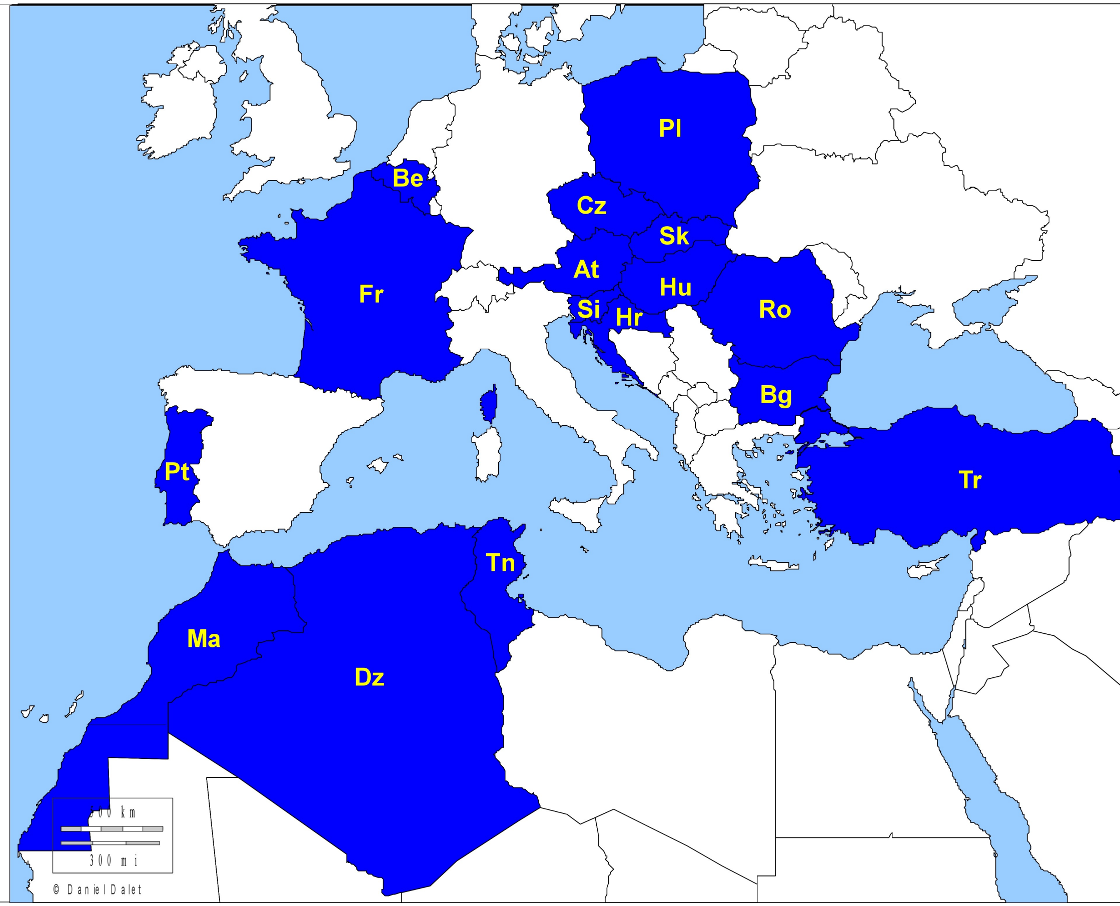
ALADIN status overview

Piet Termonia

37th EWGLAM and 22th SRNWP Meeting

Members of the ALADIN Consortium

Algeria
Austria
Belgium
Bulgaria
Croatia
Czech R.
France
Hungary

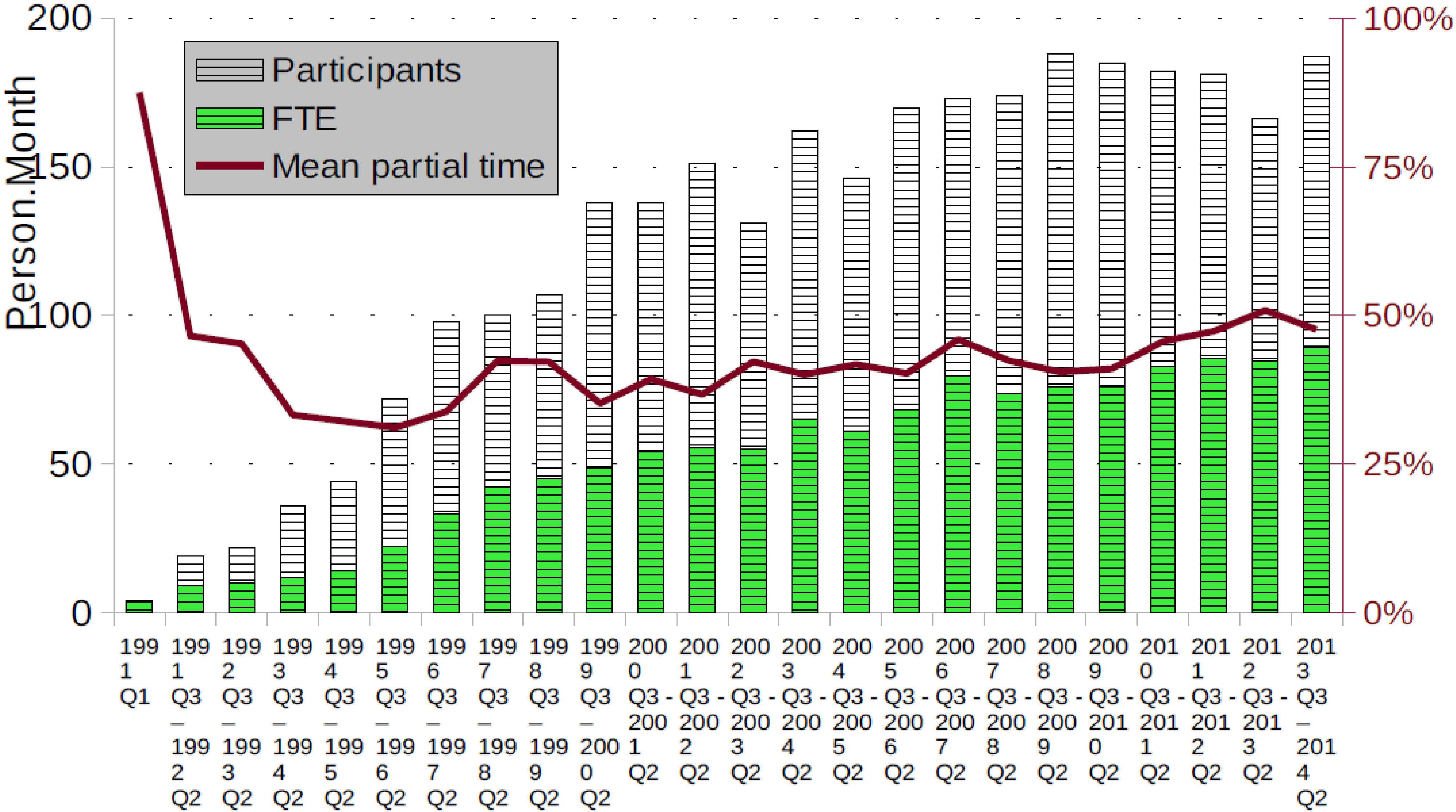


Morocco
Poland
Portugal
Romania
Slovakia
Slovenia
Tunisia
Turkey

Updated on 07/01/2013

Total participation in the ALADIN project

Evolution of the yearly Full Time Equivalent



Courtesy Patricia Pottier

ALADIN Consortium

General Assembly (GA)

supreme governing body of the ALADIN Consortium

Chairperson : Abdalah Mokssit (Ma)

Vice-Chairperson : Martin Benko (Sk)

Director of each of the Members (Dz, At, Be, Bg, Hr, Cz, Fr, Hu, Ma, Pl, Pt, Ro, Sk, Si, Tn, Tr)

Observers from HIRLAM and ECMWF

Program Manager (PM)

main executive officer of the ALADIN Consortium

Piet Termonia (Be)

« Bureau »

GA chairperson, PAC chairperson, CSSI chairperson, PM

Policy Advisory Committee (PAC)

advisory body

Chairperson : Michael Staudinger (Au)

Vice-Chairperson : Fatih Buyükkasabbasi (Tk))

2 MF Members :

- Philippe Bougeault (Fr)
- Alain Joly (Fr) (subst. Gwenaëlle Hello)

2 RC-LACE Members :

- Radmila Brozkova (Cz)
- Vladimir Pastircak (Sk) (subst. Dijana Klaric (Hr))

2 Flat-rate Members :

- Daniel Gellens (Be)
- Maria Monteiro (Pt) (subst. Abdelwaheb Nmiri (Tu))

Observers :

- LACE Project Manager
- Chairperson of CSSI
- Chairperson of HIRLAM Advisory Committee

Programme Team

Local Team Managers

Dz : Mohamed Benamara
At : Christoph Wittmann
Be : Alex Deckmyn
Bg : Andrey Bogatchev
Hr : Alica Bajic
Cz : Radmila Brozkova
Fr : Claude Fischer
Hu : Balaz Szintai
Ma : Hassan Haddouch
Pl : Marek Jerczynski
Pt : Maria Monteiro
Ro : Simona Tascu
Sk : Jozef Vivoda
Si : Neva Pristov
Tn : Zied Sassi
Tr : Alper Güser

Project Team

all manpower committed by Members and acceding Members

Committee for Scientific and System/maintenance Issues (CSSI)

Chairperson : Claude Fischer (Fr)

ALADIN Coordinator for Networking Activities (ACNA) : Maria Derkova
Data assimilation : Claude Fischer
Dynamics and LBC coupling : Pierre Bénard
Maintenance : Ryad El Khatib
Numerical efficiency issues : Martina Tudor
Observations and Monitoring : Alena Trojakova
Physics : Daan Degrauwe
Predictability and LAM EPS : Alex Deckmyn
Surface : Jean-François Mahfouf
Verification : Christoph Zingerle

Responsible Member for LAM Climate : Ales Farda

Support Team

Consortium level cooperation support (LACE) : Yong Wang
Consortium level cooperation support (MF) : Claude Fischer
Documentation officer : ????
Information officer : Maria Derkova
Administration and PM assistance : Patricia Pottier
Secretarial support : ????

Task Force 1 | Task Force 2 | Task Force 3

HIRLAM Consortium

CNRM/GMAP, Patricia Pottier on May 19, 2015

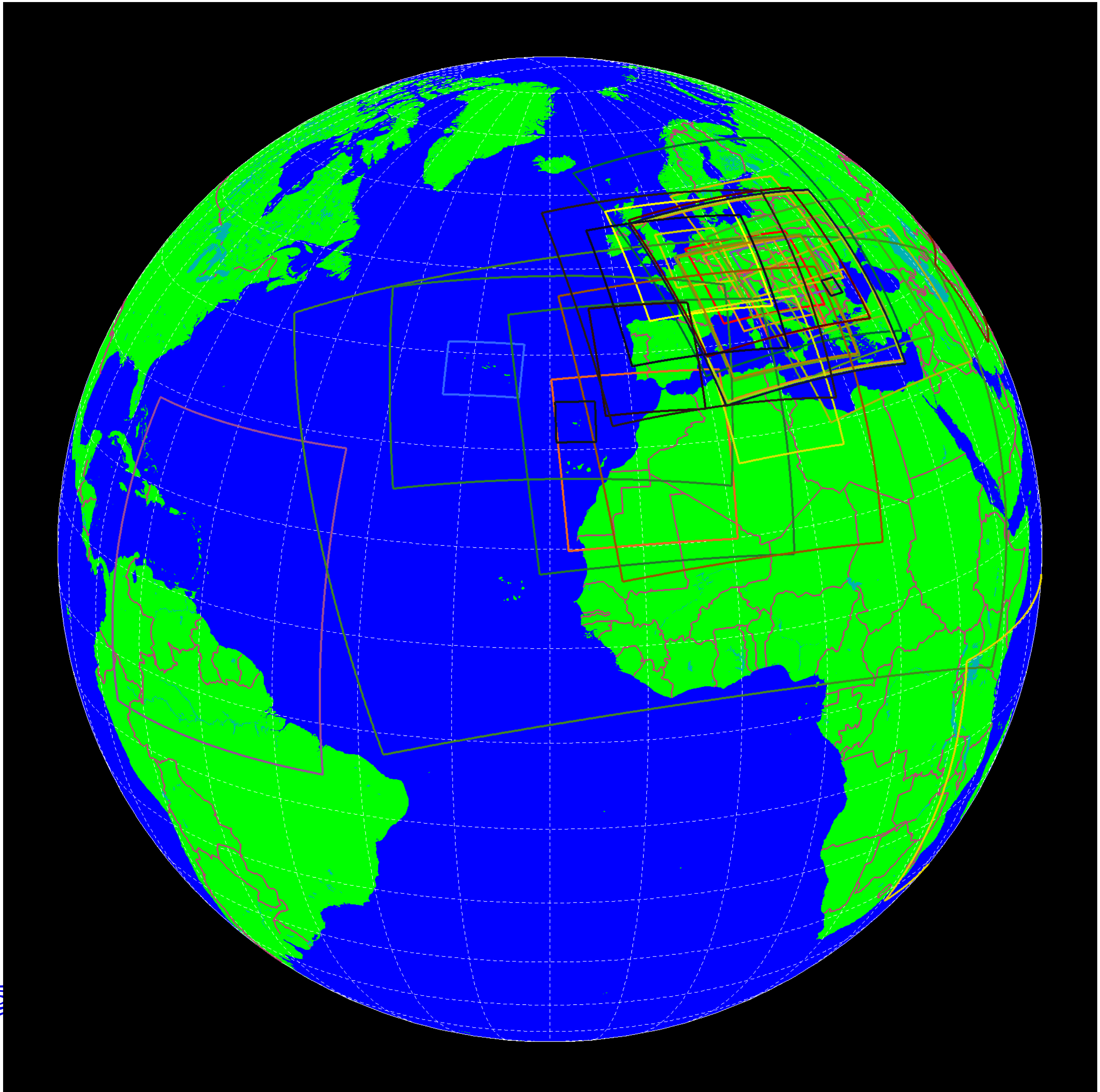
Courtesy Patricia Pottier

Activities

- ALADIN workshop/HIRLAM ASM (2015: Denmark)
- Several working week meetings (some together with HIRLAM)
- Visiting stays including phasings of new cycles in Toulouse
- Operational/technical coordination: ACNA
  - Coordinate the LTMs
  - Coordinate the local implementations of the “export versions”
- Facilitate extra NWP actvities (data assimilation, EPS), in particular in the LACE consortium (cfr. talk of Yong)

“Seamless” code universe

	Reanalysis	Numerical Weather Prediction	Climate
Global	ERA-40 ERA-Int, ...	IFS ARPEGE	ARPEGE-clim, CNRM CMIP runs
Meso scale	Downscaling	ALADIN System ALADIN	ALADIN-climate ENSEMBLES, CORDEX, ...
Convection permitting		ALARO AROME	ALARO-climate AROME-climate



Recognizing the capabilities and achievements of the NMHS belonging to Aladin and Hirlam consortia:

1. The NMHS present at the joint Aladin-Hirlam meeting (dec 2, 2014) share the same objective to jointly develop and maintain the best possible skilled limited area weather forecasting system, building on the developments of the IFS/Arpege global forecast system and on the Aladin and Hirlam limited area systems. This limited area system is defined as a set of data pre-processing, data assimilation, atmospheric model and postprocessing tools for producing the best possible operational mesoscale weather forecasts.

2. Aladin and Hirlam consortia will work together with the aim of forming one single consortium by the end of the 2016-2020 MoUs. To this aim, the following issues have to be resolved:
- code ownership (software IPR) : current situation and suitable evolutions. In particular advantages vs drawbacks of open source solutions should be assessed;
- data policy (access to model outputs) ; to this aim a map of the various current operational configurations of the limited area system should be produced and scenarios for data dissemination should be assessed;
- global picture of annual contribution of countries to the various types of activities (from fundamental research to code implementation);
- identification of common activities and specific activities (possibility of core and optional programs);
- branding (including suitable evolution of the name of the system).

3. Human resources to support the work will be identified.

4. Both PM will report every six months on those issues to the consortia governing bodies.

5. Joint meeting of governing bodies of both consortia will be held at least once a year.

From science to operations summarized on 1 sheet

activity		ALADIN governance	Link with HIRLAM	Actions undertaken	
Scientific research		CSSI	Common work plan	No stimulus needed	**common code**
Algorithms (scalability/ efficiency)	Scientific **validation**	CSSI	Add-hoc discussions during the ASM/workshop	Action on ACRANEB2; Physic-dynamics interaction; HARP	
"phasing" + **sanity check**		MF + CSSI + ACNA	Close link with the HIRLAM system PL		
porting		ACNA			Different governances: split repsonsibilities, but **common tools**
Meteorological (local) **validation**		LTMs		HARMONIE system (Ankara action)	

END USERS

New demands

Novelty:
CMCs, *Canonical* Model **Configurations**

v. A Canonical Model Configuration is a configuration of the ALADIN System for which resources are provided by the Members in order to (a) perform regular code updates, which includes the required scientific and technical validation according to the state of the art of the latest research and development, and (b) to provide the coordination and networking activities in order to install and run any canonical configuration at this state-of-the-art level by the ALADIN Consortium Members.

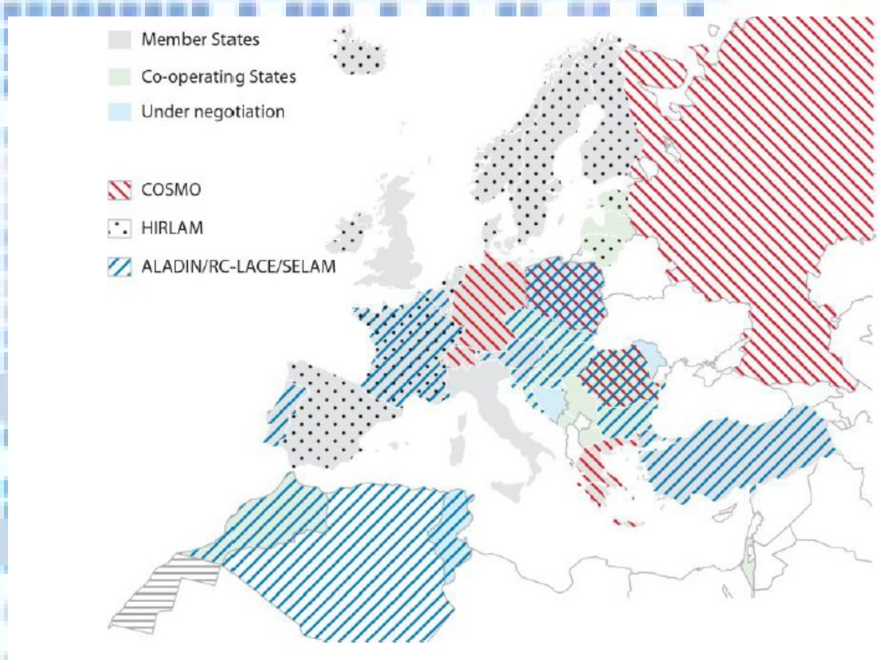
Forecasters meeting Ankara, 2014 conclusions

Forecasters need guidance to interpret high-resolution model output. This was a recurring problem during the discussions and emphasized by several forecasters. This related to the intrinsic stochastic nature of clouds and microphysics processes. It was also concluded that the human eye is not capable of interpreting a weather map in a probabilistic sense; i.e. it is not possible to interpret spatial variation in forecast patterns as probabilities over a wider area.

Energy-efficient SCalable Algorithms for weather Prediction at Exascale

ESCAPE

- ESCAPE will develop world-class, extreme-scale computing capabilities for European operational numerical weather prediction (NWP) and future climate models.
- Led by ECMWF
- The aim was/is to involve the LAM community.
- Kick off meeting last week (1-2/10)



In memory of Jean-François

A short *tribute* by two papers on the core of “convection-permitting” modeling

- **<u>Pea07</u>**: Piriou, J.-M., Redelsperger, J.-L., Geleyn, J.-F., Lafore, J.-P. Guichard, F., 2007: An Approach for Convective Parameterization with Memory: Separating Microphysics and Transport in Grid-Scale Equations.J. Atmos. Phys, 64, 4127-4139
- **<u>G07</u>**: Gerard, L., 2007: An integrated package for subgrid convection, clouds and precipitation compatible with meso-gamma scales. QRMS, 133, 711-730.
- **<u>Gea09</u>**: Gerard, L., Piriou, J.-M., Brožková, Geleyn, J.-F., Banciu, D., 2009: Cloud and Precipitation Parameterization in a Meso-Gamma-Scale Operational Weather Prediction Model. Mon. Wea. Rev., 137, 3960-3977

3MT

Cloud System Resolving Model (**CSRM**)

$$
\begin{cases}
\dfrac{\partial q}{\partial t} = T_q - C + E_C + E_P & -(\mathbf{u}\cdot\nabla)q \\
\dfrac{\partial s}{\partial t} = T_s + R + L(C - E_C - E_P) + H & -(\mathbf{u}\cdot\nabla)s \\
\dfrac{\partial u}{\partial t} = \dot{u}_p & -(\mathbf{u}\cdot\nabla)u \\
\dfrac{\partial v}{\partial t} = \dot{v}_p & -(\mathbf{u}\cdot\nabla)v
\end{cases},
$$

Arakawa-Schubert (QE)

$$
\begin{cases}
\dfrac{\partial \sigma}{\partial t} = -D + E - \dfrac{\partial \omega^*}{\partial p} & \text{(mass)} \\
\dfrac{\partial \sigma q_c}{\partial t} = -Dq_c + E\overline{q} - \dfrac{\partial \omega^* q_c}{\partial p} - C & \text{(water vapor)} \\
\dfrac{\partial \sigma s_c}{\partial t} = -Ds_c + E\overline{s} - \dfrac{\partial \omega^* s_c}{\partial p} + LC & \text{(heat)},
\end{cases}
$$

3MT

Cloud System Resolving Model (**CSRM**)

$$\frac{\partial q}{\partial t} = T_q - C + E_C + E_P \quad \overline{-(\mathbf{u}\cdot\nabla)q}$$

$$\frac{\partial s}{\partial t} = T_s + R + L(C - E_C - E_P) + H \quad -(\mathbf{u}\cdot\nabla)s$$

$$\frac{\partial u}{\partial t} = \quad -(\mathbf{u}\cdot\nabla)u \, ,$$

$$\frac{\partial v}{\partial t} = \quad -(\mathbf{u}\cdot\nabla)v$$

Budget formulations

Arakawa-Schubert (QE)

$$0 = -D + E - \frac{\partial \omega^*}{\partial p} \quad \text{(mass)}$$

$$0 = -Dq_c + E\bar{q} - \frac{\partial \omega^* q_c}{\partial p} - C \quad \text{(water vapor)}$$

$$0 = -Ds_c + E\bar{s} - \frac{\partial \omega^* s_c}{\partial p} + LC \quad \text{(heat),}$$

DETRAINMENT TO THE NEIGHBOURING GRIDBOX?

3MT

Cloud System Resolving Model (**CSRM**)

$$\begin{cases} \dfrac{\partial q}{\partial t} = T_q - C + E_C + E_P - (\mathbf{u}\cdot\nabla)q \\ \dfrac{\partial s}{\partial t} = T_s + R + L(C - E_C - E_P) + H - (\mathbf{u}\cdot\nabla)s \\ \dfrac{\partial u}{\partial t} = \dot{u}_p - (\mathbf{u}\cdot\nabla)u \\ \dfrac{\partial v}{\partial t} = \dot{v}_p - (\mathbf{u}\cdot\nabla)v \end{cases},$$

Microphysics

Transport

Pea07

$$\begin{cases} \dfrac{\partial \sigma}{\partial t} = -D + E - \dfrac{\partial \omega^*}{\partial p} & \text{(mass)} \\ \dfrac{\partial \sigma q_c}{\partial t} = -Dq_c + E\bar{q} - \dfrac{\partial \omega^* q_c}{\partial p} - C & \text{(water vapor)} \\ \dfrac{\partial \sigma s_c}{\partial t} = -Ds_c + E\bar{s} - \dfrac{\partial \omega^* s_c}{\partial p} + LC & \text{(heat),} \end{cases}$$

3MT

G07-> Gea09

Cloud System Resolving Model (**CSRM**)

$$
\begin{cases}
\dfrac{\partial q}{\partial t} = T_q - C + E_C + E_P - (\mathbf{u}\cdot\nabla)q \\
\dfrac{\partial s}{\partial t} = T_s + R + L(C - E_C - E_P) + H - (\mathbf{u}\cdot\nabla)s \\
\dfrac{\partial u}{\partial t} = \dot{u}_p - (\mathbf{u}\cdot\nabla)u \\
\dfrac{\partial v}{\partial t} = \dot{v}_p - (\mathbf{u}\cdot\nabla)v
\end{cases},
$$

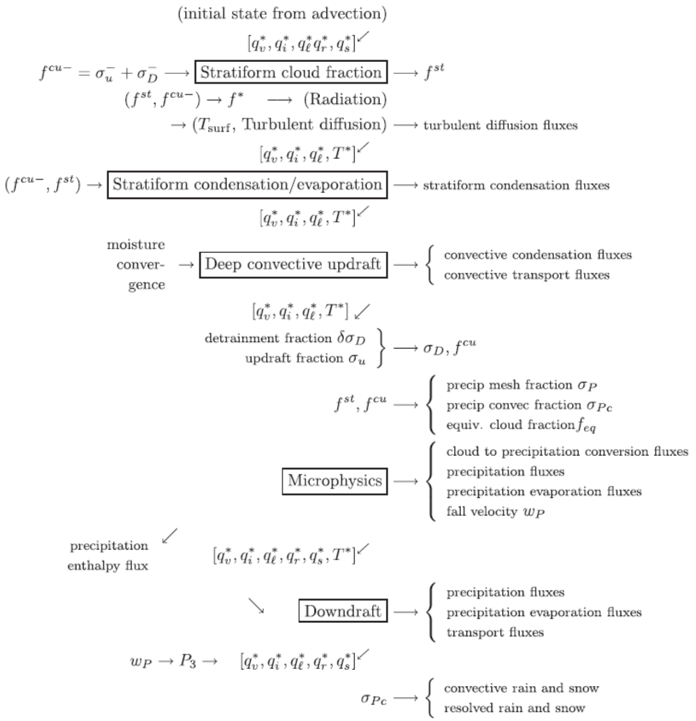
Microphysics

Transport

Pea07

Gridbox repartitioning

+ cascade: Modular



$$
\begin{cases}
\dfrac{\partial \sigma}{\partial t} = -D + E - \dfrac{\partial \omega^*}{\partial p} & \text{(mass)} \\
\dfrac{\partial \sigma q_c}{\partial t} = -Dq_c + Eq - \dfrac{\partial \omega^* q_c}{\partial p} - C & \text{(water vapor)} \\
\dfrac{\partial \sigma s_c}{\partial t} = -Ds_c + Es - \dfrac{\partial \omega^* s_c}{\partial p} + LC & \text{(heat)},
\end{cases}
$$

No parameterization of the detrainment needed: it is done by the dynamics: **M**ultiscale

Combining the insights and promoting of the works of his colleagues and understanding the deep implications of it is was a really unique quality of Jean-François.

Thank you for your attention