

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

Tribute to Jean-Francois Geleyn



Climate Change

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with lots of inputs from former aladinists

European Centre for Medium-Range Weather Forecasts (ECMWF)





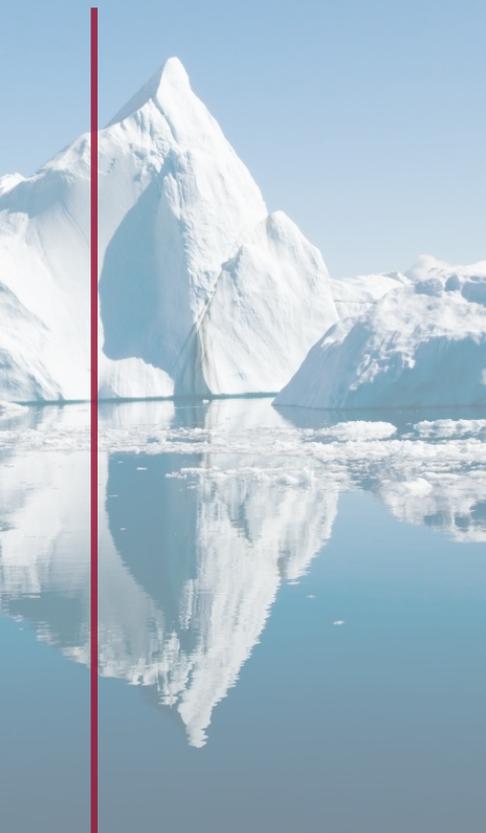
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OVERVIEW

- **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**



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PERSONAL INTRODUCTION



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BERN/CRAND 2 Rue Royal 15840 Pours cedex 07

Johann

23 August, 1991

EXPRES



LETTRE

PAR AVION
BY AIR MAIL

M. A.

MORANYI

Hungarian Meteorological Service
Weather Forecast Institute
Tatabánya tér 15 Budapest 18
Post office Box 32
1675 BUDAPEST

HONGRIE

Paris, 23/08/92

Dear Mr Horangi,

Please find enclosed for your Paris change-over of Sunday the first the following items

- (*) - a train ticket Paris Austerlitz - Toulouse
- (*) - a reservation for the train 13h24 → 20h30 (the one you are most likely to take)
- (*) - a ticket for going from the airport "Roissy" to Paris with access to the internal Paris ~~metro~~ underground system (do not worry please because it is printed in reverse order on the ticket, they work both ways and I honestly did not go to the airport for buying it!)
 - three metro tickets, for the case you would need them (in principle not)
 - a phone card, should you be in trouble at any stage
 - 100 FF so that you can help yourself in need.

(*) please keep them after use, except of course if the automatic gate swallow your Roissy Paris ticket in Paris Austerlitz (I do not remember the kind of gates they have there)

Here are the instructions for going from the airport terminal to the Toulouse train.

- after checking through police and customs go straight out and look for the stop of the "Navette Airport". Take the

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

next one going to "Gare SNCF - RER". Stop there and take the train with the enclosed ticket. Change RER train in the station "St Michel - Notre Dame". Take there the direction "RER C - Mairie Palaiseau/Dardan/Etampes". The railway station "Gare d'Austerlitz" is the next stop for any train. There you look for the train 4409 leaving for Toulouse at 1324 and for coach N° 37 - Reserved seat 37 (easy to remember in that case!)

If you miss the train because of delay of your flight you cannot find me (I do not yet have a number in my new flat in Toulouse) but you can call the "Porte de garde" of the Netto - France company in Toulouse

Go to a "card" phone-box

lift ("decrochez")

Shift the card in as indicated ("introduisez carte ou faites numero d'urgence")

lock ~~the~~ down the card protection ("Robattez le volet")

Wait until sign "credit --- Numerotez" and

dial 16 - 61079090
wait for time

and explain them (possibly in french) when you will arrive

" Ici Monsieur Horanyi - Message pour Monsieur

Geleyn - J'arrive à

vingt heures quarante huit	soixante	deux	(00.02)
vingt heures quarante sept	soixante	deux	(00.02)
minuit	deux		(00.02)
quatre heures	vingt sept		(04.27)
quatre heures	quarante cinq		(04.45)
cinq heures	cinquante neuf		(05.59)

(*) depending on which train you can catch (without reserved seat in

Instructions how to use the phone (card) and call the "poste de garde" 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 ("Robattez 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 a quatre heures vingt sept (depending which train you can catch)

that case)

The time table is indeed 1749 - 0002 (small extra fee to pay)
2057 - 0427
2120 - 0445
2047 - 0553 ("sleeping" train)

(Sorry for the time table mess I did on the previous page but the first of September is a "change" day for it - now you have the correct one)

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.

Yours sincerely



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."



Cooperation offer to Central and Eastern European countries

“limited area-type” version of ARPEGE

MINISTERE DE L'EQUIPEMENT, DU LOGEMENT, DES TRANSPORTS ET DE LA MER

DIRECTION DE LA METEOROLOGIE 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 possibility to cooperate 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 RETIM system of french NWP products form the EMERAUDE/PERIDOT system (soon to be replaced by the ARPEGE system).

The idea is to associate central European specialists in NWP or in meso-scale atmospheric modelling to the development of the fine-mesh validation and to the improvement of a « limited-area-type » version of the ARPEGE system. This kind of collaboration would 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 from February 91 onwards ; place : Paris) ; at this stage it will 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 1,5/2 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 schedules or durations, since many yet unknown factors would 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 DMN 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. Lambergeon, poste 7050
ou Mme A. Rigaud, poste 7052

for scientific and technical matters :

Mr J.F. Geleyn
CNRM/GMAP
42 avenue Gaspard Coriolis
F-31057 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 mutu collaboration,

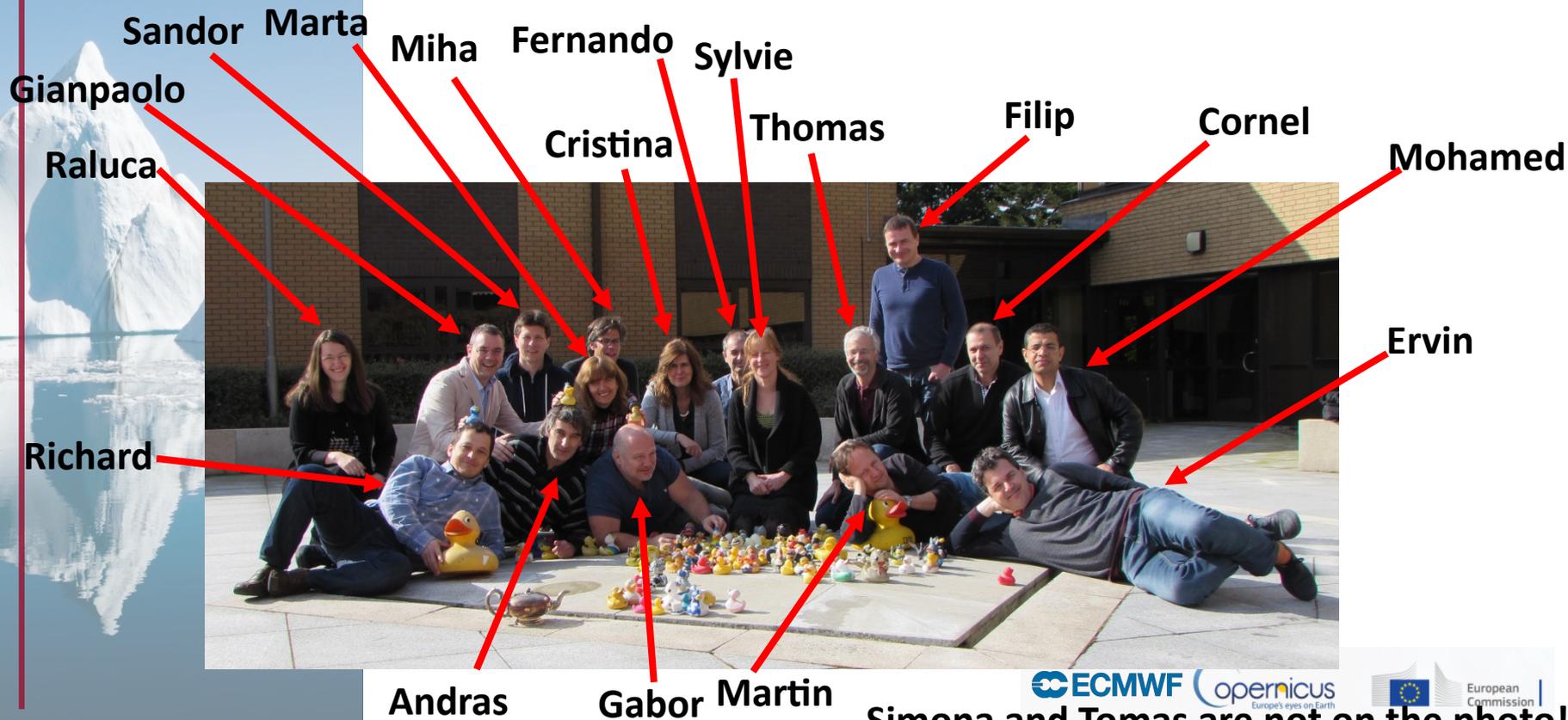
Sincerely yours,

1. Feasibility study (Paris)
2. Development phase (long and frequent stays in Toulouse)
3. Transportation phase (to home)



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FROM ALADIN TO ECMWF (19 people)





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ALADIN to ECMWF: SOME BACKGROUND

- 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



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ALADIN to ECMWF: COLOUR CODE

Colour code:

- **Data Assimilation**
- **Dynamics**
- **Physics**
- **Others (verification, technical developments...)**



ALADIN to ECMWF: FROM THE EARLY ALADIN TEAM

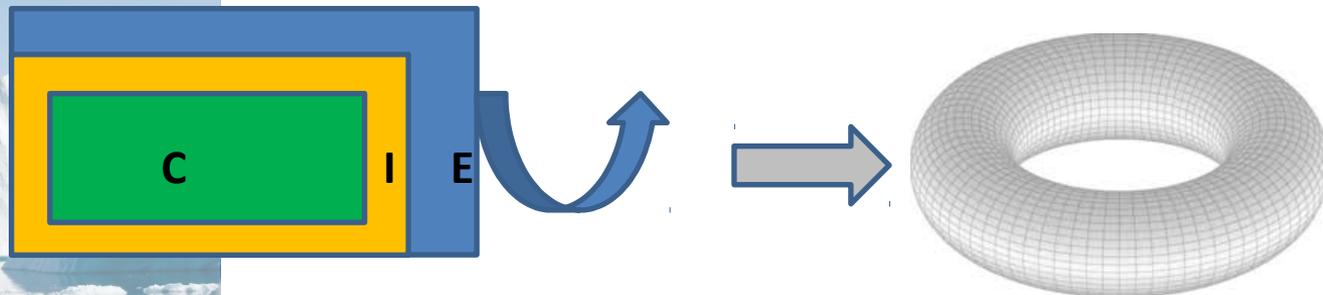
NAME	ALADIN	ECMWF
Sylvie Malardel (1991) “godmother”	Spectral transforms, AROME: physics, SL, NH, physics-dynamics interface	High resolution and NH dynamics, grey zone, physics-dynamics interface
Andras Horanyi (1991)	Spectral transforms, TL and AD for ALADIN, early DA developments (NMC method)	Data assimilation impact studies using OSEs and EDA, reanalysis, climate projections
Gabor Radnoti (1991)	Digital Filter Initialisation, lateral boundary coupling, phasing	IFS boundary conditions for the member states (BC project), DA impact studies, testing new IFS R&D modifications in IFS for operations
Martin Janousek (1991)	DDH developments, plotting, SL scheme, phasing	Verification of IFS operational forecasts
Marta Janiskova (1993) “first at ECMWF”	Simplified physics for TL and AD, coupling problems, systematic errors in ALADIN linked to physics	Simplified physics for DA (including TL and AD), assimilation of space-borne cloud radar and lidar observations



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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.



ALADIN to ECMWF: 2nd GENERATION

NAME	ALADIN	ECMWF
Filip Vana (1995)	Semi-Lagrangian Horizontal Diffusion (SLHD), turbulence scheme, TL and AD for the SL	OpenIFS, physics-dynamics interface, Single Column Model (SCM), development and maintenance of TL/AD code of the IFS
Cornel Soci (1996)	High resolution sensitivity studies using the adjoint of ALADIN, 3DVAR and surface assimilation work, phasing	Contribution to the ERA5 global reanalysis
Fernando Prates (1996)	Lower boundary conditions for the NH SL, phasing	IFS model monitoring, developments for tropical cyclone products
Cristina Madeira (1996) (Prates)	Cloud-radiation-vertical transport interaction, FULL-POS, cloud radiative properties	Monitoring of in-situ observations
Sandor Kertesz (1997)	Lake parameterisation, ODB in 3DVAR, evaluation of 3D-FGAT, IFS LBC-s for ALADIN	Metview, CodesUI (GRIB and BUFR examiner), ecFlowUI, BUFR parameter/table database management



ALADIN to ECMWF: 2nd GENERATION

NAME	ALADIN	ECMWF
Richard Mladek (1997)	Aerosol parameterisation in ARPEGE, heavy precipitation in the Alpine region (HERA), tuning of subgrid scale orography	Defining data standards, creating/maintaining processing suites to archive data, new ocean parameters in the seasonal forecasts
Thomas Haiden (1997)	Spin-up problem in ALADIN, horizontal diffusion in sigma coordinates, mountain convection, stratus formation, flood forecasting, nowcasting	Forecast evaluation and verification, boundary layer problems, upper air predictability
Ervin Zsoter (1998)	Study of the vertical resolution increase	Developments for the Global Flood Awareness System (GLOFAS)
Simona Stefanescu (1999) (Briceag)	Background error covariance modelling for ALADIN 3DVAR and ARPEGE 4DVAR data assimilation	EC-Earth climate project, Copernicus Climate Change Service (C3S) multi-system seasonal forecast



ALADIN to ECMWF: 3rd GENERATION

NAME	ALADIN	ECMWF
Raluca Radu (2000)	Study of coupling problem for high resolution, spectral nudging	ERA5 global reanalysis production, ERA5 data to the Copernicus Climate Data Store
Gianpaolo Balsamo (2000)	Analysis of Soil Moisture in a Mesoscale Weather Prediction Model	Land, ocean and cryosphere modelling, coupling to the atmosphere
Miha Razinger (2002)	Verification with respect to SYNOP stations	Verification of CAMS air quality products, CAMS global data dissemination, Atmospheric Data Store (ADS)
Mohamed Dahoui (2005)	Assimilation of IASI radiances, assimilation of infrared radiances in cloudy conditions	Data monitoring, IFS monitoring, Development of monitoring tools



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ALADIN → COPERNICUS



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ALADIN to COPERNICUS

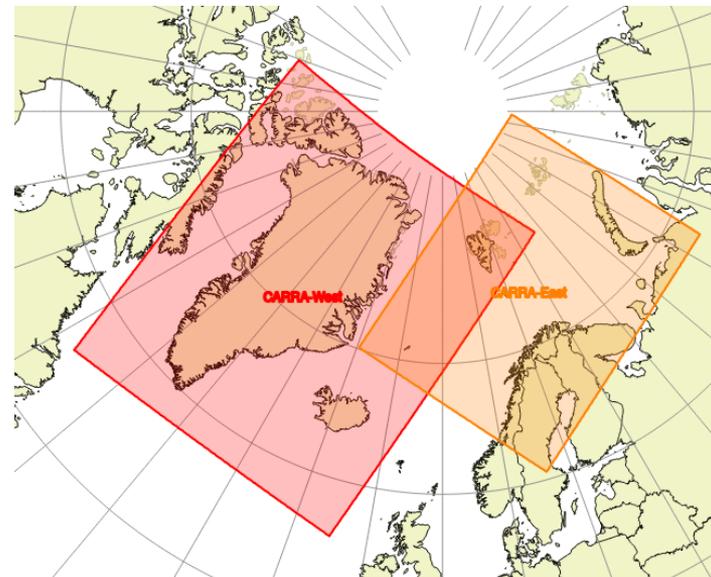
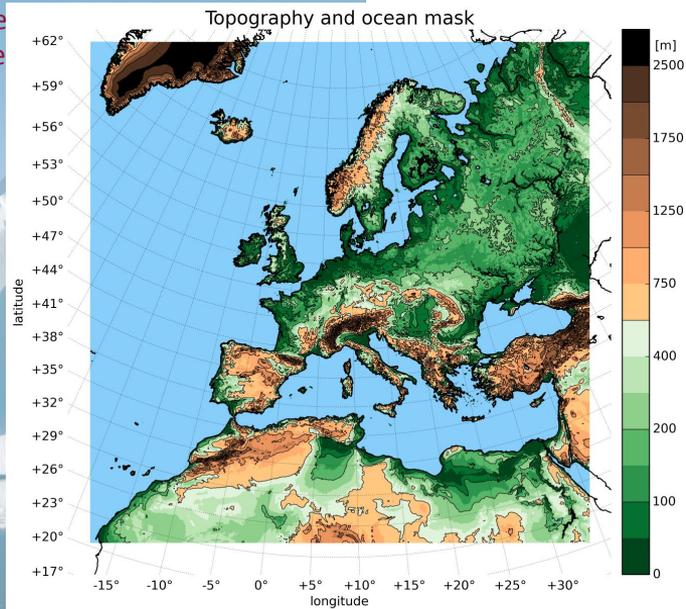
Copernicus is an EU flagship environmental project, which includes a satellite component (Sentinels) and a service component (6 services: atmosphere (CAM5), marine, land, climate change (C3S), security, emergency)

- Currently there are 5 “aladinists” working directly for Copernicus (CAM5 and C3S)
- The topics covered are ERA5 global reanalysis, verification and dissemination of CAM5 products, Atmospheric Data Store, production of reanalysis and seasonal forecasts, climate projections



COPERNICUS CONTRACTS WITH ALADIN(HARMONIE) INVOLVEMENT: CERRA and CARRA REGIONAL REANALYSES

Climate Change



5.5 km, 106 levels, HARMONIE/ALADIN hydrostatic
Surface analysis at 5.5 km – no downscaling
Plus 10 ensemble members at 11km
Period: from early 1980s onwards (UERRA extension (11km): 1961-2019)
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



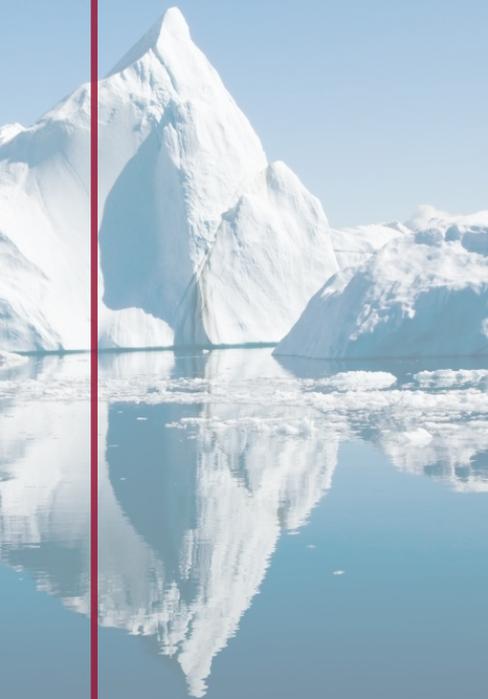
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SUMMARY

- **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!!)**



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**THANKS FOR YOUR
ATTENTION!**