

**Memorandum of Understanding IV**  
among the National Meteorological and Hydrological Services of Central and South Eastern  
Europe  
for the RC LACE  
(Regional Cooperation for Limited Area Modelling for Central Europe)  
Programme

**1. Preamble**

The National Meteorological and Hydrological Services of Austria, Croatia, the Czech Republic, Hungary, Romania, Slovakia and Slovenia, the Members of the RC LACE group, hereinafter referred to as “Members”, represented by their directors/general directors:

**a) recognizing**

- the great importance of the regional co-operation in the field of mesoscale numerical weather modelling in Central and South Eastern Europe,
- the collaborative projects shared for use in operational forecasting, bringing substantial economic and social benefit to Members,
- the promotion of regional co-operation by World Meteorological Organization, in particular in the field of high impact weather;

**b) considering**

- the well established mutual co-operation among Members in the field of mesoscale numerical weather prediction in Central and South Eastern Europe,
- the mutually beneficial continuation of collaboration with Météo France and other ALADIN partners,
- the objectives and membership in ALADIN Programme,
- the cooperation with the HIRLAM Programme;

**c) valuating**

- the networking of scientists existing around the Numerical Weather Prediction (NWP) applications in Central and South Eastern Europe,
- the top-end technical achievements already dedicated to high-level forecasting products,
- the success of RC LACE Projects in the period 2008-2012 and implementation of operational products in the fields of observation pre-processing and limited area ensemble prediction;

**d) desiring**

- to facilitate research and development activities of RC LACE on the Limited Area Model ALADIN for the Central and South Eastern European regions in order to contribute maintaining its quality and associated know-how at world-top level,
- to technically cooperate for reaching a good level of operational applications of ALADIN model at Members' services;

Have agreed as follows:

## **2. Objectives**

- To continue participating to a common NWP endeavour of all Members with the basic aim to acquire and consolidate a long-term oriented “NWP culture” starting from data monitoring and/or treatment up to response through modelling efforts to forecasters’ critics and/or requirements.
- To guarantee a quality and reliability of outputs superior to that of the coupling model and similar on average (but better on specific points of interest) to that of other LAM systems inside the EUMETNET/SRNWP network.
- To perform research and development with the aim to continuously improve the quality of products, measured by appropriate statistical scores as well as by the capacity to forecast severe weather events.
- To continue giving high priority to specifically NWP-oriented training, either in multi-national programmes, or in bilateral actions or through the Members’ involvement in fostering specific training actions for the whole RC LACE community.
- To contribute to advanced research efforts in coordination with other ALADIN and HIRLAM Partners.
- To enhance cooperation with research institutions and universities and participate in associated interdisciplinary applications.
- To participate to the maintenance of the ALADIN-HIRLAM software and tools.
- To assimilate available observational data in the highest possible resolution.
- To progress at operational applications in the fields on mesoscale modelling and high resolution ensemble prediction systems
- To actively participate in relevant EUMETNET Programmes.
- To contribute to the development and implementation of mainstream applications linked to climate modelling, air quality modelling, hydrology and marine modelling, crisis management, road and air traffic condition applications, and similar.
- To agree on data policy and to establish and follow procedures for the exchange of observational data useful for the purpose of mesoscale data assimilation, verification, very short range prediction, nowcasting, and high impact weather warnings.
- To work in common on any technical project with intention to diminish the costs involved in reaching the above-stated objectives.

## **3. Council**

- RC LACE Council consists of the directors/general directors of each Member. Council is the overall authority of RC LACE. Council is chaired by its President, assisted by Vice President, elected among the Directors, for the period of two years, with one possible re-election. The terms of references for President and Vice President are appended (Annex 1).
- Council shall meet in ordinary session at least once per year. It may meet in extraordinary session at the request of either the President or 1/3 of the Members.
- Council determines the policy of RC LACE, approves its budget, and supervises the execution of the programme. Council takes decisions on the strategic goals of the programme based on documents and reports of the executive and advisory bodies of RC LACE and independent reviewers.

- Council considers for approval any important document of RC LACE, like Strategy, Scientific Plan, progress reports, RC LACE Steering Committee (LSC) reports, Account of Incomes & Expenses Reports and Contracts.
- Council could demand the actions and advises from LSC and Management Group (MG) on matters of interest.
- Council takes the decisions on the MG appointments.
- Council determines RC LACE membership issue and the relation with international projects and organisations.
- Council decisions shall be taken by consensus of all Members on any budgetary issue and on any possible amendment to the present Memorandum of Understanding (MoU). Council decisions on other matters shall be taken by a simple majority of all Members. A vote by correspondence, requiring a simple majority of all Members, may be used to take decisions on minor issues.
- A representative of Météo-France, RC LACE Programme Manager (PM), Chairperson of LSC, ALADIN Programme Manager and other experts invited by the President of the Council may participate at the Council meetings but without voting right.
- Members of the Council could invite their advisors to the Council meeting.

#### **4. Management Group**

Management Group is the executive body of RC LACE and comprises Programme Manager (PM), ALADIN-LACE System Coordinator (ASC), Data Manager (DM) and Area Leaders for at least data assimilation, dynamics, physics and predictability. Programme Manager is the chief executive officer of RC LACE. The Terms of References of the Management Group members are appended (Annex 2). The Management Group is appointed by Council for two years with the possibility of prolongation for additional two years period.

#### **5. Steering Committee**

RC LACE Steering Committee (LSC) is the advisory body of RC LACE and it consists of a representative from each Member. One representative of Météo-France, non-LACE ALADIN partners and HIRLAM are also taking part in the LSC meetings as observers. The LSC representatives are delegated by Members. The LSC member should not be at the same time the Management Group member. The LSC Chairperson is elected within the LSC members by a simple majority and for a period of two years with one possible re-election. LSC shall evaluate all suggestions and ideas related to NWP issues and it shall meet at least twice a year, once not later than one month before the Council meeting. The Management Group should participate at the LSC meetings (without voting right). LSC shall report to Council. The Terms of References of LSC are appended (Annex 3).

#### **6. Organization of work**

RC LACE common work and actions are dedicated to the research and development, implementation and operational deliverable actions and products. Members contribute to the common work by sharing knowledge, experience, technical resources and manpower.

The common research and development activities shall be topic oriented. The topics shall in greatest possible extent follow the ALADIN scientific programme and they shall fall into main



areas, at least: dynamics & coupling, physics & surface, data assimilation and EPS & predictability.

The work is carried out in a “top-down” manner:

- Objectives are defined by the RC LACE Scientific Strategy and executed via Scientific plans including Projects.
- Scientific plan defines the Projects, research and development actions and support activities for the period of up to four years. Scientific plan is adjusted to ALADIN and HIRLAM common plans and actions. Scientific plan considers the achievements and tools developed by ALADIN and HIRLAM Partners and ensures the activities for the implementation at RC LACE environment. Modifications to the Scientific plan can be made by the request of the LSC Members and ALADIN and HIRLAM Partners.
- The Projects focus on research and development efforts, which are on the one hand delivering operational applications, and on the other hand initiating new important research and development activities. The Projects are proposed and led by Area Leaders, and monitored and evaluated by LSC.
- The description of the Projects contains the following most important information: leader; duration; main objectives; deliverables; necessary tasks (work) to achieve the objectives; necessary resources (computer, manpower etc.) to obtain the deliverables; split of tasks between the Members; commitments from the concerned RC LACE members.
- Each Project is accepted by the Council at which time the national commitments are clearly stated and formally approved. Each Project is voluntarily attributed to one Member, thus becoming a Project Responsible Centre for the Project by providing the basic environment necessary for its realisation.
- There are also cross-cutting Projects (where more Area Leaders are concerned. The activities between such Projects are strongly coordinated by the Management Group, especially by the Programme Manager.
- Beside the work on Projects, other research and development activities with longer-term goals, given by the strategic plan are performed. These activities are under the direct control of the Area Leaders.
- The list of the Projects is defined according to the RC LACE priorities proposed by Members and Management Group and evaluated by LSC.
- Projects involving operational products are under the highest priorities of RC LACE Members obligations, RC LACE Management group actions and RC LACE Budget plans.
- Scientific plan is fulfilled by NWP teams and Management Group, either locally and/or in the form of research stays.
- Management Group is responsible for the execution of the Scientific plan, by leading and coordinating the Projects, and their deliverables. Management Group supervises the common operational, technical and scientific work and provides the solutions for the ongoing actions.
- Management Group monitors the progress of the Projects with the emphasis on the product deliverables for all Members. Management Group monitors and assists in portability of deliverables and applications related to operational products,
- Management Group assists Project Responsible Centre and provides the working plan for the staff resources allocated to the Project. Management Group coordinates the need for the working power and ensures resources for the mobility of manpower.
- Management Group proposes the plan of research stays, which might be individual or they may be organised as so-called research group stays, when participants meet at a common

place and work jointly on the Project. The Project tasks and research and development actions shall be opened to anyone within ALADIN Partners, SRNWP partners, research institutions and universities.

- The financing of the stays shall be coordinated by Programme Manager according to the approved proposals. Upon the payment documents issued by Programme Manager, the final approval of these payments shall be made by President of the Council.
- Project Responsible Centre ensures the committed working power and technical environment for the execution of tasks planned in the Project, during the Project duration.
- Management Group can ask Project Responsible Centre for the status-report of the NWP environment and working power dedicated to Project. Management group contributes to the coordination of operational products.
- Project Responsible Centre takes all possible measures to ensure the use of the most recent version of the ALADIN library. In this activity, Members shall be partly assisted by ALADIN-LACE System Coordinator and Programme Manager.
- Execution of the Scientific plan is reported by Management Group and evaluated by LSC twice a year. Overall status on the progress of RC LACE shall be reported to the Council members by LSC also twice a year.
- Reports and documents are available on RC LACE web pages.
- Deliverables are shared in the most efficient manner via secured media, taking into account the proprietary rights of the Members and ALADIN Partners.

## **7. Budget**

- The following regular costs shall be shared among Members:
  - a) Travel cost for research stays and research group stays.
  - b) Travel cost for common trainings and actions.
  - c) Salary supplement or prime of Programme Manager.
  - d) Salary supplement or prime of Area Leaders.
  - e) Salary supplement or prime of ALADIN/LACE System Coordinator and Data Manager.
  - f) Meetings and travel cost for LSC Chairperson.
  - g) Meetings and travel cost of the Management Group, including ASC phasing stays at Météo-France.
  - h) Financial obligations to ALADIN Programme, defined by ALADIN MoU.
  - i) Miscellaneous costs as agreed by the Council.
- Other common RC LACE actions could be financed upon the Council decision.
- The annual contributions of Members shall be paid to the “RC LACE Budget account” established at ZAMG. The contributions shall be paid according to the arrangement approved by the Council. The used currency shall be Euro.
- The Budget shall be drawn by Programme Manager every year, considered by LSC and approved by the Council. The scale of Members’ contributions shall be based on the Rules on RC LACE Budget Contribution (Annex 4)
- The Account of Incomes & Expenses Report shall be presented to Council by Programme Manager at each Council meeting.



## **8. Commitments of Members**

- The Members financially contribute to RC LACE based upon the financial rules (Annex 4) and scale of contributions approved annually by RC LACE Council.
- The Members take part at the Council and LSC and provide manpower to Management Group.
- The Members contribute in manpower and technical resources to the scientific, development, technical and administrative activities of RC LACE based upon the decisions made by the Council.
- Based on the RC LACE Scientific plan the Members contribute to the Projects.
- The Members host the Projects through the frame of Project Responsible Centre for common RC LACE deliverables and operative products.
- The Members will contribute to the Project Responsible Centre with manpower and technical resources. The highest priorities are dedicated to operational products approved by RC LACE Council.
- The Members ensure the technical and administrative help for RC LACE staff and actions with the aim to harmonise the quality of the applications "from the top". This requires in particular good updating of the ALADIN versions, common verification applications and exchange of local data whenever necessary.

## **9. Entry into force, duration and amendments**

The RC LACE MoU-IV will take effect upon signature of all the Members on January the 1<sup>st</sup> 2013 and be of four year duration, ending on 31<sup>st</sup> of December 2016. The MoU duration can be extended by the decision of the Council taking into account the constraints by the ALADIN MoU. Amendments will take the effect following the decision of the Council.

## **10. Adhesion/Denunciation**

Any intention from an additional National Meteorological and Hydrological Service to join RC LACE shall be considered by the Council on case-by-case basis and in conformity with ALADIN MoU. Similarly, any intention of a Member to withdraw from RC LACE shall be considered by the Council.

RC LACE programme may at any time be terminated by the Council decision with at least two years notice.

## Signatures

by the representatives of the National Meteorological and Hydrological Services

Director of ZAMG, Austria

.....  
Dr. Michael Staudinger

Director of DHMZ, Croatia

.....  
Mr. Ivan Cacic

Director of ČHMU, Czech Republic

.....  
Dr. Vaclav Dvorak

President of OMSZ, Hungary

.....  
Dr. Zoltan Dunkel

General Director of Administratia  
Nationala de Meteorologie, Romania

.....  
Dr. Ion Sandu

Director General of SHMU, Slovak Republic

.....  
Dr. Martin Benko

Director of Meteorological Office, ARSO, Slovenia

.....  
Dr. Klemen Bergant

Signed on  
13<sup>th</sup> of November 2012 in Vienna.

## **Annex 1: Terms of References of RC LACE President and Vice President**

RC LACE President and Vice President are elected among the members of the Council.

The duties of President are:

- Chairing the Council session.
- Organizing the Council session together with Programme Manager and local host.
- Representing the Members and taking all correspondence with international organizations and National Meteorological and Hydrological Services.
- Representing RC LACE at any written document like contracts and invoices.
- Monitoring the work of Programme Manager.
- Ensuring the contacts between Council and RC LACE executive and advisory bodies.

RC LACE Vice President deputizes RC LACE President in case of necessity.

## **Annex 2: Terms of References of the Management Group**

### **ToR of Programme Manager:**

Programme Manager (PM) is a full-time position. PM acts under the responsibility of the Council. In the period between the Council sessions PM acts under the responsibility of the Council President. PM is the head of the Management Group. The duties of PM are:

- PM is responsible to the Council for the execution of the RC LACE Programme.
- PM is responsible for the preparation of Scientific Plan in harmonisation with the Management Group based on the advices from LSC.
- PM is responsible to coordinate the work plans and actions of RC LACE Management Group.
- PM is responsible to coordinate the implementation of the Project deliverables at Member services.
- PM is responsible to coordinate operational deliverables, together with Management Group and Project Responsible Centre.
- PM is responsible for resource planning and coordination together with the Management Group.
- PM is responsible to organise individual and/or research group stays together with the Management Group.
- PM is coordinating Projects that are not related to a single area and not coordinated by a single Area Leader.
- PM is responsible for the elaboration of solutions for existing problems.
- PM contributes to the preparation of longer term scientific and/or technical strategies of the RC LACE Programme.
- PM organises together with the President and local host, the sessions of the Council and will provide reports to the Council about the RC LACE Programme execution.
- PM prepares the Annual Budget and will survey contributions and expenses.
- PM seeks for additional funding with special emphasis on the EU funds.
- PM is responsible for running the administration of the RC LACE Programme.
- PM is the contact point in the relations between RC LACE and the Numerical Weather Prediction Partners and participates at ALADIN and HIRLAM meetings.
- PM is responsible for representing the RC LACE programme at Numerical Weather Prediction meetings or will deputise this responsibility among other Management Group members.



### **ToR of Area Leader**

RC LACE Area Leader (AL) is a three-quarter-time position. AL acts under the responsibility of Programme Manager. The duties of the AL are:

- AL is responsible for the preparation of the Scientific Plan together with the Programme Manager.
- AL proposes Projects and defines scientific, technical and organizational background for the Projects.
- AL can be responsible for one or several Projects at the same time.
- AL is responsible for coordinating the scientific work belonging to his/her area of research, for supervising RC LACE scientists working on associated topics and for performing a scientific watch on relevant issues, all this in order to accomplish the Scientific Plan and contribute to steer its evolution.
- AL has the responsibility of presenting progress reports on these tasks to RC LACE Steering Committee.
- AL leads Projects and coordinates a dedicated manpower and other means necessary for the fulfilment of the Projects.
- AL is responsible for the execution of the Projects and delivering the results.
- AL is responsible for planning and coordination (together with Program Manager) of Project operative deliverables, in the cooperation with Project Responsible Centre.
- AL designs, organizes and leads other research activities, which are not organised in a Project form.
- AL is responsible to organise the individual and/or research group stays in co-operation with the Programme Manager.
- AL is responsible for the applicability of the Research and Development results in ALADIN. In coordination with ALADIN-LACE System Coordinator the AL will be responsible for implementation of the relevant developments to the ALADIN library.
- AL participates in inter-consortia coordination activities.
- AL can deputise RC LACE PM during the short time period, upon PM or RC LACE President request, approved by RC LACE President.

### **ToR of ALADIN-LACE System Coordinator**

ALADIN System Coordinator (ASC) is a half time position. ASC acts under the responsibility of Programme Manager. The duties of the ASC are:

- ASC is responsible to phase the agreed part of the developed code to the reference ALADIN library. To ensure effectiveness of the phasing ASC should stay at CNRM/Météo-France close to and with some overlap with the main phasing period. The length of these stays should be harmonized with Météo-France and they should not take more than three months per year.
- ASC is responsible to collect the validated code developments done by the scientists under organization of RC LACE and verify that the coding standards of IFS/ARPEGE/ALADIN are respected.
- ASC is responsible to advise other members about structural changes in the code of higher cycles of the library.
- ASC is responsible to provide support during porting of new developments for each Member in a balanced way controlled by Programme Manager.
- ASC is responsible to provide support to Project Responsible Centre during porting and testing new cycle of libraries related to RC LACE operative deliverables and products.
- ASC may visit some RC LACE centres regarding the phasing issues under the Programme Manager supervision. The ASC travel expenses at such short missions would be paid by host institutes, under the common rules.
- ASC is entitled to refuse the phasing to the principal ALADIN library of such pieces of the code which are too far from the coding standards or developed on too obsolete library cycles. ASC should advice the developer of the code how to proceed in such a case.
- ASC is responsible to maintain the WWW page of RC LACE.

#### **ToR of Data Manager**

RC LACE Data Manager (DM) is a half time position. DM acts under the responsibility of Programme Manager. The duties of the DM are:

- DM is responsible for common planning and technical work with data covered by the Data Assimilation actions, projects and operative deliverables.
- DM is responsible for the verification issues within the RC LACE Programme.
- DM duties are adjusted to research achievements and needs in Data Assimilation.
- DM leads the activities related to the organisation of observational databases.
- DM assists in installation of data assimilation suites at the members.
- DM ensures the technical background of the observational data exchange.
- DM is involved in the maintenance of the Observation Pre-processing for RC LACE (OPLACE) system

#### **Annex 3: Terms of References of RC LACE Steering Committee**

##### ***ToR of RC LACE Steering Committee:***

The responsibilities RC LACE Steering Committee (LSC) are as follows:

- Evaluation of all the aspects of Programme activities.
- Propose Strategy and present it to the Council for approval.
- Evaluate Scientific plan and advise Management Group in planning process.
- Evaluate Project proposals according to the Strategy and priorities of the Members.
- Evaluate the progress of Projects and possibly advise the modification or termination of Project.
- Evaluation of voluntary contributions through local Research and Development activities.

- To prepare report about quality of the RC LACE Programme that is presented by LSC Chairman during the Council session.
- To verify the execution of commitments to the ALADIN Programme.
- LSC shall meet twice per year and act as the main forum that would evaluate all suggestions and ideas related to the NWP issues of the RC LACE Programme.
- LSC may invite some experts out of RC LACE and ALADIN community to LSC meetings in order to present NWP related achievements.
- LSC is coordinating common scientific actions with the HIRLAM Programme.

***ToR of RC LACE Steering Committee Chairperson:***

The responsibilities of RC LACE Steering Committee (LSC) Chairman are as follows:

- To organise and chair the LSC sessions.
- In periods between LSC sessions to follow the work of the Management Group.
- In periods between LSC sessions to distribute and coordinate the expertise work of LSC members.
- To report the quality and progress of the RC LACE Programme to Council.

**Annex 4: Rules on RC LACE Budget Contribution**

RC LACE Members contribute to RC LACE Budget according to the following rules:

- The Budget contribution is based on Economic indicator Gross National Income (GNI).
- The distribution is updated every year upon the year before the last statistics, issued by World Bank: Development Indicators database.
- Budget Contribution Tables are approved by Council, by consensus of all Members.
- Budget Contribution could not be smaller than minimum ALADIN yearly budget (flat-rate) contribution, neither bigger than 50% of total RC-LACE Budget.
- The Budget contributions are paid upon the Invoice issued by RC LACE, represented by RC LACE President.
- Deadline for the Budget contribution is 30<sup>th</sup> of April of the actual year.



## **List of Acronyms**

ALADIN	Air Limitée Adaptation Dynamique développement International (limited area model developed within the international co-operation); name of LAM system
AL	Area Leader
ALARO	ALADIN-AROME intermediate configuration (sub-programme of the ALADIN Consortium)
AROME	Applications of Research to Operations at Mesoscale
ARSO	Agencija Republike Slovenije za okolje
ARPEGE	Action Recherche Petite Echelle Grande Echelle (global model with variable resolution mesh used in Météo-France and developed in collaboration with European Centre for Medium range Weather Forecasts as a part of the Integrated Forecasting System)
ASC	ALADIN-LACE System Coordinator
CHMU	Cesky hydrometeorologicky ustav
CNRM	Centre National de Recherches Météorologiques
DHMZ	Državni HidroMeteorološki Zavod
DM	Data Manager
ECMWF	European Centre for Medium range Weather Forecasts
EUMETNET	EUropean METeorological NETwork
GNI	Gross National Income
HIRLAM	High Resolution Limited Area Model
HPC	High Performance Computers
IFS	Integrated Forecasting System (global model used in European Centre for Medium Range Weather Forecast)
IT	Information Technology
LACE	Limited Area modelling for Central Europe
LAEF	Limited Area Ensemble Forecasting
LAM	Limited Area Model
LBC	Lateral Boundary Conditions
LSC	LACE Steering Committee
MoU	Memorandum of Understanding
NWP	Numerical Weather Prediction
OECD	Organization for Economical Co-operation and Development
OPLACE	Observations Pre-processing for LACE Data Assimilation
OOPS	Objective Oriented Prognostic System
OMSZ	Országos Meteorológiai Szolgálat
PM	Programme Manager
RC LACE	Regional Co-operation for Limited Area modelling in Central Europe
SHMU	Slovensky hydrometeorologicky ustav
SRNWP	Short Range Numerical Weather Prediction (co-operation network within EUMETNET)
ToR	Terms of References
ZAMG	Zentralanstalt für Meteorologie und Geodynamik