

COSMO Verification for the region of Sochi-2014 Olympics

Comparison of forecasts from COSMO
versions of different scales

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and many others*
Roshydromet

Overview

- Subjective forecasters' opinions (from the FROST survey)
- Aggregated scores (COSMO-RU7, RU2, RU1)
- Precipitation study

Subjective forecasters' opinions

- Models performed more or less in a similar way: temperature, precip (tendencies, onset/end of precip) – more useful, wind, gusts, visibility - poor
- In steep orography, all model forecasts suffered from uncertain identification of the model grid point most appropriate for the real-world point of interest.

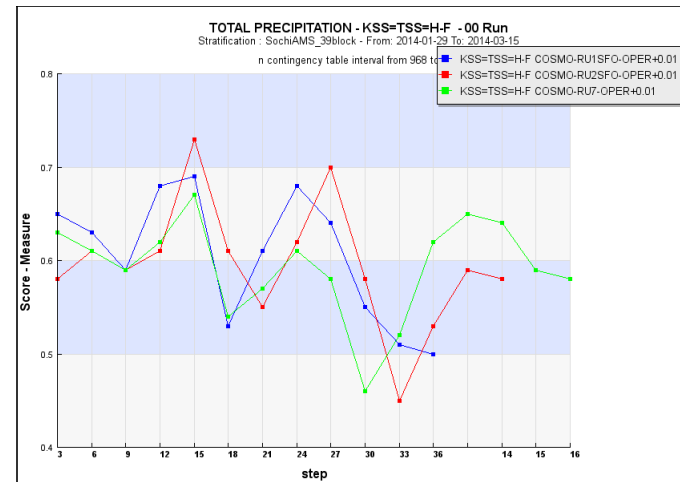
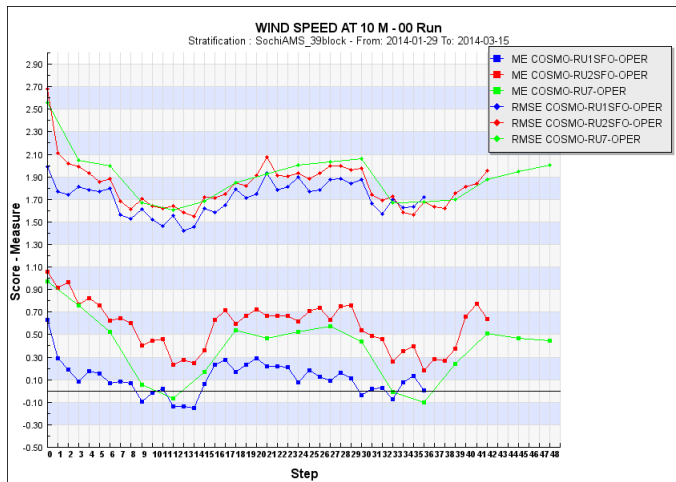
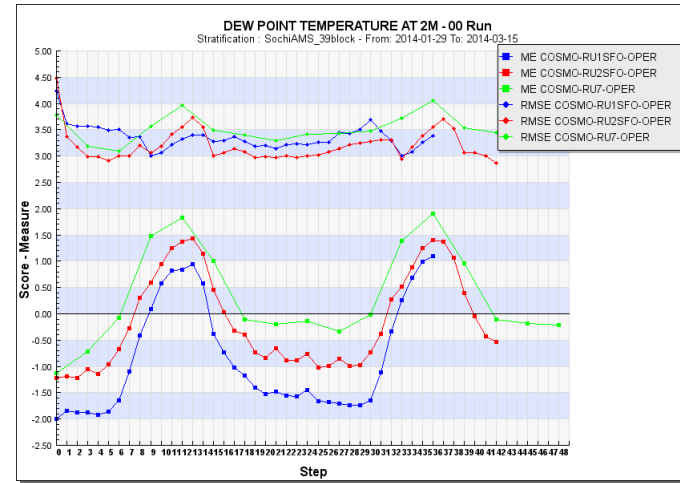
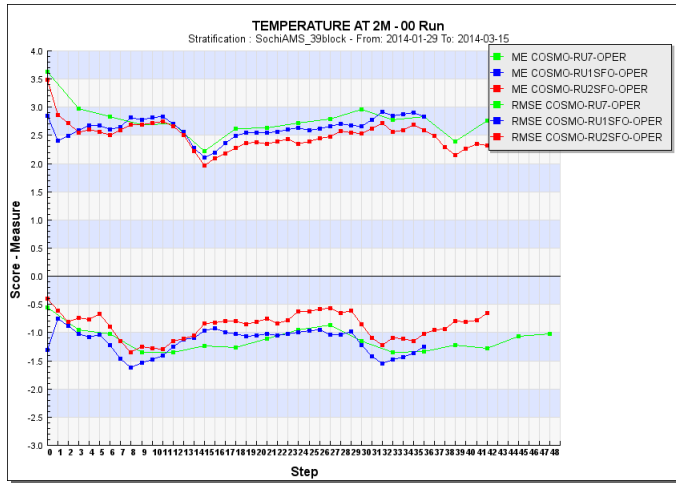
Subjective forecasters' opinions, COSMO

- COSMORU7: The basic model for the forecasters. Reasonable precip fact. Overestimated precip intensity. Tmin, Tmax poor. Wind poor. dT/dt OK.
- COSMORU2: Also the basic model for the forecasters. In general better than Cosmo-Ru7.
- COSMORU1: The comments are contradictory. Some forecasters preferred Cosmo-RU1 (helpful wind, humidity). Overestimated precip intensity.
- **Among the five COSMO based models/ensembles, COSMO-Ru2 is perhaps the best**

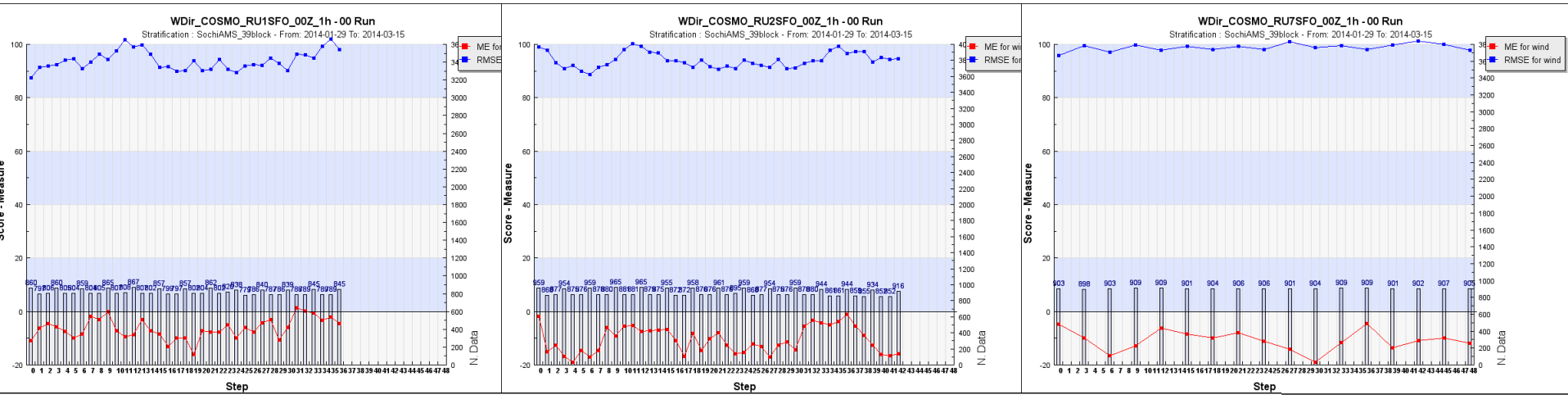
COSMO-RU1 and COSMO-RU2 nodes



COSMO-RU1, RU2, and RU7 verification during 29.01-15.03.2014 in the Sochi region

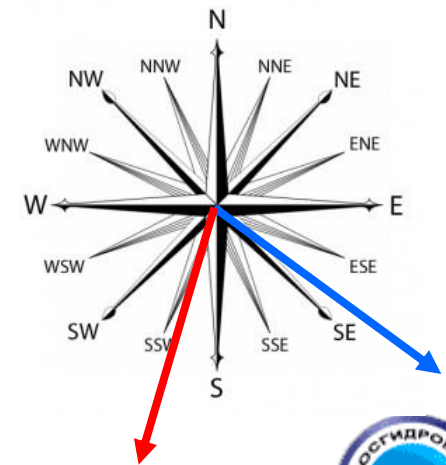
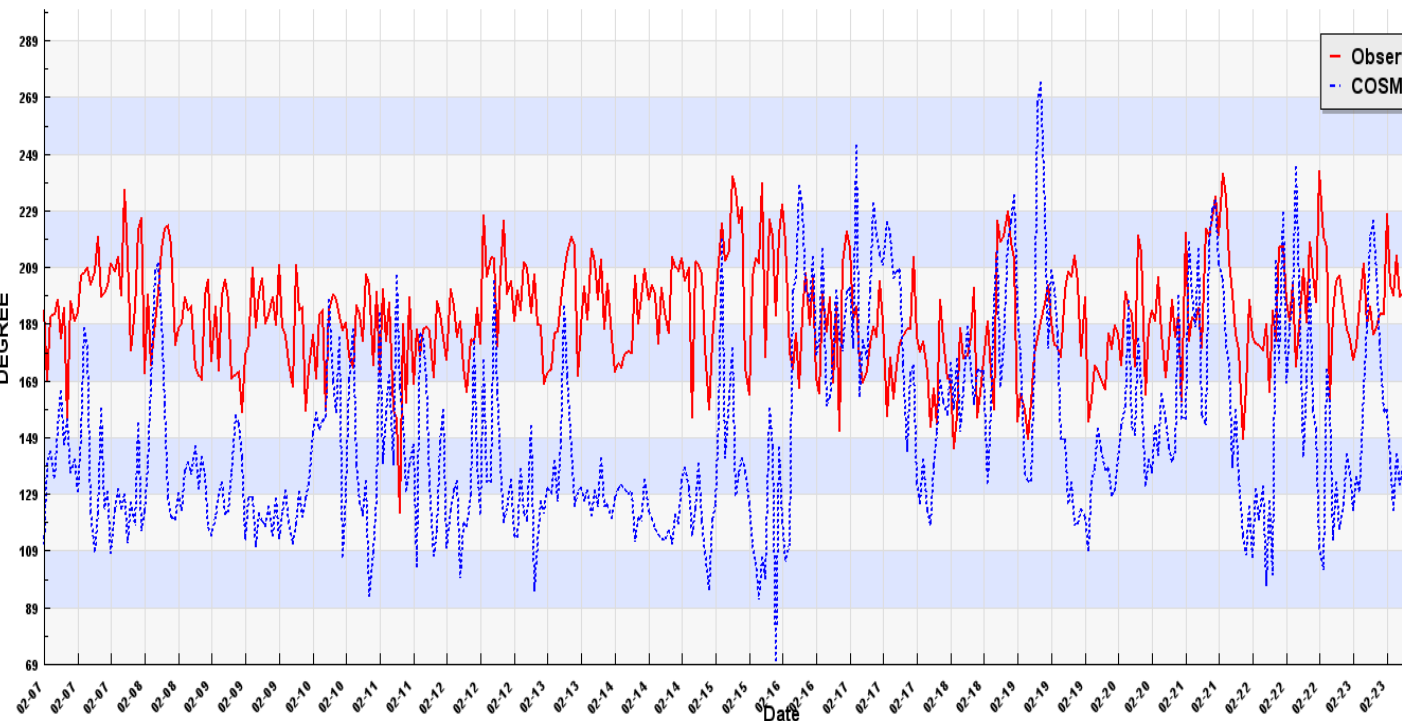


Wind direction

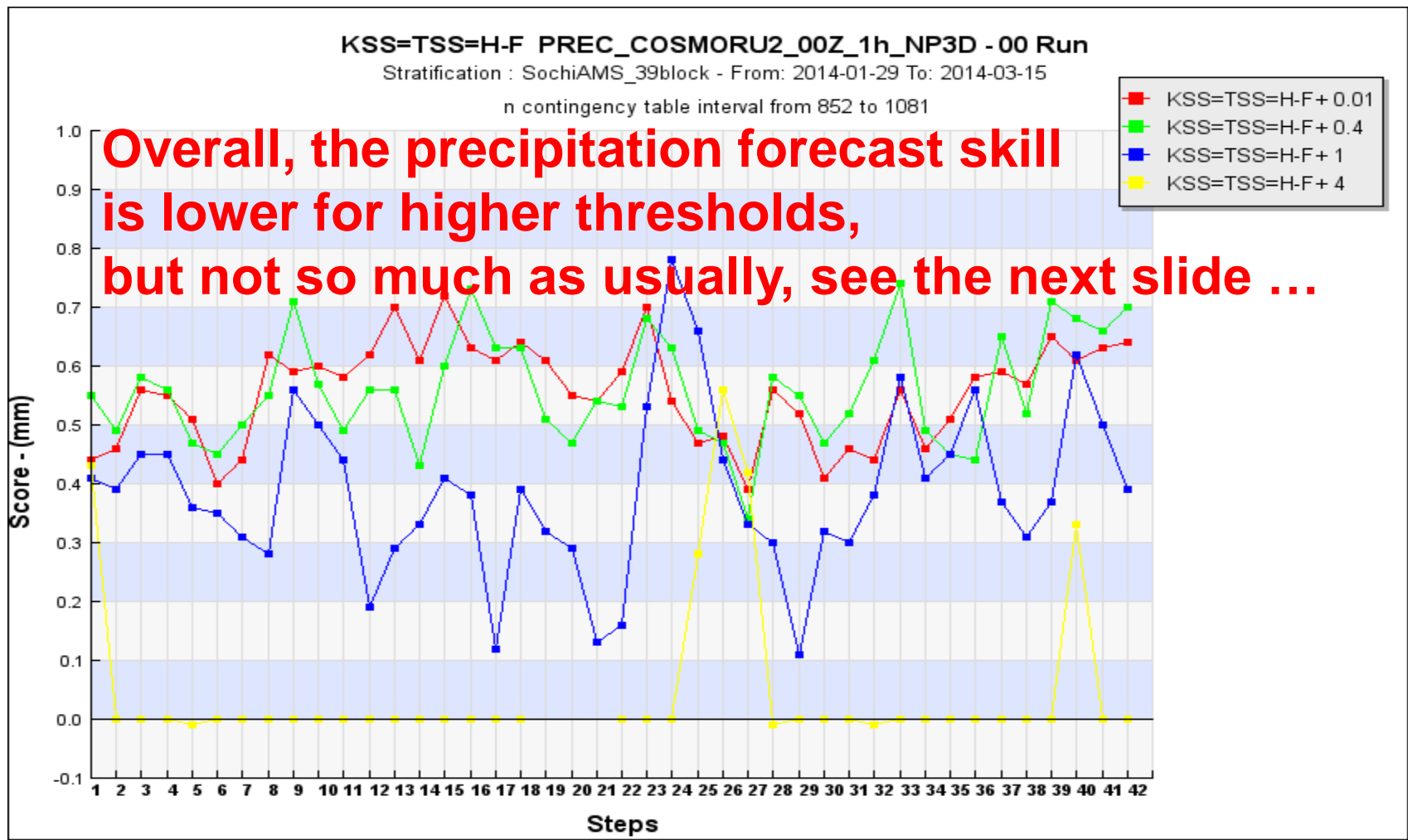


test_wind_dir: WIND DIRECTION AT 10 M - DEGREE TRUE

Stratification: SochiAMS_39block - From: 2014-02-07 To: 2014-02-23



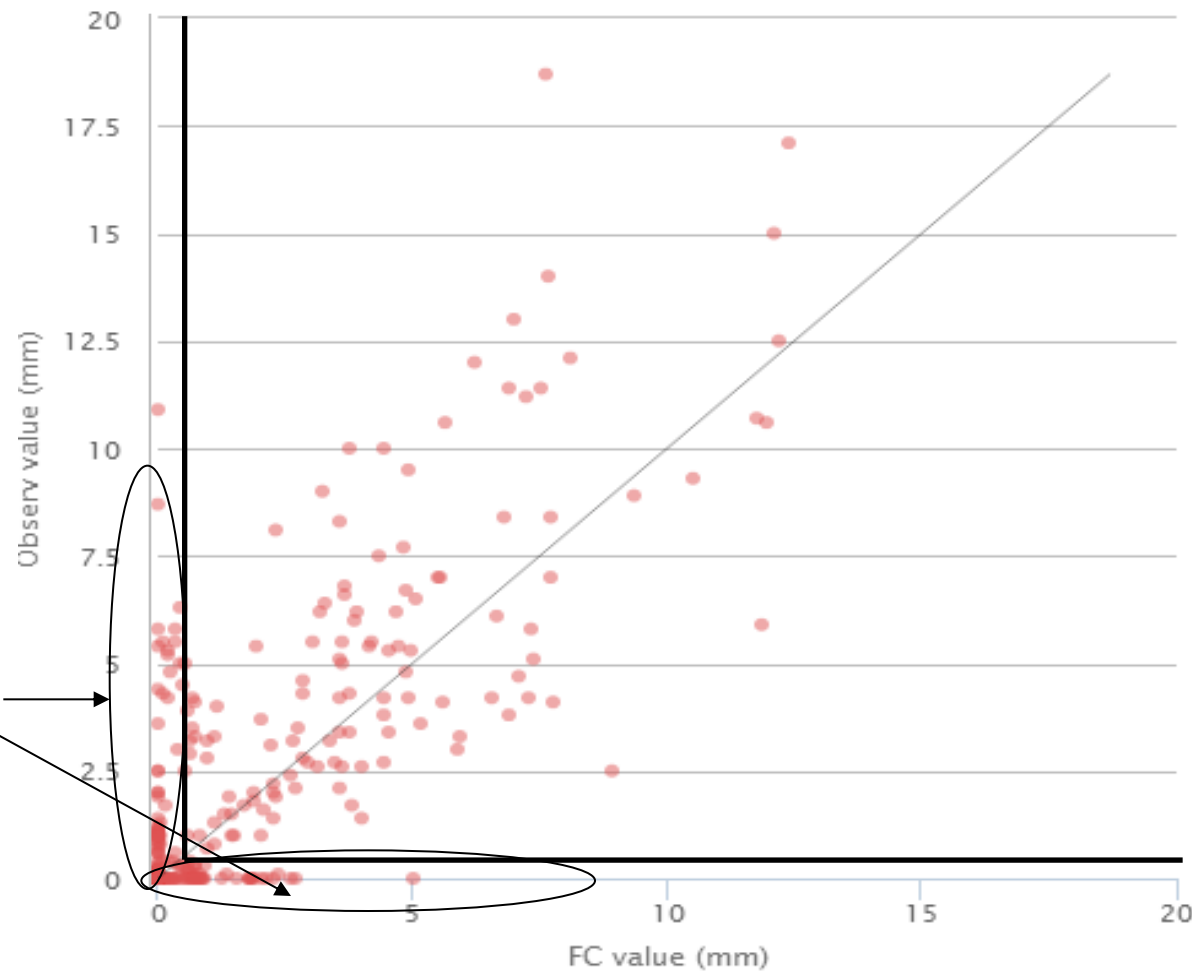
Hanssen-Kuipers score for different precipitation thresholds



... because of the distribution of forecasts and observations (explanation to the previous slide)

MSE=1.8 RMSE=1.34 (without zero: MSE=5.69 RMSE=2.39)

Precipitation



Overpopulated stripes along the axes

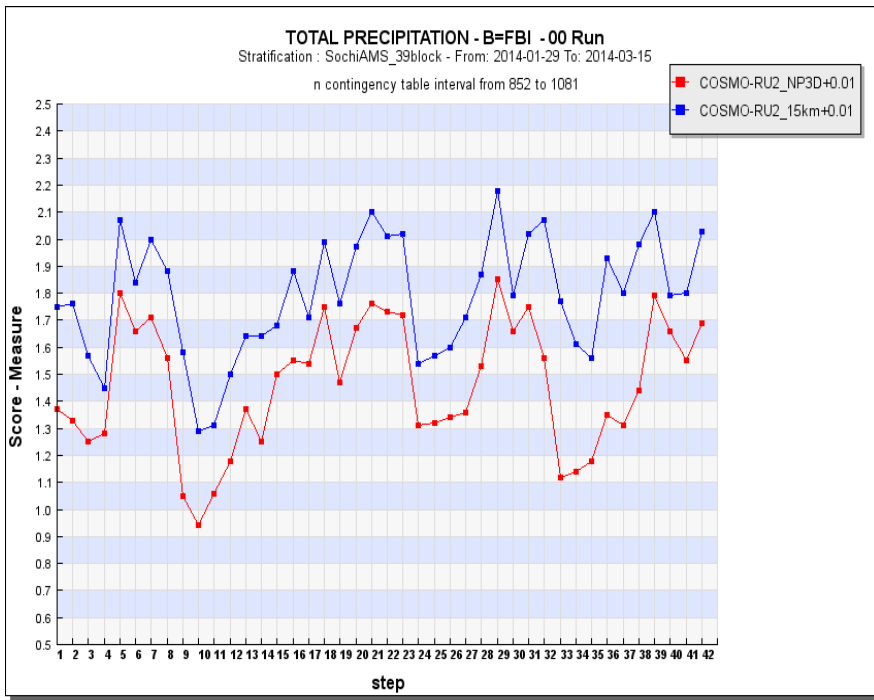
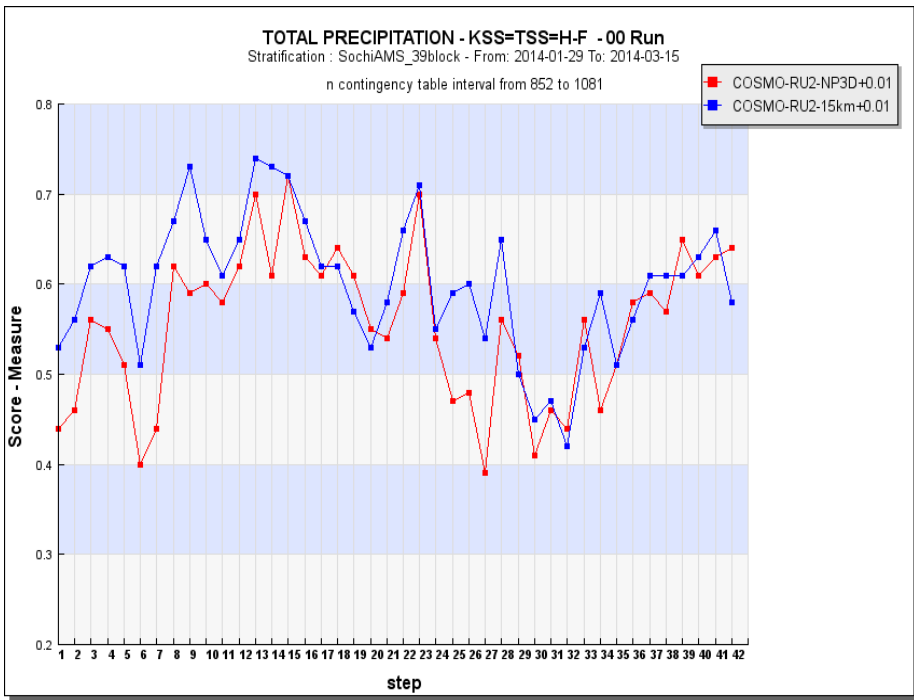
Nearest_point_3D and 15_km_radius methods

precip > 0.01 mm/1h, COSMO-RU2



Hanssen Kuipers

FBI



Online verification tool at FROST

Point forecast and diagnostic data viewer

Model: COSMO2 Accumulation period: 12 h Parameter: Total Precipitation Station: Selected area on map Values: All values Init. time: 00

Initial Date and Period: 1.1.2014 - 31.3.2014

Values: ETS: ≥0.1 Completed Show data for map area

MSE=1.38 RMSE=1.18 (without zero: MSE=4.07 RMSE=2.02)

Precipitation

Observ value (mm) vs FC value (mm) scatter plot

Station: Krasnaya Poliana (Roshydromet) (37107) ETS=0.6(85)

Hits	False alarms
14	7
Misses	Correct rejections
2	62

More ...

Map Satellite

Map data ©2014 Google 2 km L

Color scale: -1 to 1

Show NEW CHART

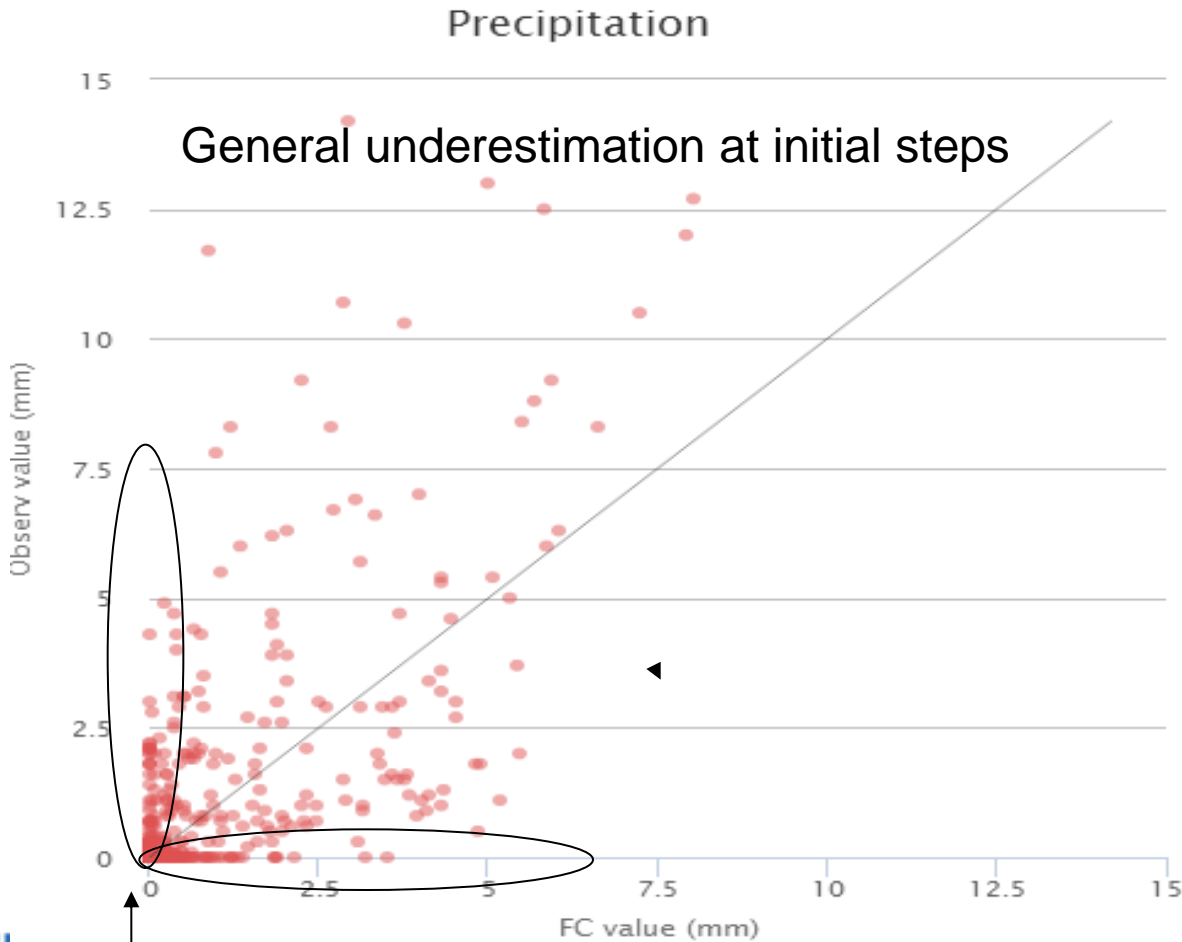
ETS

ETS vs Accumulation period line graph

Windows taskbar: 8:52

COSMO-RU2 3h precip accumulations, 00Z init time, Sochi region, 01.01.2014-31.03.2014 3h lead time

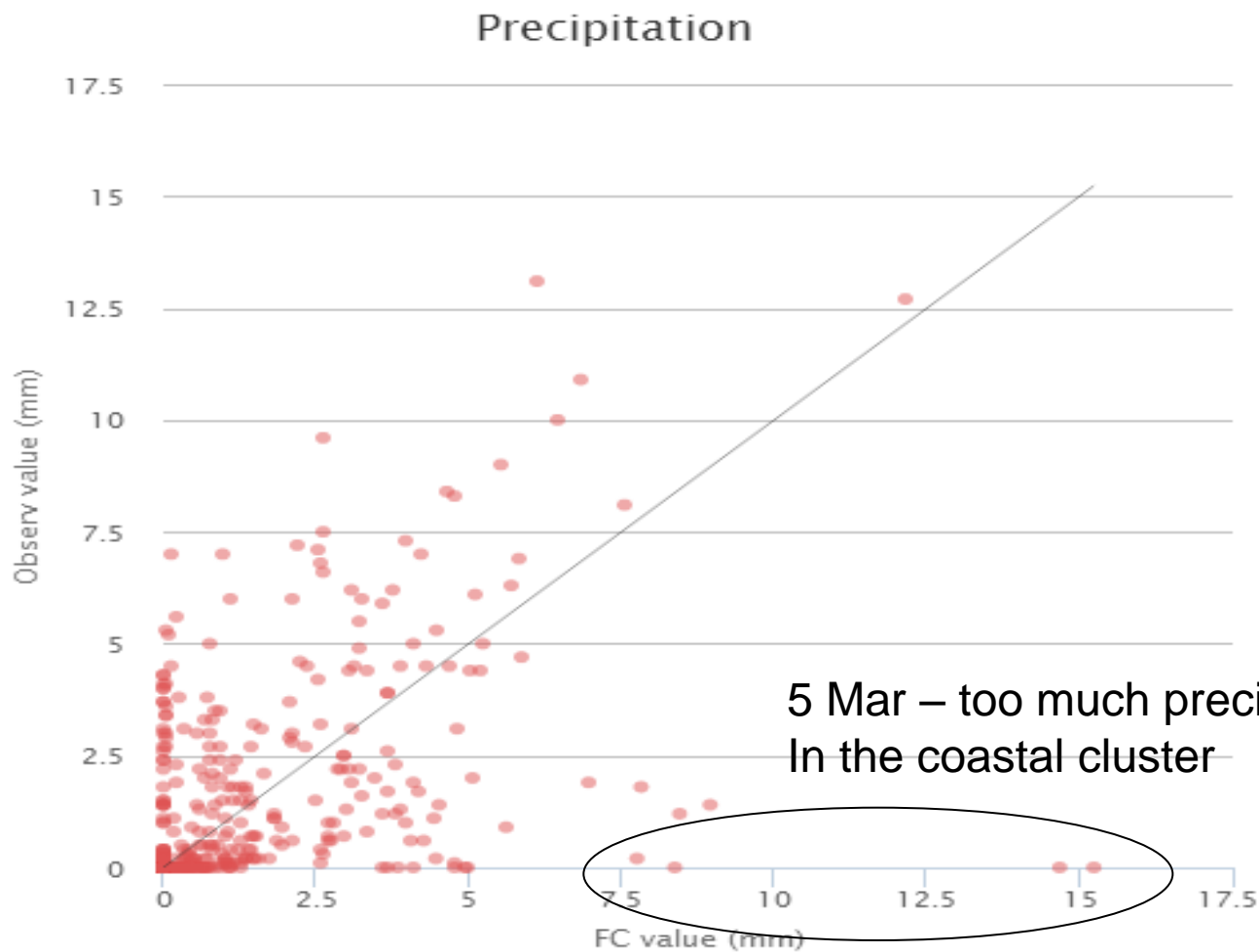
MSE=1.61 RMSE=1.27 (without zero: MSE=3.96 RMSE=1.99)



Typical distribution

6h leadtime

MSE=1.96 RMSE=1.4 (without zero: MSE=5.64 RMSE=2.37)

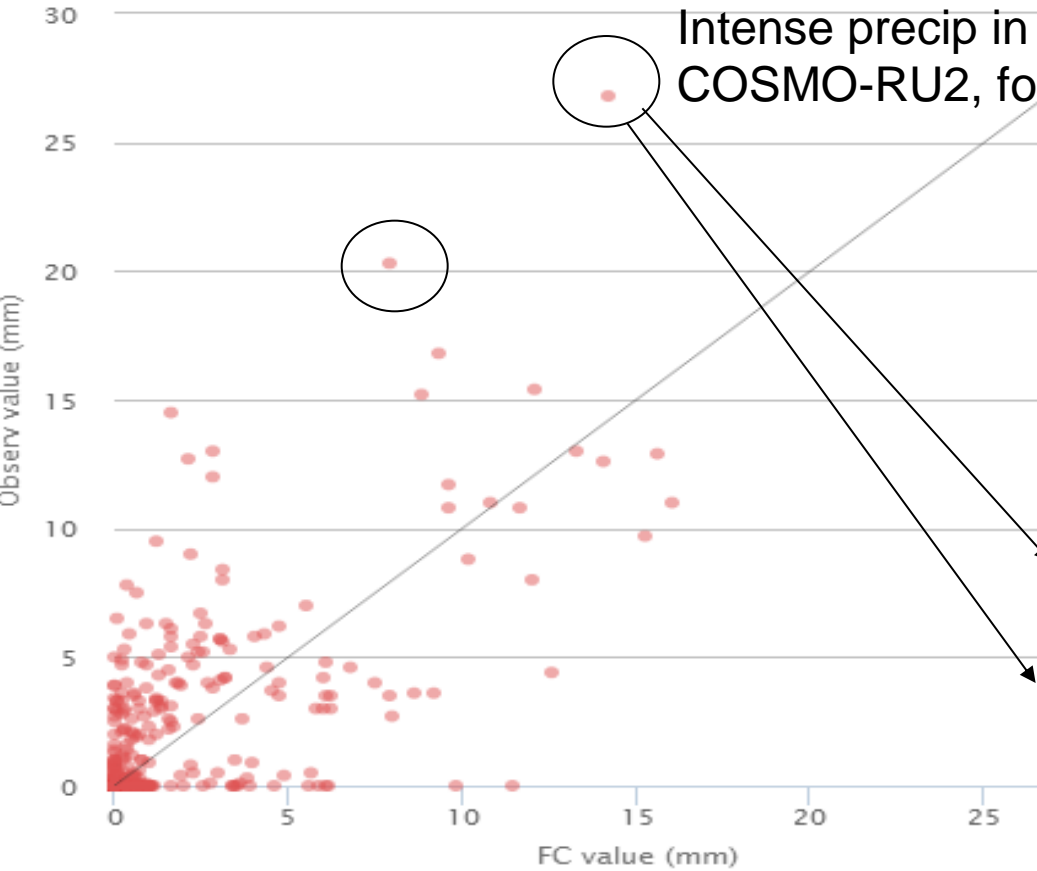


5 Mar – too much precip forecasted
In the coastal cluster

9h leadtime

MSE=3.07 RMSE=1.75 (without zero: MSE=7.98 RMSE=2.82)

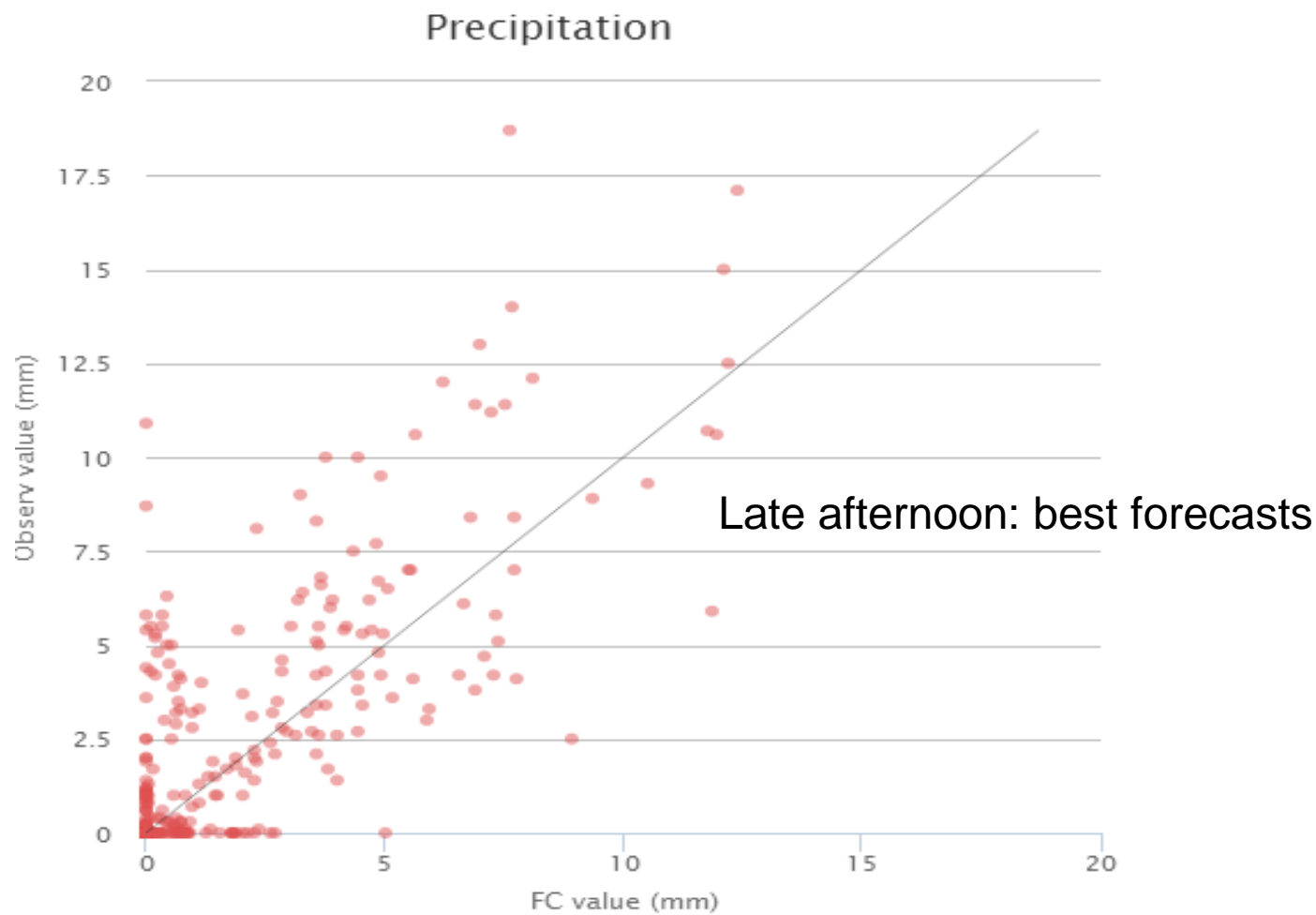
Precipitation



a	b	c	d	Thr >mm/3h
COSMO-RU1				
1	0	1	58	14
1	0	1	58	16
1	0	1	58	18
1	0	1	58	20
1	0	0	59	25
COSMO-RU2				
1	0	1	58	14
0	0	2	58	16
0	0	2	58	18
0	0	2	58	20
0	0	1	59	25

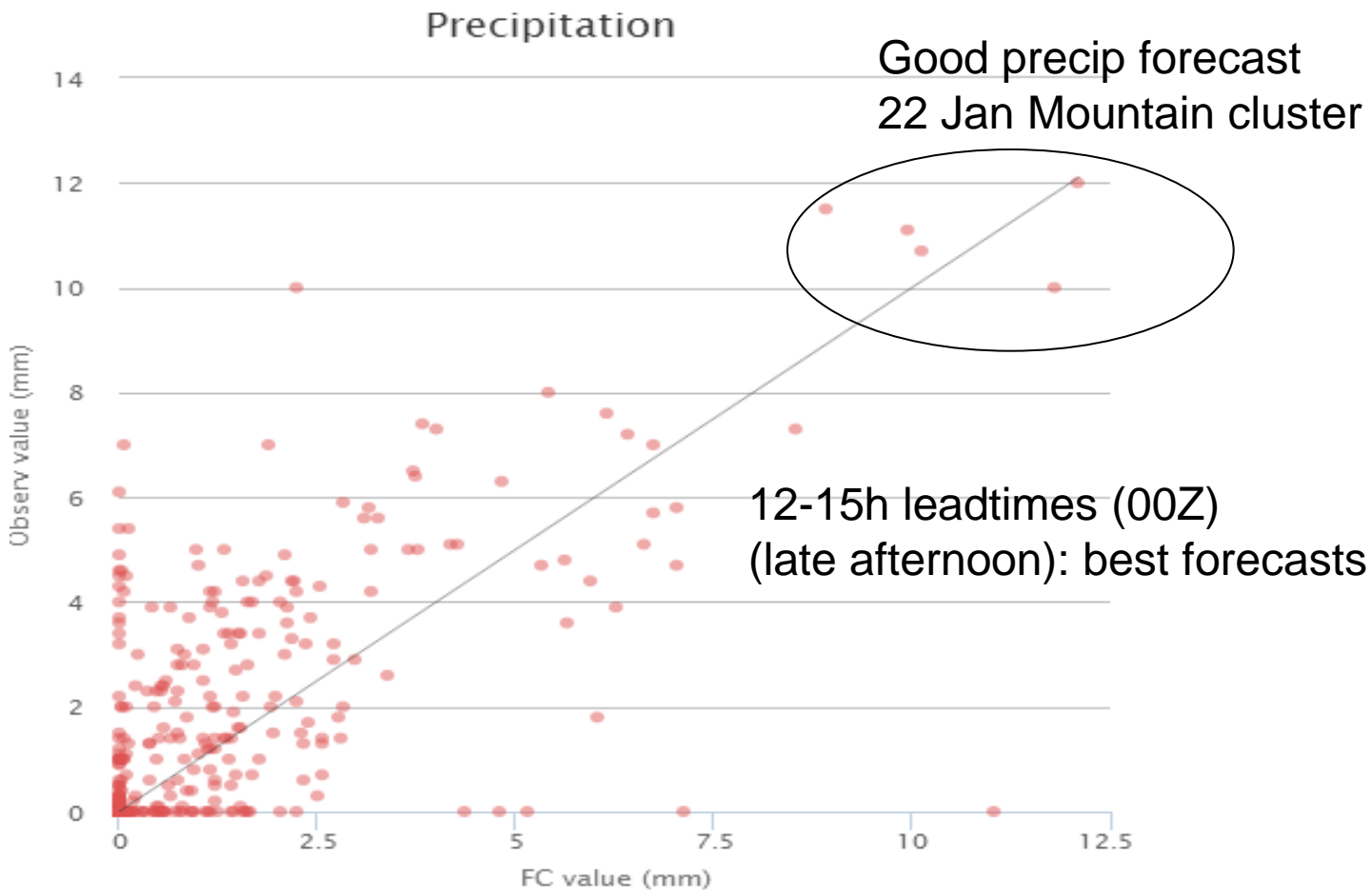
12h leadtime

MSE=1.8 RMSE=1.34 (without zero: MSE=5.69 RMSE=2.39)



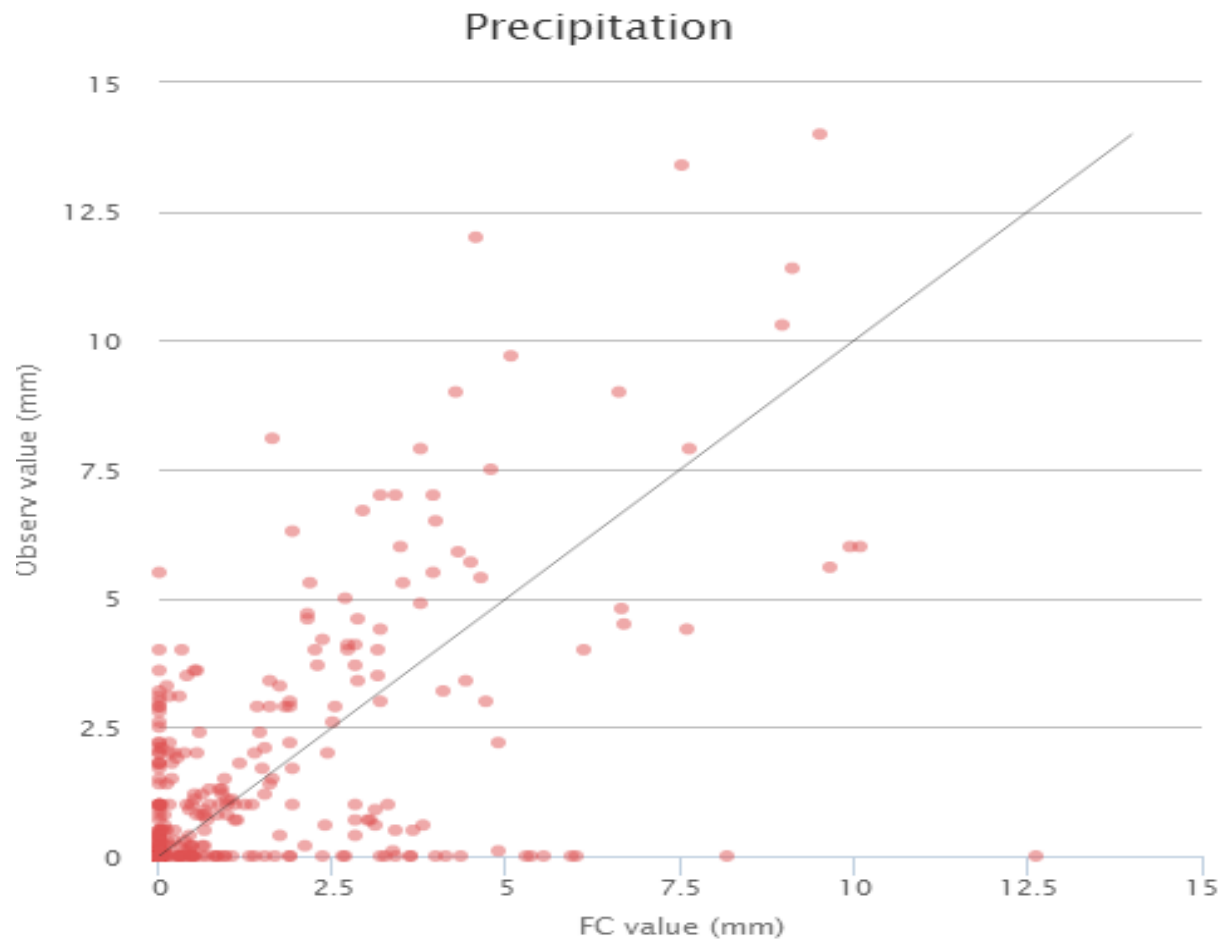
15h leadtime

MSE=1.35 RMSE=1.16 (without zero: MSE=4.07 RMSE=2.02)



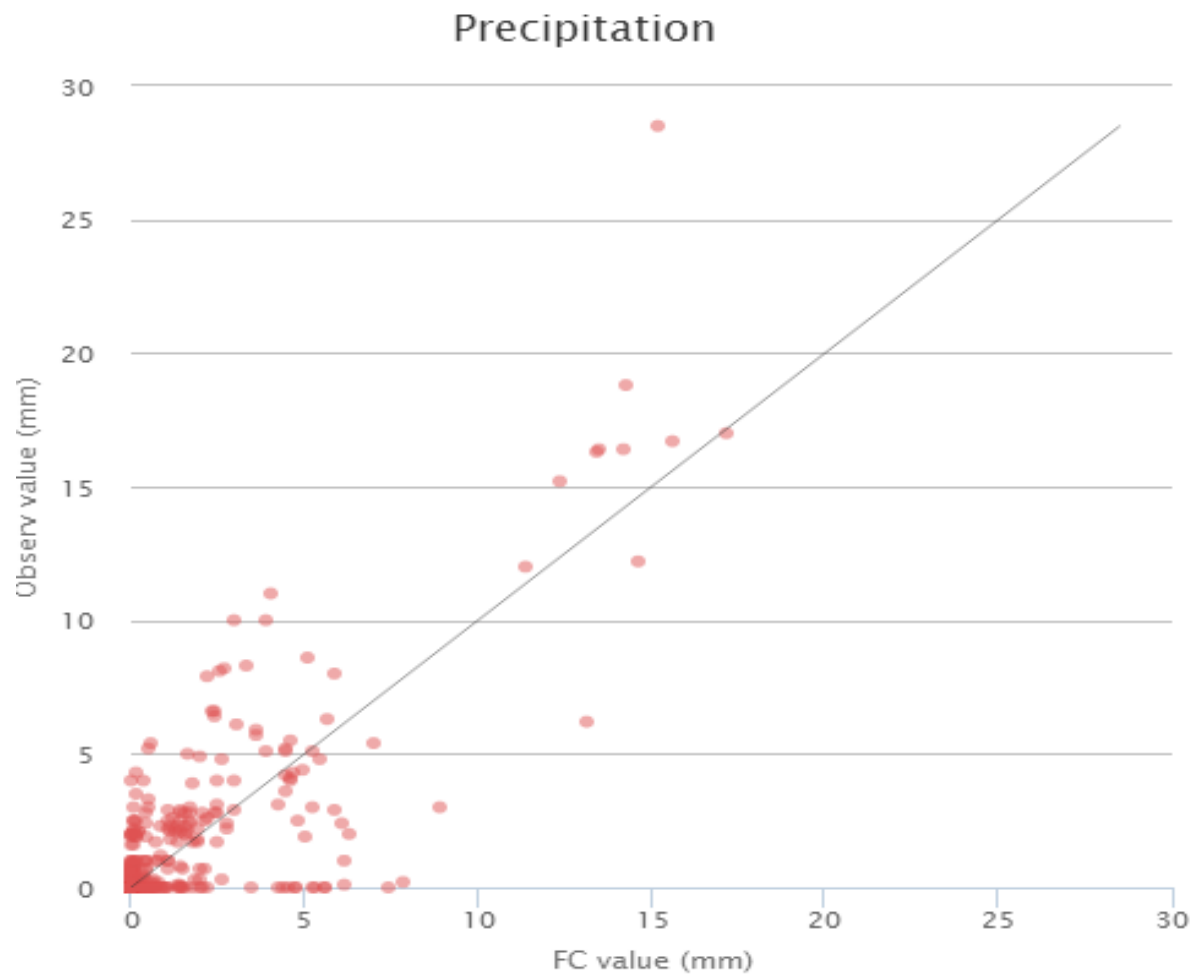
18h leadtime

MSE=1.55 RMSE=1.24 (without zero: MSE=4.47 RMSE=2.11)



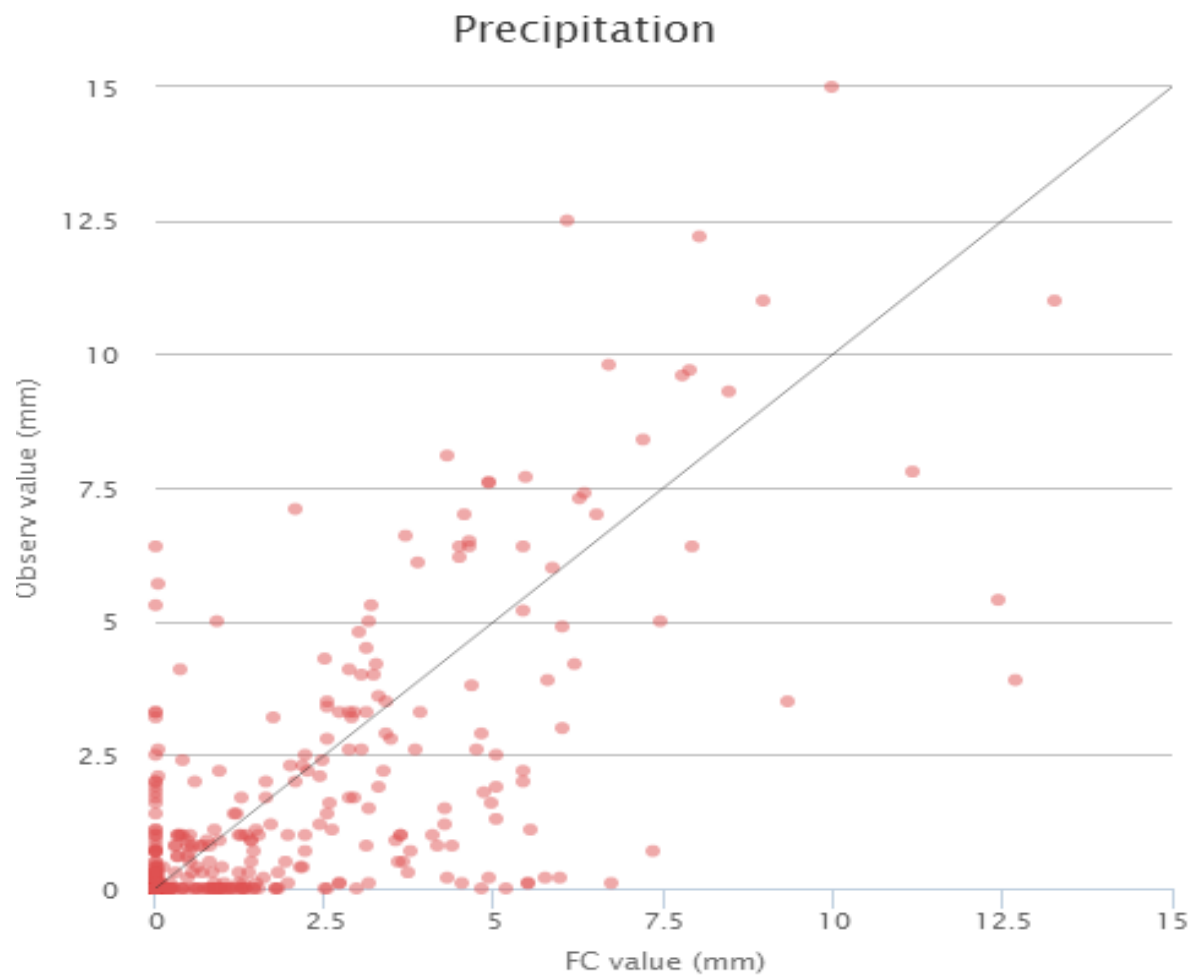
21h leadtime

MSE=1.62 RMSE=1.27 (without zero: MSE=4.05 RMSE=2.01)



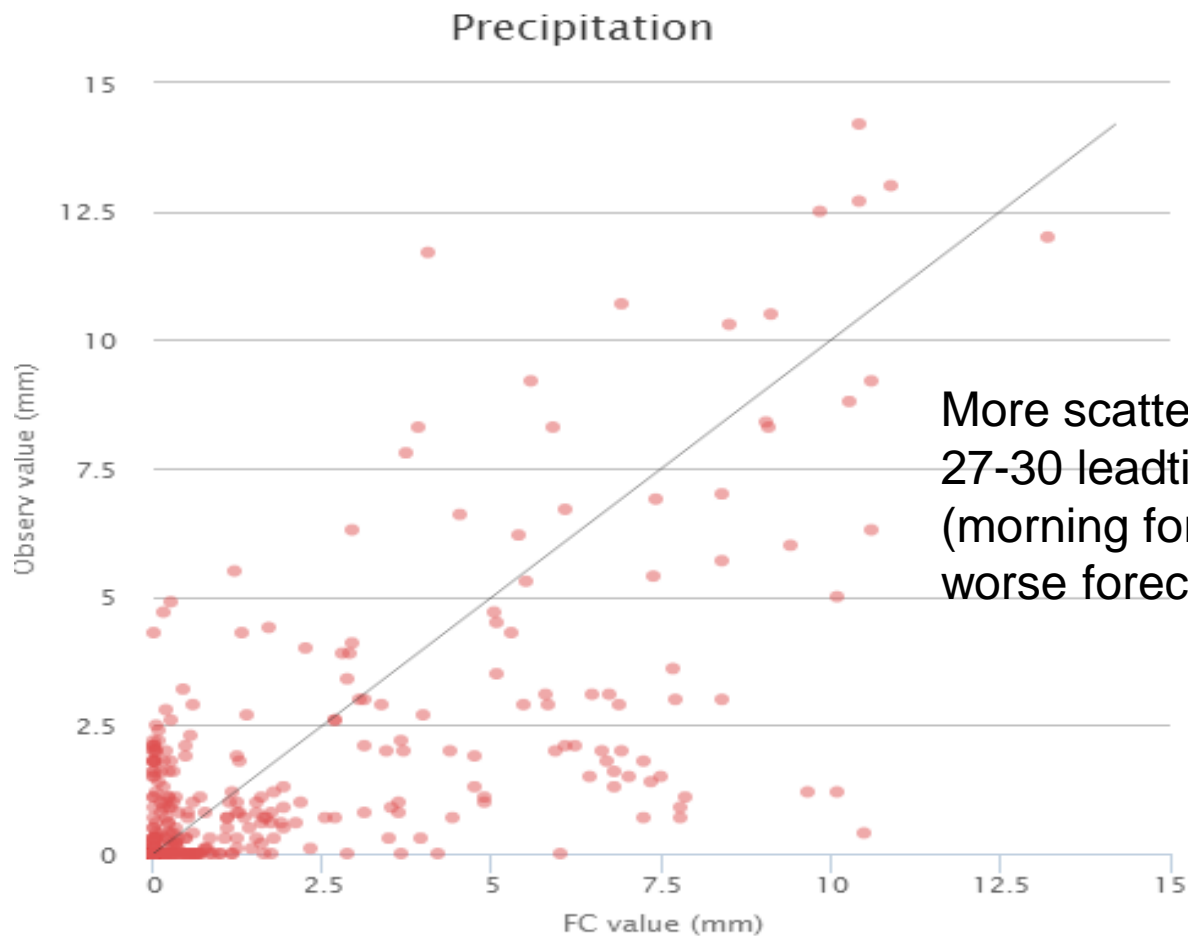
24h leadtime

MSE=1.52 RMSE=1.23 (without zero: MSE=3.92 RMSE=1.98)



27h leadtime

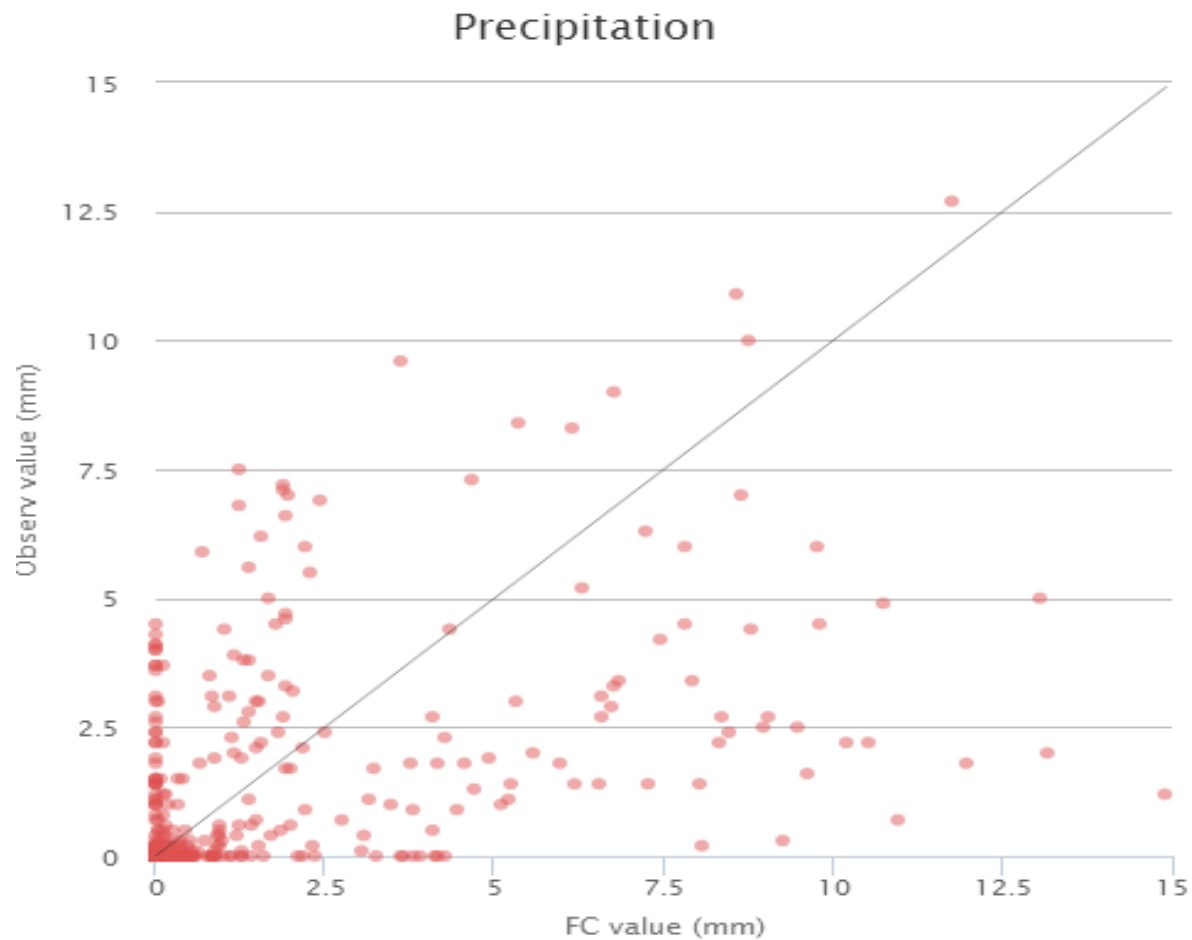
MSE=1.84 RMSE=1.36 (without zero: MSE=5.04 RMSE=2.25)



More scattering
27-30 leadtimes
(morning for local time)
worse forecasts

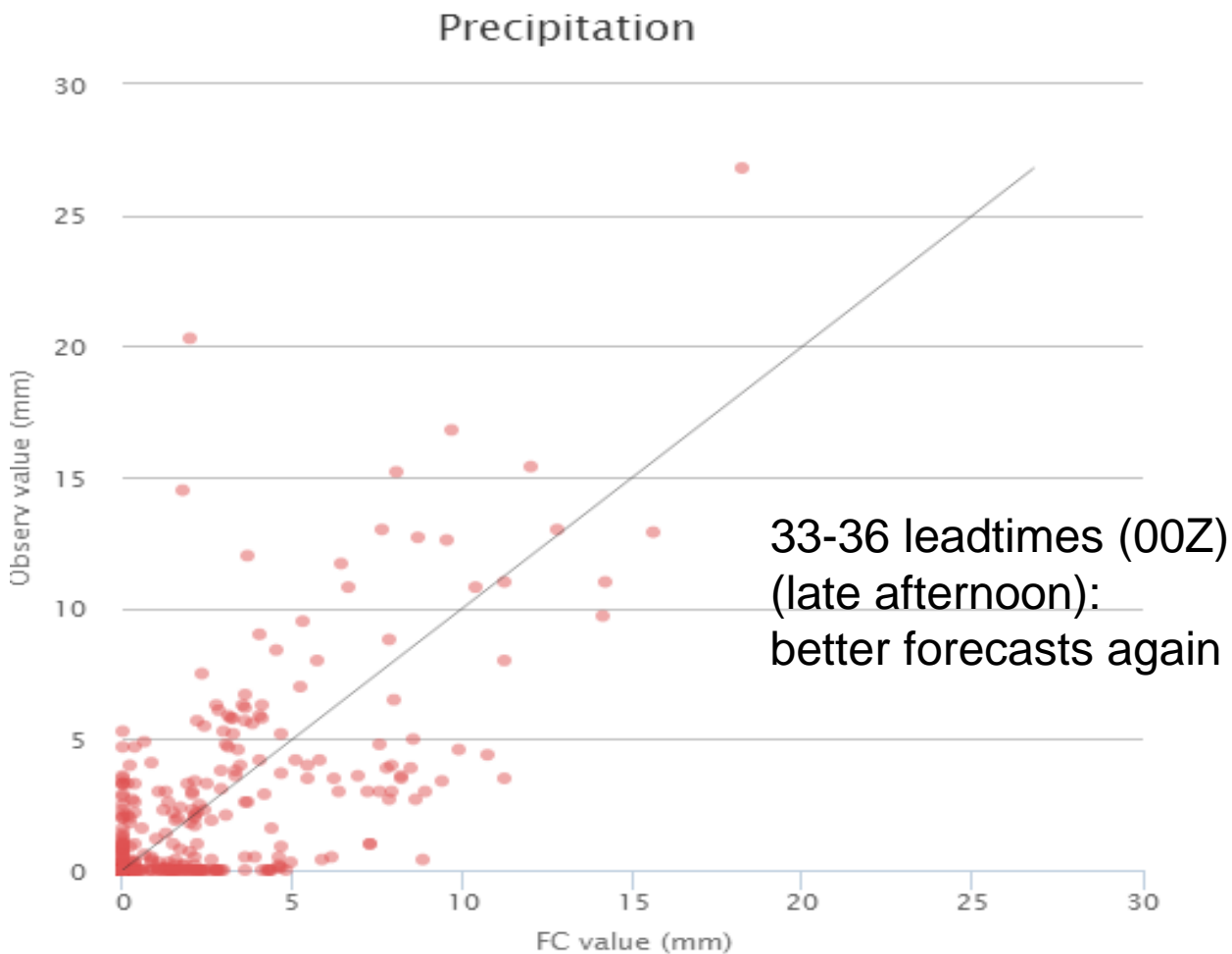
30h leadtime

MSE=2.85 RMSE=1.69 (without zero: MSE=7.55 RMSE=2.75)



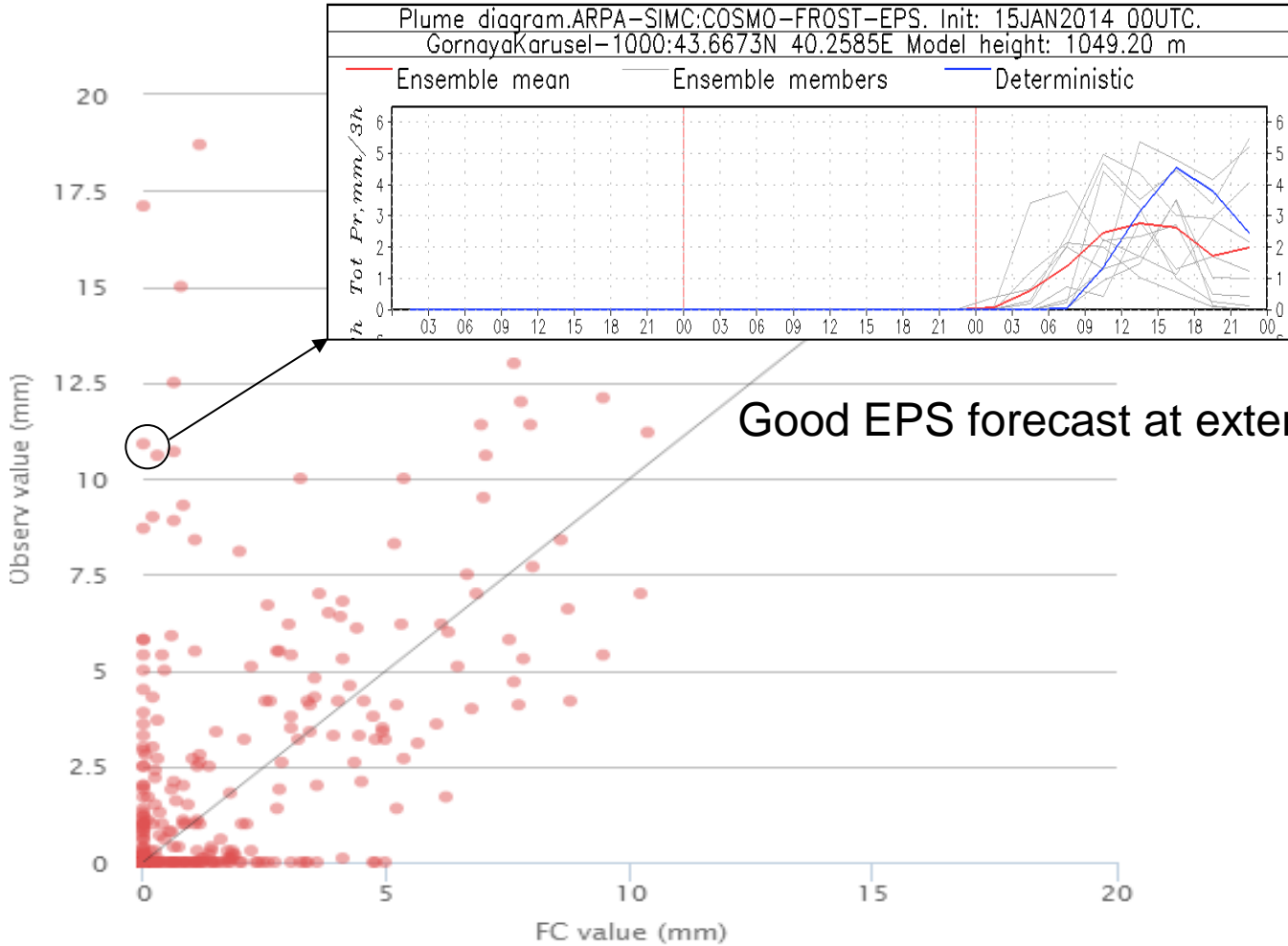
33h leadtime

MSE=2.83 RMSE=1.68 (without zero: **MSE=7.21 RMSE=2.69**)



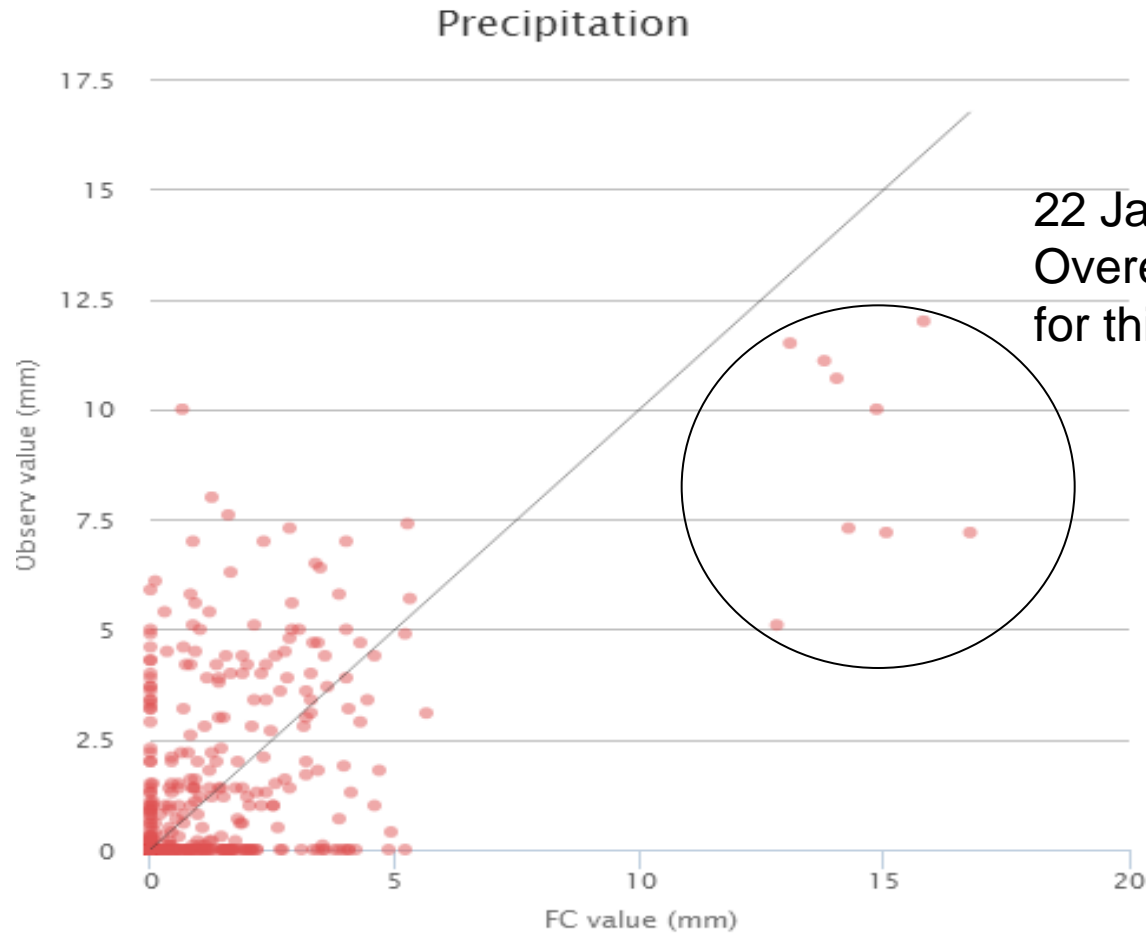
36h leadtime

MSE=3.09 RMSE=1.76 (without zero: MSE=8.4 RMSE=2.9)



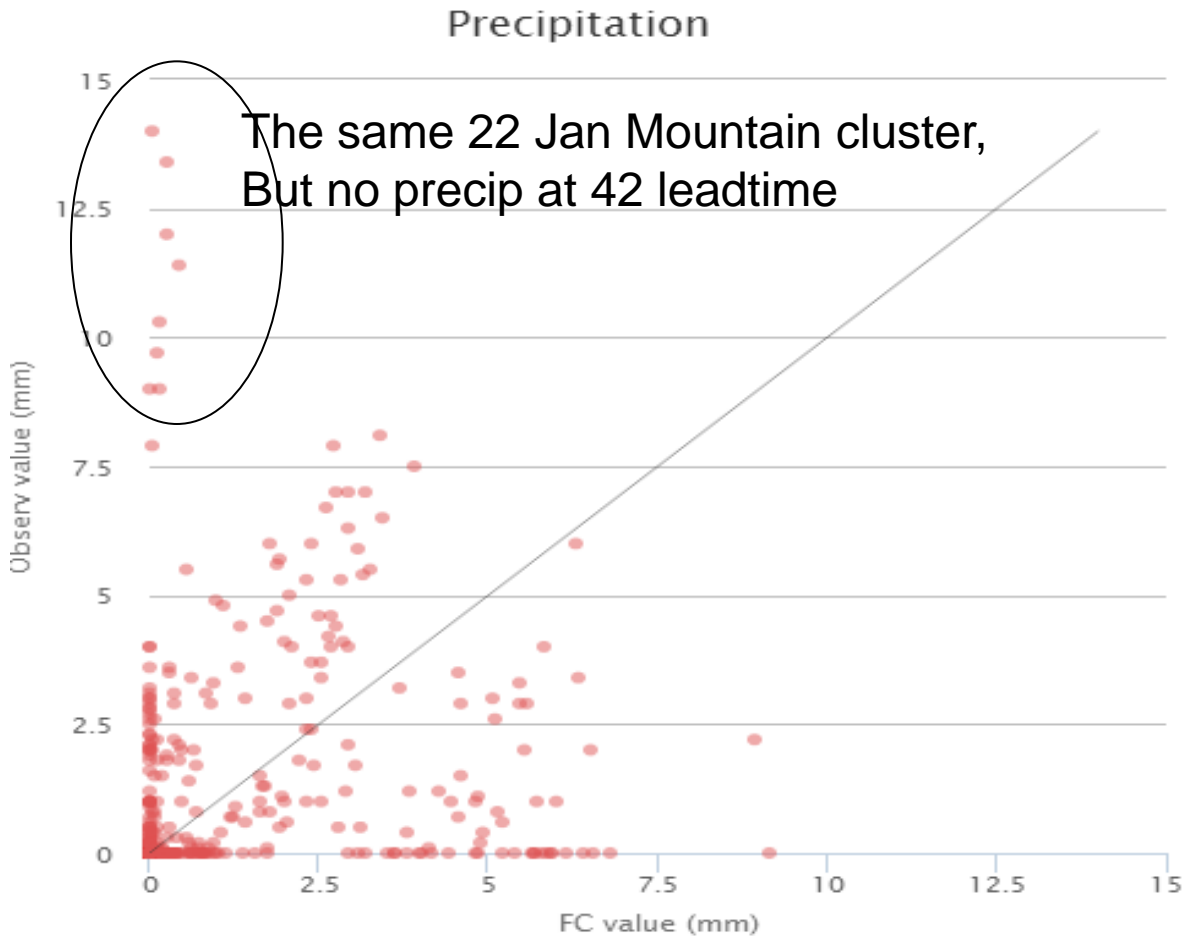
39h leadtime

MSE=1.95 RMSE=1.4 (without zero: MSE=4.89 RMSE=2.21)



42h leadtime

MSE=3.14 RMSE=1.77 (without zero: **MSE=8.06 RMSE=2.84**)



Conclusions

- **Traditional scores aggregated over the Sochi region show overall prevalence of COSMO-RU2 wrt COSMO-RU7 and COSMO-RU1**
- **However, some cases of intense precipitation and visibility are better predicted by COSMO-RU1**
- **Wind is also better in COSMO-RU1**
- **Precipitation is best forecasted in the late afternoon**

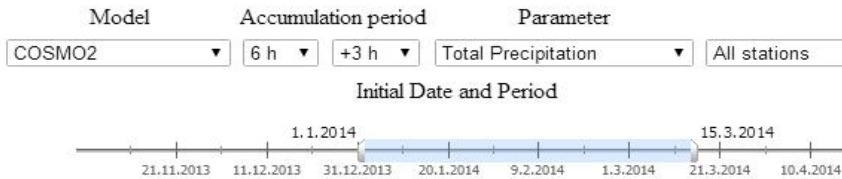
Plans

- **Further analysis of predictability of HIW cases complemented by ensemble predictability and sensitivity studies**
- **Implementation of spatial verification methods**

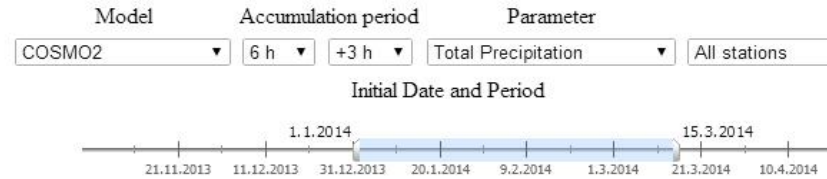
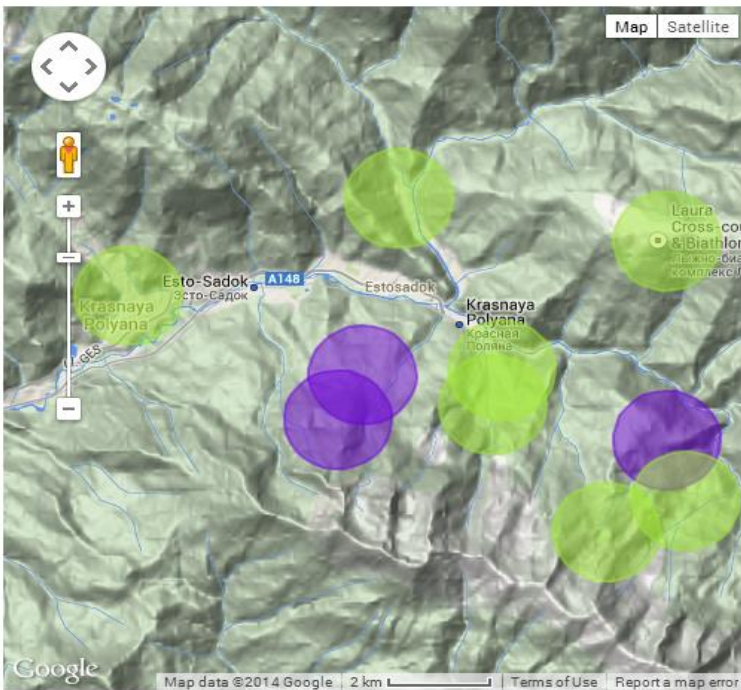
Thank you for your attention!



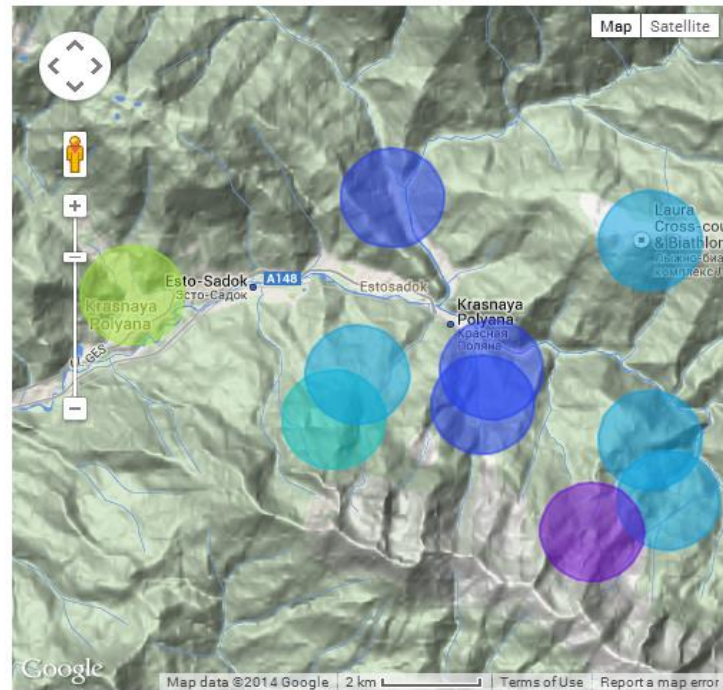
Dynamical display of geographical distribution



Values: HK | All | Completed | Show data for map area

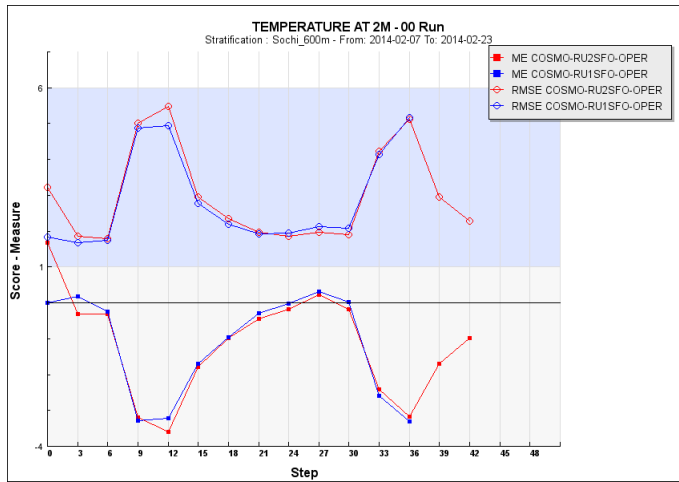


Values: BIAS | All | Completed | Show data for map area

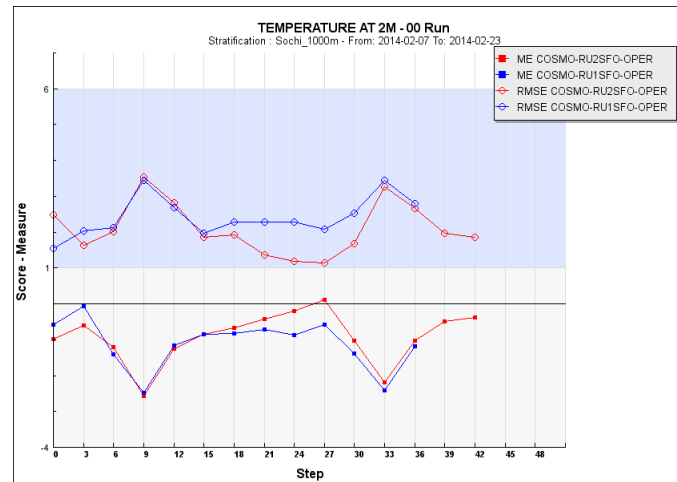


T2m, COSMO-RU1 and COSMO-RU2, Stratified by height

600 m



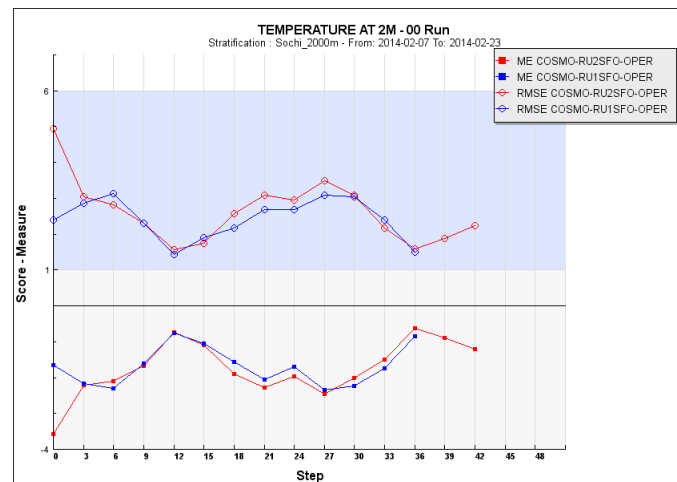
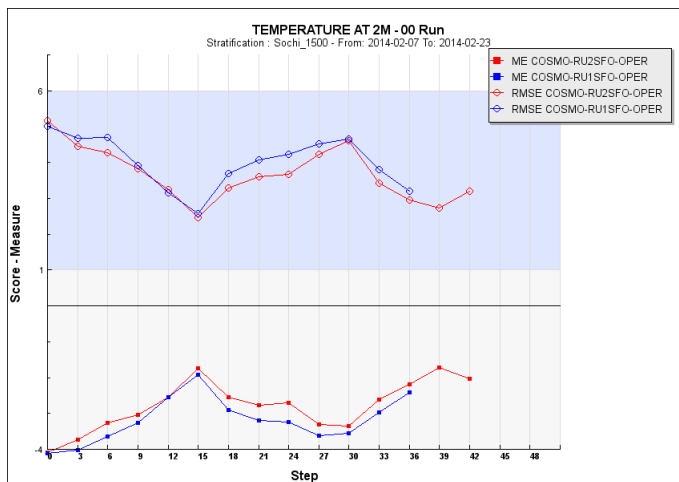
1000 m



1500 m

COSMO-RU1 is blue!

2000 m



Inverse diurnal cycle of errors for higher levels