Performance of COSMO-S14-EPS during the Olympics: comparison with other EPS systems

Andrea Montani, C. Marsigli, T. Paccagnella

ARPA Emilia-Romagna Servizio IdroMeteoClima, Bologna (I)

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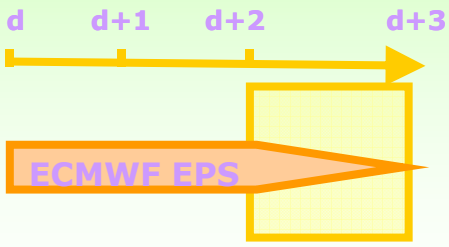
Outline

- **Limited-area ensemble activity for FROST-2014:**
  - ➢ relocation of COSMO-LEPS: COSMO-S14-EPS.

In the framework of CORSO Project, COSMO-LEPS was cloned over the Sochi area so as to provide:

- probabilistic forecasting at high resolution for the Olympic competitions,
- support to the deterministic forecasting,
- initial and boundary conditions for COSMO-RU2-EPS.

COSMO-S14-EPS @ ECMWF: Olympic status



clustering interval

4 variables
Z U V Q

3 levels
500 700 850 hPa

Cluster Analysis and RM identification

2 time steps

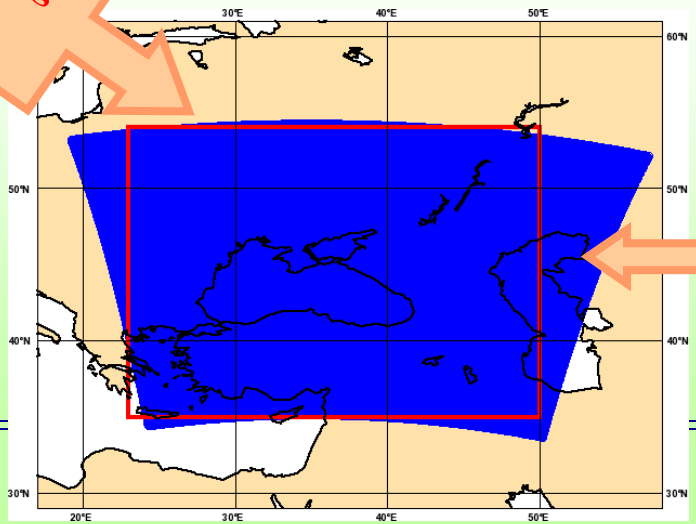
Black-Sea area

Complete Linkage

10 Representative Members driving the 10 COSMO-model integrations (weighted according to the cluster populations)

employing either Tiedtke or Kain-Fristch convection scheme (randomly choosen) + perturbations in turbulence scheme and in physical parameterisations

clustering area



Integration Domain

- Δx ~ 7 km; 40 ML; fc+72h;
- int2lm 1.20 + cosmo 4.26.
- initial time: 00/12 UTC;
- computer time (~ 4.5 million BUs for 2014) is provided by an ECMWF Special Project;
- suite managed by ARPA-SIMC;

Disseminated products

post-processing uses COSMO-software **fieldextra**:

- ➔ probability fields for the exceedance of thresholds for surface fields;
- ➔ ensemble mean and ensemble standard deviation for some fields;
- ➔ individual ensemble member runs (ICs and BCs from 10 selected EPS members): start at 00UTC and 12UTC; $\Delta t = 72h$;
- ➔ 1 deterministic run (ICs and BCs from the deterministic ECMWF forecast) to "join" deterministic and probabilistic approaches: start at 00UTC and 12UTC; $\Delta t = 72h$;
- ➔ provision of hourly boundary conditions (from fc+0h to fc+48h) for convective-resolving ensemble (RDP part);
- ➔ provision of hourly boundary conditions (from fc+0h to fc+48h) for higher-resolution deterministic modelling (RDP part).

Timeliness of delivery (Sochi local time = UTC + 4 hours)

Many efforts were made to anticipate the arrival of 00UTC products:

1) we were given the "go-ahead" by ECMWF at about 8.00(20.00) UTC for the 00 (12) UTC run: **we had no control on this**;
2) model runs take 10 minutes;
3) dissemination of boundary conditions started at 8.10 (20.10) UTC and took 20 minutes, but occasionally up to 1 hour;
4) dissemination of products started at 8.15 (20.15) UTC and took 5-10 minutes;
5) in the best situation, delivery terminated by 8.30 (20.30) UTC.

Outline

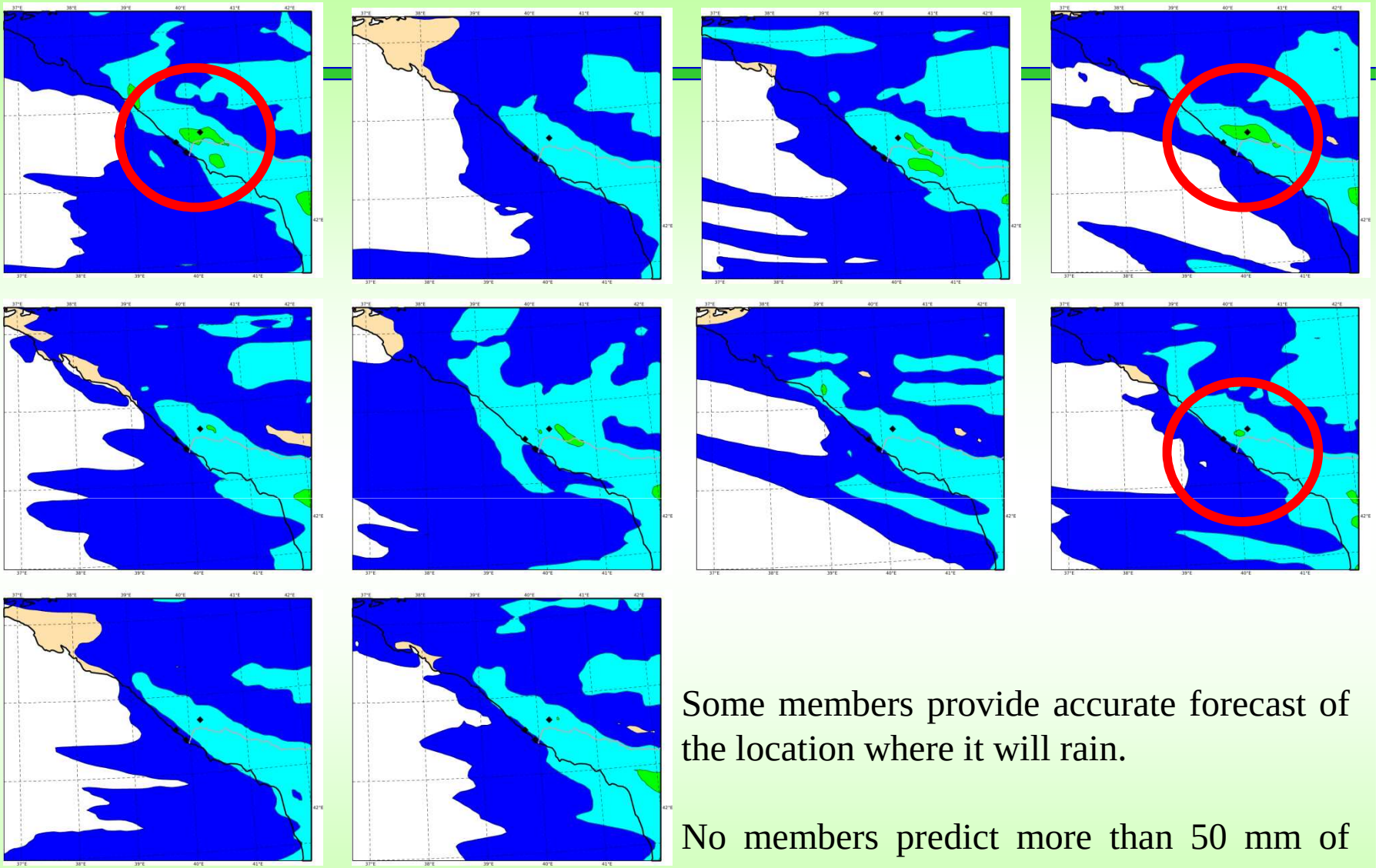
- **Performance of COSMO-S14-EPS:**
  - ➢case-study assessment: example of comparison between COSMO-S14-EPS and Aladin-LAEF (by ZAMG) to assess strengths /weaknesses of different forecast systems.

Case-study assessment

18.02.2014: cold front with about 30 mm of precipitation in 24 hours very localised near Krasnaya Polyana (little rain elsewhere).

	COSMO-S14-EPS	ALADIN-LAEF
Hor. Resol. (km)	**7**	**10**
Vert. Resol (ML)	40	37
Fcst length (hours)	72	72
Ensemble size	**10**	**16**
Initial time	00/12	00/12
IC/BC	selected EPS members	EPS members

COSMO-S14-EPS: 2014021700 + 24-48h

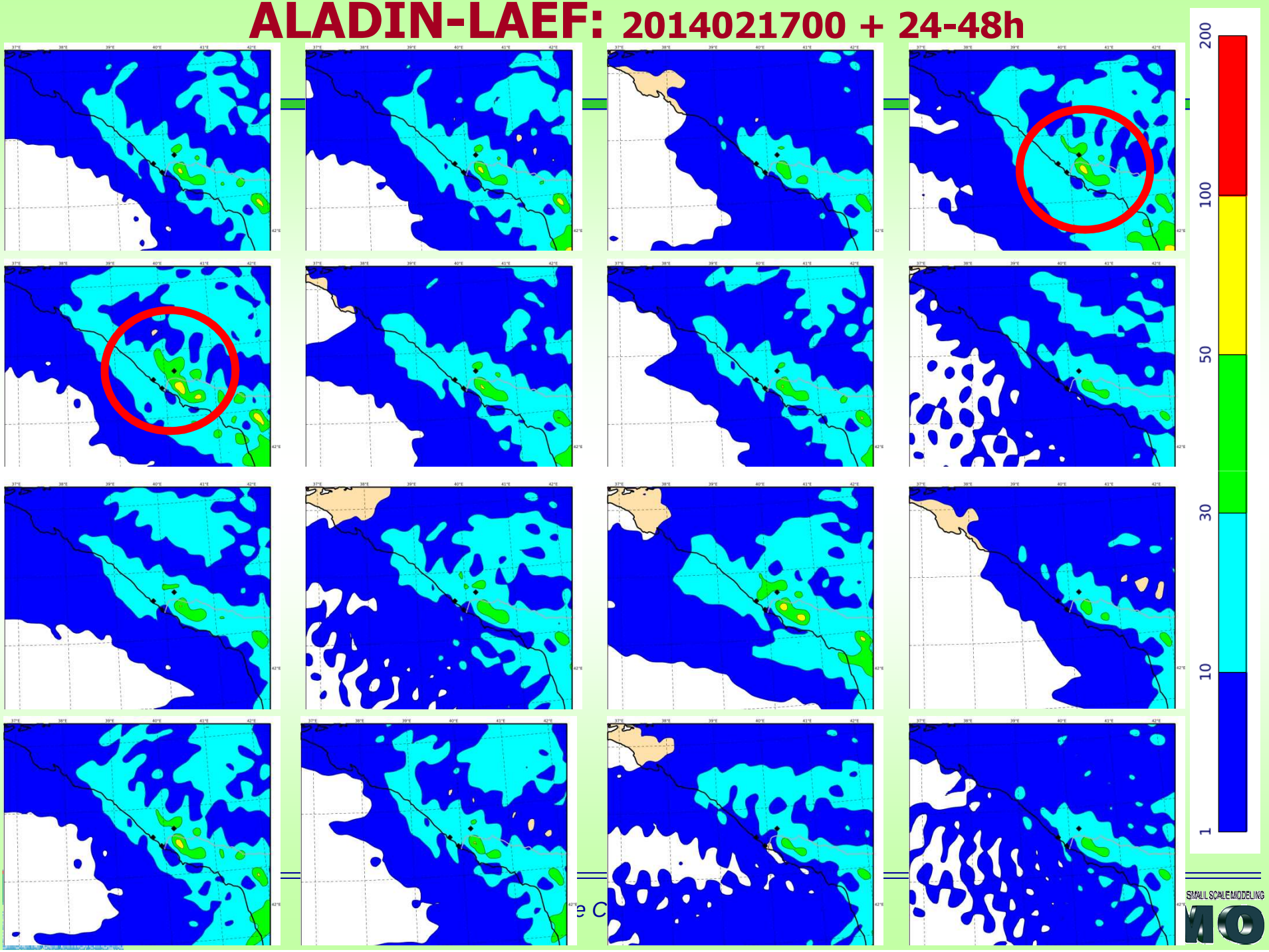


Some members provide accurate forecast of the location where it will rain.

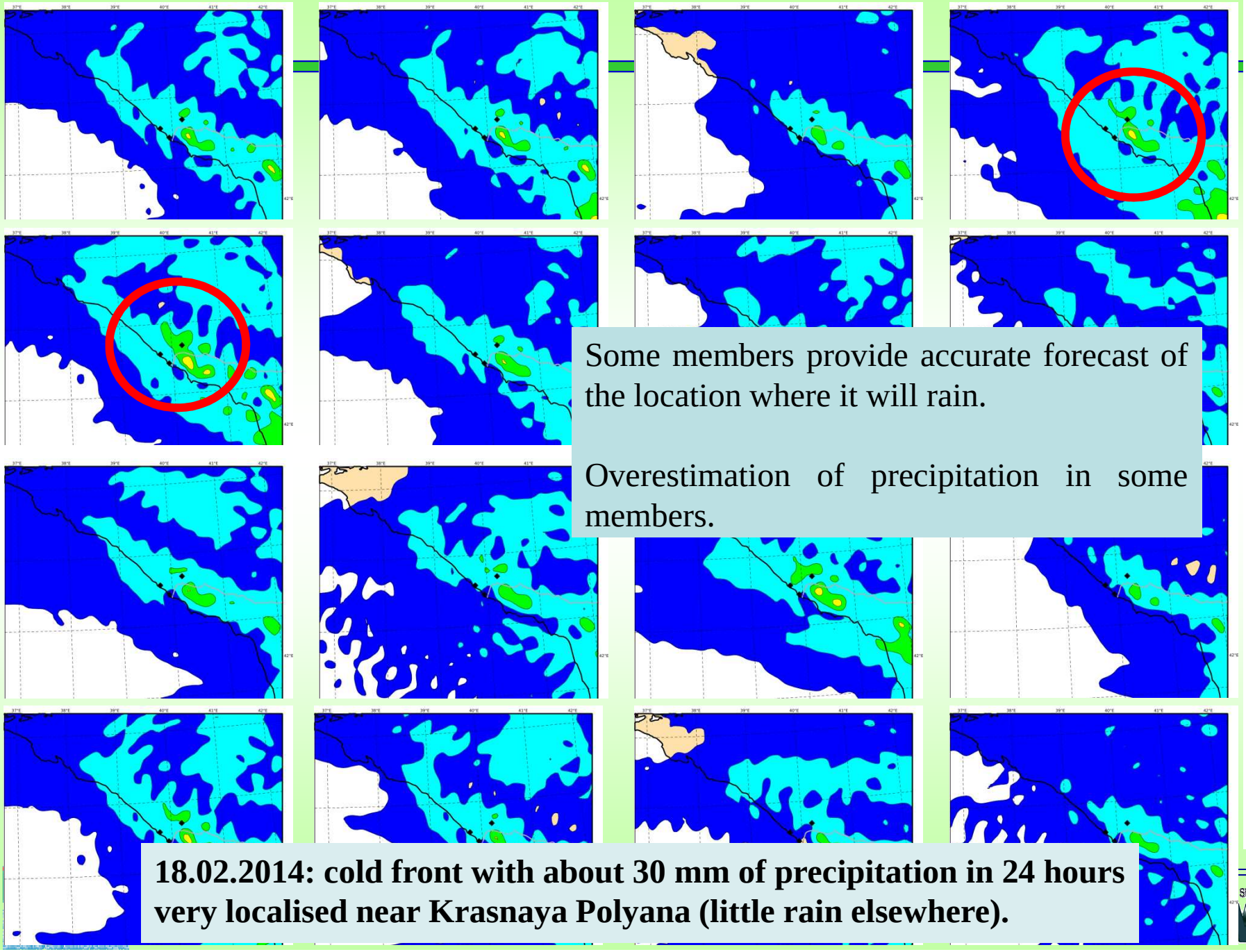
No members predict more than 50 mm of precipitation anywhere in the region.

18.02.2014: cold front with about 30 mm of precipitation in 24 hours very localised near Krasnaya Polyana (little rain elsewhere).

ALADIN-LAEF: 2014021700 + 24-48h



ALADIN-LAEF: 2014021700 + 24-48h



Some members provide accurate forecast of the location where it will rain.

Overestimation of precipitation in some members.

18.02.2014: cold front with about 30 mm of precipitation in 24 hours very localised near Krasnaya Polyana (little rain elsewhere).

SMALL SCALE MODELING

Main results

- In order to encourage the use of ensemble products during the Olympics and to strengthen the links between forecasters and ensemble developers, a training event was organised in Sochi in October 2013.
- The COSMO-based ensemble system over the Sochi-area (COSMO-S14-EPS) was developed, implemented and ran on a daily basis before and during the Olympics.
- Dissemination of products was reliable and as timely as possible: 00UTC (12UTC) products were disseminated by about 8.30 UTC (20.30UTC).
- Verification results during the Olympics are still preliminary and based on case studies: they show good performance of COSMO-S14-EPS when compared to other similar (convection-parameterised) ensemble systems running at the same time.

The Olympics are over; and now....?

Present status

- In the last COSMO year, COSMO-S14-EPS "survived" a number of ECMWF upgrades (increase of vertical resolution, change of member-state server, change of super-computer).
- COSMO-S14-EPS was switched off on 30 April 2014. It would be a pity to lose the forecast experience on using EPS-based products ...

Plans

- Perform verification vs different types of observation networks.
- In the framework of FROST2014, test performance of "multi-model" ensemble products for case studies.
- ....

Thank you !