ACCORD

A Consortium for COnvection-scale modelling Research and Development

ACCORD consortium presentation

C. Fischer, PM, with input by A.-L. Dhomps (CSS), Alexandre Mary, (IL), Daan Degrauwe (CRA-AL), Jana Sanchez (Doc Officer)

Transition to the next phase 2026-2030

Scientific Strategy approved: https://www.accord-nwp.org/?Strategy-2026-2030

The next MoU (MoU2) has been approved and is currently in the signing process.

Some of the management positions already have been filled (PM, CSS, Integration Leader, 2 CSC-Leaders).

Open calls for the positions of the Area Leaders (8), the Doc Officer, the CNA => DL 7 October.

Budget financial mechanism and budget trajectory are under discussion.

Assembly meetings: 7 July - 9 October - 1&2 December 2025.

The start of phase 2 will be 1 January 2026.

Snapshots on some priority thematics

- MQA Infrastructure
- Code integration and new code versions
- Common scripting system
- Code refactoring and adaptation (to GPU)
- Documentation
- AI/ML for NWP

MQA Infrastructure

In 2025, the aim is to set up a prototype for a common infrastructure supporting process oriented verification. The intended capabilities include:

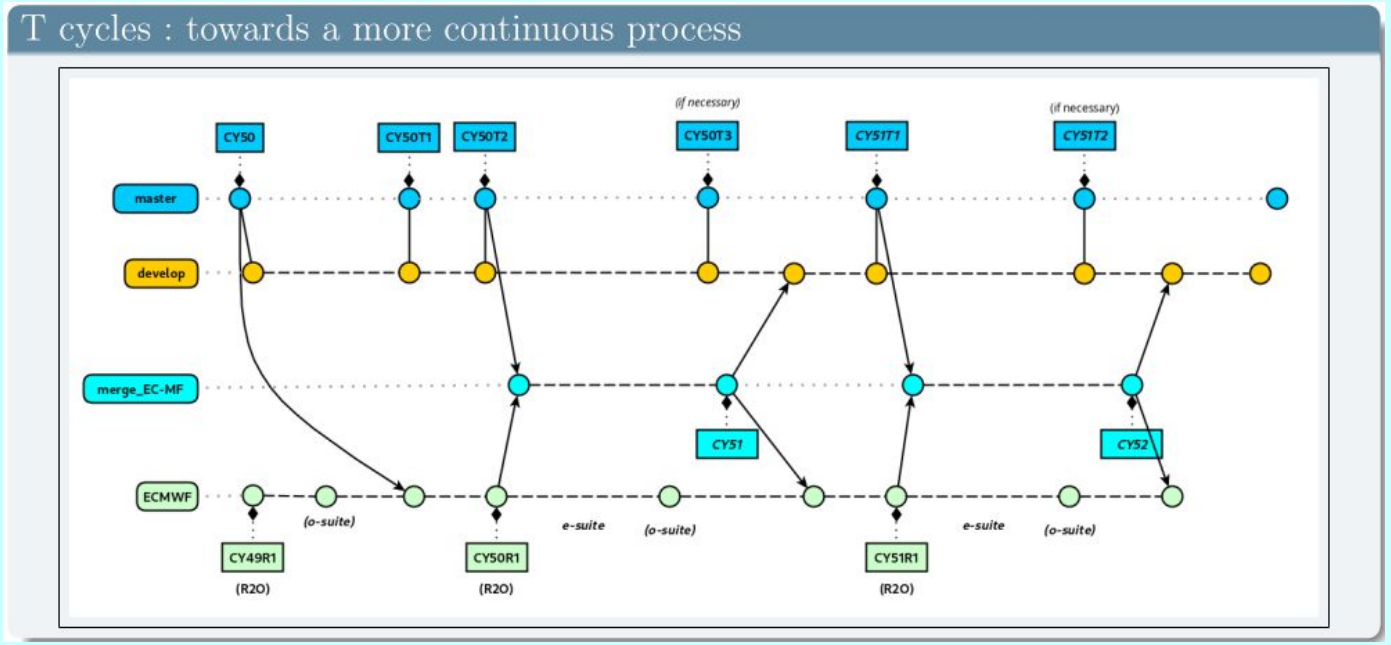
- Use the ECMWF special project SPFRACCO for the infrastructure
- Catalogue of data and their access
- Support for using physics-based model diagnostic tools (DDH, MUSC)
- Interfaces to specialized observations such as Cloudnet and ICOS data, and to the offline SURFEX validation system (OSVAS)
- Panelification tool
- Lagrangian verification/diagnosis based on pattern recognition
- Application of obs. operators and data used for DA verification using DA screening tools

In ACCORD this effort is very much transversal to many scientific Areas (MQA, Physics, Surface, Dynamics, System …) and to the 3 CSCs (Harmonie-Arome, Arome, Alaro).

We also would like to extend the MQA-I to validating and comparing with data driven forecast models.

Code integration and new code versions

- At present: source code forge under GITHUB, testing tool DAVAÏ, code reviewing process, documentation of Pull Requests
- Staffing: Integration Leader, DAVAÏ developer team (4-5 persons)



courtesy by Alexandre Mary (MF)

- We want to continue to improve and modernize our working practices: compilation tool (CMAKE?), toward more continuous integration, progressively widen the scope of testing

Common scripting system

- A roadmap for the development of a common scripting system in ACCORD has been approved by the Assembly in July
- We will start from the scripts used by DEODE (Destination Earth on-demand DT)
- The roadmap covers about 2026-2027, including the extension toward DA components and EPS
- An aim will be to progressively form a small team of “scripting experts”

Code refactoring and adaptation (to GPU)

- The ACCORD GPU adaptation strategy relies on
  - source-to-source translation scripts to generate GPU-targeted code (OpenACC) from CPU-targeted code
  - smart (hardware-aware) data structures: FieldAPI
  - manual porting of specific parts like communications, spectral transforms
- This strategy allows to keep a single code base while targeting different platforms, which is a necessity in a consortium like ACCORD
- This approach is shared with ECMWF (IFS) and Meteo-France (ARPEGE)

Code refactoring and GPU adaptation

- Status overview

courtesy by Daan Degrauwe (RMI)

Model part	Status	Method
Spectral transforms	Ported	manual + CUDA FFT
Semi-implicit computations	Ported	manual + source-to-source scripts
Gridpoint dynamics	Ported	source-to-source scripts
Semi-Lagrangian advection	Ported	manual + source-to-source scripts
ALARO physics	Ported	source-to-source scripts
AROME physics	Refactored	
HARMONIE-AROME physics	Refactored	
Lateral boundary conditions	Ported	source-to-source scripts
Diagnostics, IO	Not started	

- A full timestep with ALARO physics can run on GPU, without any CPU-GPU transfers.

Documentation: Work in progress

- General inventory of existing documentation
- Scientific documentation of the codes
  - per Area and large code component
  - shared online editing (Overleaf)
  - long-term archiving under GITHUB (for versioning)
- Welcome pack
  - including info where to find tutorials and webinars such as for GITHUB and the ACCORD source code forge
- Namelist repository
- Support to other Project staff for organizing information and documentation in ACCORD-related GITHUB projects
- Documentation Officer is Jana Sanchez (AEMET)

AI/ML for NWP

- **Hybrid AI-ML/physics-based approaches**, i.e. where AI/ML can help either enhance the functions of our physics-based NWP models or increase numerical performance (reduce cost): inside our DA system, inside our EPS, etc.
- **Designing a validation benchmark** (process-oriented, using appropriate diagnostics and metrics, use cases) to evaluate the meteorological performance of data-driven models alongside physics-based models and foster collaboration between AI/ML developing teams and physics-based NWP teams
- **Organize** ways how to efficiently interface ACCORD with the European-scale initiatives (ECMWF Pilot Project, EUMETNET E-AI Programme, Destination Earth etc.)
- left over to the other existing collaborations:
  - fully data-driven models
  - from-obs-to-forecast emulators

All Staff Workshop 2025

- On the invitation of HungaroMet, located in Zalakaros, from 31 March through 4 April

  - Opening/closing sessions
    + 8 General Area Sessions
    + 10 Topical sessions
  - 64 presentations
  - 75 speakers including 14 newcomers
  - ~ 60 remote participants during the sessions
  - Up to 110 online connexions on Wednesday

Tack så mycket för din uppmärksamhet

- thank you for your attention
- Check the ACCORD website at http://www.accord-nwp.org/ !

Documentation: definitions to help frame the effort on doc.

5 levels of documentation:

1) Scientific papers, Newsletter articles, Internal notes with scientific or technical description of a new feature, peer-reviewed papers.

2) User's guides, Tutorials, How To's.

3) Code related Documentation (close to the codes, close to the PRs).

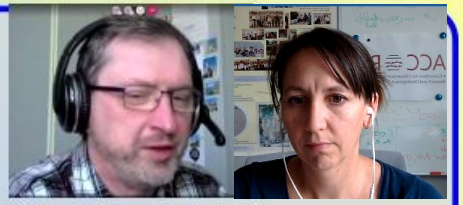
4) Meteorological Validation

5) Reports of WW, Meetings and ACCORD Stays

Management Group (composition)

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)**

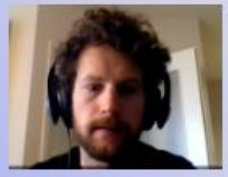
System: **Daniel Santos (Dk)**

Data Assimilation:
Benedikt Strajnar (Si)

Physics: **Metodija Shapkalijevski (Se)**

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)

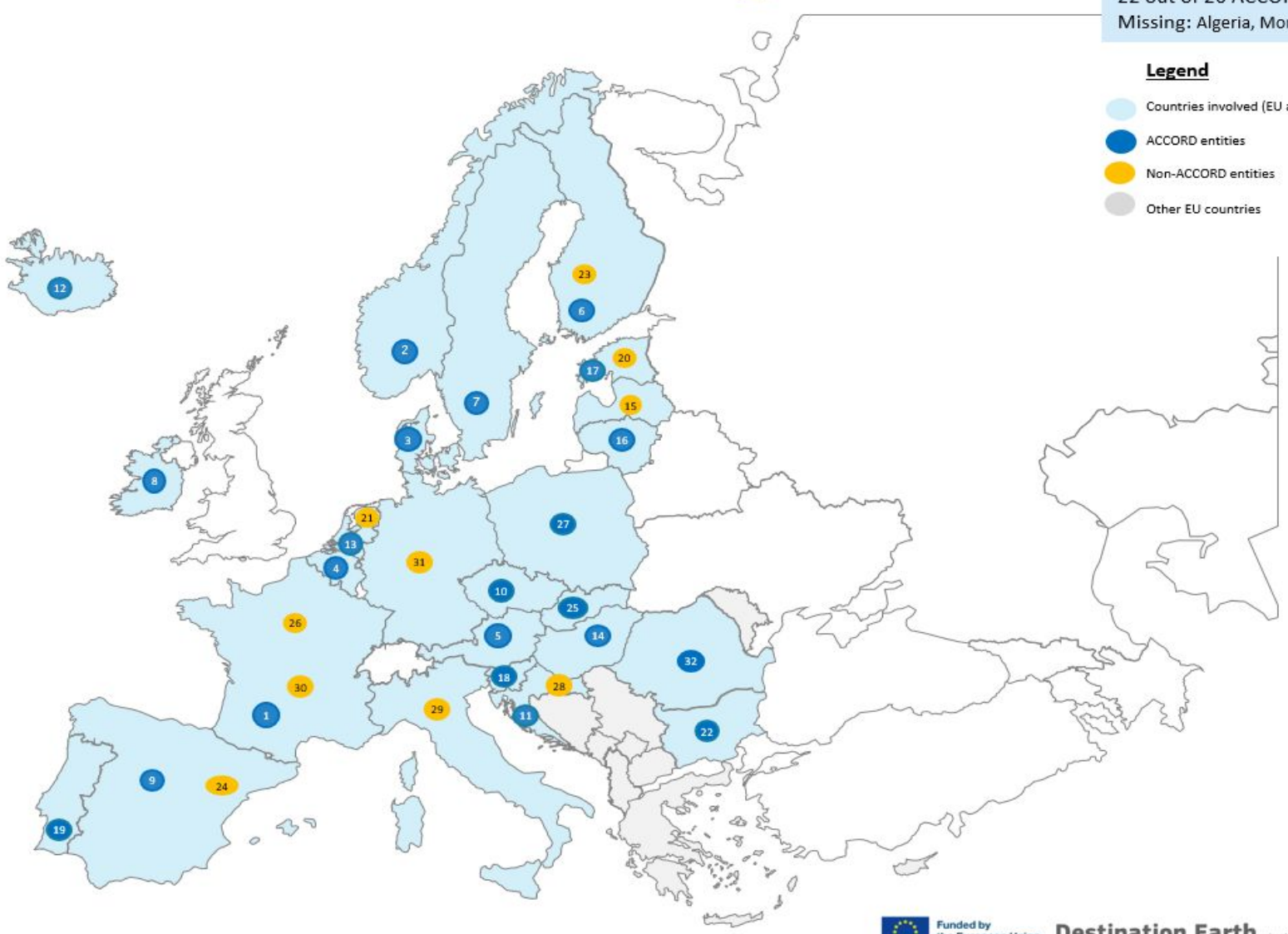
Destination Earth DE_330

- The goal is to develop an On-demand Extreme Event Digital Twin, interfaced with the global digital twin (ECMWF), the data lakes (EUMETSAT) and the core service platform (ESA)
- The system will use modern HPC facilities from the EuroHPC Joint Undertaking
- An ACCORD-based offer has been chosen by ECMWF in September 2021. 22 out of 26 ACCORD NHMSs are involved.
- Météo-France is the Prime Contractor with ECMWF (Elisabeth Gérard, MF); the scientific and technical leadership is shared with other ACCORD Members
  - Roger Radriamampianina (Met.no), Kristian Pagh Nielsen (DMI)
  - WP leaders from the various institutes
- Phase 1: Make a prototype demonstrating the proof-of-concept of the on-demand digital twin (1/09/22 - 30/04/24)
- Phase 2: Start the operationalisation of the digital twin components (1/05/24 - 30/04/26)

Funded by the European Union Destination Earth implemented by ECMWF esa EUMETSAT

DestinE (DE_330) Phase 2

Entities involved in DE_330



22 out of 26 ACCORD entities involved in DE_330
Missing: Algeria, Morocco, Tunisia, Turkey

1	Météo-France	FR
2	Met Norway	NO
3	DMI	DK
4	KMI-IRM	BE
5	GeoSphere Austria	AT
6	FMI	FI
7	SMHI	SE
8	Met Éireann	IE
9	AEMET	ES
10	CHMI	CZ
11	DHMZ	HR
12	IMO	IS
13	KNMI	NL
14	OMSZ	HU
15	LEGMC	LV
16	LHMS	LT
17	ESTEA	EE
18	ARSO	SI
19	IPMA	PT
20	TalTech	EE
21	RIVM	NL
22	NIMH	BG
23	CSC	FI
24	BSC	ES
25	SHMU	SK
26	INRAE	FR
27	IMGW	PL
28	IRB	HR
29	CINECA	IT
30	CNRS	FR
31	DLR	DE
32	NMA	RO

Funded by the European Union | Destination Earth | implemented by ECMWF | esa | EUMETSAT

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