Applications and Verification

Work Plan

Prepared by:	Area Leader Doina-Simona Tașcu	
Period:	2024	
Date:	September 2024	

Introduction and background

The main activities within the “Applications and Verification” area are 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. Furthermore, to maintain a documentary fund which should help the NWP colleagues.

The reporting and planning of work in RC-LACE is now aligned with activities from the Rolling Working Plan (RWP) of ACCORD consortium.

Goals

The primary goal is to develop and adapt/use different specific applications into user-friendly mode. Many tools and software products were developed along the years for meteorological parameters. These days, it is imperative to have easy to use applications, maybe to find and to identify the operational activities, to make a common way for saving time and manpower resources. Nowadays, it is important to make the applications easy to implement without too much cost and to make a common way for saving time, computer costs and manpower. It is a big challenge to identify and to merge all the beneficial technical approaches and applications for all countries.

Action/Subject/Deliverable: Development of HARP [MQA1]

Description and objectives:

Harp (Hirlam-Aladin R-package) is a verification toolbox first developed in the Hirlam and Aladin consortia. Harp consists of a number of installable R-packages for in/output, point and spatial verification and visualization. These R-packes are kept in github (https://github.com/harphub) and provided to work with tidy data together with examples and tutorials on the web as well as in workshops:

- https://github.com/harphub/harp_tutorial
- https://harphub.github.io/harp-training-2022/.

Tasks description:

- *Harp code development* [MQA1.2]

- *Harp enhancements*. Implementation new capabilities into HARP [MQA1.3]

The outlook of the work of Polly Schmederer at DMI:

- Open pull request for https://github.com/harphub/oper-harp-verif.
- Implementing a more sophisticated approach for averaging the FSS

- Ranks: weighting the FSS values according to thresholds / window sizes, in order to give smaller window sizes and higher thresholds higher credit as they are more difficult to forecast
- Do further investigation of python/reticulate to possibly add new/different gridded data sources
- Adding score D90
- Add more plotting options as available in panelification
- Allow looking for smaller threshold instead of greater threshold (harpSpatial)
- Replace fobs=0.5 by calculated fobs (harpSpatial)
- Allow distinction between verification and plotting domain (harpSpatial).

The great results of the work of Martin Petraš and Alena Trojáková have showed the needed of new challenges:

- Harp has been enhanced to read radiosonde (TEMP) data in OBSOUL format and source code modification needs to be added to Harp github repository
- They observed inconsistencies in the amount and the timing of data between VOBS and OBSOUL files. The exact explanation for differences remains unclear and more investigations is needed to clarify this
- They have identified potential opportunities for using OBSOUL for verification with a higher vertical data density. This raises the question: are these high resolution data usable and even necessary? The first version of TEMP OBSOUL interface for Harp is limited to surface and standard levels.
- They conducted a series of comparative tests to verify the new interface for OBSOUL TEMP with respect to the VOBS data. More detailed testing is needed to ensure that the OBSOUL TEMP data can be fully utilised by Harp. For instance, the verification of wind speed and/or components requires further attention.

Contributors, proposed efforts: Polly Schmederer (2 pm), Martin Petras (2 pm)

MQA1 total: 4 pm

Action/Subject/Deliverable: Development of new verification methods [MQA2]

Description and objectives:

This topic, in RC-LACE, was started in Austria for verification and visualization of different meteorological parameters. The idea was to calculate a number of scores and present them together with the visualized field, such that humans can quickly have a look at the fields and the scores in one single place. It also comes with some rankings, but those are to be taken with a grain of salt. One example of this kind of application is Panelification.

Tasks description:

- Verify wind forecasts at levels relevant for wind farming [MQA2.4]
- Develop verification methods/tools tailored for extreme event evaluations [MQA2.6]

Proposed contributors, estimated efforts: Phillip Scheffknecht (2 pm), Iris Odak Plenković (1 pm)
MQA2 total: 3 pm

Action/Subject/Deliverable: Verification, evaluation and error attribution [MQA3]

Description and objectives:

It is widely recognized the importance of the numerical weather prediction model outputs for the operational weather forecast. One of the main goals of this activity is the assessment of the meteorological quality of forecast products, to identify the strengths and weaknesses of the forecast.

Tasks description:

- Verification of operational systems [MQA3.1]
- Evaluation of updates and new cycles [MQA3.2]
- MQA infrastructure. This task includes activities in support of a common infrastructure for MQA. [MQA3.3]
- Acting as user representative The user representatives collect experiences regarding the meteorological performance of forecasting systems from meteorologists and end users. [MQA3.5]
- User feedback and interaction: Activities of this task include supporting the user representative in collecting feedback and compiling use cases. [MQA3.6]

In Hungary, the work related to the operational EMOS post-processing for radiation runs daily, as described in the February 2023 verification report, will continue by adding more stations and for a longer period. At the moment, as input data they use the 11-member forecasts of AROME-EPS as well as measurements at 7 stations from a running training period of 31 days. The test period was chosen from 2 May to 31 August 2023 partly because we have a large number of radiation measurements from a private company for this period.

Proposed contributors, estimated efforts: Katalin Jávorné Radnóczi (2 pm)

In Poland, a further task is to upgrade the HARP verification system which is not yet operational.
Proposed contributors, estimated efforts: Piotr Sekuła (1 pm).

In Romania, the future plans will be a continuous work of:

- validation of the MSLP, cloudiness and cumulated precipitation for different intervals
- the use the radiosonde observation in order to compute an altitude validation.

Proposed contributors, estimated efforts: Raluca Pomaga (1 pm)

Proposed contributors, estimated efforts: Polly Schmederer, Christoph Wittmann, Phillip Scheffknecht, , Iris Odak Plenković, Endi Keresturi, David Tajti, Boglarka Toth, Katalin Jávorné Radnóczi, Piotr Sekuła, Małgorzata Szczęch-Gajewska, Piotr Sekula, Simona Tascu, Alexandra Craciun, Raluca Pomaga, Michal Nestiak, Martin Petras, Jure Cedilnik.
MQA3 total: 10 PM

Summary of resources [PM]

Subject/Action	**Resource (estimated)**	**LACE stays**	**DEODE**
Development of HARP [MQA1]	4 pm	1 pm	
Development of new verification methods [MQA2]	3 pm		
Verification, evaluation and error attribution [MQA3]	10 pm		
Total	**17 pm**	**1 pm**	

Activities of management, coordination and communication

1. 44th LACE Steering Committee meeting
2. 5th ACCORD All Staff workshop 2025
3. 45th LACE Steering Committee meeting
4. 47th EWGLAM and 32th SRNWP Meeting