ACCORD

A Consortium for COnvection-scale modelling
Research and Development

Consortium talk

Claude FISCHER, PM/ACCORD, 43rd EWGLAM/28th C-SRNWP, 27 Sept 2021

Milestones in building up the scientific and technical management

- **Strategy for 2021-2025 adopted by joint A-H Assembly**

- **1st ACCORD Assembly on 27 Nov 2020:**
  - voting of MoU1 by the Assembly of the 26 Members
  - designation of PM + 3 CSC Leaders (Arome, Harmonie-Arome, Alaro)
  - designation of Local Team Managers (LTM)

- **February 2021: selection process for Management Group members => designation of MG on 8 March 2021 (Assembly)**

- **Working practices:**
  - MG meets every 2nd Friday
  - LTM meetings about once every quarter of year

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Management Group   Chaired by PM

Area Leaders

Dynamics:
Ludovic Auger (Fr)

Surface: **Patrick Samuelsson (Se)**

Meteorological QA:
Carl Fortelius (Fi)

E.P.S.: **Henrik Feddersen (Dk)**

System: **Daniel Santos (Dk)**

Data Assimilation: **Roger Randriamampianina (No)**

Transversal activities:
Piet Termonia & Daan Degrauwe (Be)

Integration Leader
Alexandre Mary (Fr)

CSC Leaders

CSC Arome:
Eric Bazile (Fr)

CSC Alaro:
Martina Tudor (Hr)

CSC Harmonie-Arome:
Jeanette Onvlee (Nl)

Management tools

- Common Manpower Register (CMR) supervised by the Consortium Scientific Secretary (P. Pottier)

- Rolling Work Plan (RWP): defines work packages & tasks, under the responsibility of the MG. Drafting the RWP involves co-leads with an effort to span the coordination across "families"

- Communication: website (http://www.umr-cnrm.fr/accord/); several email lists (@accord-nwp.org); wiki (CNRM redmine); Google Drive; Slack

- Budget mechanism managed by MF

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Example of how cooperation is organized within the ACCORD upper-air DA Area

➢ **Formation of teams**
  ○ **Research teams**:
    ■ To deal with some high priority tasks from the rolling work plan
  ○ **Support teams**:
    ■ Local implementation of developed solutions
    ■ Guarantee the exchange of knowledge on developments/achievements.
  ○ **The Teams' work is organized and supported by the Area leader and the co-chairs**

➢ **Avoid repetition of development works**
  ○ **Porting of developments**:
    ■ All developments/achievements should be ready to be used in each CSC
    ■ Definition of "functions" composed of input data, namelist setup and consistent file naming conventions
    ■ Developers are responsible for the "functions", short how-to describing the implementation process, changed source codes, and scientific documentation if appropriate
    ■ Little by little we build a common and modular DA system

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Rolling Work Plan 2022: some headlines

- Towards a common working environment (source code forge, cycling practices and tools etc.)

- Code engineering, phasing and (meteor.) quality assurance ("CepQA")

- The adaptation of the ACCORD NWP codes to new HPC ("SPTR1" Area)

- OBS: crowd-sourced & IoT / DA: preparations toward OOPS

- Modeling:

    - Dynamical core is SISL-ST, hydrostatic or fully compressible (NH), however research is done on GP version of SI

    - Physics: 3 main packages (defining the so-called "CSCs": AROME, ALARO, HARMONIE-AROME). Efforts for triggering specific topics across-CSCs

- R&D about the use of ML for NWP codes: which problems seem most appropriate ? Which methodology to test ?
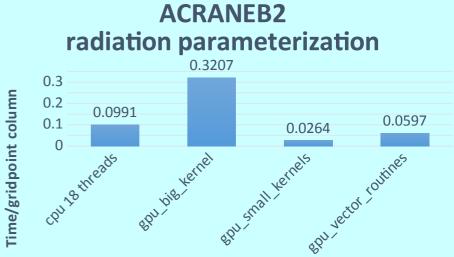
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- New work package to prepare ACCORD codes for novel technologies, such as GPU's, vector accelerators, FPGA's

- Participation in IDRIS/Nvidia Hackaton (May 2021) to port parts of the model to GPU:

- Fast Fourier Transforms: significant speedup of calculations when run on GPU, but host-device transfers become bottleneck. Scalability beyond 4 GPU's remains issue.

- Physics parameterizations (deep convection, radiation): testing various strategies of porting existing code to GPU's + tools to automate annotation with OpenACC directives.

ACRANEB2 radiation parameterization

Time/gridpoint column

cpu 18 threads	gpu_big_kernel	gpu_small_kernels	gpu_vector_routines
0.0991	0.3207	0.0264	0.0597

- This work reveals that a broader restructuring of the ACCORD code is necessary to prepare for hybrid architectures:
- Smart data structures (shared with IFS); integration with Atlas framework
- Investigation of DSL toolchain to generate hardware-specific code, starting from current (cpu-targeted) code

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ACCORD EPS

- **Re-organization of work packages to promote collaboration across "families"**
  - Perturbations: Model (SPPT, SPP, …), Surface, Initial conditions, Lateral boundary conditions
  - Post-processing: Calibration, User-oriented approaches

- **User oriented approaches: develop products that can enhance the use of EPS**
  - Improved warnings of high-impact weather
  - Reduction of "information overload"
  - Develop decision making criteria for
    - renewable energy
    - hydrology
    - transportation safety
    - popular events

- **ACCORD EPS meeting on "Ensemble calibration and user-oriented approaches"**

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Thank you for your attention

- Any (time for) questions ?

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Cooperation within ACCORD DA area - the Teams

➢ **Research teams**
- ○ Variational & EnVar in OOPS
- ○ Initialisation/Spinup in nowcasting
- ○ 4D-Var
- ○ Large scale information in LAM DA
- ○ Preparation for future Satellite products
- ○ Assimilation of "rain observations"
- ○ VarBC
- ○ Sub-hourly RUC and continuous DA
- ○ Coupled DA
- ○ Assimilation diagnostics, monitoring and verification
- ○ Assimilation and quality control of observations at appropriate scales
- ○ Machine learning for DA
- ○ Ground based remote sensing

➢ **Support teams**
- ○ VarBC implementation
- ○ DAsKIT
- ○ (Fixed station) conventional observations
- ○ Moving platforms
- ○ Ground based remote sensing observations
- ○ Assimilation of retrievals
- ○ Assimilation of (cloud free and cloudy) radiance data
- ○ B computation
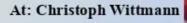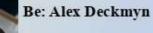- ○ Diagnostic and verification

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Local Team Managers — Chaired by CNA

Dz: Mohamed Mokhtari

At: Christoph Wittmann

Be: Alex Deckmyn

Bg: Boryana Tsenova

Hr: Antonio Stanesic

Cz: Radmila Brožková

Dk: Bent Hansen Sass

Ee: Ivar Ansper

Fi: Reima Eresmaa

Fr: Ghislain Faure

Hu: Gabriella Szépszó

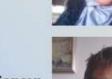Is: Halldór Björnsson

Ie: Saji Varghese

Lt: Martynas Kazlauskas
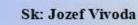
Ma: Siham Sbii

Nl: Jan Barkmeijer

No: Jørn Kristiansen

Pl: Bogdan Bochenek

Pt: Maria Monteiro

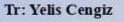Ro: Alexandra Craciun

Sk: Jozef Vivoda

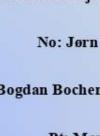Si: Neva Pristov

Es: Javier Calvo

Se: Susanna Hagelin

Tn: Haythem Belghrissi

Tr: Yelis Cengiz

ACCORD also has a Governance level …

- Assembly (representatives of the DGs)

- Policy Advisory Committee (PAC)

- Scientific and Technical Advisory Committee (STAC)