SURFEX Steering Committee

- Committee members
- General presentation by the SURFEX team (40')
  - SURFEX V9 (Marie and Patrick 25')
    - Status and issues (Patrick 10')
    - Code management, rules, content and schedule of the next releases (Marie 10')
    - Documentation (Patrick 5')
  - Physiography, status, ongoing developments (Diane 5')
  - The MASCOT project (Patrick 10')
- Presentation of group activities (60') :
  - ACCORD (Patrick, including contribution of the 3 CSCs), MESONH (Quentin)
  - CEN (Matthieu), GMGEC (Christine), GMME (Aaron)
- Open discussion

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Committee members

- SURFEX team
  - Patrick Le Moigne, Marie Minvielle, Diane Tzanos, Antoine verrelle, Soline Bielli, Bertrand Bonan
- ACCORD
  - Patrick Samuelsson
- CEN
  - Matthieu Lafaysse
- GMGEC
  - Christine Delire, Jeanne Colin
- GMME
  - Aaron Boone
- MESONH
  - Quentin Rodier
- Invited people:
  - Ekaterina Kurzeneva, Rafiq Hamdi

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General presentation by the SURFEX team

- SURFEX V9
- Physiography
- The MASCOT project

SURFEX V9: status and issues

- Current organization of a new release
  - Incremental procedure: phasing, validation via STRATO, production of technical and scientific documentation
  - Agreement given by the SURFEX team to publish the modifications
- The version 9 phasing issue
  - The official repository is managed by the SURFEX team
  - V8.1 is the master branch
  - SURFEX_V9_DEV is the V9 development branch which was tagged with V9.0.0
  - In // ACCORD has developed the SURFEX_NWP branch based on V8.1+ and has contributed directly to the CY49 development cycle
- Delay in migrating SURFEX code management to GitHub

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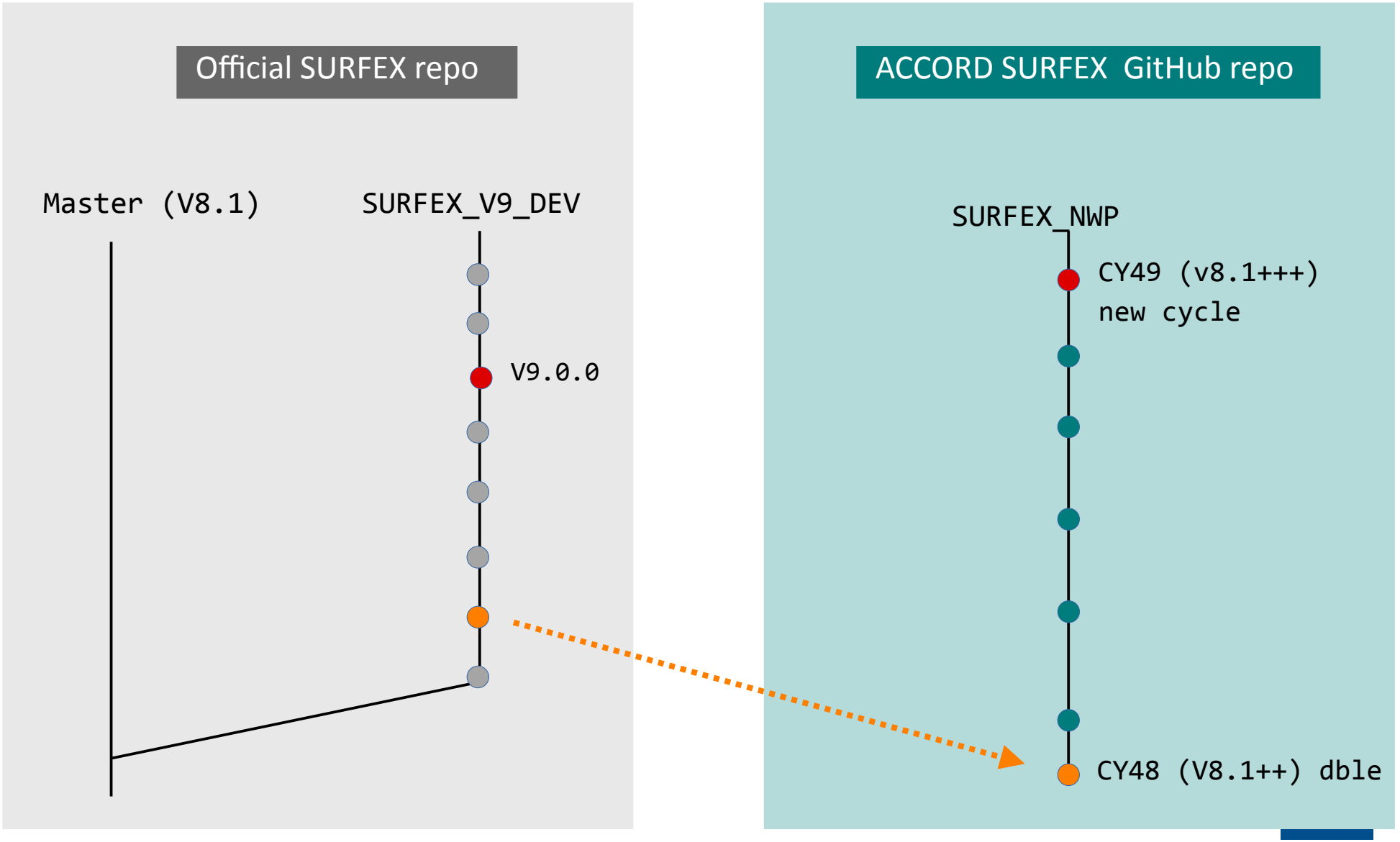
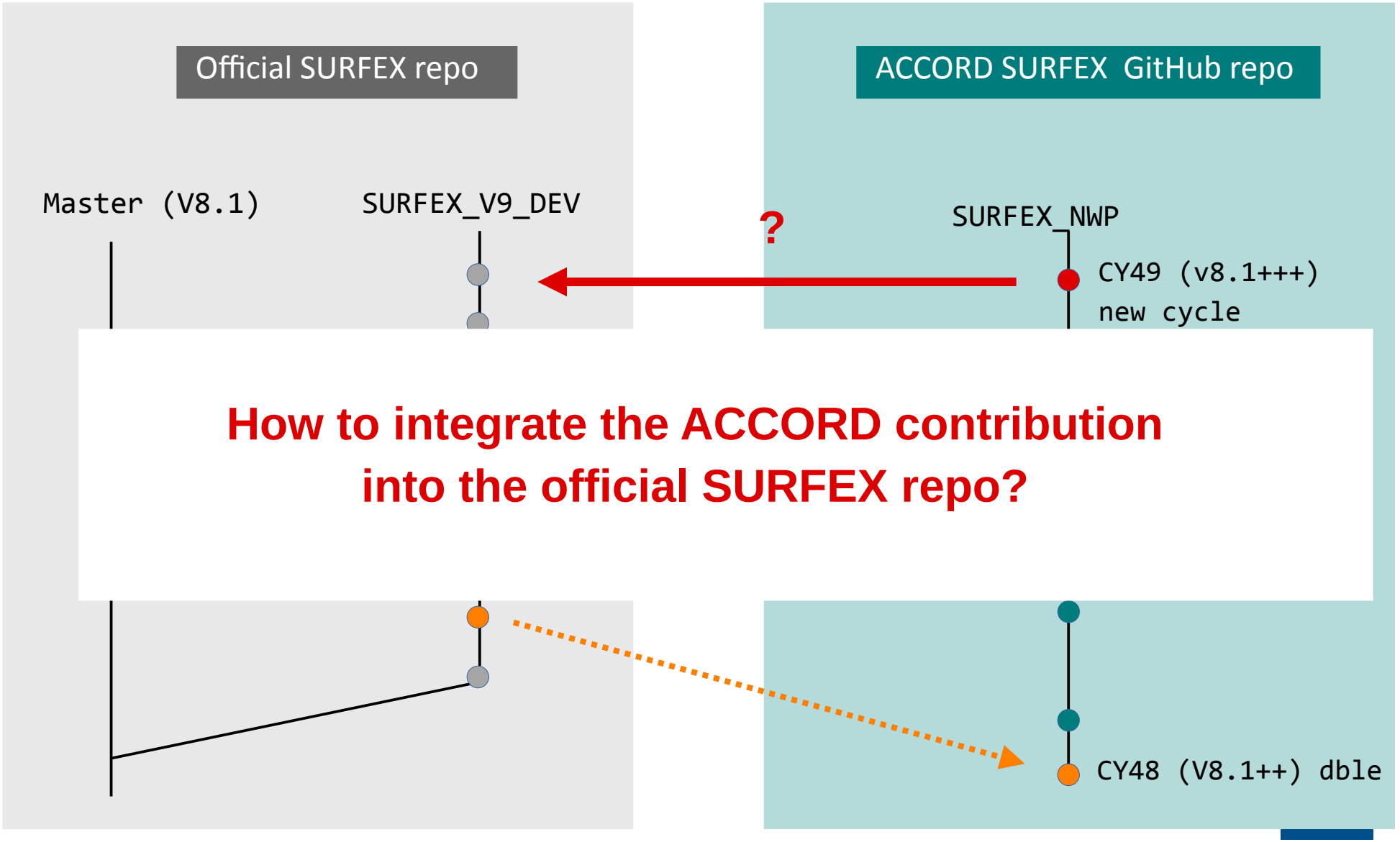
SURFEX V9: status and issues



SURFEX V9: status and issues



SURFEX V9: status and issues

- SURFEX code management based on **GitHub by the end of 2024**. Impossible to delay too much the future contributions (ACCORD, CEN, …)
- **Mandatory to find a solution to integrate the ACCORD contrib into the official SURFEX repo (operational status).**
- Possible solutions
  - ACCORD succeeds in phasing and validating STRATO by the end of September:
    - The other contribs come afterwards
    - Migration of SURFEX code management to GitHub
    - Publication of V9.1.0
  - Proposition given to CEN to contribute. If CEN agrees, phases, validates its contrib by the end of September:
    - Migration of SURFEX code management to GitHub
    - Publication of V9.1.0
    - The other contribs, including ACCORD will be for V9.2.0 or later
  - If ACCORD and CEN are not ready to contribute in time:
    - Migration of SURFEX code management to GitHub
    - Publication of V9.1.0
    - The other contribs, including ACCORD and CEN will be for V9.2.0 or later

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Software code management

- Météo-France wants to stop using Redmine to host GIT projects in the future
- Need to migrate SURFEX code to GitHub/Gitlab
- The repository must be smaller to be hosted on GitHub
  - non-ascii files included in STRATO
  - they make the history too heavy
- STRATO will have to be reorganized, non-ascii files externalized
- History will have to be rewritten

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Rules for future releases

- New SURFEX version numbering (e.g. V9.0.0) with a third number for bugfixes

- Call for contribution for a new release will be more frequent, with smaller contribution.
  - For example each year.

- Between 2 versions, there may be calls for bugfix contributions.

- The SURFEX team will launch a call for contributions for a given date.
  - At this date, only **ready contributions** will be accepted.

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Rules for future releases

What is a « ready contribution » ?

- Proposed modifications must be:
  - phased with the current reference version
  - proposed as a Pull Request on the GitHub repository (otherwise they will be rejected)
- STRATO must have been run on PC and Belenos
  - to analyse the outputs
  - to be able to explain all differences
  - to provide outputs of STRATO
  - update of STRATO is necessary
- Technical documentation (user's guide) must have been updated
  - Pull Request on a dedicated GitHub repository

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Rules for future releases

End of incremental contributions

Until now, each contributor phased after the contribution of the previous contributor

→ This process has resulted in significant schedule shifts

To offer more frequent versions, the SURFEX team is proposing:

- To stop this incremental process
- To be responsible for merging the various contributions
  - for the code and the documentation
  - assistance will be requested from the contributor in case of conflicts

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Rules for future releases

Organization

- The future organization will be based on ***forks***
- Each development group will have to work on its *fork*, with one/two people identified as responsible for their *fork*, and the code management.
- Once the various contributions from their group have been integrated into the main branch of their *fork*, this identified manager can make a **pull request** on the official SURFEX repository.
- **Commits**:
  - A commit must be made in English, with an explicit message
  - A single commit for a contribution of a development group with 150 modified routines is not acceptable.
  - Too many commits doesn't help. A happy medium must be found, with commits that dissociate developments.

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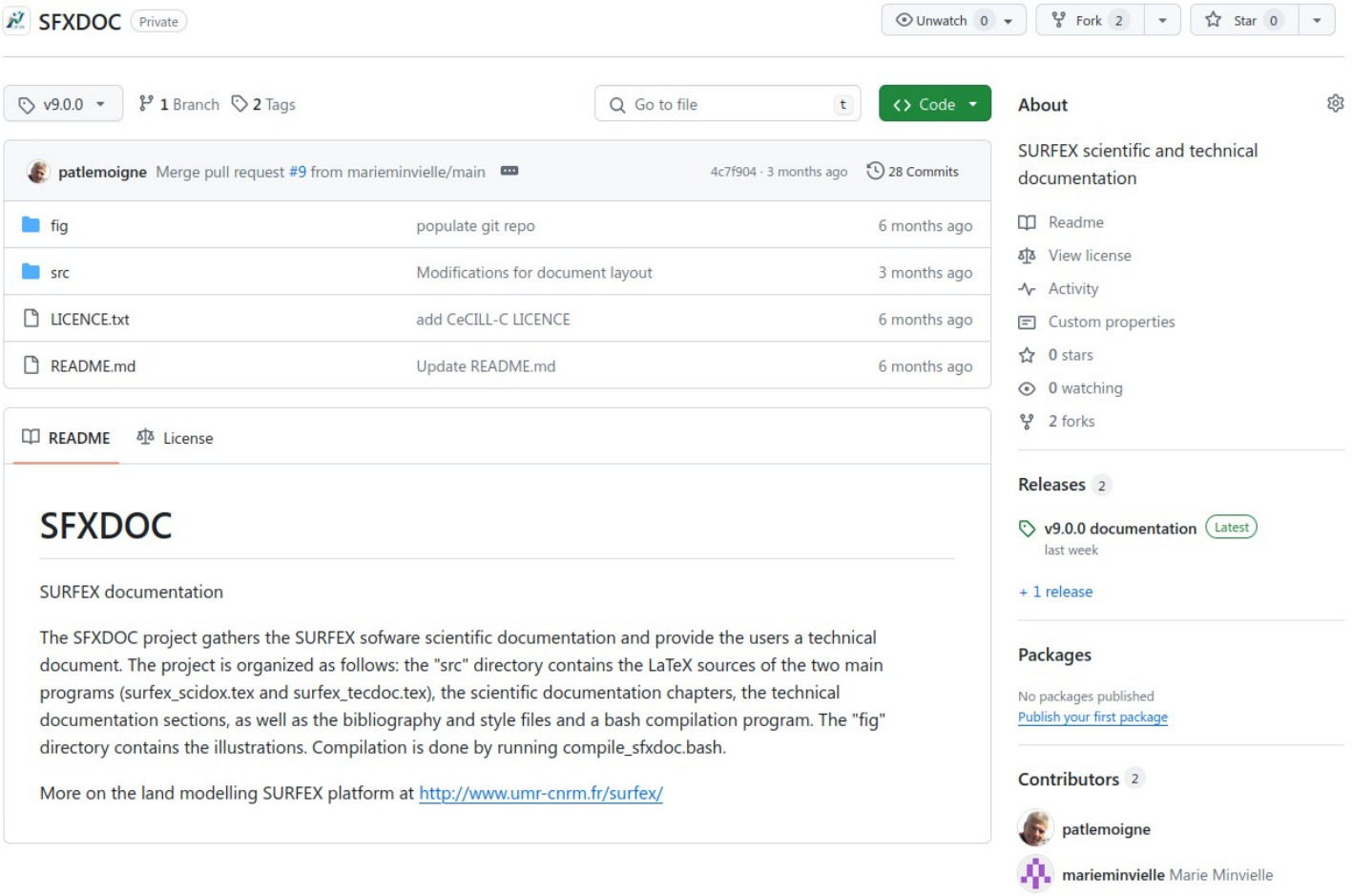
SURFEX V9: Documentation

- Technical and scientific documentation migrated to GitHub
- https://github.com/UMR-CNRM/SFXDOC



- Contributions via PR only

Physiography

The MASCOT project

Modélisation et **A**ssimilation des **S**urfaces **C**ontinentales pour l'**O**péra**T**ionnel

- Land surface data assimilation and modeling at CNRM
  - Importance of **surface-atmosphere coupling** in **NWP** and climate models
  - Representation of surface processes in **SURFEX** in NWP models (AROME LAM and ARPEGE global) and climate models
  - **SURFEX** used in offline mode for several applications including snow and avalanche forecast, hydrology, soil and vegetation monitoring with **advanced options for physics and assimilation**
  - **Old options** in **NWP** for surface modeling and assimilation
  - Will to **improve surface modeling and assimilation in NWP** models

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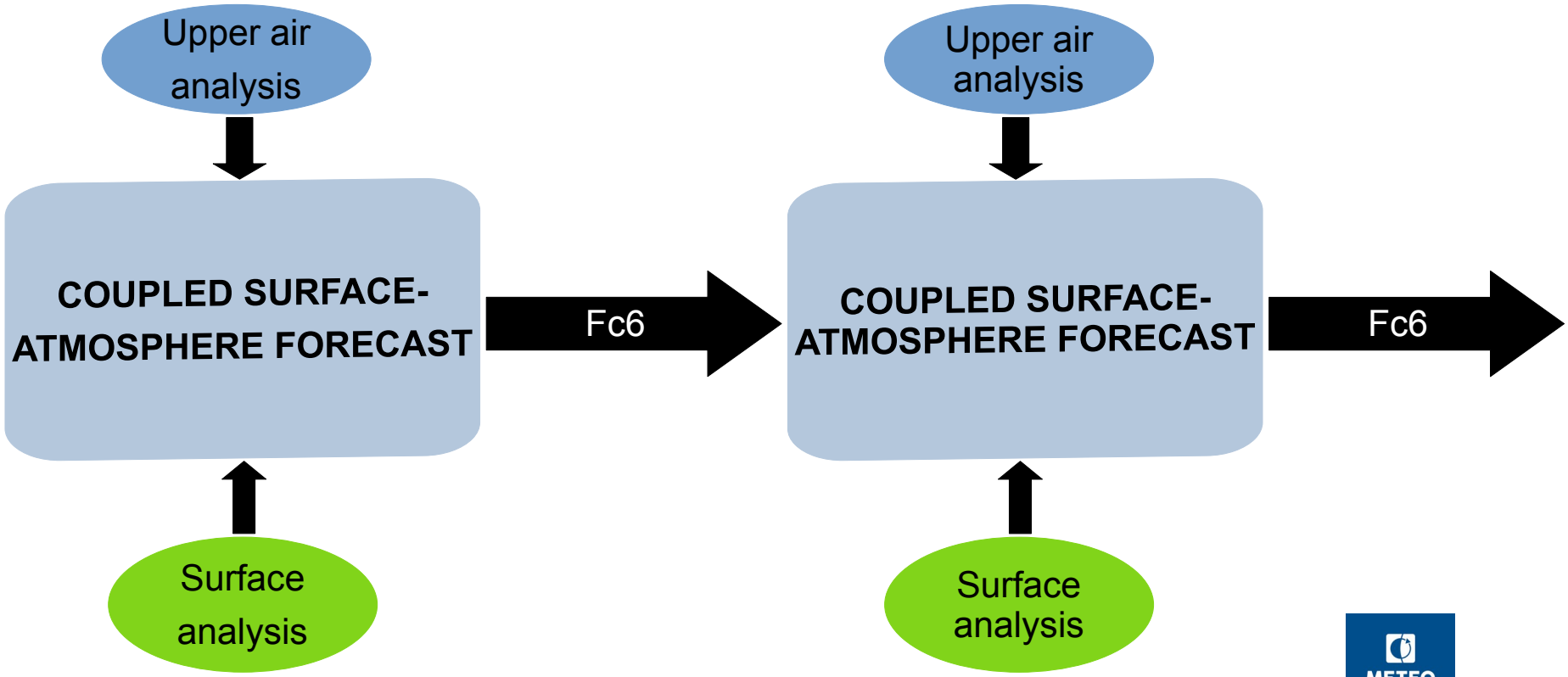
The MASCOT project (2023-2026)

Modélisation et Assimilation des Surfaces Continentales pour l'OpéraTionnel

- **Towards an improved version of surface modelling and assimilation, in operational NWP systems at Météo-France, aiming to reach (and go beyond) the current state of the art internationally**

- Definition, implementation and evaluation of a new configuration for NWP
- Evaluation in AROME and ARPEGE (including ensemble versions).



Structure of the project

- **WP0**: Coordination (Camille Birman, Patrick Le Moigne)
- **WP1**: Development of data assimilation methods in the joint IFS-ARPEGE-AROME code
- **WP2**: Technical developments for SURFEX implementation in NWP models
- **WP3**: Definition, implementation and evaluation of a new surface physics in ARPEGE and AROME

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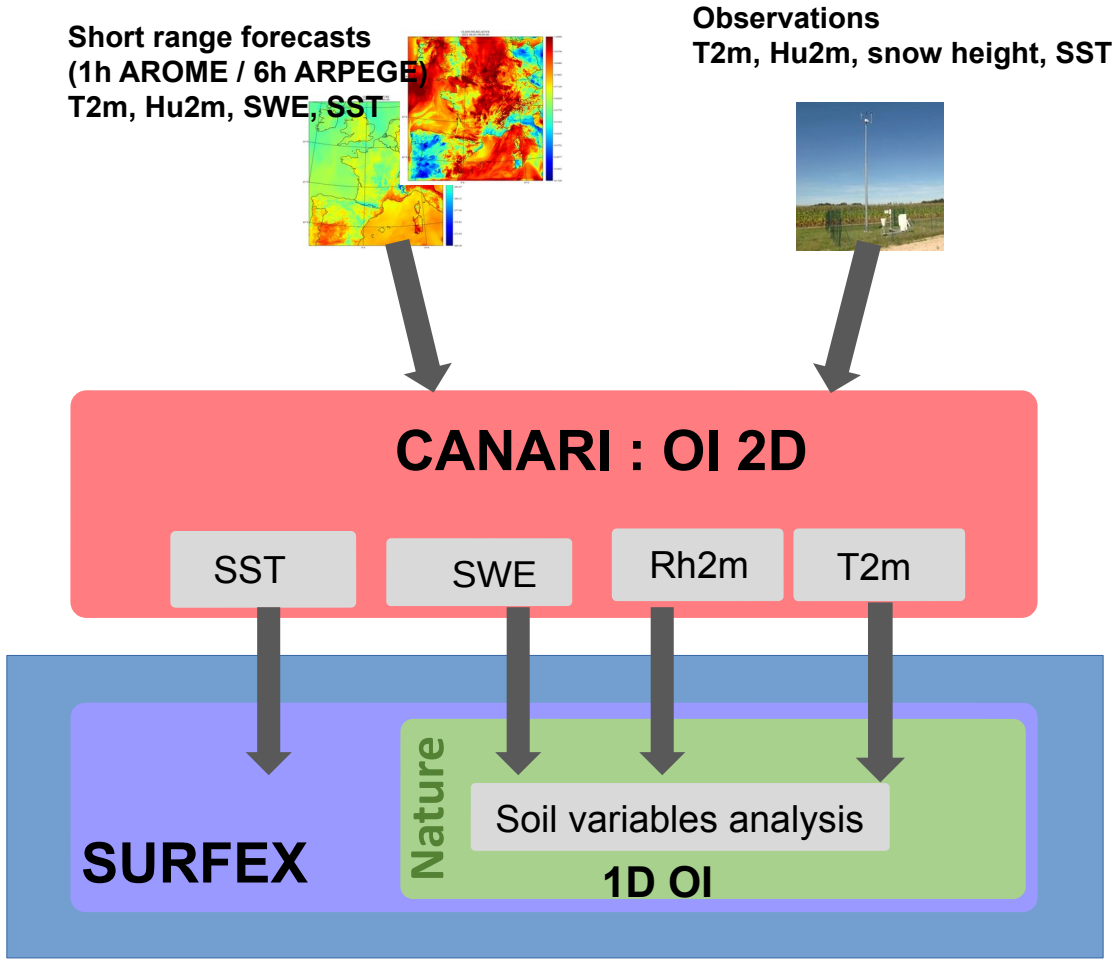
WP1: Land DA methods in the joint IFS-ARPEGE-AROME code

Current land surface data assimilation system for NWP: Optimal Interpolation



2-step system: 2D+1D

2D Optimal Interpolation for screen-level variables

ongoing work on the 2D part **towards 2DEnVar** (Sophie Marimbordes's PhD)

1D Optimal interpolation for **soil** variables (2 layers)

ongoing work on the assimilation of **satellite products** observing surface temperature (Zied Sassi's postdoc)

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WP1: Land DA methods in the joint IFS-ARPEGE-AROME code

Future land surface modeling and adapted data assimilation system

Process	Oper	Target
Heat/water transfer in the soil	Force-restore, 3 layers (ISBA 3L)	Diffusion, multilayer (ISBA DIF)
Vegetation	1 patch	Multi-patches?
Snow	1 layer (D95)	Multilayer (ISBA-ES)
Photosynthesis	Jarvis	ISBA-A-gs (AST)?
Town	Rocks	TEB?
Lakes	« Waterflux » Charnock	FLake?
Physiography database	ECOCLIMAP V1	ECOCLIMAP-SG?
Canopy	none	Bulk + litter (MEB)?

Adaptation of **1D Optimal Interpolation** to the **multilayer scheme** (and options)

Implementation of **1D OI** in **EDA** with **multilayer** scheme

Development of a **1D ensemble multilayer** method (EnVar/EnKF) (*longer term*)

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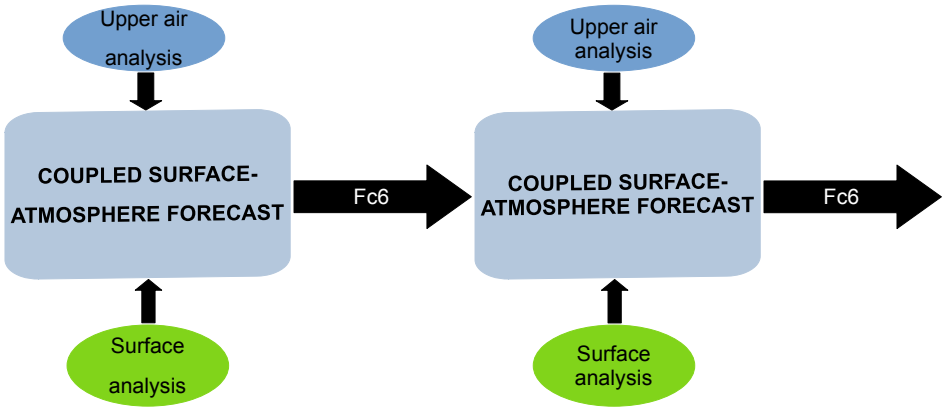
WP2: Test and validation framework

Will help the operational implementation of new SURFEX releases

Validation process:

1) offline
2) offline with surface DA
3) coupled
4) coupled with surface DA
5) coupled with surface and upper-air DA



Offline configurations (OLIVE) are set up

Operational model output in FA format – Forcing data in NetCDF:

ARPEGE 00, 06, 12, 18 → P1 to P6 / AROME 00, 01,… 23 → P1

Focus 1st on ARPEGE T1798 c2.2

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WP3: Definition, implementation and evaluation of a new surface physics in ARPEGE and AROME

Target physics

Process	Oper	Target
Heat/water transfer in the soil	Force-restore, 3 layers (ISBA 3L)	**Diffusion, multilayer (ISBA DIF)**
Vegetation	1 patch	**Multi-patches**
Snow	1 layer (D95)	**Multilayer (ISBA-ES)**
Photosynthesis	Jarvis	**ISBA-A-gs AST option**
Town	Rocks	TEB?
Lakes	« Waterflux » Charnock	FLake? Ongoing tests
Physiography database	ECOCLIMAP V1	**ECOCLIMAP-SG**
Canopy	none	Bulk + litter (MEB)?

T1798 c2.2 + ECOSG + FA + ISBA-DIF + ISBA-ES + 12 patches + AST + NVGRIBSFX=123 :

PGD FA // → 45Gb
PREP FA monoproc → 2Gb

Ongoing work on:

- PREP FA //
- SP/DP
- Number of patches
- FLake
- Validation

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