Aspects concerning PP CORSO tasks 1 and 2

http://cosmo-model.org/content/tasks/priorityProjects/corso/default.htm
http://cosmo-model.org/content/tasks/achievements/default.htm

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COSMO – METEOROLOGICAL SUPPORT FOR OLYMPICS "SOCHI-2014"

COSMO Priority Project
CORSO:
Consolidation of
Operation and
Research results for the
Sochi
Olympic Games

sochi.ru 2014

PP CORSO
is considered as COSMO
contribution into WMO project
FROST-2014 (Forecast and Research
in the Olympic Sochi Testbed)

The main goal:
to enhance and demonstrate the capabilities of COSMO-based systems of short-range numerical weather prediction in winter conditions for mountainous terrain and to assess the effect of practical use of this information during SOCHI-2014 Olympic Games

Participants:
Germany, Italy, Switzerland, Greece and Russia.

MAIN DIFFICULTIES OF SOCHI METEOROLOGICAL SUPPORT and of PP CORSO

1. Complex geographical conditions
(high mountains near the subtropical Black Sea coast):

- Strong temperature gradients and inhomogeneity
- Powerful influence of high mountains on synoptic processes
- Sport venues were close to the snow boundary
- The local weather on the venues was strongly governed by local orography

Coastal cluster (Sochi)　　　　　　　　　　　　　　Mountain cluster (near Biathlon Stadium)

End of Jan 2013

2. Low observational network density.

Timelines of PP CORSO

Phase 1	Phase 2	Phase 3
2011 / 2012	2012 / 2013	2013 / 2014
- Choice of strategy - Proposals for development and modification of algorithms - Preliminary tests	- Tests - Pre-operational running - Feed-back from forecasters *All algorithms must be implemented very fast, based the previous experience of COSMO-countries (incl. know-how for mountain forecasting)*	- Tuning implementation - Operational runs - Analysis of results

Expert meetings were a very important part of PP CORSO!

ARPA-SIMC, 5-10 December 2011
Italy, Bologna
Tasks 1 and 3
Italy: T. Paccagnella, A.Montani,   C.Marsigli,
           D.Cesari,   M.-S.Tesini.
Russia: G.Rivin,   E.Astakhova, A.Scherbakov.

DWD, 2-6 July 2012
Germany, Offenbach on Main
Task 1
Germany: D.Majewski, C.Schraff, J.Foerstner.
Russia: G.Rivin,   D.Blinov.

DWD, 5-10 December 2013
Germany, Offenbach on Main
Task 1
Germany: D.Majewski, J. Helmert.
Russia: I.Rozinkina,   M.Shatunova

MeteoSwiss: 12-16 December 2011
Switzerland,   Zurich-Geneva
- Planning and optimizing PP CORSO
- Tasks 1 and 2
Switzerland: More than 15 participants,
              responsible: Ph. Steiner,
              M.Arpagaus,   P. Eckert
Russia: G.Rivin,   I.Rozinkina

An example of the expert meeting agenda

Monday 12 December 2011, MeteoSwiss Zurich			
Time	Title	Who	Place
09:00	COSMO-1: Numerics (Prototype configuration and Code-Improvements for stability)	Guy de Morsier, Marco Arpagaus	507
11:00	COSMO-1: Physics	Marco Arpagaus, Oliver Fuhrer	507
12:30	Lunch		
13:30	COSMO-1: synchronization of the developments at Roshydromet and MeteoSwiss	Marco Steiner	
14:30	Snow map derived from satellites	Nand (even Bette analy	

Tuesday 13 December 2011, MeteoSwiss Zurich			
Time	Title	Who	Place
09:00	CORSO project plan (2nd part)	Marco Arpagaus, Philippe Steiner	507
11:00	Postprocessing	Vanessa Stauch	Ackermannstrasse
12:00	Lunch		
13:00	Kalman Filter for COSMO (Kalman modul computing the coefficients / Fieldextra part applying them)	Vanessa Stauch	Ackermannstrasse
14:00	Use of COSMO-ART	Philippe Steiner, Pirmin Kaufmann	507
15:00	Additional questions of Roshydromet	Marco Arpagaus, Philippe Steiner, ?	

(from left table continued) 16:30 CORSO project plan, mainly task 2 — Marco Steiner; 18:30 End

PP CORSO (Project Leaders: G.Rivin, I.Rozinkina (Roshydromet)

TASK 1.High resolution COSMO-modeling for mountainous regions (TL G.Rivin)

1.1. Improvement of modeling technology of deterministic forecasting of weather conditions with resolution 2.2.km for the North-Caucasian area (SOCHI-2014) (FDP)

1.2. Development of COSMO-So-1km (RDP)

TASK 2. Downscaling / postprocessing for Sochi area and applications (TL I.Rozinkina)

2.1. Adapted down-scaling techniques for winter conditions in the mountains and IOC requirements (FDP)

2.2. Determination of typical COSMO-model inaccuracies for typical synoptic situations (RDP)

TASK 3. Development and adaptation of COSMO EPSs for Sochi region
TLs E. Astakhova, A. Montani

3.1. Adaptation of COSMO LEPS 7 km to the Sochi region and to specific requirements of winter Olympics. Operational ensemble forecasts during the Trials and Olympics (FDP)

3.2. Development and verification of COSMO-RU-LEPS 2.2 km for the Sochi region (with ICs and BCs from SOCHMEL7) (RDP)

PP CORSO PARTICIPANTS

Task 1 **High resolution COSMO-modeling for mountainous regions**

        Russia: G. Rivin, Yu. Alferov, D. Blinov, M. Chumakov, E. Kazakova, A. Kirsanov, M.Nikitin, V. Perov, A. Revokatova, I. Rozinkina, M. Shatunova

        Germany: D. Majewski, J. Foersner, J. Helmert, M.Baldauf

        Switzerland: G. de Morsier, M. Arpagaus, P. Steiner

Task 2 **Downscaling / postprocessing for Sochi area and applications**

        Russia: I. Rozinkina, D. Blinov, A. Bundel, E. Kazakova, A. Kirsanov, V.Kopeikin, A. Muravev, G. Rivin, M. Zaichenko

        Switzerland: P. Eckert, J-M. Bettems

        Greece: E. Avgoustoglou, A. Voudouri

Task 3 **Development and adaptation of COSMO EPS for Sochi region**

        Russia: E. Astakhova, D. Alferov, G. Rivin

        Italy: A. Montani, C. Marsigli, T. Paccagnella

Task 1

High resolution COSMO-modeling for mountainous regions

2.5 FTE / Year

Subtask 1.1

Improvement of technology of deterministic forecasting of weather conditions with resolution 2.2.km for the North-Caucasian area (SOCHI-2014), (including the operational support)" (1,5 FTE)

DAS – activities (0,8 FTE)

- **The new version of COSMO-Ru7/2 operational technology including the nudging-assimilation was developed for Caucasian region.** The analysis of skill of forecasts of T2m showed the essential improving of model's results **for the first 3-6 hours** for the version with nudging-assimilation and non efficient differences for other parameters in comparison with technology with starts from GME initial data.

- The realization of continuous model runs based on continuous assimilation cycles has allowed organizing the optimal time of starts of operational runs of COSMO-Ru1, nested into COSMO-Ru7/2, adapted to the timetable of work of Olympic Organizing Committee.

- RDP: The module of correction of initial values of T of the low model levels and of soil based on the   T2m observations   was realized and tested. After the coupling with COSMO-Ru domestic research version it was detected the more realistic results for the forecasts of vertical profiles of temperature during all period of short-range forecasts and the little decreasing of the model's precipitations. **The module is ready for coupling with operational technology and for nudging-cycles**, but needs the further testing for more large statistics of forecasts for different synoptic situations and seasons.

Subtask 1.1

Improvement of technology of deterministic forecasting of weather conditions with resolution 2.2.km for the North-Caucasian area (SOCHI-2014), (including the operational support)" (1,5 FTE)

Snow-activities (0,7 FTE)

- The calculations of accumulated snow WE by 1-D proposed modeling algorithms based the operational measurement data was realized for some stations of Sochi area. The results seem be realistic. However the hot weather during the largest part of Olympics provides to use the artificial snow on the venues and have reduced the relevance of results of these calculations for Olympics.

- **The technology of modeling of accumulated snow WE for initial fields for COSMO-Ru was tested for the different weather conditions of Russia** and showed that the coupling with operational technologies of COSMO is useful. **This seems to be the main result of planned new PT SNOWE.**

- The technology of initial fields of snow water equivalent and snow density for COSMO-Ru is still under development. Results for 2014 are presented in COSMO Newsletter (Kazakova E., Chumakov M., Rozinkina I. Initial fields of snow cover characteristics preparation for COSMO-Ru // COSMO Newsletter No.14, 2014, pp.37-42).

Subtask 1.1

Improvement of technology of deterministic forecasting of weather conditions with resolution 2.2.km for the North-Caucasian area (SOCHI-2014), (including the operational support)" (1,5 FTE)

Snow-activities (0,7 FTE) (end)

- RDP: The experiments with COSMO-Ru2 runs for Caucasian region have showed that the high- resolution correction of initial snow mask for the mountain area with use of satellite- data (250 m resolution) improve the T2m till 5-7°C for the free-snow valleys. The available data with resolution 4 km have not the so great effect.

- RDP: The TERRA codes were adapted with respect to partial snow cover. **It was detected the stable improvement of forecasts of T2m in case of artificial model decreasing of snow covering.** The some modifications were included in the domestic version COSMO-Ru. The preparing of final version of modifications needs more numerical experiments and additional tests.

Subtask 1.2

Development of COSMO-So-1km" (1.0 FTE)

Version of the COSMO model with horizontal resolution 1.1 km, named COSMO-Ru1, was installed on cluster-based architecture Tornado in Roshydromet.

The experiments demonstrated also the capability COSMO-Ru1 to produce satisfactory forecast with lead-time till 36 hours.

From January, 29, 2014 COSMO-Ru1 runs in operational mode 4 times per day.

COSMO-Ru1 forecast were used by forecasters along with COSMO-Ru2 during SOCHI-2014 Olympic Games

Task 2

Downscaling / post-processing for Sochi area and applications

1.5 FTE / Year

Subtask 2.1

Adapted downscaling techniques for mountain winter conditions and IOC requirements (0.6 FTE)

- **The calculations of fresh-snow depth were included in the operational technology and were available for forecasters from meteograms and form charts. The algorithm was included into FieldExtra**

- **The operational technology for down-scaling corrections of forecasts for points of venues based the forecasts of lapse rate + the KF statistics was realized**. Results of tests for the forecasts archives was received

- In meteograms were included the new columns and lines: for fresh snow depth and for corrected T2m

- During the Olympics some in-situ trainings and Guidelines-recommendations for forecasters for specifics of interpretation of mesoscale products were performed.

Subtask 2.2

Determination of typical COSMO-model inaccuracies for typical climatologic /synoptic situations (0.6 FTE)

- **Traditional verification of COSMO-RU7, COSMO-RU2, and COSMO-RU1 was performed using VERSUS, FROST online verification tool, and internal software**.

- Traditional scores show general prevalence of COSMO-RU2. However, **analysis of case studies shows that COSMO-RU1 can predict better intense precipitation and relative humidity. Wind speed is also better predicted by COSMO-RU1**.

- Weather type classification was developed for the Sochi region. However, it was found difficult to calibrate the model forecasts depending on weather types because of the lack of data (only two seasons of measurements).

Aspects concerning PP CORSO tasks 1 and 2

THANKS!

QUISTIONS?

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