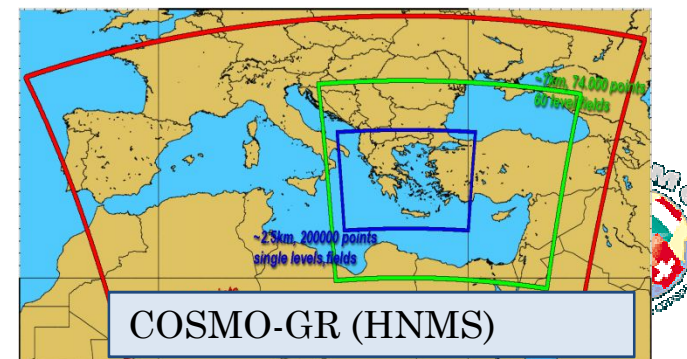
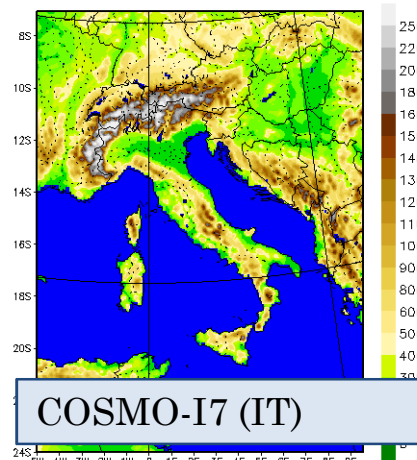
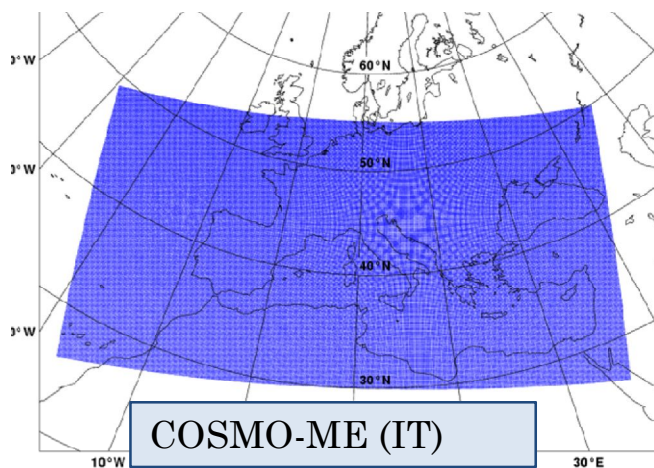
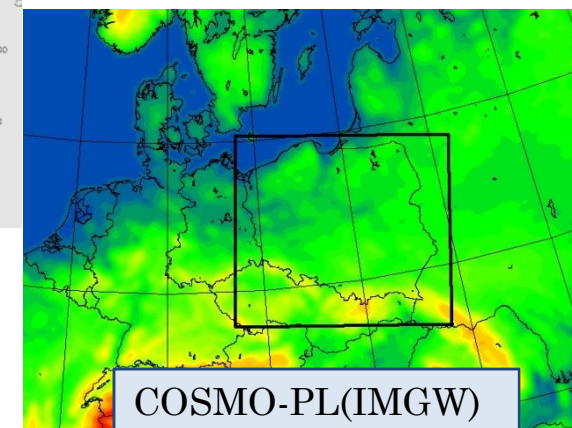
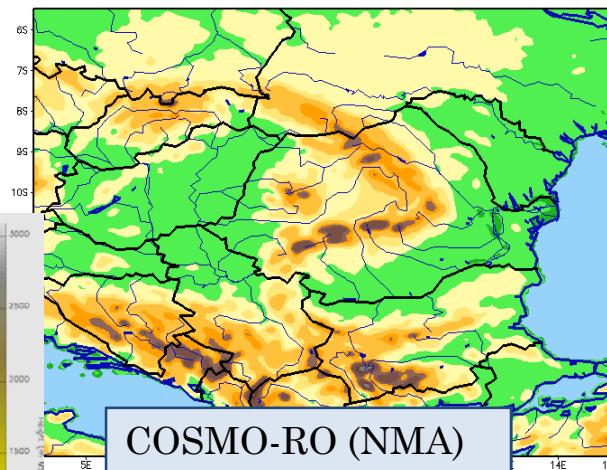
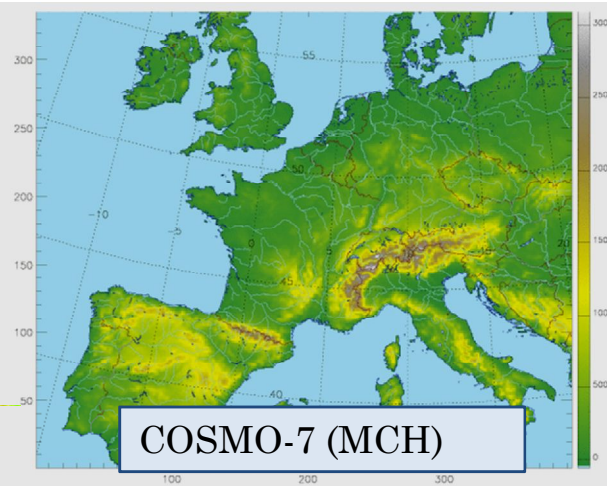
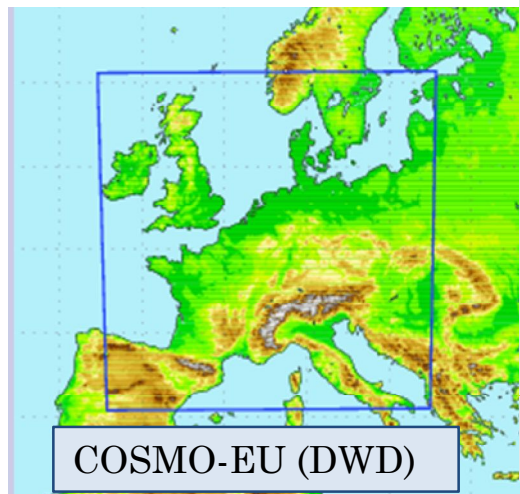


Lugano - Cosmo General Meeting
10-13 September 2012



SEASONAL COMMON PLOT SCORES

THE MODELS





- **Period: JJA 2011, SON 2011, DJF2011/2012, MAM 2012**
- **Run: 00 UTC run**
- **Continuous parameters - T2m, Td2m, Mslp, Wspeed, TCC**
 - Scores : ME, RMSE
 - Forecasts Step: every 3 hours
- **Dichotomic parameters - Precipitation:**
 - Scores:
 - FBI, ETS
 - FBI-POD-FAR-TS with performance diagram
 - Cumulating: 6h, 12h and 24h
 - Thresholds: 0.2, 2.0, 5.0, 10.0 for mm/6h and mm/12h
 - Thresholds: 0.2, 2.0, 10.0, 20.0 mm/24h



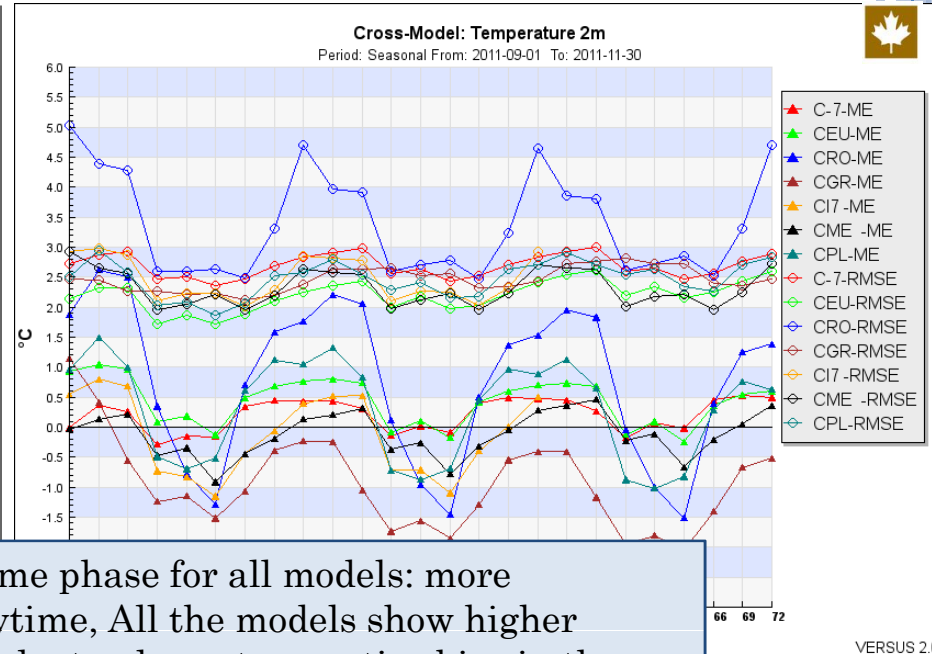
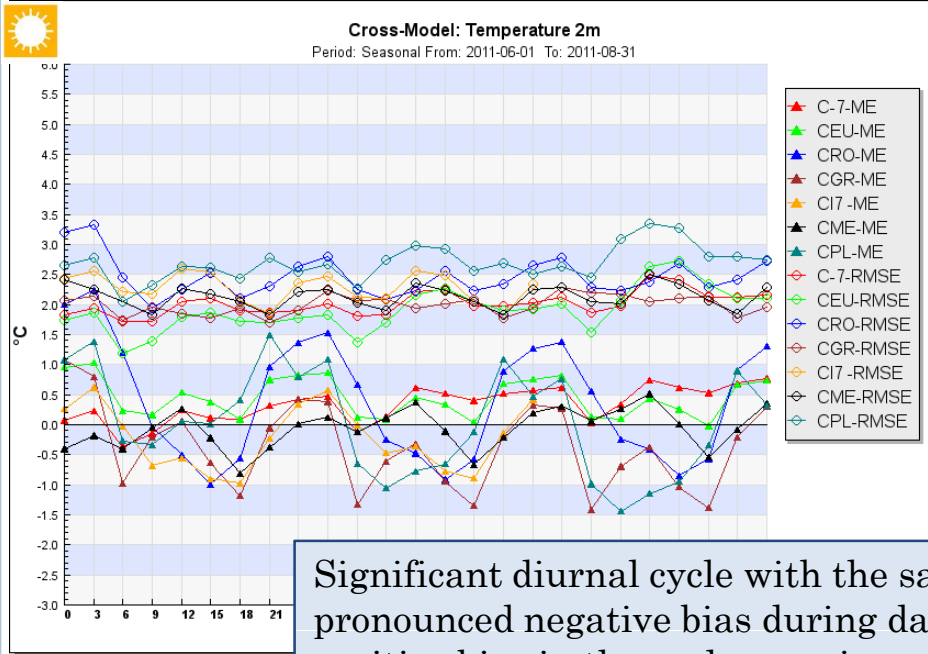


NEW! Conditional Verification

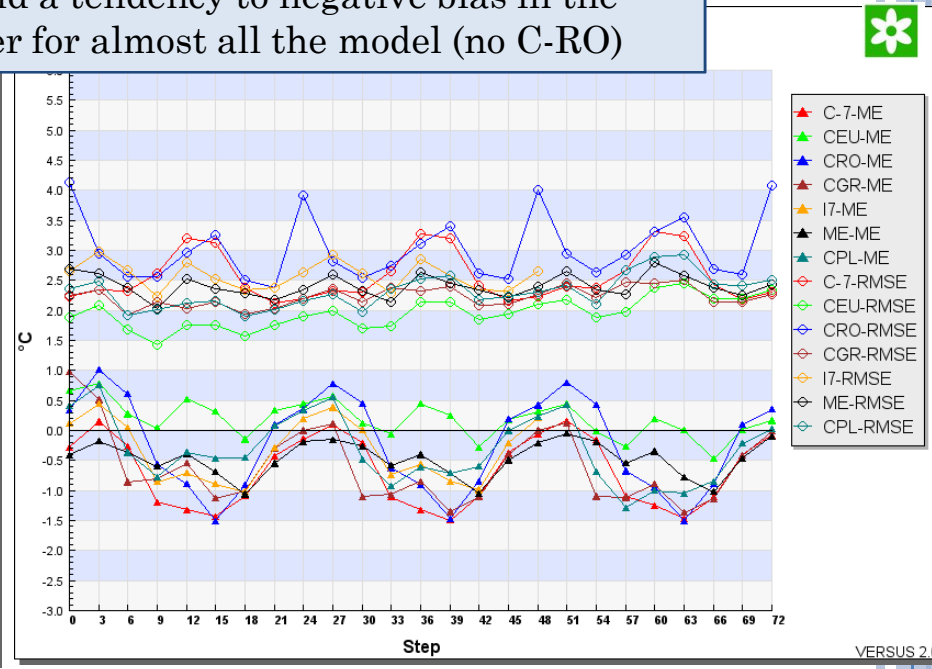
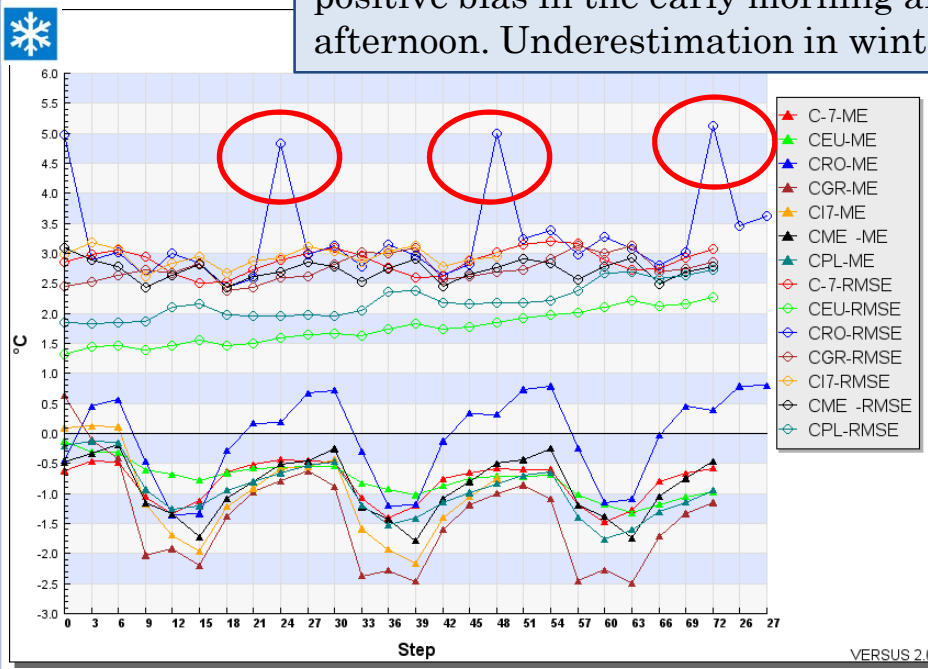
- **T2m verification with the following criteria:**
 - Total cloud cover $\geq 75\%$ (overcast condition) (condition based on observations)
 - Total cloud cover $\leq 25\%$ (clear sky condition) (condition based on observations)
- **Scores : ME, RMSE**
- **Forecasts Step: every 3 hours**



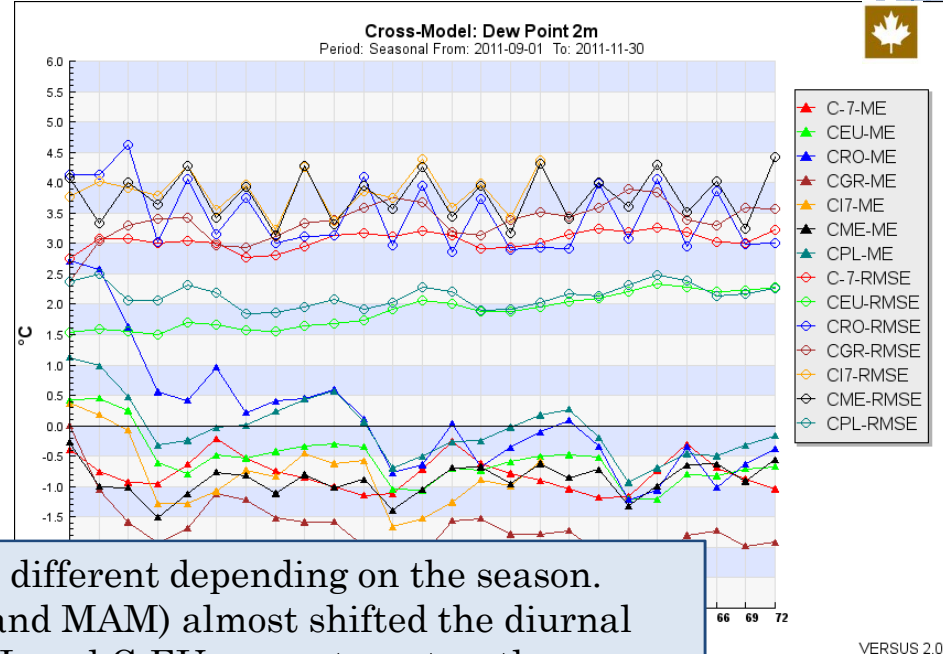
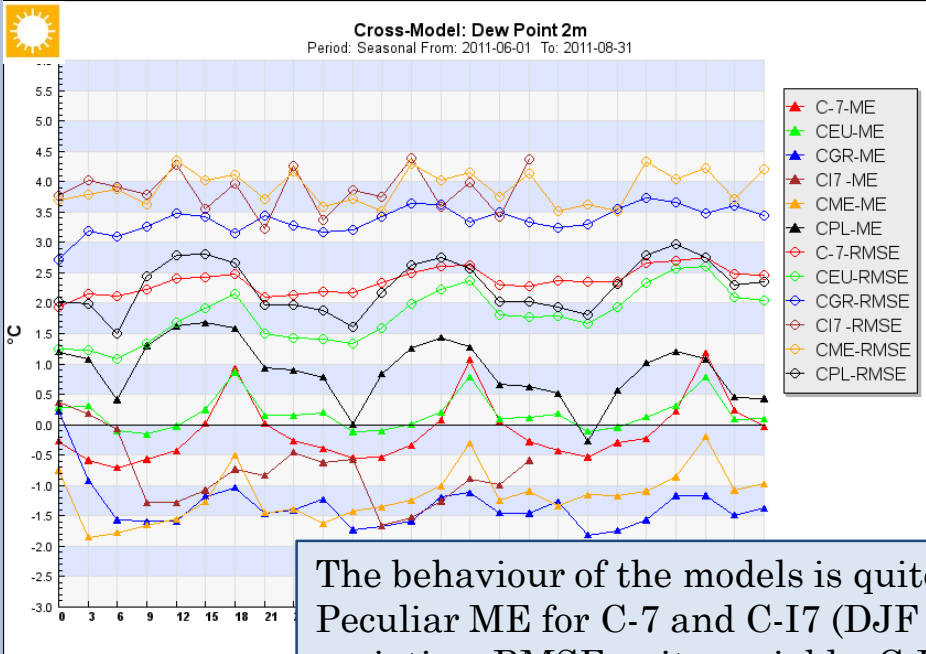
TEMPERATURE AT 2 M - JJA 2011 – MAM 2012



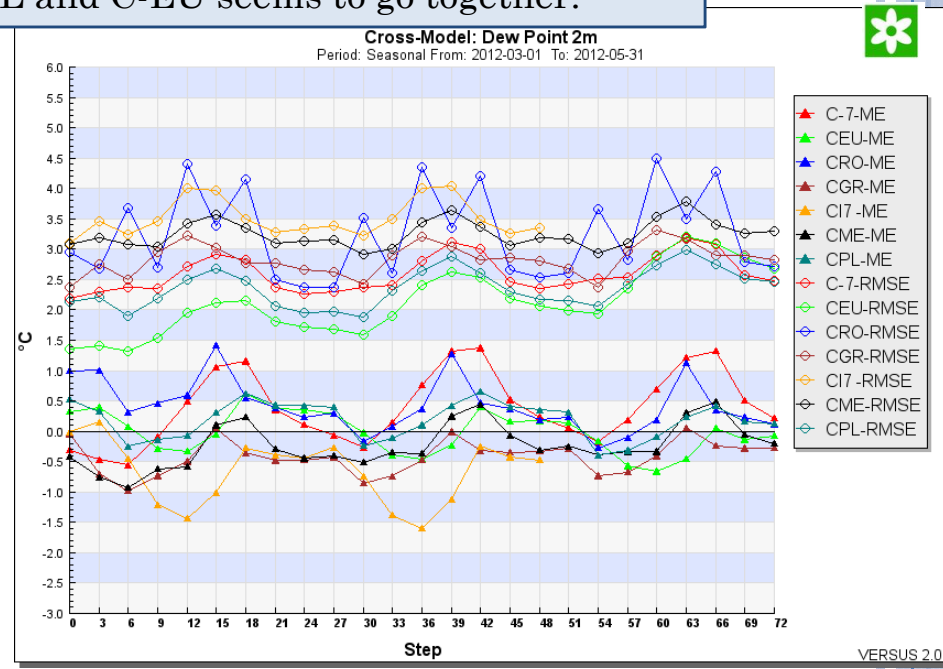
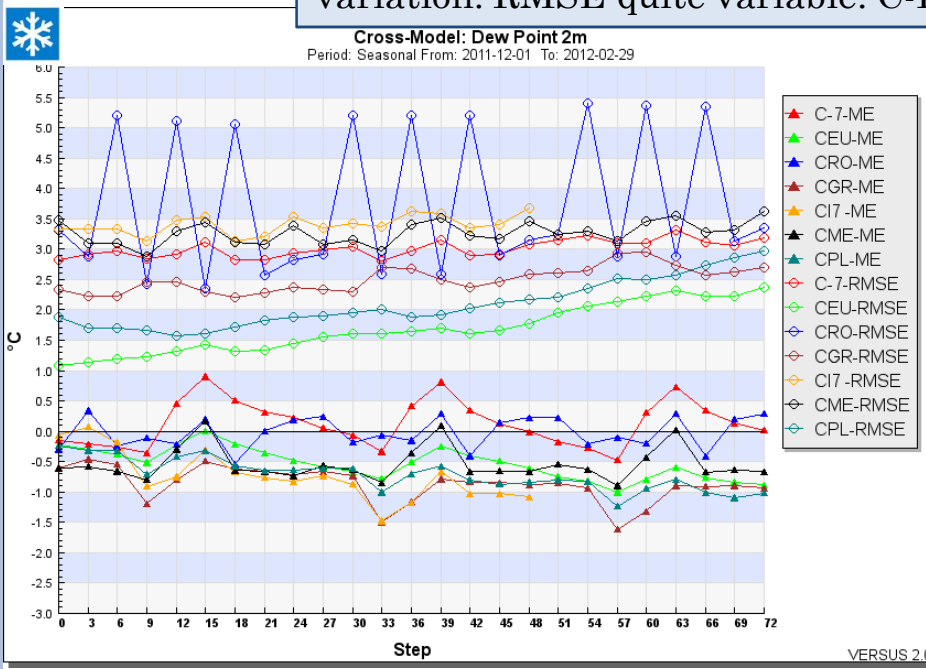
Significant diurnal cycle with the same phase for all models: more pronounced negative bias during daytime, All the models show higher positive bias in the early morning and a tendency to negative bias in the afternoon. Underestimation in winter for almost all the model (no C-RO)



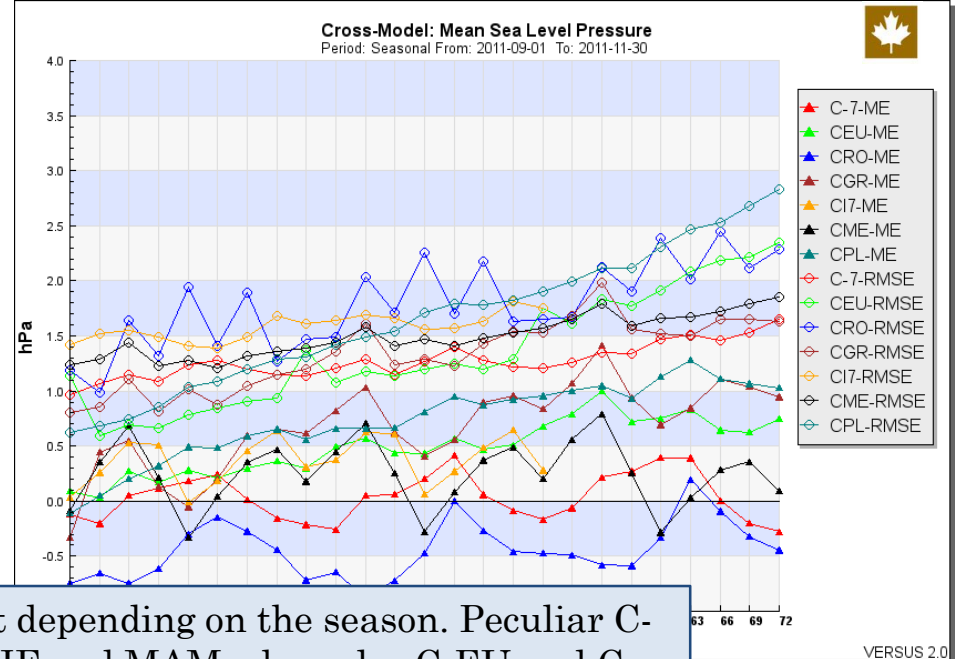
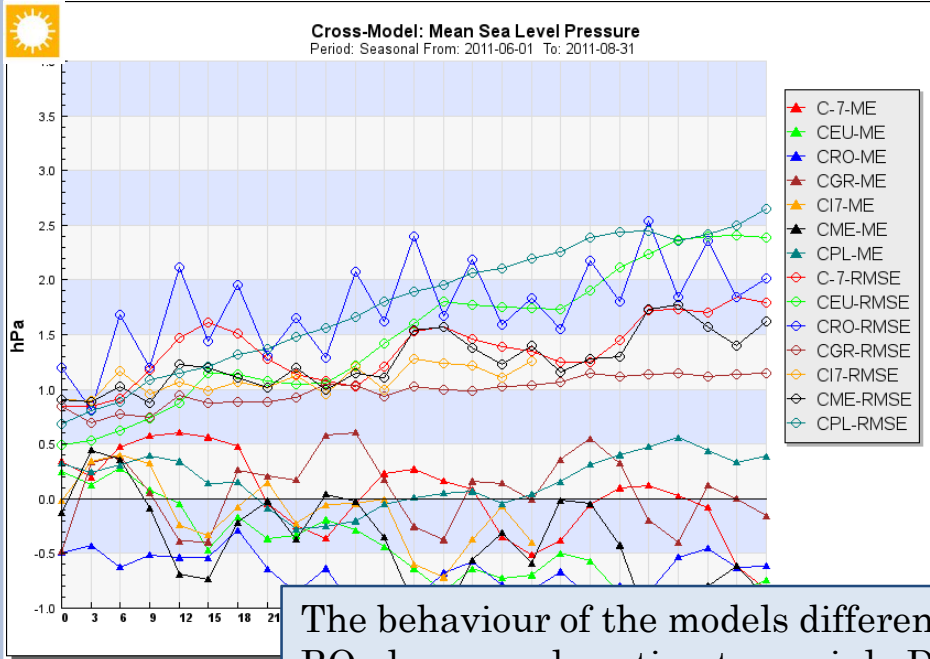
DEW POINT TEMPERATURE - JJA 2011- MAM 2012



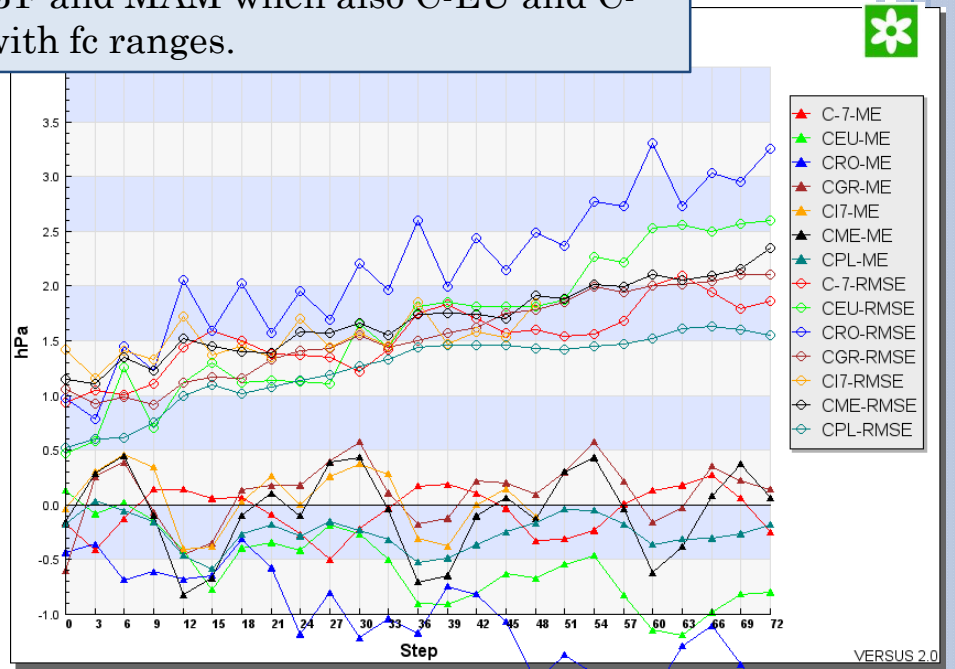
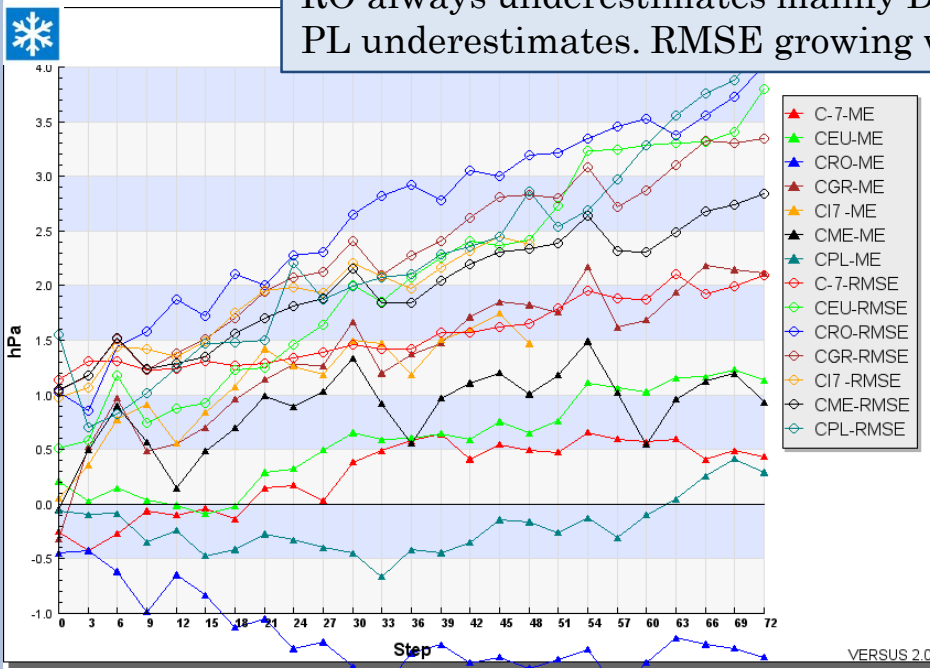
The behaviour of the models is quite different depending on the season. Peculiar ME for C-7 and C-I7 (DJF and MAM) almost shifted the diurnal variation. RMSE quite variable. C-PL and C-EU seems to go together.



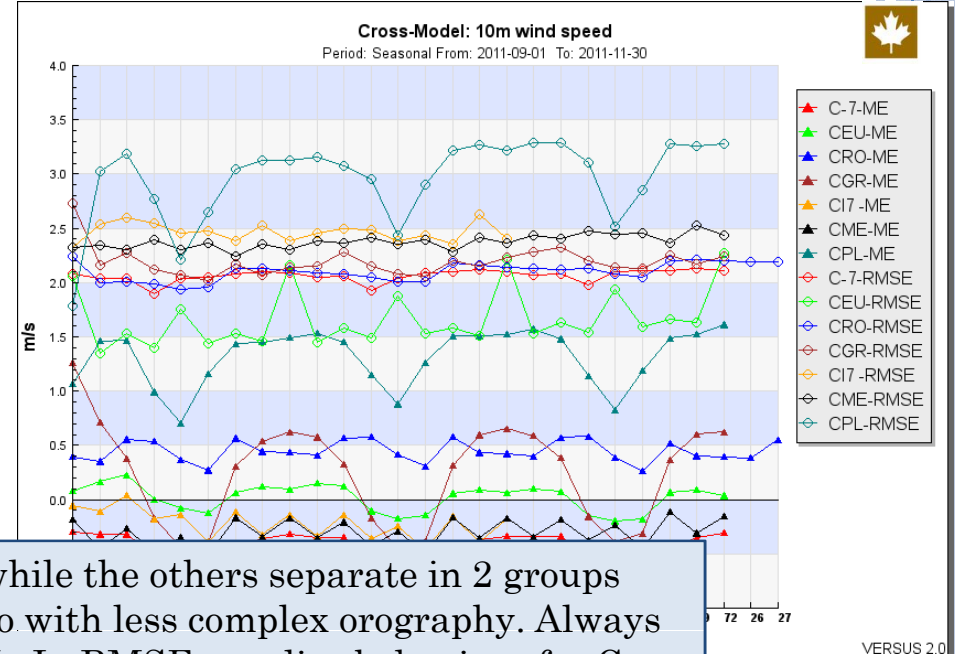
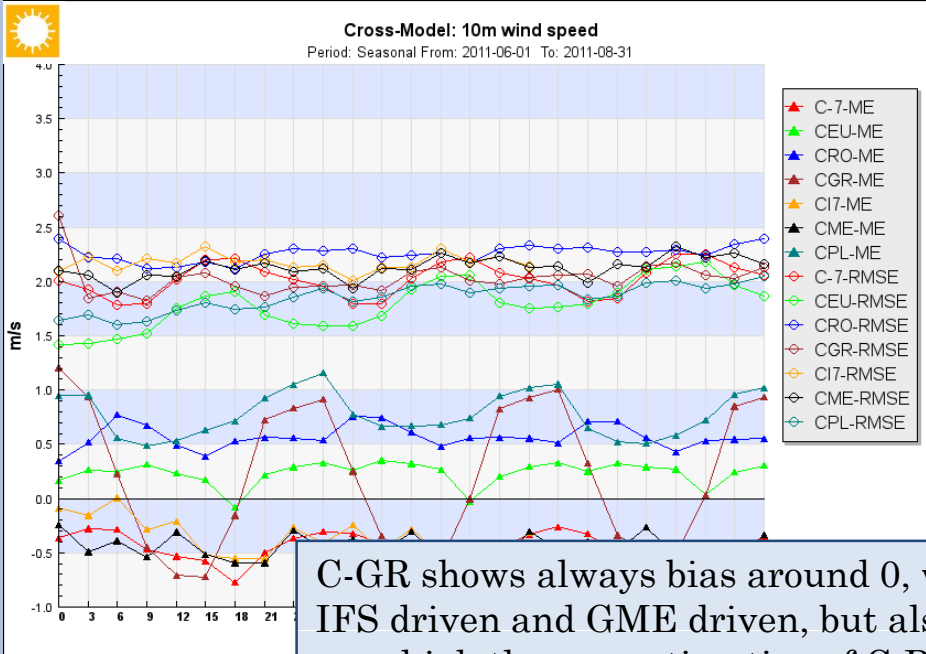
MEAN SEA LEVEL PRESSURE - JJA 2011 – MAM 2012



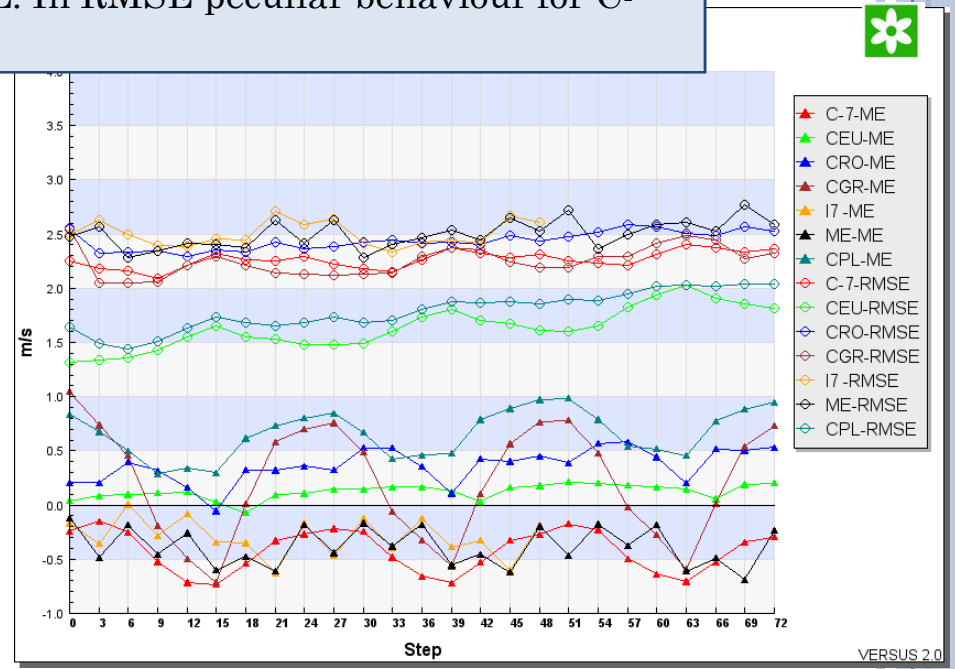
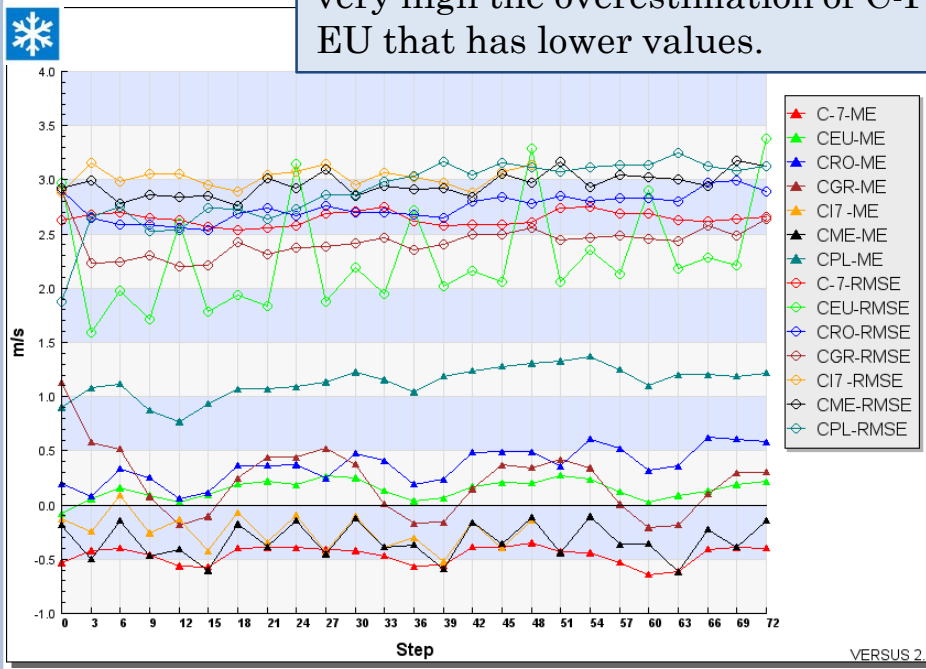
The behaviour of the models different depending on the season. Peculiar C-RO always underestimates mainly DJF and MAM when also C-EU and C-PL underestimates. RMSE growing with fc ranges.



WIND SPEED AT 10 M - JJA 2011 – MAM 2012



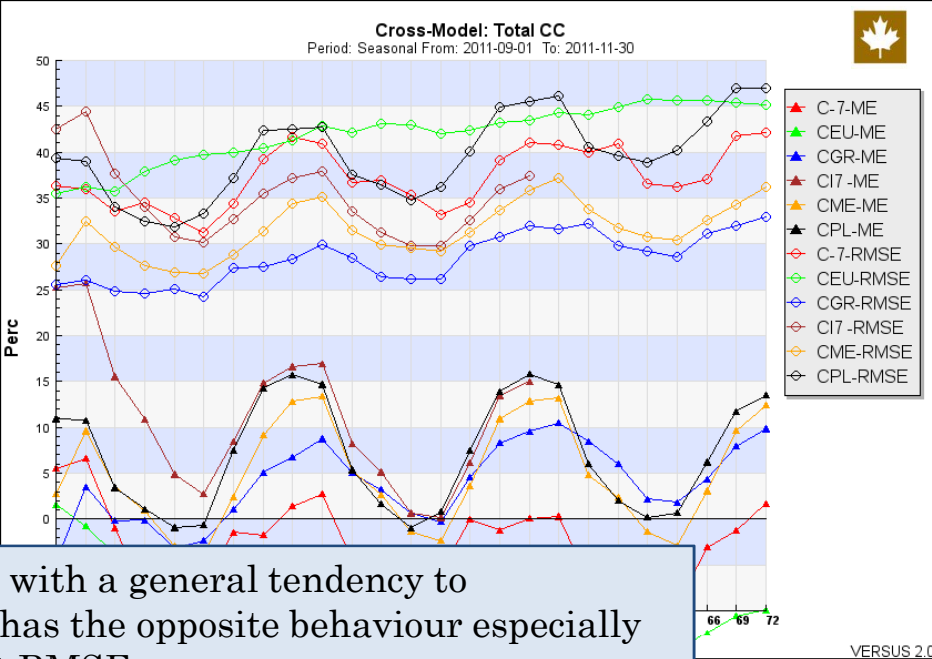
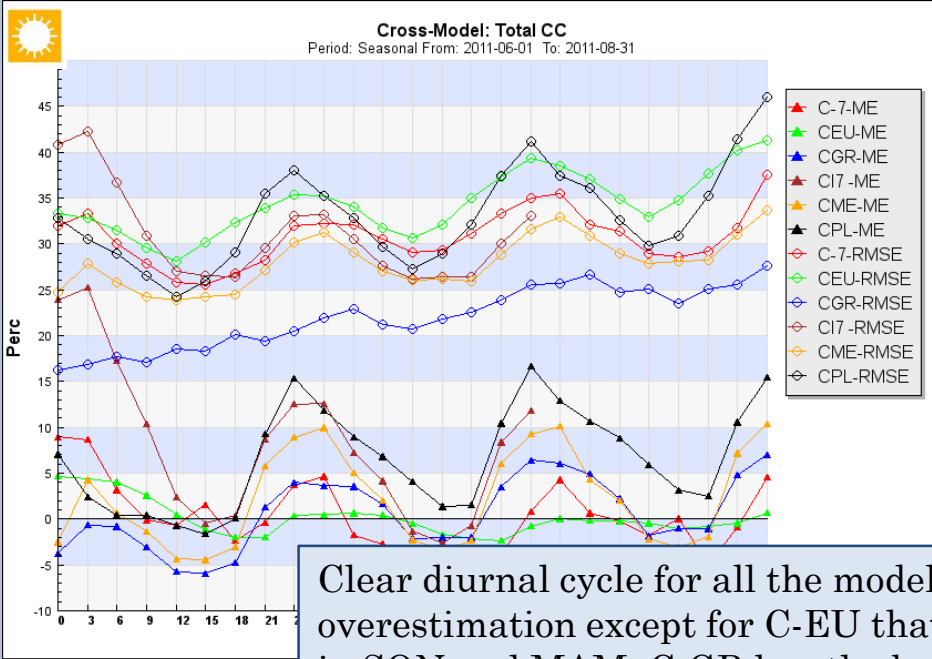
C-GR shows always bias around 0, while the others separate in 2 groups IFS driven and GME driven, but also with less complex orography. Always very high the overestimation of C-PL. In RMSE peculiar behaviour for C-EU that has lower values.



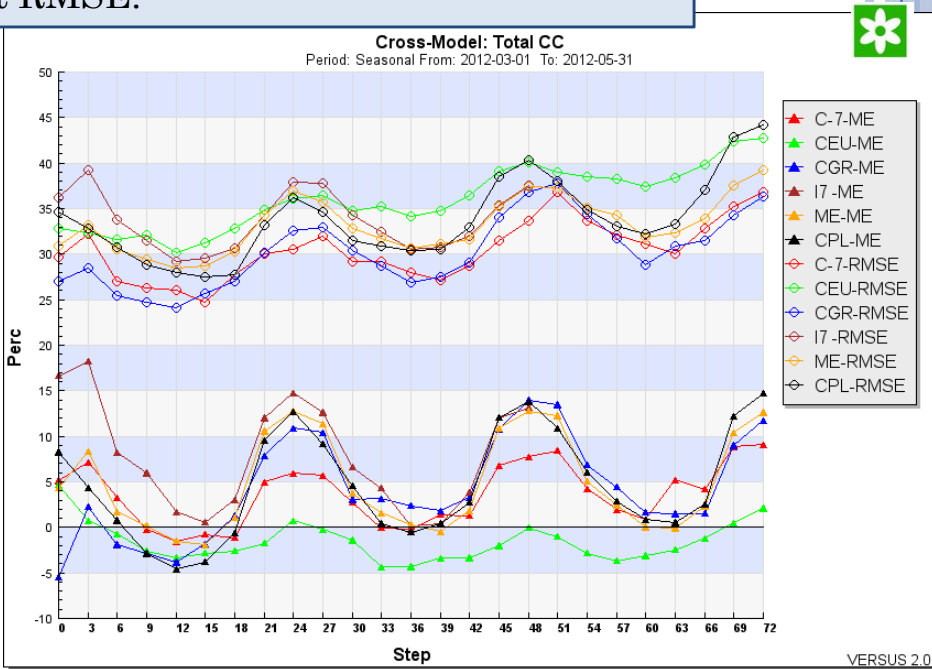
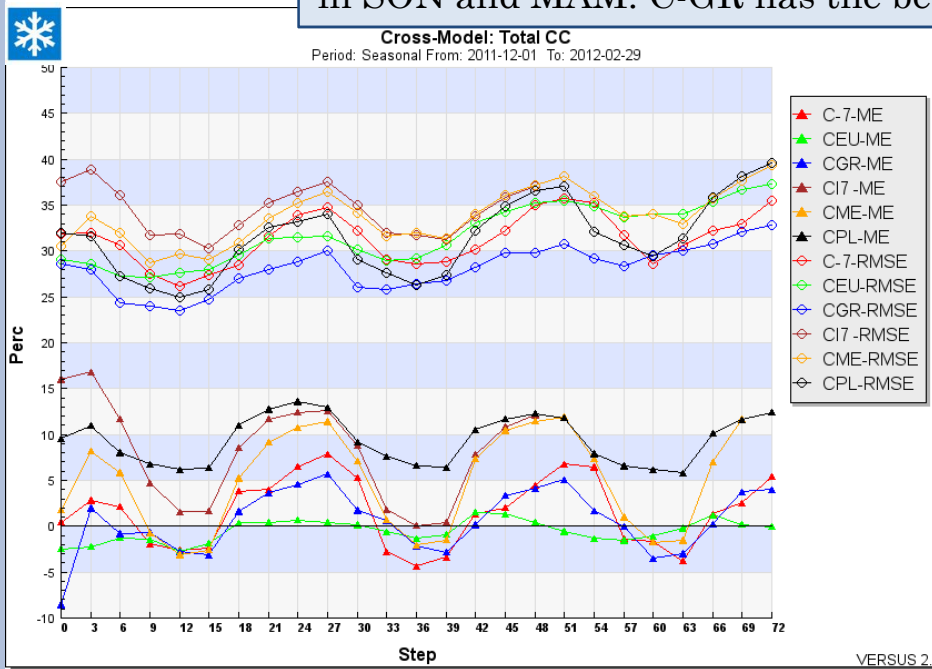
VERSUS 2.0

VERSUS 2.0

TOTAL CLOUD COVER JJA 2011 – MAM 2012



Clear diurnal cycle for all the models with a general tendency to overestimation except for C-EU that has the opposite behaviour especially in SON and MAM. C-GR has the best RMSE.



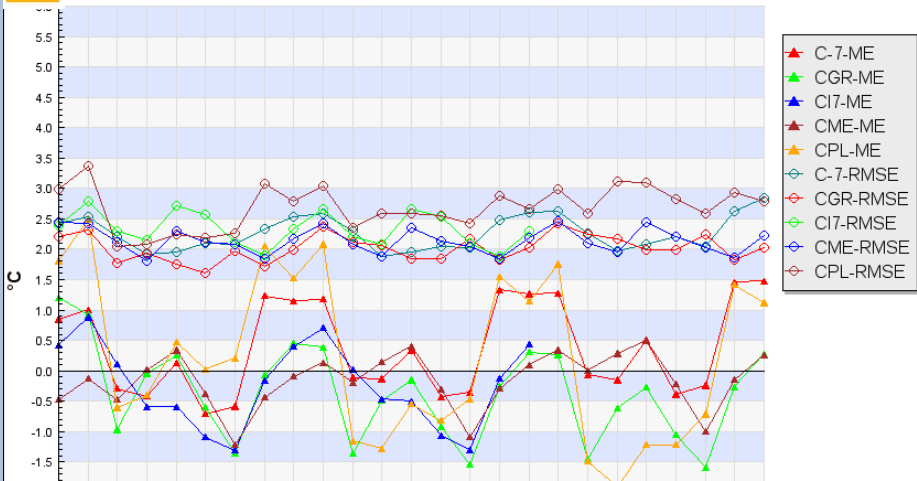
VERSUS 2.0

VERSUS 2.0

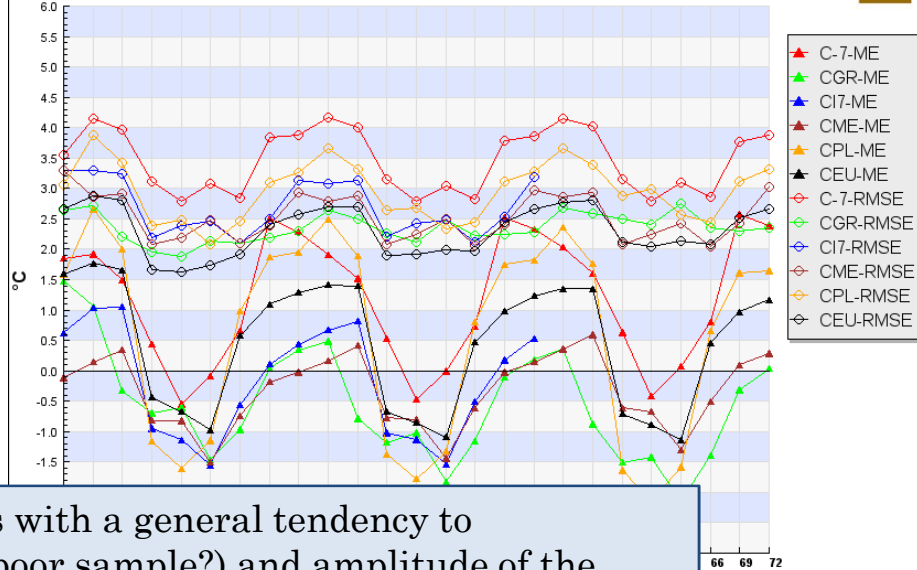
2MT IN SKY CLEAR CONDITIONS - JJA 2011 – MAM 2012



Cross-Model: T2m - TCC less than 25
 Period: Seasonal From: 2011-06-01 To: 2011-08-31



Cross-Model: T2m - TCC less than 25
 Period: Seasonal From: 2011-09-01 To: 2011-11-30

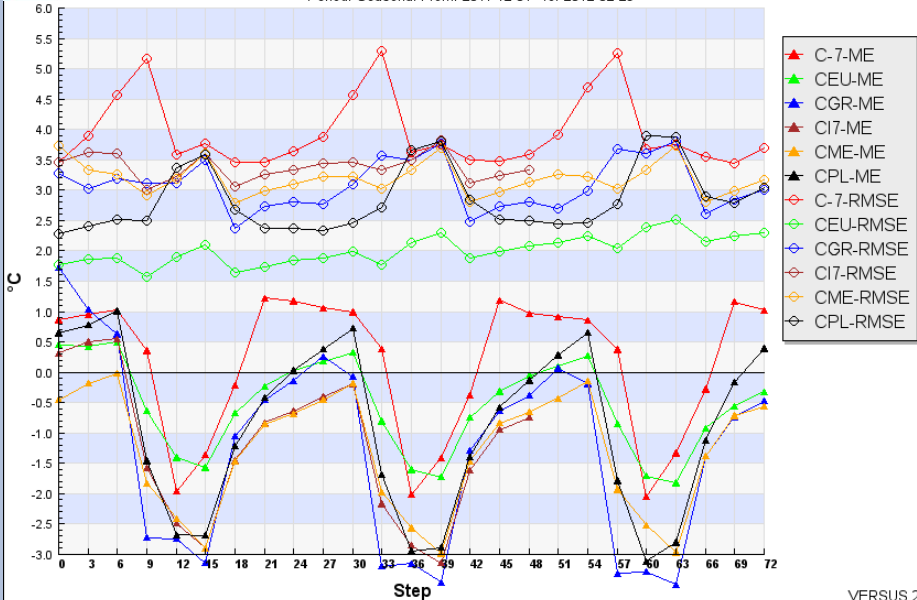


Clear diurnal cycle for all the models with a general tendency to underestimation in DJF and MAM (poor sample?) and amplitude of the error pronounced. RMSE between 2 and 4.

VERSUS 2.0



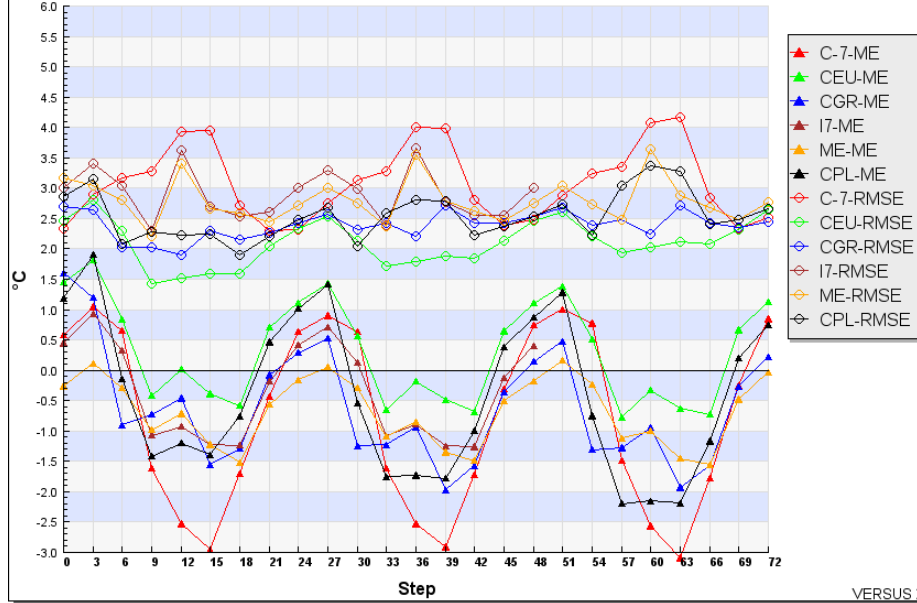
Cross-Model: T2m - TCC less than 25
 Period: Seasonal From: 2011-12-01 To: 2012-02-29



VERSUS 2.0



Cross-Model: T2m - TCC less than 25
 Period: Seasonal From: 2012-03-01 To: 2012-05-31

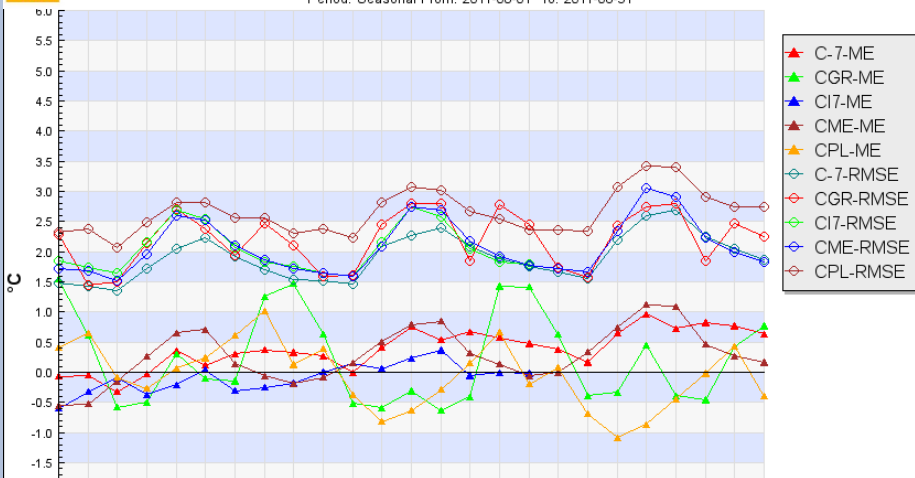


VERSUS 2.0

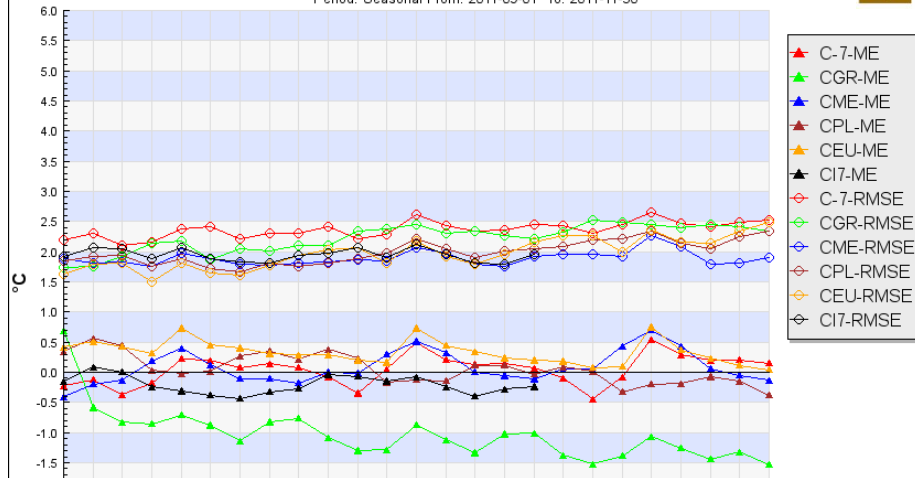
2MT IN OVERCAST CONDITIONS - JJA 2011 – MAM 2012



Cross-Model: T2m - TCC greater than 75
Period: Seasonal From: 2011-06-01 To: 2011-08-31



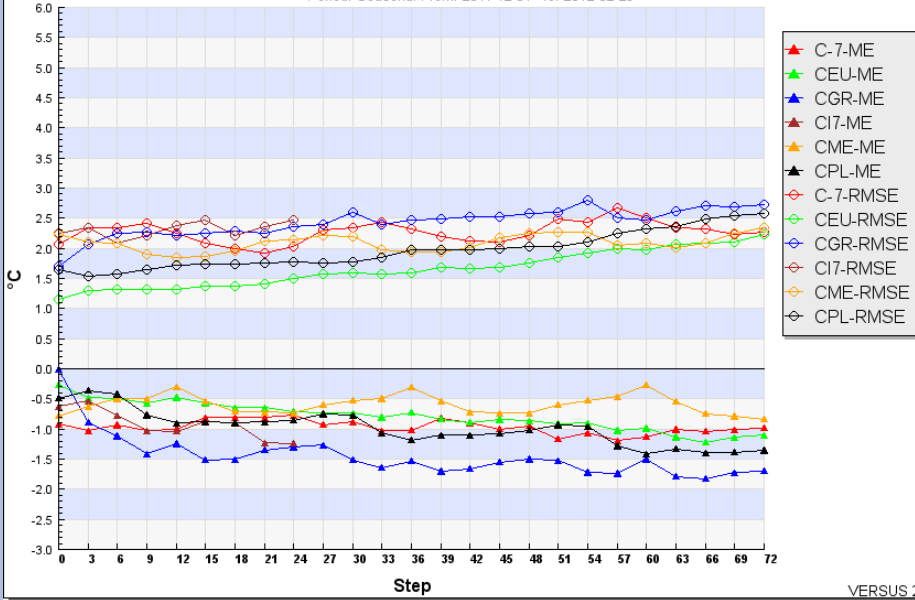
Cross-Model: T2m - TCC greater than 75
Period: Seasonal From: 2011-09-01 To: 2011-11-30



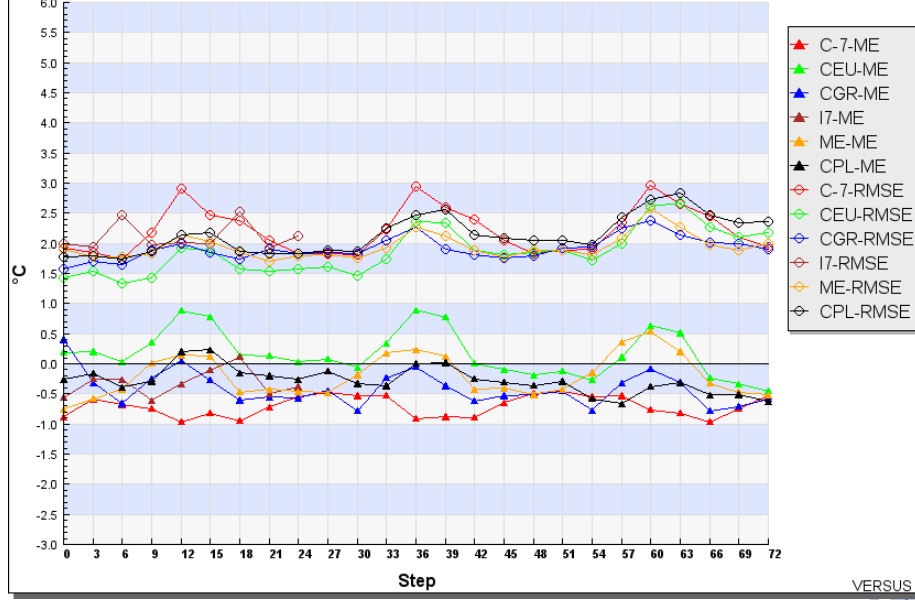
Diurnal cycle for all the models almost disappear. Me is around 0 JJA and SON (except for C-GR underestimated), while for DJF and MAM tendency to underestimation. RMSE generally lower than the previous condition.



Cross-Model: T2m - TCC greater than 75
Period: Seasonal From: 2011-12-01 To: 2012-02-29



Cross-Model: T2m - TCC greater than 75
Period: Seasonal From: 2012-03-01 To: 2012-05-31

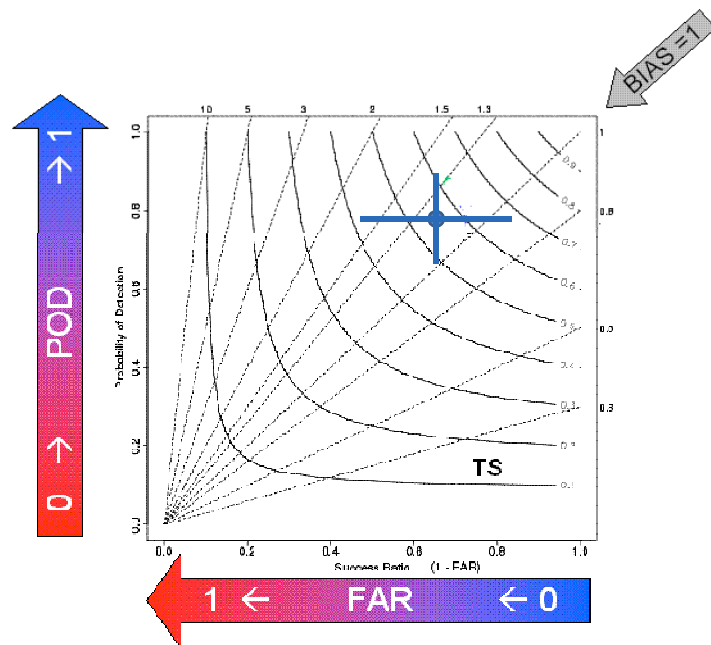


SOME POINTS TO REMEMBER ABOUT PRECIPITATION VERIFICATION:

- The purpose of these plots is to see the overall performance of COSMO model
- Relative comparison is not fair because models are different (ic/bc, assimilation cycle, model version, region characteristics, number of stations used)
- Only some thresholds and cumulation time have been considered
 - they identify different rainfall regime depending on seasons and geographical characteristics



PERFORMANCE DIAGRAM



- In the graph is exploited the geometric relationship between four measures of dichotomous forecast performance:
 - probability of detection (POD)
 - success ratio(SR, defined as 1-FAR)
 - bias score (BS)
 - threat score (TS, also known as the Critical Success Index).
- For good forecasts, POD, SR, bias and TS approach unity, such that a perfect forecast lies in the upper right of the diagram.
- The cross-hairs about the verification point represent the influence of the sampling variability.
 - They are estimated using a form of resampling with replacement bootstrapping from the verification data (from the contingency table).
 - The bars represents the 95th percentile range for SR and POD.



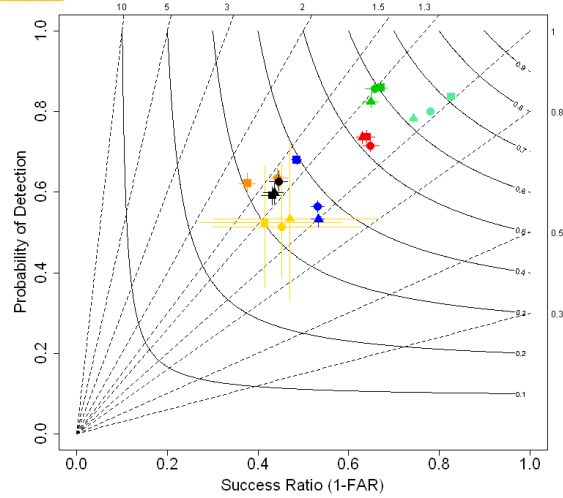
CUMULATION PERIOD: 24 h

- All the models start at 00 UTC so we considered:
 - + 0h to +24h (day 1)
 - +24h to +48h (day2)
 - +48h to +72h (day3)
- Reference threshold:
 - 0.2 mm
 - 2 mm
 - 10 mm
 - 20 mm

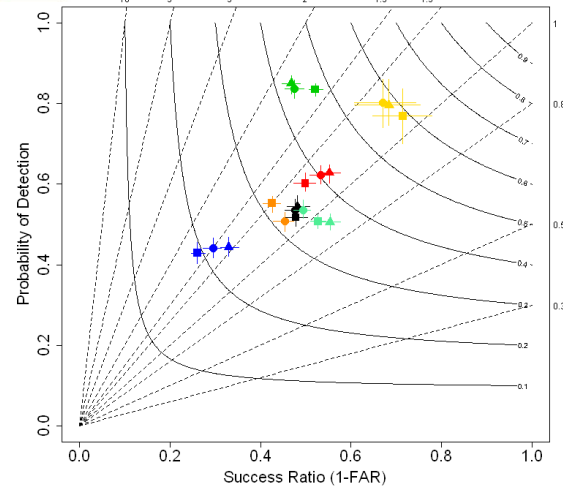




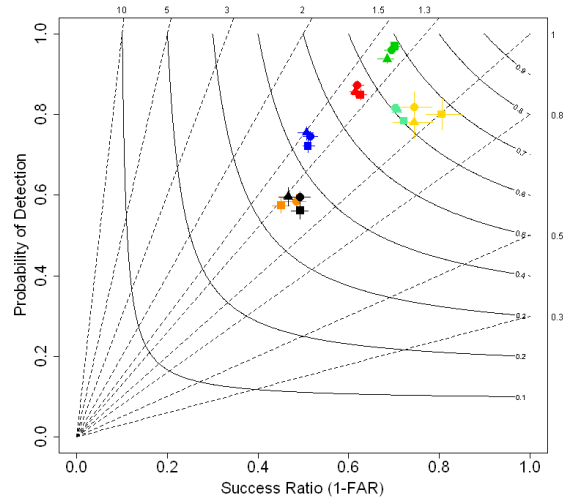
JJA2011: Precipitation in 24h - 0.2mm threshold



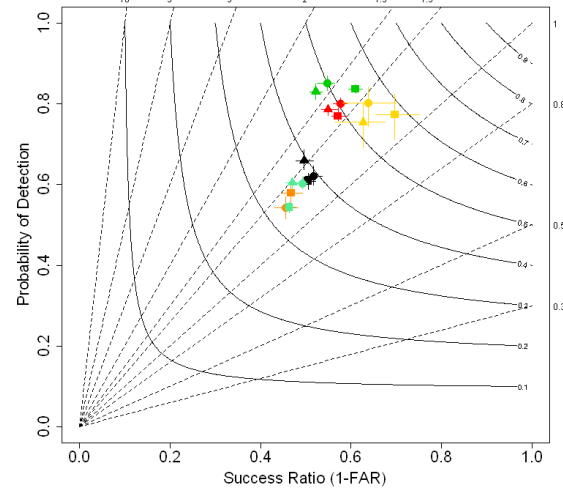
SON2011: Precipitation in 24h - 0.2mm threshold



DJF2011-2012: Precipitation in 24h - 0.2mm threshold



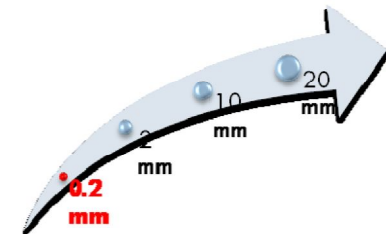
MAM2012: Precipitation in 24h - 0.2mm threshold



- COSMO-7 + 24
- COSMO-7 + 48
- ▲ COSMO-7 + 72
- COSMO-GR + 24
- COSMO-GR + 48
- ▲ COSMO-GR + 72
- COSMO-I7 + 24
- COSMO-I7 + 48
- ▲ COSMO-I7 + 72
- COSMO-ME + 24
- COSMO-ME + 48
- ▲ COSMO-ME + 72
- COSMO-PL + 24
- COSMO-PL + 48
- ▲ COSMO-PL + 72
- COSMO-EU + 24
- COSMO-EU + 48
- ▲ COSMO-EU + 72
- COSMO-RO + 24
- COSMO-RO + 48
- ▲ COSMO-RO + 72



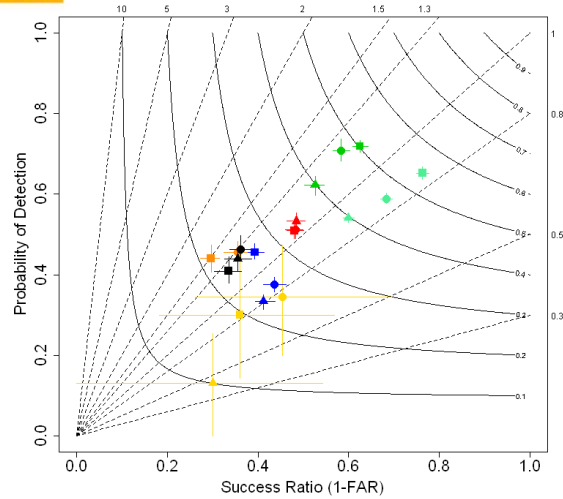
Overestimation for most of the models, in particular MAM2012.



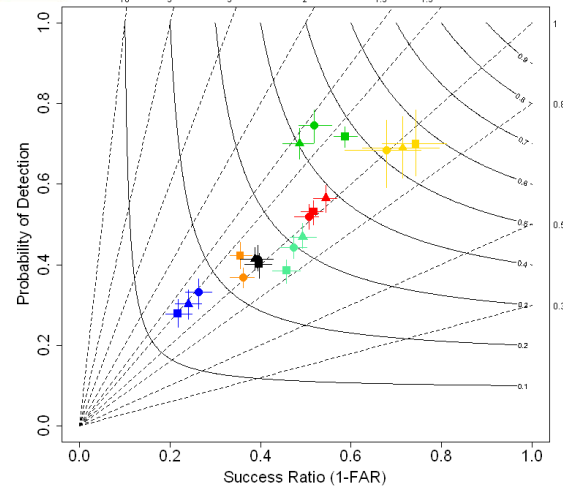
THRESHOLD



JJA2011: Precipitation in 24h - 2mm threshold



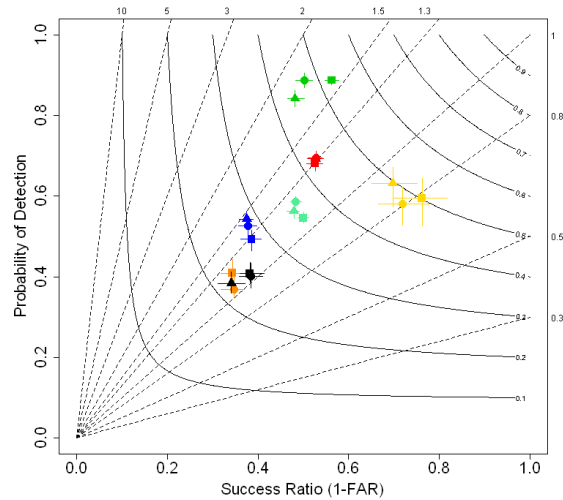
SON2011: Precipitation in 24h - 2mm threshold



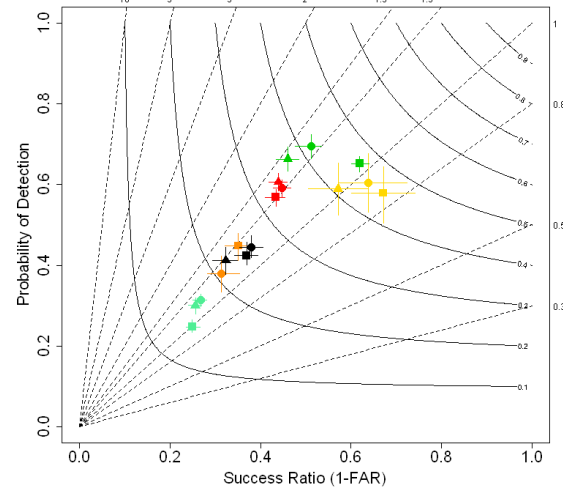
- COSMO-7 + 24
- COSMO-7 + 48
- ▲ COSMO-7 + 72
- COSMO-GR + 24
- COSMO-GR + 48
- ▲ COSMO-GR + 72
- COSMO-I7 + 24
- COSMO-I7 + 48
- COSMO-ME + 24
- COSMO-ME + 48
- ▲ COSMO-ME + 72
- COSMO-PL + 24
- COSMO-PL + 48
- ▲ COSMO-PL + 72
- COSMO-EU + 24
- COSMO-EU + 48
- ▲ COSMO-EU + 72
- COSMO-RO + 24
- COSMO-RO + 48
- ▲ COSMO-RO + 72



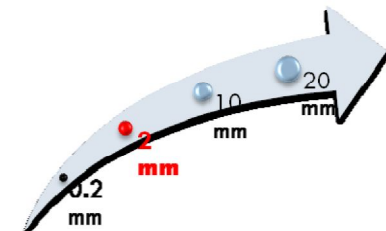
DJF2011-2012: Precipitation in 24h - 2mm threshold



MAM2012: Precipitation in 24h - 2mm threshold



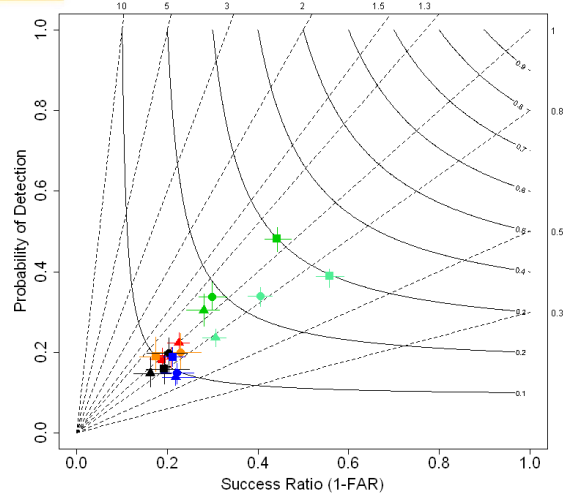
Reduction in FBI and general worsening of the scores. A part from SON the tendency is to increase the number of false alarms



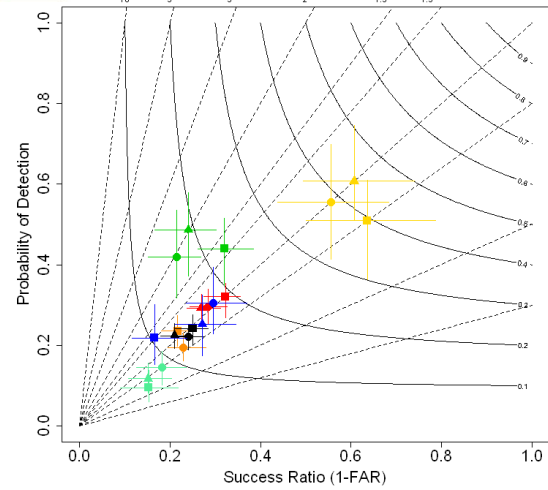
THRESHOLD



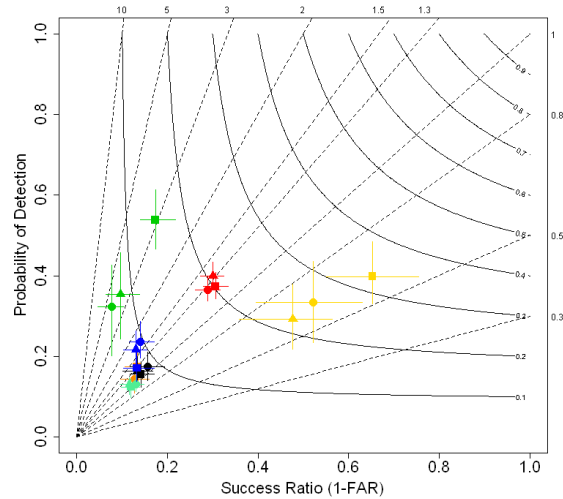
JJA2011: Precipitation in 24h - 10mm threshold



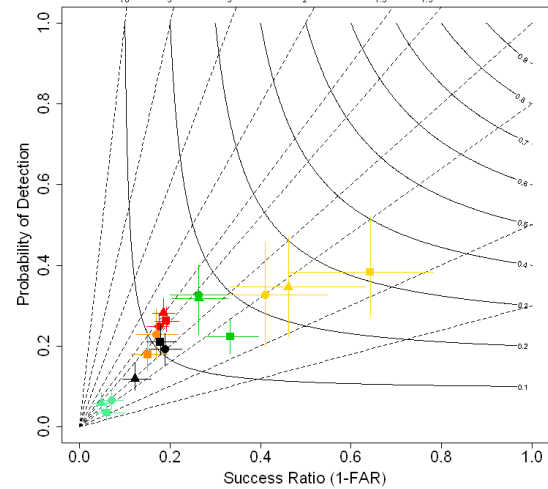
SON2011: Precipitation in 24h - 10mm threshold



DJF2011-2012: Precipitation in 24h - 10mm threshold



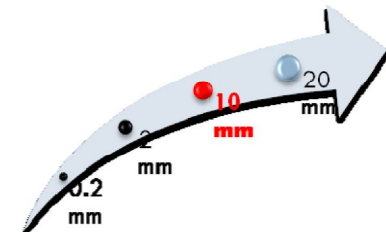
MAM2012: Precipitation in 24h - 10mm threshold



- COSMO-7 + 24
- COSMO-7 + 48
- ▲ COSMO-7 + 72
- COSMO-GR + 24
- COSMO-GR + 48
- ▲ COSMO-GR + 72
- COSMO-17 + 24
- COSMO-17 + 48
- ▲ COSMO-17 + 72
- COSMO-ME + 24
- COSMO-ME + 48
- ▲ COSMO-ME + 72
- COSMO-PL + 24
- COSMO-PL + 48
- ▲ COSMO-PL + 72
- COSMO-EU + 24
- COSMO-EU + 48
- ▲ COSMO-EU + 72
- COSMO-RO + 24
- COSMO-RO + 48
- ▲ COSMO-RO + 72



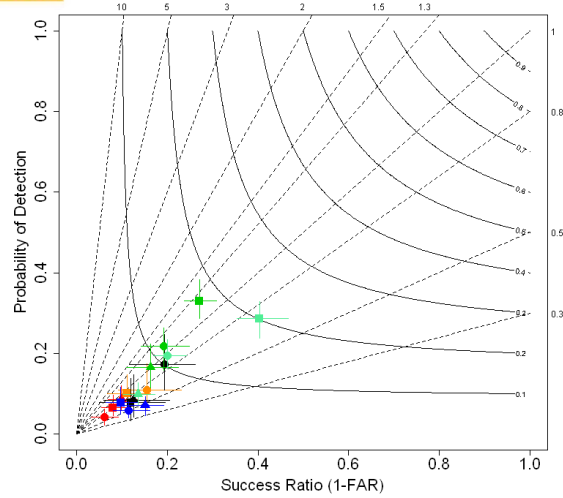
Further worsening of the scores. Good performance of COSMO-GR in SON (it is the best also in DJF and MAM)



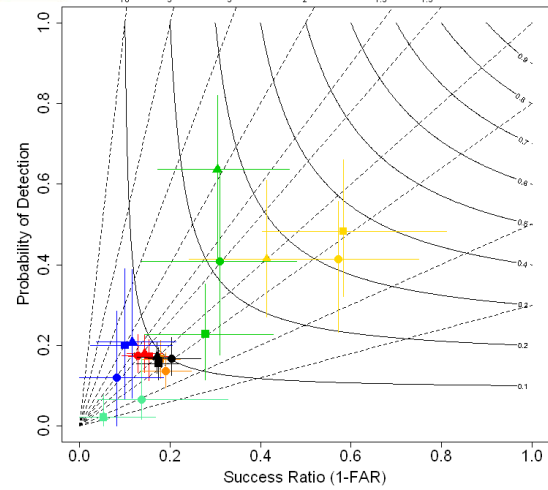
THRESHOLD



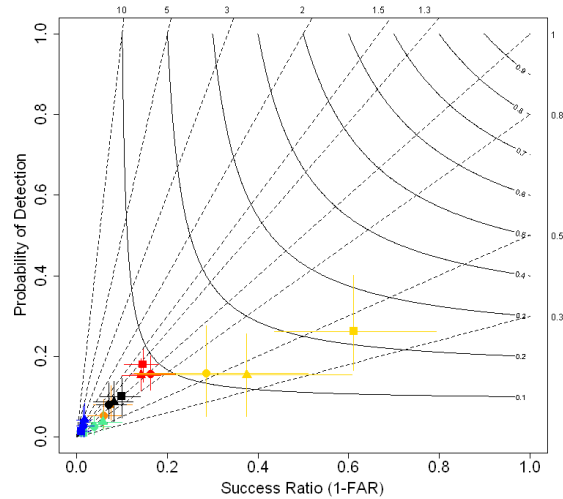
JJA2011: Precipitation in 24h - 20mm threshold



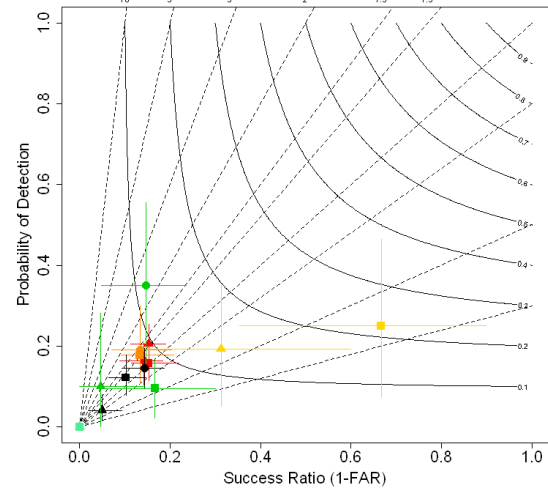
SON2011: Precipitation in 24h - 20mm threshold



DJF2011-2012: Precipitation in 24h - 20mm threshold



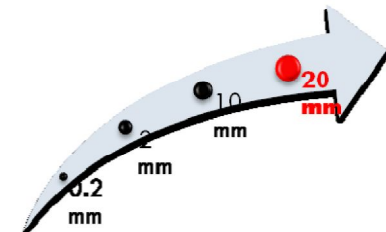
MAM2012: Precipitation in 24h - 20mm threshold



- COSMO-7 + 24
- COSMO-7 + 48
- ▲ COSMO-7 + 72
- COSMO-GR + 24
- COSMO-GR + 48
- ▲ COSMO-GR + 72
- COSMO-I7 + 24
- COSMO-I7 + 48
- COSMO-ME + 24
- COSMO-ME + 48
- ▲ COSMO-ME + 72
- COSMO-PL + 24
- COSMO-PL + 48
- ▲ COSMO-PL + 72
- COSMO-EU + 24
- COSMO-EU + 48
- ▲ COSMO-EU + 72
- COSMO-RO + 24
- COSMO-RO + 48
- ▲ COSMO-RO + 72



Quite low values for TS and POD (except from COSMO-GR in SON and COSMO-PL). The dimension of the cross-hairs indicates high variability in the contingency table entries.

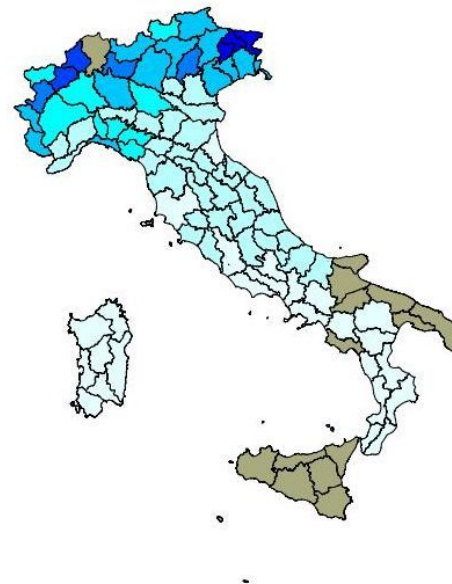


THRESHOLD

INTER-COMPARISON OVER THE SAME DOMAIN

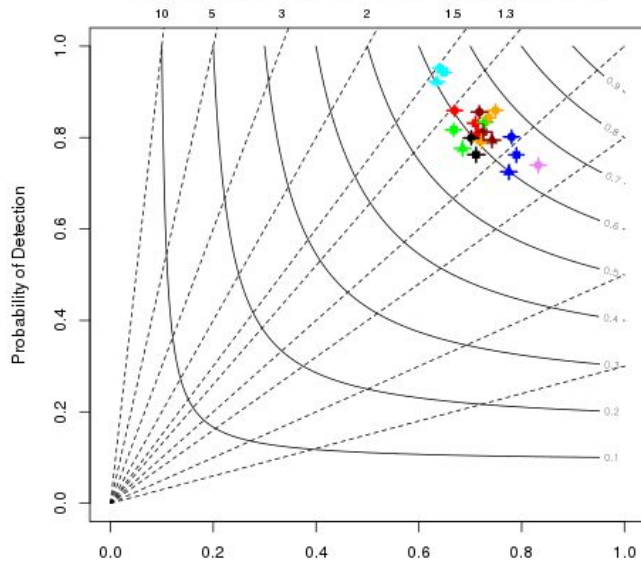
- In the previous diagrams the shown scores were evaluated on each own country
- Arpa-Piemonte performed a verification over a common domain (a part of Italy) using high resolution rain-gauges network for some COSMO models:

- COSMO-I7 and COSMO-ME
- COSMO-I2 and COSMO-IT
- COSMO-7
- COSMO-EU
- COSMO-GR
- IFS-ECMWF

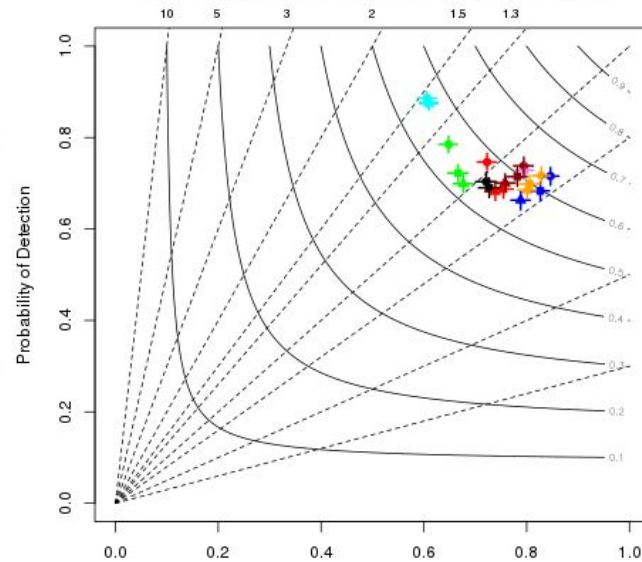




JJA2011: Precipitation in 24h - 0.2 mm threshold



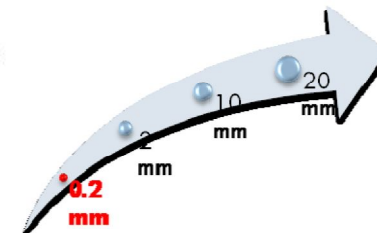
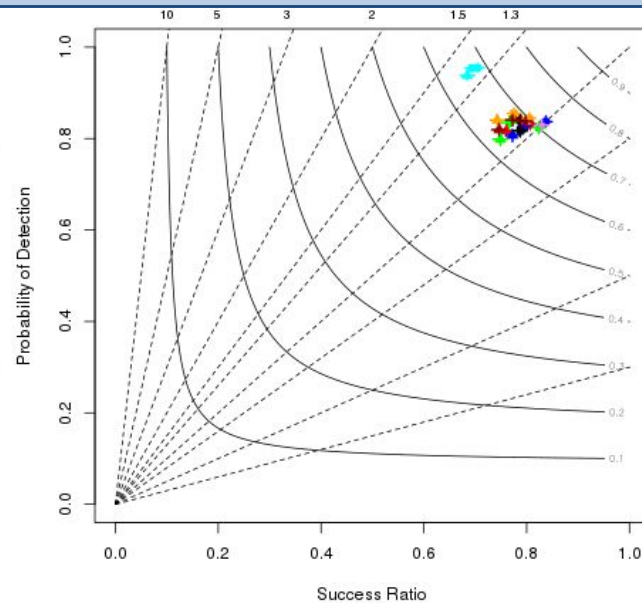
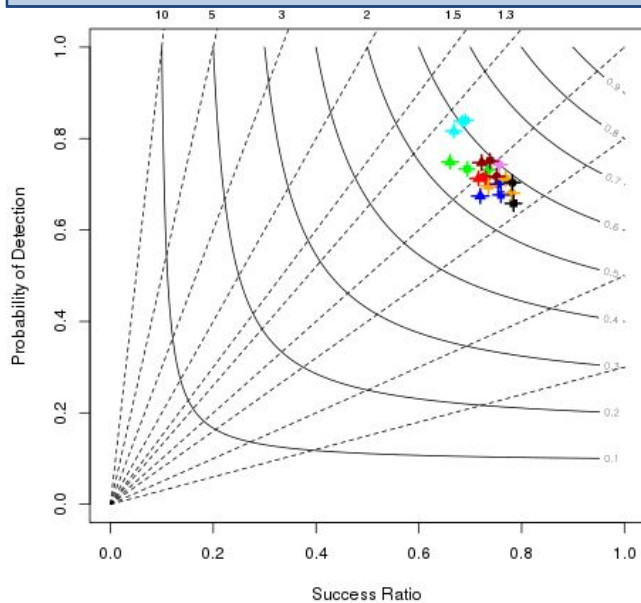
SON2011: Precipitation in 24h - 0.2 mm threshold



Average over area > 0.2 mm/24h

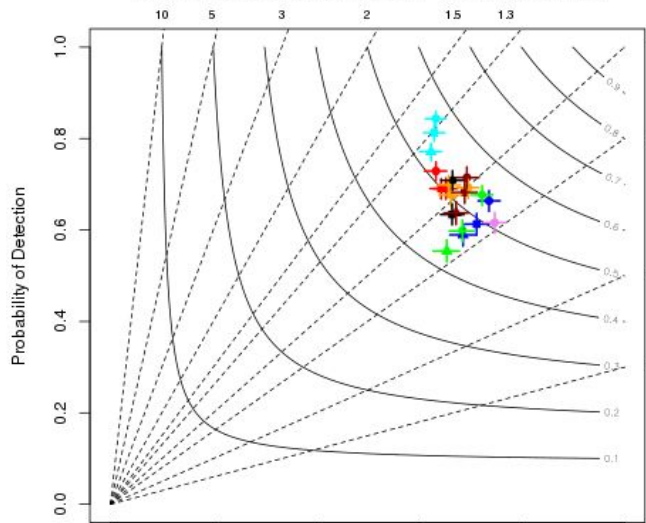
- I7 + 24
- I7 + 48
- △ I7 + 72
- 7 + 24
- 7 + 48
- △ 7 + 72
- EU + 24
- EU + 48
- △ EU + 72
- ME + 24
- ME + 48
- △ ME + 72
- I2 + 24
- I2 + 48
- △ I2 + 72
- IT + 24
- GR + 24
- △ GR + 48
- GR + 72
- ECMWF + 24
- ECMWF + 48
- △ ECMWF + 72

The difference between models are small. Scores are generally better (the verification methodology used less penalizes positioning errors - see COSMO-I7 and COSMO-ME: their verification region is unchanged)

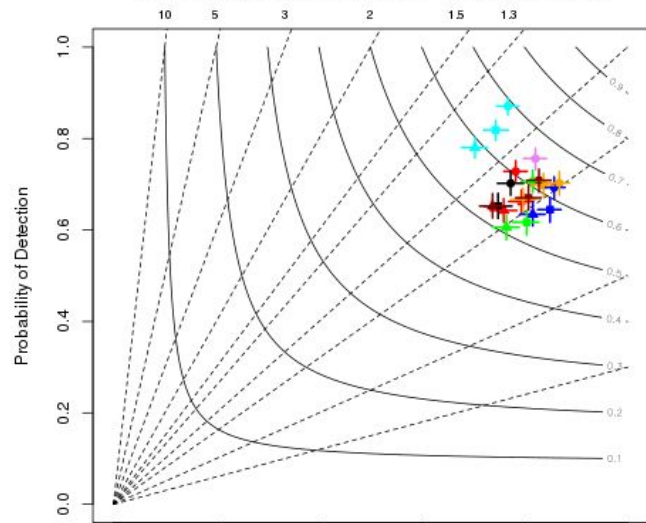




JJA2011: Precipitation in 24h - 2.0 mm threshold



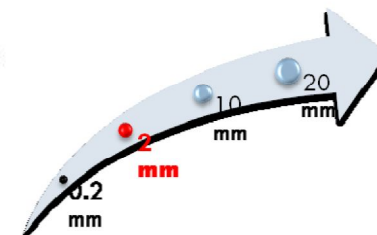
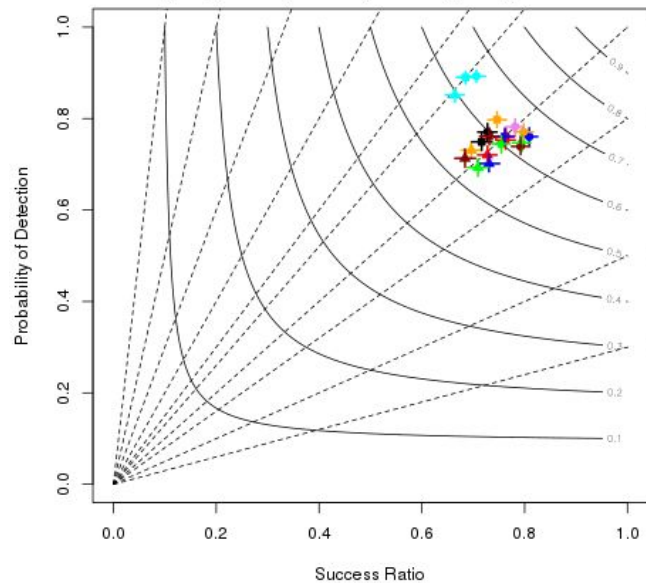
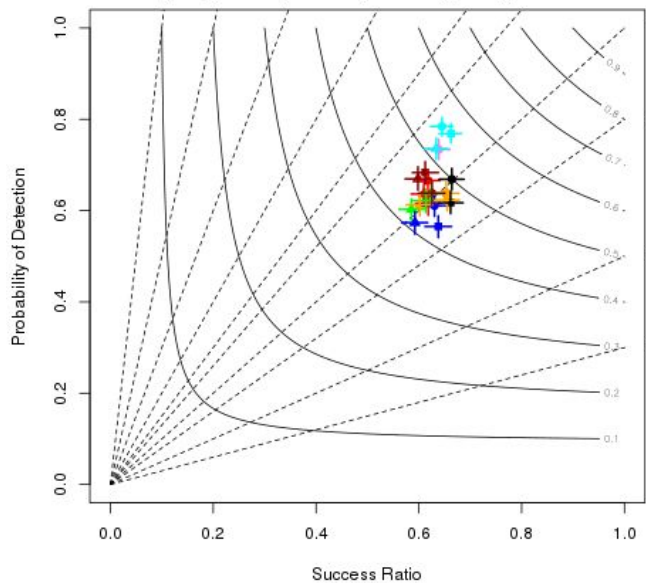
SON2011: Precipitation in 24h - 2.0 mm threshold



Average over area > 2 mm/24h

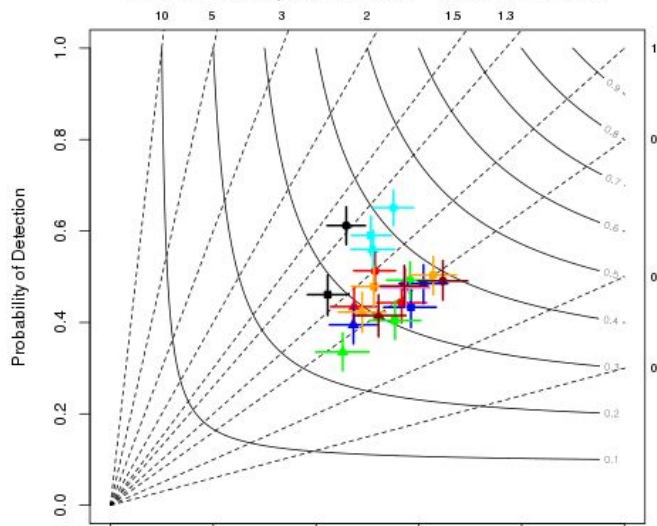
FBI near 1 in DJF and MAM, tendency to underforecast for COSMO-7 and COSMO-EU, in particular during JJA. General underestimation in SON. Note ECMWF overestimation of the number of events in spite of high POD. Good performance of all COSMO models.

- I7 + 24
- I7 + 48
- △ I7 + 72
- 7 + 24
- 7 + 48
- △ 7 + 72
- EU + 24
- EU + 48
- △ EU + 72
- ME + 24
- ME + 48
- △ ME + 72
- I2 + 24
- I2 + 48
- △ I2 + 72
- IT + 24
- GR + 24
- △ GR + 48
- GR + 72
- ECMWF + 24
- ECMWF + 48
- △ ECMWF + 72

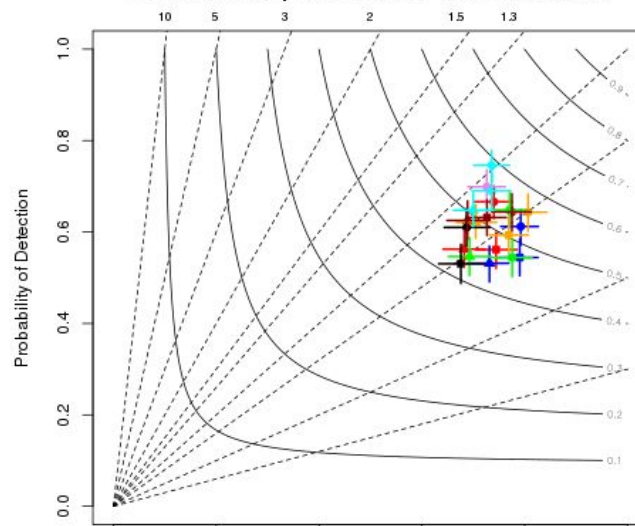




JJA2011: Precipitation in 24h - 10.0 mm threshold



SON2011: Precipitation in 24h - 10.0 mm threshold



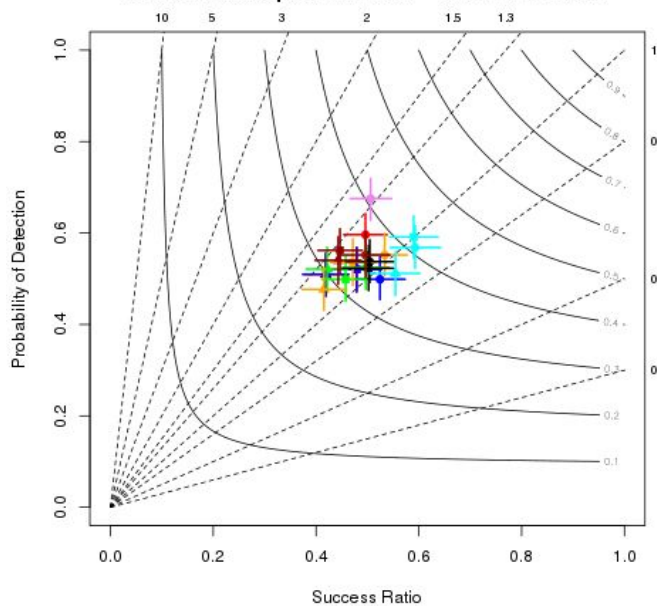
Average over area > 10 mm/24h

General decrease in FBI. Over estimation in DJF could be linked with errors in observation because of snow precipitations. POD and TS have good values. COSMO-IT very good performance in MAM.

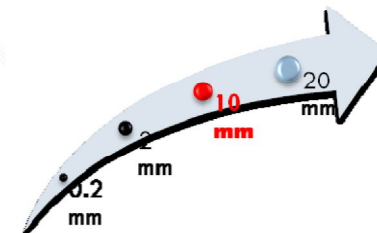
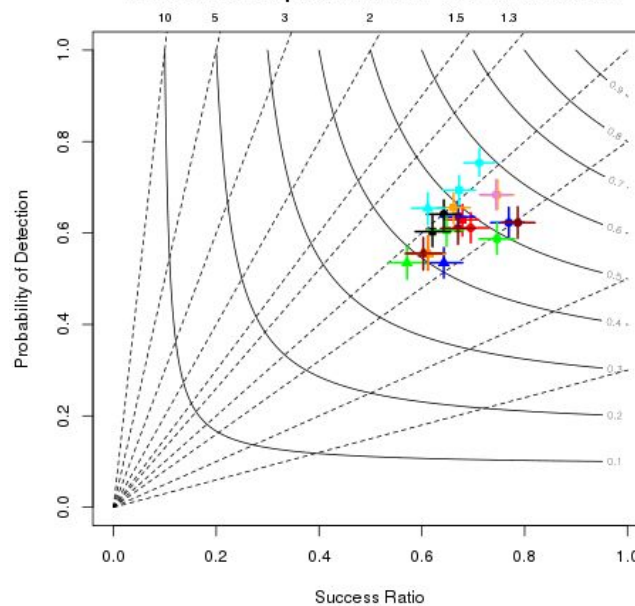
- I7 + 24
- I7 + 48
- △ I7 + 72
- 7 + 24
- 7 + 48
- △ 7 + 72
- EU + 24
- EU + 48
- △ EU + 72
- ME + 24
- ME + 48
- △ ME + 72
- I2 + 24
- I2 + 48
- △ I2 + 72
- IT + 24
- GR + 24
- △ GR + 48
- GR + 72
- ECMWF + 24
- ECMWF + 48
- △ ECMWF + 72



DJF2012: Precipitation in 24h - 10.0 mm threshold

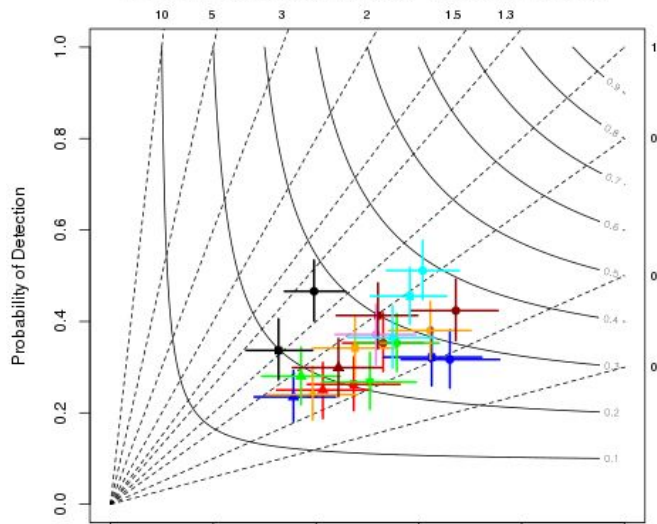


MAM2012: Precipitation in 24h - 10.0 mm threshold

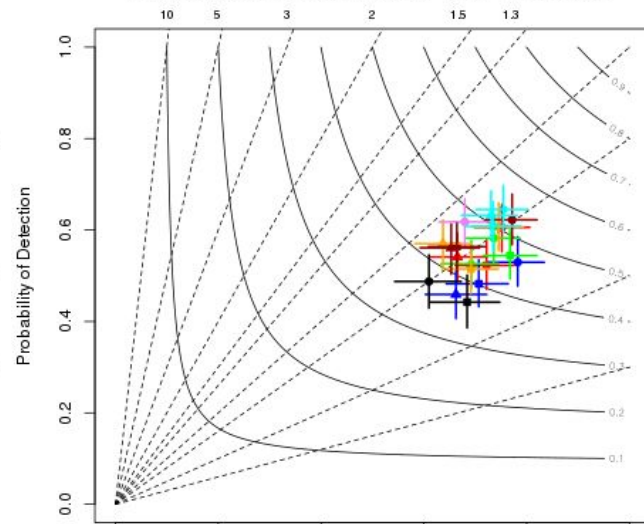




JJA2011: Precipitation in 24h - 20.0 mm treshold



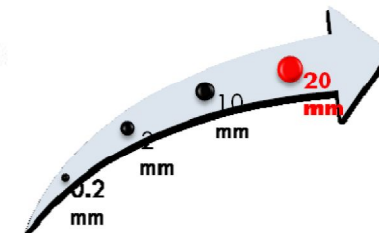
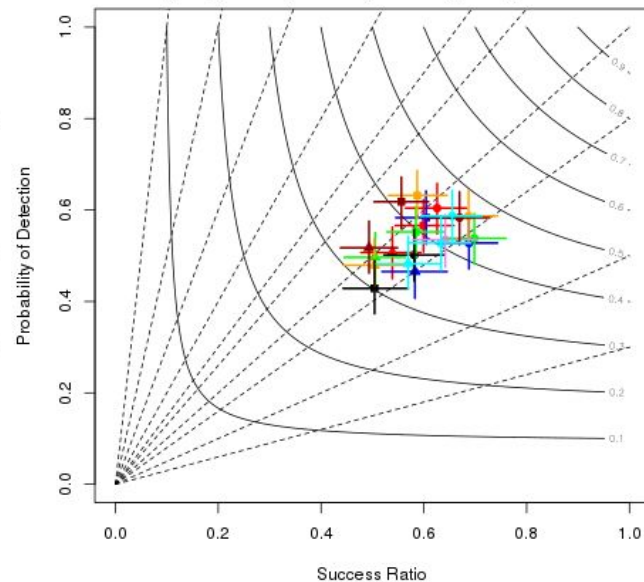
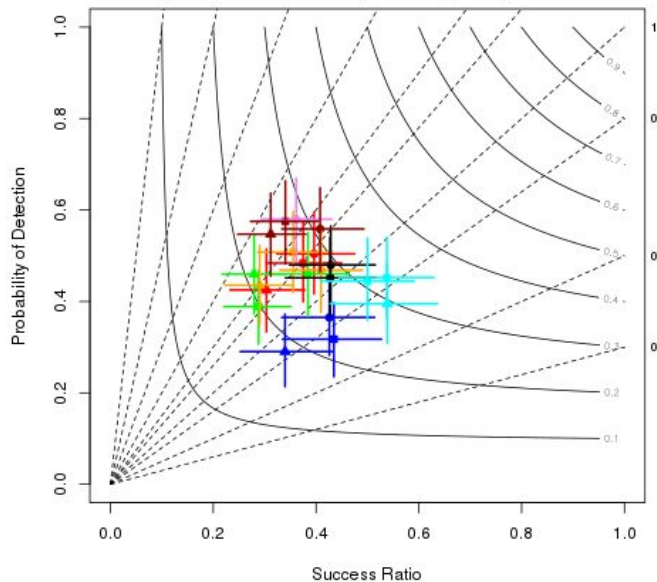
SON2011: Precipitation in 24h - 20.0 mm treshold

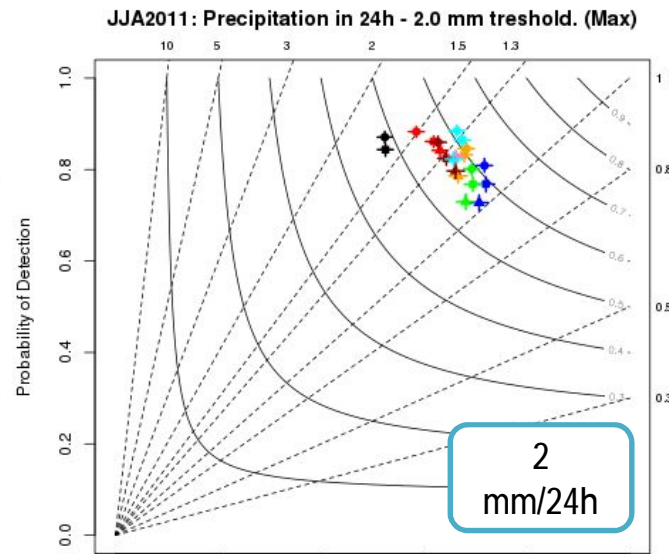
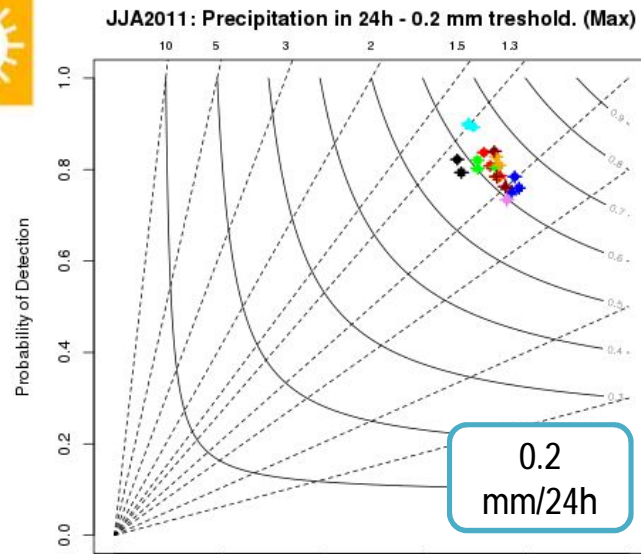


Average over area > 20 mm/24h

Further underestimation of FBI , even if in DJF most of the models overestimates, except COMSO-7 and ECMWF (remember problems in observation because of snow precipitations) . Increase in the number of False Alarms.

- I7 + 24
- I7 + 48
- △ I7 + 72
- 7 + 24
- 7 + 48
- △ 7 + 72
- EU + 24
- EU + 48
- △ EU + 72
- ME + 24
- ME + 48
- △ ME + 72
- I2 + 24
- I2 + 48
- △ I2 + 72
- IT + 24
- GR + 24
- △ GR + 48
- GR + 72
- ECMWF + 24
- ECMWF + 48
- △ ECMWF + 72

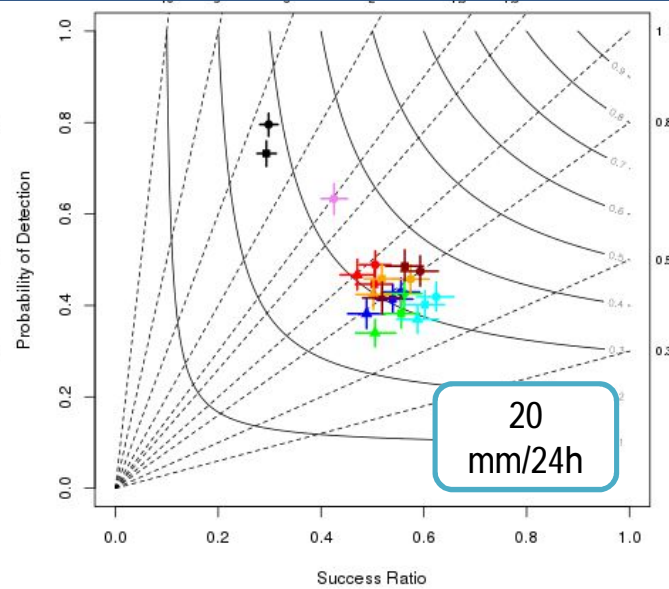
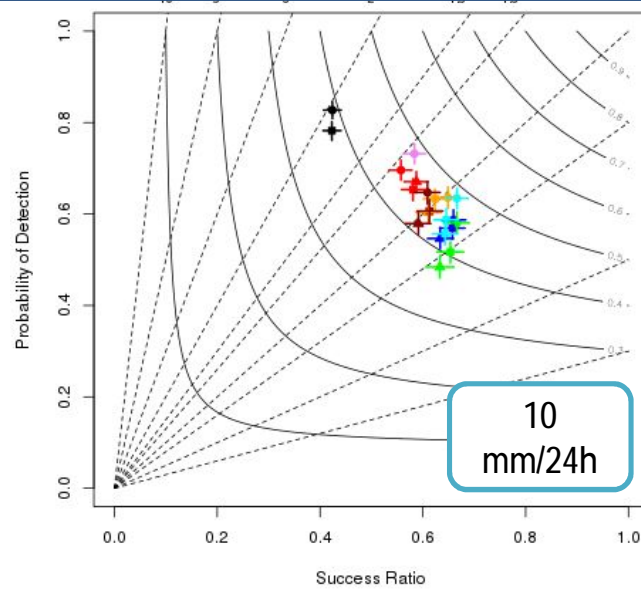




Maximum over area > threshold

- I7 + 24
- I7 + 48
- △ I7 + 72
- 7 + 24
- 7 + 48
- △ 7 + 72
- EU + 24
- EU + 48
- △ EU + 72
- ME + 24
- ME + 48
- △ ME + 72
- I2 + 24
- I2 + 48
- IT + 24
- GR + 24
- GR + 48
- △ GR + 72
- ECMWF + 24
- ECMWF + 48
- △ ECMWF + 72

Differences in models behavior are bigger if we look to the maximum: POD of the 2Km models (I2 and IT) are the highest. COSMO-IT respect to COSMO-I2 has lower FBI and FAR. Increasing in the threshold increases the tendency to underestimation, especially for COSMO-EU, COSMO-7 and ECMWF.



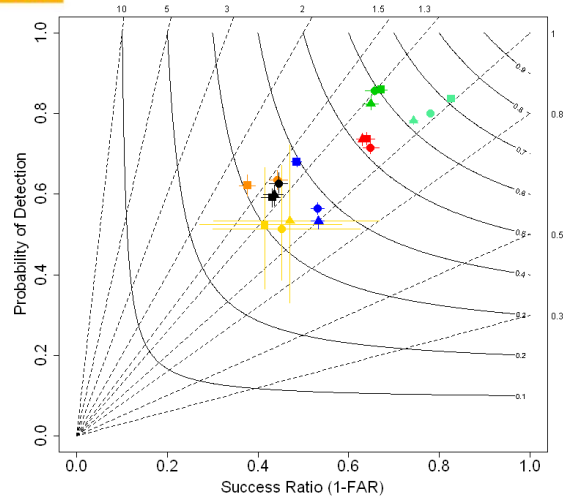
CUMULATION PERIOD: 12 h

- We considered for 12h cumulation period only the second day of forecast:
 - **+24h to +36h**
 - **+36h to +48h**
- Reference threshold:
 - 0.2 mm
 - 2 mm
 - 5 mm
 - 10 mm

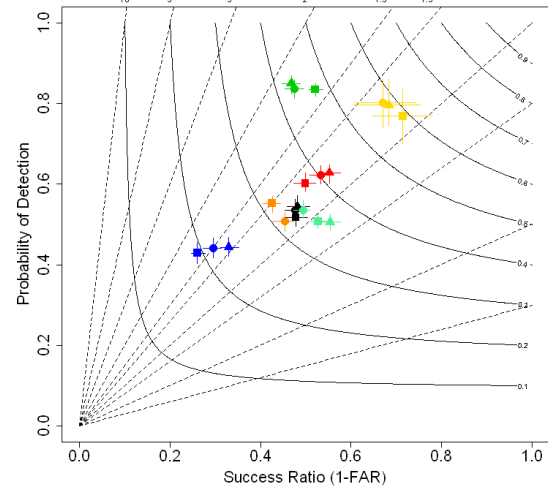




JJA2011: Precipitation in 24h - 0.2mm threshold



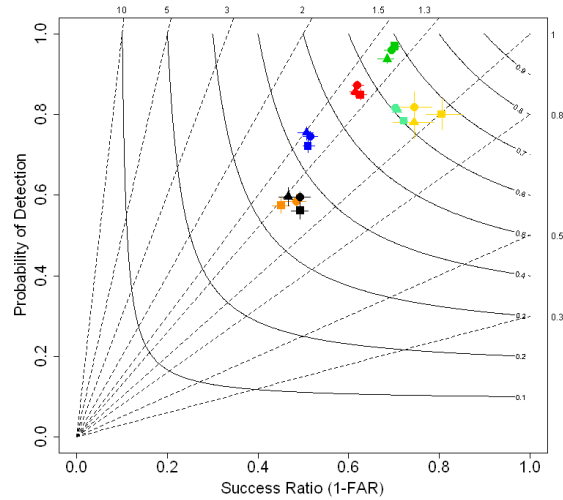
SON2011: Precipitation in 24h - 0.2mm threshold



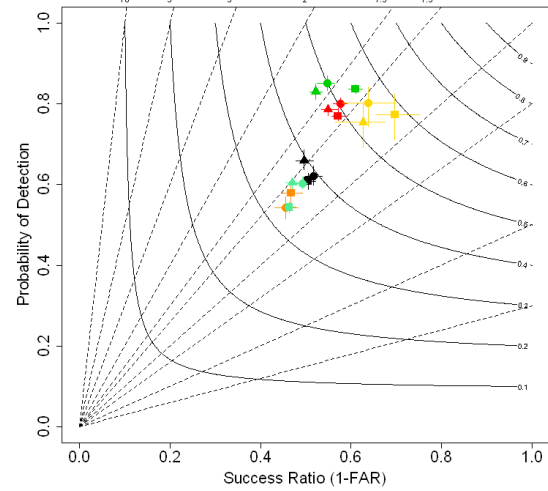
Remember
the 24h
verification



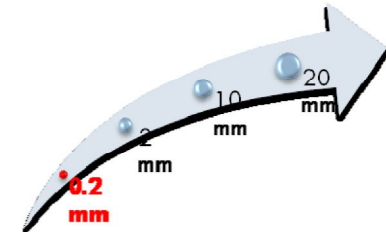
DJF2011-2012: Precipitation in 24h - 0.2mm threshold



MAM2012: Precipitation in 24h - 0.2mm threshold



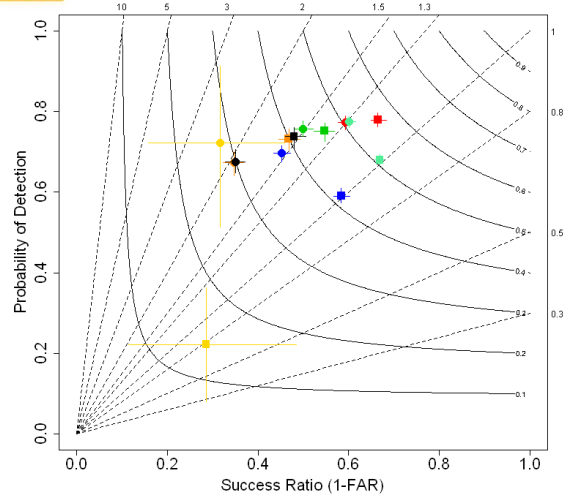
- COSMO-7 + 24
- COSMO-7 + 48
- ▲ COSMO-7 + 72
- COSMO-GR + 24
- COSMO-GR + 48
- ▲ COSMO-GR + 72
- COSMO-I7 + 24
- COSMO-I7 + 48
- ▲ COSMO-I7 + 72
- COSMO-ME + 24
- COSMO-ME + 48
- ▲ COSMO-ME + 72
- COSMO-PL + 24
- COSMO-PL + 48
- ▲ COSMO-PL + 72
- COSMO-EU + 24
- COSMO-EU + 48
- ▲ COSMO-EU + 72
- COSMO-RO + 24
- COSMO-RO + 48
- ▲ COSMO-RO + 72



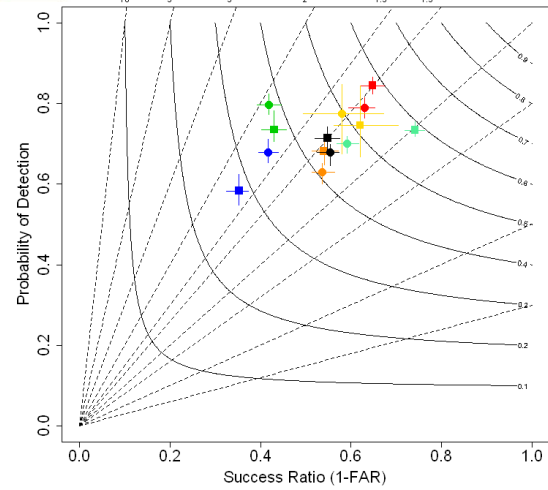
THUNDER



JJA2011: Precipitation in 12h - 0.2mm threshold



SON2011: Precipitation in 12h - 0.2mm threshold

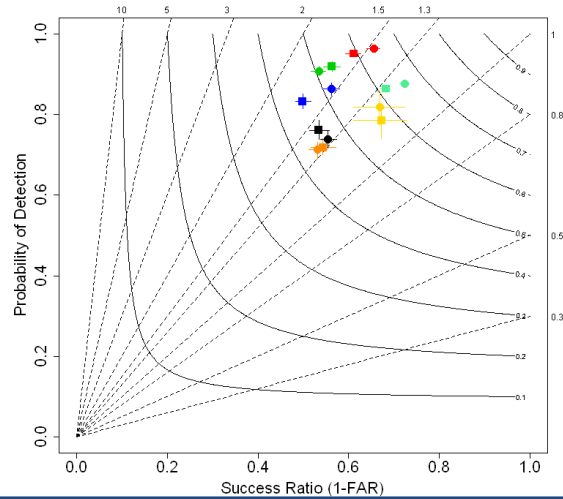


FORECAST DAY 2

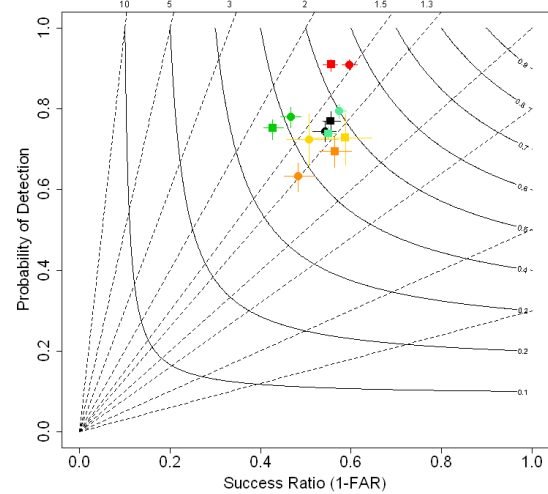
- COSMO-7 + 36
- COSMO-7 + 48
- COSMO-GR + 36
- COSMO-GR + 48
- COSMO-I7 + 36
- COSMO-I7 + 48
- COSMO-ME + 36
- COSMO-ME + 48
- COSMO-PL + 36
- COSMO-PL + 48
- COSMO-EU + 36
- COSMO-EU + 48
- COSMO-RO + 36
- COSMO-RO + 48



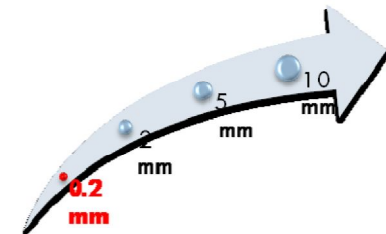
DJF2011-2012: Precipitation in 12h - 0.2mm threshold



MAM2012: Precipitation in 12h - 0.2mm threshold

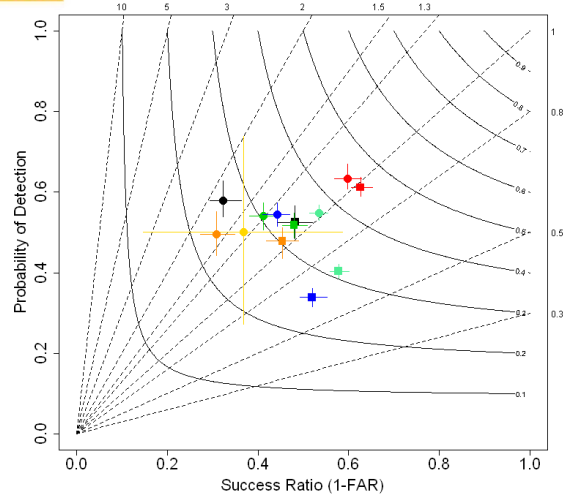


Respect to the 24h verification for this threshold (\approx yes/no rain), the number of events is overestimated but the POD and TS are better.

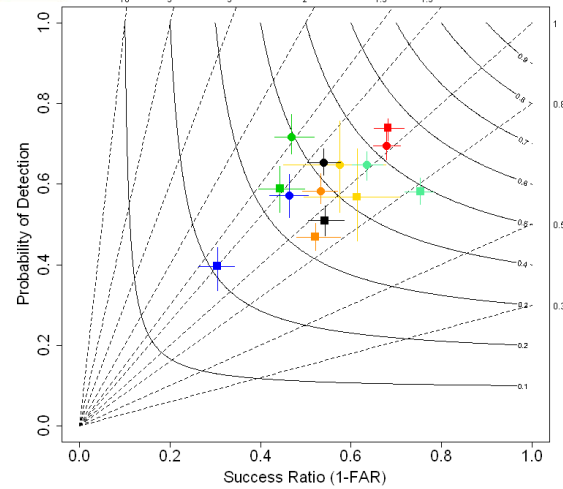




JJA2011: Precipitation in 12h - 2mm threshold



SON2011: Precipitation in 12h - 2mm threshold

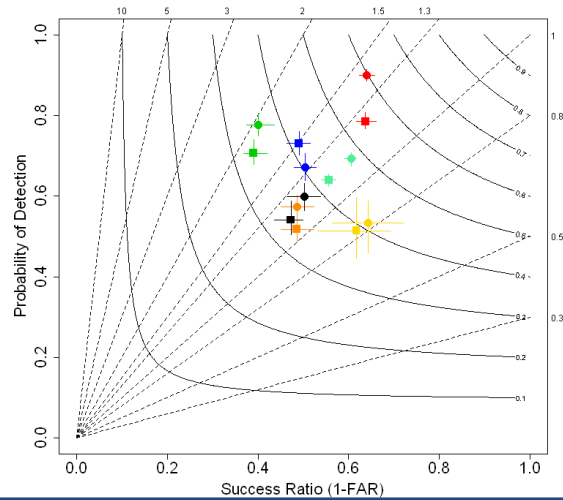


FORECAST DAY 2

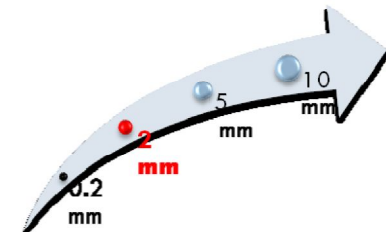
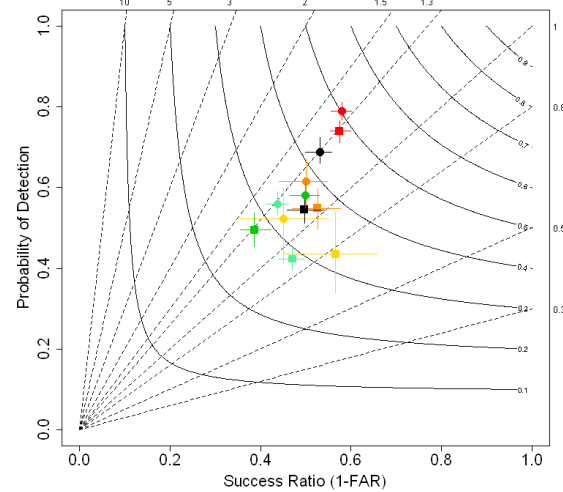
- COSMO-7 + 36
- COSMO-7 + 48
- COSMO-GR + 36
- COSMO-GR + 48
- COSMO-I7 + 36
- COSMO-I7 + 48
- COSMO-ME + 36
- COSMO-ME + 48
- COSMO-PL + 36
- COSMO-PL + 48
- COSMO-EU + 36
- COSMO-EU + 48
- COSMO-RO + 36
- COSMO-RO + 48



DJF2011-2012: Precipitation in 12h - 2mm threshold



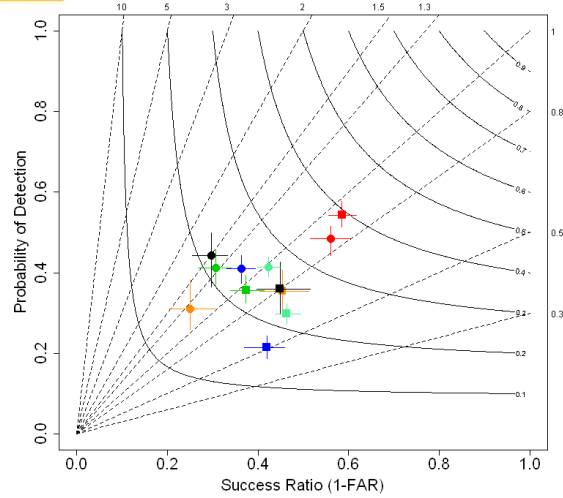
MAM2012: Precipitation in 12h - 2mm threshold



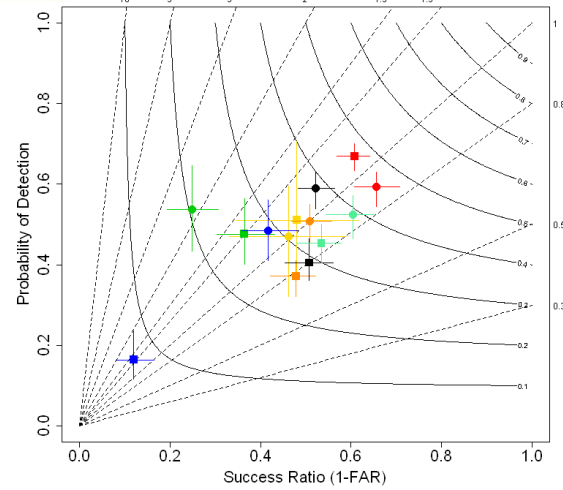
Slight worsening of the scores. Very good performance for COSMO-7 in JJA and SON, still good in DJF and MAM but in these season the overestimation is very pronounced.



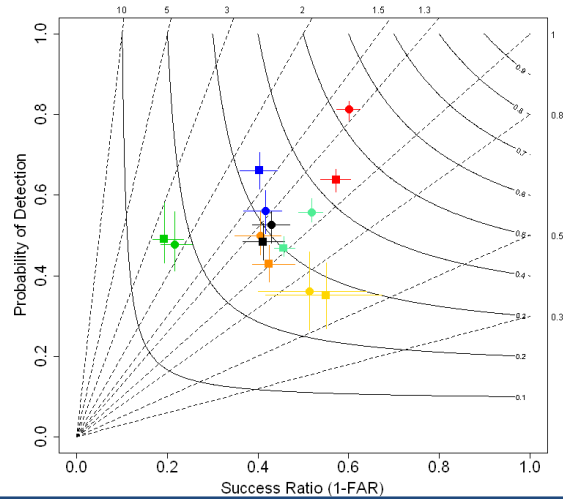
JJA2011: Precipitation in 12h - 5mm threshold



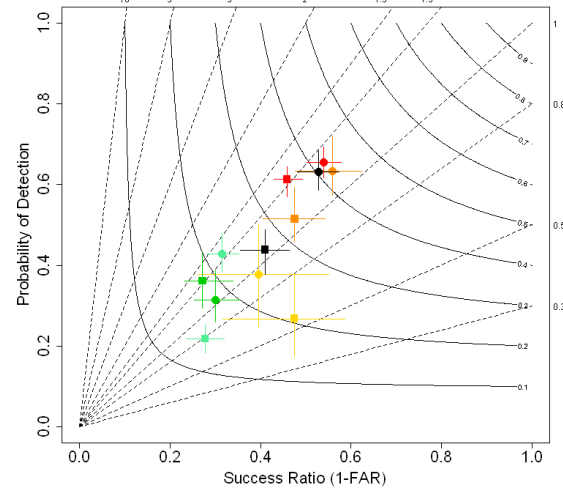
SON2011: Precipitation in 12h - 5mm threshold



DJF2011-2012: Precipitation in 12h - 5mm threshold



MAM2012: Precipitation in 12h - 5mm threshold

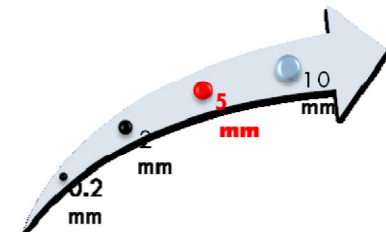


FORECAST DAY 2

- COSMO-7 + 36
- COSMO-7 + 48
- COSMO-GR + 36
- COSMO-GR + 48
- COSMO-I7 + 36
- COSMO-I7 + 48
- COSMO-ME + 36
- COSMO-ME + 48
- COSMO-PL + 36
- COSMO-PL + 48
- COSMO-EU + 36
- COSMO-EU + 48
- COSMO-RO + 36
- COSMO-RO + 48



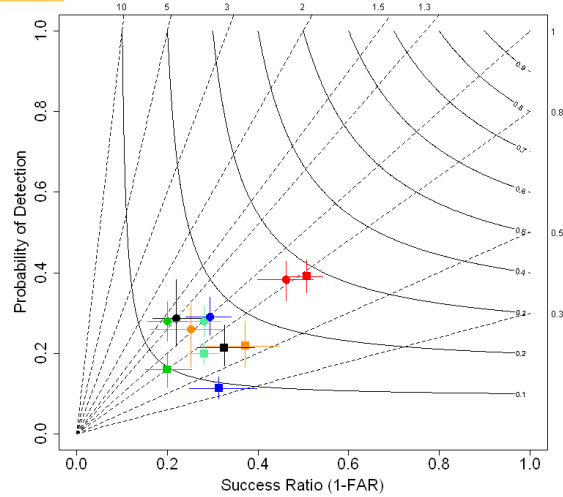
Further worsening of the scores as in the 24h cumulation. Differences between the first 12 hours and the second 12 hours of the days are evident.



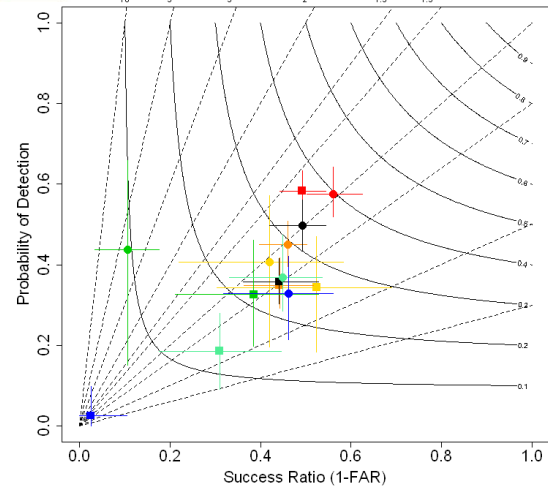
THRESHOLD



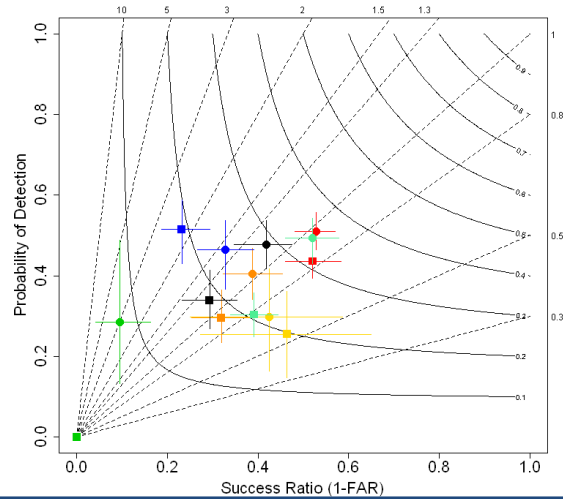
JJA2011: Precipitation in 12h - 10mm threshold



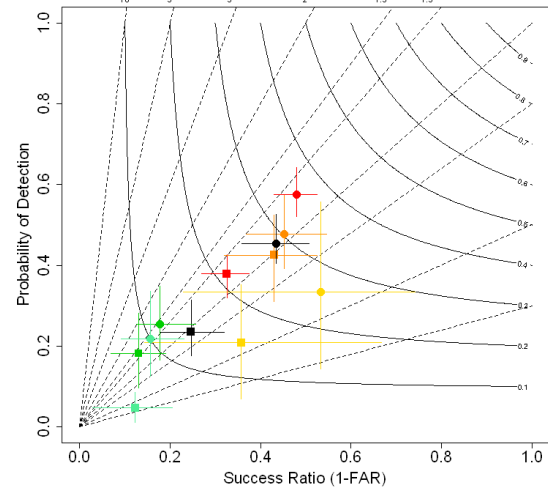
SON2011: Precipitation in 12h - 10mm threshold



DJF2011-2012: Precipitation in 12h - 10mm threshold



MAM2012: Precipitation in 12h - 10mm threshold

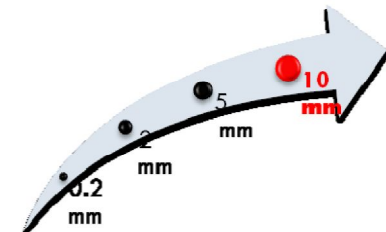


FORECAST DAY 2

- COSMO-7 + 36
- COSMO-7 + 48
- COSMO-GR + 36
- COSMO-GR + 48
- COSMO-I7 + 36
- COSMO-I7 + 48
- COSMO-ME + 36
- COSMO-ME + 48
- COSMO-PL + 36
- COSMO-PL + 48
- COSMO-EU + 36
- COSMO-EU + 48
- COSMO-RO + 36
- COSMO-RO + 48



Further worsening of the scores in particular in terms of increasing false alarms. Good performance of COSMO-7. Pronounced difference between +36 and +48, especially in MAM.



THRESHOLD

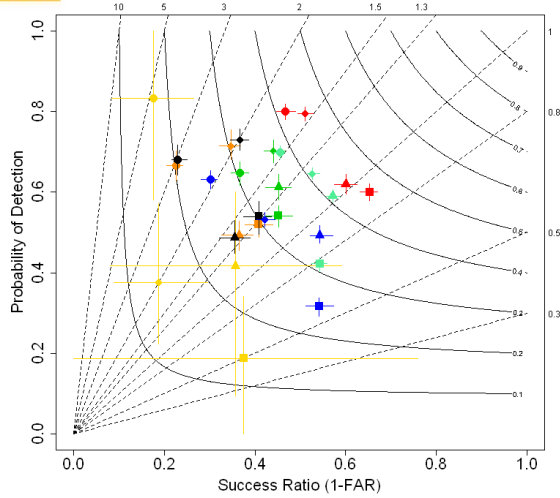
CUMULATION PERIOD: 6 h

- We considered for the 6h cumulation period only the second day of forecast:
 - + 24h to +30h
 - + 30h to +36h
 - + 36h to +42h
 - + 42h to +48h
- Reference threshold:
 - 0.2 mm
 - 2 mm
 - 5 mm
 - 10 mm

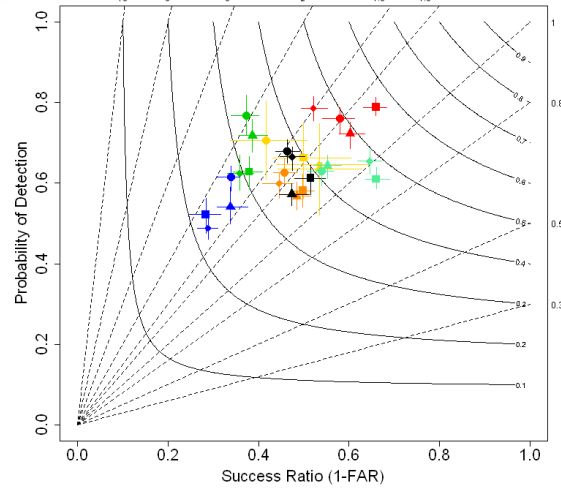




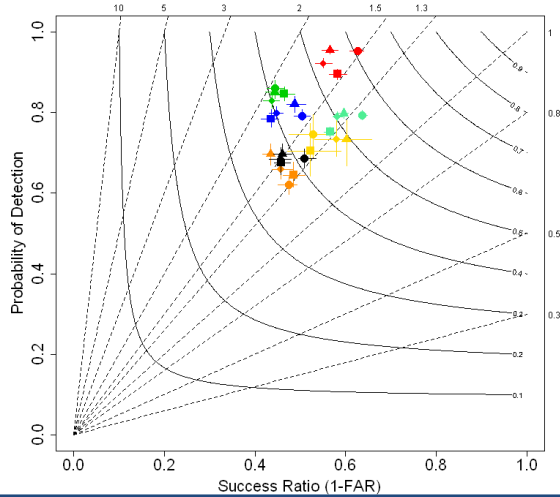
JJA2011: Precipitation in 6h - 0.2mm threshold



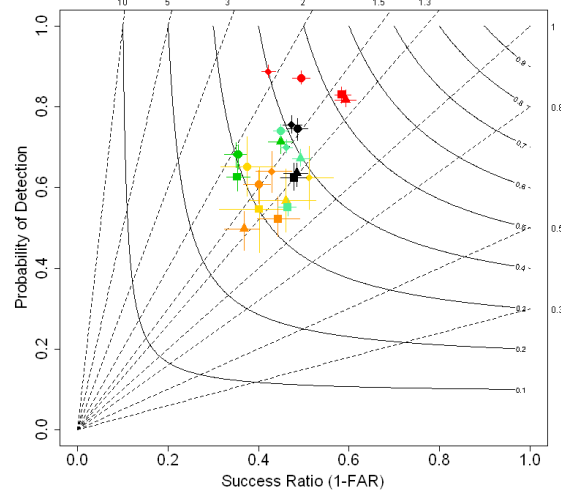
SON2011: Precipitation in 6h - 0.2mm threshold



DJF2011-2012: Precipitation in 6h - 0.2mm threshold



MAM2012: Precipitation in 6h - 0.2mm threshold

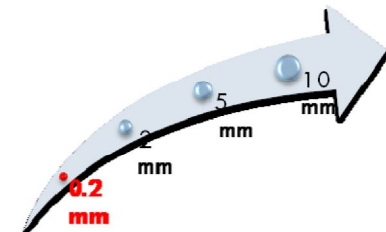


FORECAST DAY 2

- ▲ COSMO-7 + 30
- COSMO-7 + 36
- ◆ COSMO-7 + 42
- COSMO-7 + 48
- ▲ COSMO-GR + 30
- COSMO-GR + 36
- ◆ COSMO-GR + 42
- COSMO-GR + 48
- ▲ COSMO-I7 + 30
- COSMO-I7 + 36
- ◆ COSMO-I7 + 42
- COSMO-I7 + 48
- ▲ COSMO-ME + 30
- COSMO-ME + 36
- ◆ COSMO-ME + 42
- COSMO-ME + 48
- ▲ COSMO-PL + 30
- COSMO-PL + 36
- ◆ COSMO-PL + 42
- COSMO-PL + 48
- ▲ COSMO-EU + 30
- COSMO-EU + 36
- ◆ COSMO-EU + 42
- COSMO-EU + 48
- ▲ COSMO-RO + 30
- COSMO-RO + 36
- ◆ COSMO-RO + 42
- COSMO-RO + 48



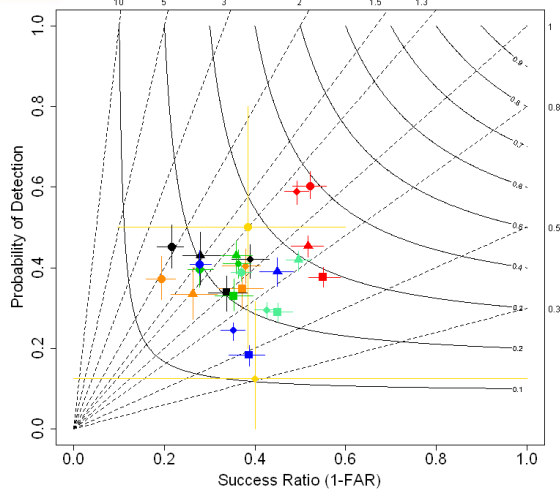
The difference between the period of the days are bigger in JJA , while in the other season are less pronounced.



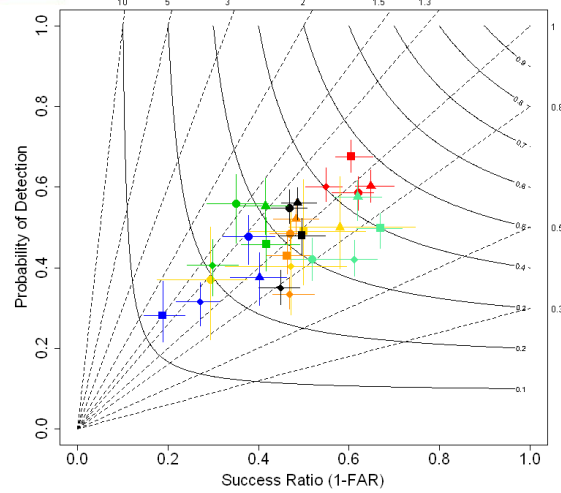
THRESHOLD



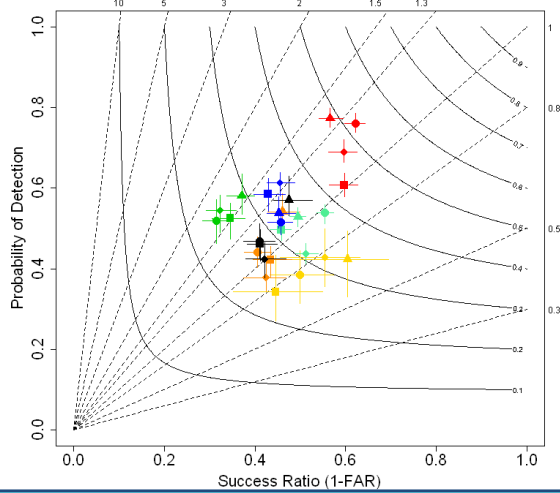
JJA2011: Precipitation in 6h - 2mm threshold



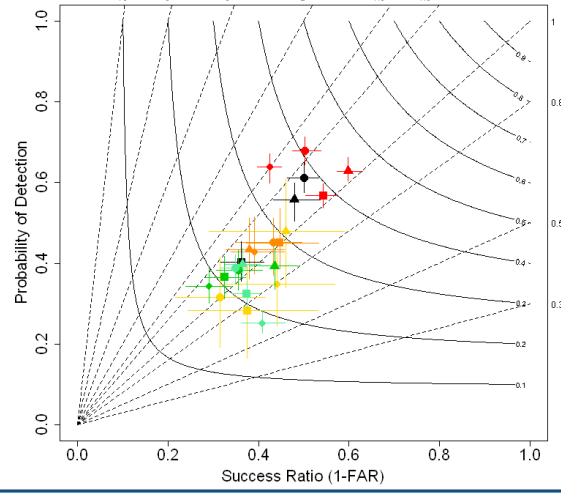
SON2011: Precipitation in 6h - 2mm threshold



DJF2011-2012: Precipitation in 6h - 2mm threshold



MAM2012: Precipitation in 6h - 2mm threshold

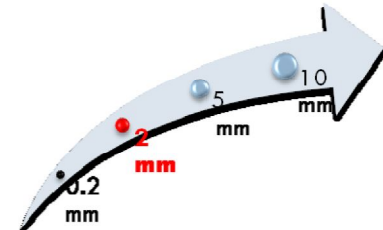


FORECAST DAY 2

- ▲ COSMO-7 + 30
- COSMO-7 + 36
- ◆ COSMO-7 + 42
- COSMO-7 + 48
- ▲ COSMO-GR + 30
- COSMO-GR + 36
- ◆ COSMO-GR + 42
- COSMO-GR + 48
- ▲ COSMO-I7 + 30
- COSMO-I7 + 36
- ◆ COSMO-I7 + 42
- COSMO-I7 + 48
- ▲ COSMO-ME + 30
- COSMO-ME + 36
- ◆ COSMO-ME + 42
- COSMO-ME + 48
- ▲ COSMO-PL + 30
- COSMO-PL + 36
- ◆ COSMO-PL + 42
- COSMO-PL + 48
- ▲ COSMO-EU + 30
- COSMO-EU + 36
- ◆ COSMO-EU + 42
- COSMO-EU + 48
- ▲ COSMO-RO + 30
- COSMO-RO + 36
- ◆ COSMO-RO + 42
- COSMO-RO + 48



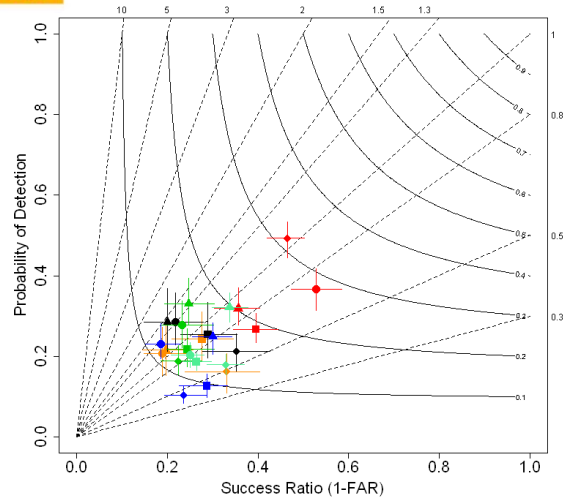
Same trend with the increasing threshold as for the other cumulating periods.



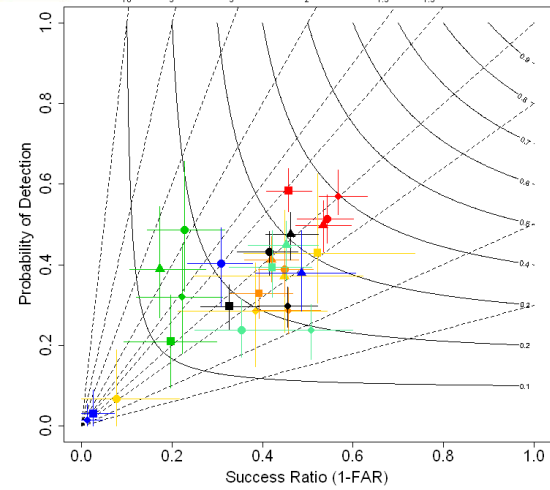
THRESHOLD



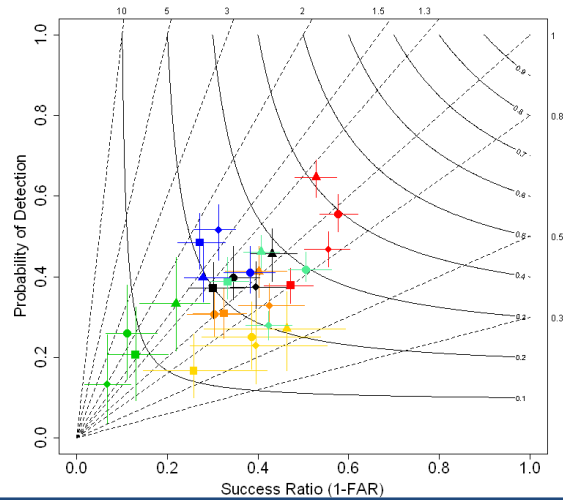
JJA2011: Precipitation in 6h - 5mm threshold



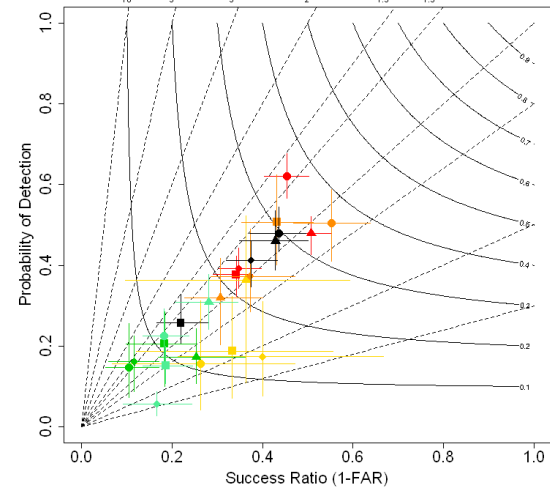
SON2011: Precipitation in 6h - 5mm threshold



DJF2011-2012: Precipitation in 6h - 5mm threshold



MAM2012: Precipitation in 6h - 5mm threshold

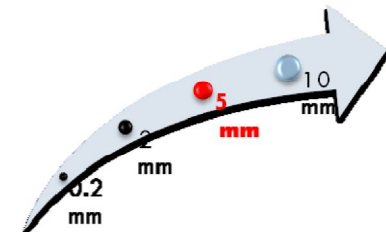


FORECAST DAY 2

- ▲ COSMO-7 + 30
- COSMO-7 + 36
- ◆ COSMO-7 + 42
- COSMO-7 + 48
- ▲ COSMO-GR + 30
- COSMO-GR + 36
- ◆ COSMO-GR + 42
- COSMO-GR + 48
- ▲ COSMO-I7 + 30
- COSMO-I7 + 36
- ◆ COSMO-I7 + 42
- COSMO-I7 + 48
- ▲ COSMO-ME + 30
- COSMO-ME + 36
- ◆ COSMO-ME + 42
- COSMO-ME + 48
- ▲ COSMO-PL + 30
- COSMO-PL + 36
- ◆ COSMO-PL + 42
- COSMO-PL + 48
- ▲ COSMO-EU + 30
- COSMO-EU + 36
- ◆ COSMO-EU + 42
- COSMO-EU + 48
- ▲ COSMO-RO + 30
- COSMO-RO + 36
- ◆ COSMO-RO + 42
- COSMO-RO + 48



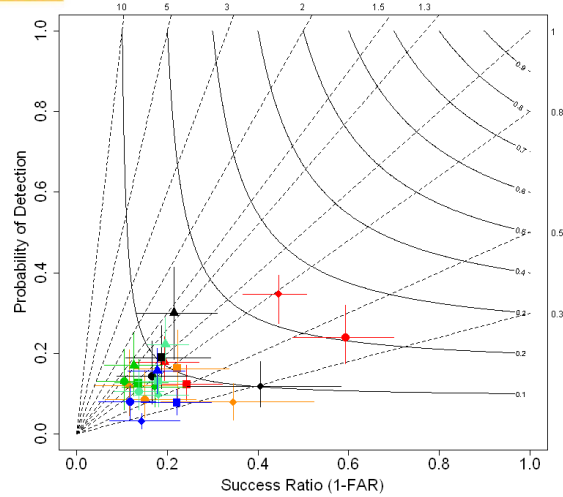
Same trend with the increasing threshold as for the other cumulating periods.



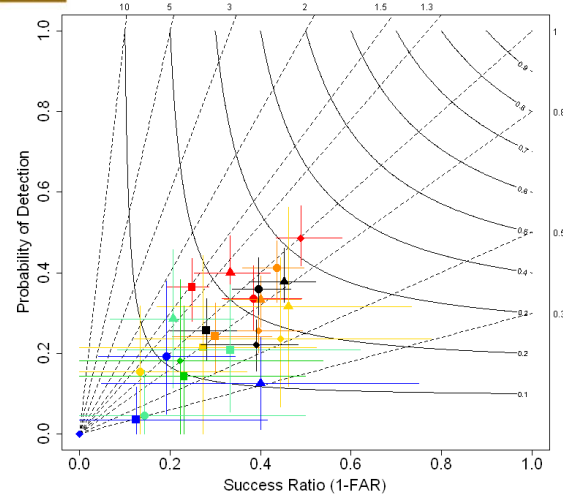
THRESHOLD



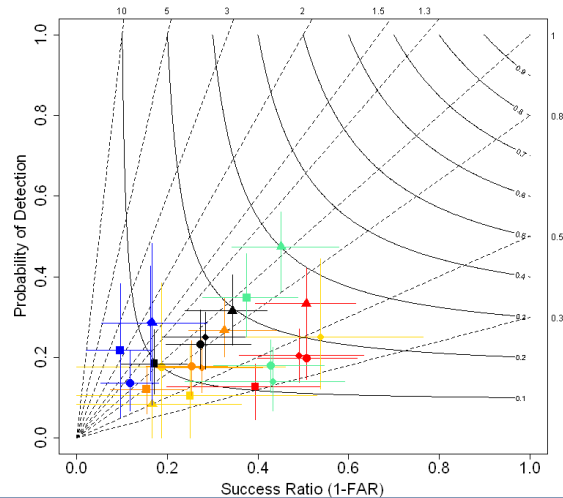
JJA2011: Precipitation in 6h - 10mm threshold



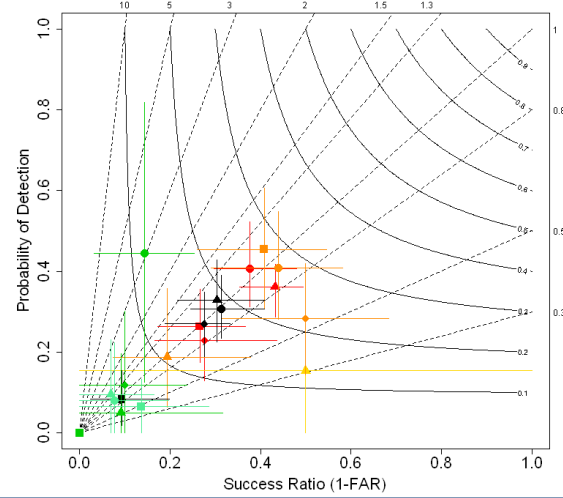
SON2011: Precipitation in 6h - 10mm threshold



DJF2011-2012: Precipitation in 6h - 10mm threshold

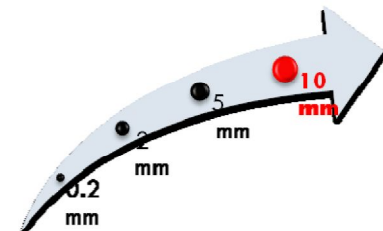


MAM2012: Precipitation in 6h - 10mm threshold



FORECAST DAY 2

- ▲ COSMO-7 + 30
- COSMO-7 + 36
- ◆ COSMO-7 + 42
- COSMO-7 + 48
- ▲ COSMO-GR + 30
- COSMO-GR + 36
- ◆ COSMO-GR + 42
- COSMO-GR + 48
- ▲ COSMO-I7 + 30
- COSMO-I7 + 36
- ◆ COSMO-I7 + 42
- COSMO-I7 + 48
- ▲ COSMO-ME + 30
- COSMO-ME + 36
- ◆ COSMO-ME + 42
- COSMO-ME + 48
- ▲ COSMO-PL + 30
- COSMO-PL + 36
- ◆ COSMO-PL + 42
- COSMO-PL + 48
- ▲ COSMO-EU + 30
- COSMO-EU + 36
- ◆ COSMO-EU + 42
- COSMO-EU + 48
- ▲ COSMO-RO + 30
- COSMO-RO + 36
- ◆ COSMO-RO + 42
- COSMO-RO + 48



THRESHOLD



Same trend with the increasing threshold as for the other cumulating periods. The sample size is very small and the scores can vary a lot.

CONCLUSION

- To be discussed together!

