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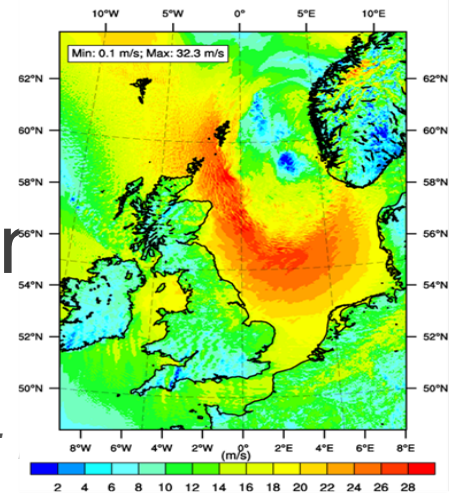
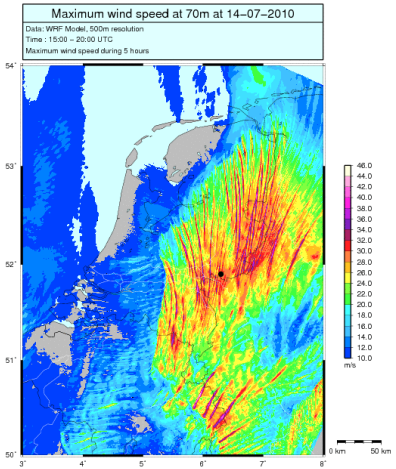
Evaluation of the new surface drag parameterization scheme

Wanjun Zhao

Daniel van Dijke

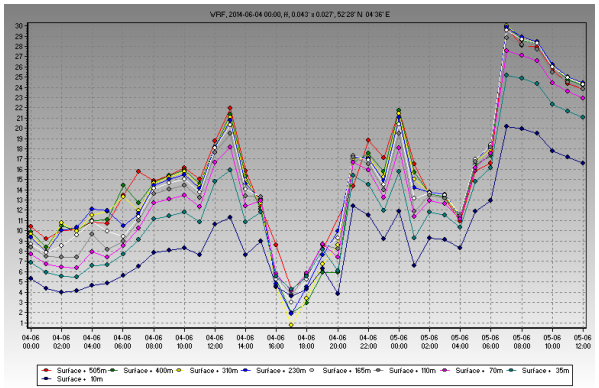
Use of WRF winds

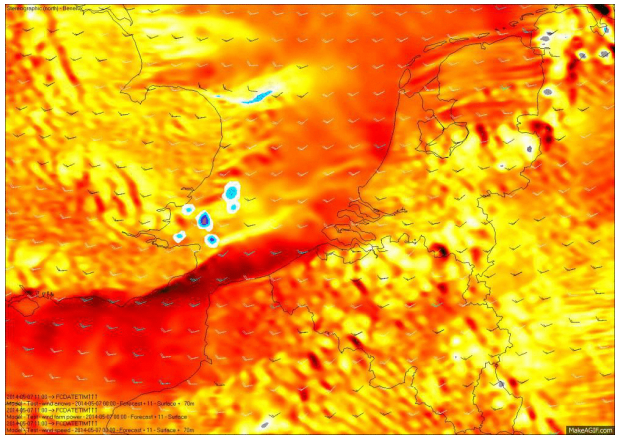




WRF applications for wi

- Wind assessments *[talk: 6B.5]*
- Wind power forecasts *[poster:*
- Hindcast extreme wind events
- Wind forecast





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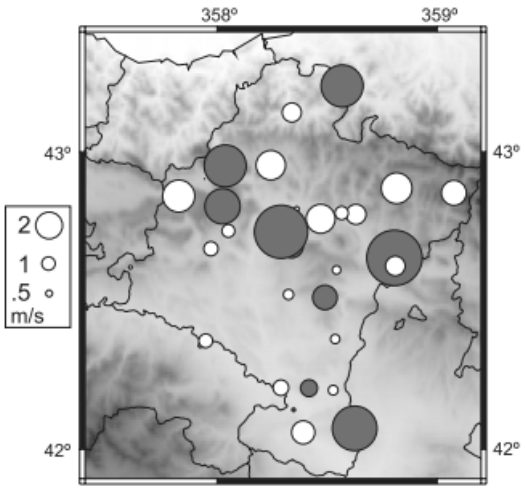
Why

Improve wind in complex terrain, remove bias. Use scheme of Jimenez and Dudhia (2012)



- Jimenez, P. A. and J. Dudhia (2012). "Improving the Representation of Resolved and Unresolved Topographic Effects on Surface Wind in the WRF Model." Journal of Applied Meteorology and Climatology **51**(2): 300-316.

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WRF setup

v3.4.1

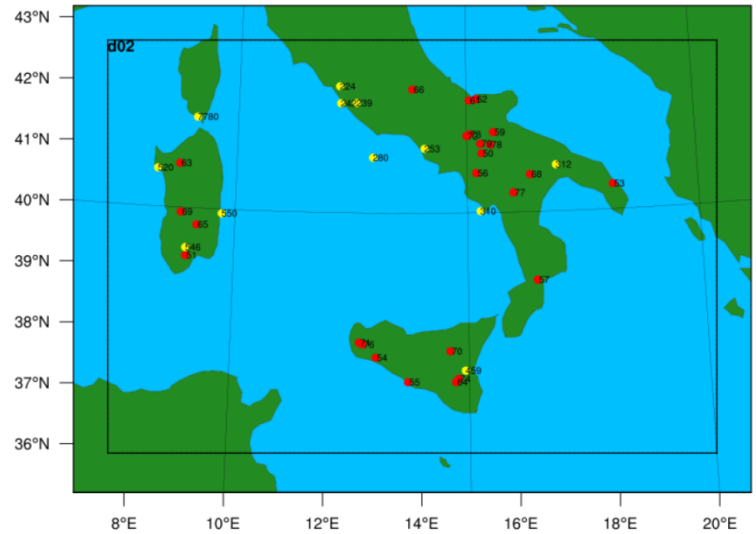
3 km inner domain

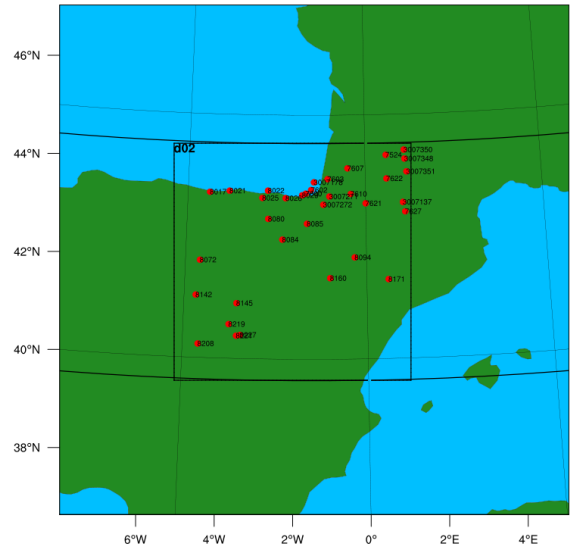
ERA interim boundaries

24h spinup, 48h run

Italy period of 28-01-2012 till 28-02-2012

Spain period of 01-12-2012 till 01-12-2013





Item	Jimenez and Dudhia	This study
Short wave radiation	Dudhia	Goddard
Long wave radiation	RRTM	RRTM
Cumulus	Kain-Fritsch (old)	Kain-Fritsch (new)
Microphysics	WSM6	WSM6
Land surface	SLAB	Noah LSM
PBL	YSU	YSU
First model level at	~30m	~10m

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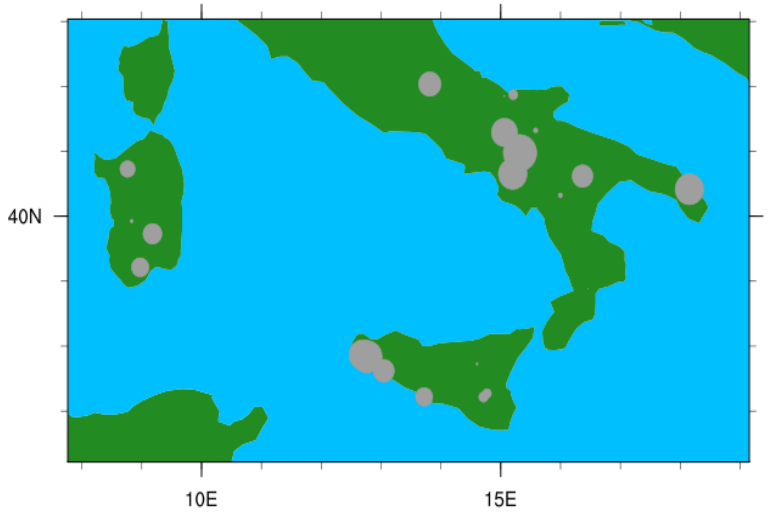
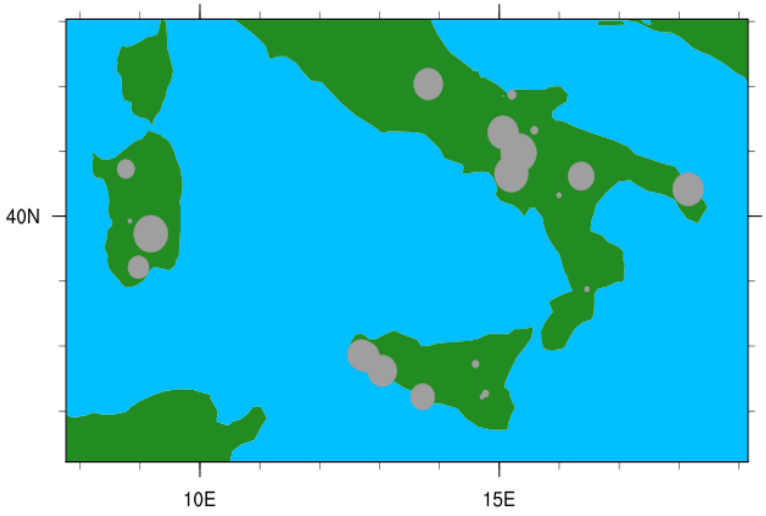
Results Italy - Bias



Without the new scheme



With the new scheme

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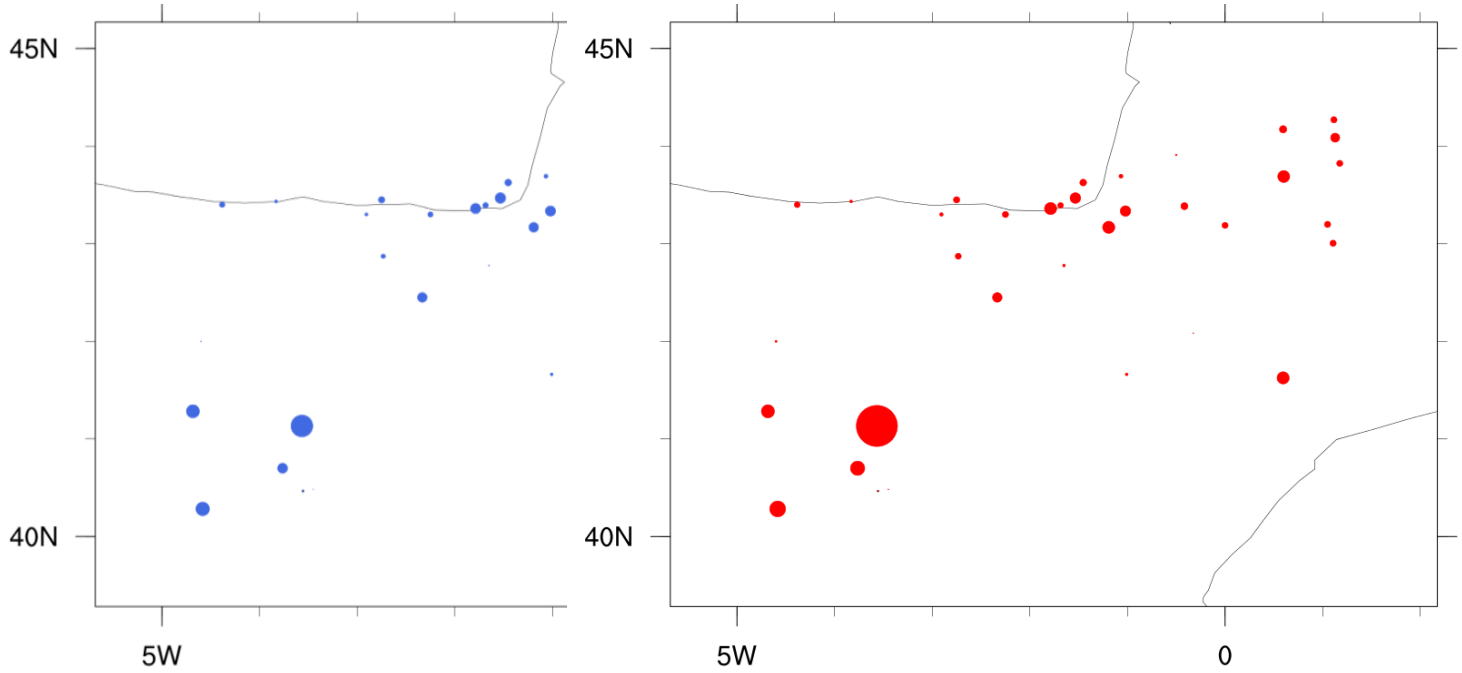
Results Spain - Bias

- Without the new scheme
- With the new scheme



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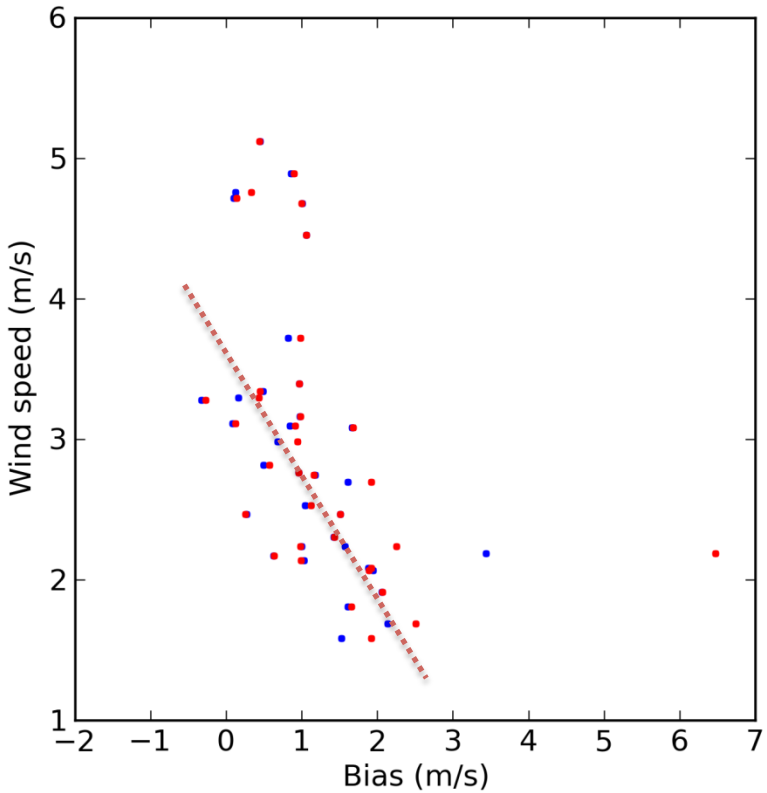
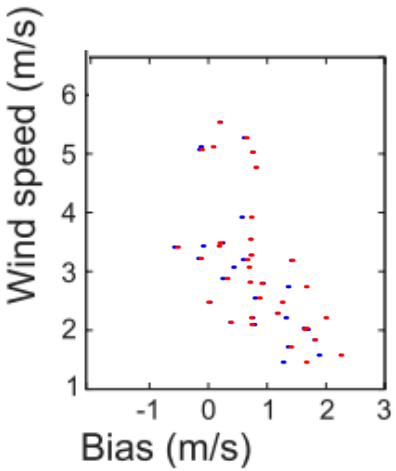
Results Spain – Bias vs mean wind speed





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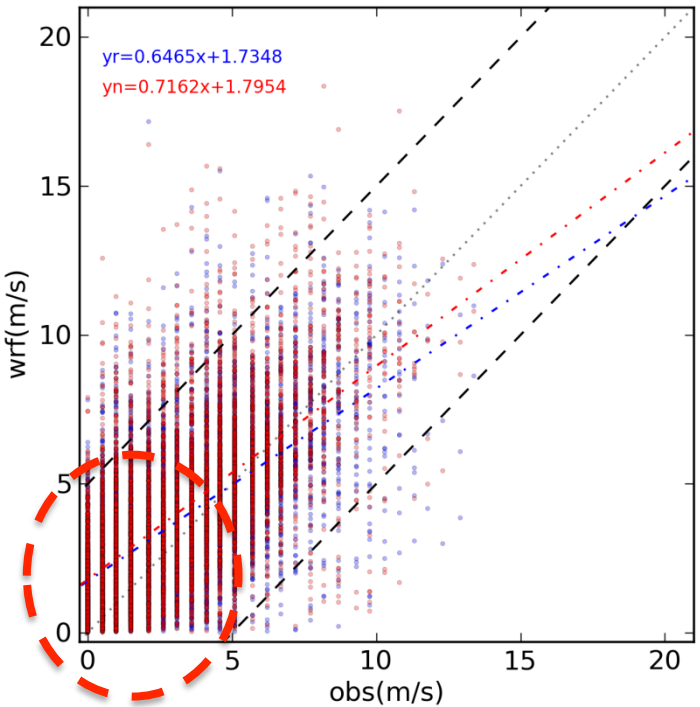
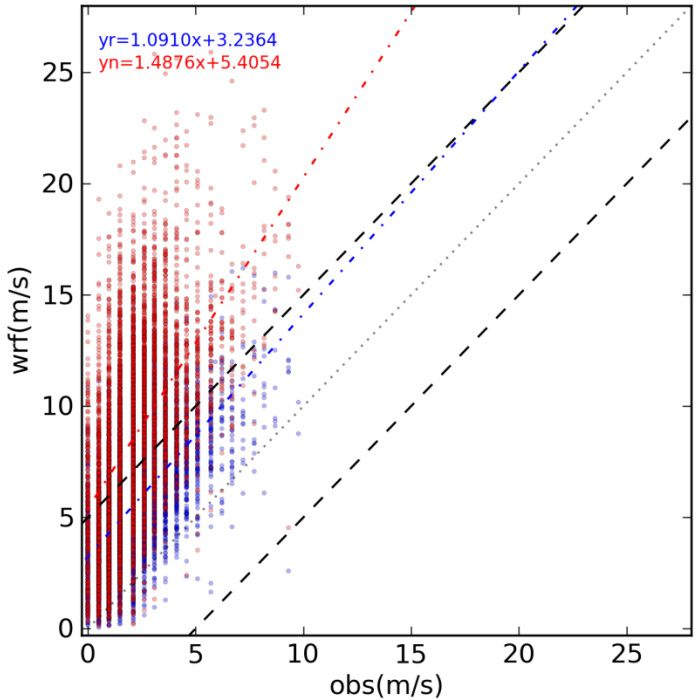
Results Spain – scatter plot

Station 8080



Station 8145



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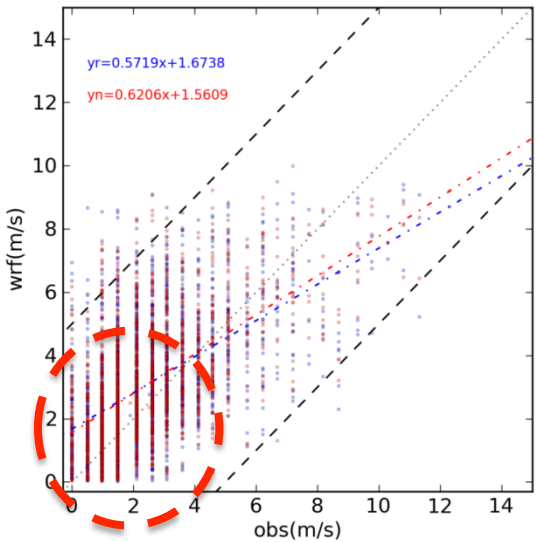
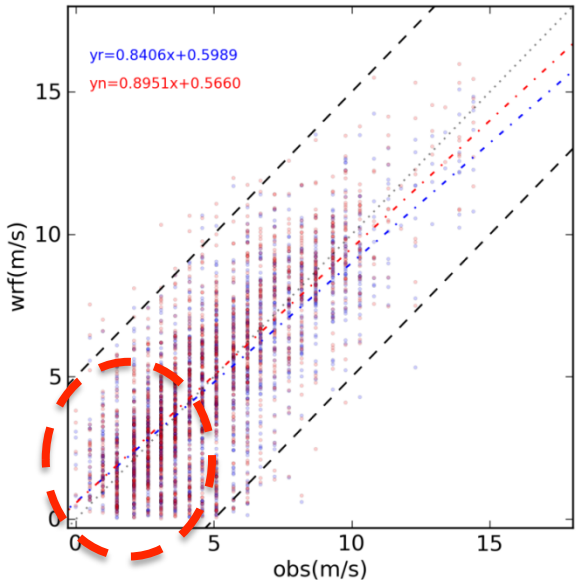
Results Spain - scatter per season

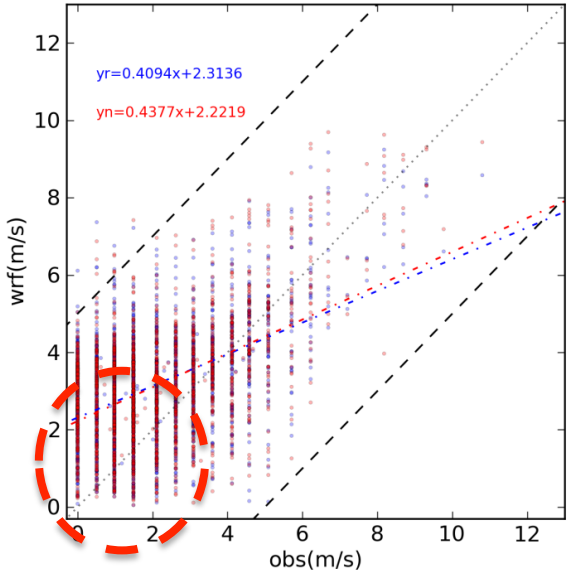
Station 7607 winter



Station 8072 spring



Station 7627 autumn



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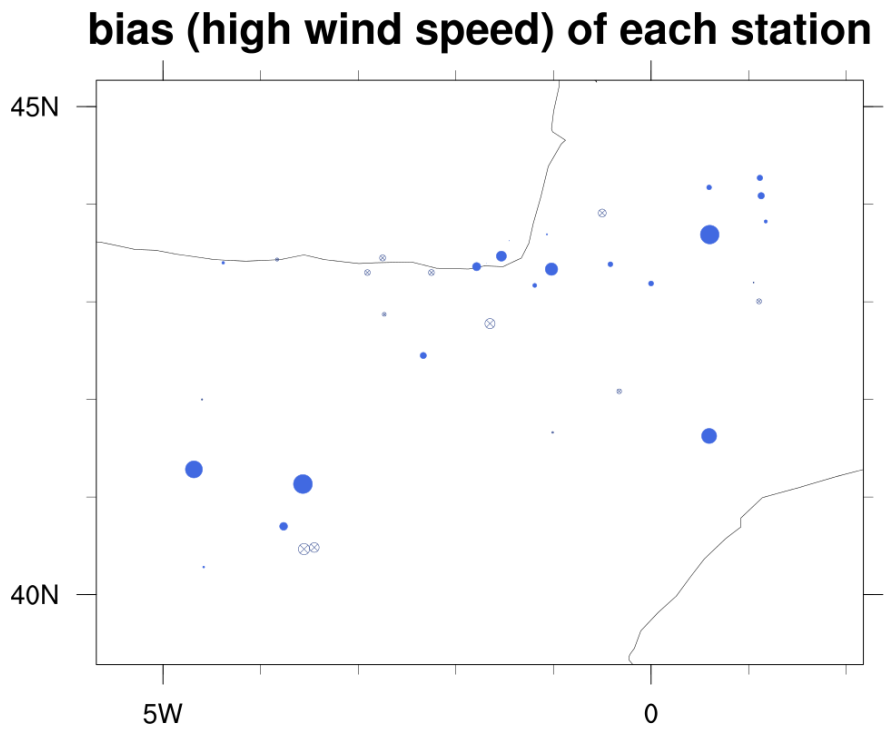
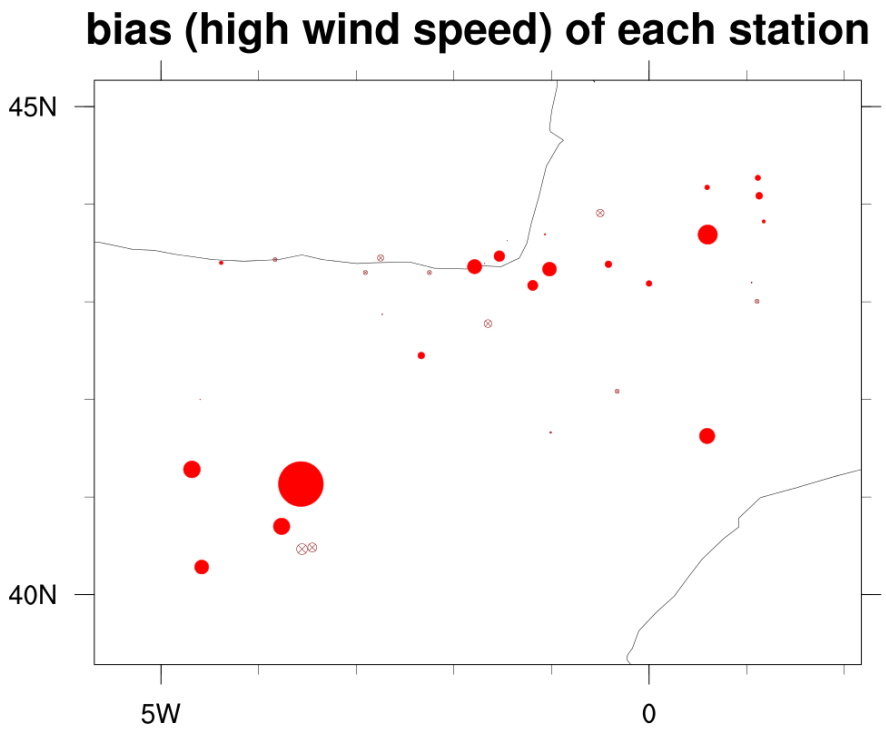
Results Spain - Bias >5m/s





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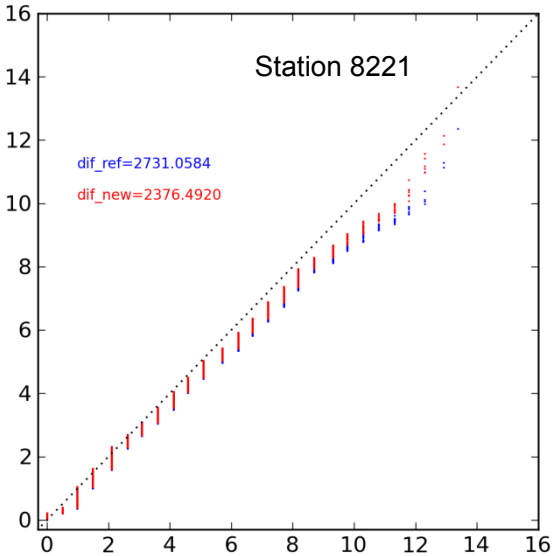
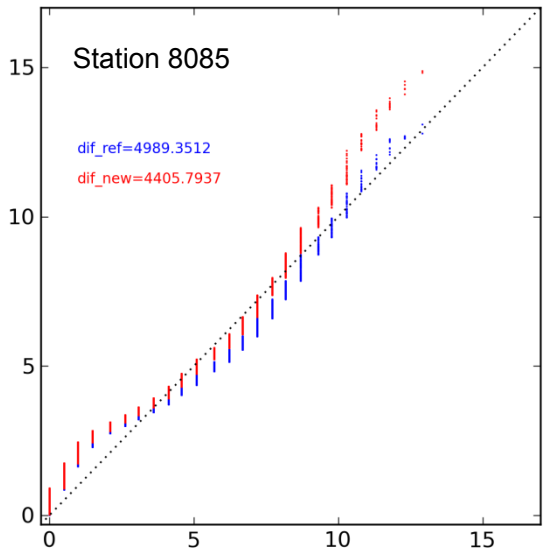
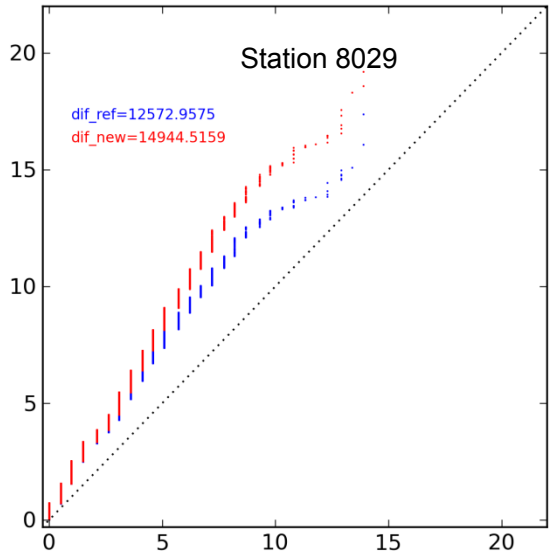
Results Spain – Q-Q plots







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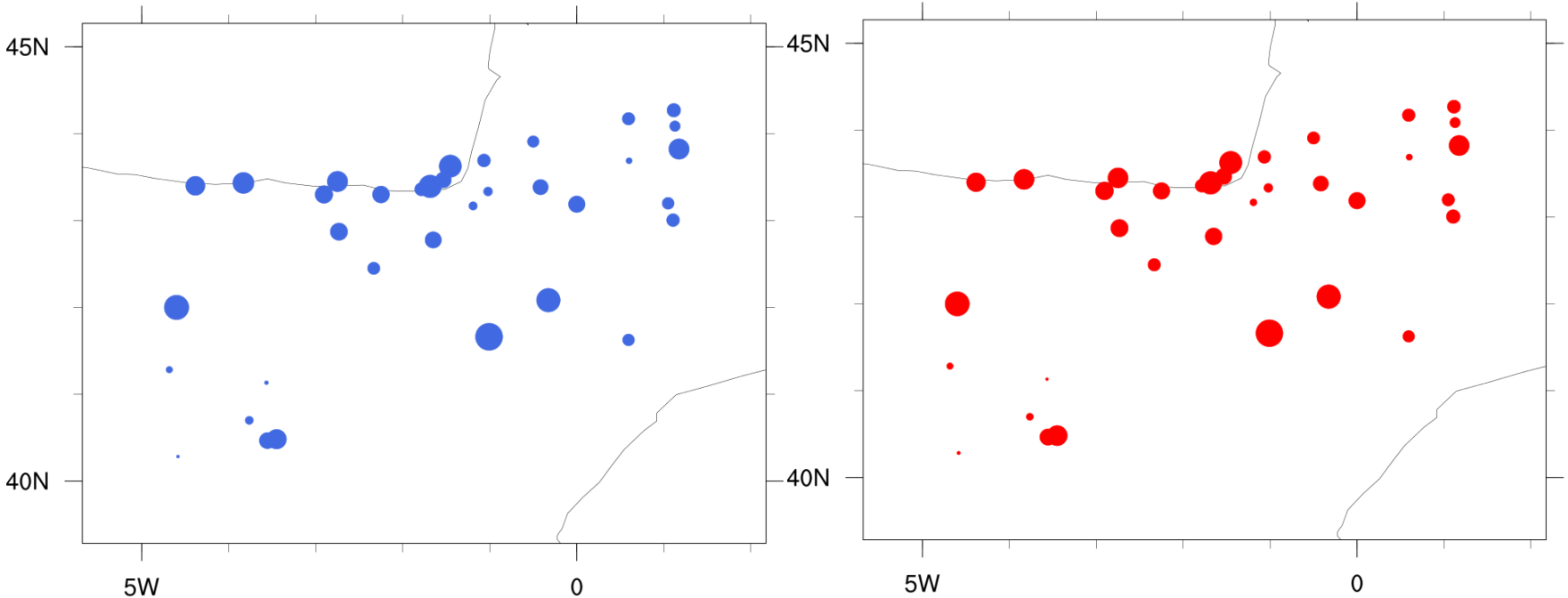
Results Spain - CSI score



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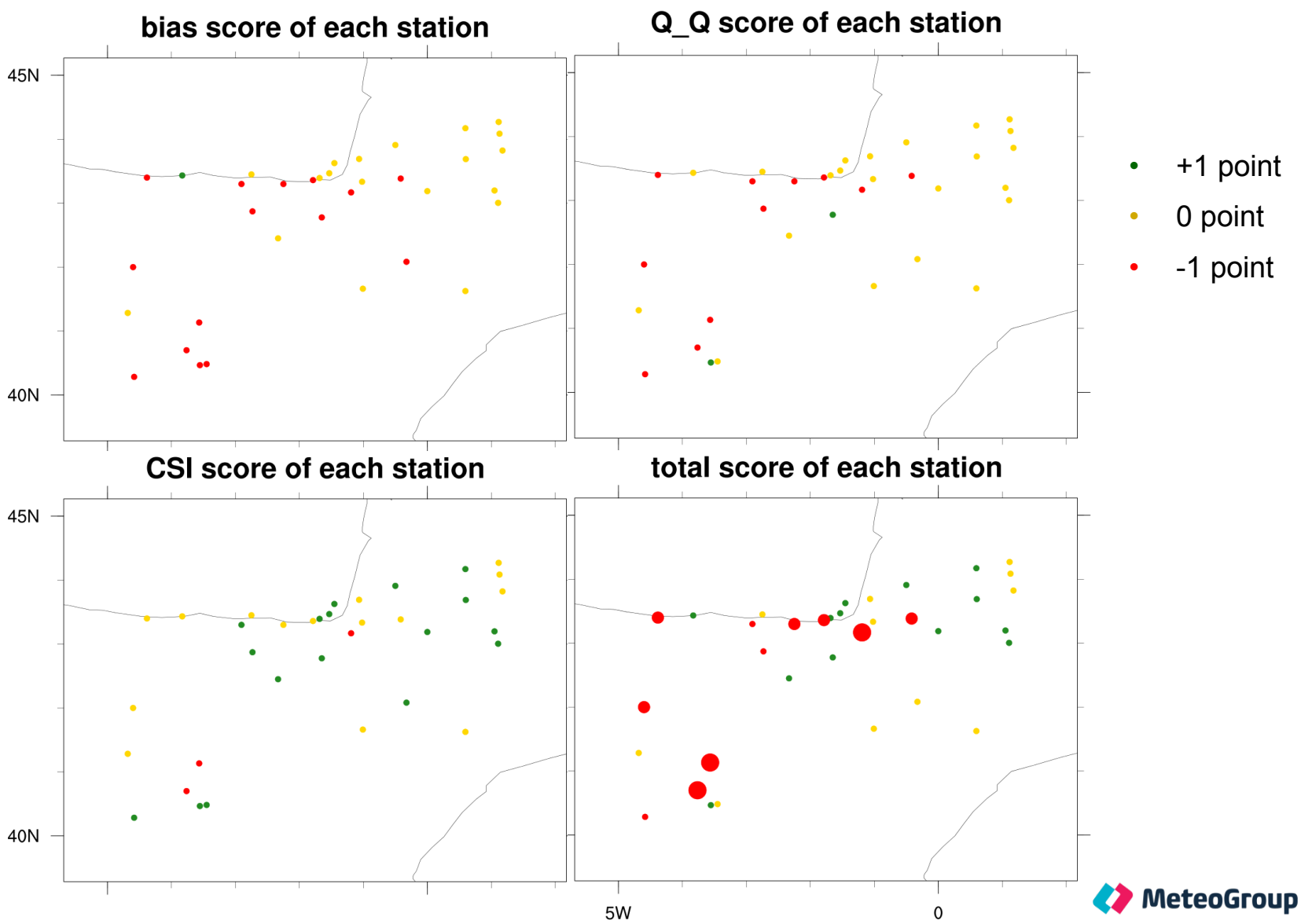
bias score of each station
Q_Q score of each station
CSI score of each station
total score of each station
45N
40N
5W
0
+1 point
0 point
-1 point

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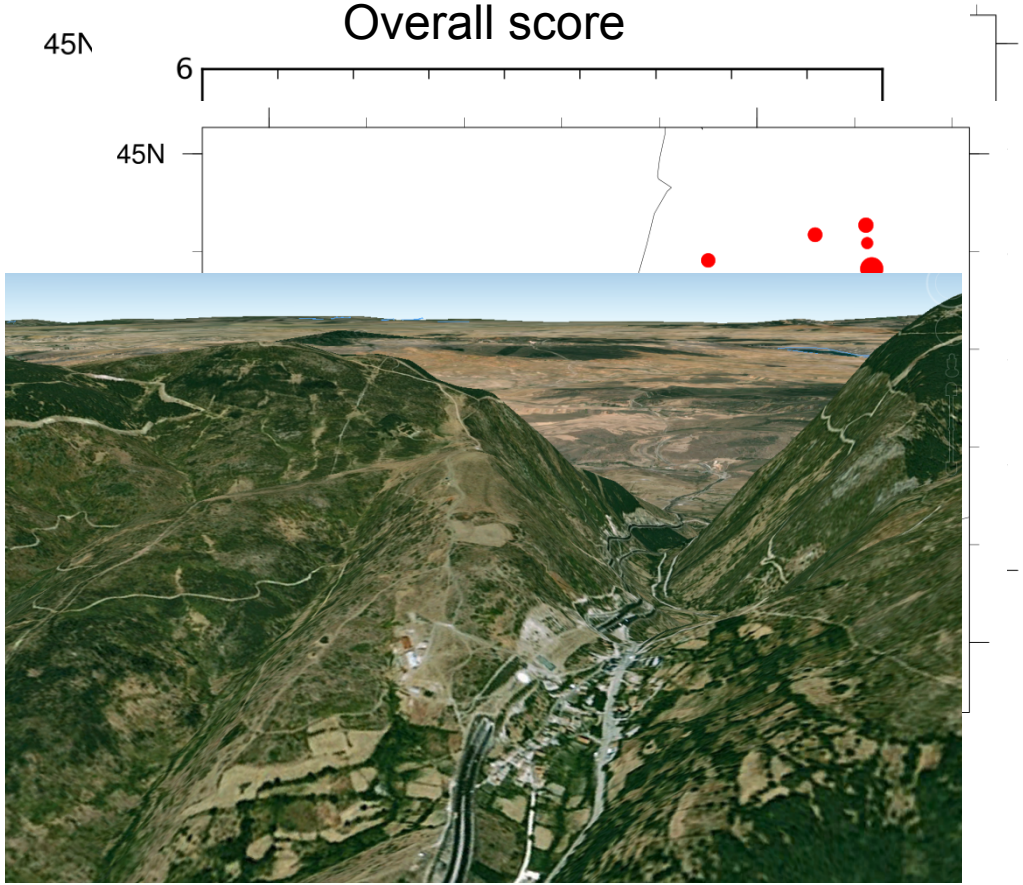
Bias vs mean wind speed

Bias

Overall score



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Conclusions

- Observation quality doubtful.
- Representative grid point important.
- No clear “winner”

- Quality of station more uncertain than quality in-/ decrease due to scheme?
  - Further investigation to station quality and representativeness of nearest grid point
- Vertical structure of model important?
  - Redo study without first model level

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to master the weather