SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year	2026
Project Title:	ACCORD common codes maintenance Special Project
Computer Project Account:	**SPFRACCO**
Principal Investigator(s):	Claude FISCHER
Affiliation:	Météo-France
Name of ECMWF scientist(s) collaborating to the project (if applicable)	---
Start date of the project:	1/1/2022
Expected end date:	31/12/2027

Computer resources allocated/used for the current year and the previous one

(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	20 MSBU	1.7 MSBU	20 MSBU	0.5 MSBU
Data storage capacity	(Gbytes)	15.000		20.000	

This template is available at:
http://www.ecmwf.int/en/computing/access-computing-facilities/forms

Summary of project objectives (10 lines max)

The goal of this SP is to provide resources to the ACCORD consortium in order to (1) enhance its capability on a common maintenance of the shared NWP codes, (2) further develop and ensure the portability of the tools used for this maintenance and (3) increase the level of validation of common code versions and design a consortium-wide infrastructure for meteorological quality assurance. Hereafter are the major elements of context for this SP request, and the description of the planned activity.

These efforts fall under the strategic goal in ACCORD to maintain and strengthen a common working environment and common working practices. With respect to the previous phase of this SP (2022-2024), the scope is slightly increased to take into account elements from the ACCORD draft scientific strategy 2026-2030 (https://www.accord-nwp.org/?Strategy-2026-2030).

Summary of problems encountered (10 lines max)

Summary of plans for the continuation of the project (10 lines max)

We will continue to use the special project resources for installing new ACCORD code versions on the ECMWF HPC, along with testing and validation tools. The goal is to be able to now install any new code release in both the ECMWF and the Meteo-France computers (see list below from CY50 to CY51). As a new goal from 2025 on, we will create an infrastructure facilitating process-oriented verification, or comparison of model results to references provided by research networks such as Cloudnet or Earth observation missions, and LES.
We plan to apply our facility also to assessing the value of high-resolution in forecasting high-impact weather, and for comparing physics-based and data driven forecasts w.r.t physical processes and the evolution of weather systems.

List of publications/reports from the project with complete references

The most appropriate current references are the talks about the new ACCORD working practices on the common codes, given at the All Staff Workshop in April this year:

- ANDRAE Ulf: Tactus - from DEODE to ACCORD with love
- MARY Alexandre: - Cycles and Integration -
- FORTELIUS Carl: **MQA infrastructure** (specific material related to an upcoming ACCORD Working Week available on demand from the ACCORD wiki pages)
- FISCHER Claude: ACCORD Introductory presentation

- FISCHER Claude: Topical session on common deployment | ACCORD

Summary of results

Recent common code versions for ACCORD and Code Integration procedures

Recent code versions: content of CY50T1
Available at https://github.com/ACCORD-NWP/IAL/releases/tag/CY50T1
• Rephasings of MF e-suite 49T1_op1 devs
• Observations : MWTS3, WIGOS, CRIS FSR, STRATEOLE2, CALISOL10M, direct radar assimilation, Mode-S AW, AMV errors & QC, OceanSat-3 OSCAT, snow cover

• DA algo : Arome 4DEnVar, hydrometeors
• Dynamics : LNHHY/LNHQE/LNHEE & LSPNHX, LSI_UPDATE_FULL/CHEAP, NTPVAR, LBIGW, LSLONDEM_SPLIT, cleanings
• EPS : SPG, RPP, SPP update
• Physics & diags : PHYEX update, Harmonie-Arome phasing, θs , CIN, Arpege/Tiedtke, DDH@tstep, aero diags
• System : porting/benchmark fixes, optimizations, Cmake compilation, various cleanings
• Refactoring : SI, SL, LAM/NH GP dynamics, extension of field_api encapsulation, YDMODEL quasi-constant
• and miscellaneous fixes...

Content of CY50T2
• Externalisation of FA/LFI/LFA
• Externalisation of PHYEX
• Externalisation of SURFEX
• Internalisation of DAVAI (in directory davai/)
• Internalisation of the bundle and integration of cmake/ecbuild compilation for LAM (in directory bundle/, cf. doc therein)
• Migration of POSNAM* to fiat and use of POSNAMEF to make empty blocks optional (env. var)
• Miscellaneous corrections

SURFEX (version 9)
• Developments in a branch of https://github.com/ACCORD-NWP/SURFEX → PR
• Merged in a staging branch for the next CY release (50T2_develop)
• The staging branch is bundled in an IAL PR to the develop branch (bundle/bundle.yml)
• Potential companion IAL PRs for interface changes

CY51
• Initial merge of CY50T1 + CY50R1 (fall 2025)
• + Merge of CY50T2 (March 2026)
• Synchronization on external packages (ecTrans, oops, ...)
• Validation work just resumed after a few months on hold
• Pending : reintroduction of FFT992 in ecTrans
• Target date for declaration : Sept. 2026

And plans beyond ? => Revisit the way we make our joint common codes => Organize some more continued cycling in ACCORD, in parallel to common cycles with ECMWF (see Figure 1)

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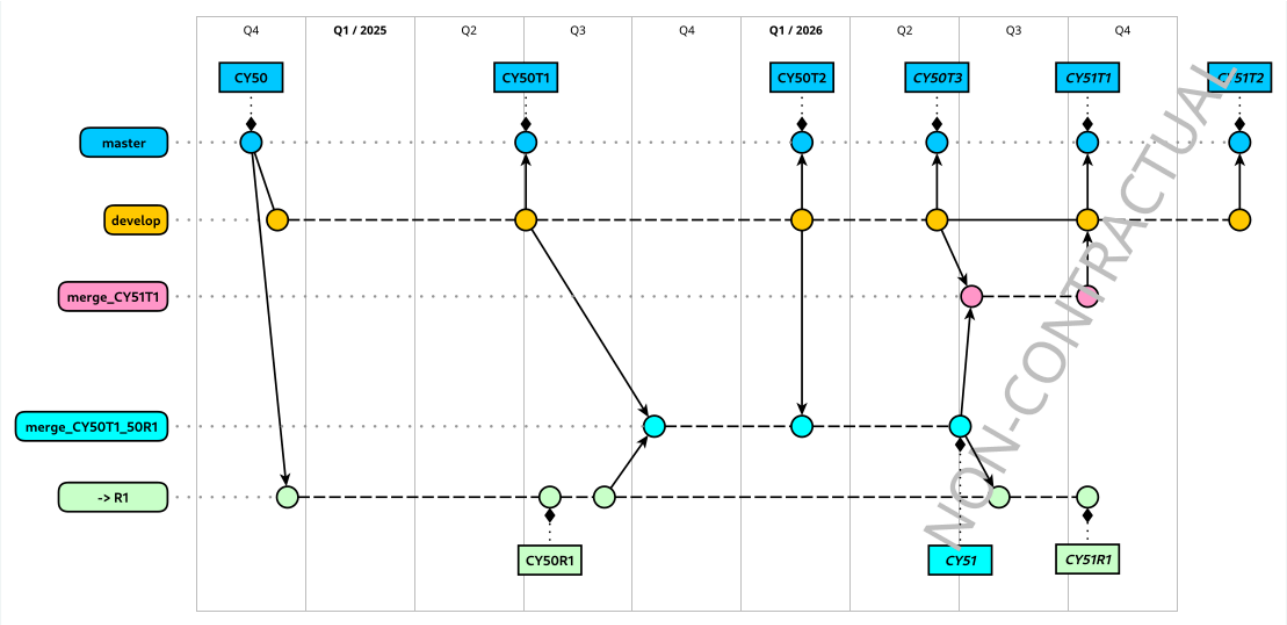

Figure 1: Schematic of code versions and continuous integration in a "develop branch"

While the current way of making joint IFS/Arpege/ACCORD cycles is a long-standing, proven-to-work practice (over 30 years of IFS-Arpege collaboration !), it is more and more questioned because of:
• Difficult merges
• Difficult validation
• A bottleneck
• Prevents agile collaboration with ECMWF, esp. on code modernization

Current investigations go toward designing a Common Continuous Integration process (CCI, see Figure 2). The guiding rules for CCI could look like:
• Neutral (see below [*]) contributions would be submitted and merged "continuously" (i.e. not as part of a call for contributions to a cycle)
→ based on latest release or up-to-date main branch
→ into a "staging" branch
→ more visibility and cross-review
• Contributions with meteorological impact (usually less than 1/3 of all PRs) cannot follow the same path (need for further statistical validation and case-studies → longer timescale)
→ thorough evaluation done in side-branches before re-entering the main branch
• Declaration of new releases on main branch is flexible :
→ after integration of meteorological-impact branches, or upon demand
→ less bound to the notion of "cycling", more linear : semantic versioning ?

[*] And assessing the neutrality of contributions:
• bit-identical (for which compilers ?) ?
• bit-reproducible (i.e. whatever the // profile) ?
• non-repro but no meteorological impact ?

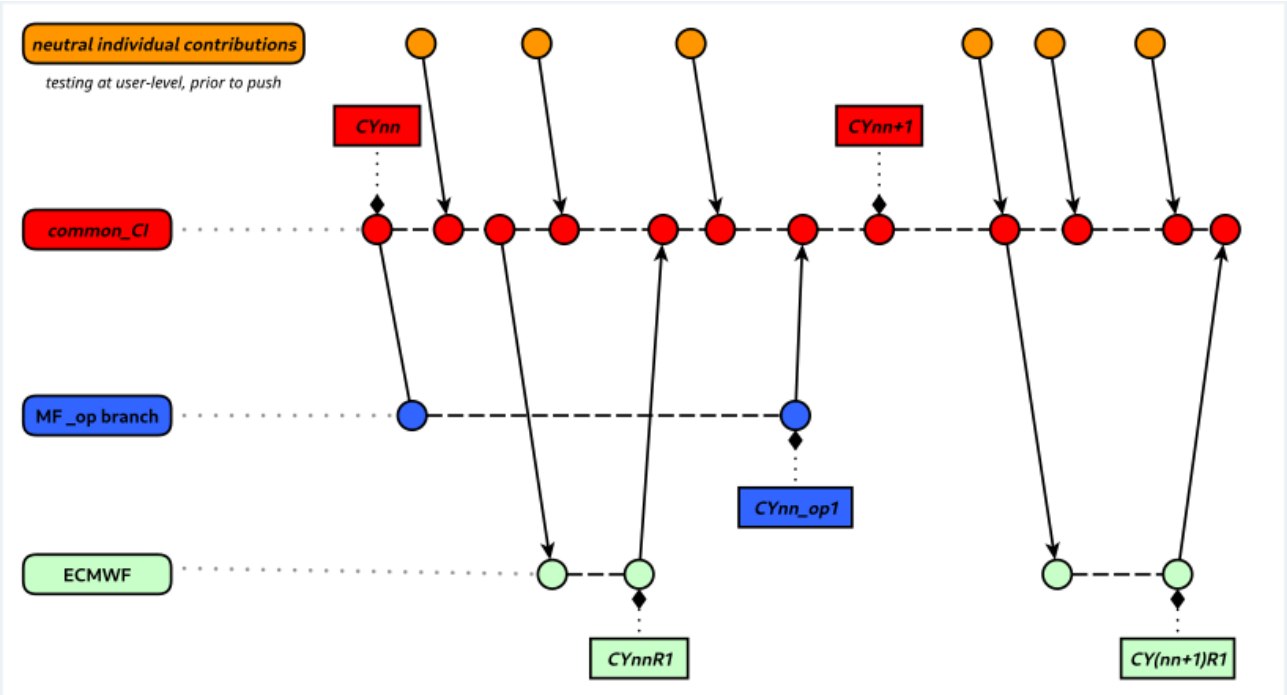

Figure 2: Schematic of CCI jointly with ECMWF, MF and ACCORD

System activities in ACCORD

In 2025-2026, a major task in ACCORD was to increase knowledge on the TACTUS scripting system, and start designing the ACCORD components in order to extend its capabilities.

TACTUS scripting system. Start knowledge and functions.
For any of the CSCs in ACCORD we can:

- Generate physiography files, both SURFEX and E923 ones
- Interpolate boundaries from IFS or any CSC
- Run a forecast, deterministic or as an EPS
- Start a run from any time and output with any frequency (
- down to the timestep)
- Additional postprocessing in python
- Archive to FDB for easy distribution of data via polytope
- Produce sqlite files suitable for harp
- Launch various downstream applications

The implemented functionality is tailored for DEODE needs and the CSC configurations for sub-kilometre resolutions.

TACTUS in ACCORD, the first steps for 2026:

- Bring tactus to ACCORD and combine it with CY50T2. Choose CY50T2 to stay at the front and make synergy with DEODE phase 3 activities
- Implement the three CSCs reflecting the current usage in ACCORD
    - ALARO as defined by ALARO users
    - AROME as defined by AROME users
    - HARMONIE-AROME as defined by UWC
- Keep the DEODE CSC setups as reference and for sub kilometre research
- Make it work on ECMWF atos and Meteo France HPC belenos

Implementation of testing and validation tools on various platforms.
The DAVAÏ testing tool for new code releases is now fully installed and usable for ACCORD teams

on the ECMWF ATOS computer (thanks to using **SPFRACCO** resources).

Prototyping an environment for a "Meteorological Quality Assurance Infrastructure" (MQA-Infrastructure").

In the beginning of December 2025, a dedicated ACCORD Working Week was organised in the premises of FMI (Helsinki) in order to develop a prototype for the MQA-Infrastructure.

The aim is to set up a prototype for a common infrastructure supporting process oriented verification. Intended capabilities include (this list will be further constructed and confirmed during 2026):

- Use the ECMWF special project **SPFRACCO** for the infrastructure
- Make a catalogue of data and access conditions
- Organize the support for using model-based diagnostic tools such as DDH (domain averaged horizontal diagnostics), MUSC (single-column model)
- Interfaces to Cloudnet and ICOS data; to OSVAS offline surface assimilation tool
- Panelification tool (classification tool of model specific output fields)
- Lagrangean verification/diagnosis based on pattern recognition
- Application of observation operators and data used for data assimilation

The aim of the Physics experts during this WW was to support the MQA prototype development by adding common process-oriented validation cases for different parameterization schemes (Turbulence and Convection, Microphysics, Radiation, CAR, surface-atmosphere continuum).