THE ALADIN COLLABORATION

WWW.CNRM.METEO.FR/ALADIN

ALADIN is a successful collaboration on numerical weather prediction involving 16 National Meteorological Services in Europe and Northern Africa. It started after an initiative taken by Météo France in 1990 and has been growing to a large-size international collaboration of about 90 full time equivalents. Since its start, the program has brought its members to the forefront of the developments in high-resolution short-range Numerical Weather Prediction.

ALGERIA | AUSTRIA | BELGIUM | BULGARIA | CROATIA | CZECH REPUBLIC | FRANCE | HUNGARY

MOROCCO | POLAND | PORTUGAL | ROMANIA | SLOVAKIA | SLOVENIA | TUNISIA | TURKEY

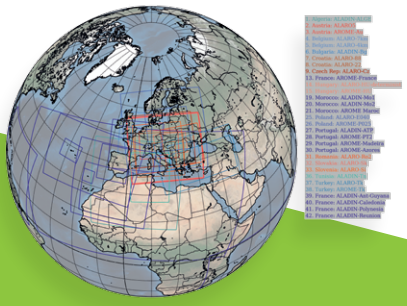
OBJECTIVES

→ **Code development**

The main activity is the conceptualization, definition, development, operation, and the maintenance of a shared, state-of-the-art, high-resolution Numerical Weather Prediction system called ***the ALADIN System***[1]. This system is used to configure the Numerical Weather Prediction applications in the participating member states. The code is shared with the global ARPEGE model of Météo France and the Integrated Forecast System (IFS) of the European Centre for Medium Range Weather Forecasts (ECMWF). The applications of the ALADIN System can run on limited geographical areas at about ten times higher resolutions than the ones of the global applications, allowing to compute weather forecast maps in high detail.

→ **From science to operations**

Significant scientific achievements are published in leading international journals. The ALADIN program coordinates scientific research and implements the scientific results into the new versions of the ALADIN System. These versions are regularly exported and installed on the High-Performance Computers in the Institutes of the ALADIN members. They are implemented in the operational applications. The members then run the numerical weather prediction model on limited areas covering their national territories Feedback from the weather forecasters of the Institutes is used to steer future Research and Development (R&d).



OPERATIONAL CONFIGURATIONS IN ALADIN CONSORTIUM

→ **Expertise building**

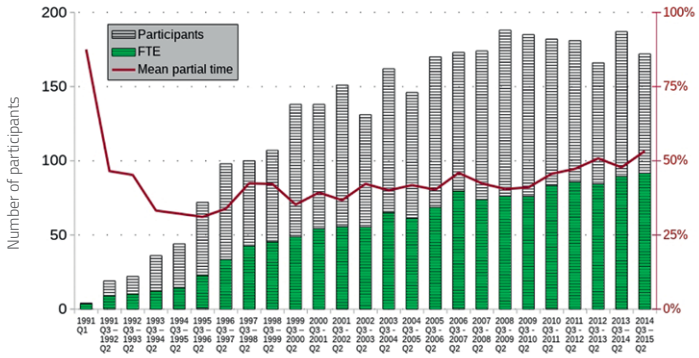
ALADIN provides a specialized background for training and recruitment of experts. This background is tightly linked to the national applications and is, as such, unique compared to purely academic research. This allows the members to create small to medium size teams to carry out R&D at a state-of-the-art international level.

→ **Pooling of Resources**

The activities of the consortium are supported by collective commitments of human resources to the operational and maintenance efforts, and to the management activities. The program has been used as a background to draw extra resources from external funding, both at national and international levels.

TOTAL PARTICIPATION IN THE ALADIN PROJECT

Evolution in the yearly Full Time Equivalent (green)



1. The acronym is derived from the French expression Aire Limitée Adaptation dynamique Développement InterNational.

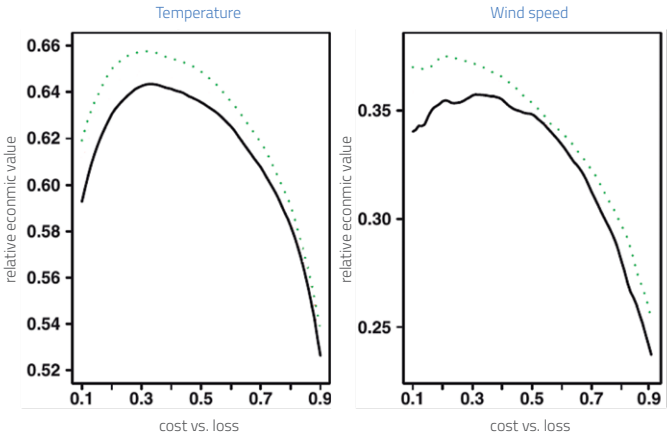
APPLICATIONS

The ALADIN consortium provides a platform for the ALADIN members for organizing optional activities related to numerical weather prediction. This can be done by individual members or in more intense optional multilateral collaborations. The applications range from nowcasting tools, specific academic case studies, to past and future climate simulations. Long model runs are used for creating atlases of wind climates. Climate-change simulations are carried out in the context of international regional climate modeling programs such as, for instance, the CORDEX project.

The most notable organization that takes part in the ALADIN consortium is the LACE consortium with 7 members in Central Europe. This consortium provides extra resources to exchange and to process meteorological data used in the model. It develops and maintains a pan-European probabilistic forecast system called LAEF. The ALADIN consortium shares its code with the HIRLAM consortium in a close scientific and technical collaboration.

ILLUSTRATION

Added economic value of probabilistic Limited-Area Model output



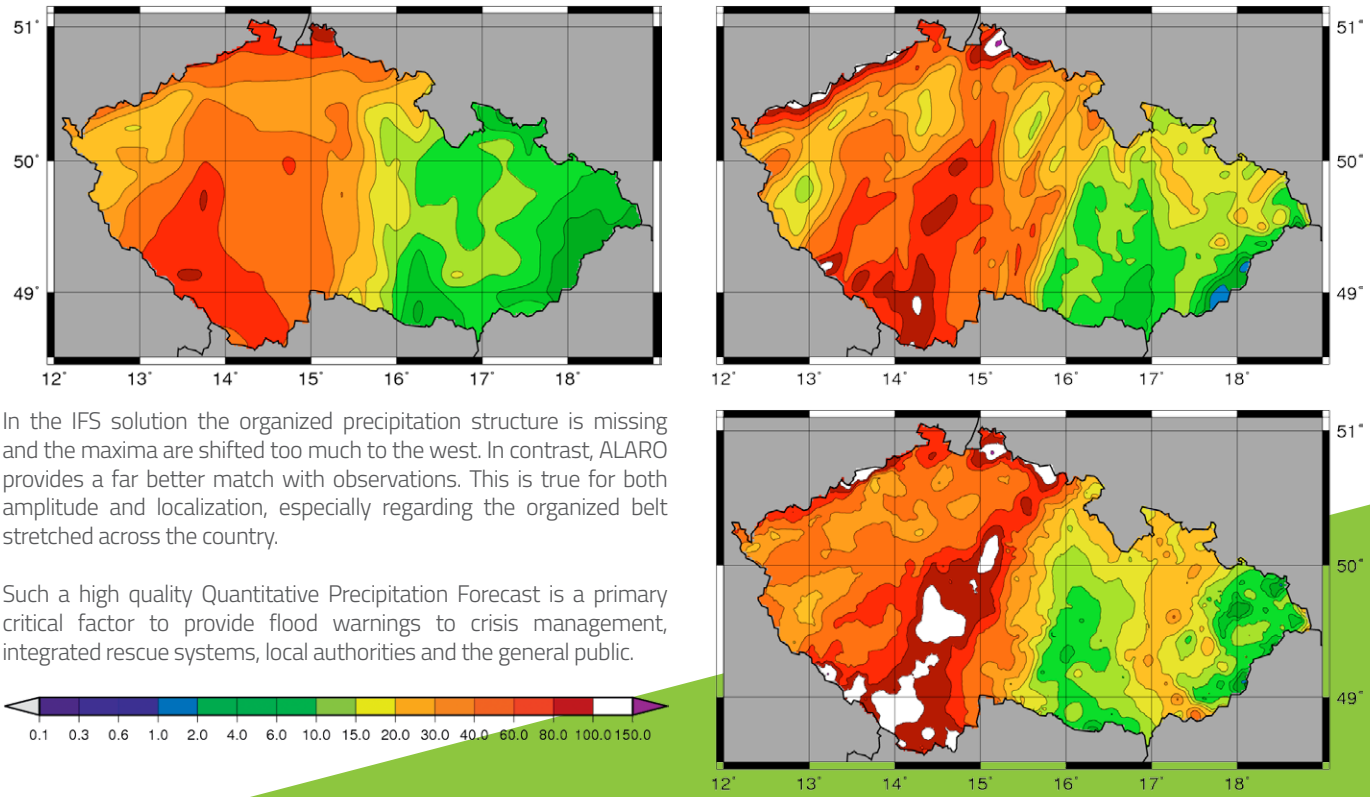
Weather Prediction models are combined to create probabilistic prediction systems. The probabilistic outputs of these systems can be used to implement weather-related economic decision-making strategies that minimize costs and losses in economic activities (e.g. management of weather-related road conditions, energy production based on on wind energy, etc...).

Using various versions of the ALADIN system, several Limited-Area Model Probabilistic systems have been developed and are running operationally. For decision-making applications based on temperature and on wind-speed model data, it has been shown (see figure) that a combination of the so-called GLAMEPS system (developed together with the HIRLAM consortium) and the LAEF system developed by the LACE consortium (green) can provide added economic value to the forecast information of the EPS of the European Centre for Medium Range Weather Forecasts (black line).

Floods in Czech Republic in June 2013

In June 2013 Central Europe was affected by severe floods. The figures show the precipitation fallen over Czech Republic from 1.6.2013 06 UTC to 3.6.2013 06 UTC.

The upper row contains the model forecasts from ECMWF/IFS (left) and the ALARO Limited-Area Model (LAM) configuration of the *ALADIN System* (right). The bottom right panel shows the precipitation measured by 760 rain gauges.



In the IFS solution the organized precipitation structure is missing and the maxima are shifted too much to the west. In contrast, ALARO provides a far better match with observations. This is true for both amplitude and localization, especially regarding the organized belt stretched across the country.

Such a high quality Quantitative Precipitation Forecast is a primary critical factor to provide flood warnings to crisis management, integrated rescue systems, local authorities and the general public.