

## Applications and Verification

### **Work Plan**

|                     |                                |  |
|---------------------|--------------------------------|--|
| <b>Prepared by:</b> | Area Leader Doina-Simona Taşcu |  |
| <b>Period:</b>      | 2026                           |  |
| <b>Date:</b>        | March 2026                     |  |

## 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 as much as possible.

## 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.

## [MQA1] Development of HARP

### 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-packages 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://github.com/harphub/harp_tutorial)
- <https://harphub.github.io/harp-training-2022/>.

Regarding the proposal for further work, Alena Trojáková mentioned the following open issues

- The wind direction verification needs to be addressed. On the last day of Martin's stay Radmila pointed out that attention needs to be paid to the verification of relative humidity in HARP. RH should be computed with respect to water to be consistent with observations, which is not the case by default. This issue was not studied due to lack of time.
- Originally, they wanted to prepare a new version of the LACE verification for the relace.eu website (upgrading the HARMONIE verification to Harp), but they were unable to do so due to technical issues (missing upper-air parameters and levels in the GRIB files exchanged within LACE) and a lack of time. This could be considered in the future if a suitable candidate emerges.

**Contributors, proposed efforts: -**

**MQA1 total: 2 pm**

## **[MQA2] Development of new verification methods**

### **Description and objectives:**

This topic related to Panelification, 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.

In Hungary, regarding plans, they would like to focus more on spatial verification and cloud verification next year. The topic would be the adaptation of Panelification in Hungary.

**Proposed contributors, estimated efforts:** visitor: Virag Lovasz (0.5 pm), host Phillip Scheffknecht)

**MQA2 total: 1 pm**

## **[MQA3] Verification, evaluation and error attribution**

### **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.

Jure Cedelnik mentioned some issues related to the station data as follows:

- We would need to consider coordination action on the LACE side to find the best practice of how we use local high-res data for verification?
- Allow strings in names of stations? (there is a HARP limitation to integers, if I recall correctly?)
- Use hashing from LATLON? (as it is used in ECMWF, not really bidirectional?)
- Data from WIGOS?

**Proposed contributors, estimated efforts: -**

**MQA3 total: - PM**

### Summary of resources [PM]

| Subject/Action                                           | Resource<br>(estimated) | LACE<br>stays | DEODE |
|----------------------------------------------------------|-------------------------|---------------|-------|
| [MQA1] Development of HARP                               | 2 pm                    |               |       |
| [MQA2] Development of new<br>verification methods        | 0.5 pm                  | 0.5 pm        |       |
| [MQA3] Verification, evaluation<br>and error attribution | - pm                    |               |       |
| <b>Total</b>                                             | <b>2.5 pm</b>           | <b>0.5 pm</b> |       |

### Activities of management, coordination and communication

1. 6th ACCORD All Staff workshop 2026
2. 45th LACE Steering Committee meeting
3. 47th EWGLAM and 32th SRNWP Meeting
4. 46th LACE Steering Committee meeting