Working Applications and Verification

Report

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Period:	2021
Date:	March 2022

Introduction and background

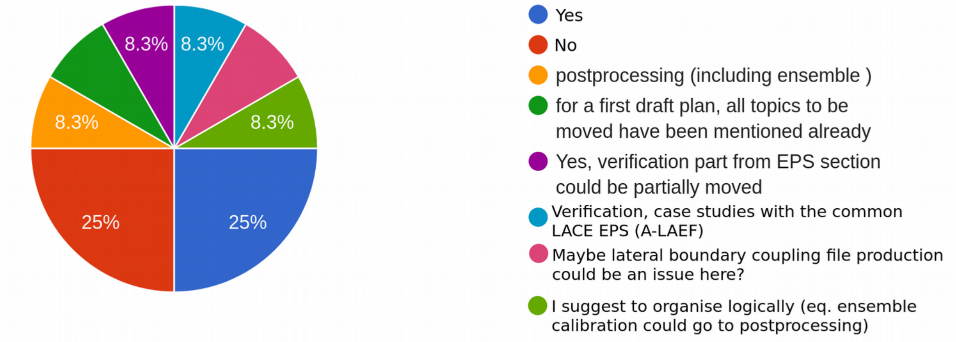
The main activities within the "Applications and Verification" area was to collect information and identify LACE members needs and create an action plan to systematically manage, organize and control the changes in the software codes. In order to gather more information about local experience regarding the existing tools and future steps for the common applications within RC-LACE a survey was sent to RC_LACE countries.

Questionnaire

Application softwares are important tools in order to allow the users to accomplish goals and purposes in there specific activities. Within RC-LACE many application were developed along the years. For a better usage of the actual application already developed by each RC-LACE contries or in research stays, in May a questionnaire was sent with some questions that aim at understanding how to better organise/structure the working plan for applications and verification area. One by one, all the questions are presented and commented as follows:

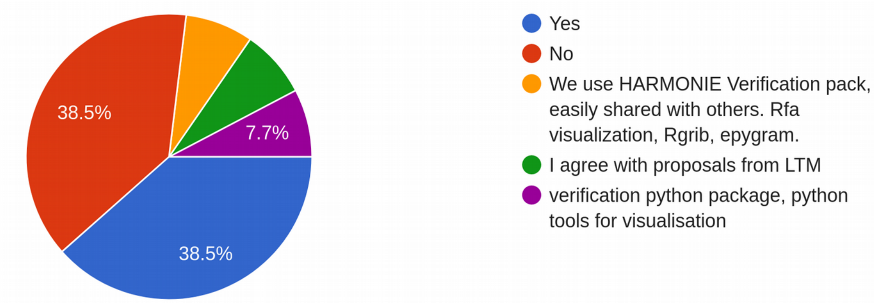
Q1. Would you propose a certain topic to be moved totally or partially to the new area from other RC-LACE working areas?

The answer(s) of this question is presented bellow in the form of diagram. One of the conclusions that can be drawn from the result of the diagram shows the desire to organise and to collect in the future the applications (or tools) for a better usage.



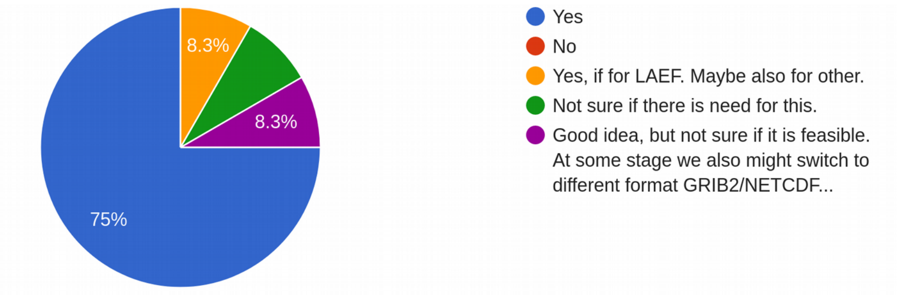
Q2. Would you propose/advirtise a local tool (verification, visualisation, etc) to be shared within RC-LACE?

The conclusion for this question is presented bellow. It can be noticed that, in special, the emphasis is on the verification side.

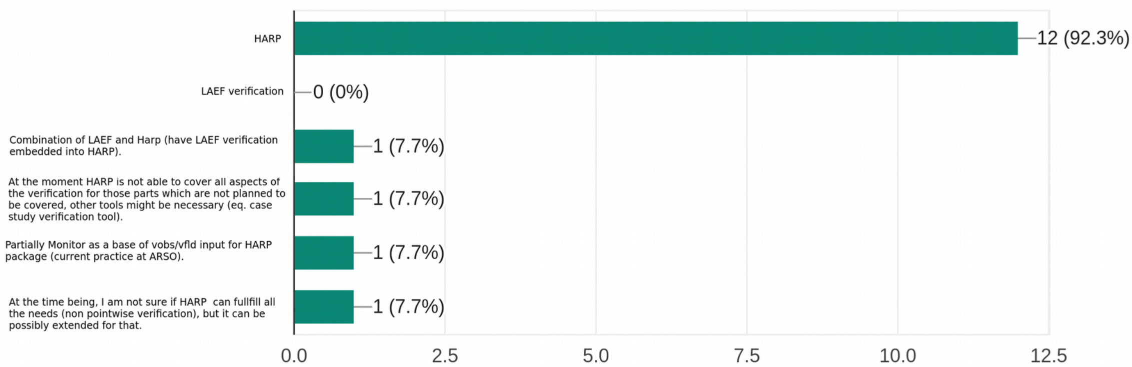


Q3. Do you agree with a common RC-LACE gribtable to be introduced in the official eccodes releases?

Even if in general the answer is yes for 75%, maybe it is better to keep it as a pending action in working plan and to do more investigation to learn about the advantages and disadvantages of the usage of future format which can be GRIB2.



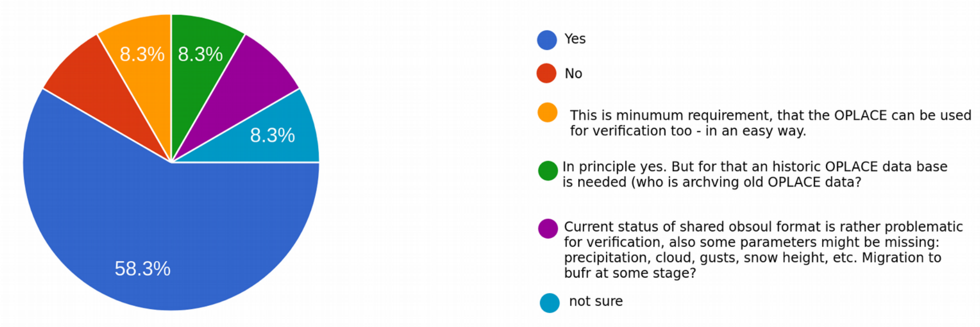
Q4. What verification tool do you consider appropiate for a common application?



It is well known that the verification of numerical model is an important tool in order to ensure a better use of the meteorological products for the operational and research usage. In this purpose, a series of verification applications are developed in different consortia, as LAEF verification, HARP and many others. Despite the fact that many efforts were involved along the years within RC-LACE in the development of LAEF verification, this activity is closed for the moment. After a discussion with Florian Weidle from Austria who used quite a lot LAEF verification in the past and now he has started to use HARP intensively, the conclusion is that HARP contains already what it was developed in LAEF verification.

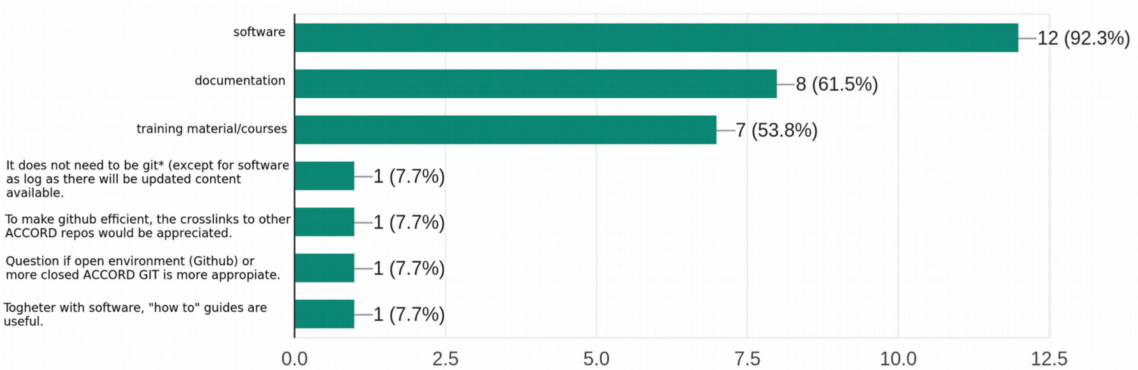
Q5. Regarding the common verification tool, is the future usage of OPLACE database suitable for any choice?

At the last LSC meeting most participants mentioned the importance of using OPLACE database as input for HARP verification. The idea of this question in the questionnaire was to find more uses and more opinions of how to start this activity. For a fair and reliable verification for long term, it is necessary to have archived an historic OPLACE database. After a discussion with Alena Trojakova, it seems that RC-LACE countries, in general, they are saving locally the data. One question arises from here: it is necessary to have separated historical OPLACE database or we should take into consideration to have in one country one storage devoted for a very long archive?

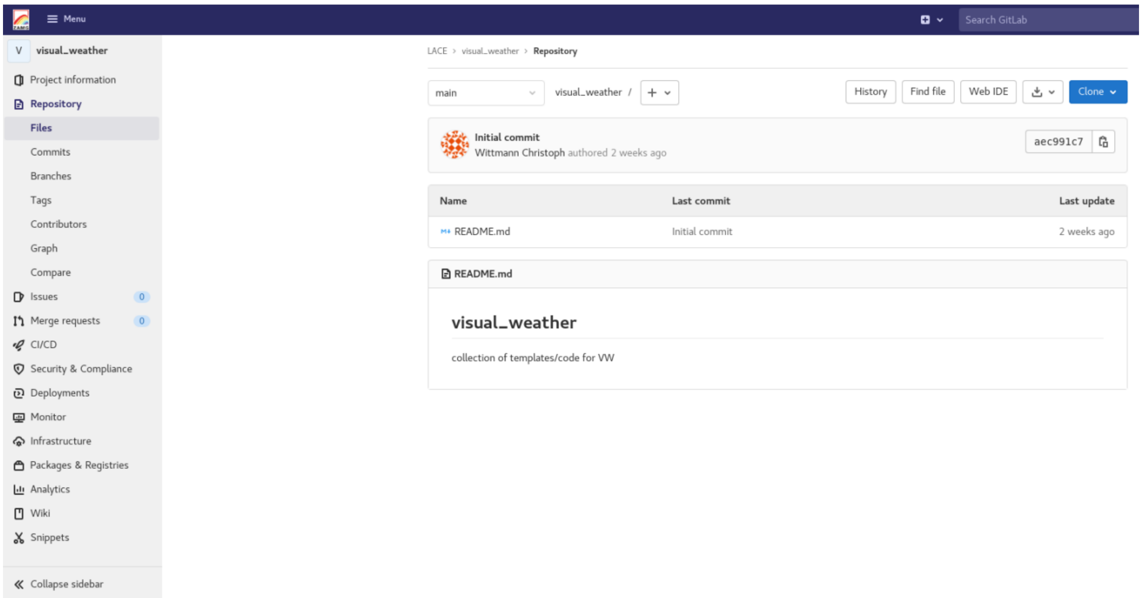


Q6. In case of Github usage, what should the content of the archive be?

The answer of this question shows that a git* platform for our areas of activity is welcome. A git* platform provides the control and trace-ability of changes in the development and maintenance phases of different software applications. Git* platform started to be used more and more in many activities. The advantages of a such platform should be taken into account.

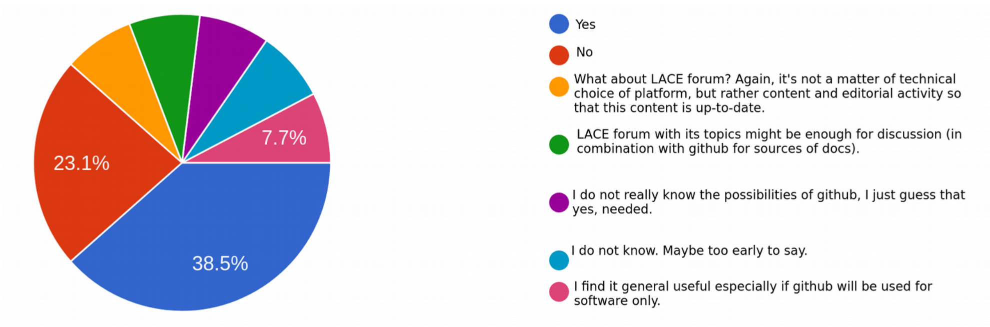


Thereby, after a disscusion with Christoph Wittmann, we have concluded that it is better to have an internal platform where to collect different kinds of information and softwares. Christoph mentioned that ZAMG has already a dedicated GitLab platform hosted by their institute and he succeded to create a specific platform for RC-LACE activities. In the figure below, it can be seen the first example which is dedicated for metgram/epsgram templates. If all countries will agree with this platform as a common repository, we can start to use to use it in the near future.



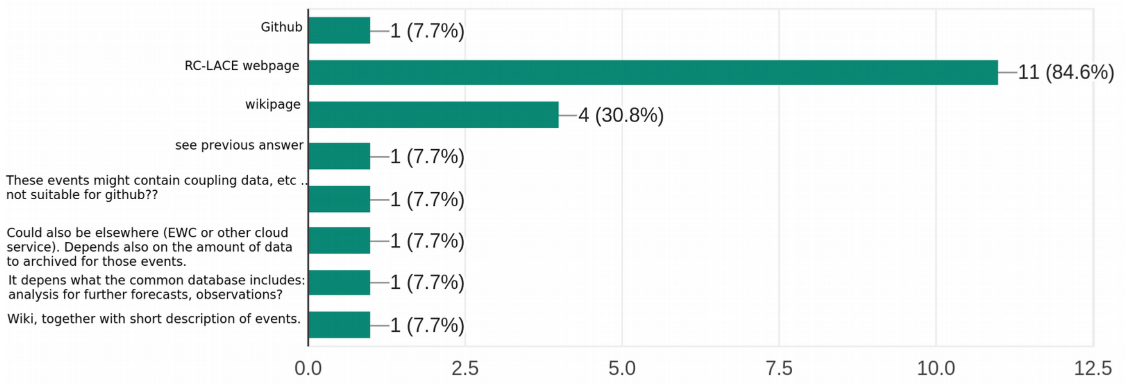
Q7. In case of Github usage, is a Wikipage still needed?

The overall finding is that LACE forum specific for this area can be useful and it will be generated in the near future.



Q8. Where should the common database for extreme events be stored?

Some interesting ideas are arising from the answer to this question. What we would like to have in this common database? Case studies containing all data: coupling and output data of the model, plots? Or only some brief description of a case study? We should take into consideration something similar with a database for OPLACE? Or it will be more suitable to use the EWC or other service?



The result of the questionnaire is showing that RC-LACE webpage is favorite for the moment. Thanks to Oldrich Spaniel and Slovakian team, the RC-LACE webpage dedicated to the data base of cases, a webpage initiated many years ago, was updated (https://www.rclace.eu/?page=9).

Q9. What topics do you propose for possible trainings?

- HARP, tools WS, EWC, AI/ML
- IO server for 001 conf, machine learning methods in usage, HARP usage
- HARP installation and application and similar for other proposed shared software
- FPOS (are we aware of ALL possibilities provided by FPOS?), gmkpack+compiling code (OLda??), epygram, model configurations (from bator to minim...), HARP, and many many more ...
- harp, if selected as a common tool; use of github, together with elaborated work practice for LACE
- The idea about one hour on-line training/lesson for different topics seems to be very positive one.
- Github tutorial; HARP installation; Model code introduction for beginners.
- detailed presentation and documentation of the tools/applications and practical exercises for a better understanding
- Model dataflow, compilation, usage of MF tools for code contributions...
- HARP, obsmonitor, SAL verification
- Fulpos training, especially introducing new variables into Fulpos, epygram, ML courses, statistical postprocessing courses

The answers to this question are shown below and it can be seen that it was very welcomed and a long list of items can be identified for the future plans. Being a large volume of topics, a proposal could be to establish some topics high priority at each LSC meeting.

Q10. In case of previous experience with machine learning, are there any topics you would propose to be included in this area?

In the answers below it can be observed the interest of LACE people in this topic. At the ACCORD level, a working group related to machine learning was formed and a list of questions will be addressed at EWGLAM meeting.

(measured) data quality control, specific disagnostics, AI/ML databases,

wind/solar energy, postprocesing of nwp forecasts

No experience

machine learning vs classical MOS in postprocessing, machine learning might be also used in physics or DA, but should be handeled in those areas then.

Machine Learning for Post-Processing (e.g. wind energy, solar energy), pre-processing and quality control, model diagnostics (e.g. screening level diagnostics?? .. maybe more for physics)

Not enough experience so far. Probably post-processing.

It's very complex question fitted more with ECMWF plans than consorcia one.

Identification of areas/topics where the forecast can be improved by means of post processing the direct model output; dedicated products for external domains.

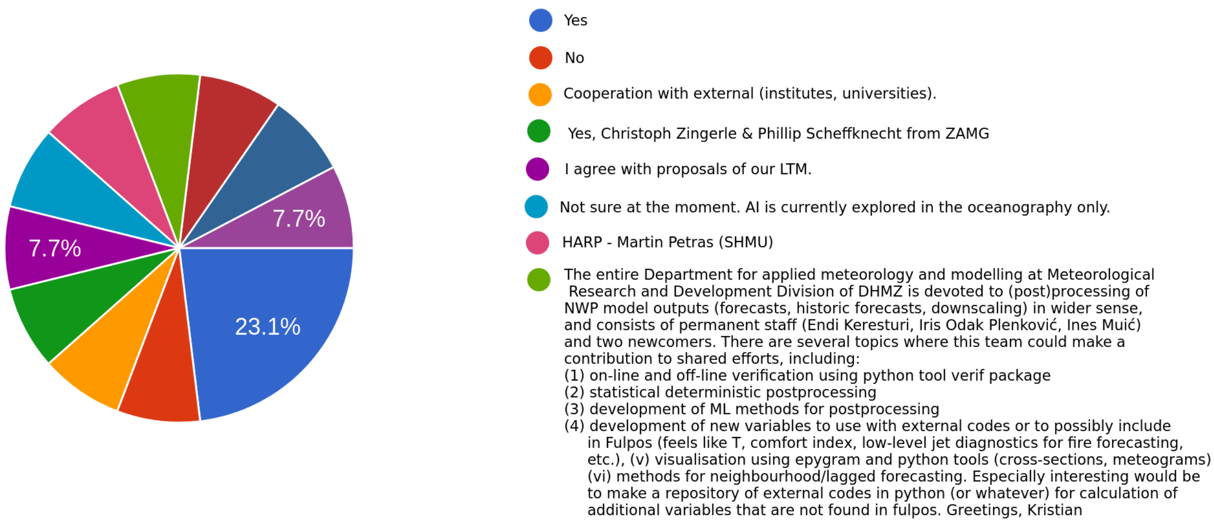
-

At OMSZ, we work on post-processing of AROME-EPS outputs to get a better calibrated forecasts. Maybe similar could be done wth A-LAEF (if there is interest).

Personally I have no experience with machine learning.

Q11. Do you consider that someone from your team can contribute to this new area? If yes, please specify the topic taking into account the questions above.

The lack of manpower is well known. The contribution of each candidate who has experience or not, but has the willingness to learn and to work in the related topics are welcomed.



As a overall conclusion, in this context it can be said that applications (including verification too) represents a step towards magic and it is important to establish a more concrete approach for the future plans. Regarding the questionnaire, the questions may not have covered the full range of needs from applications and verification points of view, but it represents a good start to achieve the most important objectives for our area of interest.

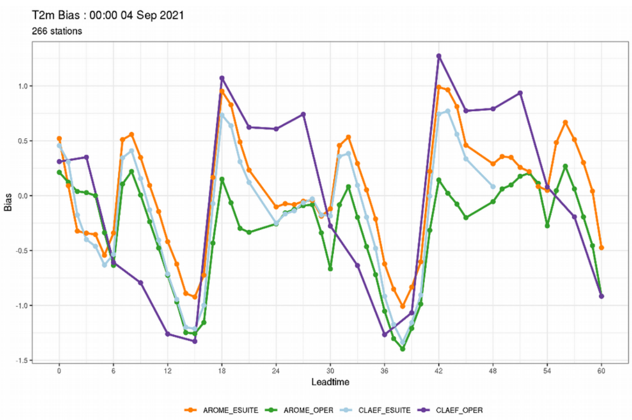
1. Action: HARP implementation and verification for deterministic and probabilistic forecasts

In **Austria**, HARP verification package was installed using anaconda environment on new verification servers. Different HARP-versions were run under different conda-environments. In order to facilitate the usage of HARP for ‚R-beginner‘, a python-wrapper was developed for deterministic verification. Verification activities were based on:

- continuous verification of AROME-Aut, CLAEF-CTRL and their e-suites implemented;
- surface parameter are included in continuous verification;
- upper air verification with radiosondes is now included for deterministic verification of operational AROME-Aut and CLAEF-CTRL;
- Verification of operational AROME-RUC implemented, only 4 runs per day are visualized on a regular basis;

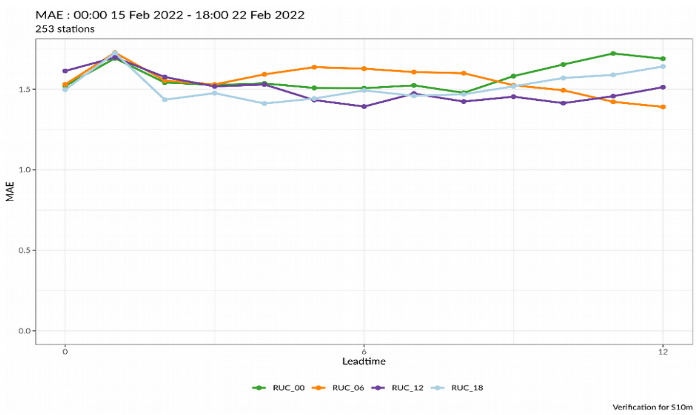
- Extraction of C-LAEF forecasts for HARP ported to ECMWF ecgate.
- verification is done for all Austrian stations and seperated for stations in flatlands, valleys and mountains. Classification of stations is based on Surface Layer Index (aka IFAC).

In figure 1, it is observed some example of HARP verification, for 2 m temperature for 266 stations (a), for temperature at 850hPa verification for AROME-AUT, C-LAEF and Member 1 of C-LAEF at Austrian radiosonde sites (b) and 10m Windspeed for selected AROME-RUC runs at Austrian (c).



(a)

(b)



(c)

Figure 1. Example of HARP verification, for 2 m temperature for 266 stations, for temperature at 850hPa verification for AROME-AUT, C-LAEF and Member 1 of C-LAEF at Austrian radiosonde sites for 4 stations (b) and 10m Windspeed for selected AROME-RUC runs at Austrian for 253 stations (c).

Another important step made by Austrian team was related to HARP – based scorecards. For this purpose, a series of steps were done as follows:

- an interface was written to ZAMG-Verification tool;

- HARP-scorecard extended to use spatial precipitation verification from ZAMG-Verification tool (Figure 2);
- Some optical adaptions implemented.

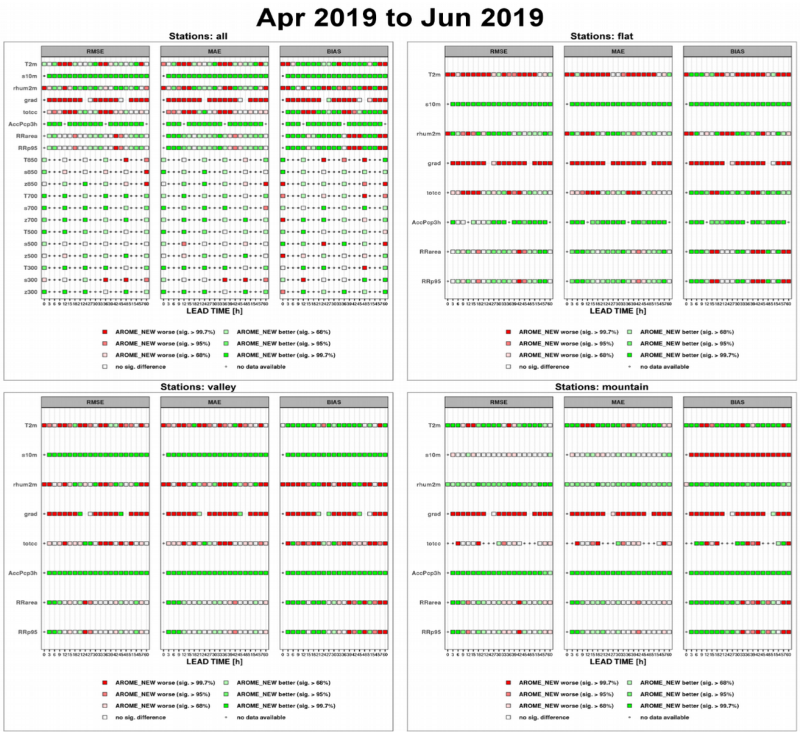


Figure 2. Example of HARP-scorecard.

In **Hungary**, there is no complete verification system for ensemble forecasts (i.e., several tools for different measures are used). Therefore, the adaptation of HARP verification for EPS approach and the extension of several verification parameters are necessary. After installing HARP, a read function was prepared for the observations used in netCDF format at OMSZ. The observations are stored in SQLITE tables in HARP. Multiple file type forecasts were tested, as GRIB, FA and vfld formats with HARP functions.

A test verification was made for the 11-member AROME-EPS for Budapest station , for June 2020. Some parameters had different unit in the observations and forecasts, so the necessary conversations were made. Also the wind speed and direction were calculated from u and v components. The verification was performed for 2-meter temperature, 10-meter wind speed and direction, mean sea level pressure and 2-meter relative humidity. The results can be displayed with the Shiny package, as in figures 3-4.

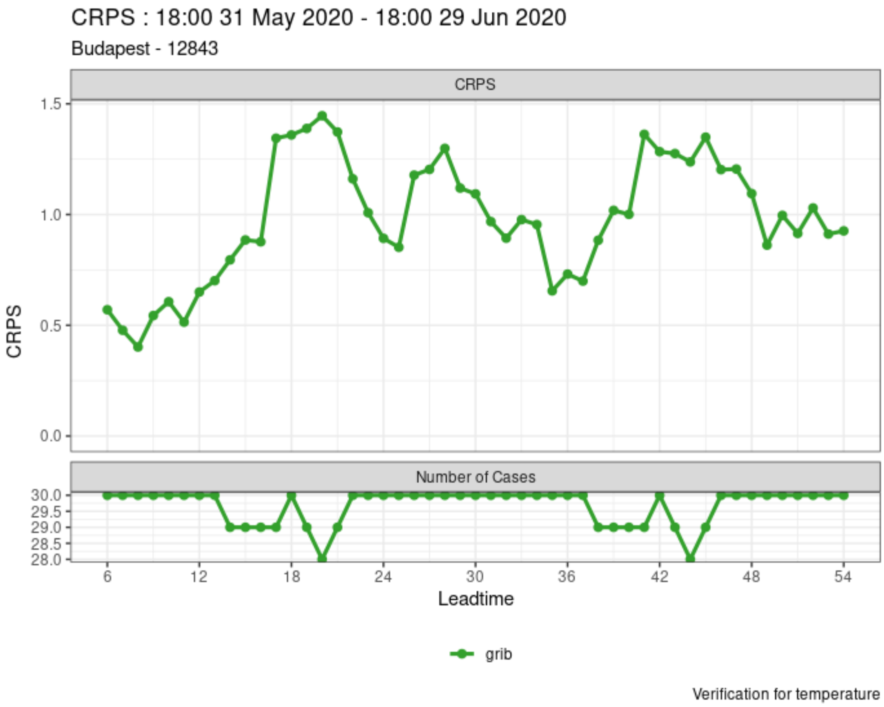


Figure 3. CRPS of AROME-EPS forecasts for 2-meter temperature calculated with HARP for Budapest, June 2020.

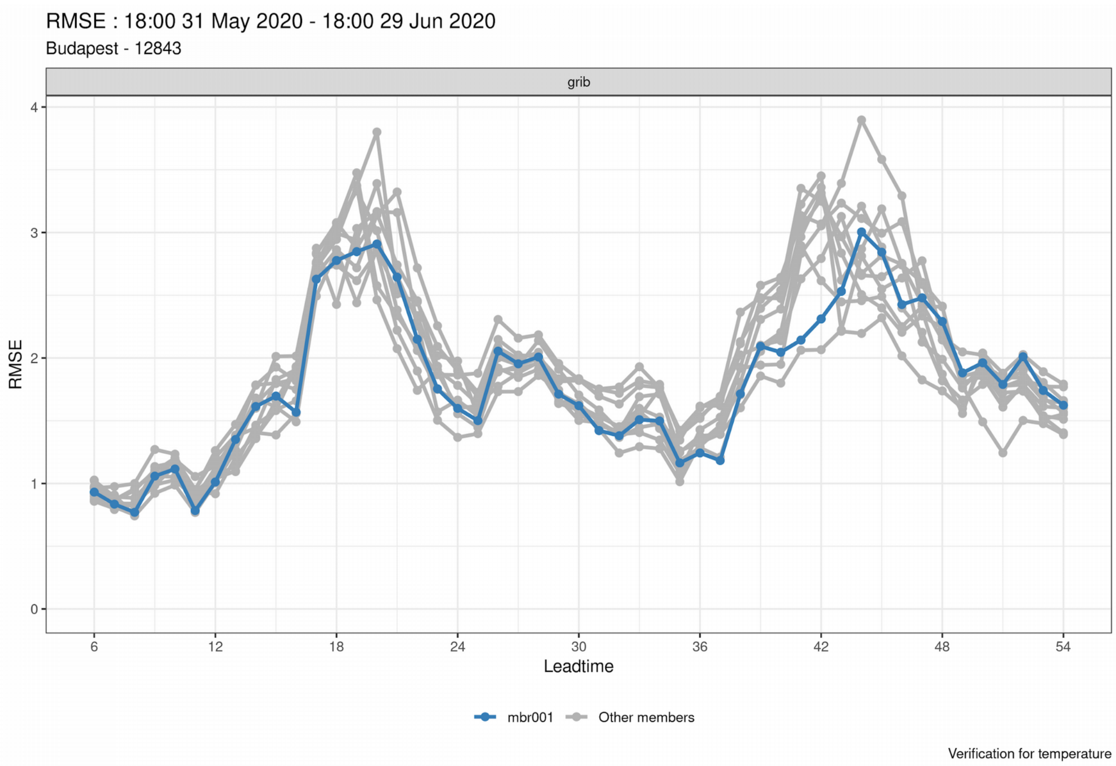


Figure 4. RMSE of the 2-meter temperature forecasts for each member (grey) and the control member (blue) of AROME-EPS for Budapest, June 2020.

The comparison was done for the scores CRPS, RMSE, bias and spread gained from HARP with the ones calculated by own current verification systems (the Perl-based

OVISYS as well as the script and Fortran-based EPSV). The results are similar in the following figures 5-6, with the exception of spread (Figure 7). Small difference can come from handling the distance between the geographical position of the observation site and the grid points: an interpolation is used in OVISYS, while the grid point nearest to the observation is taken in HARP and EPSV. The considerable difference in spread values occurs because of the different calculation methods. Also, a successfully tested verification for multiple stations was done (not just ones with WMO IDs).

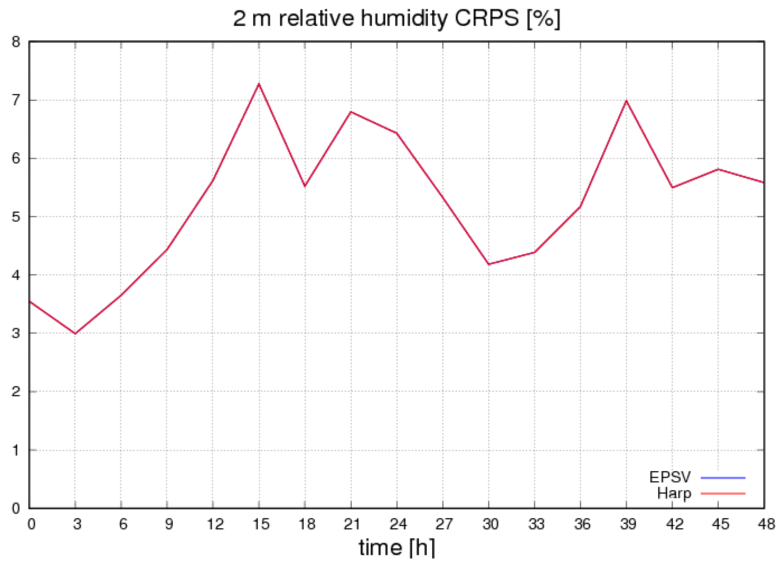


Figure 5. CRPS of the AROME-EPS forecasts for 2-meter relative humidity calculated with HARP and EPSV for EPS forecast for Budapest, June 2020.

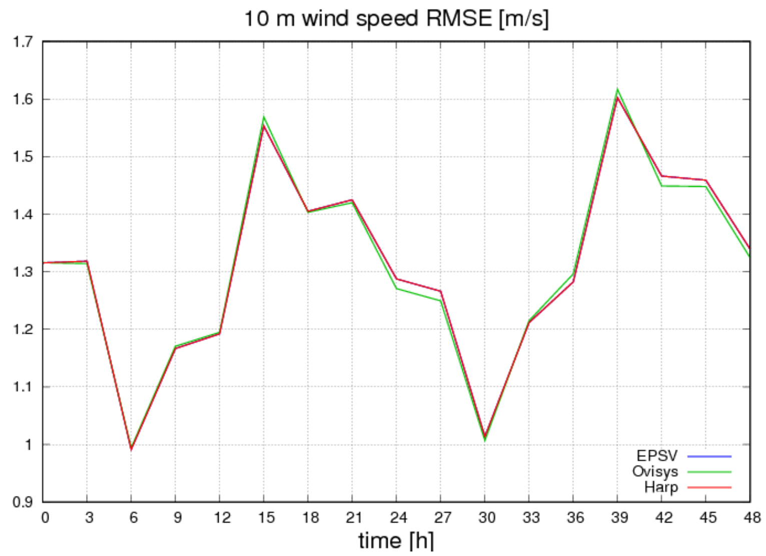


Figure 6. RMSE of AROME-EPS forecasts for 10-meter wind speed calculated with HARP, EPSV and OVISYS for Budapest, June 2020.

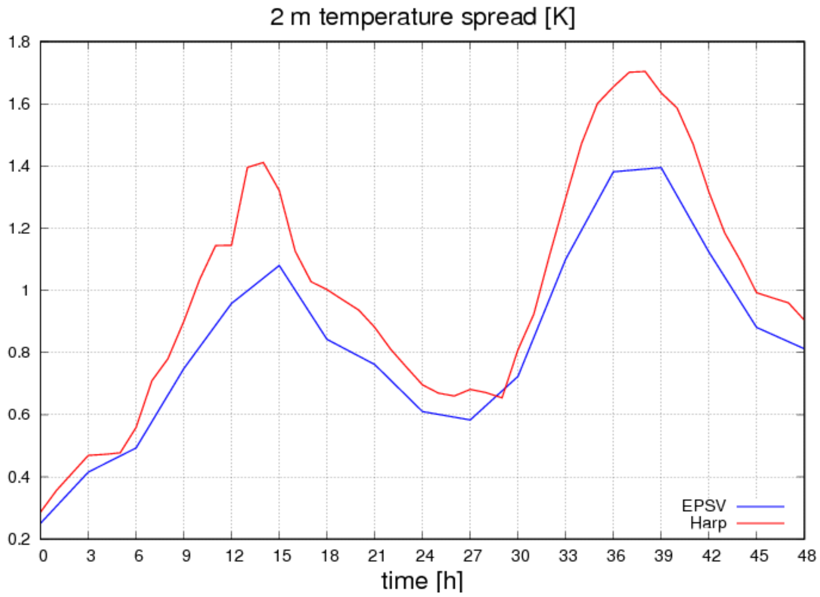


Figure 7. Spread of AROME-EPS forecasts for 2-meter temperature calculated with HARP and EPSV for Budapest, June 2020.

The work is ongoing, the HARP was applied for radiosonde measurements. Before calculation of verification measures, the observations written in netCDF format were converted to SQLite tables used in HARP. A sample verification was made for the 11-member AROME-EPS forecasts for Budapest station, June 2020 (Figure 8-9).

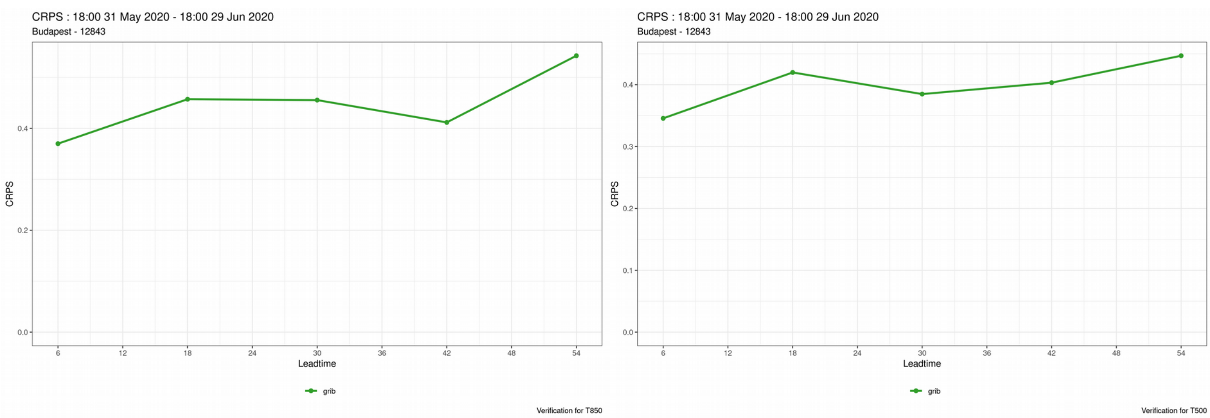


Figure 8: CRPS of AROME-EPS forecasts for temperature at 850 hPa (left) and 500 hPa (right) calculated with HARP for Budapest, June 2020.

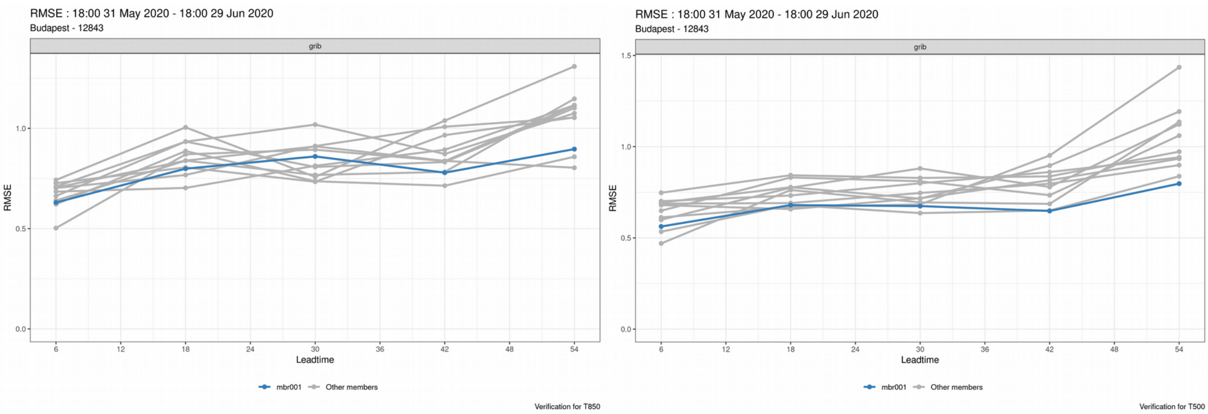


Figure 9: RMSE of the 850 hPa (left) and 500 hPa (right) temperature forecasts for each member (grey) and the control member (blue) of AROME-EPS for Budapest, June 2020.

Contributors: Katalin Jávorné Radnóczi (0.75 pm), Dávid Tajti (3 pm), Christoph Zingerle (1 pm).

2. Action: HARP linked to OPLACE database

Despite of LAEF verification potentials, it is better to focus on one package. One such package is HARP. In order to use the benefit of OPLACE system, a link between OPLACE and HARP is necessary. In this way, manpower on maintenance and developments will be saved. Thanks to Martin Petras from slovakian team, this step already started. His progress can be found on github at the following link:

https://github.com/meteorolog90/harpIO

In order to use this adapted version of HARP, it is necessary to replace the stable version of harpIO by using the command:

remotes::install_github("meteorolog90/harpIO")

This is fully integrated interfaces, no need external program or scripts. To read obsoul, you just need to call the function "*read_obs_convert*" and define arguments:

read_obs_convert(

start_date = 2021061300,
#set start date
end_date = 2021061307, #
set end date
by = "1h",

obs_format = "obsoul",
#set obs format, options : obsoul, vobs
obs_path   = "/users/ext005/app/oplace/# set path to obsoul location
obsfile_template = "obsoul_1_xxxxxy_hu_{YYYY}{MM}# set template
sqlite_path = "/users/ext005/app/oplace/ # set place for exporting SQLite databaze
country = "hu",
set country, need to add this arg. because different SID stations names
return_data = TRUE

)

There were some problems related to the station names, but they were fixed togheter with Alena. Thereby, all station names (SID) are converted from *string* into *int* one. So, if exist any “string” part in SID name, it will be removed and replaced with number. *Example:* If station name is *SI1044, SI* parts will be removed and replaced with number *96*. For station in Hungary, *HU* will be replaced with number 93, etc.

The work is done only for the new obsoul format. For the moment, the old format of obsoul is not supported and it is not easy to incorporate all flavors of files.

Contributor: Martin Petras (2 pm)

3 Action: Multiple verification methods

3.1 Verification of global radiation and 100-meter wind speed forecasts of AROME and AROME-EPS

In Hungary, a verification of global radiation and 100-meter wind speed forecasts of AROME and AROME-EPS was done. This study was motivated by the partners of OMSZ producing wind and solar energy. They provide observations from the instruments located at a few wind and solar power plant parks (in Hungary) and the AROME forecasts were evaluated for the same locations with help of a MSc student. The validation was achieved for 2 points in case of global radiation and for 3 points in case of 100-meter wind speed for a 1-year period commencing in April 2020.

At the same time, it was started to work on verification of AROME-EPS global radiation forecasts. In this case, the SYNOP observation from the network of OMSZ, from approximately 40 stations, were used. The global radiation verification is not part of the own current verification system, OVISYS, and the netCDF files are not handled by HARP, so these new verification programs are coded in shell and Fortran.

Contributors: Gabriella Szépszó (1 pm), Katalin Jávorné Radnóczi (1 pm)

3.2 Validation of AROME SEKF test suite

In **Hungary**, from 15 November 2021, an AROME-TEST parallel suite was launched for a month. Simplified extended Kalman filter (SEKF) was applied in the test run for surface assimilation. The results were evaluated and compared to the operational AROME/HU forecasts in which optimum interpolation (OI-main) is used for surface data assimilation.

Some objective and subjective evaluations were carried out:

- The forecasters were involved in the evaluation focusing on differences between the operational and test forecasts at 0, 6 and 12 UTC. They recorded daily their comments.
- At the same time, subjective verification was done by the model developers in interesting weather situations, ranking the 2-meter temperature, 10-meter wind and gust, precipitation and cloudiness forecasts from 1 to 5 (where 5 is the best).
- The objective pointwise verification was completed by the in-house developed Perl-based OVISYS verification system. RMSE and bias were computed for some surface parameters: mean sea level pressure, total cloudiness, temperature, dewpoint and relative humidity at 2 m, 10 m wind speed and wind gust, and for some upper-level parameters: temperature at 850 hPa, relative humidity at 700 and 925 hPa, geopotential height at 500 hPa. The verification contained frequency bias and some other scores calculated based on the contingency table of 12- and 24-hour precipitation amounts as well.

In the first weeks the models faced with the challenges of forecasting fog and low level cloud in an anticyclonic situation. In the rest of the period, several front systems passed Hungary often with mixed-phase precipitation. A systematic underestimation for both 2-meter temperature and dewpoint was experienced during the test period by both model versions. The temperature underestimation was especially large in the middle of the day (i.e. for the maximum values) which was even greater when using Kalman filter. It was found that it was partly related to overestimation of low-level cloud (fog) existence in some weather situations and partly was linked to some fake snow persistence in December (Figures 10-11).

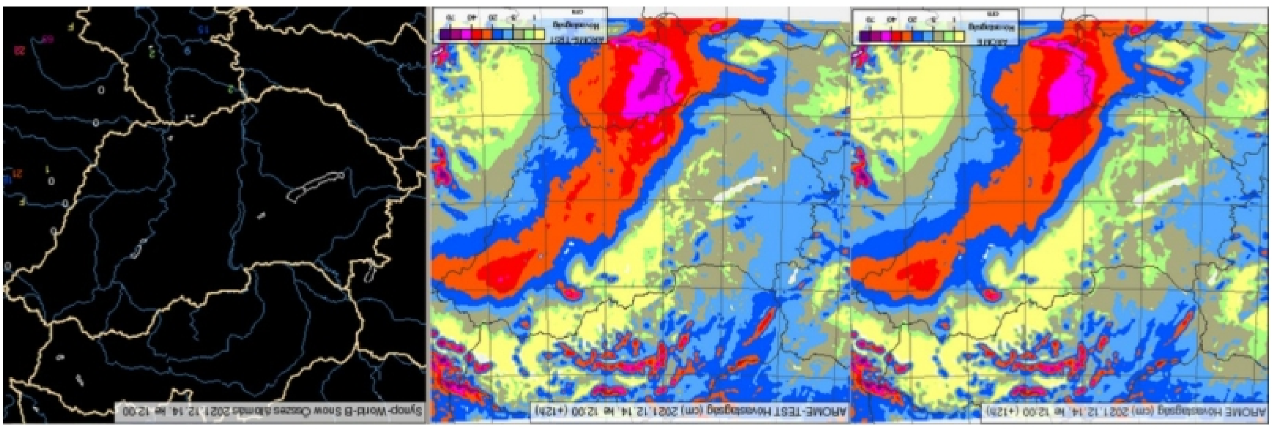


Figure 10: Snow depth (in mm) at 12 UTC on 14 December 2021 based on 12-hour forecasts of the operational AROME (left) and AROME-TEST (middle) and SYNOP observations (right).

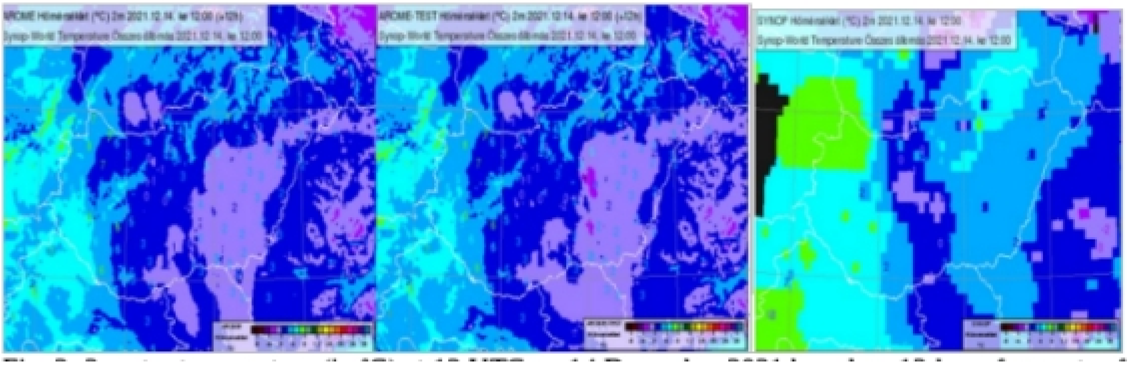


Figure 11: 2-meter temperature (in °C) at 12 UTC on 14 December 2021 based on 12-hour forecasts of the operational AROME (left) and AROME-TEST (middle) and SYNOP observations (right).

Contributor: Boglárka Tóth (0.25 pm)

3.3 Fraction Skill Score verification tool

In **Czech Republic**, it was developed the Fraction Skill Score (FSS) verification tool for precipitations. This work was motivated by the assimilation of radar observations, where we needed to compare experiments using better methods than the pointwise one.

In **Austria**, the metrics like the Fraction Skill Score and the displacement of the 90th percentile of precipitation, based on FSS were computed within Panelification tool. More details can be found in Action 4 (Panelification).

Contributor: Antonin Bucanek (1 pm)

3.4 Lightning diagnostics to ALARO

In Czech Republic, following the work of Christoph Wittmann and Jure Cedelnik related to lightning diagnostics, David Nemec started to adapt it to ALARO model taking into account the implementation of the prognostic graupel to ALARO (graupel is needed for the diagnostics, since it is based on the product of vertical velocity and graupel around the level with temperature – 15 deg C). The methods were validated with respect to lightning data available for the CZ territory and further was improved the calculation by considering the vertical velocity in the updraft, or better say the mass flux in the updraft available thanks to 3MT instead of the model resolved vertical velocity (given by the dynamics). Just to recall, we have the horizontal resolution of 2.325 km and we still use the 3MT, we find it beneficial. This modified version (using 3MT mass flux) yields better results.

Contributor: David Nemec (2.5 pm)

4 Action: Panelification

In **Austria**, the verification tool Panelification was continuously improved and expanded during 2021. The tool is focused on model comparisons of precipitation forecasts, and it helps by calculating common scores like MAE, RMSE, Correlation but also new metrics like the Fraction Skill Score and the displacement of the 90th percentile of precipitation, which is based on the FSS. It verifies against ZAMG's own INCA analysis, which provides observations on a 1 km grid

It provides a quick and understandable presentation of the scores along with the observed and simulated fields. This allows experts to compare the fields using their subjective experience while seeing quantitative metrics at the same time. It is best suited for case studies, where short periods are examined in detail. However, it also saves scores in ASCII files, which are archived for use in period verification.

A config file is used in order to export some paths:

- The tool uses the gridded precipitation as it is archived on ZAMG machines
- The tool uses epygram, which runs under Python 2
- The tool has all file paths embedded in its code

  Recent work related to this new tool can be summarized as follows:

- Verification against the INCA analysis (1 km gridded product).
- Acceleration of the plotting routines: Improved parallelization and Added „fast mode“ that uses different contouring method for quick internal use.
- New Version is Ported to Python 3 (currently limited to GRIB format).
- ASCII output can be used for period verification
- Panels are automatically generated for internal model performance monitoring (Figure 12).

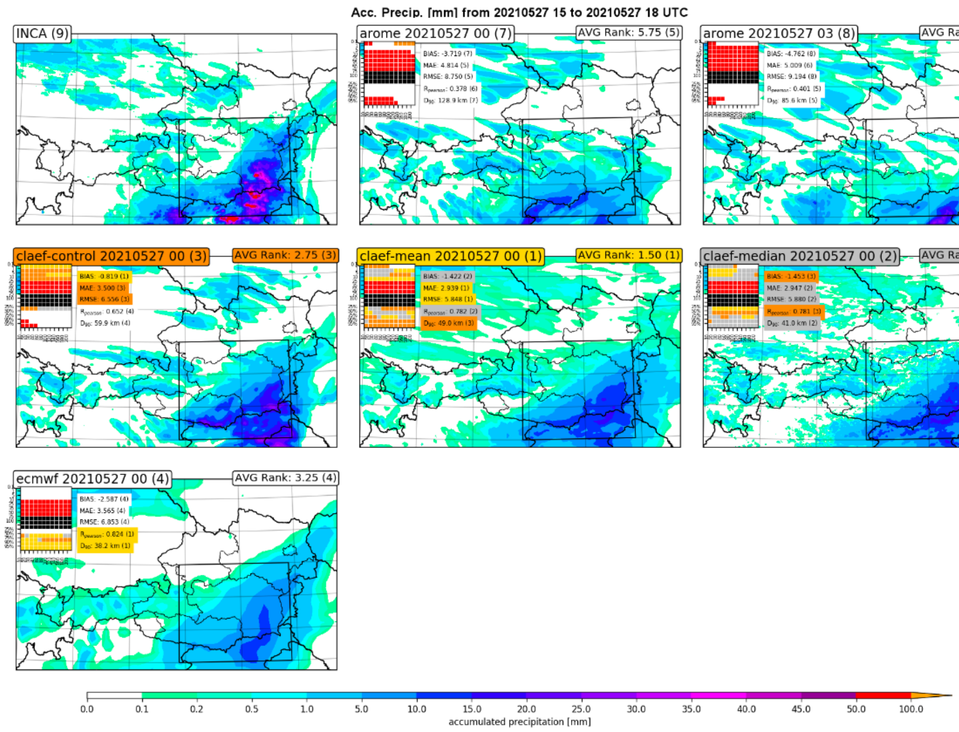


Figure 12. An example of automatically panel generated for internal model performance monitoring.

Also, a correlation for entire summer 2021 (Figure 13), for ZAMG models, for 15-19 UTC was computed and the results can be found in the below figure.

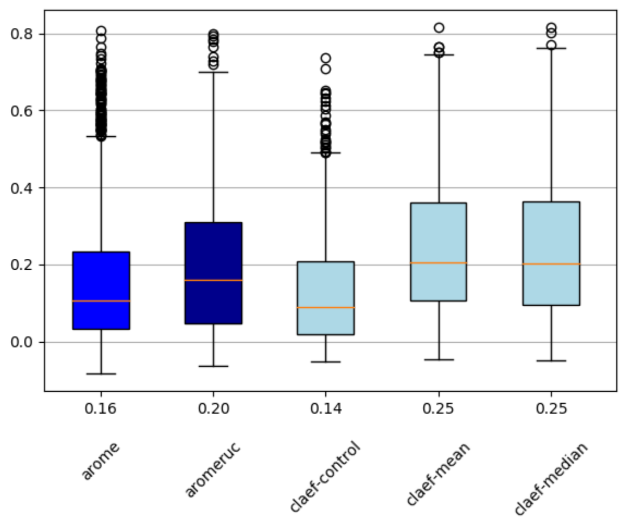


Figure 13. An example of automatically panel generated for the correlation score, summer 2021.

A branch of Panelification is used to do quick visualizations of AROME-RUC for internal usage, the example shown is an RGB cloud composite (red low, green mid, blue high), example image below. In addition, the reading of new variables is also done in preparation for the verification of additional parameters. Panel shows output of 12 runs for a single output time for comparison (Figure 14). Panels with fewer images can be used to view it as time-lagged ensemble.

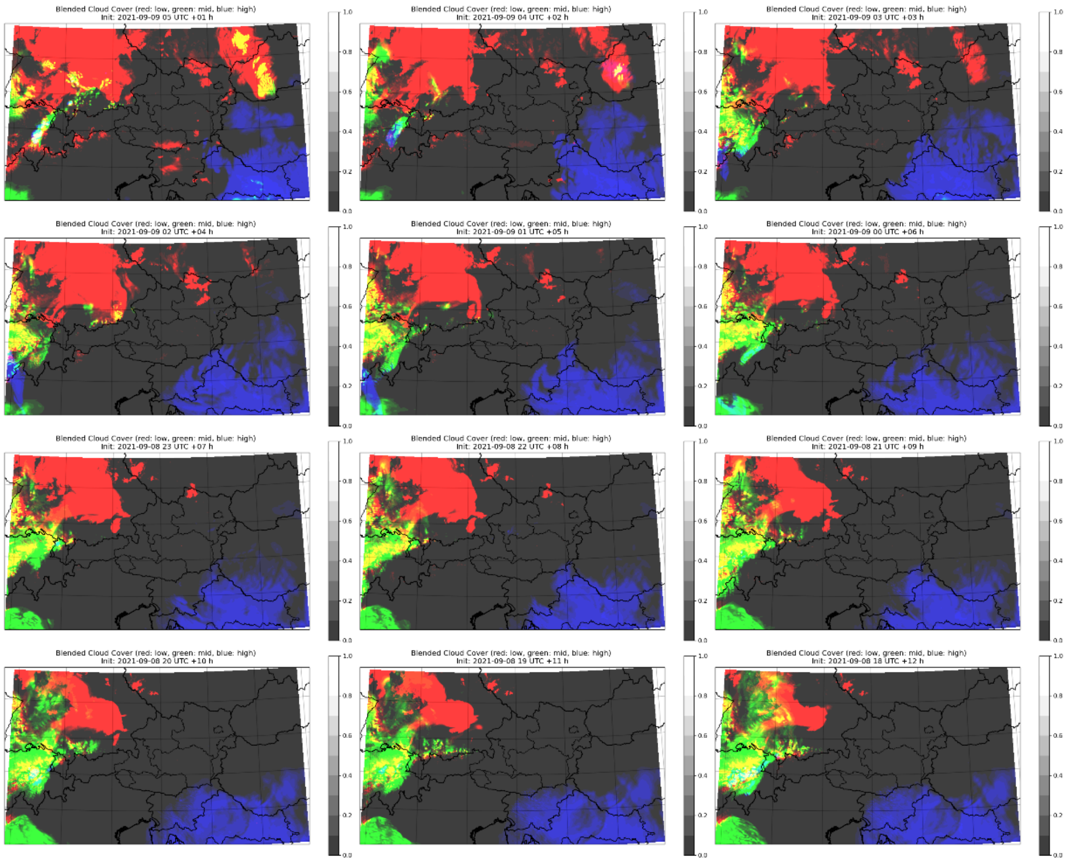


Figure 14. The output of 12 runs for a single output time for comparison.

The first major step accomplished in the second half of 2021 was a major refactoring of large parts of the Python code. Since Panelification was initially intended as a tool for quick precipitation comparisons, much of the visualization and data-I/O was explicitly configured in the code. To make it more flexible for future developments, all routines that read model or observational data and the visualization were refactored into smaller functions which are easier to work with and more flexible. In addition, the parameter details (GRIB names for each model, colors, scales, thresholds) can be defined in separate files, which allows quickly implementing additional parameters for verification against gridded data.

The second major step was the implementation of the sunshine duration as verification parameter (Figure 15). The program compares the observations and model analogously to the precipitation fields, but the errors are given in seconds of duration, rather than mm.

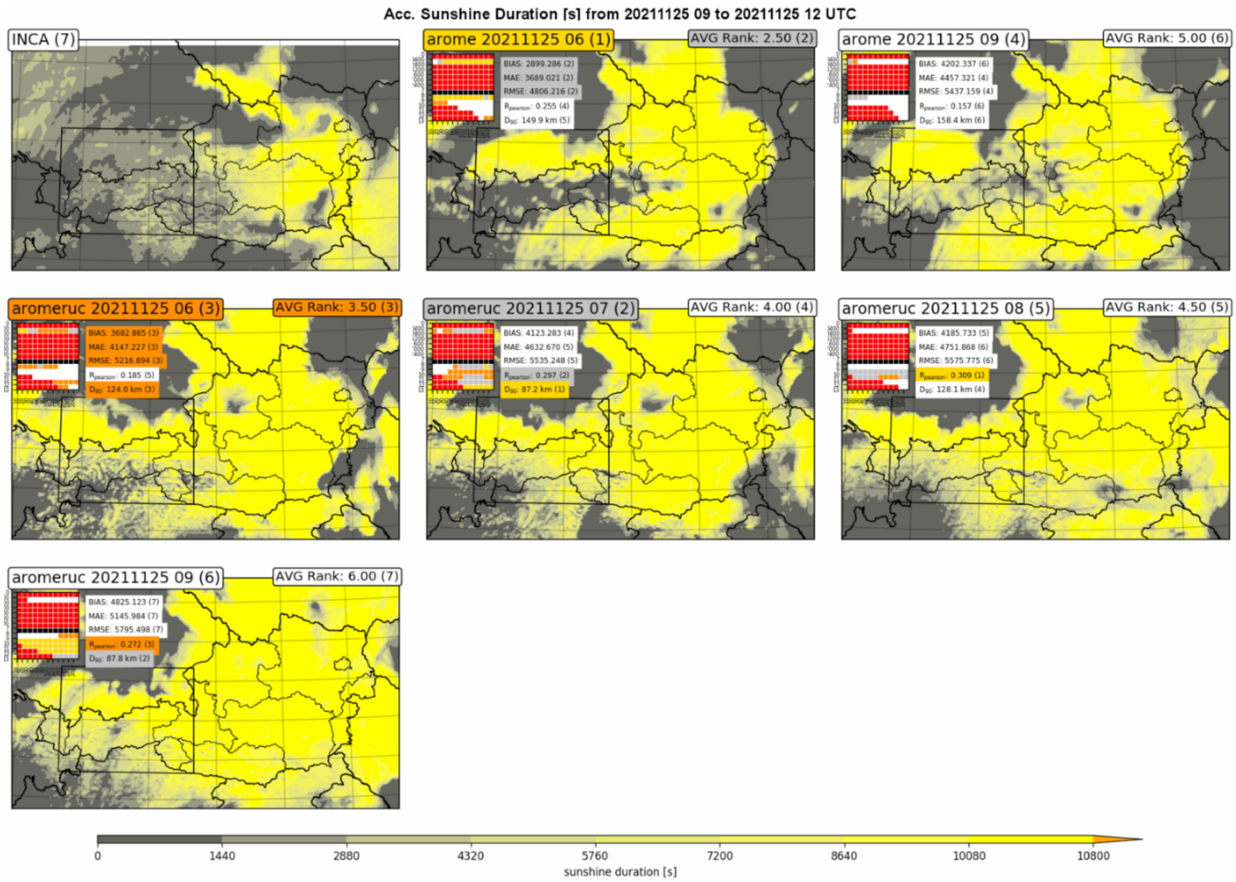


Figure 15. Example verification of the sunshine duration from 25 Nov 2021 12 to 15 UTC for the internal models AROME-Aut and AROME-RUC

Contributor: Phillip Scheffknecht (2.5 pm)

5 Action: Post-processing of model output

In **Hungary**, a work related to the post-processing of AROME and AROME-EPS in order to to improve the forecasts was started in 2021.

This study was motivated by the partners of OMSZ producing wind and solar energy. In 2021 we started to work on post-processing of AROME and AROME-EPS outputs in cooperation with three mathematician colleagues. The main objective was to improve the forecasts for global radiation and 100-meter wind speed. The methods were developed in R and python programming languages, their operational implementation is ongoing.

To improve AROME 100-meter wind speed forecasts, observations and forecasts for 100-meter wind speed and wind direction, surface pressure and temperature are taken into account. To improve AROME radiation forecasts, observations and forecasts for temperature and global radiation are used. The forecasts are in netCDF files, whereas the observations are provided in csv format, which are converted to feather format. Observations are supplied by the wind and solar energy farms (for 100-meter wind and radiation) and OMSZ. Two types of machine learning techniques were implemented: combined convolutional and artificial/feedforward neural networks to improve the forecasts in every 15 minutes up to 48 hours; convolution autoencoder to improve the forecasts over the whole time range. Autoencoder method is recommended to use for 100-meter wind speed forecasts, but it produced poor results for radiation. The point-by-point correction showed good results for both parameters (see Table 1). Both techniques consist of a separate training period and an operational post-processing. For training a longer time period (at least several months, but optimally multiple years) is recommended.

Table 1: Main characteristics of the point-by-point method developed to improve AROME wind (v100) and radiation (R) forecasts: input data of the method, training period, data selected for validation, improvement of RMSE in the training, the validation and the whole periods (the range represents different geographical locations).

Input data	**Time period**	**Validation**	**Improvement in RMSE [%]**		
			Training	Validation	Total
observations, forecasts: **v100**, MSLP, T2	2020/04/17–12/31	20% of data randomly selected	9-16	7-17	9-16
observations, forecasts: **R**, T2	2020/04/17–12/31	20% of data randomly selected	10-13	11-13	10-13

Multiple methods were developed to improve AROME-EPS 100-meter wind speed forecasts: EMOS (ensemble model output statistics) models and a multilayer perceptron neural network (MLP) approach. Both use wind speed observations from wind farms and ensemble forecasts. The training was conducted over a 51-day rolling training period. EMOS models were tested applying several distributions: truncated normal (TN), log-normal (LN) and truncated generalized extreme value (TGEV) predictive distributions. These can be used with a regional or with a local approach: data for all points from the training period are considered together providing a single set of EMOS parameters or the model was trained separately for the different locations. Local models showed more promising results and the best result, 12 % reduction in CRPS, is obtained with truncated normal distribution supported with multilayer perceptron method (TN-MLP in Figure 16). To improve AROME-EPS global radiation forecasts, EMOS models using censored logistic (CL0) and censored normal (CN0) predictive distributions were developed (Baran and Baran, 2021) fitting better to diurnal radiation characteristics. They use a 31-day rolling training period, and radiation ensemble forecasts and observations of OMSZ as input. Measurement data were provided in csv format, but an R script were constructed to handle netCDF files directly. The methods decrease the CRPS with 10-15 % and increase the ensemble spread reducing the radiation underestimation (Figure 17).

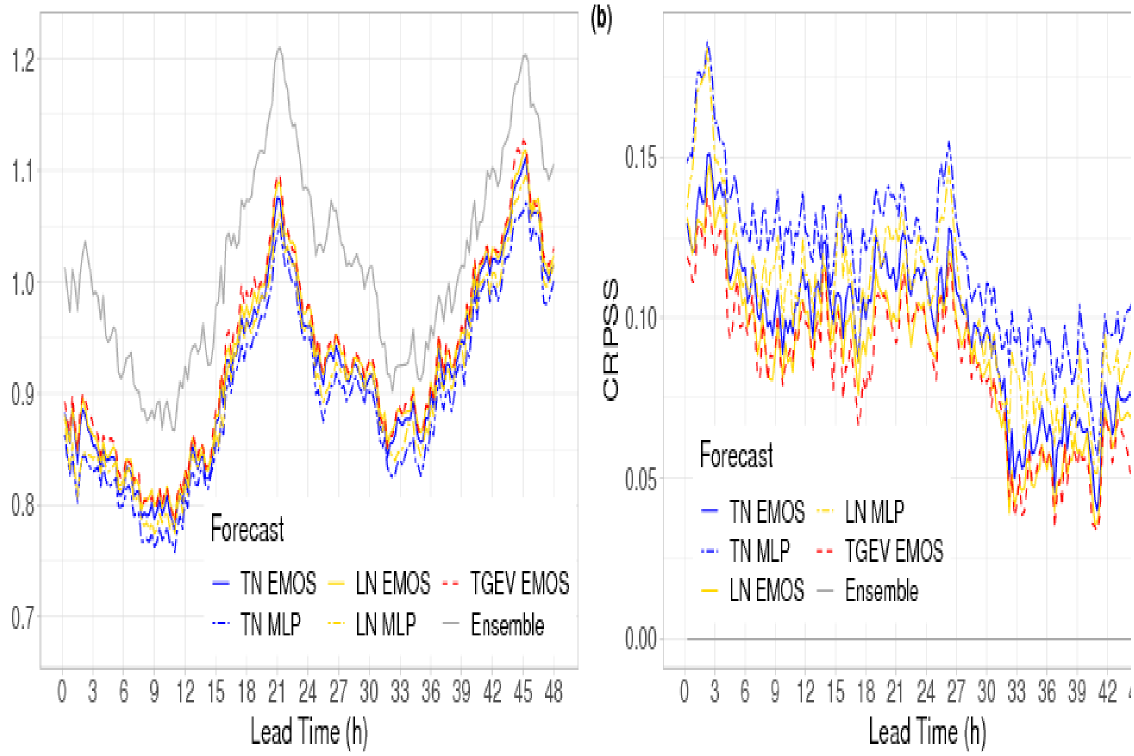


Figure 16: Mean CRPS of AROME-EPS 100-meter wind speed forecasts for the raw ensemble (grey) and for the ensemble post-processed with different methods.

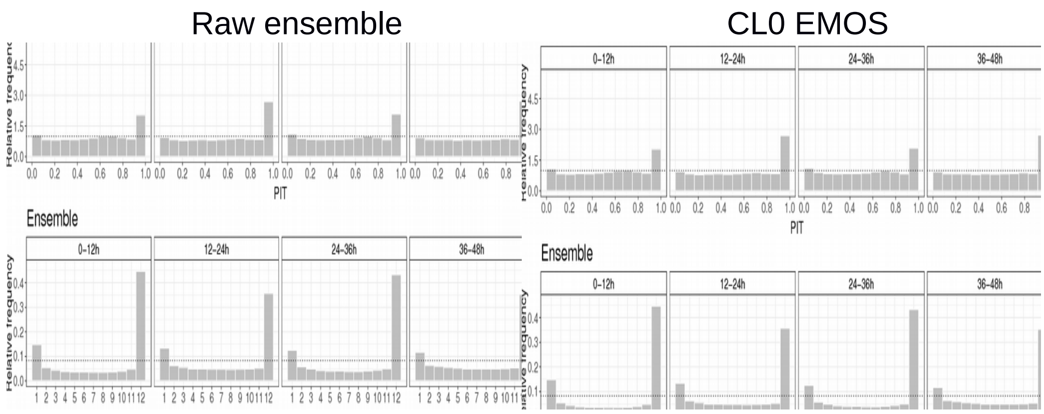


Figure 17: Talagrand diagram of AROME-EPS radiation forecasts between 12- and 24-hour lead times for the raw ensemble (left) and for the ensemble post-processed with the CL0 EMOS method (right).

Contributors: Gabriella Tóth (0.25 pm), Dávid Tajti (1.25 pm)

Documentation: Baran, S. and Baran, Á., 2021: Calibration of wind speed ensemble forecasts for power generation. Időjárás 125, 4, 609–624. DOI: https://doi.org/10.28974/idojaras.2021.4.5

6. Action: lace@egitlab

The gitlab platform provides control and trace-ability of changes in the development and maintenance phases of different software applications. In time, the usefulness of it will increase productivity with minimal human efforts when somebody intends to use a software in a different country or a different home computer. Gitlab platform makes available the software to multiple people which can work together to the same soft/script/programs and finally they can establish the final version of the code which can be put in the master branch and declare the “export version” of that code. For the safety of the softwares, in order to protect our developments, weekly (or maybe daily) automatic savings should be done.

The Gitlab server is available for exchanging tools within LACE and hosted by ZAMG.

Contributor: Christoph Wittmann (0.25 pm)

7 Action: Database of cases

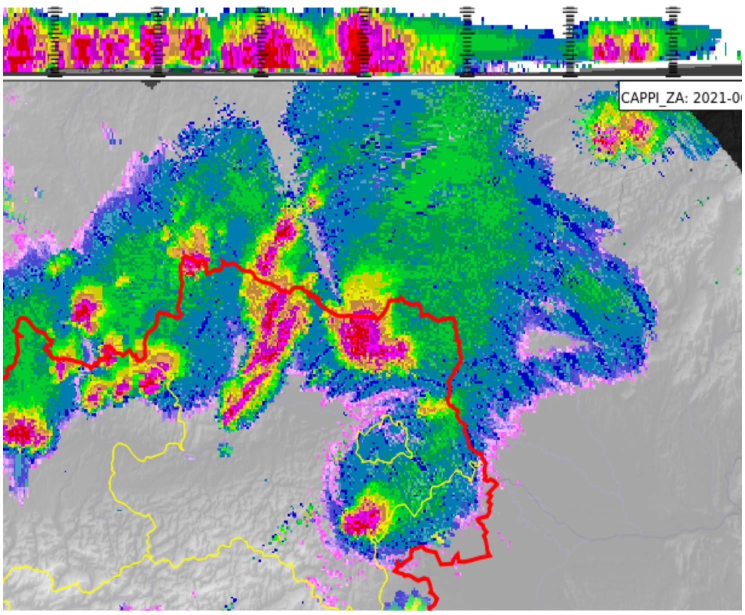
The following case studies are provided bu austrian team.

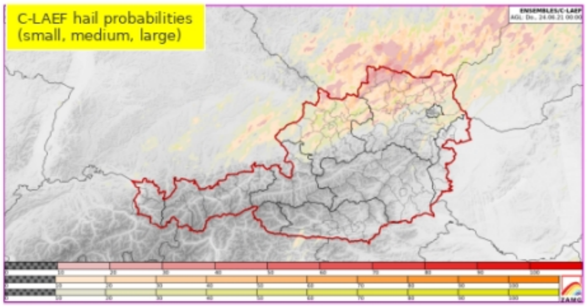
Hail event 24.06.2021

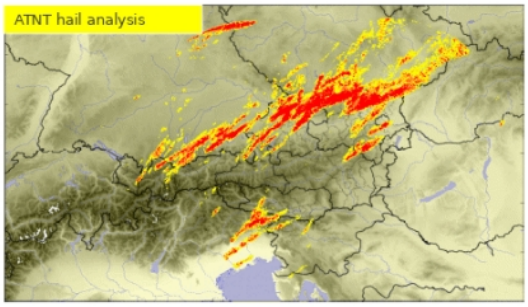
Series of supercells developing over north eastern part of Austria producing large hail and wind gusts and moving to NE (producing tornado in CZ close to boarder to AT).

Forecast problem:

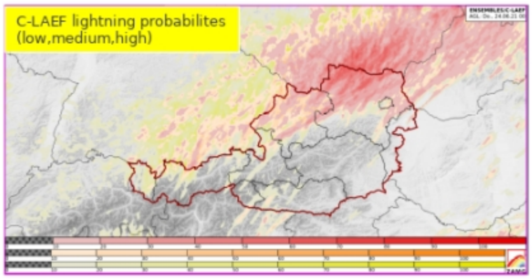
- Where models able to predict this type of convective activity? (supercell activity, large hail, wind gust)?
- Good case for (extreme) tuning of hail and lightning diagnostics.
- Predicting tornados is not our goal.

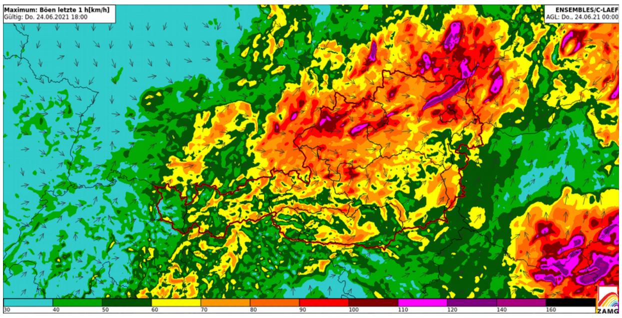


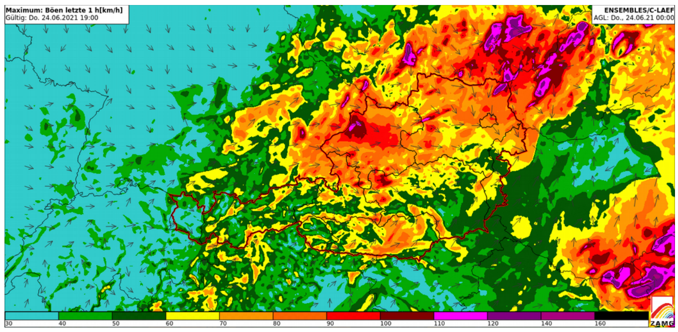


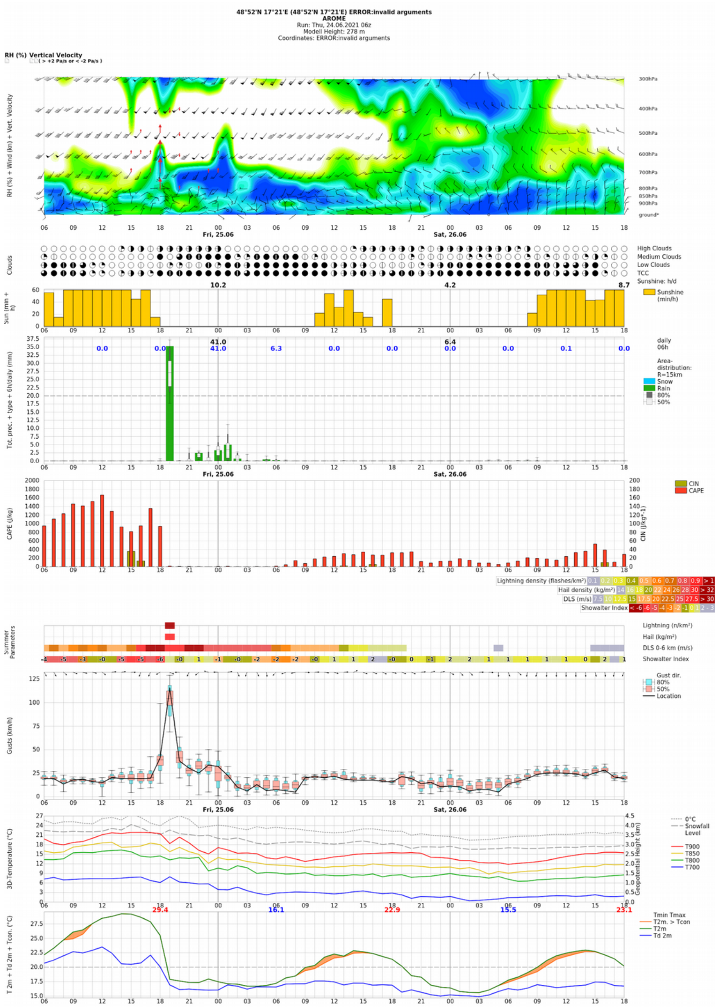


- C-LAEF 00 UTC run with strong indication of potential for large hail
- case with one of the strongest indications for large hail out of C-LAEF in summer 2021









Conclusions:

- C-LAEF 1hr max wind gusts > 100kmh for NE Austria / CZ / SK
- predicting tornado is not our goal, but potential for extreme conv. gusts

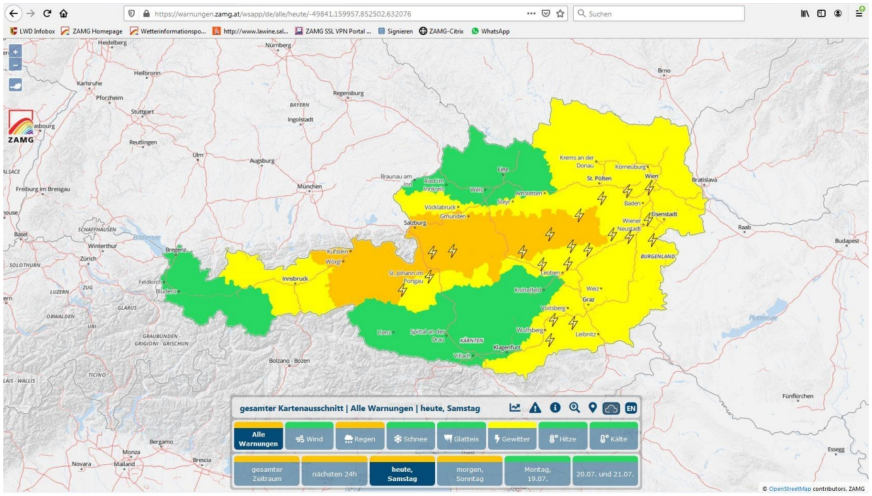
Flood event 17.07.2021

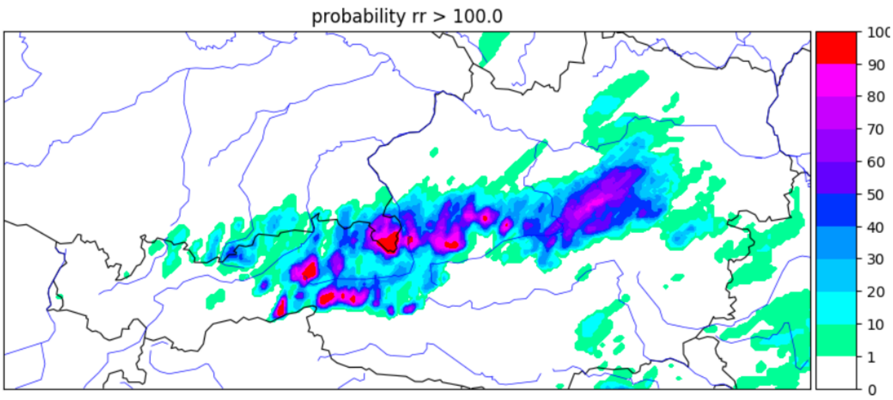
On 17.07.2021, it took place an upslope precipitation event along the northern side of the Alps. Embedded convection, causing local floodings (overall orange warning level, locally red) more convective activite in flatland area, strong convection/thunderstorm producing localized precipitation peaks.

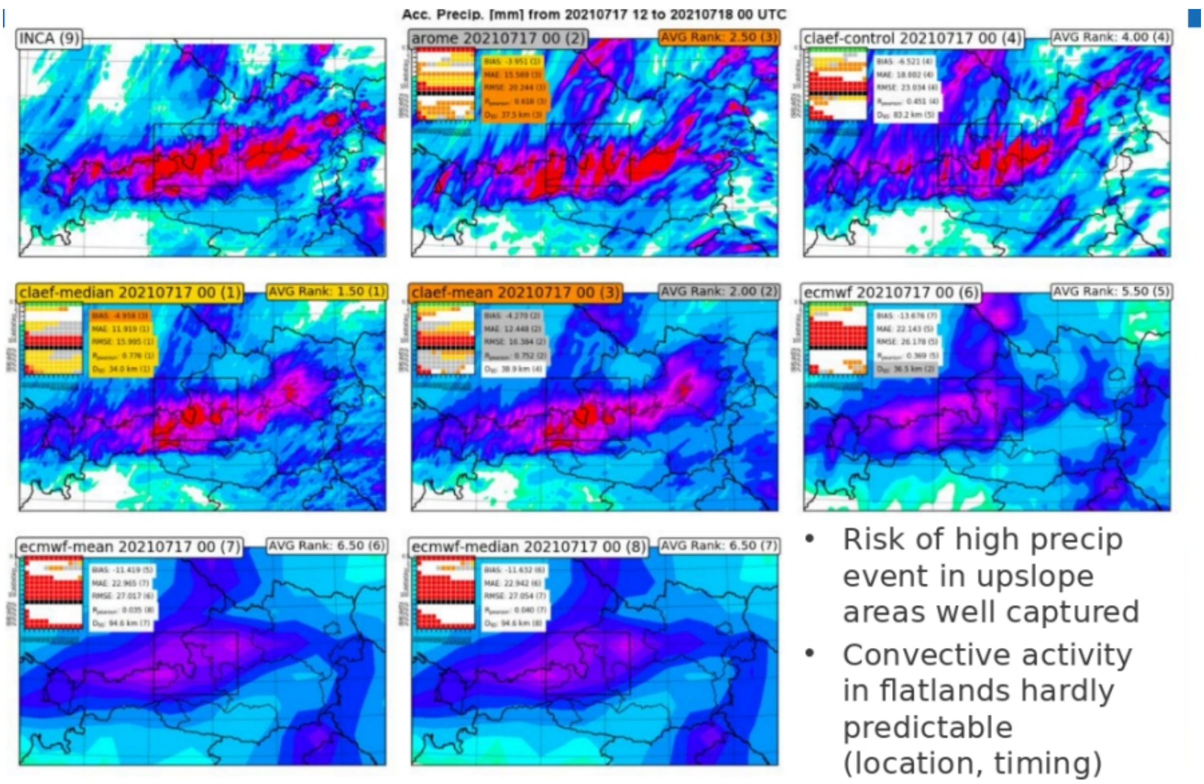
Forecast problem:

- combination of upslope precipitation and „pure“ convective activity .
- high (upslope areas) vs. low (flatland) predictability


source: kurier.at

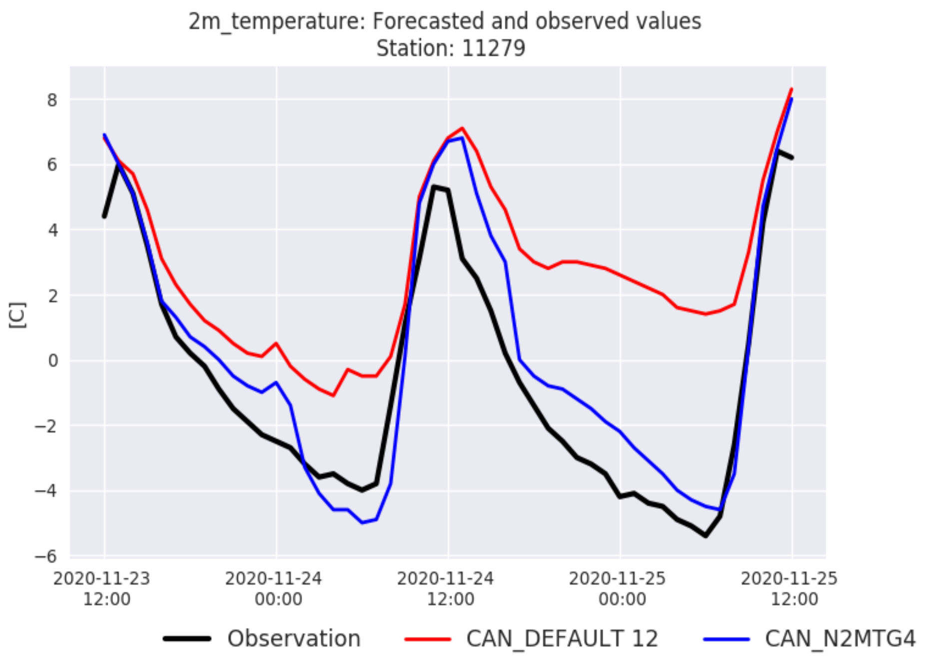



probability rr > 100.0
100
90
80
70
60
50
40
30
20
10
1
0



Tmin in Alpine valleys

Tmin in Alpine valleys during winter is an old problem. Large positive bias in radiation nights with shallow inversions and forecast errors are up to 5-10K. It can be seen marginal improvement with higher model resolution (10 -> 5 -> 2.5 -> 1km -> …)



Contributor: Christoph Wittmann (0.5 pm)

8 Action: Trainings

Climake

The presentation was held on 20.04.2021. The training hour was registered by hungarian colleagues, but it was not possible to upload it on RC-LACE web page.

The common machine where the clim files can be generated is belenos from Meteo-France. Some examples can be found in the following paths: /home/gmap/mrpa/szintai/CLIMAKE and /home/gmap/mrpe/tascus/CLIMAKE. The first step consists in building the domain. One tool to do it is domain_maker.py from epygram. It is expected to be more detailed in the future. The output of domain_maker.py is used as input for climake tool. One example was shown by Balazs in his user on belenos machine:

1. to clone climake tool by using the following command:

~suzat/SAVE/cloneClimake

2. Running:

./climake -c config_hun_cy43.conf

./postpromake -c postpromake_config_filemode_HUNGARY.conf

Contributor: Balasz Szintai (0.25 pm)

Summary of resources [PM]

Subject	Manpower
Questionnaire	All countries
HARP implementation and verification for deterministic and probabilistic forecasts	4.75
HARP linked to OPLACE database	2
Multiple verification methods	5.75
Panelification	2.5
Post-processing of model output	1.50
lace@egitlab	0.25
Database of cases	0.5
Trainings	0.25
Total	17.50