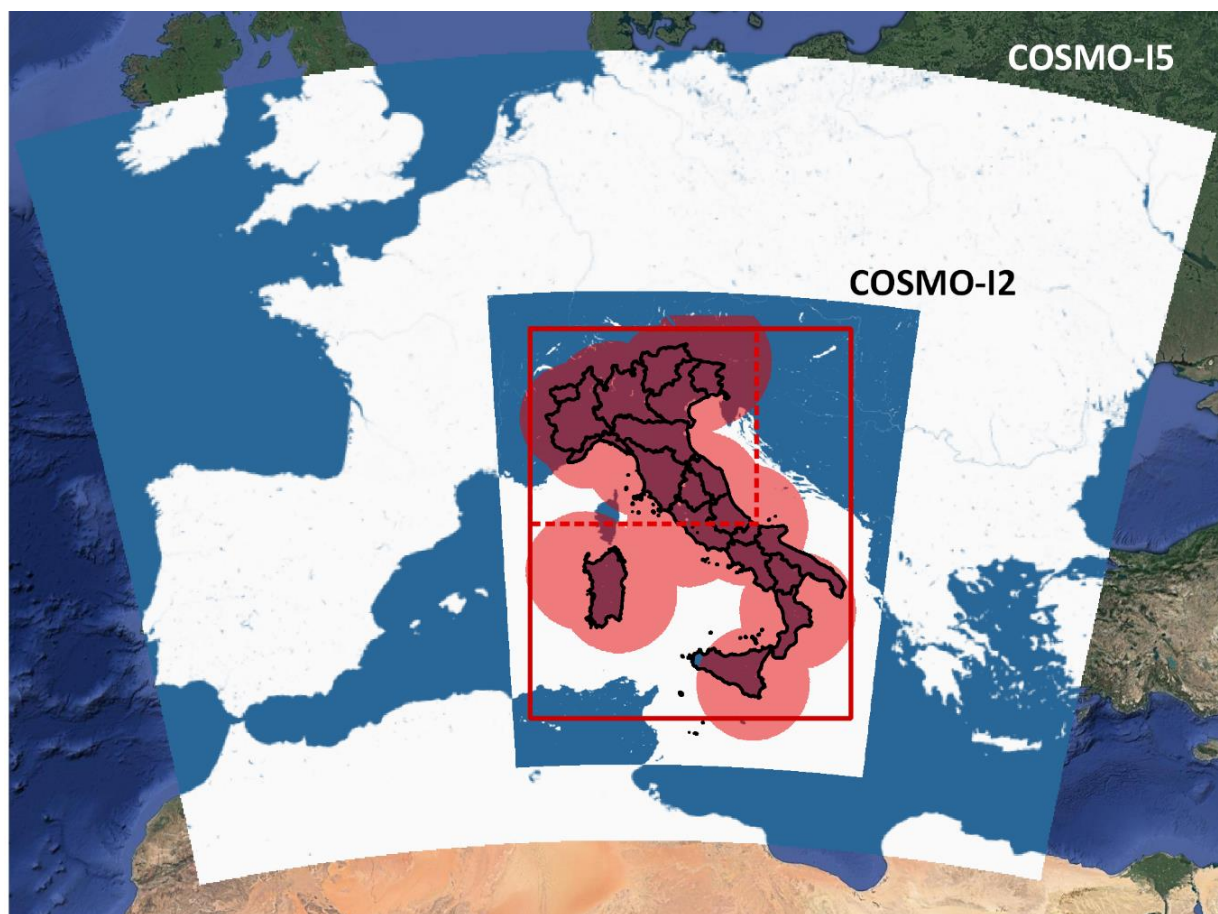
¹ Chirici et al., 2019. Forest damage inventory after the "Vaia" storm in Italy, Forest@

Simulations set-up (COSMO)

COSMO forecast simulations starting 29 October 2018 00UTC up to +36h

IFS HRES→COSMO-I5→ COSMO-I2

The dotted red line indicates the wind verification domain and the continuous red line the precipitation verification domain (for both COSMO and ICON)

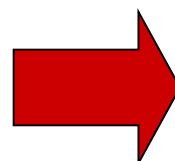


Simulations set-up (ICON)

ICBC from ICON at 13 km resolution
(analyses and forecasts)



Domain over Europe at 5 km resolution



Domain over Italy at 2.5 km resolution

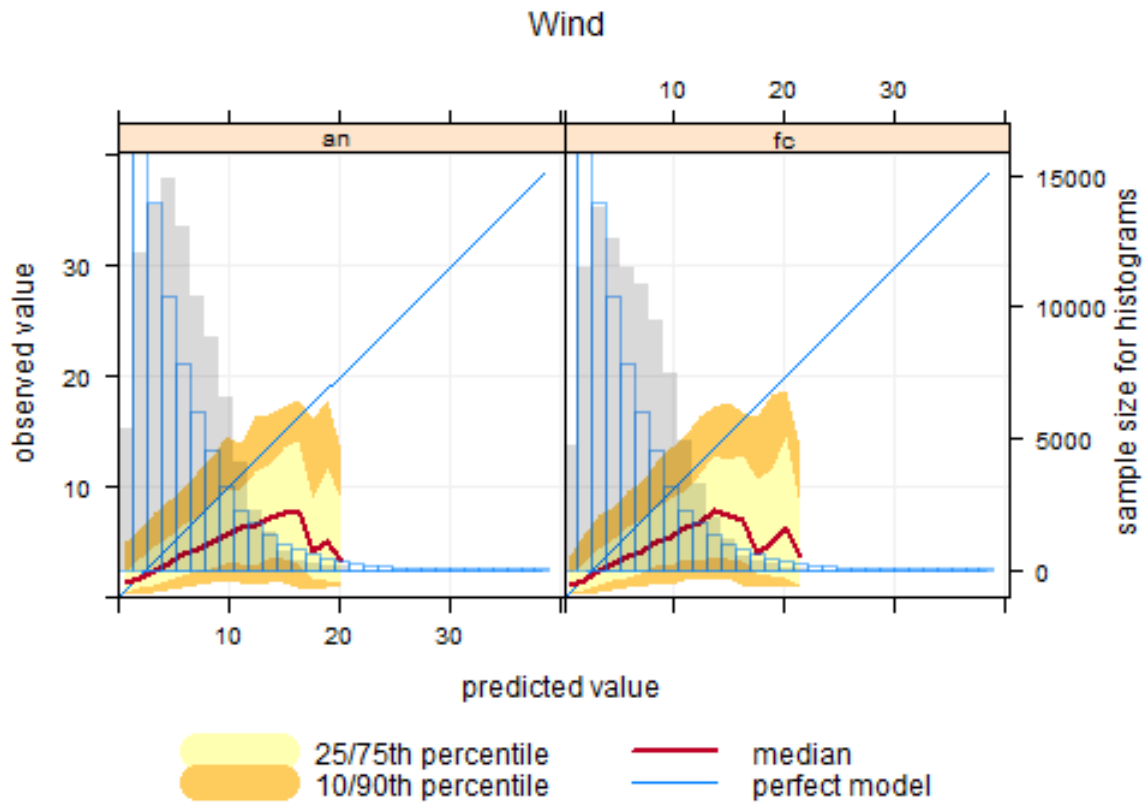
Hindcast runs: 26 October 2018 00UTC for 5 days

Forecast runs: 29 October 2018 00UTC up to +36h

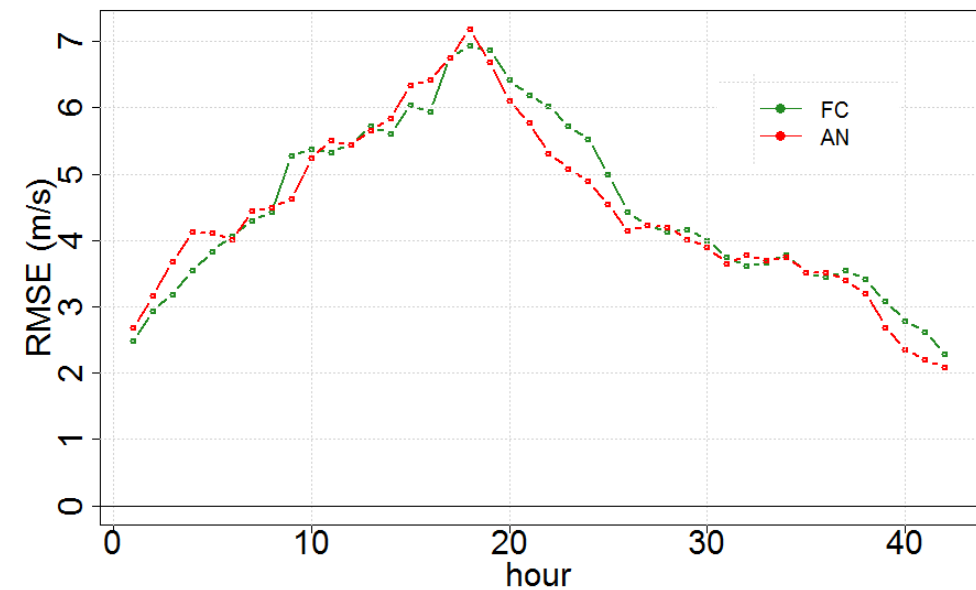
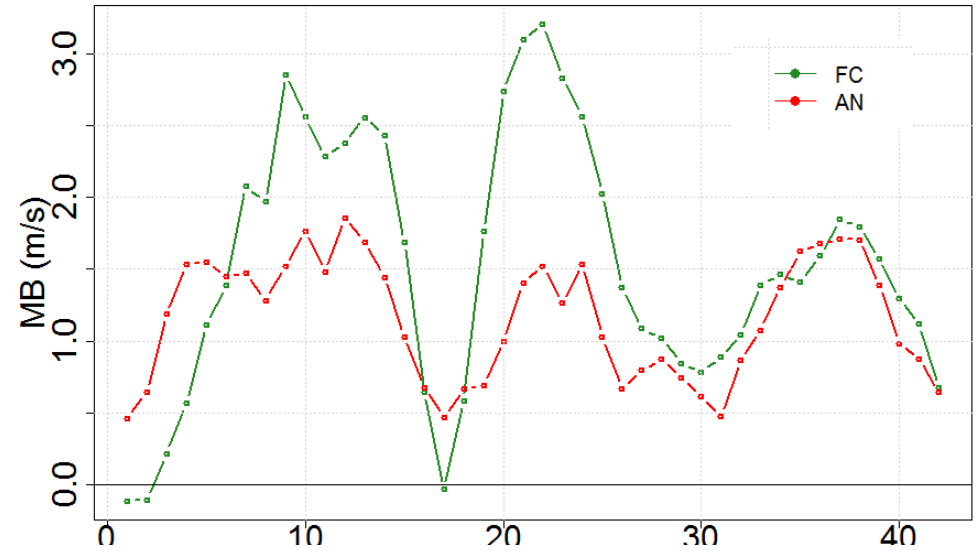
Verification period: 29-30 October 2018

Wind verification results

ICON 10m Wind

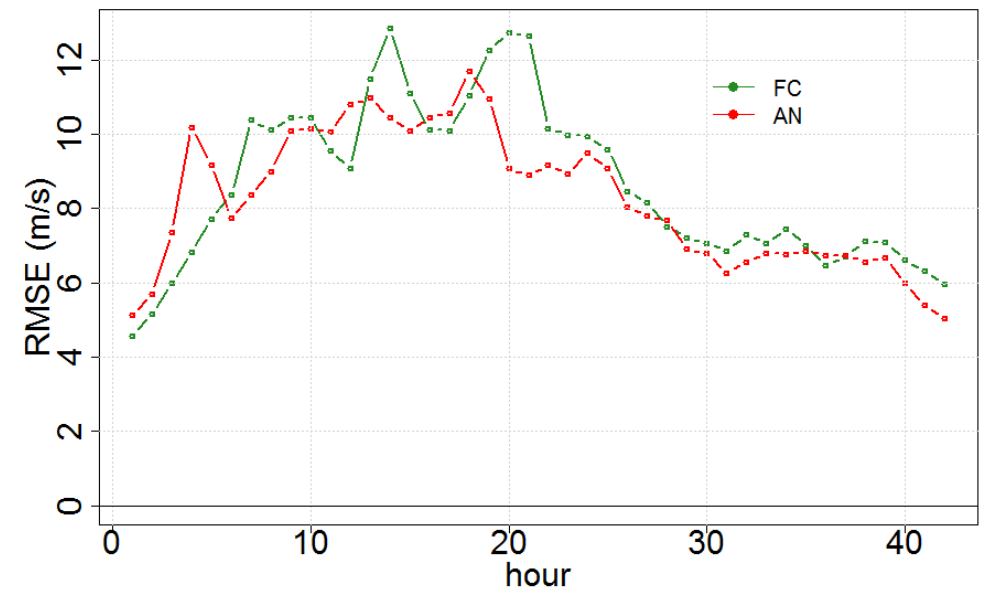
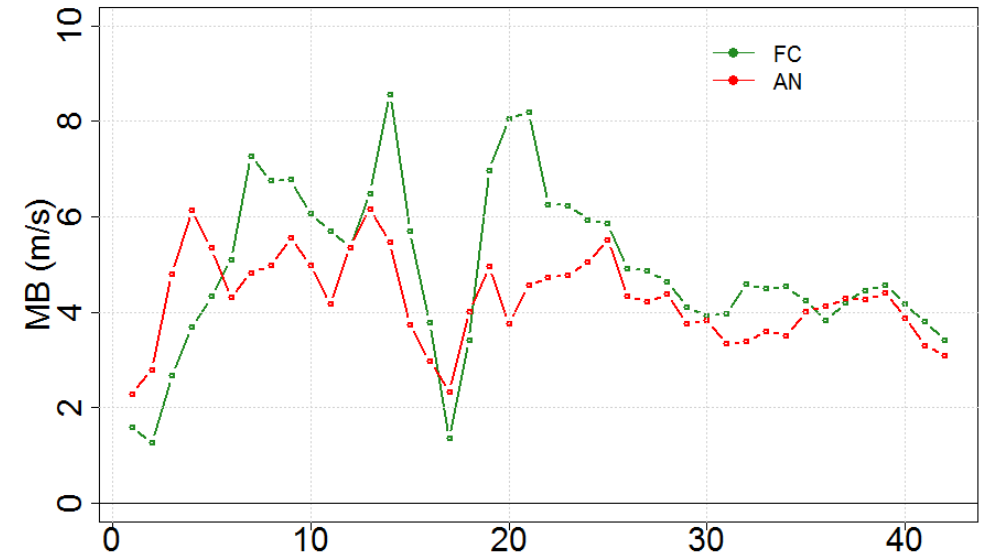
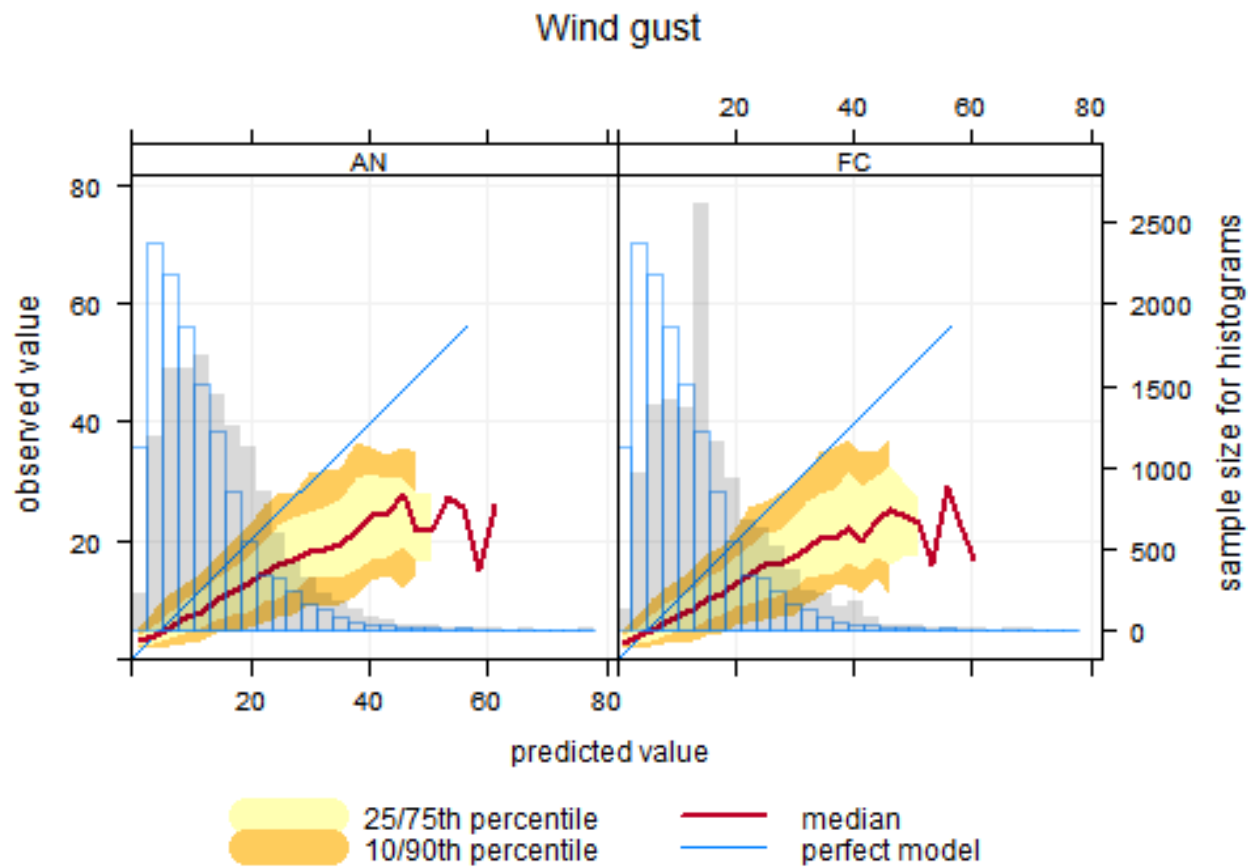


ICON analysis better than ICON forecast as shown by the MB and RMSE behaviour

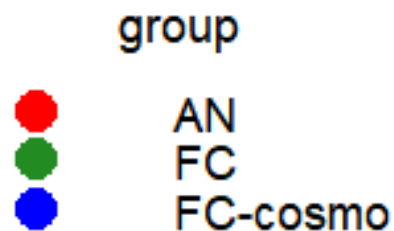
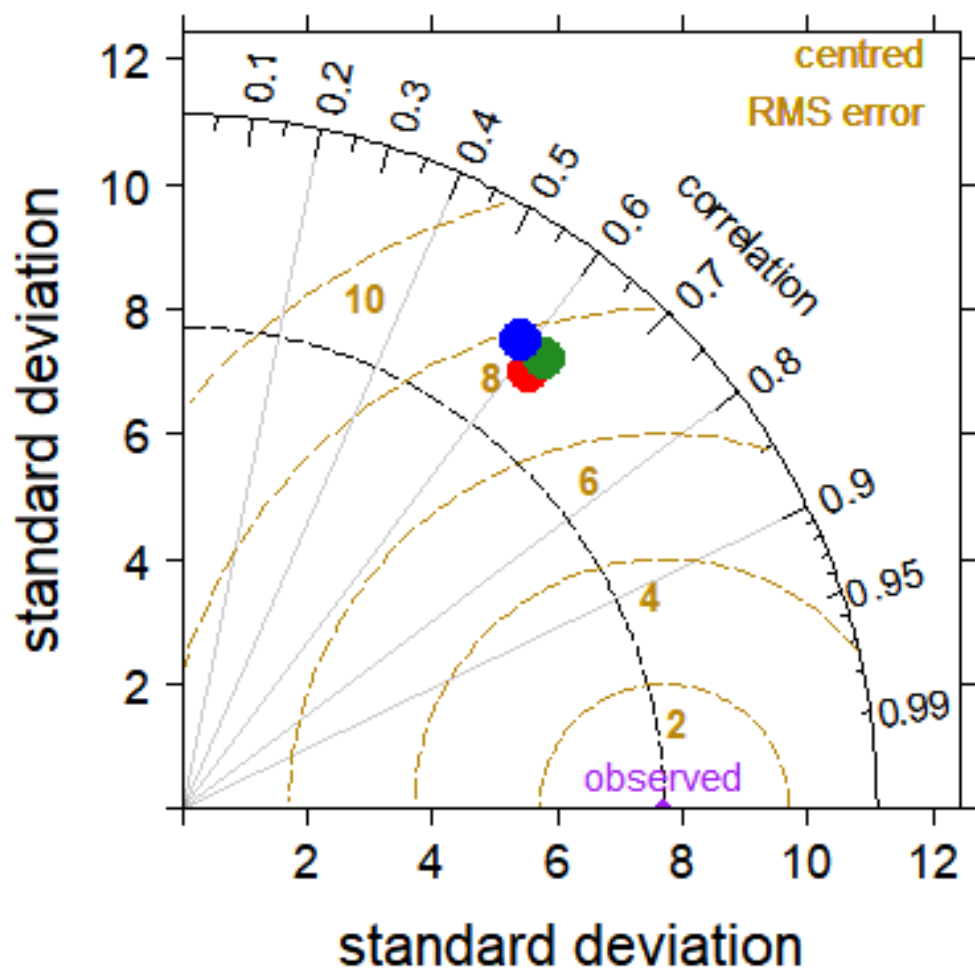


Wind verification results

ICON 10m Wind Gust



Wind verification results



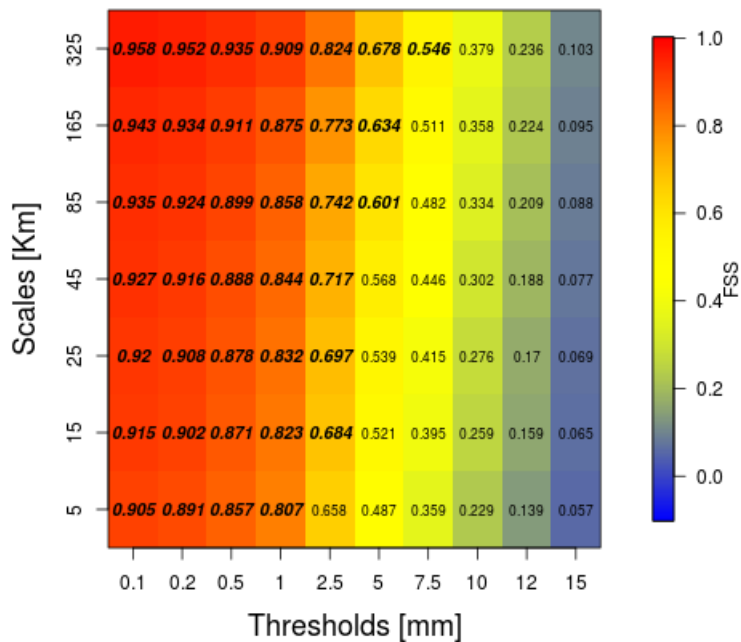
Concerning the wind gust:

1. ICON forecast seems slightly better than COSMO forecast
2. ICON analysis better than ICON forecast as expected and shown by the MB and RMSE behaviour

Precipitation verification results

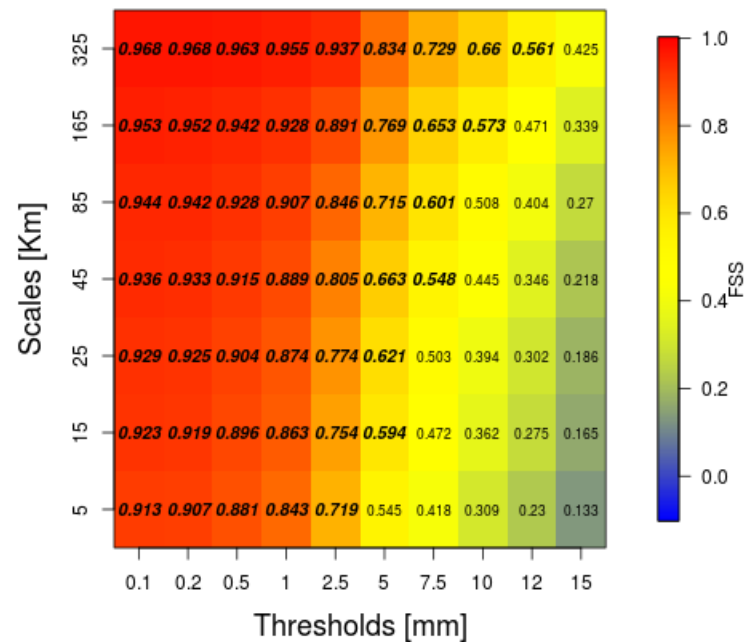
Fuzzy verification with the COSMO software VAST

Fractions skill score ICON - FSS - 20181029 - 3 Tsteps



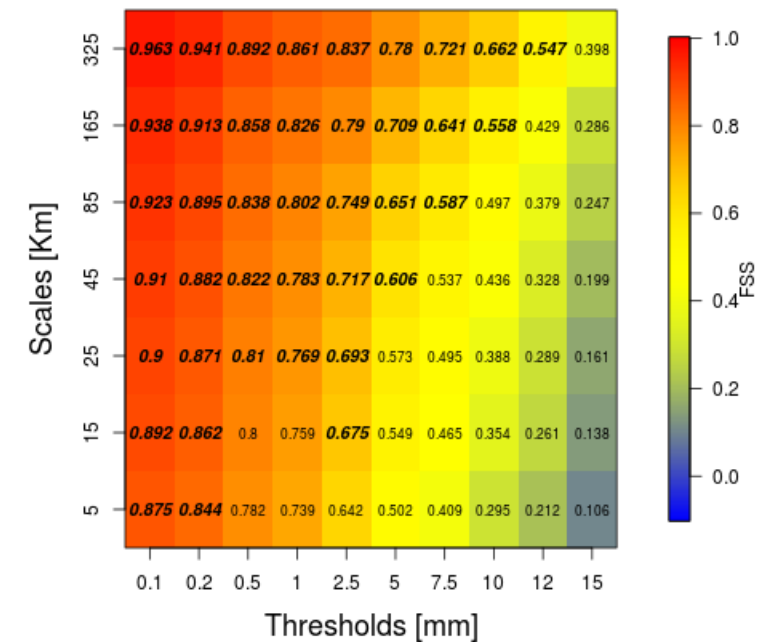
ICON analysis 20181029

Fractions skill score ICON - FSS - 20181029 - 3 Tsteps



ICON forecast 20181029

Fractions skill score COSMO-OT - FSS - 20181029 - 3 Tsteps



COSMO forecast 20181029

- The simulations in general provide a good performance, which degenerates for higher thresholds and smaller spatial scales
- The useful scale forecast (FSS_{useful} , in bold italics in the figure) indicates a better performance of ICON compared to COSMO



Conclusions and next steps

- The simulations of the VAIA storm indicate a slightly better performance of ICON model with respect to COSMO model
- In general, both models overestimated wind and wind gust
- Further tests are needed, considering also different weather conditions



**THANKS FOR YOUR
ATTENTION**