ICCARUS 2018, DWD, Offenbach (D), 1st March 2018

WG7 Meeting

Participants: Elena Astakhova (RHM), Michael Buchhold (DWD), Grzegorz Duniec (IMGW), Pierre Eckert (former MCH), Tobias Heppelmann (DWD), Ekaterina Machulskaya (DWD), Chiara Marsigli (Arpae SIMC, WG7 coordinator), Andrzej Mazur (IMGW), Martin Sprengel (DWD), André Walser (MCH).

Agenda:

9:00 – 9:10 – opening

9:10 – 9:30 – T. Heppelmann: Current developments in convective-scale EPS at DWD

9:30 – 9:50 – A. Mazur: From SPRED to APSU at IMWM

9:50 – 10:10 – E. Astakhova: Model perturbation with SPG at RHM

10: 10 – 10:40 – all: APSU discussion

10:40 – 11:00 – coffee break

11:00 – 11:20 – C. Marsigli: SRNWP-EPS II Programme

11:30 – 11:50 – A. Walser: COSMO-E experiments with the Kober and Craig boundary layer perturbation scheme

11:50 – 12:00 – closing

<u>T. Heppelmann</u> showed a comparison between COSMO-DE-EPS (operational, 2.8 km hor. res., 50 levels) and COSMO-D2-EPS (2.2 km hor. res., 65 levels, domain extended to the west). It was particularly noticed that scores in 2m temperature for June are better for the latter, but remarkably less spread is obtained. This was ascribed to the tendency of D2 to produce more clouds than DE, then having less incoming radiation at the ground and as a consequence making less effective the soil moisture perturbations, which are the main factor for determining the spread in 2m T in the warm season. In terms of gusts, D2 does not outperform DE, due to too strong winds.

Then he presented new results about the scheme to model the model error (by E. Machulskaya), which now is being revised by allowing the estimators of the model parameters to account for the (horizontal) diffusion. In order to implement the scheme also in the ICON model, it is being studied how to estimate the model error (fc-ana or fc-fc).

In the discussion it was suggested that the enlargement of the domain to the west may also have a role in decreasing the spread in 2mT, by giving less weight to the LBC perturbations with respect to IC perturbations.

<u>A. Mazur</u> showed the spread/skill evaluation of the operational ensemble of IMGW, indicating an improvement of the spread to match the forecast error in 2017. He also showed results from 3 experimental set-ups in which other variables/parameters are perturbed (soil temperature, eff_coeff and c_soil), not providing at the moment satisfactory results. In the APSU PP they propose to focus on the

prediction of fog (with a post-processing method to compute the forecast visibility range), for which spread/skill relation is also computed in terms of visibility. In addition, they focus also on the prediction of thunderstorms, based on an algorithm developed for this purpose, and they propose to use the Polish lightning detection network for verification. Finally, he recalls that they are using for the perturbation of the model a random perturbation at each grid point based on the machine RNG, modified by them for the purpose. This method has been chosen for its simplicity and easiness of maintenance. In the APSU PP they will further investigate its potential for the perturbation of different model variables/parameters.

In the discussion it is suggested to consider also the possibility of applying perturbations with some spatial structure, to improve their effectiveness.

E. Astakhova presented results from the use of the Stochastic Pattern Generator of Tsyrulnikov and Gayfulin for model perturbations with COSMO-Ru2-EPS. It is recalled that this SPG is only for Limited-Area Models and produces 2D as well as 3D fields. In the experiments it has been used for perturbing T, u and v in additive mode, independently perturbed with fixed spatial and temporal correlations. No humidity perturbations are tested yet and the plan it to use for them a different method currently under development (see APSU PP). From the first tests, it was shown that the spread obtained for 2m T is only slightly less than the one obtained with SPPT (used with MCH set-up, for reference), but the error is also lower. In the free atmosphere the spread obtained is instead greater. It is then planned to try a different setup with larger standard deviations.

During the discussion it was suggested to repeat the test of SPG compared with SPPT by adopting set-ups as similar as possible for the two schemes, in order to permit a clean comparison of their behavior. For this purpose, SPG should be applied also in multiplicative mode.

The discussion about the APSU PP was somehow included in the discussion of the results of the three talks. It was added that the Project proposal would have been discussed at the STC on the 2nd of March. [Note: the project has been approved in that date by the STC].

C. Marsigli presented the status of the SRNWP-EPS II Programme of EUMETNET, to which the COSMO members Italy, Poland and Switzerland also participate (Italy co-coordinates the Programme). The Programme is going to end at the end of 2018 and as deliverable will provide also SW which may be valuable for the Consortium. One SW package (developed by AEMET) permits to perform the calibration of ensemble outputs (per member) for 2m temperature and 10 m wind, and it can be run on different European LAMs (among which COSMO). The second SW package (developed by COMET) consists of 2 fortran codes. They perform the post-processing of ensemble outputs (per member) to provide a forecast in term of visibility (with 3 different methods, for the prediction of fog) and in terms of thunderstorms (codified as phenomenon, not as accumulated precipitation). The codes are almost ready for testing and they will be distributed to all the EUMETNET members.

On top, the Programme has organized 4 Workshops. The next one will take place in Bologna from the 16 to the 18 of May, in collaboration with the ASIST Programme, and will deal with the connections between Nowcasting and EPS. The last one will take place in Madrid in October and will deal with the representation of model uncertainty (it is foreseen the participation of SRNWP physics experts).

In the context of this programme and of the activities of the Joint Working Group on Forecast Verification of WMO, C. Marsigli is organizing a survey on the "new" types of observations which could be used for the verification of fog and thunderstorms. In the survey it will also be included a review of the methods which

are used internationally for the purpose of this verification. This survey will be shared also with WG4 and WG5, beside WG7, which members will also be contacted for providing information.

A. Walser presented the work performed by Seraina Klaus about testing of the Kober and Craig stochastic boundary layer perturbation scheme in COSMO-E, to address the issue of forecasting convection over the Swiss plateau, particularly in strong forcing cases where the model shows deficiencies. Results from verification on cases seem to indicate some beneficial effect of this scheme on domain-averaged precipitation w.r.t. to the operational forecasts with SPPT, but looking at the precipitation maps and at the 3D structure of the systems, it is shown that the convection is largely destroyed by the application of these perturbations and its organization is lost. The model tends to produce too many and scattered cells and the vertical structure is destroyed. Also tuning of the scheme parameters does not seem promising, because only the use of an "aggressive" setup showed good results in a weak forcing case, which leads to even worse results in the other cases. Tests have been performed also with COSMO-E at 1 km and they exhibit a remarkably good behavior on the selected cases without additional model perturbations.

Next meeting of WG7 will take place at the GM 2018.