EXECUTIVE SUMMARY OF THE THIRD MEDIUM-TERM (2002-2004) ALADIN RESEARCH PLAN

Prepared for the 7th Assembly of ALADIN Partners to be held in Bucharest

INTRODUCTION

The third medium term research plan for ALADIN was compiled with the participation of lot of scientists of the ALADIN countries and was presented in the last ALADIN Assembly in Casablanca. It was felt that the original document was a very exhaustive list of tasks and plans, however due to its length it was nearly impossible to comprehend it easily and make the necessary conclusions. The present document tries to underline the most important objectives of the mentioned period of the ALADIN project together with the anticipated results of the project until the end of 2004.

MAIN OBJECTIVES AND CONSTRAINTS

The most important target for the ALADIN project is the smooth convergence from dynamical adaptation type of model to a model with continuous data assimilation schemes together with the refinements needed for very high resolution applications. Simultaneously it is anticipated that the means of co-operation will be changed putting more responsibility on each individual ALADIN Partner. All Partners have to provide a more even contribution to the project (also locally) in order to achieve the ambitious goals of the near and more distinct future.

TECHNICAL AND ORGANISATIONAL ISSUES

As in the previous years the code maintenance problem remains crucial for the project. The number of people capable to work on the code for maintenance point of view should be enlarged (systematic training should be organised together with the equal share of burden between the Partners and people) in order to provide a safe background for the operational and development work. The operational versions should be harmonised more systematically (this becomes more important than earlier when the operationally applied configurations will show more diversity). Harmonised collaboration should take place in the field of observational data (including also data exchange) in order to have chance for a successful exploitation of data assimilation in ALADIN (see more at the scientific issues). Further optimisation should be carried out in the field of external applications in order to avoid any work duplication. Verification will be a key issue in medium term especially taking into account the increase of resolution and the data assimilation aspects. A common verification strategy is to be built and routinely executed together with the invention of new verification methods for very high resolution.

SCIENTIFIC ISSUES

Continuous progress is anticipated in dynamics (numerics): the non-hydrostatic semi-Lagrangian advection scheme will be stabilised until the end of the period. Certainly there are numerous scientific and technical problems to be solved in order to achieve this goal like the scientific evaluation and experimentation of the Predictor/Corrector scheme, development of the two-time-level semi-Lagrangian scheme for the non-hydrostatic dynamics, new formulations of the bottom and upper boundary conditions, consideration of diabatic and orographic forcing effects, etc. The activities around the dynamics of the model are accelerated in the last few years and this momentum is planned to be kept. The application of simple experimental frameworks is further encouraged for the clear theoretical understanding of the problems and for simpler experimentation before the full 3D tests.

The recent years showed some weaknesses of the present coupling (Davies' relaxation) scheme of ALADIN (especially in case of rapidly evolving cyclones well predicted by ARPEGE, but not correctly considered through the lateral boundary conditions), therefore the ongoing experimentation will be continued and anticipated to result in a new and more efficient treatment of lateral boundary conditions for the ALADIN model. Special attention will be paid to the interaction of coupling with orography (noise problem), possible application of spectral coupling (new approaches are probably needed for time interpolation), the interaction of coupling and data assimilation.

The developments for the physical parameterisation schemes will concentrate basically on the march towards very high resolution. This work means on the one hand the improvement of the basic parameterisation packages capable to work on that resolution. On the other hand new prognostic variables should be defined like the ones related to convection, microphysics, turbulent processes, planetary boundary layer, etc. This ambitious program requires to build a very efficient network and high level of coordination. In the view of 4d-var applications the simplified physical parameterisation package will be considered. The foreseen changes and the future move to a predictor-corrector approach to the time-stepping procedure will involve the re-examination of the physics-dynamics interface.

Of major scientific interest are also data assimilation issues: the 3d-var (upper air) data assimilation scheme is going to arrive to its possible operational application at the beginning of the period and then the work will be continued towards 4d-var resulting the prototype version of 4d-var for the end of the period. On this path plenty of original scientific problems have to be studied and solved and the so called 3d-FGAT (FGAT stands for First Guess at the Appropriate Time) scheme will serve as an intermediate step towards 4d-var. One shouldn't forget about the possible optimal combination of the already successfully applied blending algorithm together with the variational assimilation tools. Key question for the successful application of any data assimilation scheme in ALADIN is the efficient usage of different type of data sources, observations. Therefore big weight should be given to the observation handling (new observational data base - ODB - to be installed at every partner) with special emphasis of new type of observations to be used in the course of data assimilation. The CANARI optimal interpolation scheme will further serve as a tool for surface data assimilation during the period of the research plan. The tools applied for variational data assimilation will be further used for sensitivity studies, singular vector computations, predictability investigations, etc. Maybe this latter can be underlined due to the fact that the first investigations on ensemble forecasting using limited area models on short range are planned to be completed until the end of the research period.

SUMMARY, OUTLOOK

The third medium-term research plan for ALADIN targets a main orientation of the scientific project objectives towards high-resolution modelisation, especially non-hydrostatic dynamics and physics, and data assimilation. It shouldn't be forgotten that all the validation and tuning of the developments will be more complicated taken into account the constraints posed by the various data assimilation frameworks. At the same time the organisational structure will be also changed putting more responsibility and initiative to each Partner. If this double challenge will be successfully overtaken the ALADIN project will be put into a new perspective in the European co-operations for limited area modelling.