WG4

PT CORSO-A:

Final status

TL : I.Rozinkina, G.Rivin

Team:

E. Astakhova, D. Alferov, E.Avgoustoglou, J-M. Bettems, D.Blinov, P.Eckert, A.Montani, G.Rivin, I.Rozinkina, M.Shatunova, J.Helmert

(RHMC, DWD, MS, ARPA-SIMC, HMC)

COSMO GM Offenbach, 5 - 8 Sept. 2016

Goal:

- **To transfer results of the PP CORSO to COSMO software, applications and know-how for be available for COSMO- community**

The resources requested/spent: **1.0** FTE

Period: 09.2014 – 08.2015 - 08.2016

Subtasks:

ST1: The guidance of the optimal domain's size selection for COSMO-1 for the regions with complex mountain relief

ST2: T2m Implementation of algorithm of subgrid “h-correction” of (due to the differences between model’s and real orograpy) based on COSMO T lapse rate forecasts

ST3: Preparing of archives COSMO-Sochi-EPS applicable for research (as TIGGE LAM) aimed at improving COSMO EPS systems and available for community

ST4: Preparing of guidelines for forecasters “The features of using and interpretation of the results of meso-scale modeling” based on Sochi experience

The guidance of the optimal domain's size selection for COSMO-1 for the mountain regions

G.Rivin, M.Shatunova,D.Blinov, (RHMC), J.Helmert (DWD)

Motivation:

-The runs of COSMO-1 for Sochi2014 demonstrated that forecast results depend on size and on site of domain of runs

-The calculations of COSMO-1 are strong useful for meteosupport in mountain areas, but they are very computing expensive

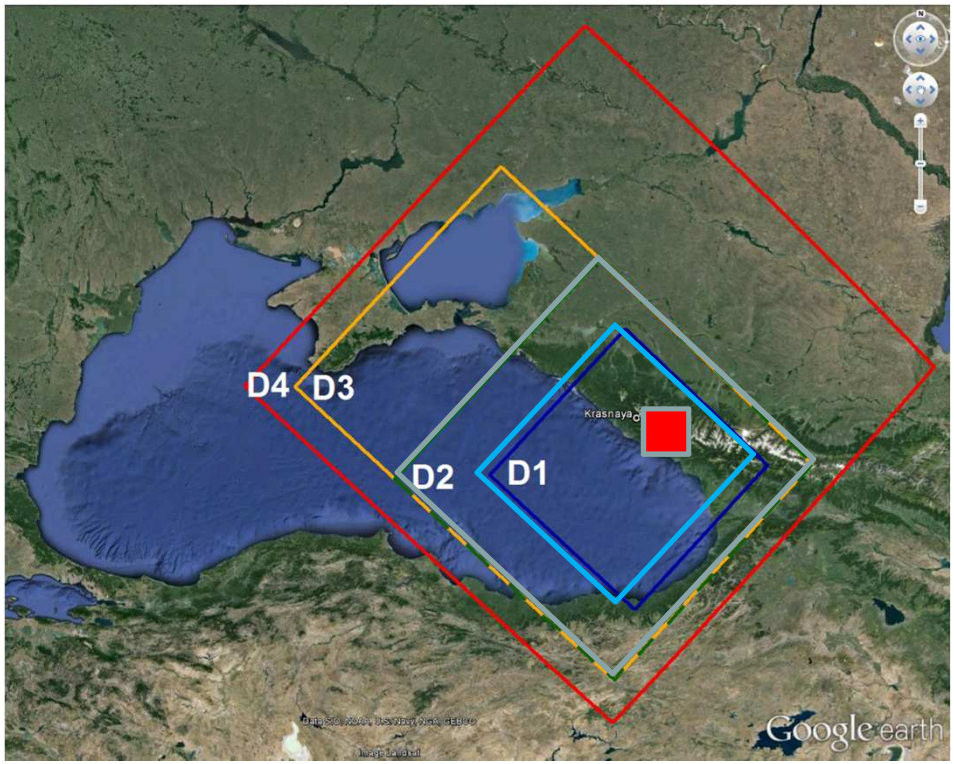
Expected results:

The results of experiments with different COSMO-1 domains and proposals for choosing minimal useful domain size of COSMO-1 &

Practical recommends for COSMO-1 calculations in limited computing resources

Selected Domains

COSMO-Ru1 simulations performed for different domains from February 3 to March 31, 2014



The must part of observation data used for verification was available for region of competitions (Red)

D1: 300 x 300 km (90 000 / ~ 60 000 km2)**
D2: 450 x 450 km (202 500 / ~ 120 000 km2)**
D3: 450 x 650 km (292 500 / ~ 200 000 km2)**
D4: 750 x 750 km (562 500 / ~250 000 km2)**

What was performed:

- Several simulation domains were selected taking into account the prevailing direction of air mass transfer (using of GWT_27 weather type classification) and its transformation due to local conditions (e.g. orography effect)

- Simulations are made for the period 3-20 February, 2014

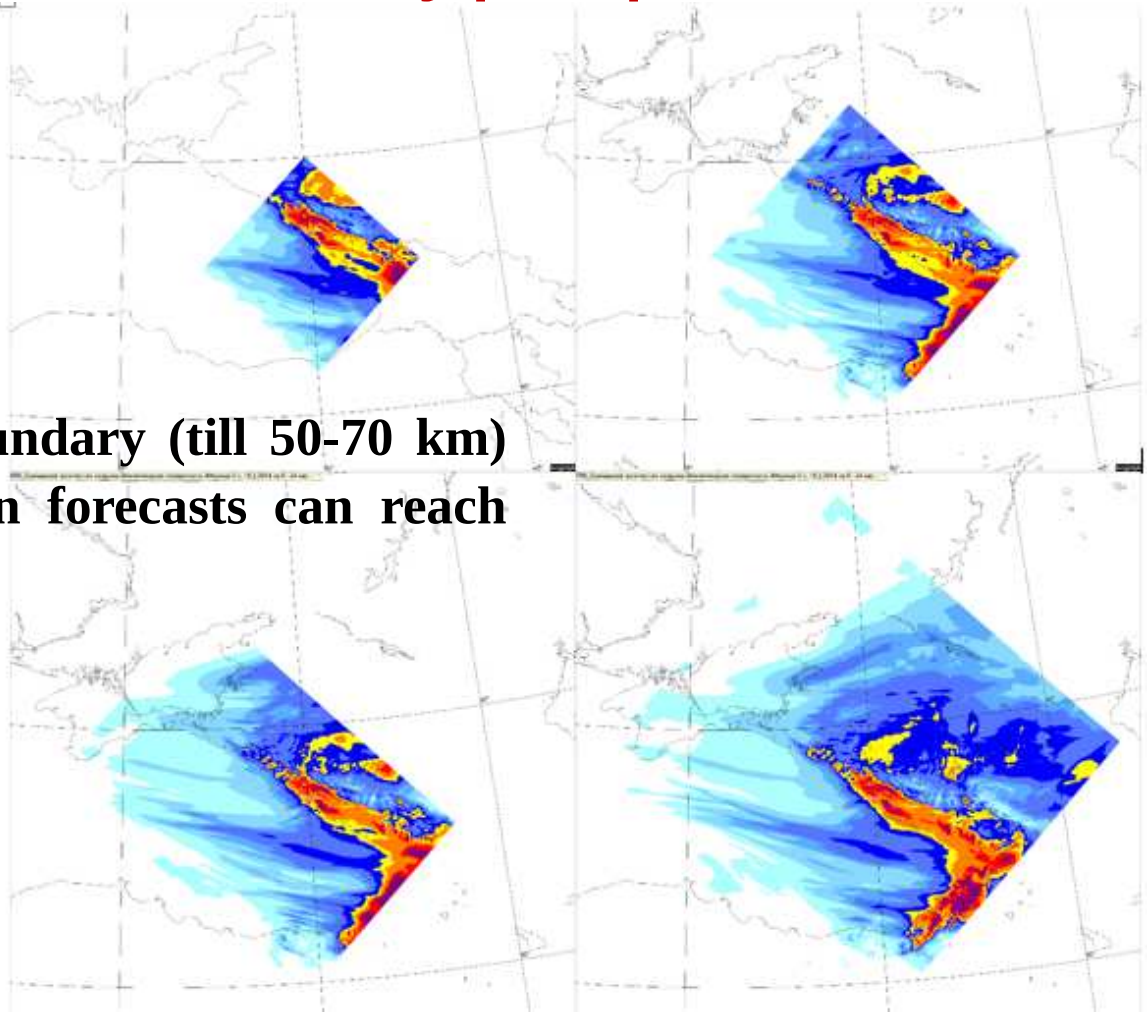
- Forecasts verification by VERSUS was made for the mentioned period

- Forecasts for different domains for heavy precipitation cases were investigated

- Forecasts evaluated for the central part of the domains onl

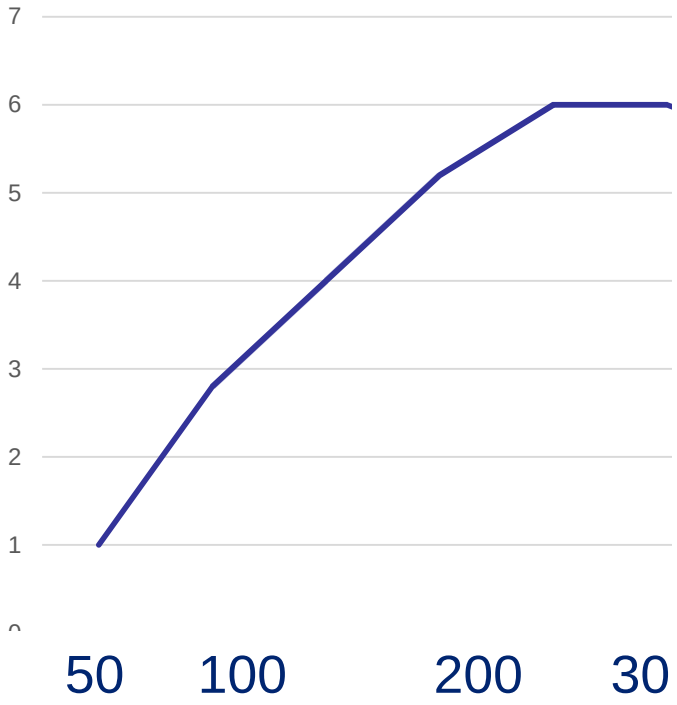
Case studies of heavy precipitation events

Near the domains boundary (till 50-70 km) the difference between forecasts can reach 10 mm/day.



24 h precipitation predicted from 18.02.2014, 00 UTC

Subjective complex conclusion about selection of size of domain



Experiments with COSMO1 performed at 2013-2014

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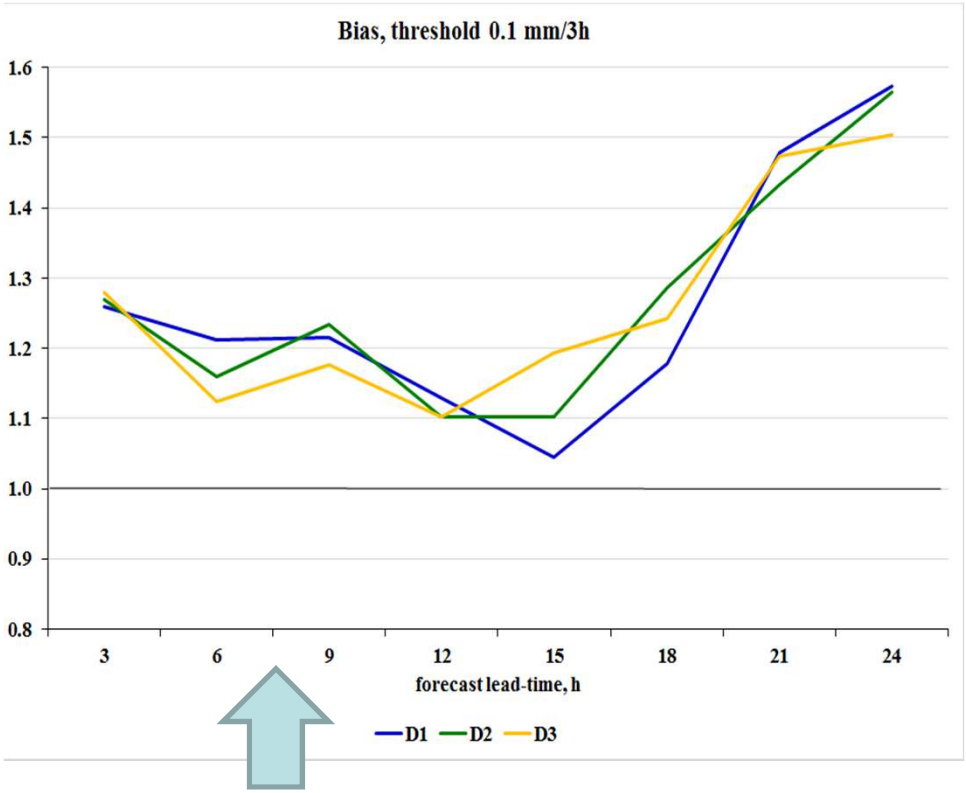
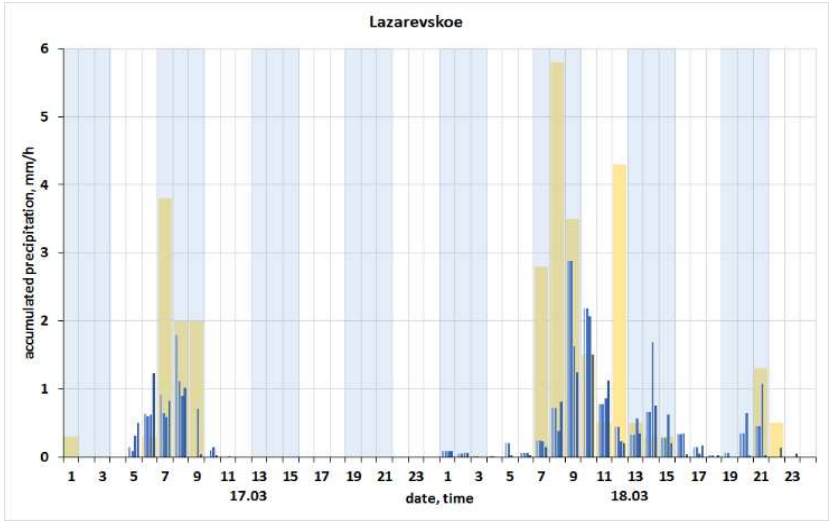
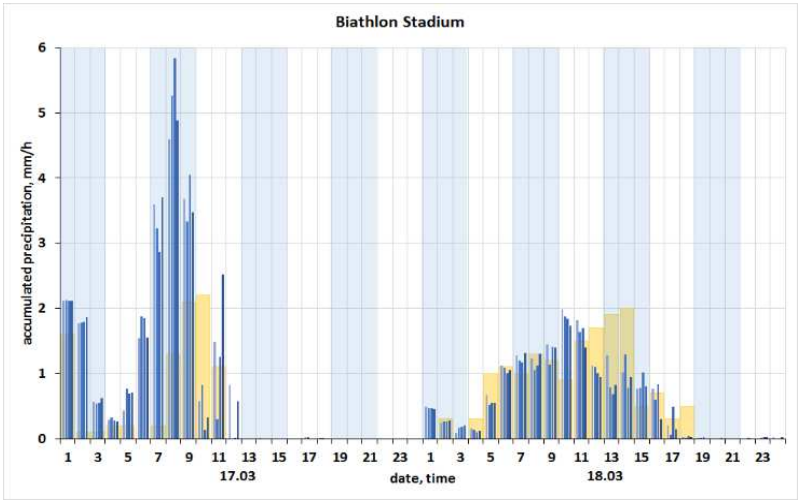
ST1: Testing of precipitation forecasts for different domains

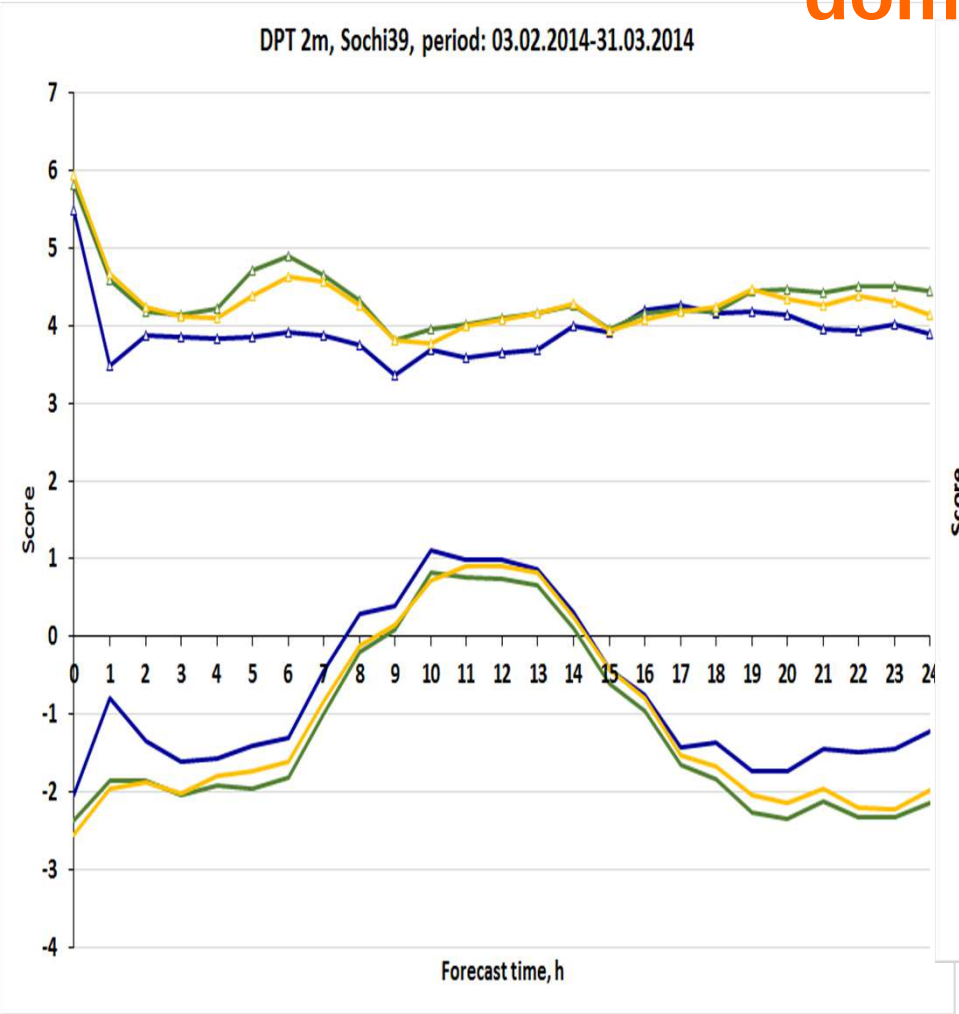


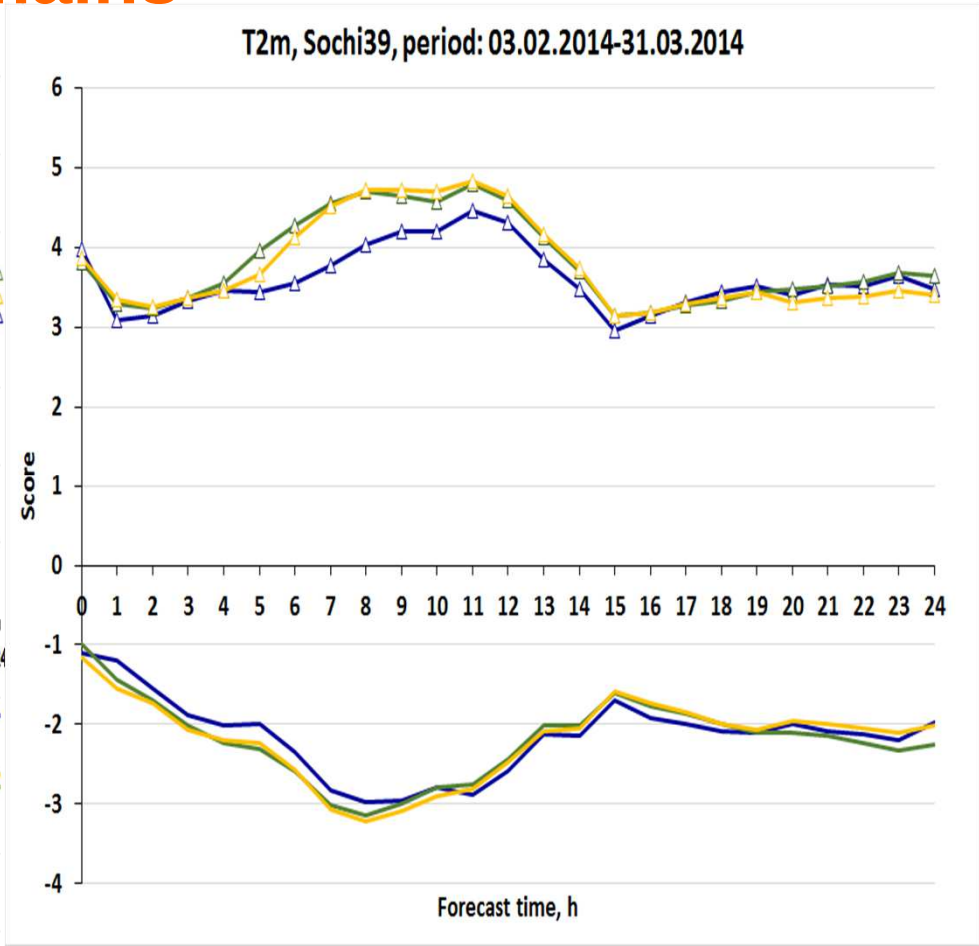
All stations, all precipitations (more 0.1 mm/3h)





ST1: Testing of T2m& TD2m forecasts for different domains

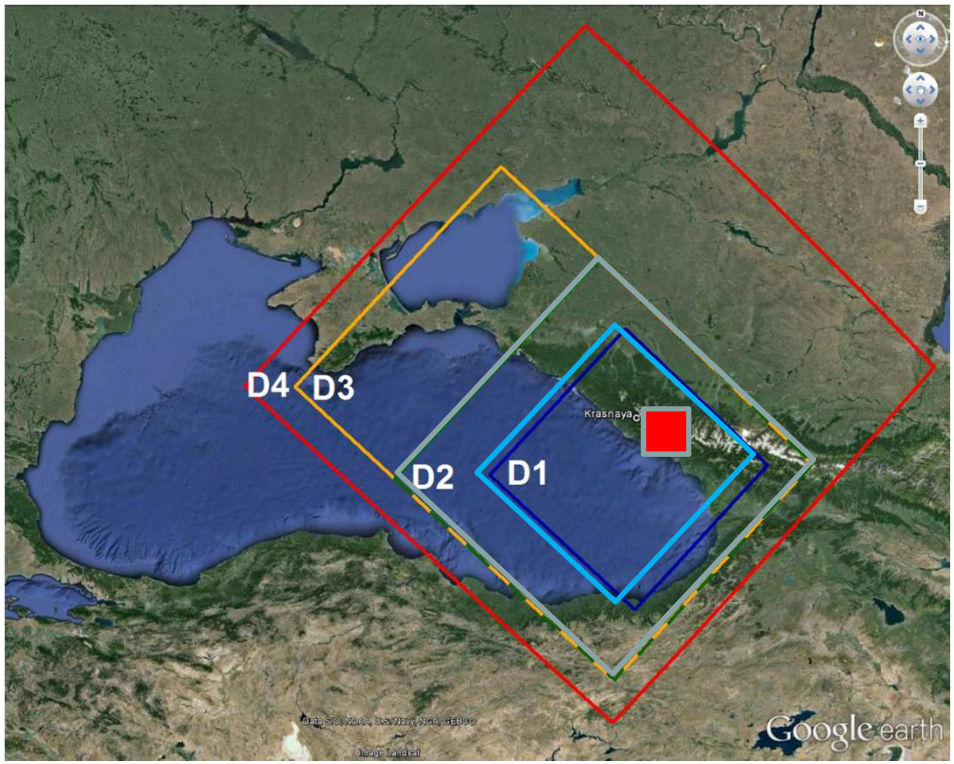




ME_D1 ME_D2 ME_D3 RMSE_D1 RMSE_D2 RMSE_D3

Selected Domains

Evaporation over water surface and produced cloudiness in COSMO1 can be bigger than in COSMO7



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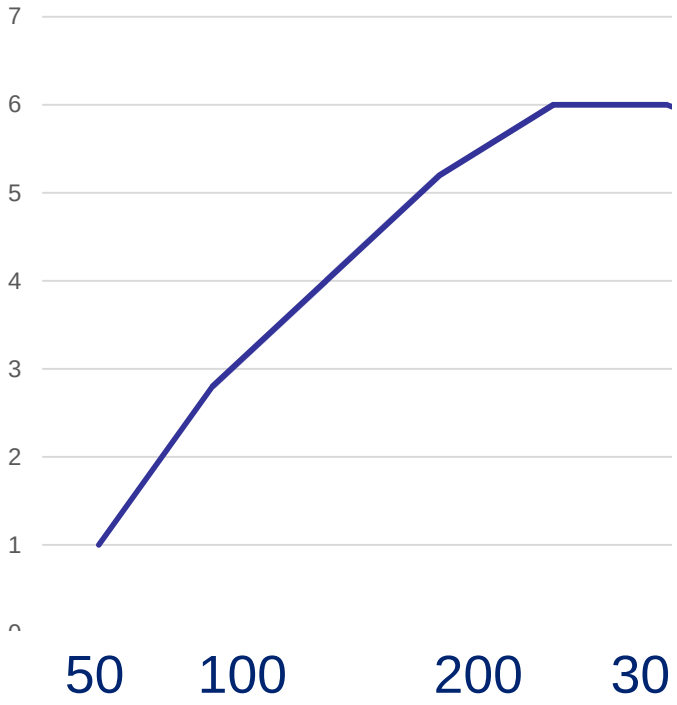
Subjective complex conclusion about selection of size of domain



Experiments with COSMO1 performed at 2013-2014

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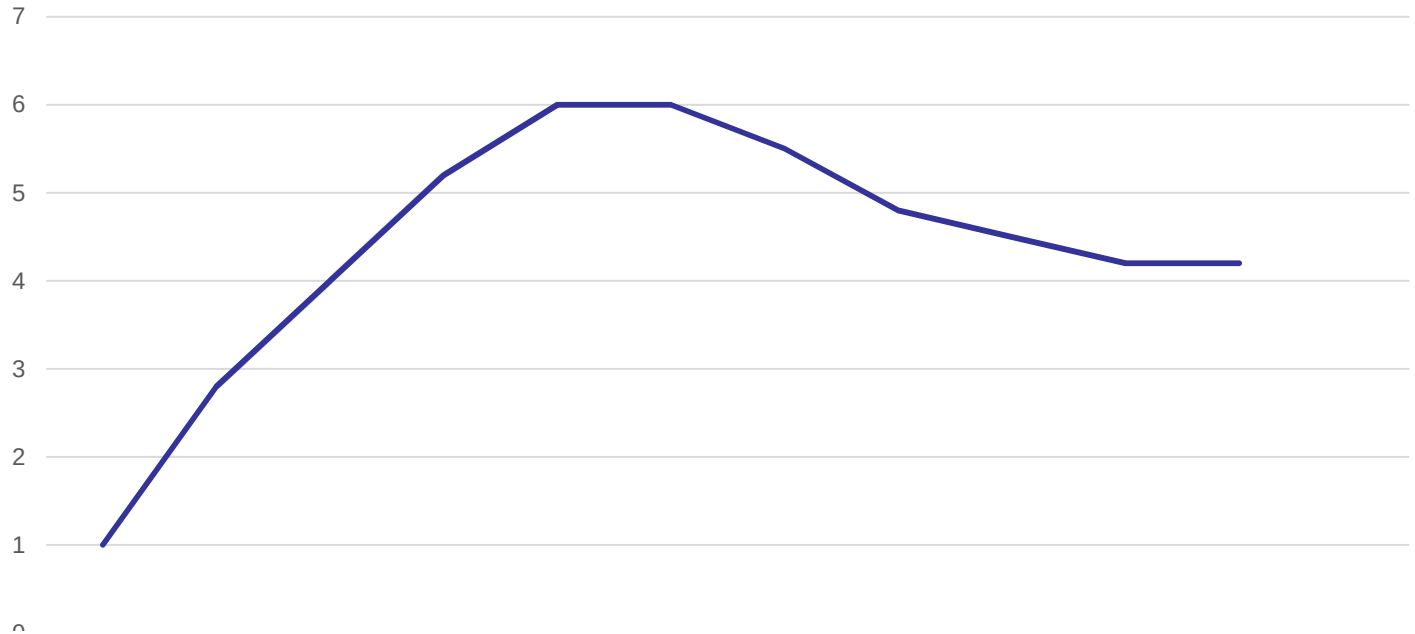

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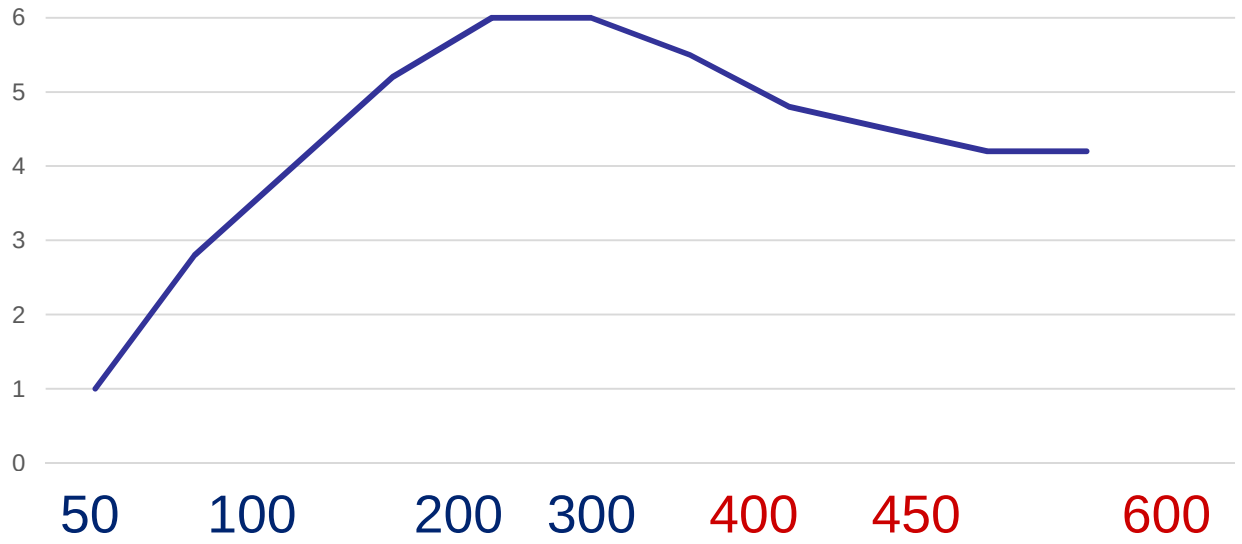
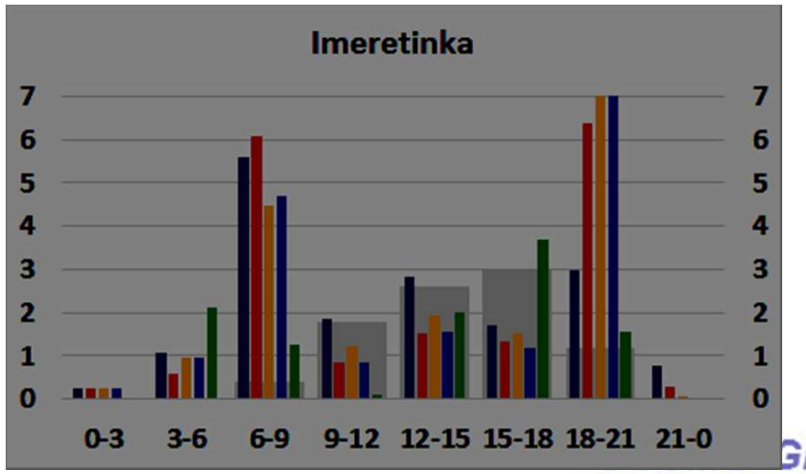




CONCLUSION:

Verification of the forecasts shown:

- for V10m : insignificant variations of the results for chosen domains
- for T2m-TD2m : some increasing of negative Bias and of RMSE for domains larger 400-600 km (due to included large sea surfaces-?)
- for precipitation: COSMO1 overestimates precipitation sum averaged for all period regardless of the domain size; in case of heavy precipitation both tendencies as under- as overestimation can be observed for different points
- The influence of borders can be indicated in fields of precipitations till 50 km Difference between forecasts can reach 10 mm for daily amount and 2-3 mm for hourly-accumulated precipitation
- Verification scores **demonstrate possibility to use rather small simulation domain (300x300 grid points) for the forecasts with lead-time until 18 h without loss of forecast quality**

M. Shatunova. G. Rivin **"Optimal domain's size selection for 1.1 km resolution of nested COSMO models for the mountainous regions"** ***COSMO NL (in Issue)***

ST2: Implementation of algorithm of subgrid "h-correction" of T2m (due to the differences between model's and real heights) based on COSMO T lapse rate forecasts (h-correction)

D.Blinov, I.Rozinkina (RHM), J-M.Bettems (MS), E.Avgoustoglou (EMS)

Expected results:

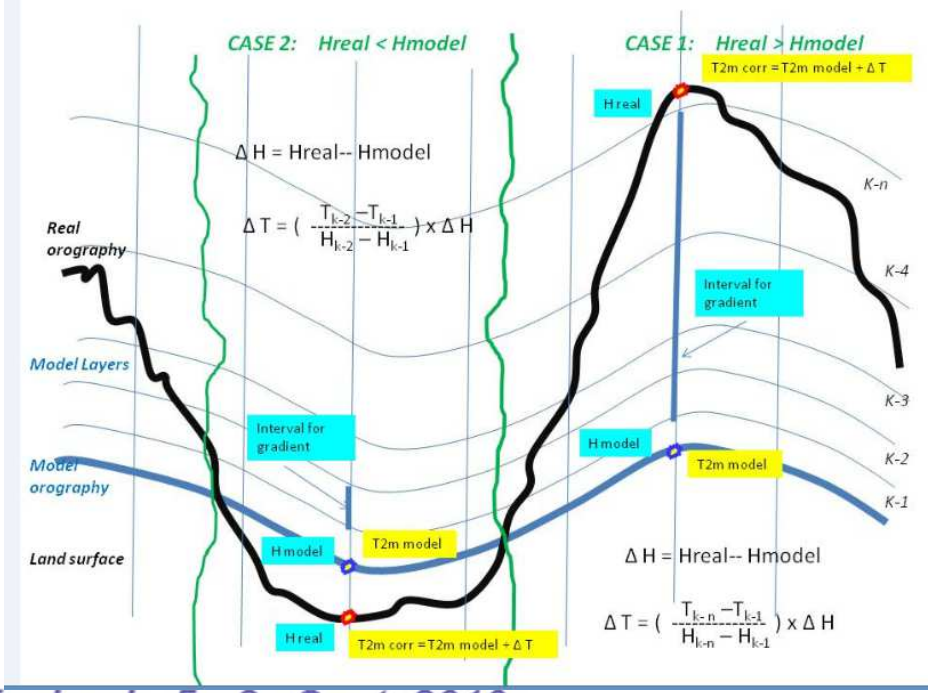
Adapted algorithm & software for the implementation into Fieldextra and into techniques of forming of COSMO meteogram tables, Results of tests for different weather conditions and points

What was performed:

At 2015-16:

The algorithm was formulated and included into FieldExtra Software (since 2016, FieldExtra 12.2.0,J-M Bettems)

The tests based FieldExtra tools performs for mountain stations of Russia and Greece



ST3: Preparing of archives COSMO-Sochi-EPS applicable for research aimed at improving COSMO EPS systems and available for community

E. Astakhova, D.Alferov (RHMC), A.Montani (ARPA-SIMC)

Goal:

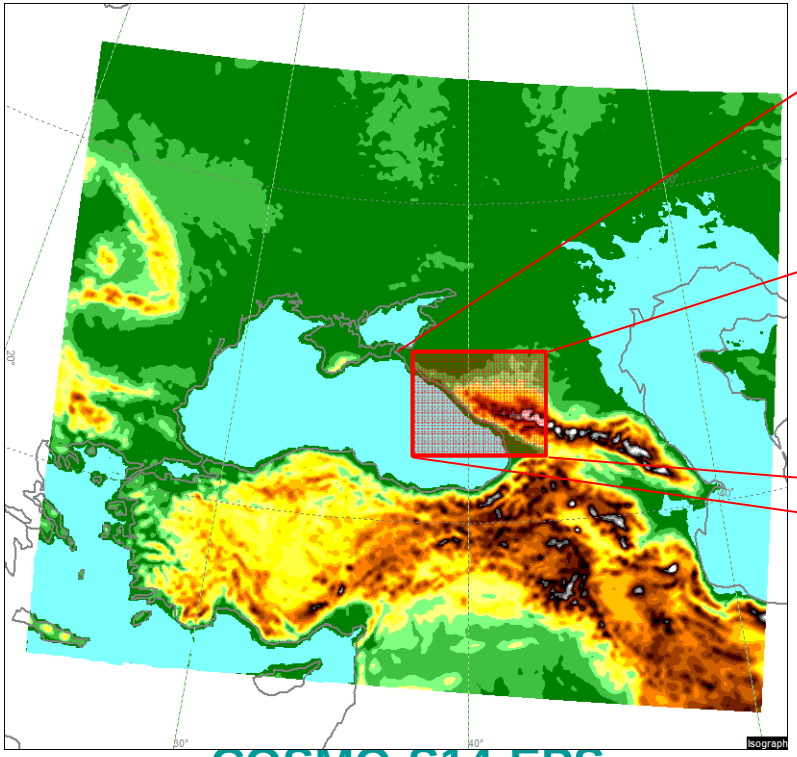
Archives of 7 km and 2.2 km EPSs forecasts for the Sochi-2014 modeling area applicable for research aimed at improving COSMO EPS systems and available for community

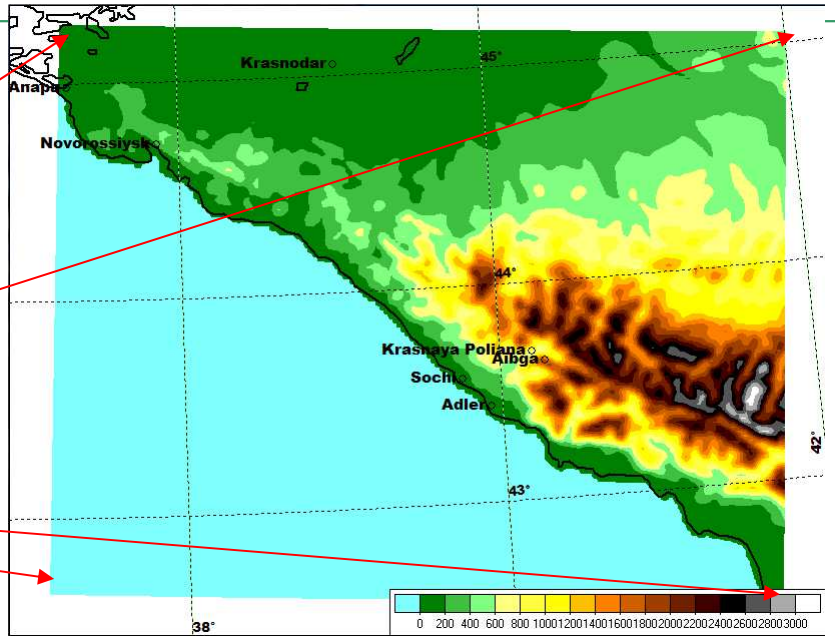
Results:

- Archive of COSMO-EPS forecasts in TIGGE-LAM style for the period of Olympics/Paralympics (January 14,2014 – March 16, 2014 are prepared
- Web-tool to export forecasts and observations is developed
- A list of most interesting cases during Olympics/Paralympics is available
- ICs and BCs for high-resolution EPS available on demand

Two COSMO-EPS were developed in CORSO project

COSMO-S14-EPS – a “clone” of COSMO-LEPS moved to the Sochi region
COSMO-Ru2-EPS – downscaling of COSMO-S14-EPS
10 members





COSMO-S14-EPS

Domain: 1575 km * 1680 km
Grid: 226*241, 40 lev
Step: 7 km

COSMO-Ru2-EPS

Domain: ~ 376 km *288 km
Grid: 172x132, 50 lev
Step: 2.2 km

Specification of CORSO Unified Archive for Sochi (follows TIGGE-LAM)

- *Data format:* ***WMO-GRIB2***
- *Period:* **January 14,2014 – March 16, 2014**
- *Ensemble systems:* **COSMO-S14-EPS, COSMO-Ru2-EPS**
- *Model runs:* **2 per day (00 UTC, 12 UTC)**
- *Time step frequency:* **3h (cumulated parameters are not archived at step 0)**
- *Grid:* **original model grid**
- *Parameters:* **T 2m, Td 2m, U 10m, V 10m, gusts 10m, pmsl, 3-h accum prec**
- *Static fields:* **orography, land-sea mask (are archived only once)**

GRIB files for ensembles contain the following metadata: **size of ensemble; ensemble member's number; type of forecast (perturbed/control)**

CORSO archive is a part of FROST-2014 archive,

which additionally contains forecasts by 4 other EPSs:

GLAMEPS (11km), HarmonEPS(2.5 km), NMMB-EPS(7 km),LAEF-EPS (11 km)

Web-tool to export gridded ensemble forecasts from the archive

Select interval of forecast initial dates

From 2014-01-14 To 2014-03-16

Select forecast origin and initial time

	COSMO-S14-EPS	GLAMEPS	LAEF-EPS	NMMB-EPS	COSMO-Ru2-EPS	HarmonEPS
00:00	☐		☐	☐	☐	
06:00		☐				☐
12:00	☐		☐	☐	☐	
18:00		☐				☐

Select all Clear

Select ensemble members

☐0	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	☐10	☐11	☐12	☐13	☐14
☐15	☐16	☐17	☐18	☐19	☐20	☐21	☐22	☐23	☐24	☐25	☐26	☐27	☐28	☐29
☐30	☐31	☐32	☐33	☐34	☐35	☐36	☐37	☐38	☐39	☐40	☐41	☐42	☐43	☐44
☐45	☐46	☐47	☐48	☐49	☐50	☐51	☐52	☐53	☐54					

Select all Clear

Forecast Lead Time [hr]

☐0	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	☐10	☐11	☐12	☐13	☐14
☐15	☐16	☐17	☐18	☐19	☐20	☐21	☐22	☐23	☐24	☐25	☐26	☐27	☐28	☐29
☐30	☐31	☐32	☐33	☐34	☐35	☐36	☐37	☐38	☐39	☐40	☐41	☐42	☐43	☐44
☐45	☐46	☐47	☐48	☐51	☐54	☐57	☐60	☐63	☐66	☐69	☐72			

Select all Clear

Select meteorological parameters

☐10 metre U wind component	☐10 metre V wind component	☐Wind Gusts at 10 m height, m/s
☐Dew Point Temperature (at 2 m above the ground), K	☐Temperature (at 2 m above the ground), K	☐Land-sea mask
☐Mean sea level pressure, Pa	☐Orography	☐Total precipitation, mm

Select all Clear

Your email:

Submit (Once your data are ready you will get a notification to this E-mail)

http://frost2014.meteoinfo.ru/forecast/exportgridforcs

Web-tool to export observations from the automatic meteorological stations in the Sochi region

Select a time interval between 2011-01-01 23:00:01 and 2014-09-29 13:24:53

Date from 2014-01-15 00:00 to 2014-03-19 00:00

Select stations

☐ Snowboard-1025	☐ Freestyle-1080	☐ Biathlon-1500	☐ Biathlon-1400
☐ Biathlon Stadium	☐ Ski Stadium	☐ Nordic Combination-675	☐ Nordic Combination-615
☐ Ski Jump-650	☐ Ski Jump-800	☐ Sledge-830	☐ Sledge-700
☐ Krasnaya Poliana (Roshydromet)	☐ Kordon Laura (Roshydromet)	☐ Gornaya Karusel-1500 (Roshydromet)	☐ Gornaya Karusel-1000 (Roshydromet)
☐ Aibga (Roshydromet)	☐ Solokh-Aul (Roshydromet)	☐ Kichmai	☐ Imeretinka (Roshydromet)
☐ Agrostation Sochi (Roshydromet)	☐ Kepsha (Roshydromet)	☐ Lazarevskoye (Roshydromet)	☐ RKHU-1 (2320m)
☐ RKHU-2 (2137m)	☐ RKHU-3 (2043m)	☐ RKHU-8 (1740m)	☐ RKHU-4 (1580m)
☐ RKHU-7 (Finish, 980m)	☐ Adler-AMSG	☐ Magry (Roshydromet)	☐ Helicopter Pad Roza-Khutor
☐ Lunnaya Polyana (Helicopter Pad)	☐ Krasnaya Poliana-Verblude (Megafon)	☐ Adler-Norluis (Megafon)	☐ SBT-Dacha (Megafon)
☐ Adler-Airport (Megafon)	☐ SYNOP stations		

Select all Clear

Select parameters

☐ Wind Speed	☐ Wind Direction	☐ Air Temperature	☐ Dew Point Temperature
☐ Ground Temperature	☐ Relative Humidity	☐ Precipitation	☐ Precipitation Intensity
☐ Atmospheric Pressure	☐ Visibility	☐ Cloud Base Height	☐ Reflected Sort-Wave Irradiance
☐ Total irradiance			

Select all Clear

Your e-mail: Accept

http://frost2014.meteoinfo.ru/obs/export-observations-data

PT CORSO-A: ST3

A list of most interesting cases during the Olympics/Paralympics

Date	on competitions)	Behavior of models
February 7, 2014	Foehn	Underestimation of temperature by the most part of models
February 10-11, 2014	Precipitation dissipation	Precipitation predicted by the overwhelming majority of models but not observed actually
February 15, 2014	Wind gusts	Underestimation of maximum wind speed in Krasnaya Polyana (by 3.5-7 m/s) by the most part of models
February 16-17, 2014	Local cyclogenesis/Poor visibility (postponed competitions in biathlon and snowboard)	Not all forecasting systems performed well
February 18, 2014	Cold front/Precipitation	Accurate precipitation forecast by the majority of models
February 22, 2014	Foehn	Underestimation of air temperature (by 2.4-4.4°C) by the most part of models
March 11, 2014	Cold front/Temperature (postponed competitions in Alpine skiing)	Not so accurate forecast of maximum air temperature and diurnal variations
March 13, 2014	Weak slow process/Precipitation above 1500 m caused by "settling" of clouds	Inaccurate forecast of precipitation by the majority of models
March 16-17, 2014	Cold front/Wind gusts	Underestimation of wind speed by the most part of models

- **The CORSO and FROST-2014 archives are ready**
- **The Web tools to export data are prepared**
- **Various observation data are available**

"COSMO-based ensemble forecasting for Sochi-2014 Olympics: archiving the results" *E. Astakhova, A. Montani, D. Kiktev, A. Smirnov :* COSMO News Letter No. 16, pp. 40-45

Welcome to the Sochi testbed!

ST4: Preparing of guidelines for forecasters "The features of using and interpretation of the results of meso- scale modeling" *I.Rozinkina, (RHMC) P.Eckert (MS)*

Expected results:

Guidelines for forecasters –concerning the features of interpretation of High resolution NWP products

Motivation:

The implementation, including interpretation of LAM HR products has some features in comparison with products of Global modeling. Some experience was obtained as result of feed-back from forecasters during Sochi2014 and trials

PT CORSO-A: ST4

DRAFT

Recommendations to forecasters on the use of products of small scale LAM NWP

2015

CONTENTS

Availability of Results for COSMO:

ST1: "Optimal domain's size selection for 1.1 km resolution of nested COSMO models for the mountainous regions" *M. Shatunova, G. Rivin :* Prepared for COSMO NL

ST2: Software included into FieldExtra, 12.2.0.

ST3: "COSMO-based ensemble forecasting for Sochi-2014 Olympics: archiving the results" *E. Astakhova, A. Montani, D. Kiktev, A. Smirnov :* COSMO News Letter No. 16, pp. 40-45
http://www2.cosmo-model.org/content/model/documentation/newsLetters/newsLetter16/cnl16_06.pdf
http://frost2014.meteoinfo.ru/obs/export-observations-data,
http://frost2014.meteoinfo.ru/forecast/exportgridforcs

ST4: "Guidelines for forecasters of interpretation of LAM mesoscale NWP products" *I.Rozinkina, P.Eckert* **(**will be presented on COSMO-model.org till Feb 2017)

WG4

PT CORSO-A:

Thanks for your attention!

Thanks to:
E. Astakhova and M.Shatunova
for provided matters for presentation