VERIFICATION OF COSMO PL 2.8 km and 7 km
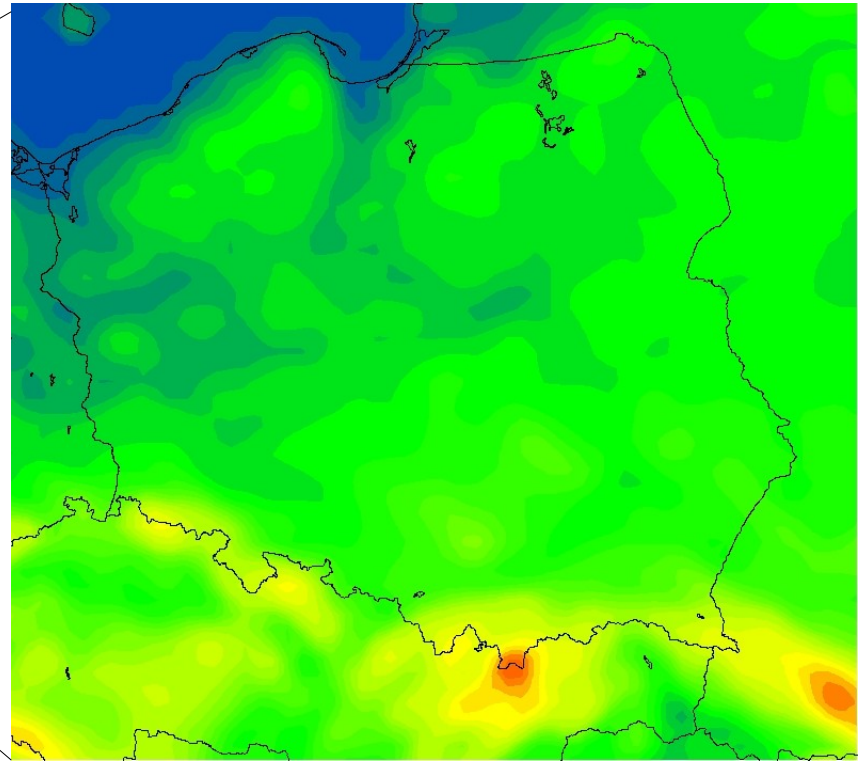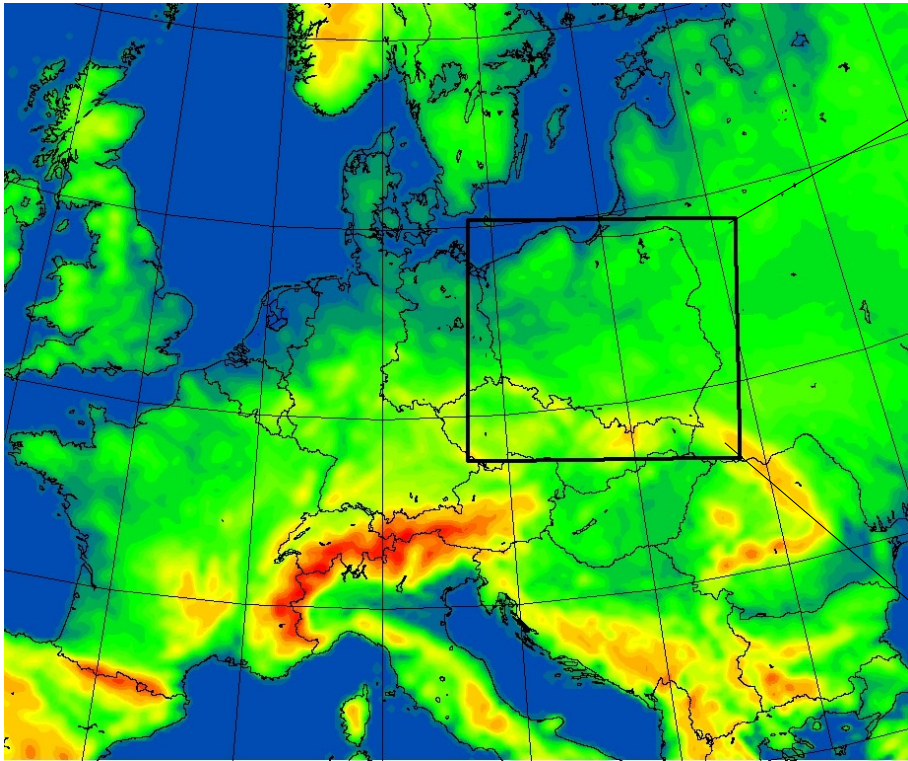
Joanna Linkowska
Andrzej Mazur

IMGW-PIB, Warsaw, Poland

- **MODELS CONFIGURATION**

- **UPPER AIR VERIFICATION**

- **REGIONAL VERIFICATION OF WIND SPEED – WIND ENERGY**

- **CONDITIONAL VERIFICATION**

- **STRATIFIED VERIFICATION of PRECIPITATION**

- **CONCLUSIONS**

MODEL DOMAIN
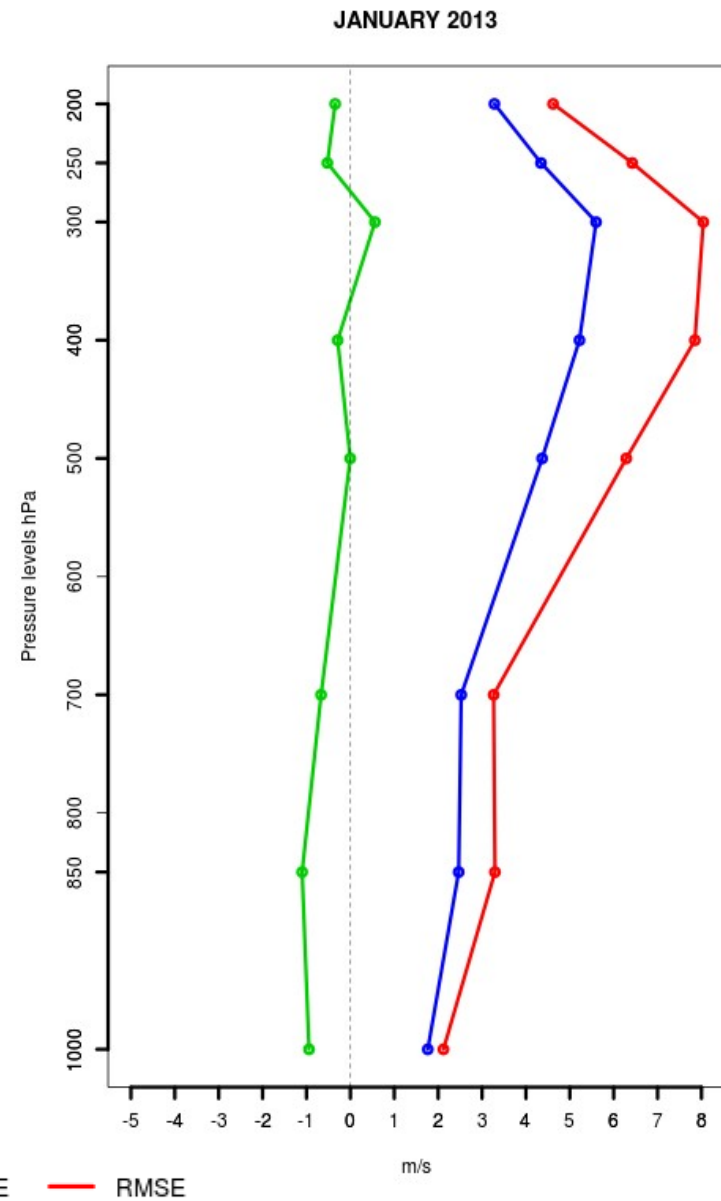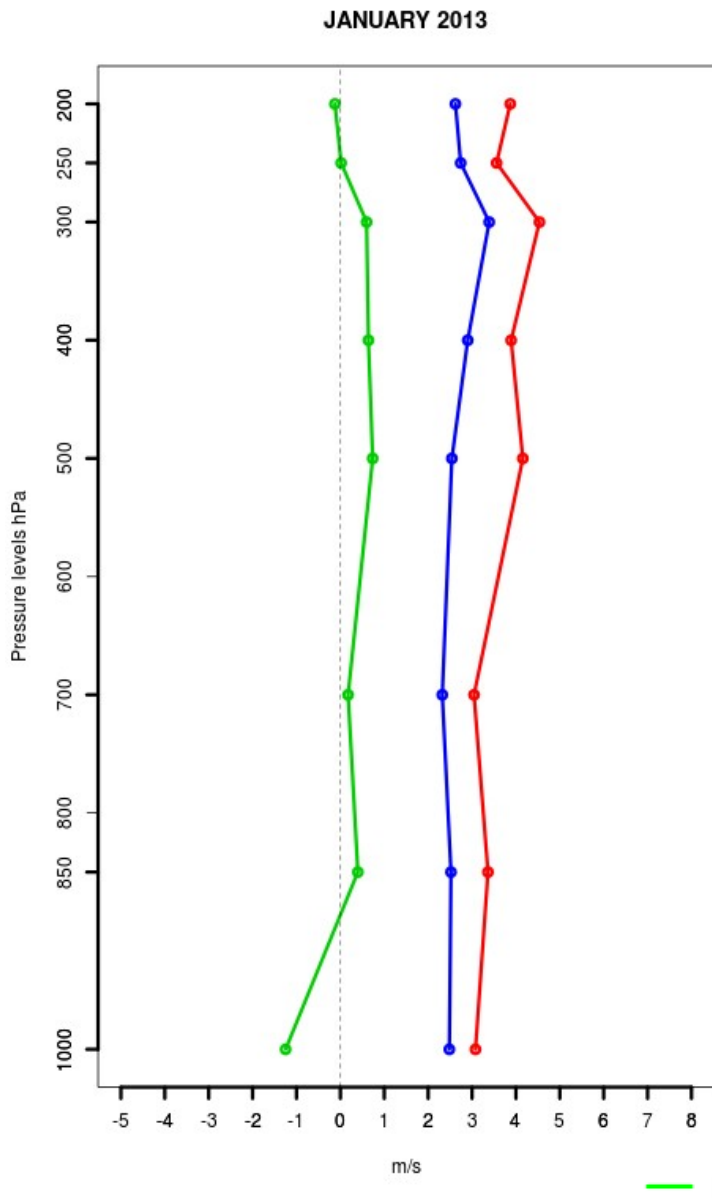
COSMO PL 7

COSMO PL 2.8

MODEL CONFIGURATION

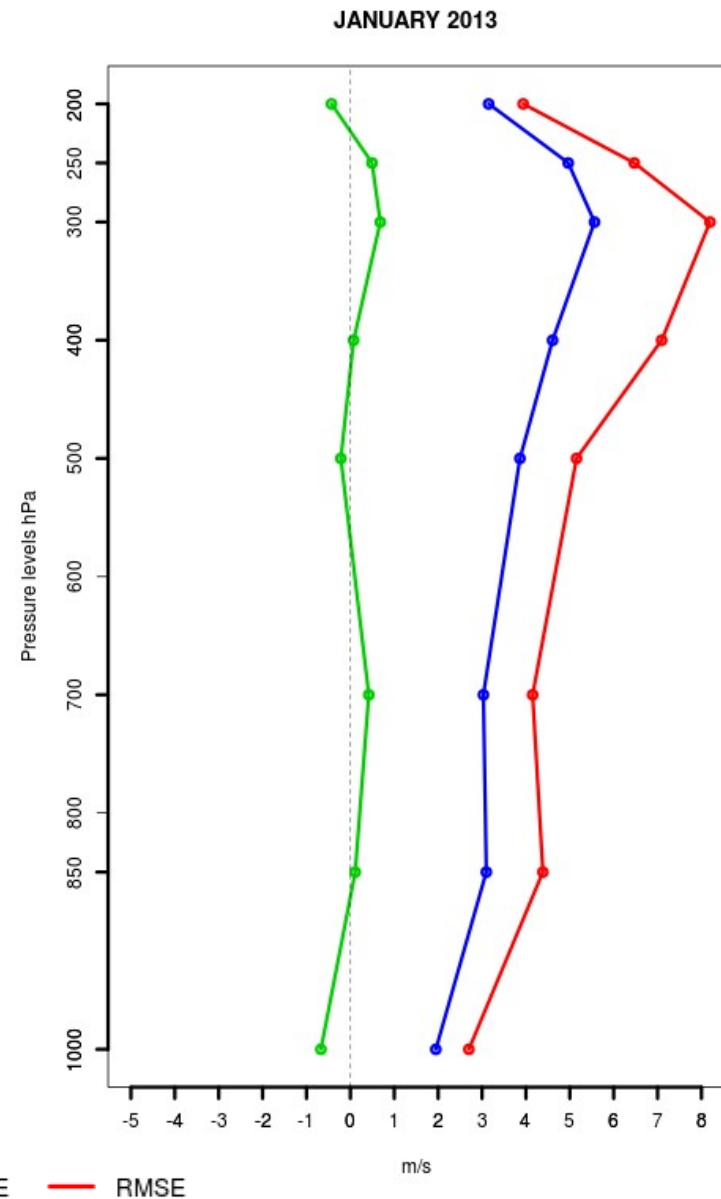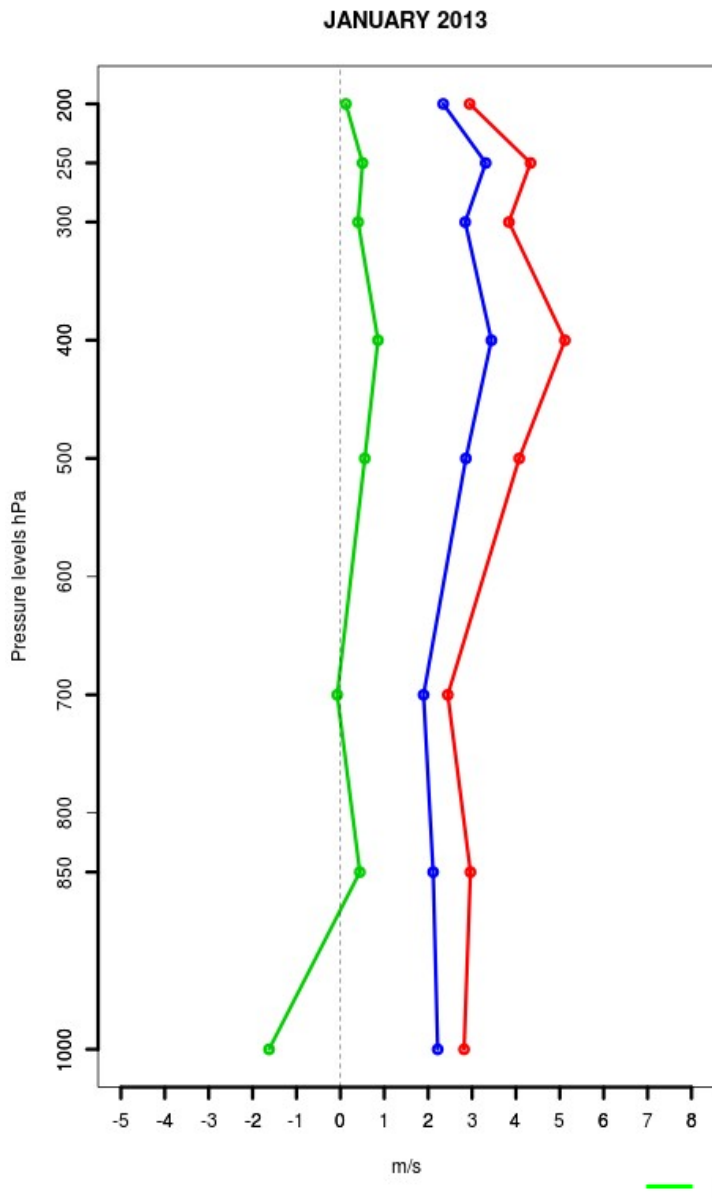|	COSMO 2.8	COSMO 7
Domain Size [grid points]	285 x 255	385 x 321
Time Step [sec]	20	40
Forecast Range [h]	36	78
Initial Time of Model Runs [UTC]	00 12	00 06 12 18
Model Version Run	4.08	4.08
Lateral Boundary Conditions	Interpolated from COSMO-PL 7	Interpolated from GME at 3h intervals
Initial State	Interpolated from COSMO-PL 7	Interpolated from GME
Data Assimilation	none	Nudging scheme
Prognostic Variables	U, V, W, T, P, Q_V, Q_C, Q_I, Q_{VS}, TKE	U, V, W, T, P, PS, Q_V, Q_C, Q_I, Q_{VS}, TKE

Vertical profile of wind speed, ME, MAE and RMSE, January 2013, Forecast run 00 UTC, time lag 24, averaged over 3 TEMP stations
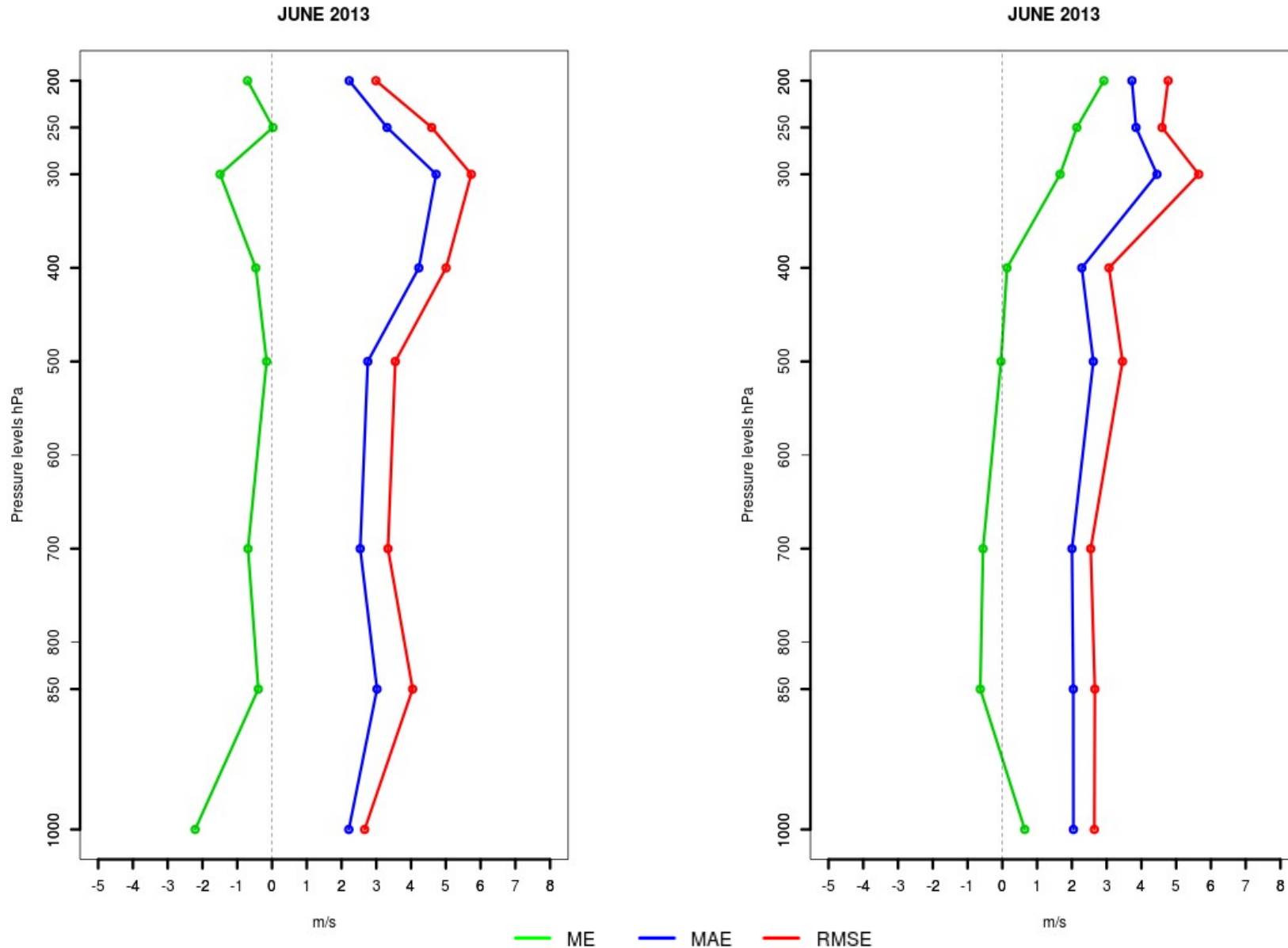## COSMO PL 2.8   COSMO PL 7

JANUARY 2013

JANUARY 2013

ME   MAE   RMSE

Vertical profile of wind speed ME, MAE and RMSE, January 2013, Forecast run 12 UTC, time lag 24, averaged over 3 TEMP stations
COSMO PL 2.8   COSMO PL 7

Vertical profile of wind speed ME, MAE and RMSE, June 2013, Forecast run 00 UTC, time lag 24, averaged over 3 TEMP stations

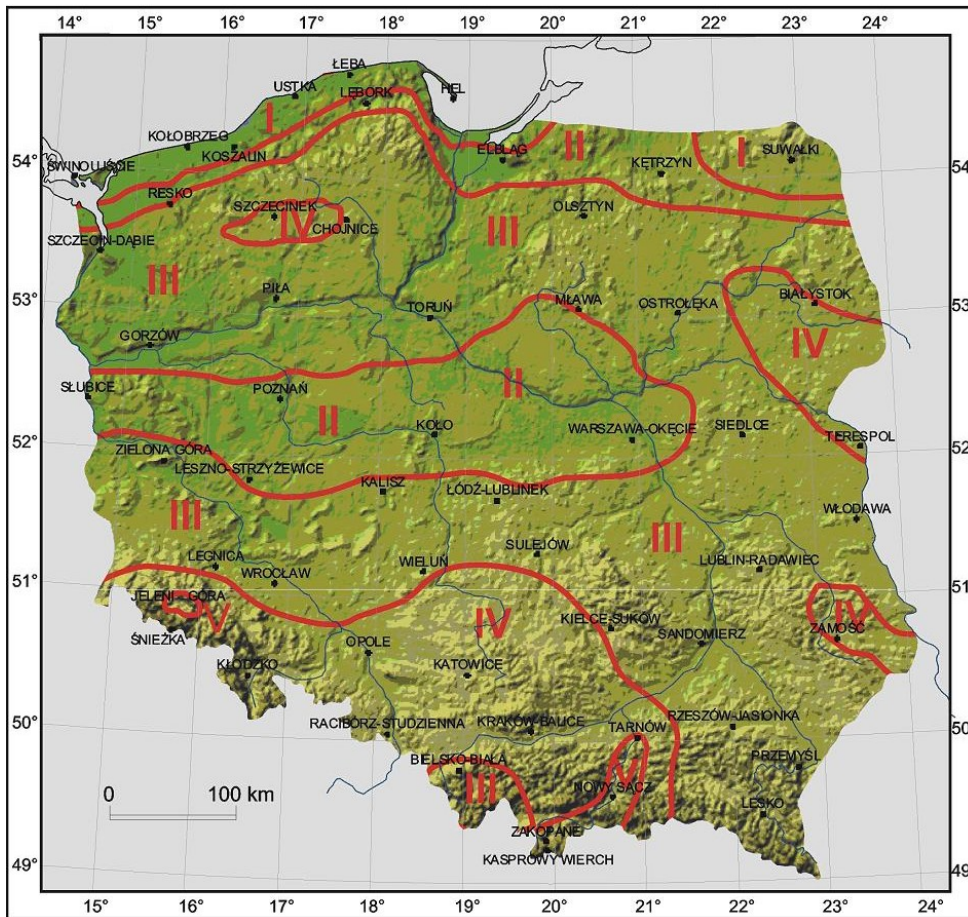## COSMO PL 2.8   COSMO PL 7

Vertical profile of wind speed, ME, MAE and RMSE, June 2013, Forecast run 12 UTC, time lag 24, averaged over 3 TEMP stations
COSMO PL 2.8   COSMO PL 7

REGIONAL VERIFICATION OF WIND SPEED – WIND ENERGY

Lorenc H, 2001, IMGW
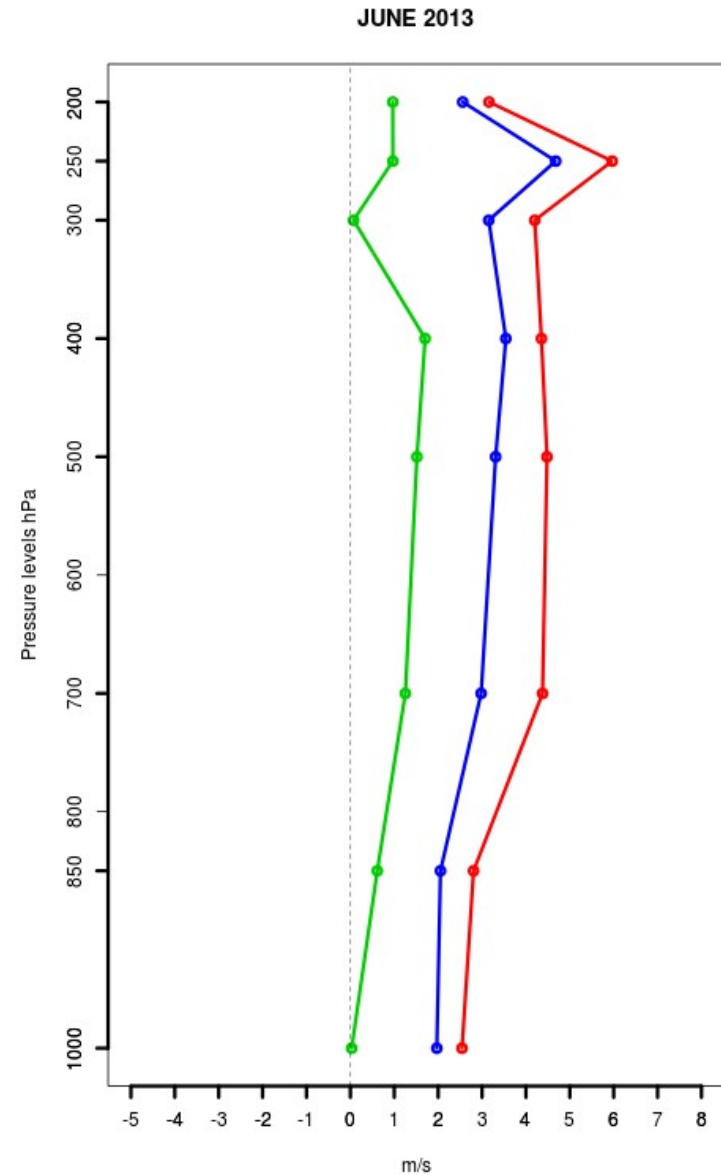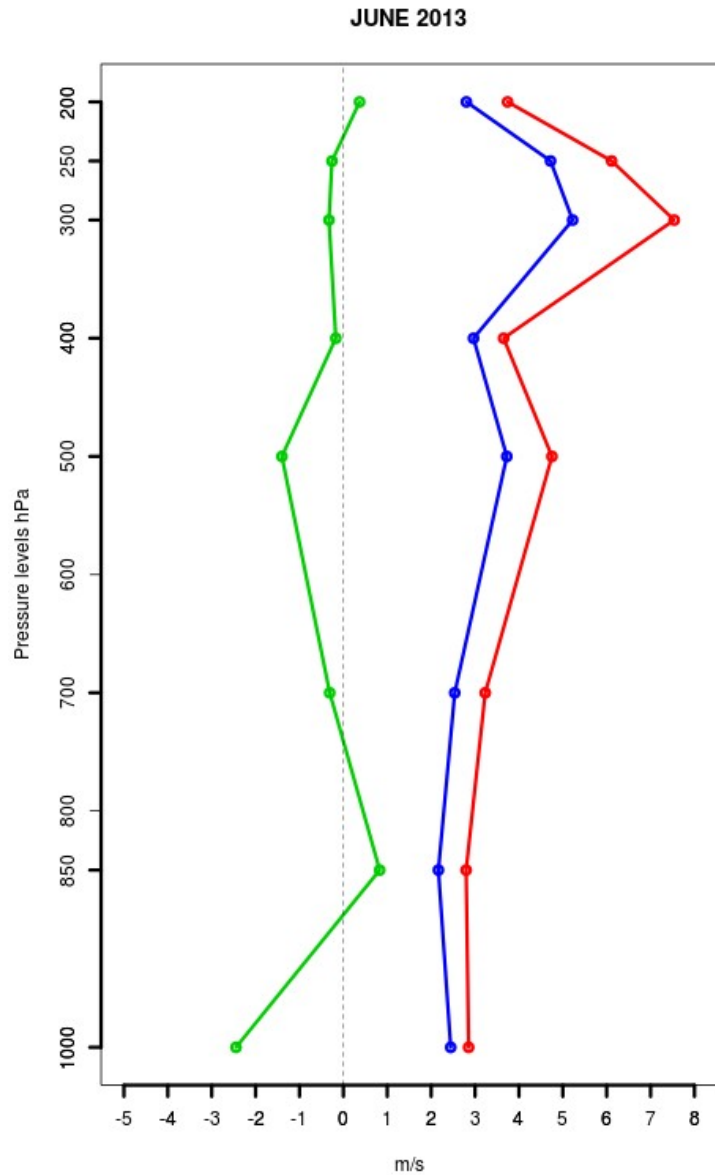
The most favoured regions regarding wind energy resources are the Baltic Sea coast and north-eastern part of the country called the Suwałki region (zone I) and the lowlands of Wielkopolska and Mazovia in West-Central and Central Poland (zone II).

Wind speed at 10 m, ME, all zones
Forecast run 00 UTC, April 2013
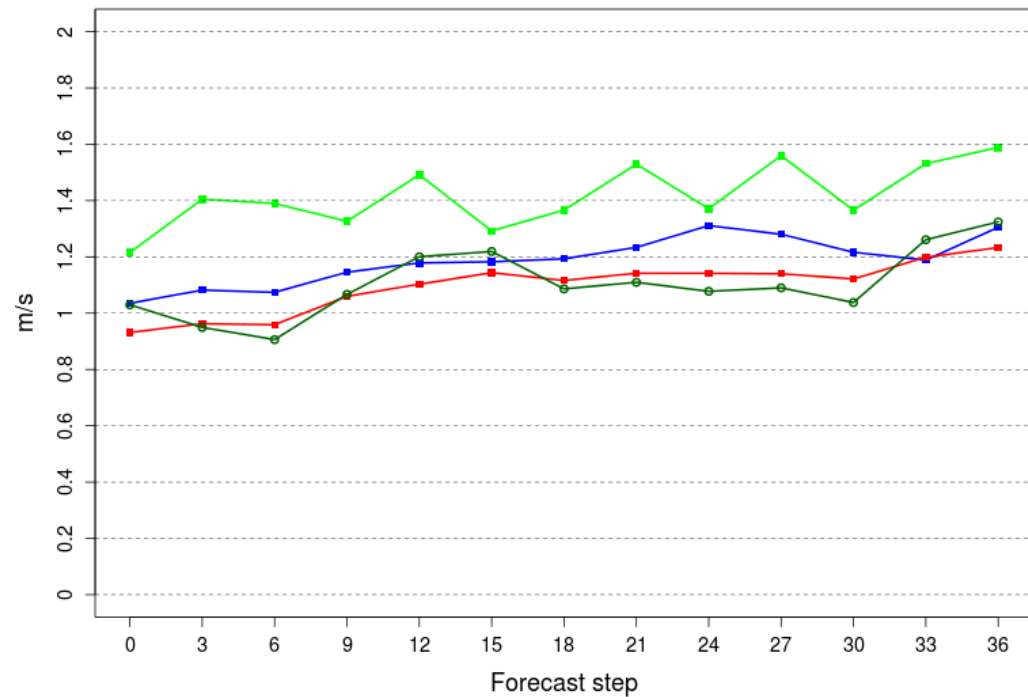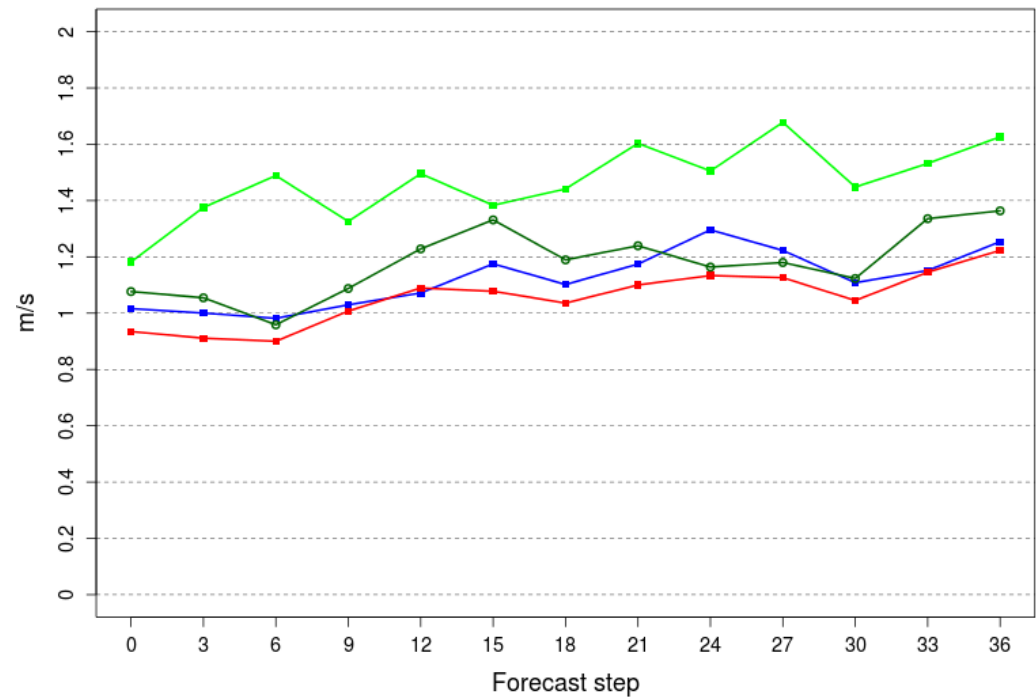

ME, COSMO PL 2.8, APRIL 2013
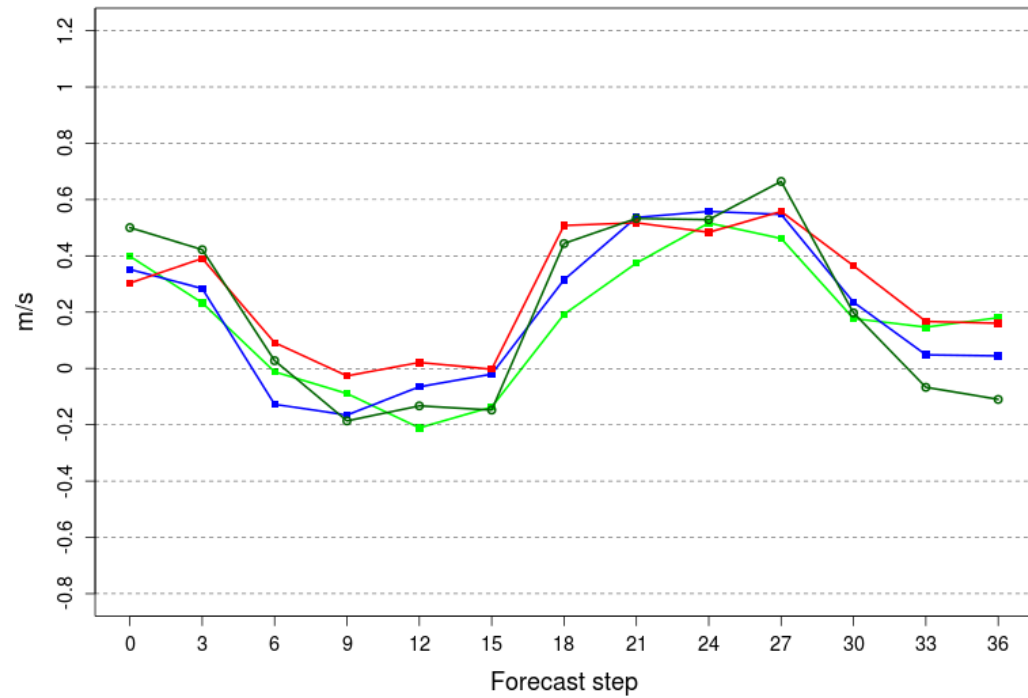
ME, COSMO PL 7, APRIL 2013
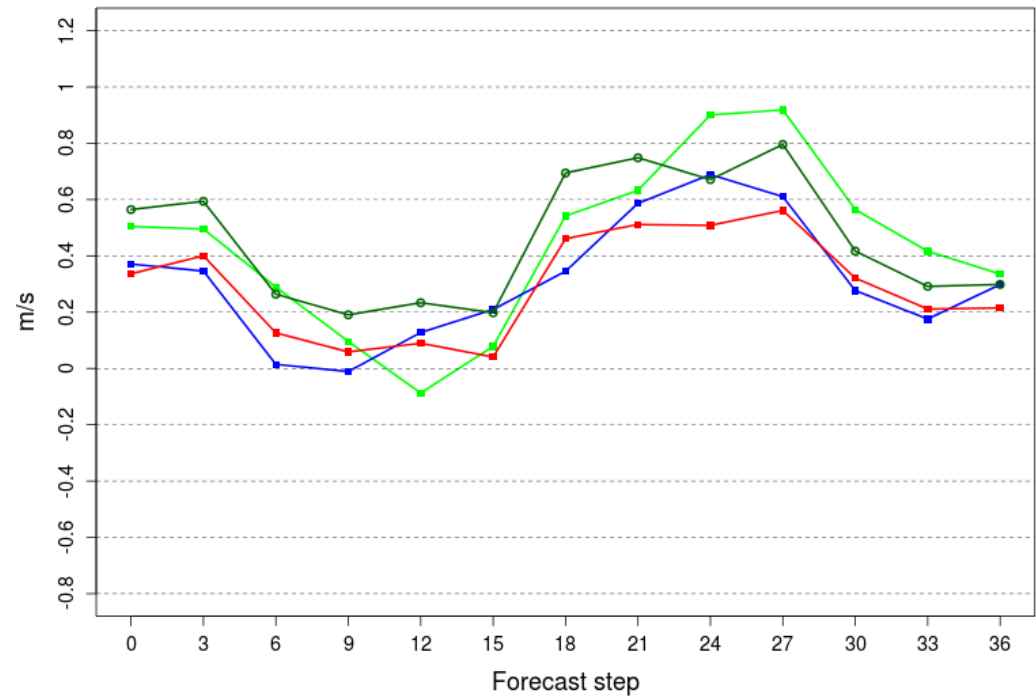
zone I   zone II   zone III   zone IV

Wind speed at 10 m, MAE, all zones
Forecast run 00 UTC, April 2013
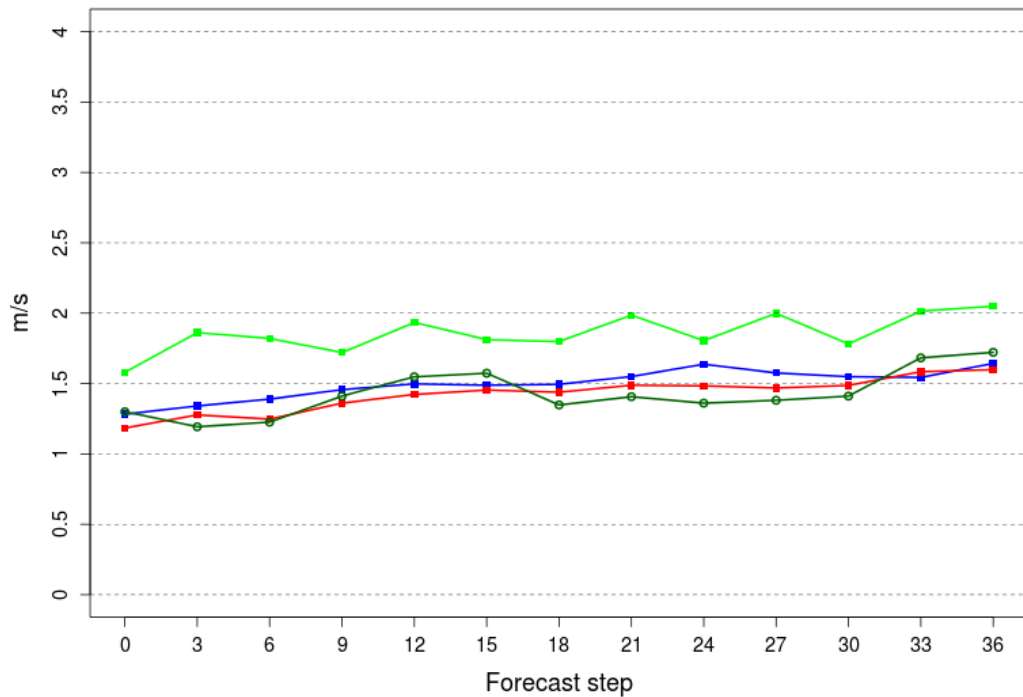

MAE, COSMO PL 2.8, APRIL 2013
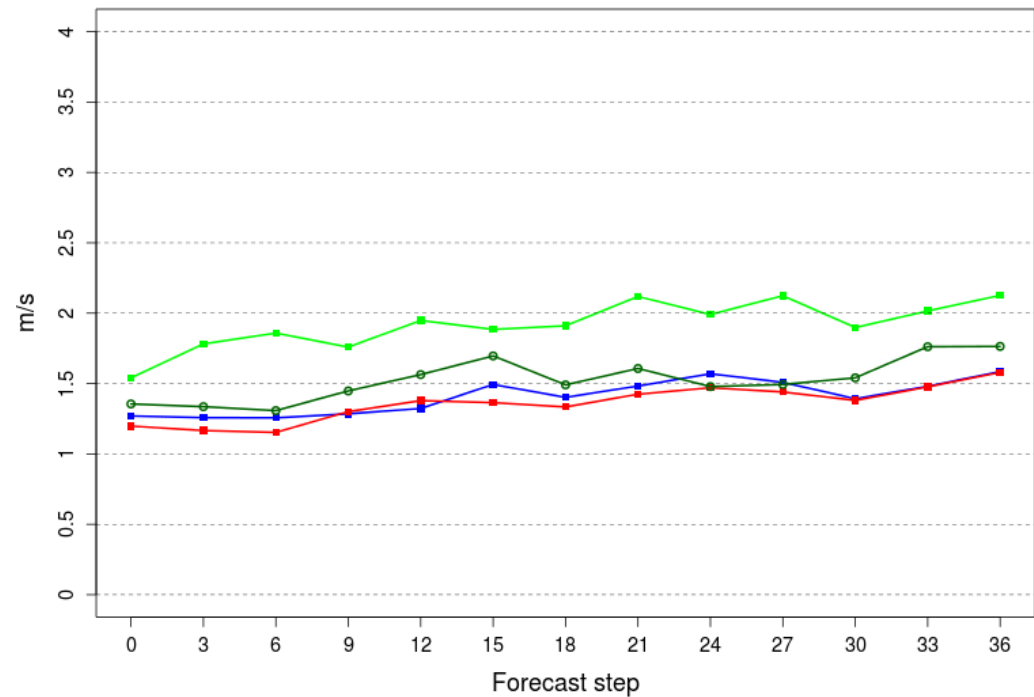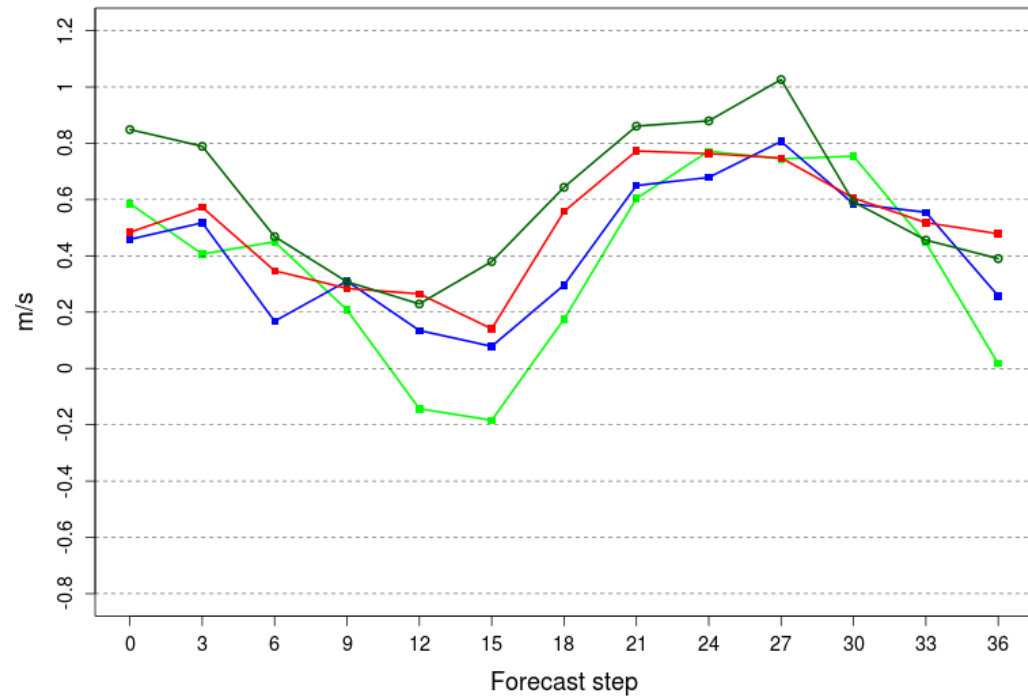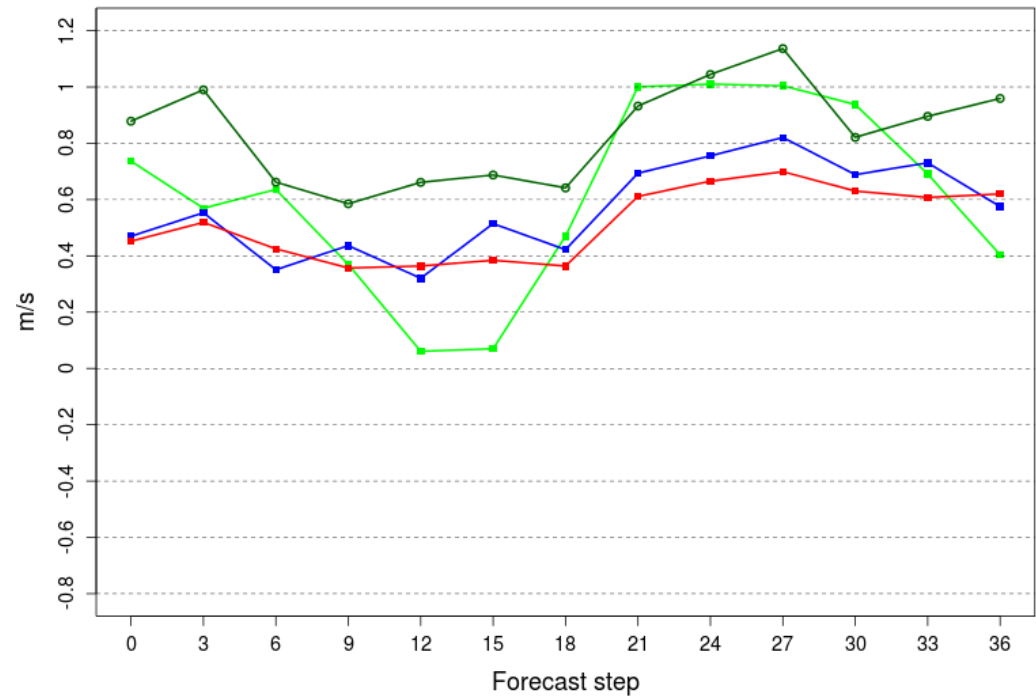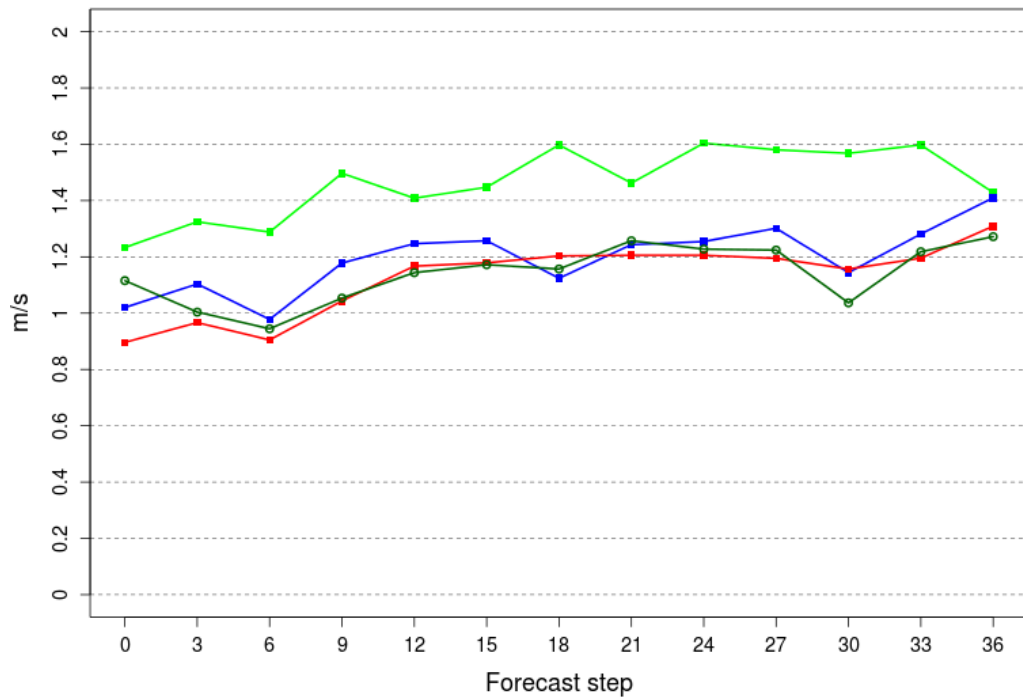
MAE, COSMO PL 7, APRIL 2013

zone I   zone II   zone III   zone IV

Wind speed at 10 m, RMSE, all zones
Forecast run 00 UTC, April 2013

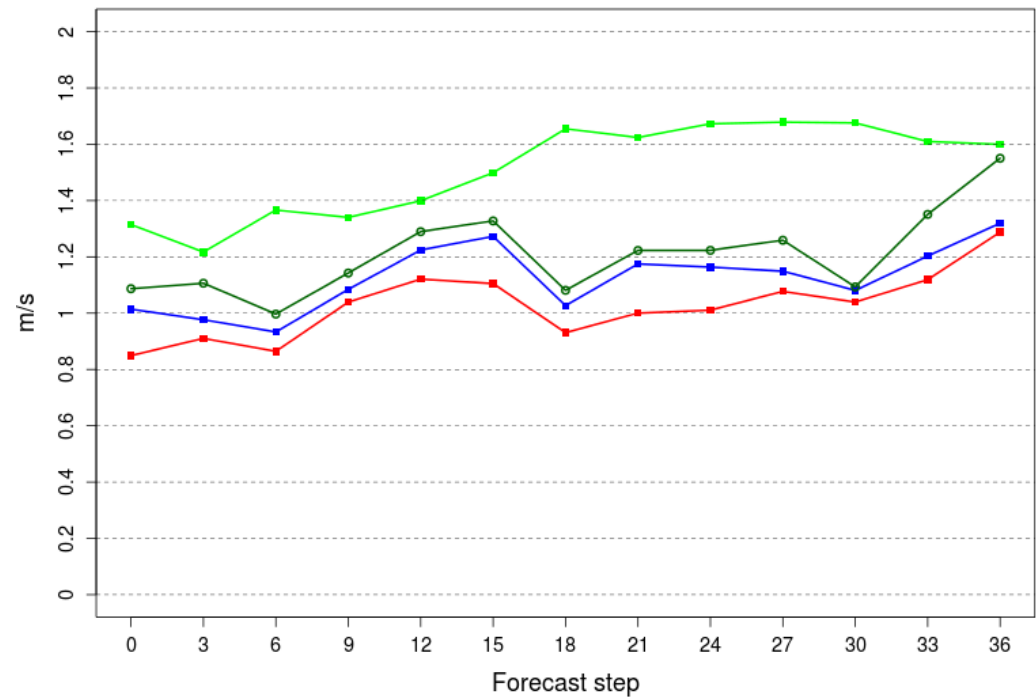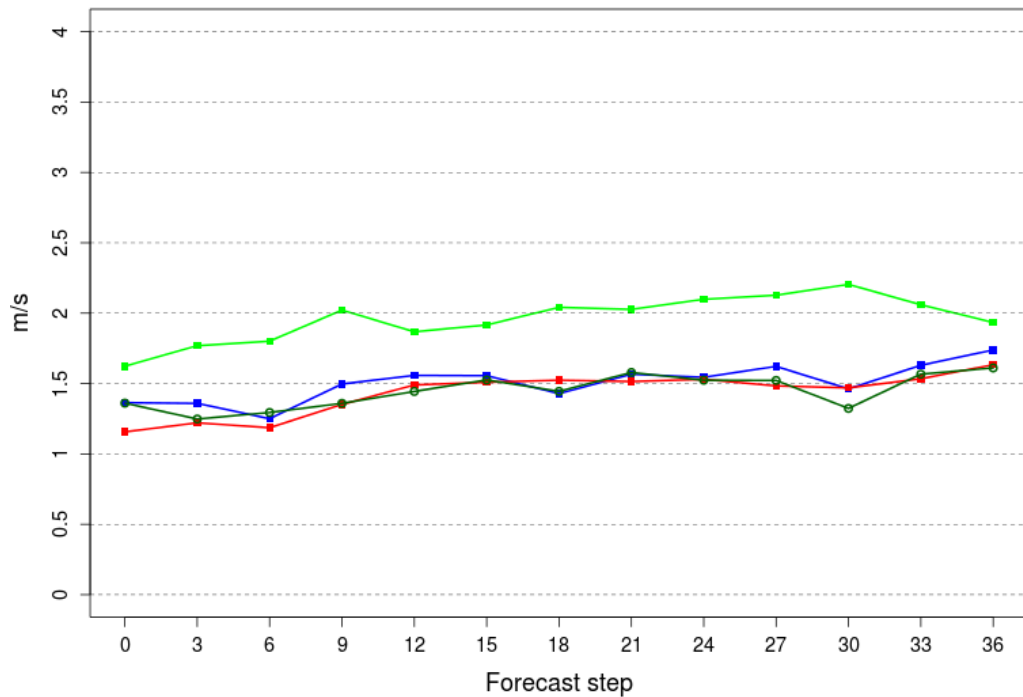RMSE, COSMO PL 2.8, APRIL 2013

RMSE, COSMO PL 7, APRIL 2013

Legend: zone I, zone II, zone III, zone IV

Wind speed at 10 m, ME, all zone
Forecast run 00 UTC, July 2013

Wind speed at 10 m, MAE, all zones
Forecast run 00 UTC, July 2013

MAE, COSMO PL 2.8, JULY 2013

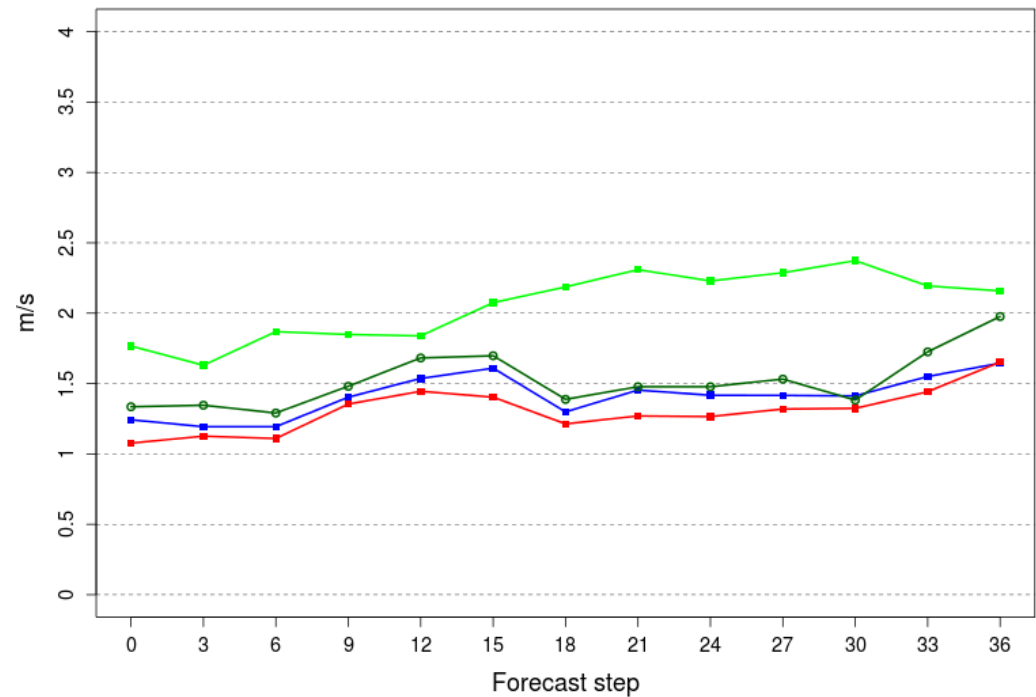MAE, COSMO PL 7, JULY 2013

Wind speed at 10 m, RMSE, all zones
Forecast run 00 UTC, July 2013
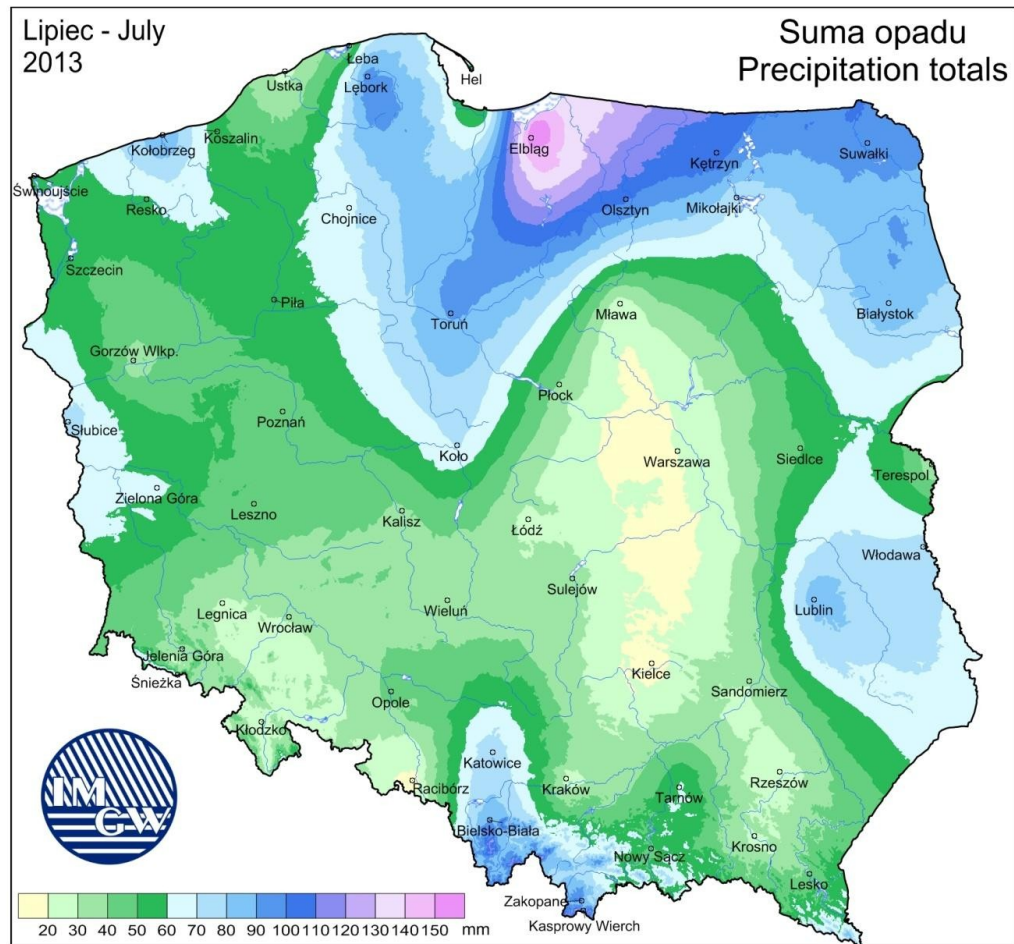

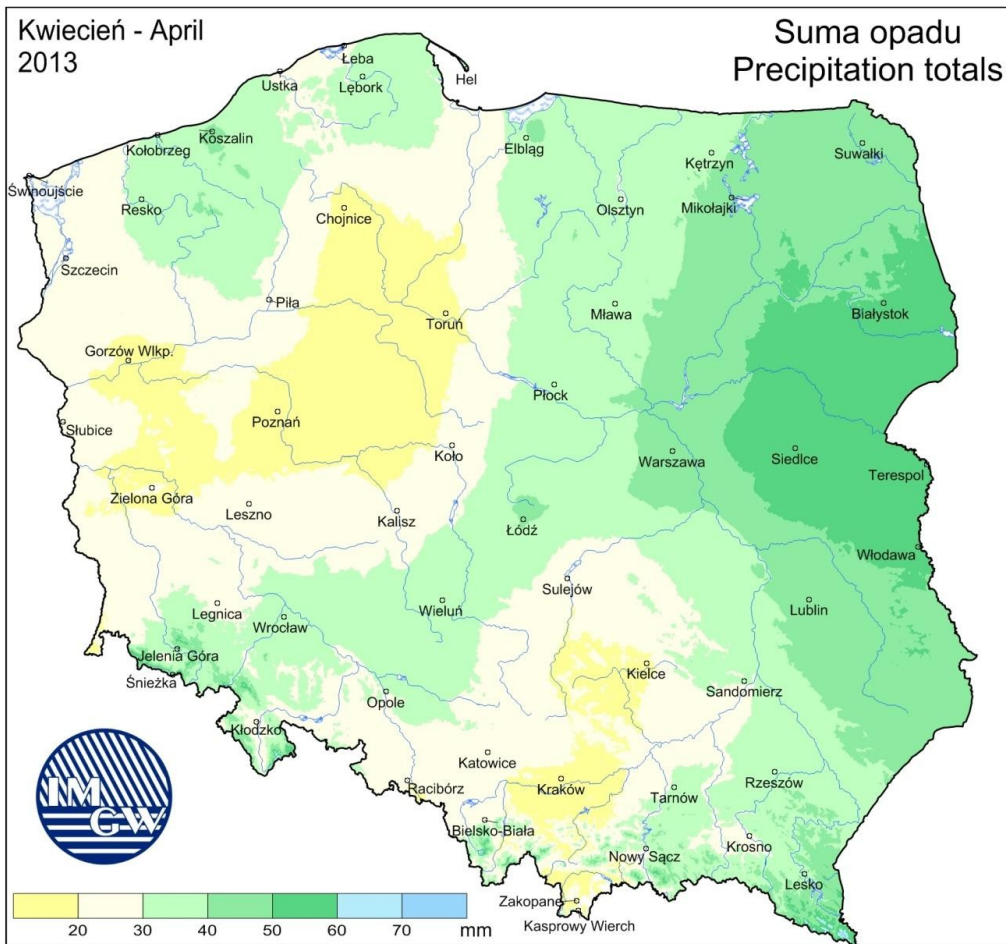
RMSE, COSMO PL 2.8, JULY 2013

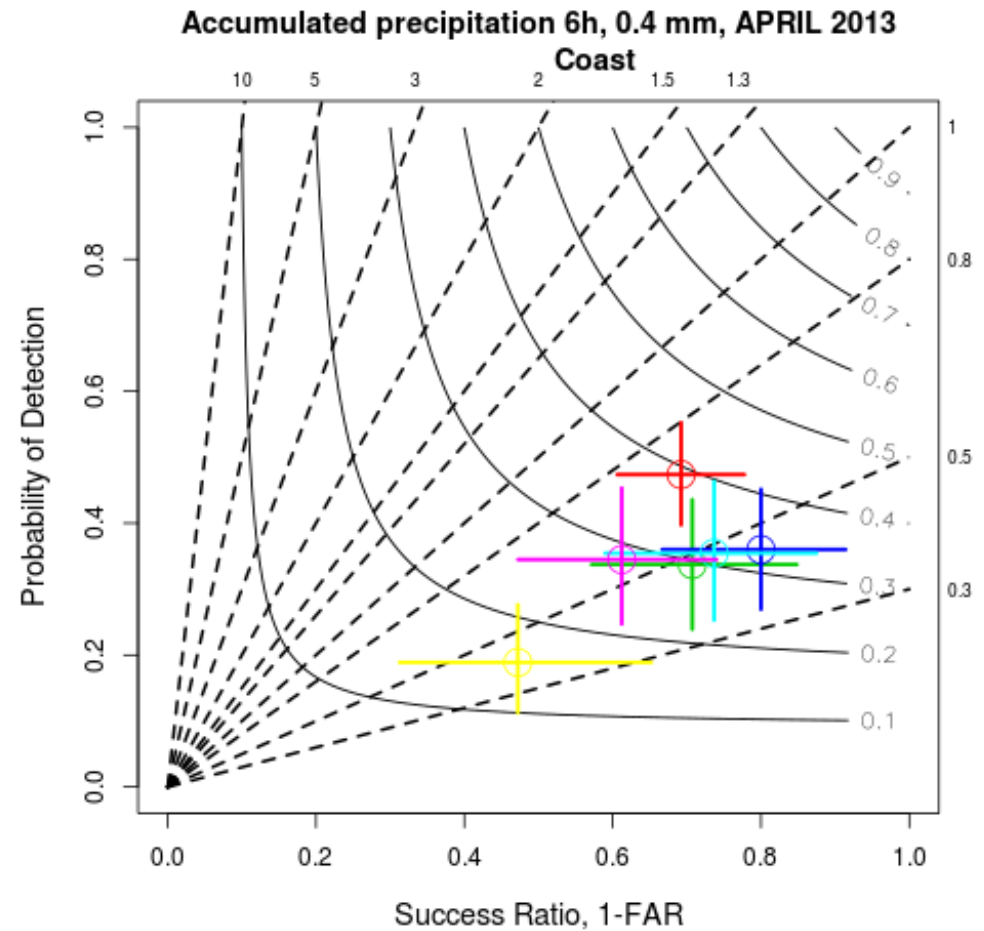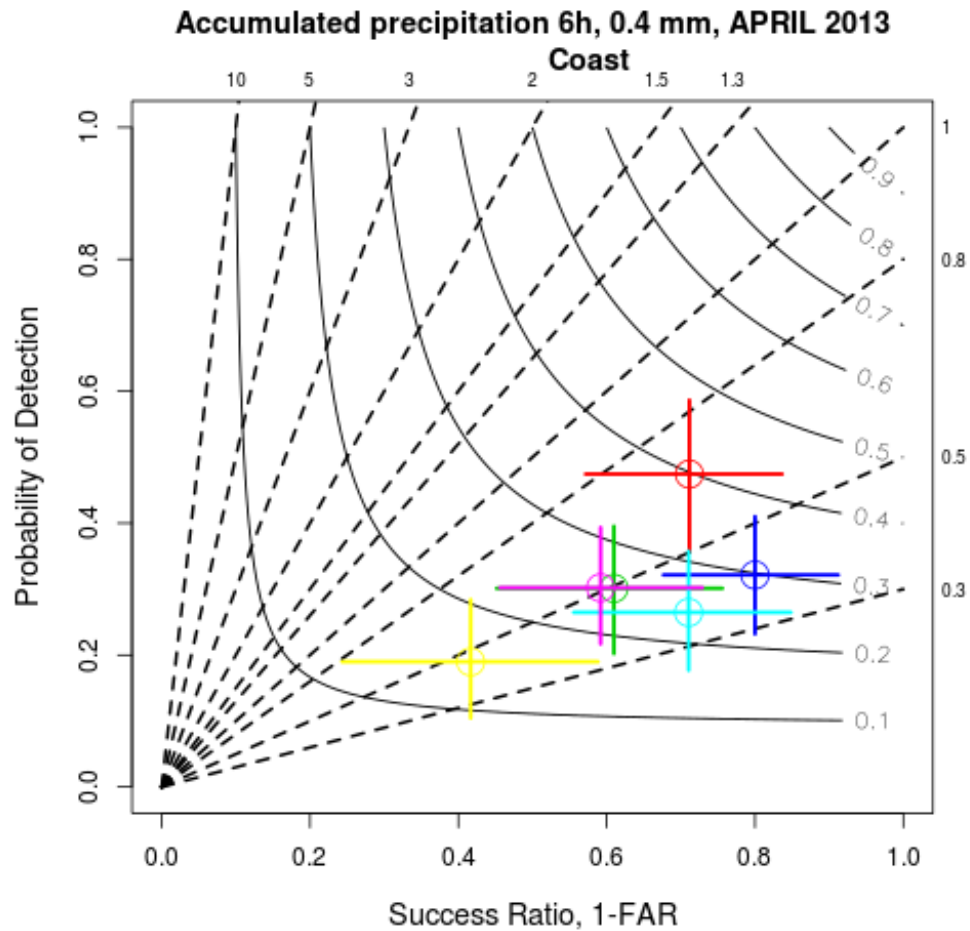RMSE, COSMO PL 7, JULY 2013

zone I   zone II   zone III   zone IV

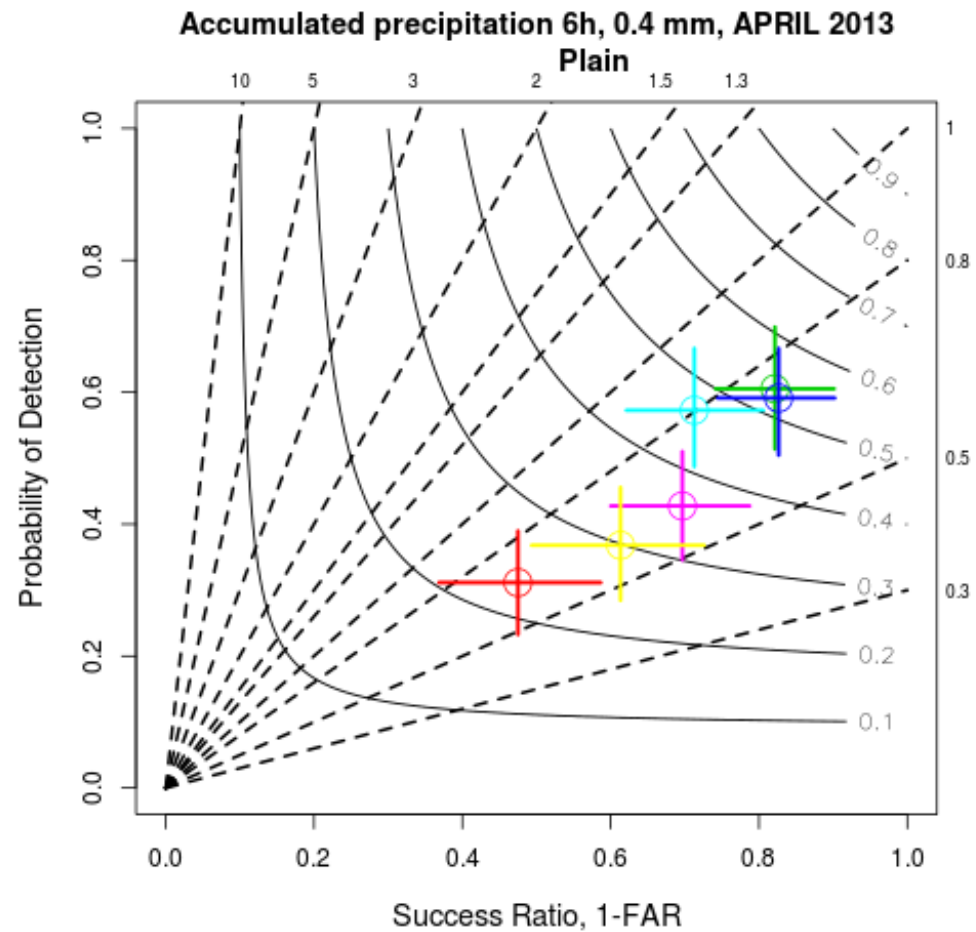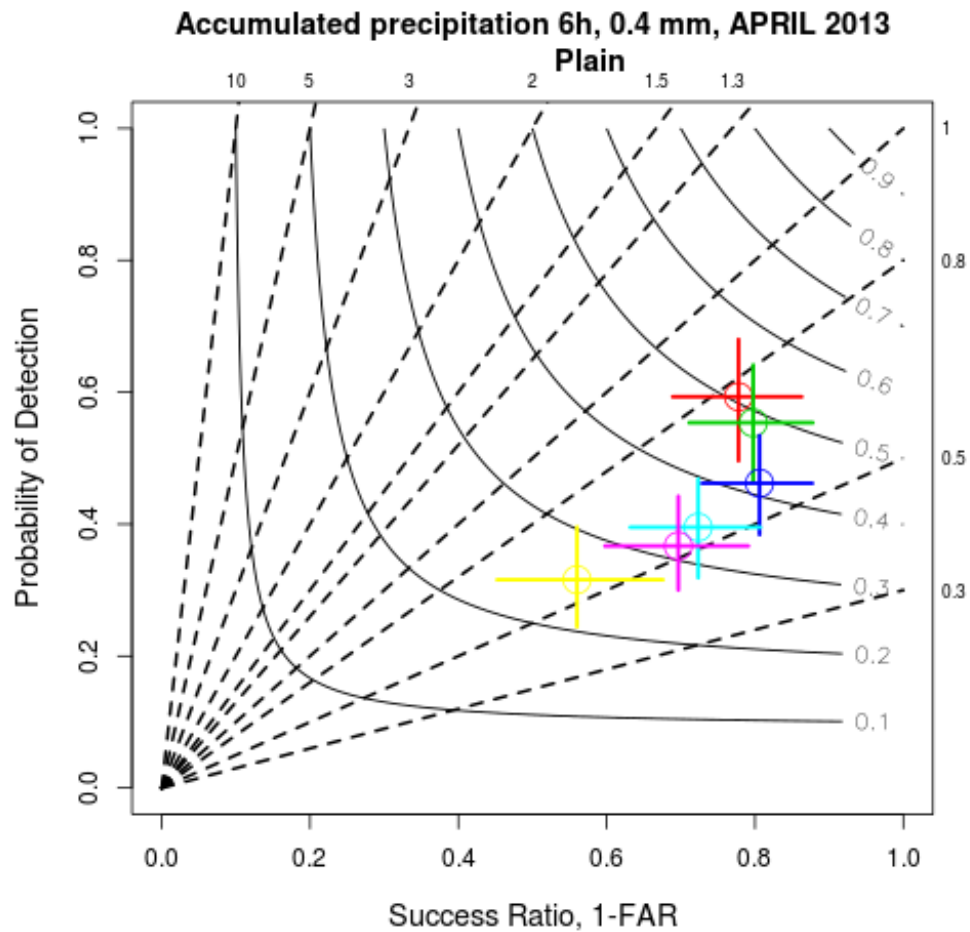# Monthly precipiation

April 2013

July 2013

Accumulated Precipitation 06 h, 0.4 mm, Terrain: Coast
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 0.4 mm, Terrain: Plain
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7

Accumulated precipitation 6h, 0.4 mm, APRIL 2013 — Plain

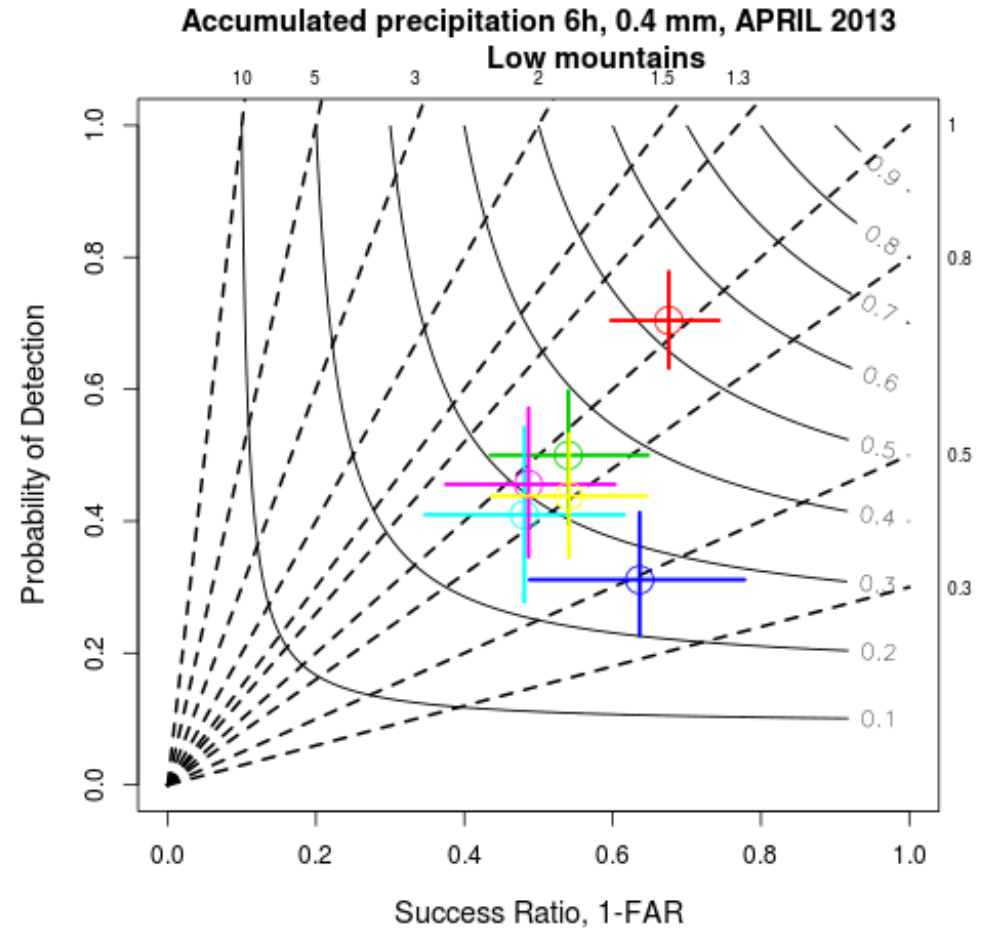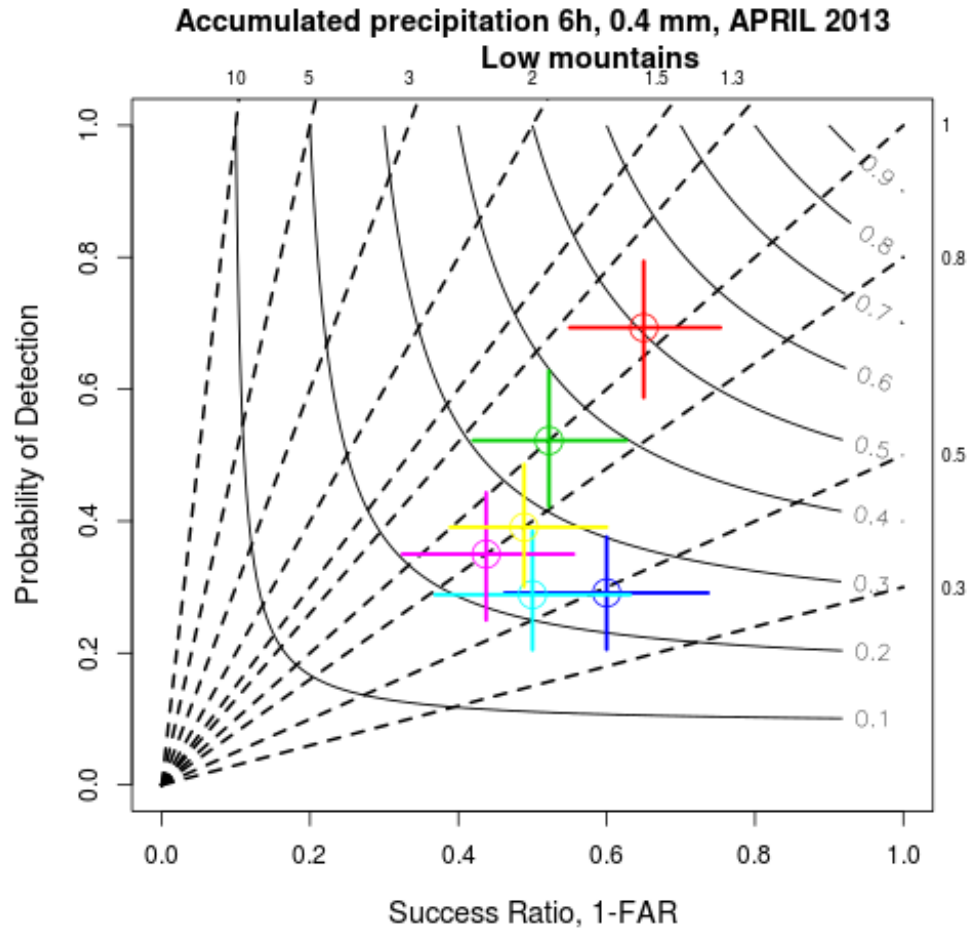Accumulated precipitation 6h, 0.4 mm, APRIL 2013 — Plain

Legend: 06 12 18 24 30 36

Accumulated Precipitation 06 h, 0.4 mm, Terrain: Low Mountains
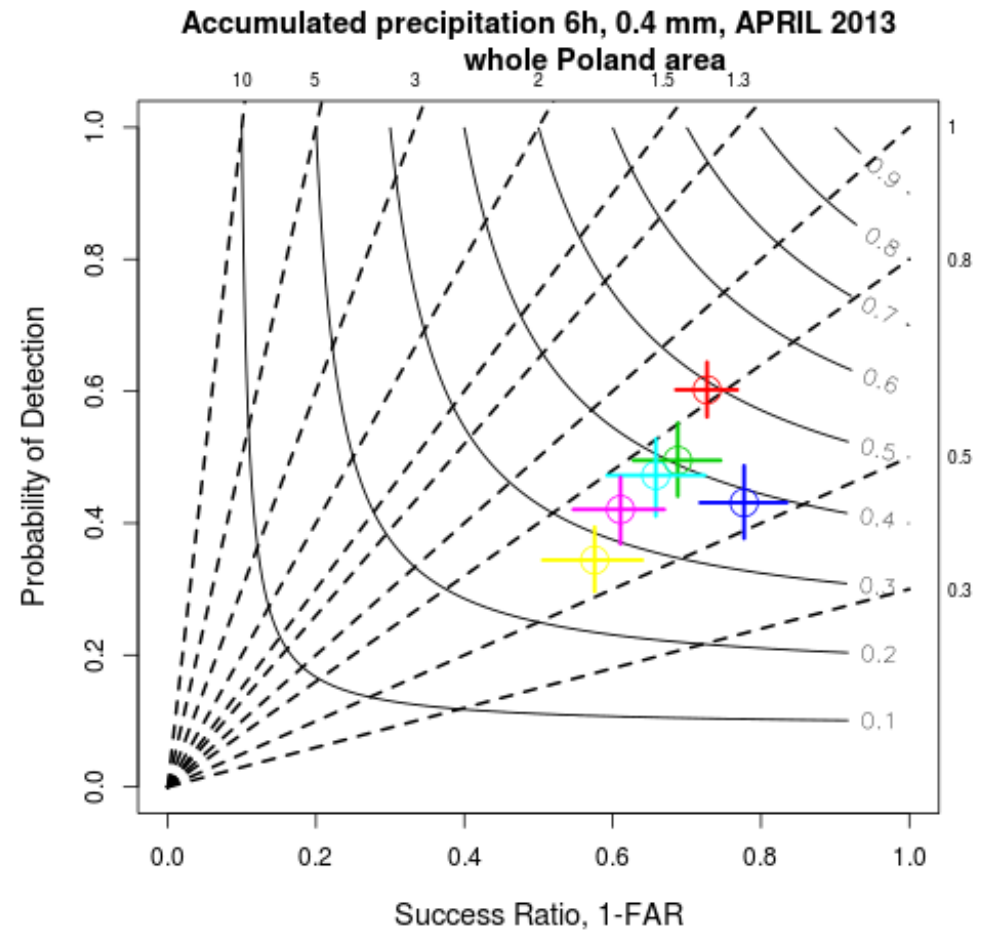## Forecast run 00 UTC, April 2013
COSMO PL 2.8 COSMO PL 7
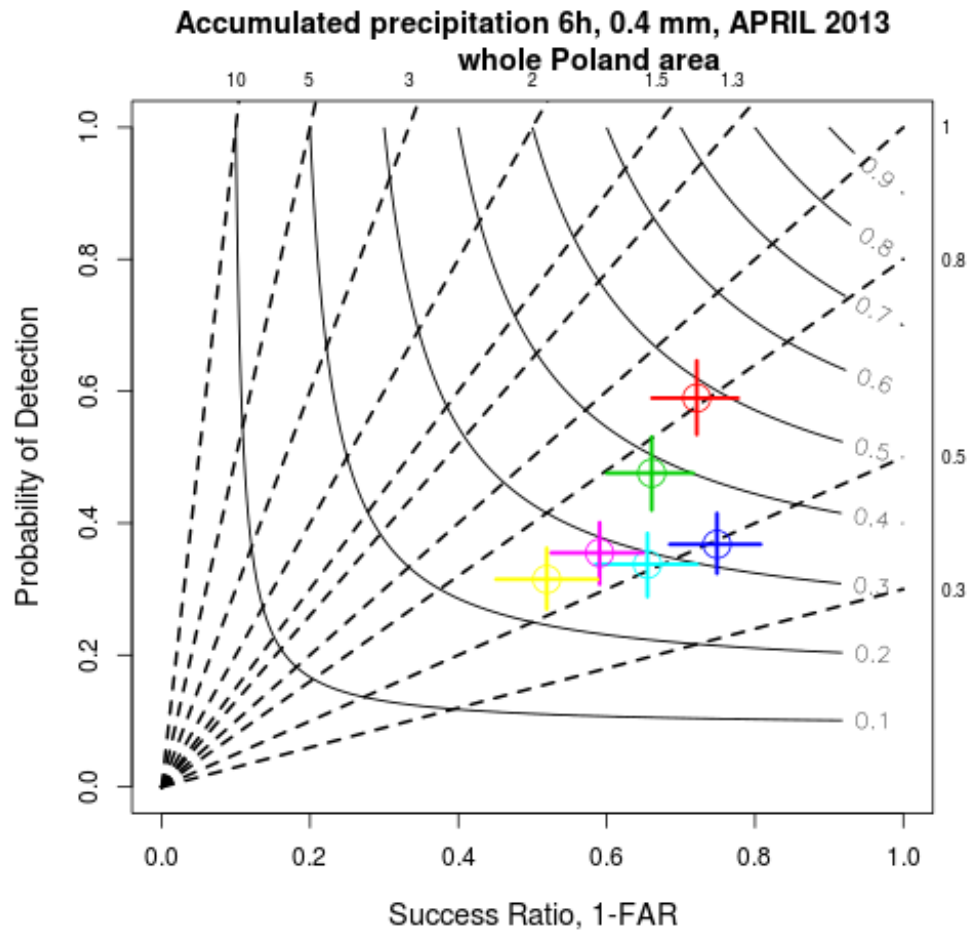
Accumulated Precipitation 06 h, 0.4 mm, Terrain: whole Poland area
Forecast run 00 UTC, April 2013
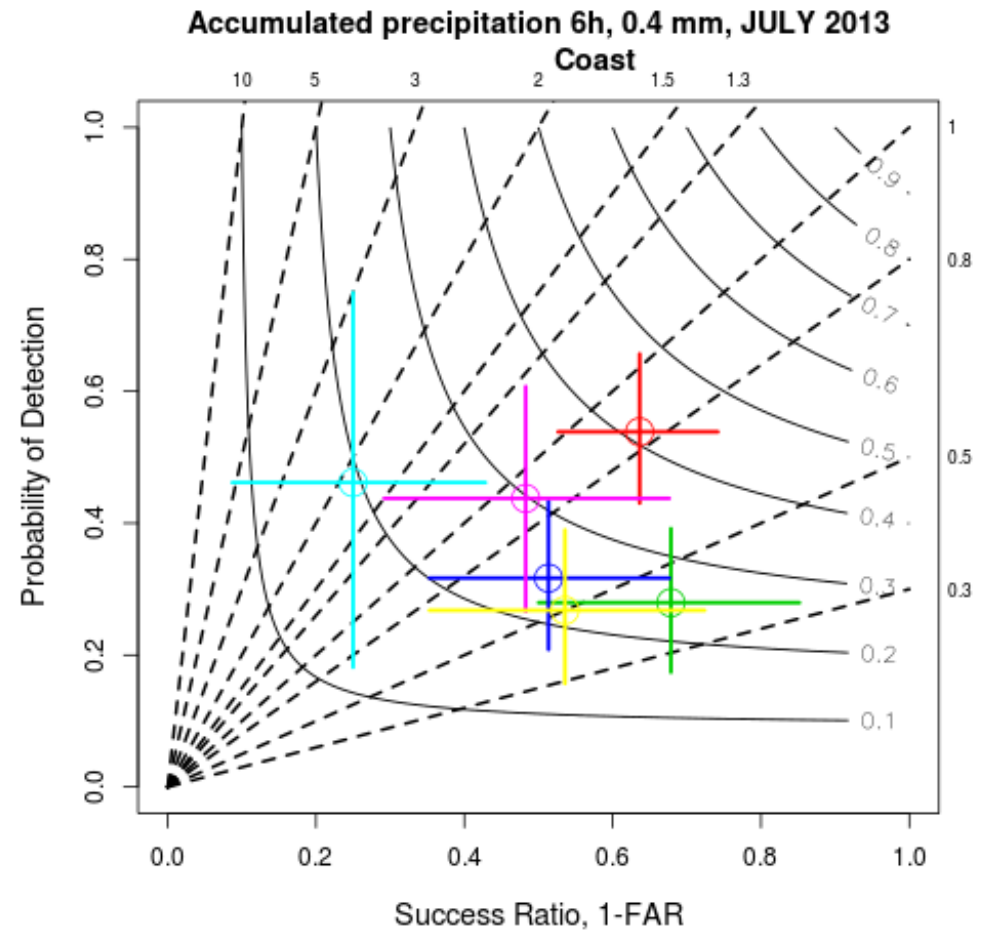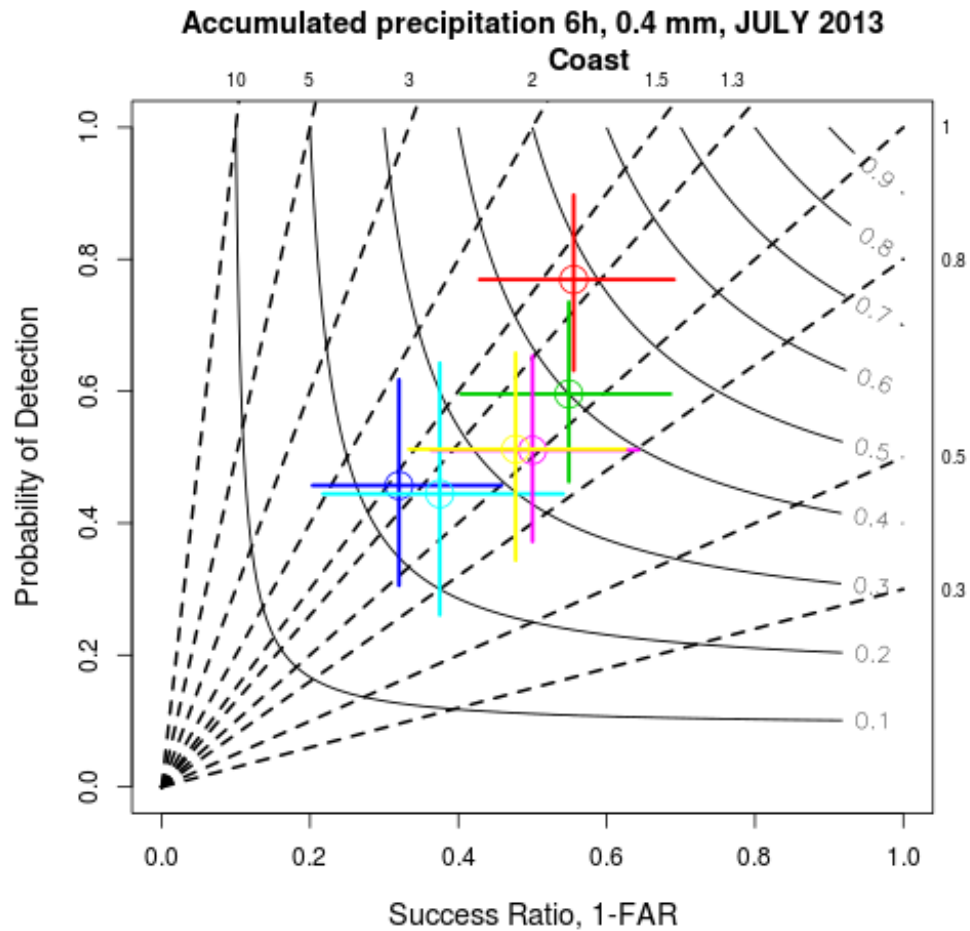### COSMO PL 2.8   COSMO PL 7

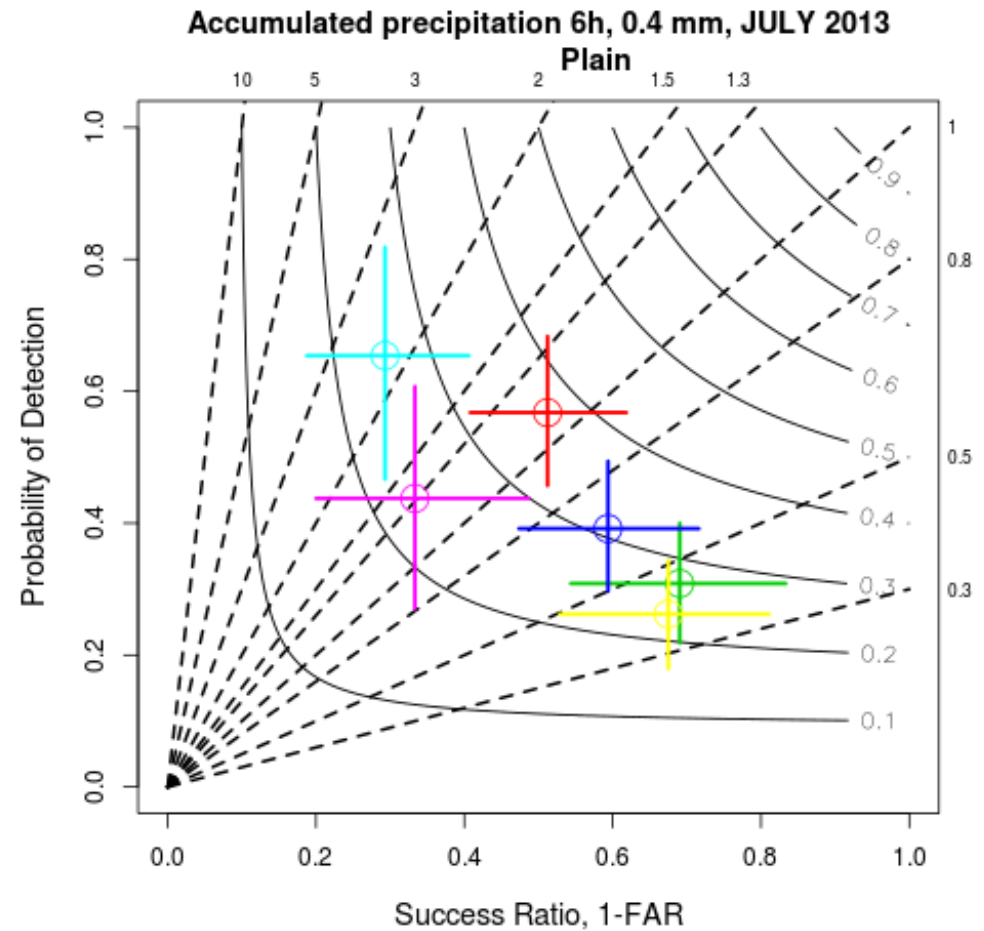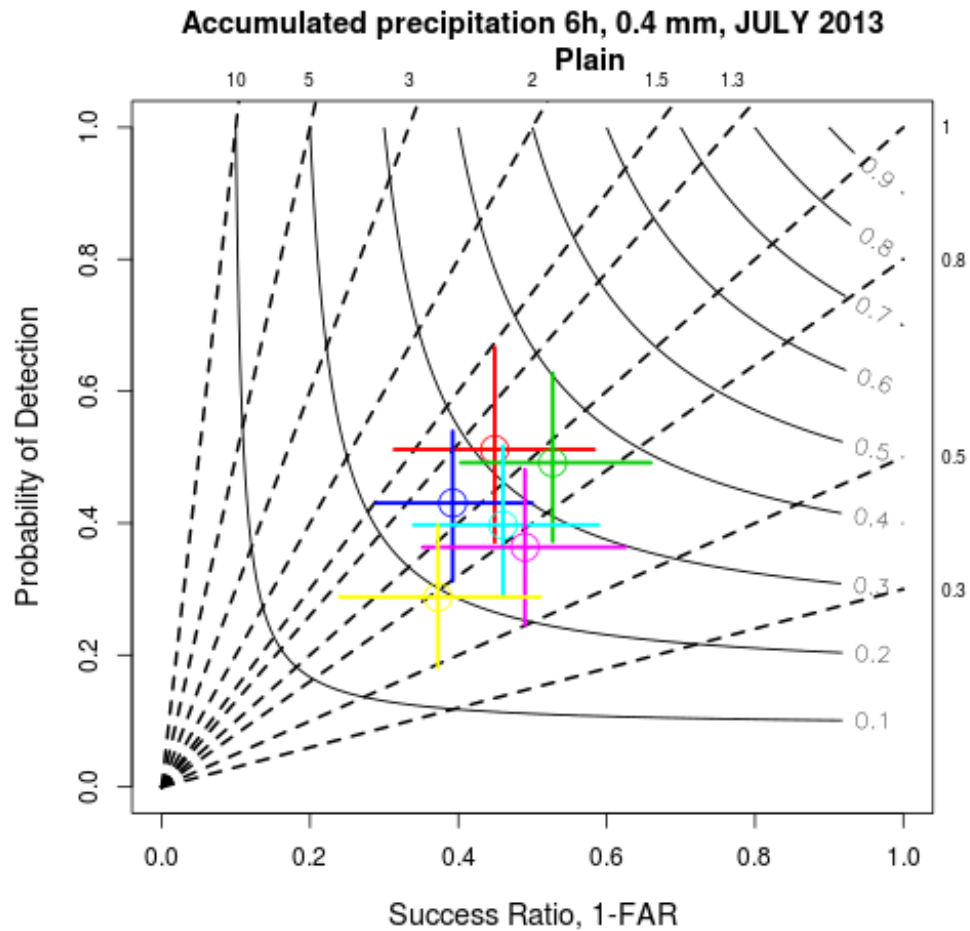# Accumulated Precipitation 06 h, 0.4 mm, Terrain: Coast
Forecast run 00 UTC, July 2013
COSMO PL 2.8 COSMO PL 7

Accumulated Precipitation 06 h, 0.4 mm, Terrain: Plain
Forecast run 00 UTC, July 2013
COSMO PL 2.8   COSMO PL 7

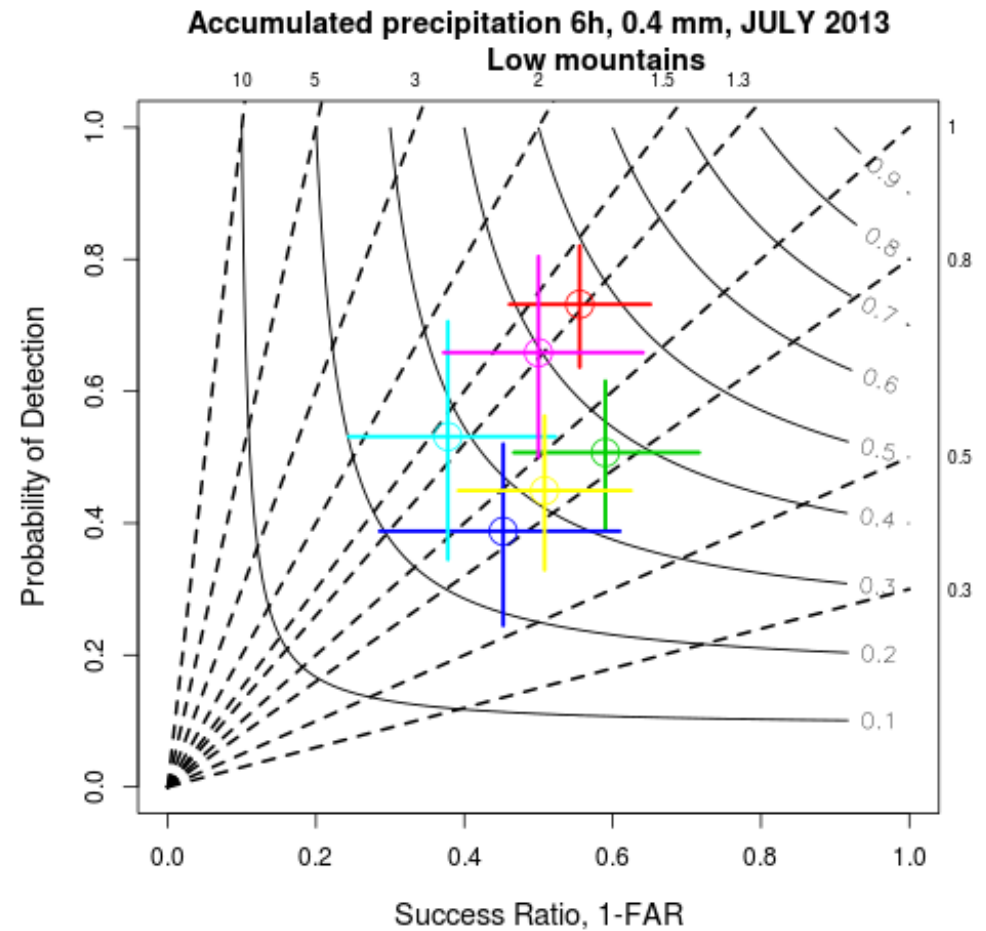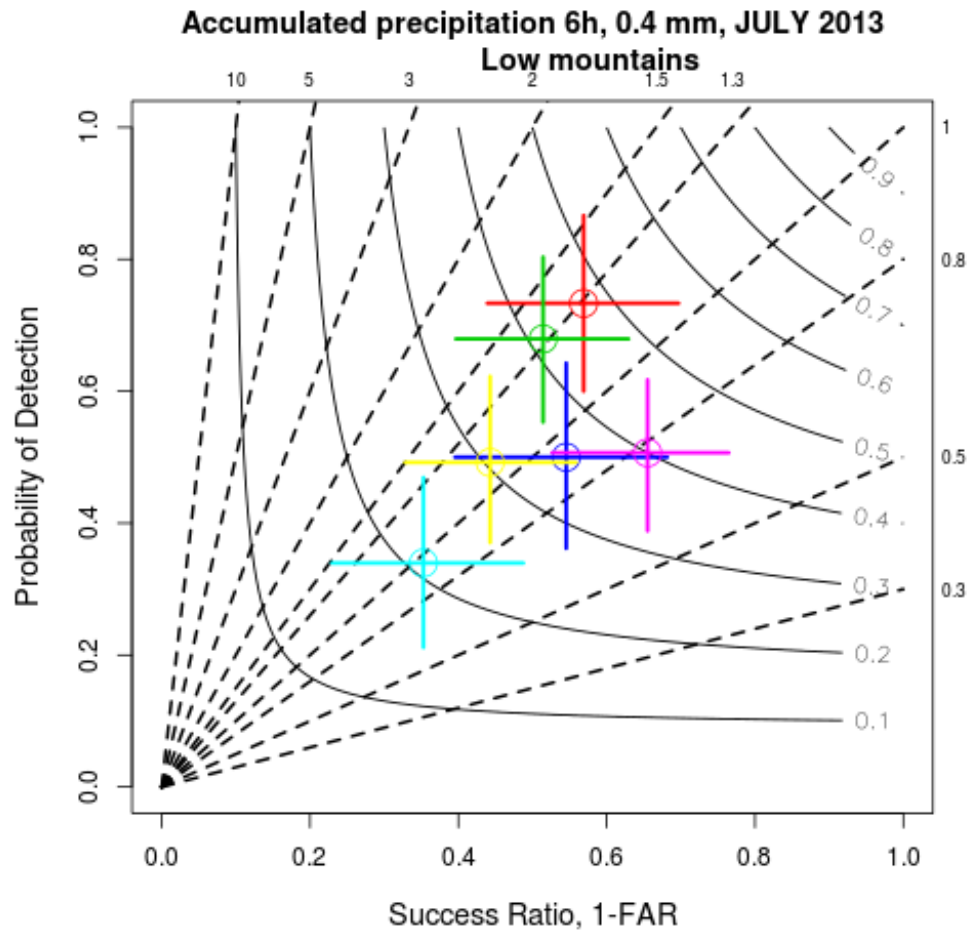# Accumulated Precipitation 06 h, 0.4 mm, Terrain: Low mountains
Forecast run 00 UTC, July 2013
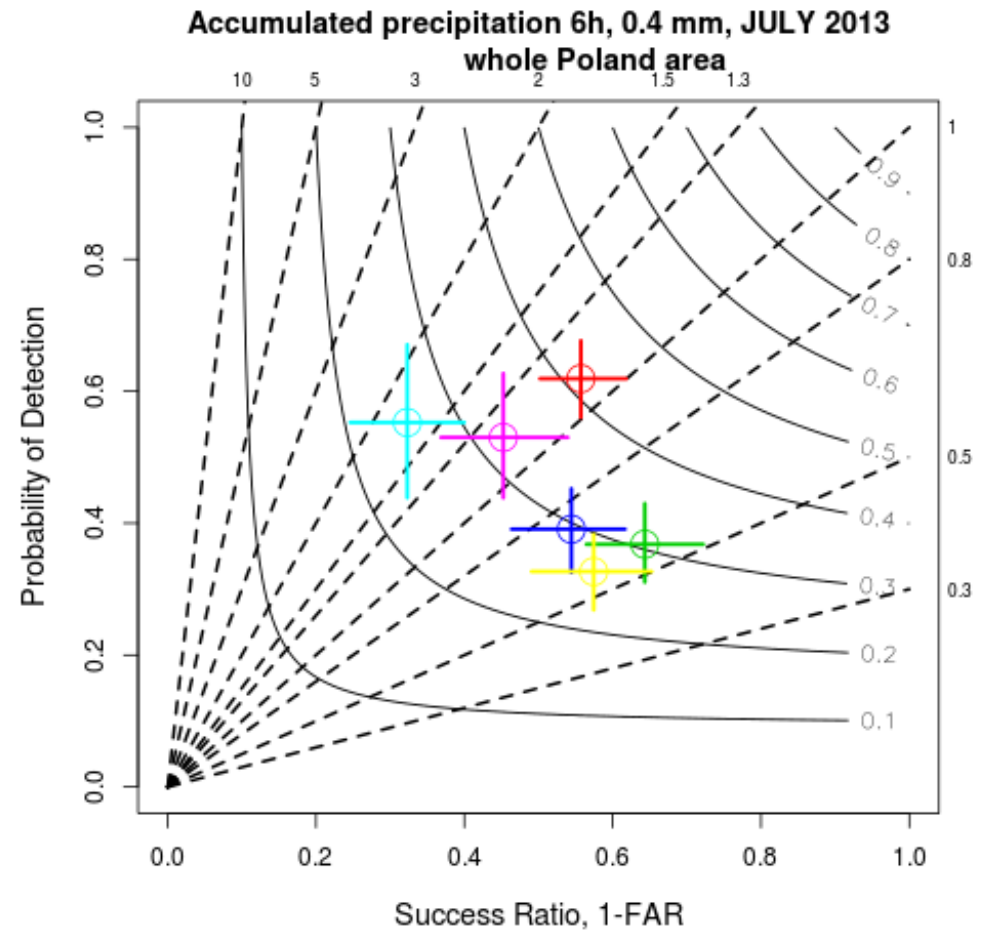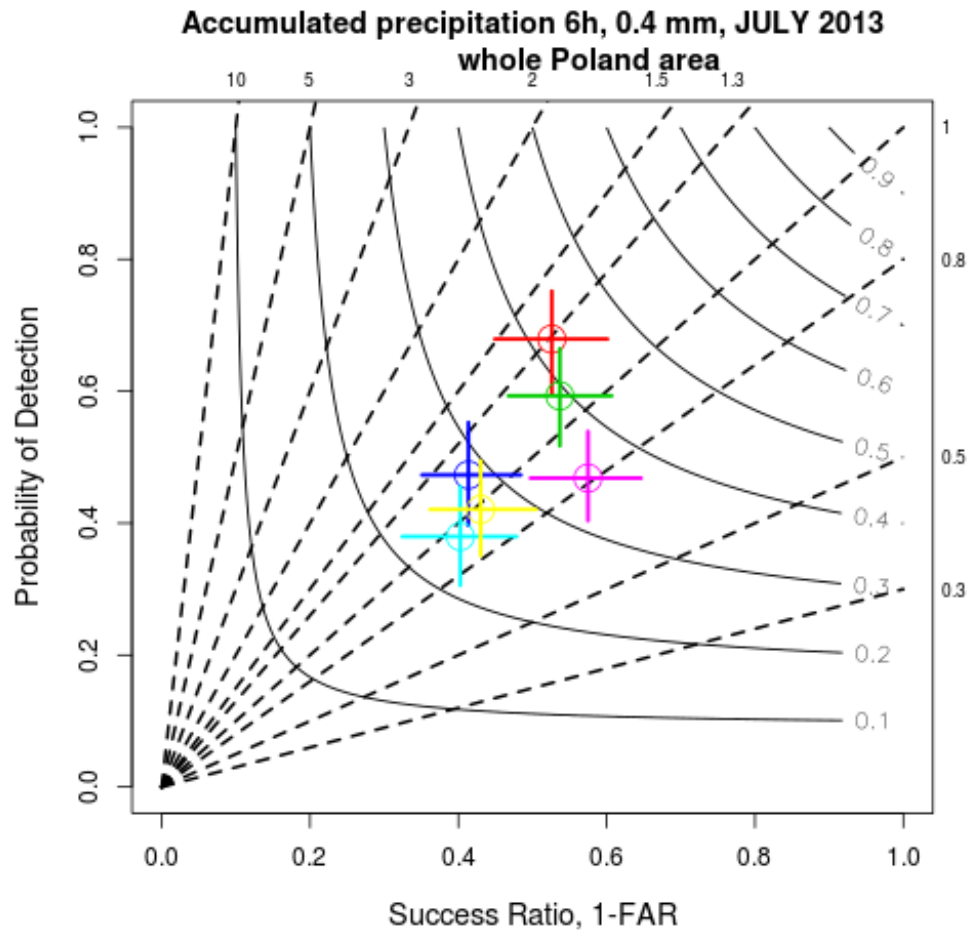### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 0.4 mm, Terrain: whole Poland area
Forecast run 00 UTC, July 2013
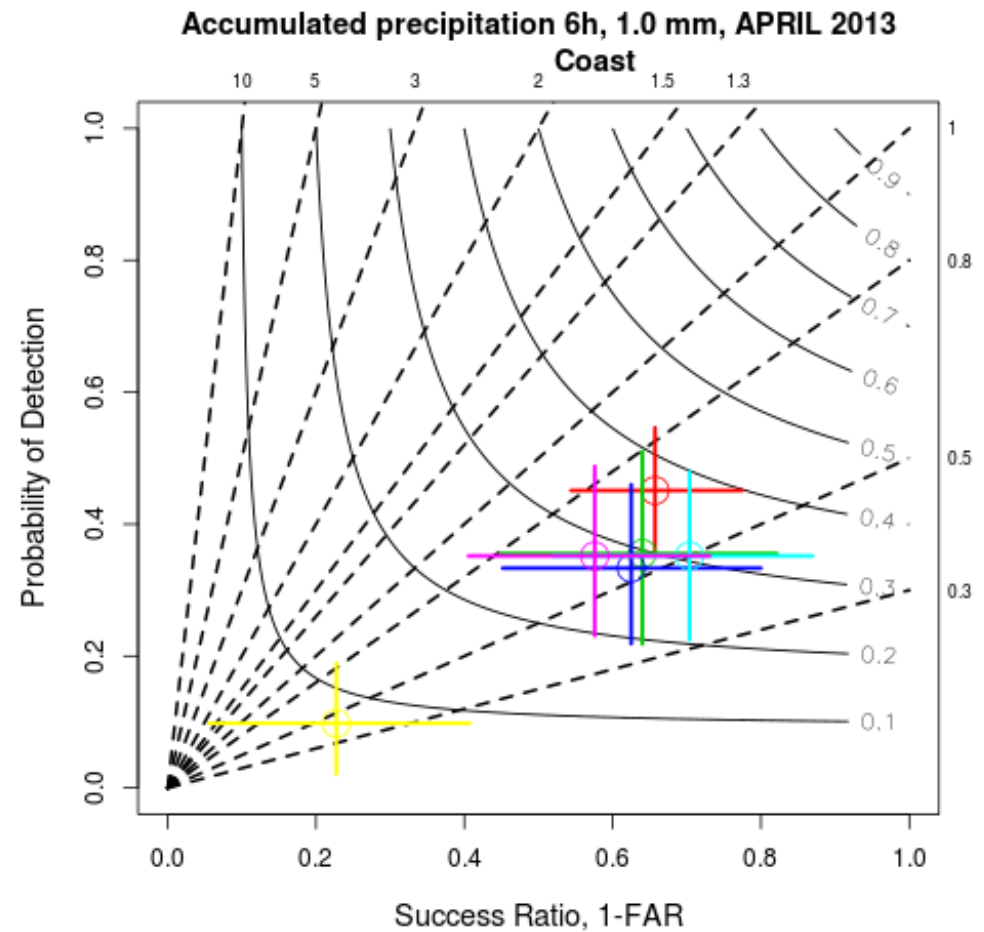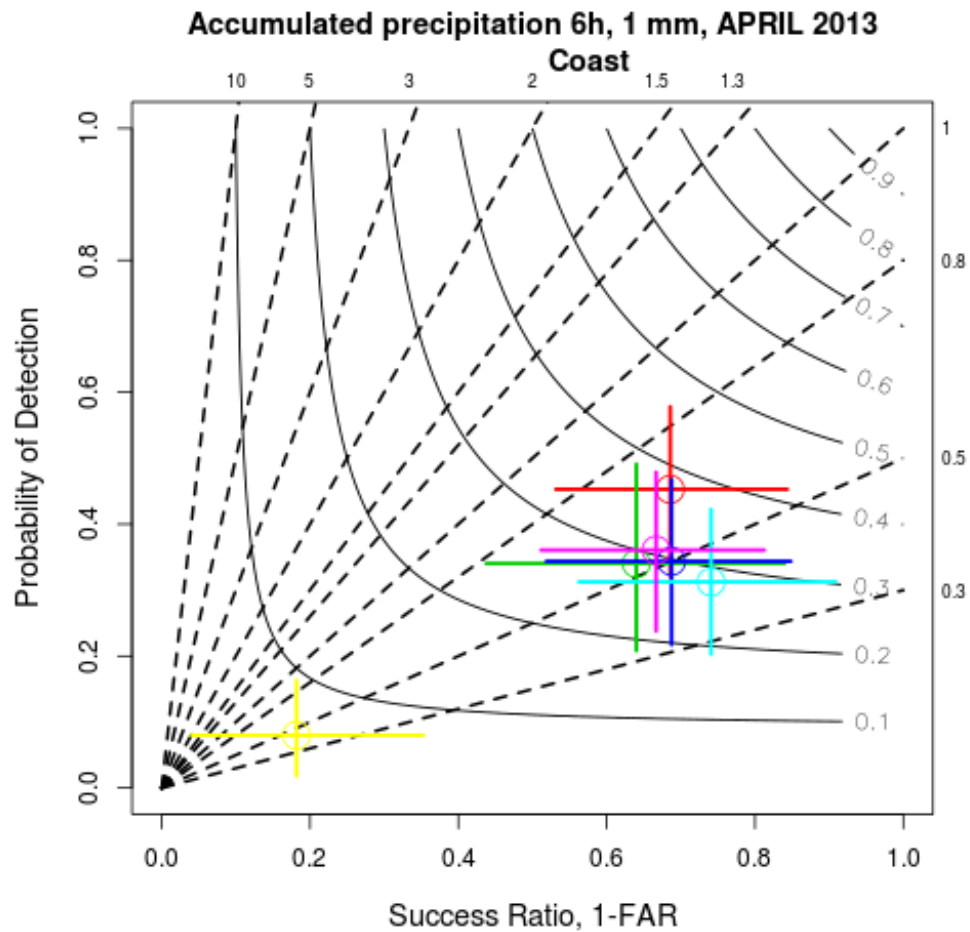### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Coast
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7

Accumulated precipitation 6h, 1 mm, APRIL 2013
Coast

Accumulated precipitation 6h, 1.0 mm, APRIL 2013
Coast
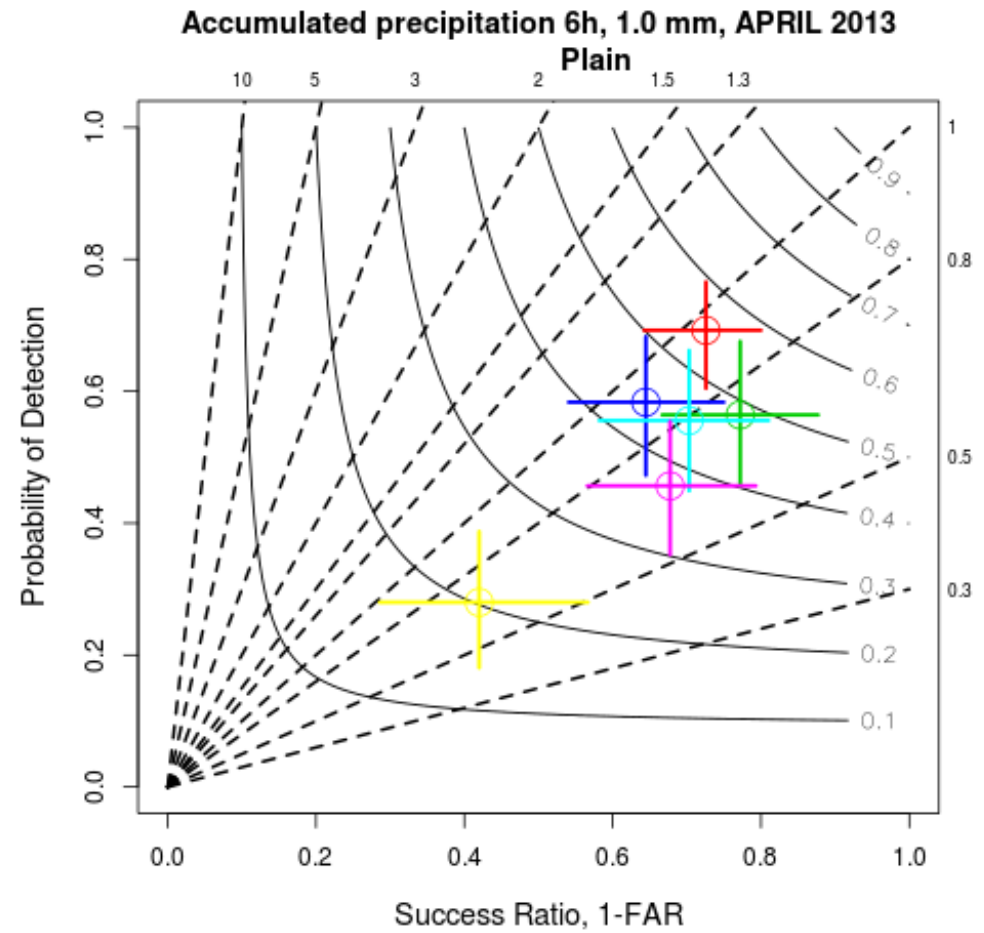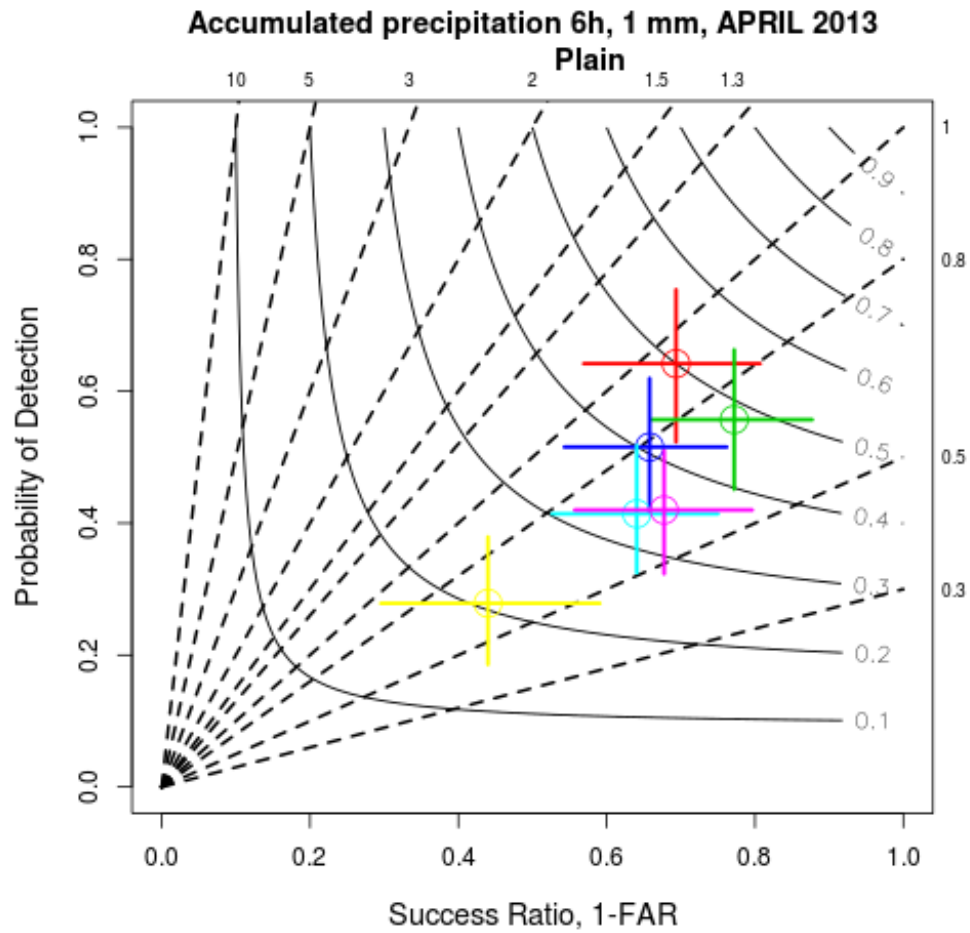
06   12   18   24   30   36

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Plain
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7

Accumulated precipitation 6h, 1 mm, APRIL 2013 — Plain (left)
Accumulated precipitation 6h, 1.0 mm, APRIL 2013 — Plain (right)
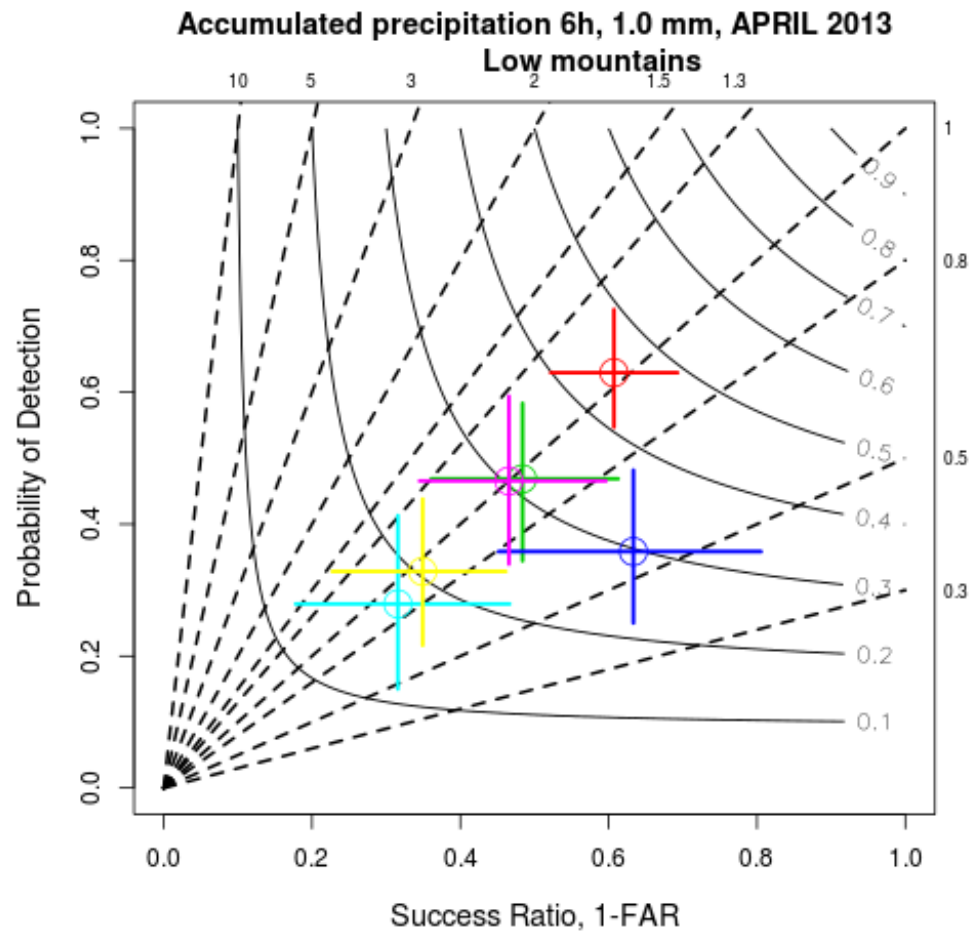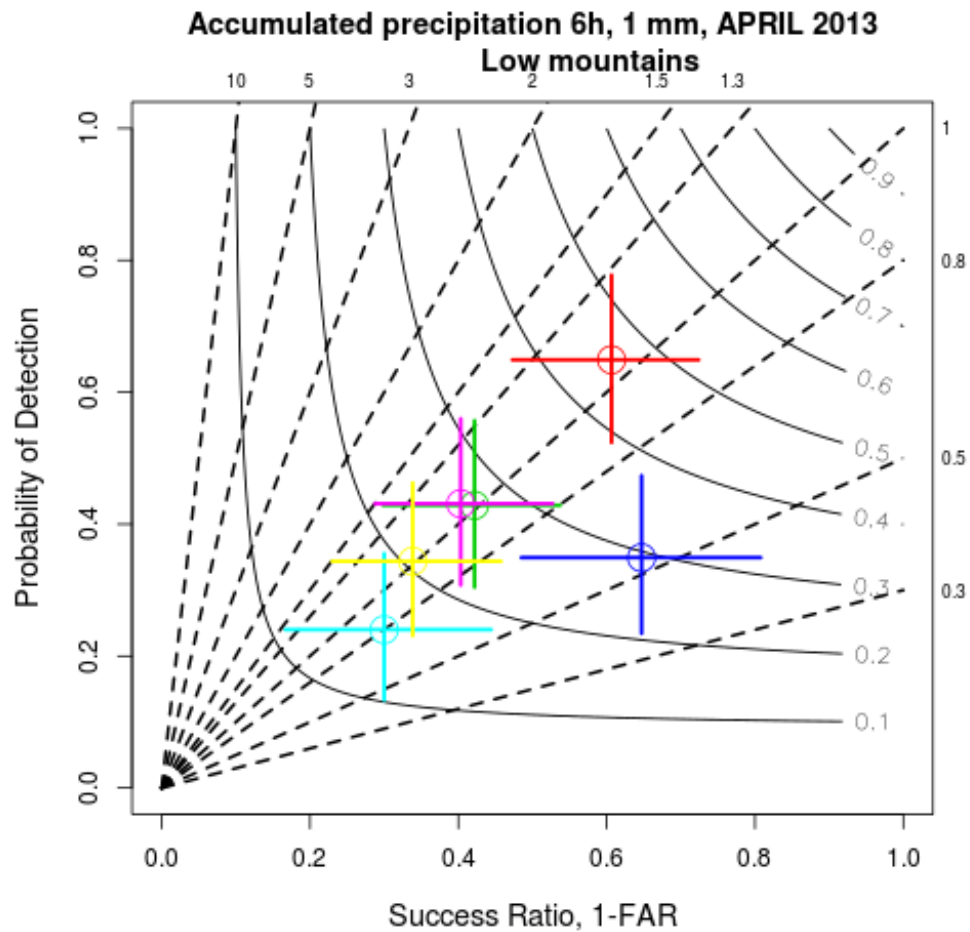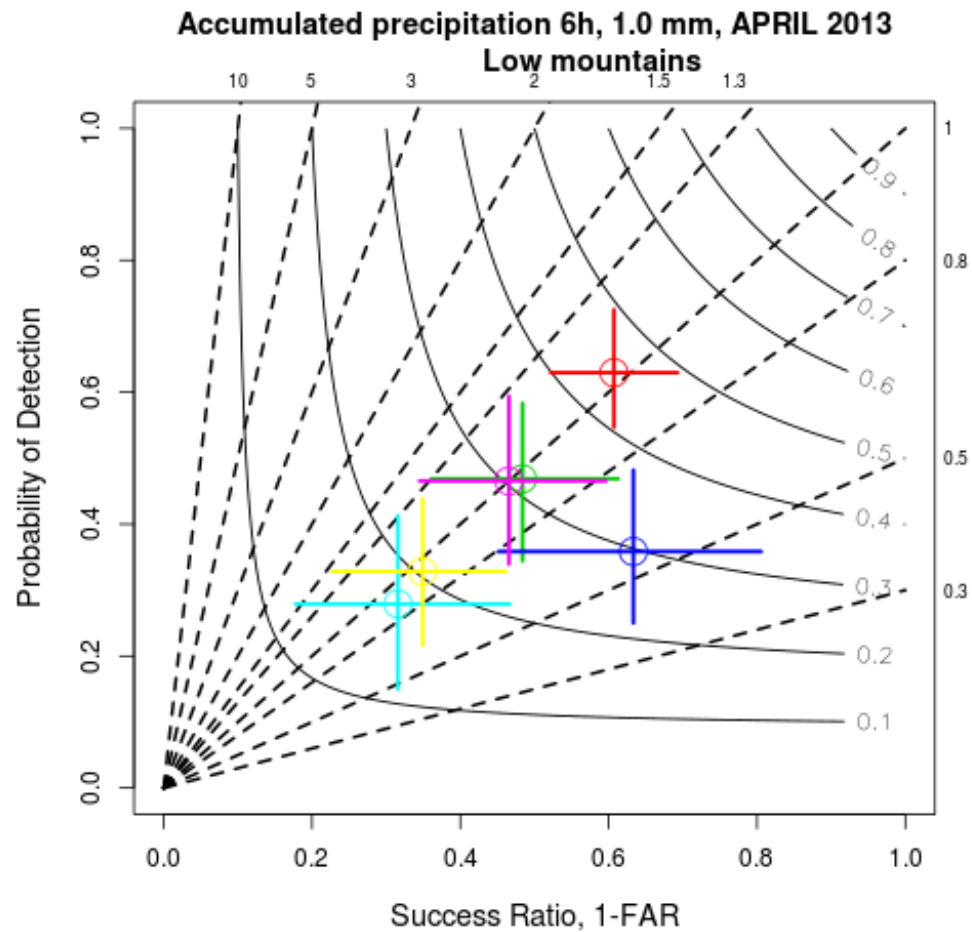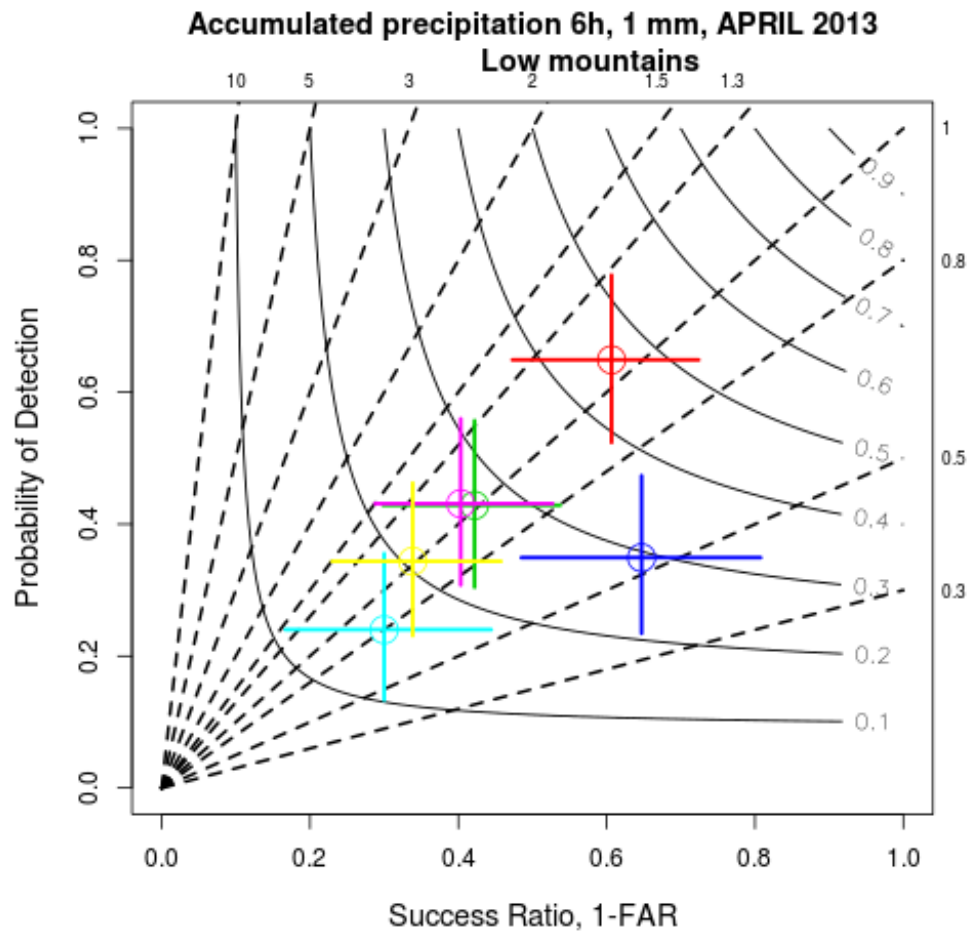
Legend: 06 12 18 24 30 36

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Low mountains
Forecast run 00 UTC, April 2013
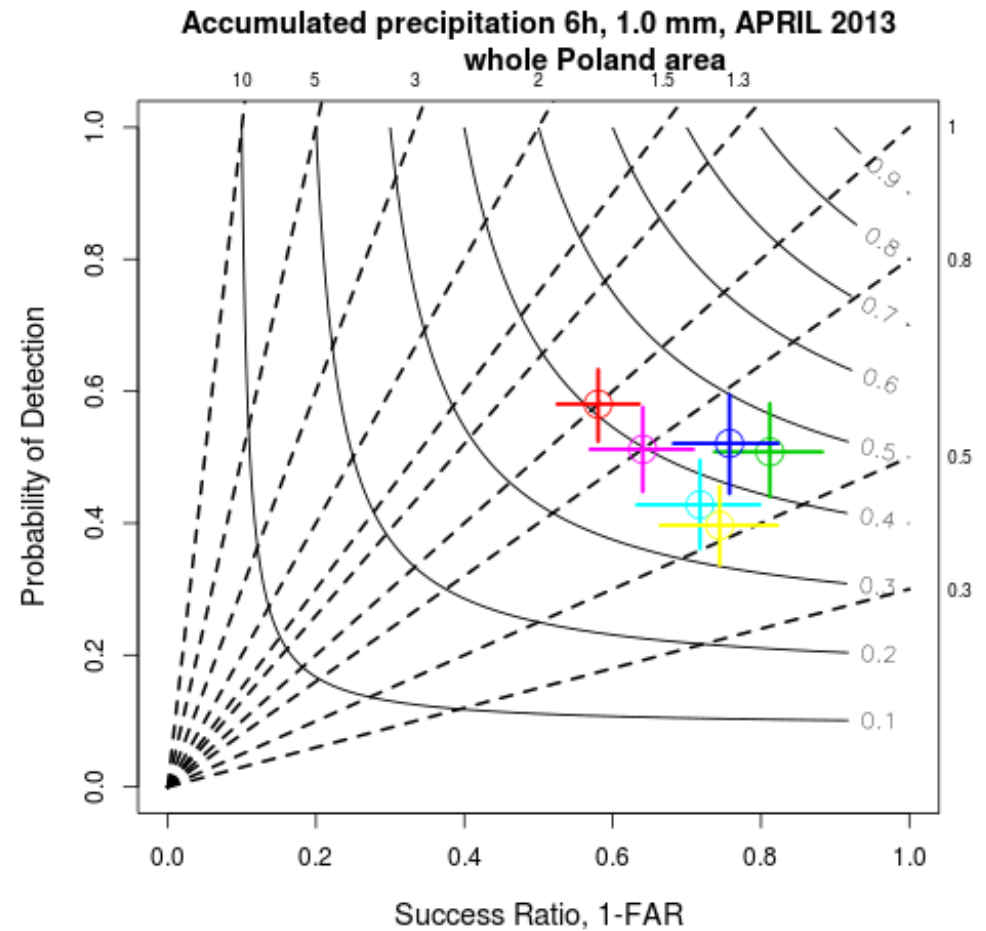### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Low mountains
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7
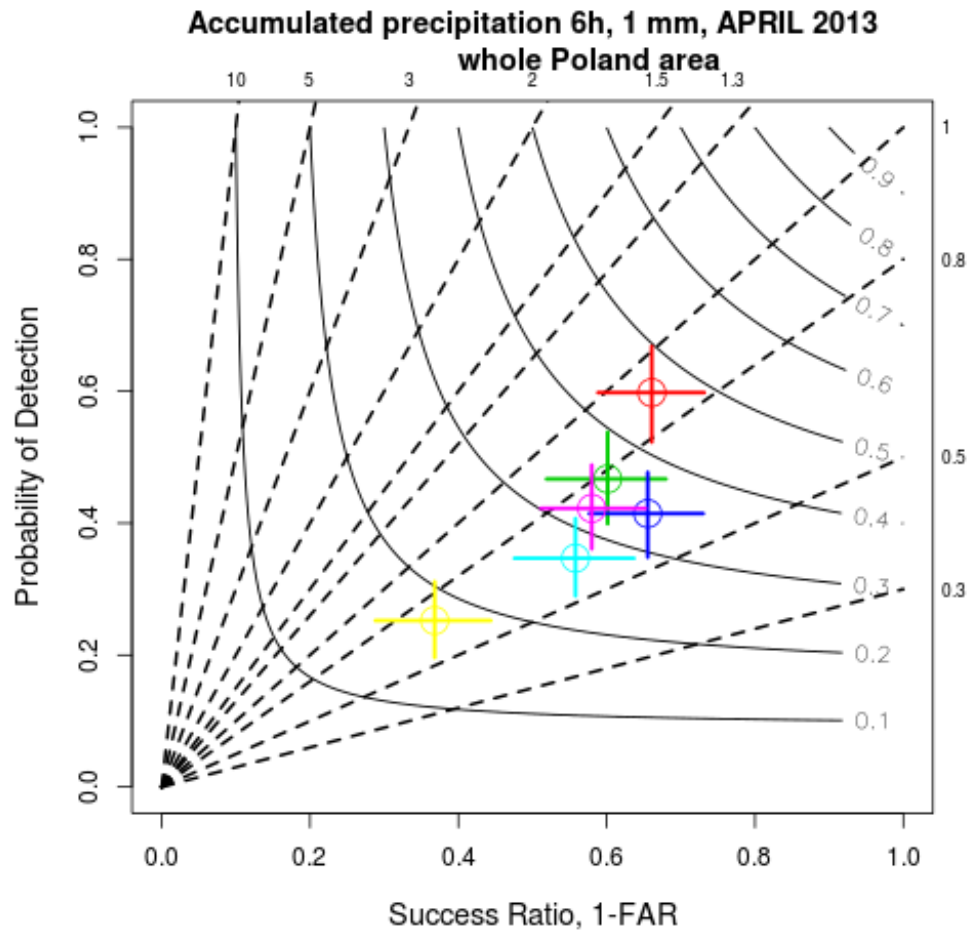
Accumulated Precipitation 06 h, 1.0 mm, Terrain: whole Poland area
Forecast run 00 UTC, April 2013
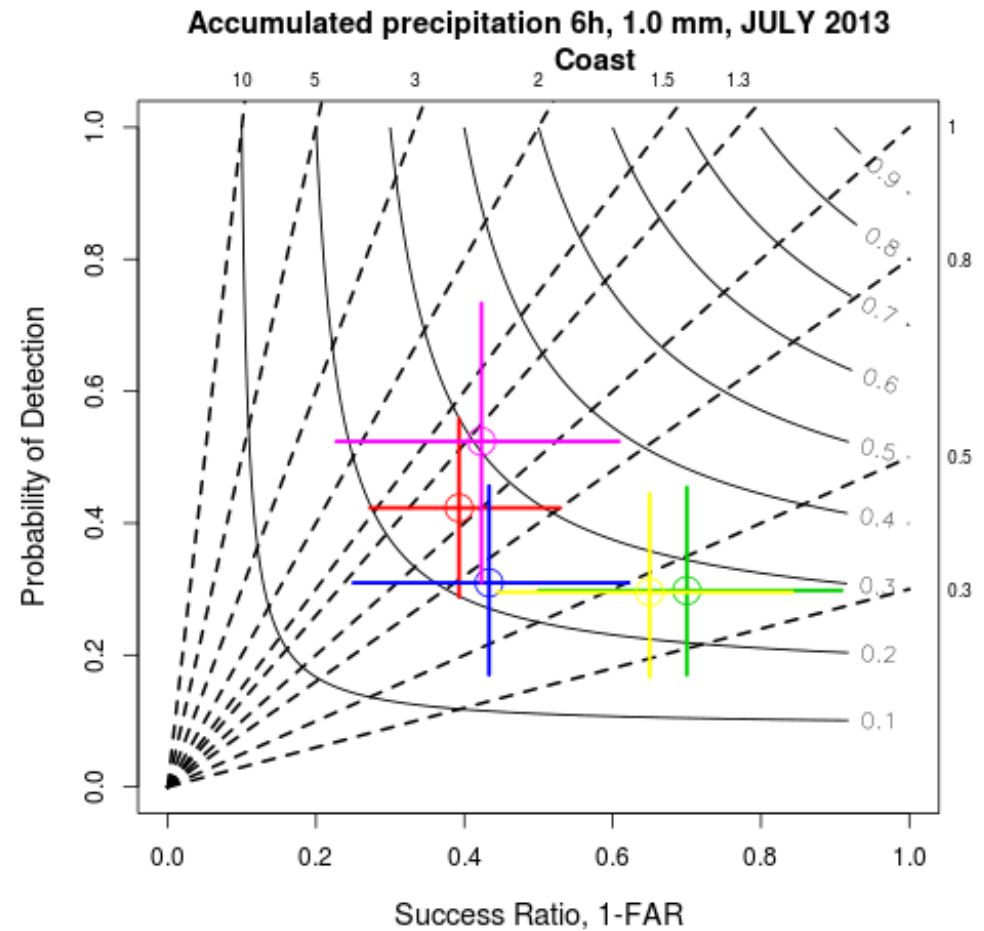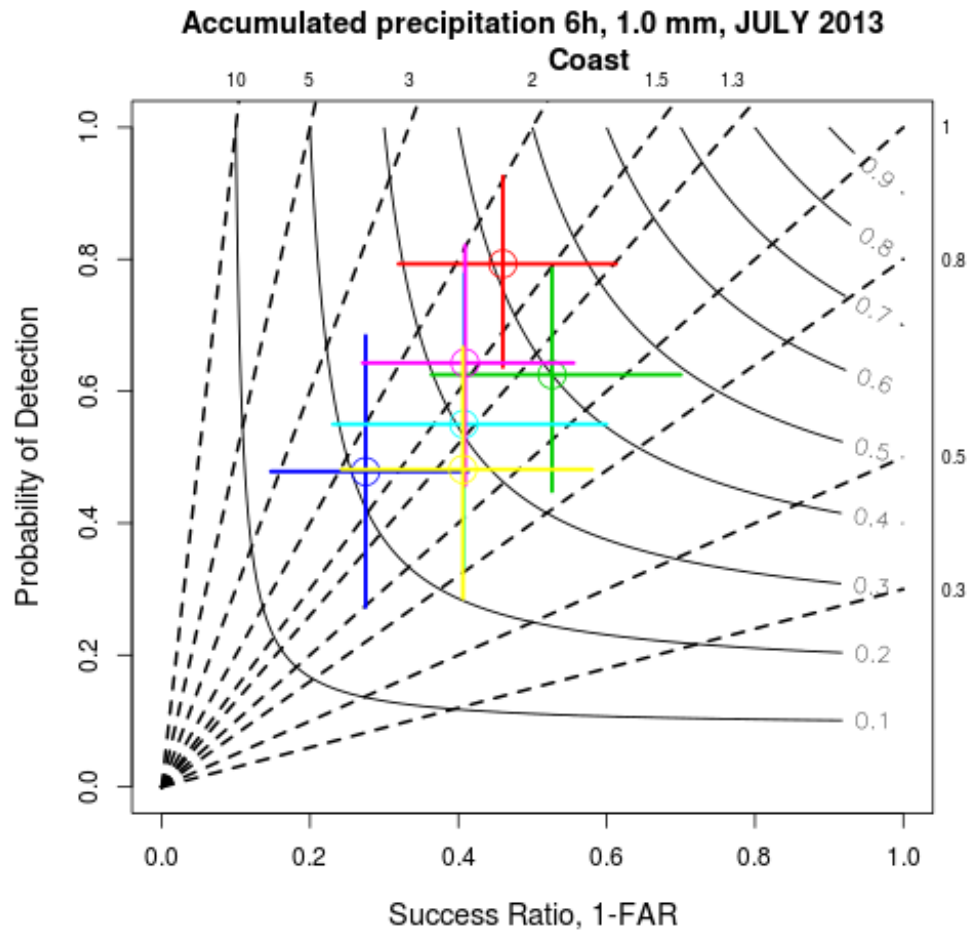### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Coast
Forecast run 00 UTC, July 2013
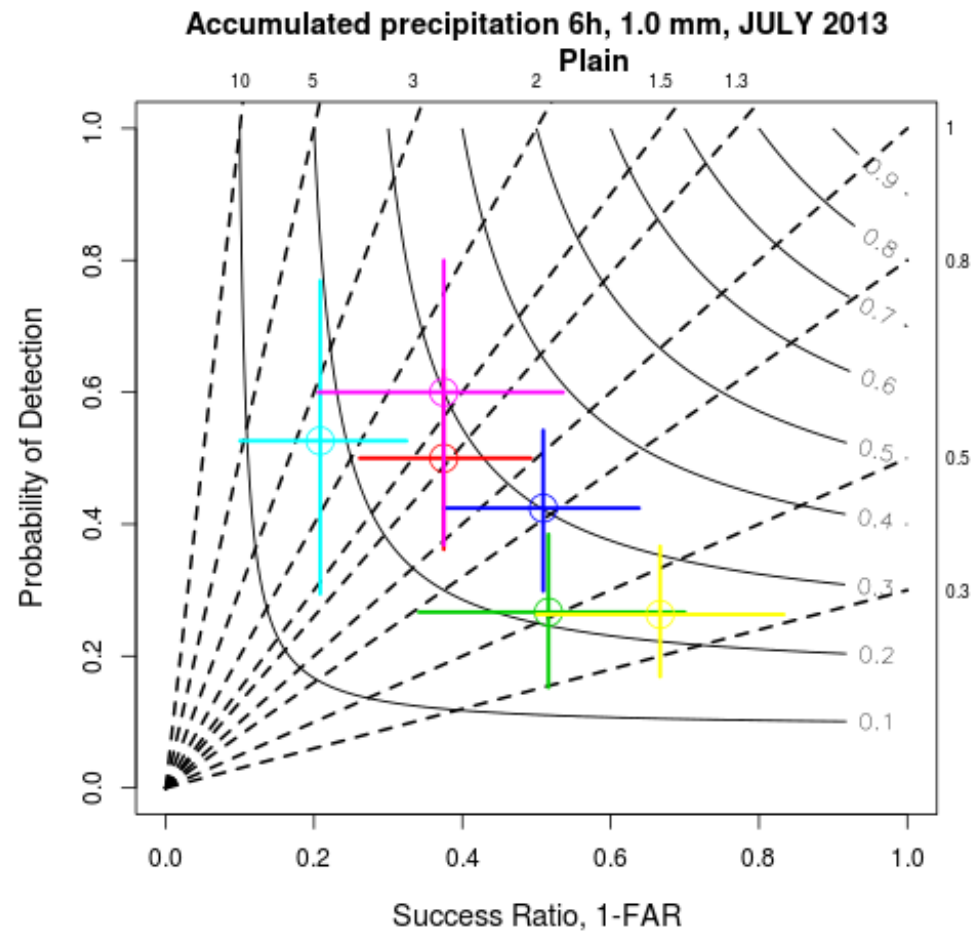### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Plain
Forecast run 00 UTC, July 2013
COSMO PL 2.8   **COSMO PL 7**

Accumulated Precipitation 06 h, 1.0 mm, Terrain: Low mountains
Forecast run 00 UTC, July 2013
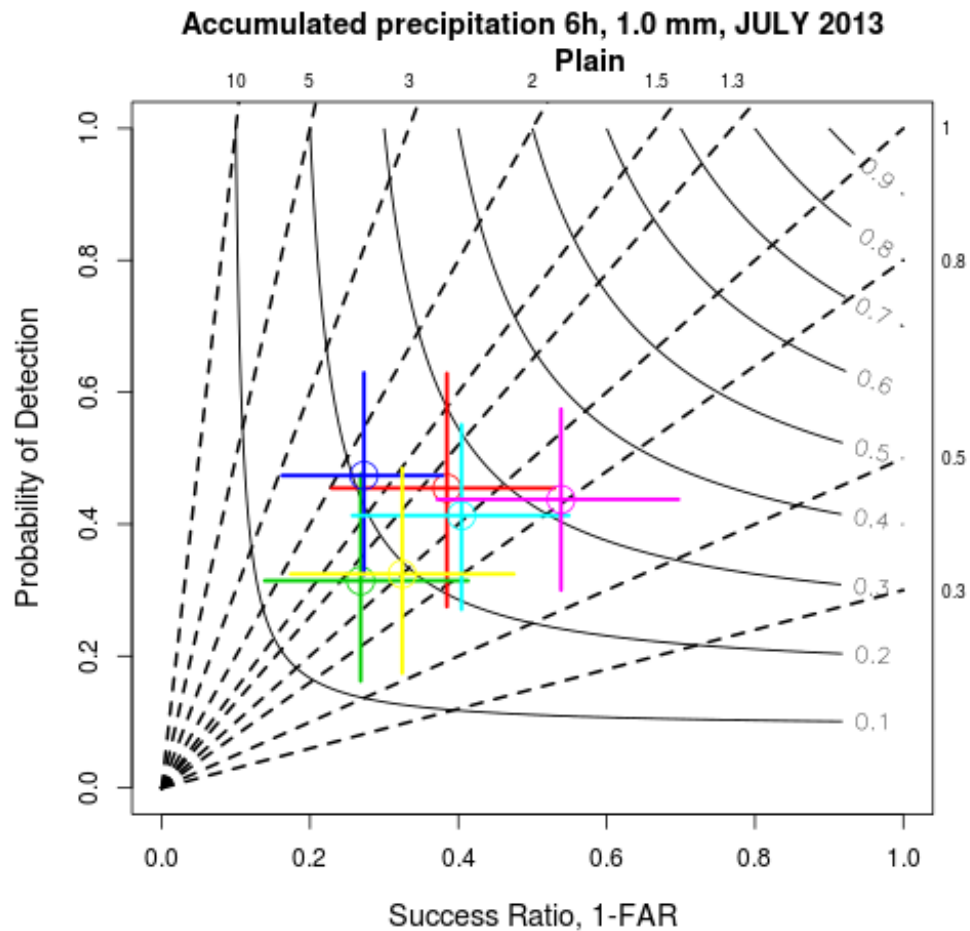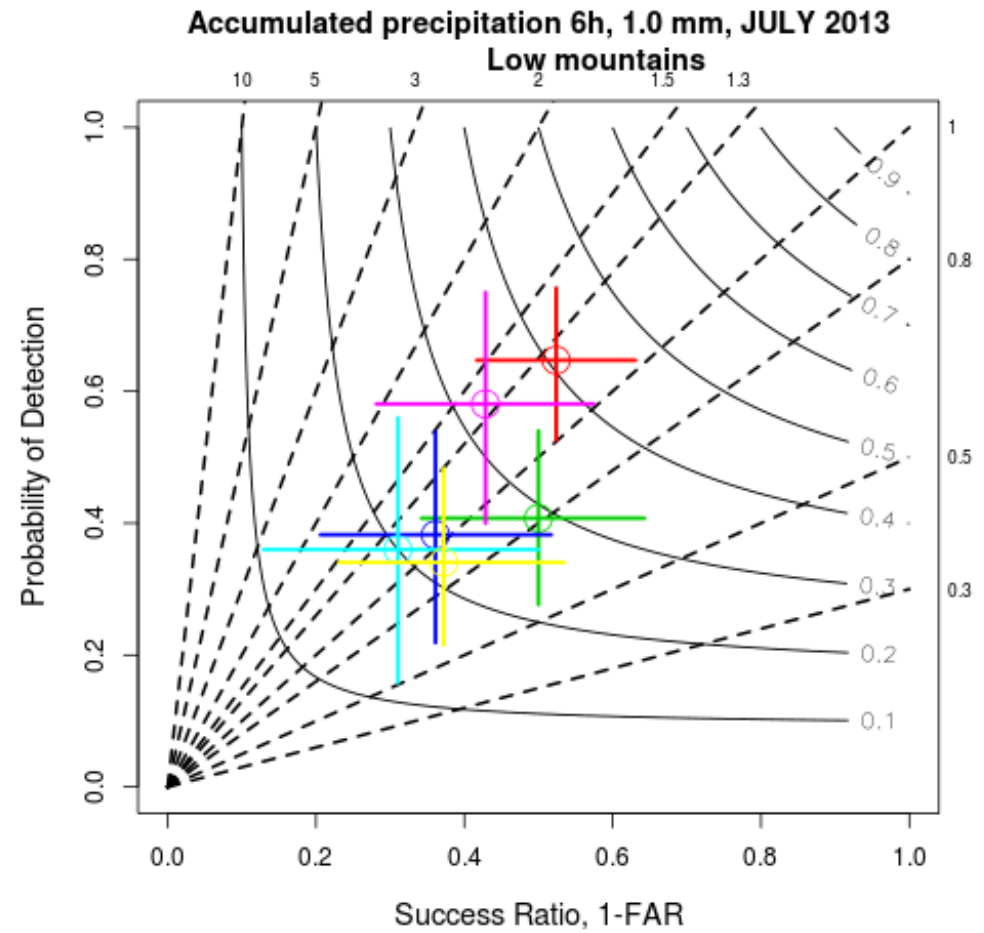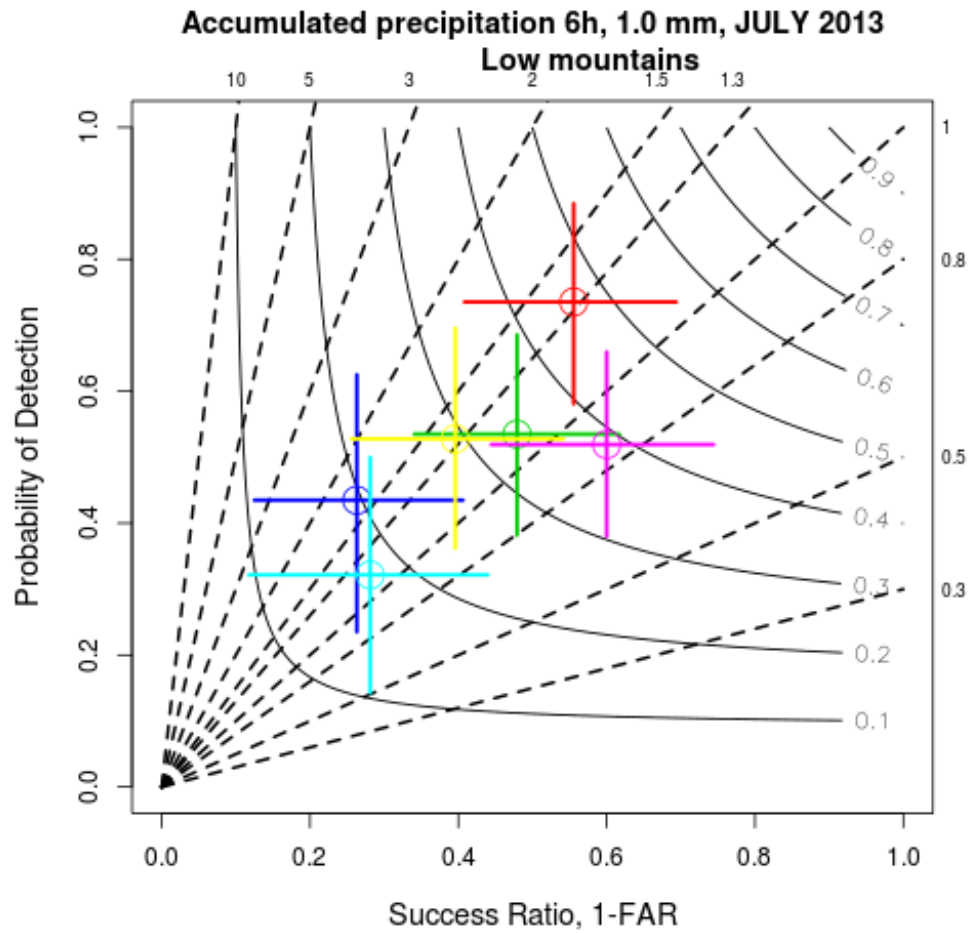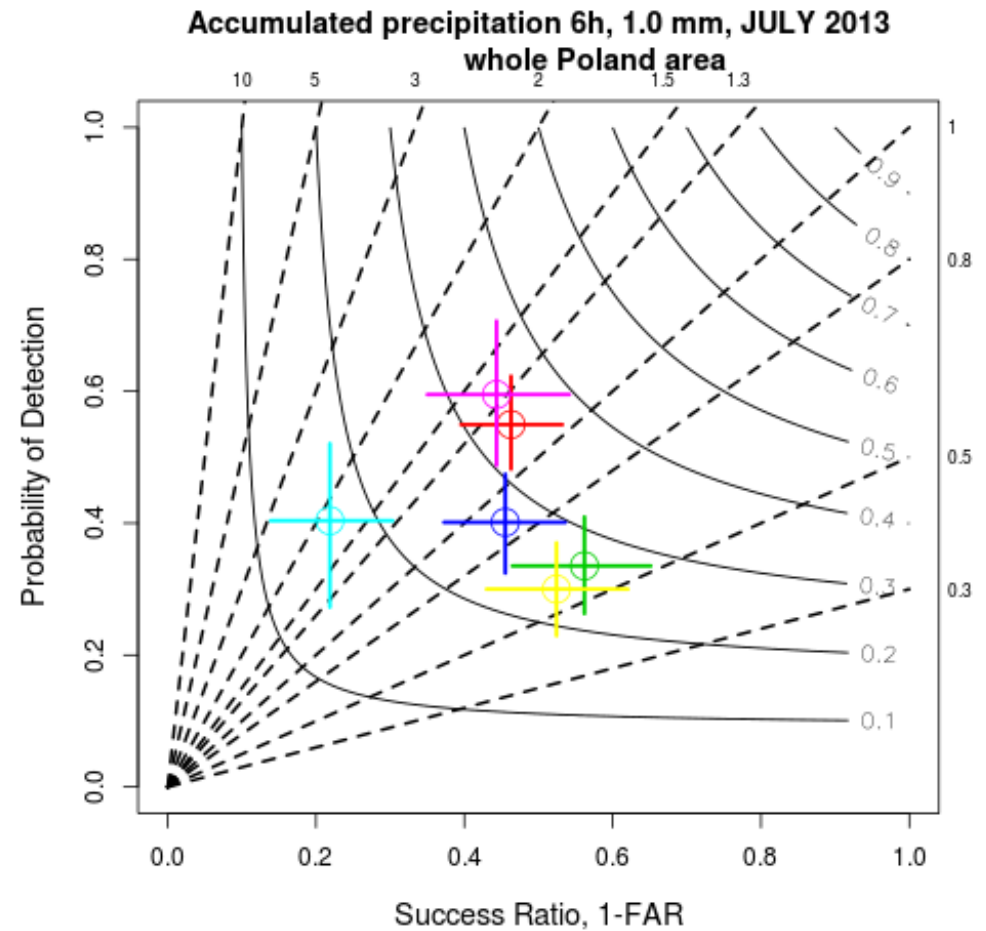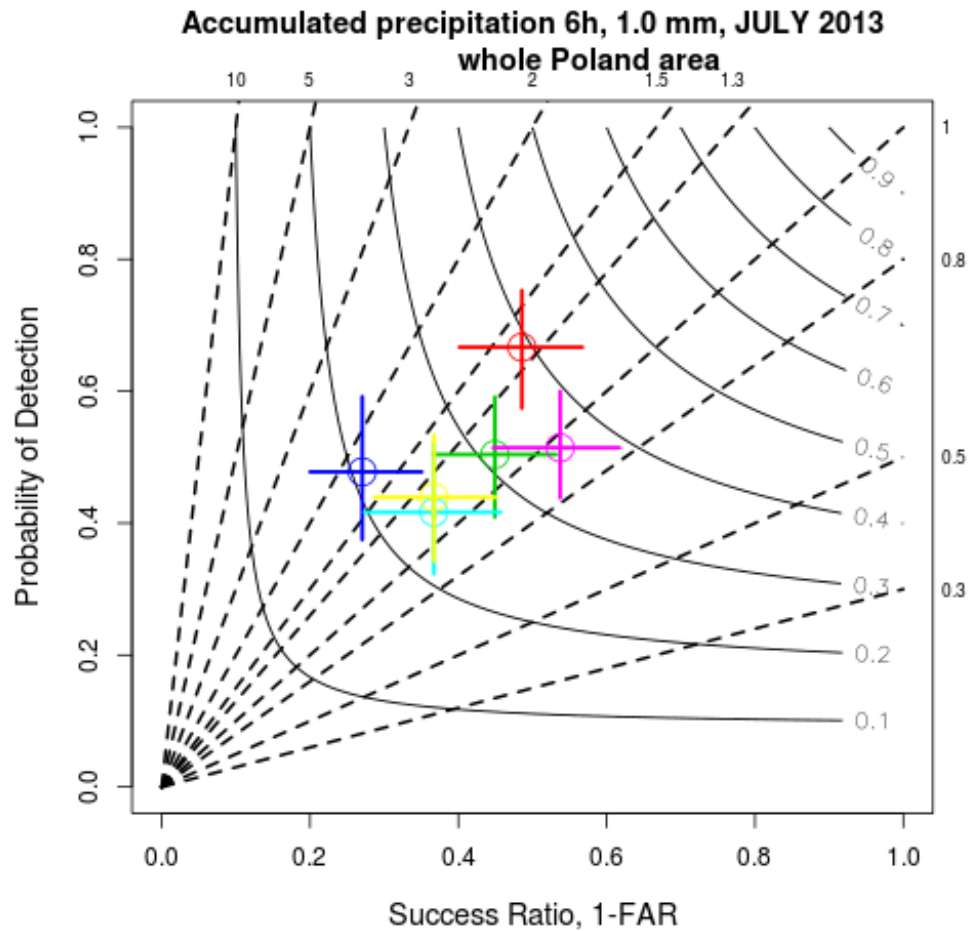### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 06 h, 1.0 mm, Terrain: whole Poland area
Forecast run 00 UTC, July 2013
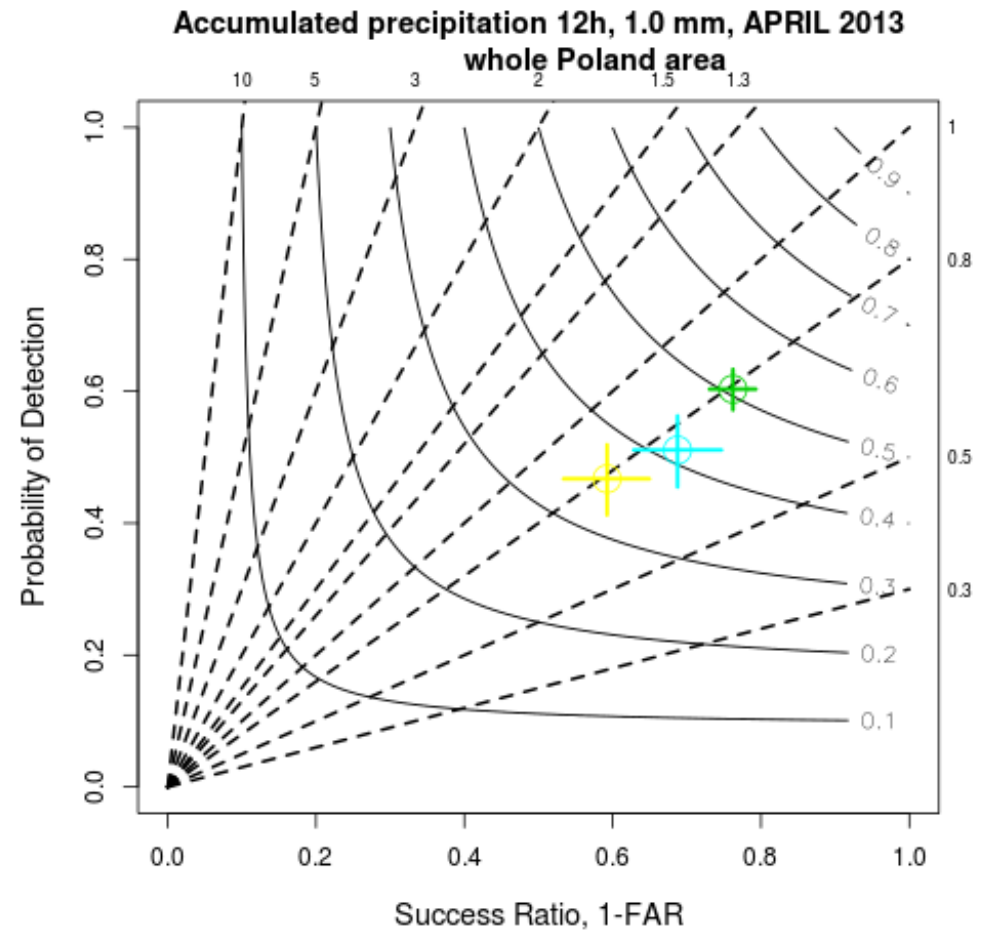### COSMO PL 2.8   COSMO PL 7

Accumulated Precipitation 12 h, 1.0 mm, Terrain: whole Poland area
Forecast run 00 UTC, April 2013
COSMO PL 2.8   COSMO PL 7

Accumulated precipitation 12h, 1.0 mm, APRIL 2013 whole Poland area

Accumulated Precipitation 12 h, 1.0 mm, Terrain: whole Poland area
Forecast run 00 UTC, July 2013
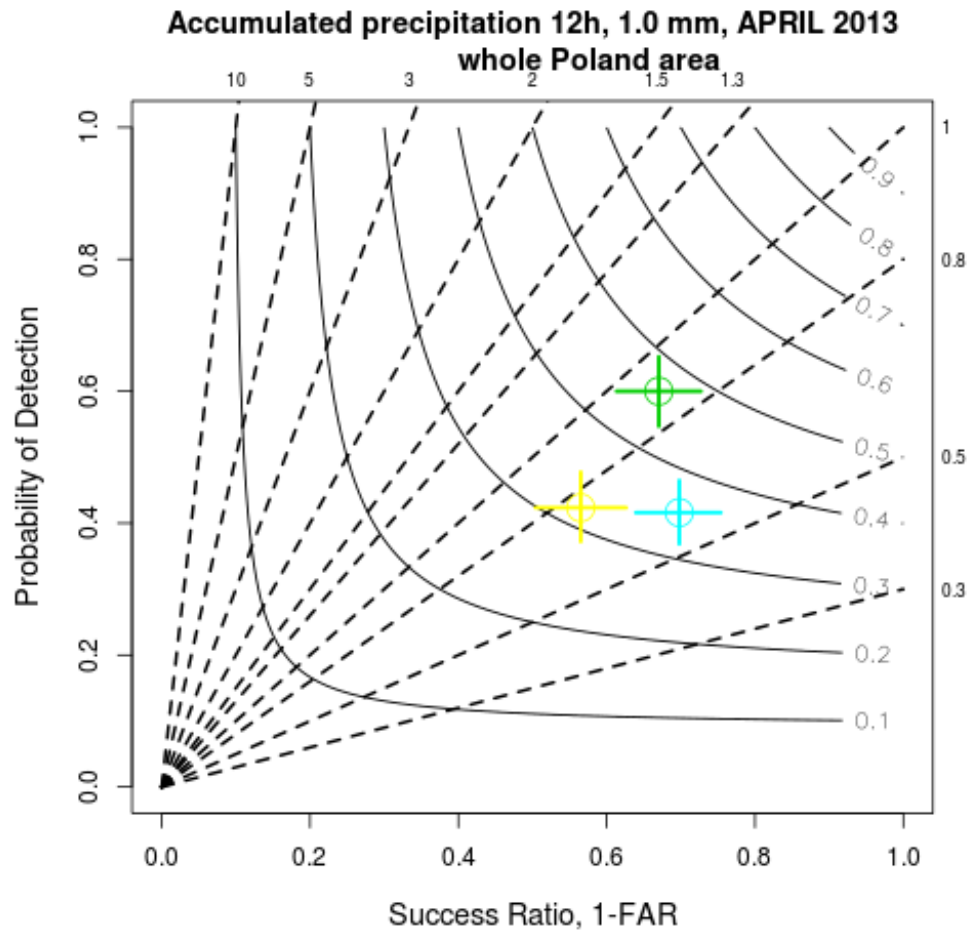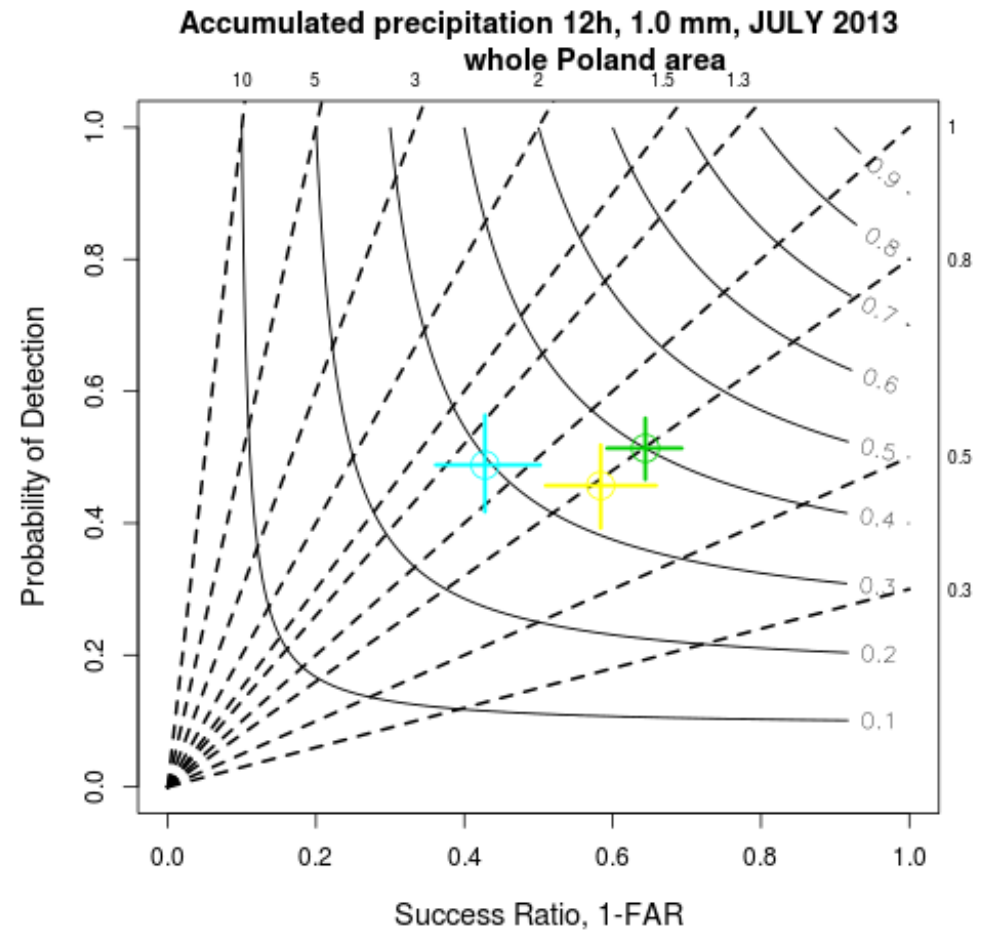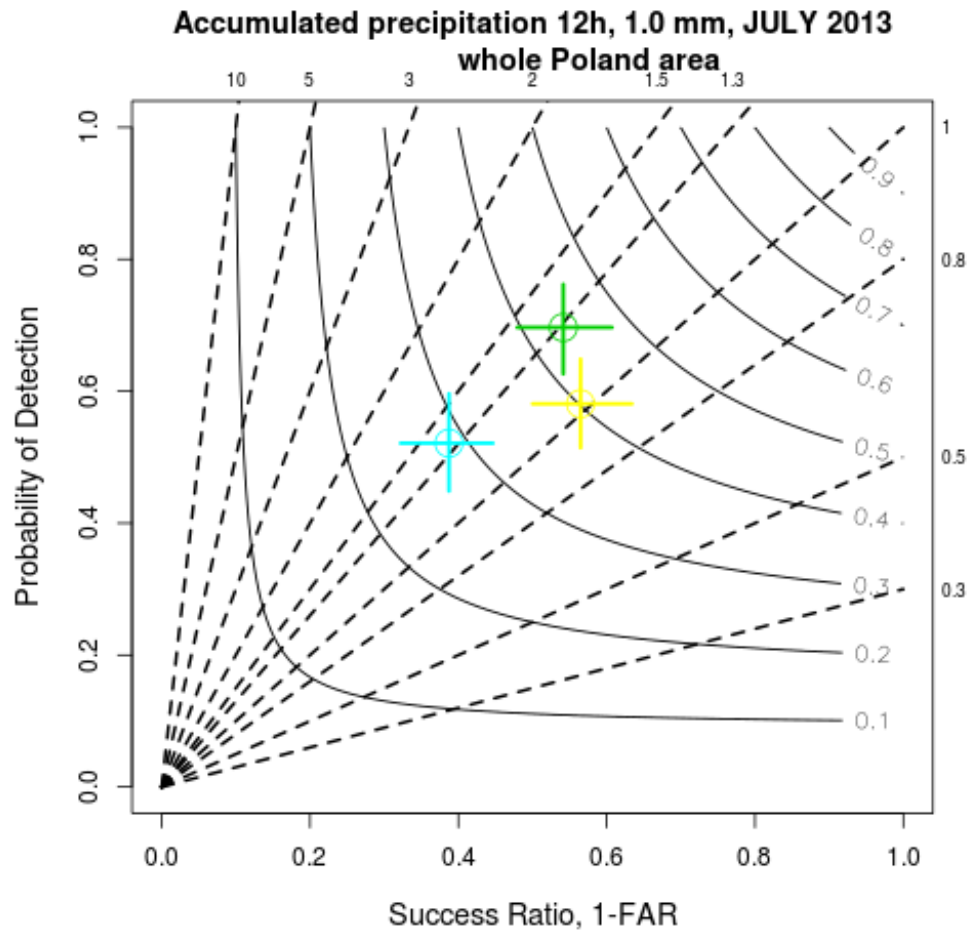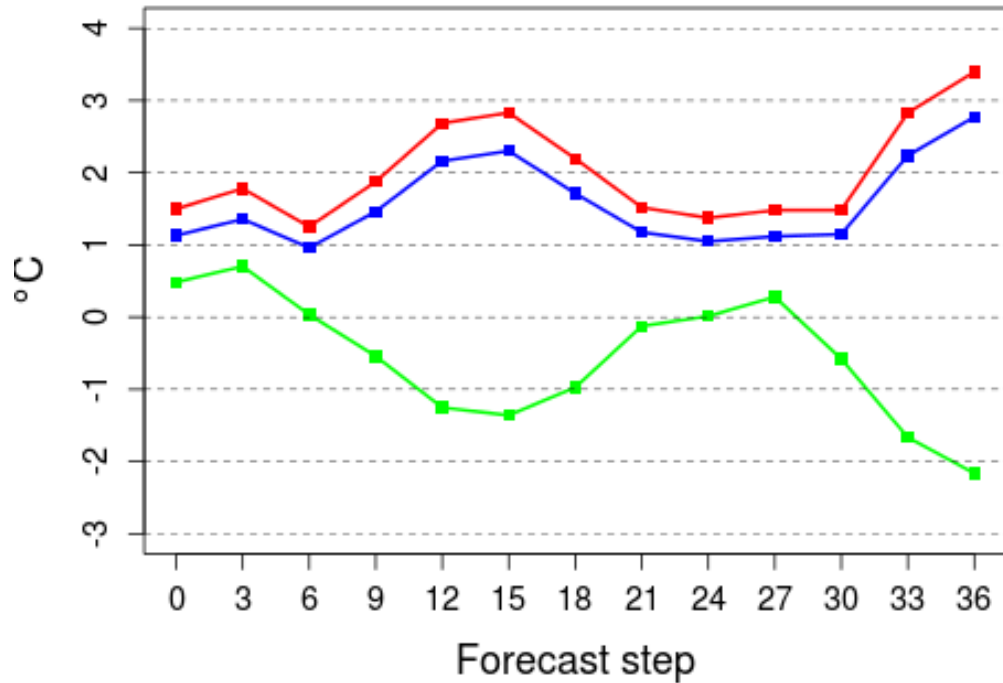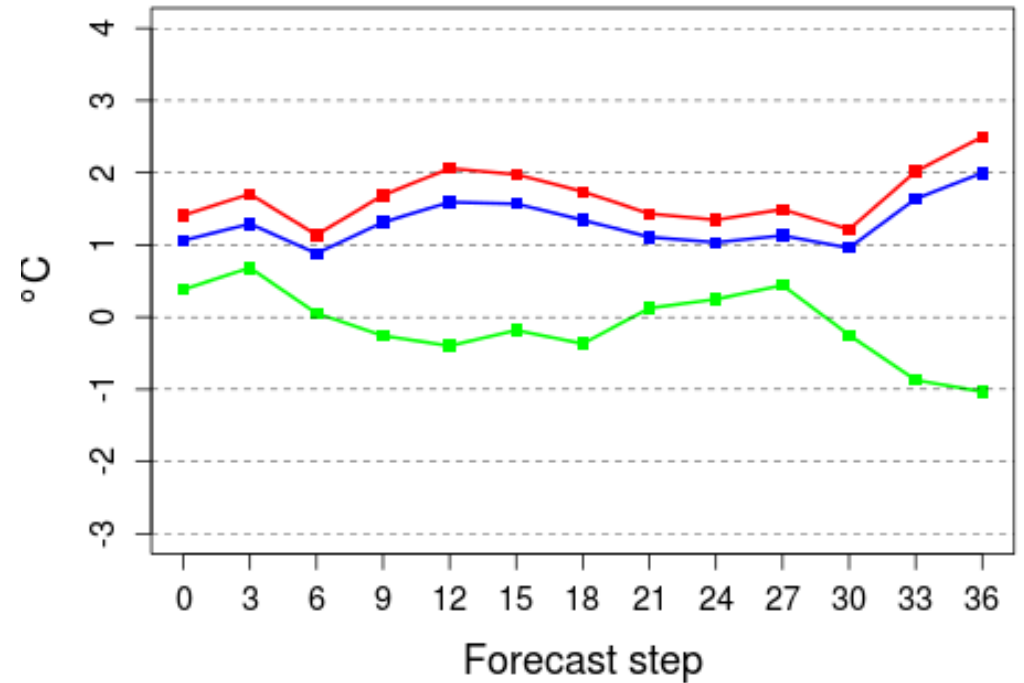### COSMO PL 2.8   COSMO PL 7

Temperature 2m, ME, MAE, RMSE, 00 UTC, All Poland stations, Conditions: TCC >= 75%

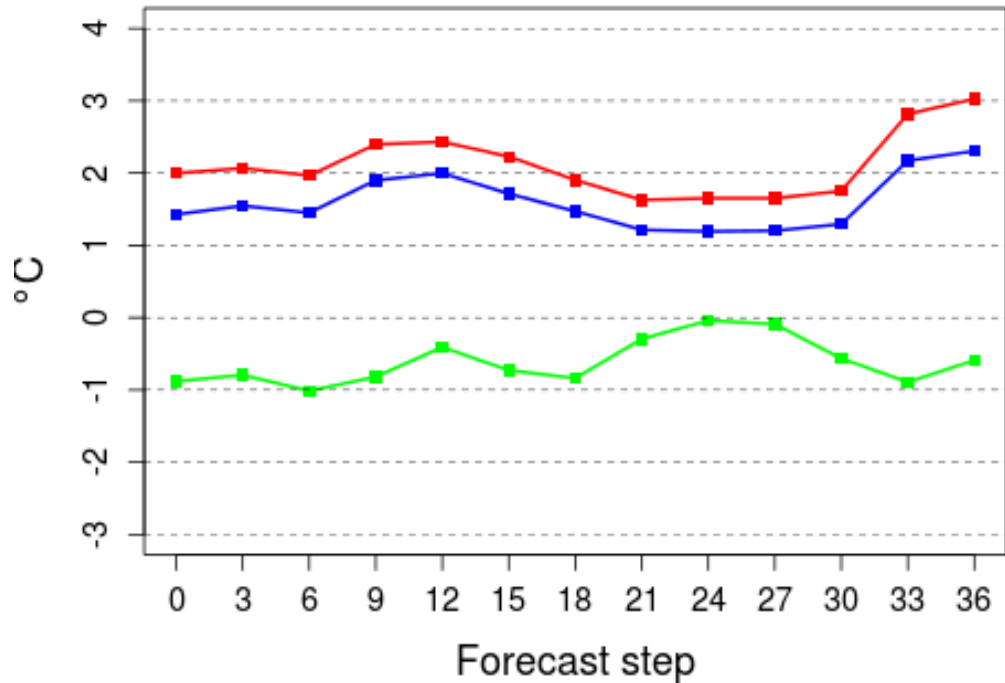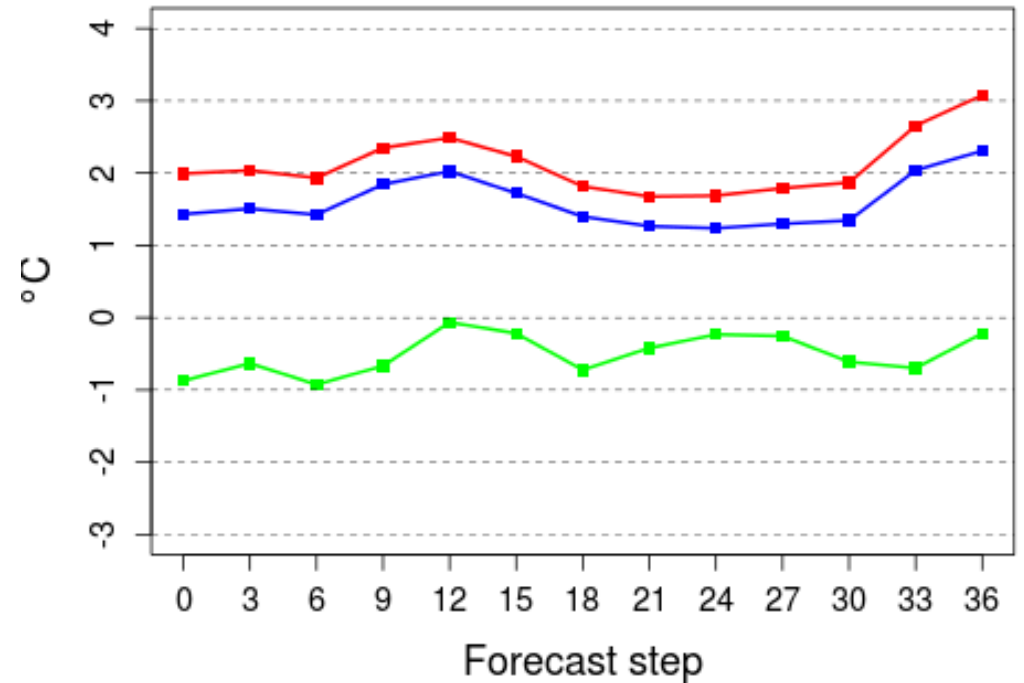# Temperature 2m, ME, MAE, RMSE, 00 UTC, All Poland stations, Conditions: TCC >= 75%, WS < 2.5 m/s

Temperature 2m, COSMO PL 2.8, 00 UTC, APRIL 2013

Temperature 2m, COSMO PL 7, 00 UTC, APRIL 2013

Conclusions

- No significant differences between COSMO PL 2.8 and 7 as far as conditional verifications and precipitatins are concerned.

- Some improvement when comparing vertical profiles of wind speed (mainly in mid-pressure levels)

- Also some improvement of wind-speed in wind-energy zones (especially in early hours of forecasts)

Thank you for your attention