The influence of ALADIN cooperation on European level: from ALADIN to Copernicus

Tribute to Jean-Francois Geleyn

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with lots of inputs from former aladinists

European Centre for Medium-Range Weather Forecasts (ECMWF)
• Early ALADIN: personal note: my first “encounter” with Jean-Francois
• From ALADIN to ECMWF: influence of Jean-Francois (ALADIN) on personal careers
• Copernicus EU project today: heritage from ALADIN/HIRLAM
PERSONAL INTRODUCTION
23 August, 1991

Mr. A. HORANYI
Hungarian Hydrolological Service
Weather Forecat Institute
Tatabanya ter 15 Budapest 18
Post Office Box 32
1675 Budapest

[Signature]
The content of the envelope:

- Train ticket: Paris Austerlitz – Toulouse
- Seat reservation for the 13:24 train
- Ticket from Roissy to Gare d’Austerlitz
- 3 additional metro tickets, in case of need
- A phone card, in case of need
- 100 FF cash, in case of need
- A photo about Jean-Francois, to recognise him at the station in Toulouse
Instructions how to use the phone (card) and call the “poste de guard” at Meteopole in case of delays:

• Go to a “card” phone box
• Lift (“decrochez”)
• Shift the card in as indicated (“Introduisez carte ou faites numero d’urgence”)
• Lock down the card protection (“Robatzez le volet”)
• Wait until sign “credit…. Numerotez” and dial 16-61079090 (wait for tune after dialling 16)
• And explain them (possibly in French) when you will arrive: “Ici Monsieur Horanyi – message pour Monsieur Geleyn – J’arrive à quatre heures vingt sept (depending which train you can catch)
And the ALADIN adventure has started…. In fact it was already Phase B, after the visit of Radmila, Vlad and Dezso in Paris in March, 1991.

“I will be at the station at 20:30, if the guard has received no phone call from you. To recognise me I also enclose a photo. I hope everything will go right.”
MINISTÈRE DE L’ÉQUIPEMENT, DU LOGEMENT, DES TRANSPORTS ET DE LA MER
DIRECTION DE LA MÉTÉOROLOGIE NATIONALE
Boulogne, on 27 November 1990
INFORMAL TRANSLATION

Dear Sir,

In this letter, the Direction de la Météorologie Nationale wishes to offer to the Central European Meteorological Services a cooperation in the area of Numerical Weather Prediction (NWP). This proposal is geared towards longer term perspectives and aims at building on and improving the expertise already existing in your service or your country, while also generating some positive returns for our own work. It is complementing the distribution by the EOSTIM system of French NWP products form the EMERAGRE/PERIOD system (soon to be replaced by the ARPEGE system).

The idea is to associate central European specialists in NWP to the validation and improvement of the ‘limited area-type’ version of the ARPEGE system. This kind of collaboration could be quite similar to the one existing between the Swiss Meteorological Service and the Deutsche Wetterdienst. It would allow to familiarize your specialists with very advanced development techniques in NWP and should in principle lead to some ‘dynamical-adaptation-type’ use with fine meshes on a small domain, in case your country (or countries) would gain future access to relatively powerful computing devices. We think that this strategy is suited to your future needs.

A first draft for a three-phase plan was suggested during your visit (or that of your representative) in Toulouse:

a) Evaluation of the specific difficulties of such a project by a few central European NWP specialists with operational or quasi-operational experience (target date: as soon as possible)

This activity is divided in three phases:

- First phase (Sept 90 - July 91): We shall stage at first be crucial to keep in mind that the above-mentioned difficulties are likely to be of the non-scientific type: i.e. rather linked to the problems of portability and flexible use for sophisticated software. Subsequently and if feasible, design of the project, in an exercise where all declared participants would be associated by correspondence (target date: plan ready around May 91).

- b) If phase a) concludes to the feasibility of such a project, then scientific and technical familiarization for the chosen scientists, identification and selection of individual duties and beginning of work on them, all this taking place first in Paris (up to July 91) and subsequently in Toulouse (from September 91) by means of long or frequent stays. One can estimate that a person chosen for this type of activity would have to spend around 30% of his/her time in France, a few key persons charged with coordinating duties inside the project being there quasi-permanently. This phase should last for 1½ years at least.

- c) Transportation phase, either of carefully isolated specific problems for further research activities or of the full developed code, the proportion of remote work increasing regularly. It is far more difficult here to describe working conditions in detail. Some yearly stay in the same location should have to be considered in due time.

Such a plan, if it receives your support, is very likely to benefit from French grants for the living allowances of the people working on it, the support for travel costs remaining your responsibility.

We envisage, in case of a sufficiently positive response of the contacted services, to ask for such financial support during December 90. We thus would like you to give us very rapidly your opinion about this proposal; if it is positive, your remarks about the plan as well as an estimate of the number of people you would envisage to associate to the project (in the sense defined with respect to phase b) and, if possible, some names and CVs.

Your correspondents at DNM for all details concerning this proposal are:

- for organization and financial matters:
  Bureau des Relations Internationales
  1 quai Branly
  F-75340 Paris Cedex 07
  Tél : (33) 01.45.56.71.71
  Mr. D. Lambergeron, poste 7050
  or Mme A. Biquand, poste 7052
- for scientific and technical matters:
  Mr. J-P. Geleyn
  CNRM/GMIP
  42 avenue Gaspard Coriolis
  F-31402 Toulouse Cedex 01
  Tél : (33) 05.61.07.84.50
  Fax : (33) 05.61.07.84.53

In the hope that we shall establish a mutual collaboration,

Sincerely yours,

1. Feasibility study (Paris)
2. Development phase (long and frequent stays in Toulouse)
3. Transportation phase (to home)
FROM ALADIN TO ECMWF (19 people)
Currently there are 19 people at ECMWF who has ALADIN background (not counting senior former MF/ECMWF people as Florence or Jean-Noël)

These people got to ECMWF, partly because of their experience with ALADIN and with the ARPEGE/IFS system (without being in ALADIN there chances would be much less)

The idea is to illustrate the impact of ALADIN on their scientific career through their respective roles in ALADIN and ECMWF
Colour code:

- Data Assimilation
- Dynamics
- Physics
- Others (verification, technical developments...)
<table>
<thead>
<tr>
<th>NAME</th>
<th>ALADIN</th>
<th>ECMWF</th>
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<tbody>
<tr>
<td>Sylvie Malardel</td>
<td>Spectral transforms, AROME: physics, SL, NH, physics-dynamics interface</td>
<td>High resolution and NH dynamics, grey zone, physics-dynamics interface</td>
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<tr>
<td>(1991) “godmother”</td>
<td></td>
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<tr>
<td>Andras Horanyi</td>
<td>Spectral transforms, TL and AD for ALADIN, early DA developments (NMC method)</td>
<td>Data assimilation impact studies using OSEs and EDA, reanalysis, climate projections</td>
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<tr>
<td>(1991)</td>
<td></td>
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<tr>
<td>Gabor Radnoti</td>
<td>Digital Filter Initialisation, lateral boundary coupling, phasing</td>
<td>IFS boundary conditions for the member states (BC project), DA impact studies, testing new IFS R&amp;D modifications in IFS for operations</td>
</tr>
<tr>
<td>(1991)</td>
<td></td>
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<tr>
<td>Martin Janousek</td>
<td>DDH developments, plotting, SL scheme, phasing</td>
<td>Verification of IFS operational forecasts</td>
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<tr>
<td>(1991)</td>
<td></td>
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<tr>
<td>Marta Janiskova</td>
<td>Simplified physics for TL and AD, coupling problems, systematic errors in ALADIN linked to physics</td>
<td>Simplified physics for DA (including TL and AD), assimilation of space-borne cloud radar and lidar observations</td>
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<td>(1993) “first at ECMWF”</td>
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Lateral Boundary Conditions: coupling (Gabor Radnoti) – design details (still used operationally)

- Davies-Kallberg relaxation scheme combined with double periodicity requirement (HIRLAM solution adapted to ALADIN):
  - “Columbus’ Egg” (from Jean-Francois): Requirement by the semi-implicit time stepping of the spectral model: coupling performed in the end of grid-point time stepping, Helmholtz operator of SI scheme applied on large scale coupling fields.
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<tbody>
<tr>
<td>Filip Vana (1995)</td>
<td>Semi-Lagrangian Horisontal Diffusion (SLHD), turbulence scheme, TL and AD for the SL</td>
<td>OpenIFS, physics-dynamics interface, Single Column Model (SCM), development and maintenance of TL/AD code of the IFS</td>
</tr>
<tr>
<td>Cornel Soci (1996)</td>
<td>High resolution sensitivity studies using the adjoint of ALADIN, 3DVAR and surface assimilation work, phasing</td>
<td>Contribution to the ERA5 global reanalysis</td>
</tr>
<tr>
<td>Fernando Prates (1996)</td>
<td>Lower boundary conditions for the NH SL, phasing</td>
<td>IFS model monitoring, developments for tropical cyclone products</td>
</tr>
<tr>
<td>Sandor Kertesz (1997)</td>
<td>Lake parameterisation, ODB in 3DVAR, evaluation of 3D-FGAT, IFS LBC-s for ALADIN</td>
<td>Metview, CodesUI (GRIB and BUFR examiner), ecFlowUI, BUFR parameter/table database management</td>
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<tr>
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<tr>
<td>Richard Mladek (1997)</td>
<td>Aerosol paramaterisation in ARPEGE, heavy precipitation in the Alpine region (HERA), tuning of subgrid scale orography</td>
<td>Defining data standards, creating/maintaining processing suites to archive data, new ocean parameters in the seasonal forecasts</td>
</tr>
<tr>
<td>Thomas Haiden (1997)</td>
<td>Spin-up problem in ALADIN, horizontal diffusion in sigma coordinates, mountain convection, stratus formation, flood forecasting, nowcasting</td>
<td>Forecast evaluation and verification, boundary layer problems, upper air predictability</td>
</tr>
<tr>
<td>Ervin Zsoter (1998)</td>
<td>Study of the vertical resolution increase</td>
<td>Developments for the Global Flood Awareness System (GLOFAS)</td>
</tr>
<tr>
<td>Simona Stefanescu (1999)</td>
<td>Background error covariance modelling for ALADIN 3DVAR and ARPEGE 4DVAR data assimilation</td>
<td>EC-Earth climate project, Copernicus Climate Change Service (C3S) multi-system seasonal forecast</td>
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ALADIN to ECMWF: 2\textsuperscript{nd} GENERATION
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<tr>
<td>Raluca Radu (2000)</td>
<td>Study of coupling problem for high resolution, spectral nudging</td>
<td>ERA5 global reanalysis production, ERA5 data to the Copernicus Climate Data Store</td>
</tr>
<tr>
<td>Miha Razinger (2002)</td>
<td>Verification with respect to SYNOP stations</td>
<td>Verification of CAMS air quality products, CAMS global data dissemination, Atmospheric Data Store (ADS)</td>
</tr>
<tr>
<td>Mohamed Dahoui (2005)</td>
<td>Assimilation of IASI radiances, assimilation of infrared radiances in cloudy conditions</td>
<td>Data monitoring, IFS monitoring, Development of monitoring tools</td>
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ALADIN → COPERNICUS
Copernicus is an EU flagship environmental project, which includes a satellite component (Sentinels) and a service component (6 services: atmosphere (CAMS), marine, land, climate change (C3S), security, emergency)

- Currently there are 5 “aladinists” working directly for Copernicus (CAMS and C3S)
- The topics covered are ERA5 global reanalysis, verification and dissemination of CAMS products, Atmospheric Data Store, production of reanalysis and seasonal forecasts, climate projections
5.5 km, 106 levels, HARMONIE/ALADIN hydrostatic
Surface analysis at 5.5 km – no downscaling
Plus 10 ensemble members at 11km
Partners: SMHI, Météo-France, Met Norway

2.5 km, 65 levels, HARMONIE/AROME non-hydrostatic
Special emphasis on handling of “cold surfaces”: snow, sea ice, glaciers
Period: July 1997 – June 2021 (24 years)
Partners: Met Norway, SMHI, DMI, FMI, VI, Météo-France
SUMMARY

- Jean-Francois and ALADIN had a big impact on all of our scientific career
- Also impact on personal levels: good relations, friendships all over Europe
- We are all very grateful for this (Jean-Francois: ”I hope everything will go right” → I think, it did!!)
THANKS FOR YOUR ATTENTION!