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WP5: SEASONAL FORECAST DEMONSTRATORS

Kick-off meeting, 17 January 2023

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WP5 Team

WP5 Lead: Núria Pérez-Zanón (BSC) and Anca Brookshaw (ECMWF)

WP5 Partners:

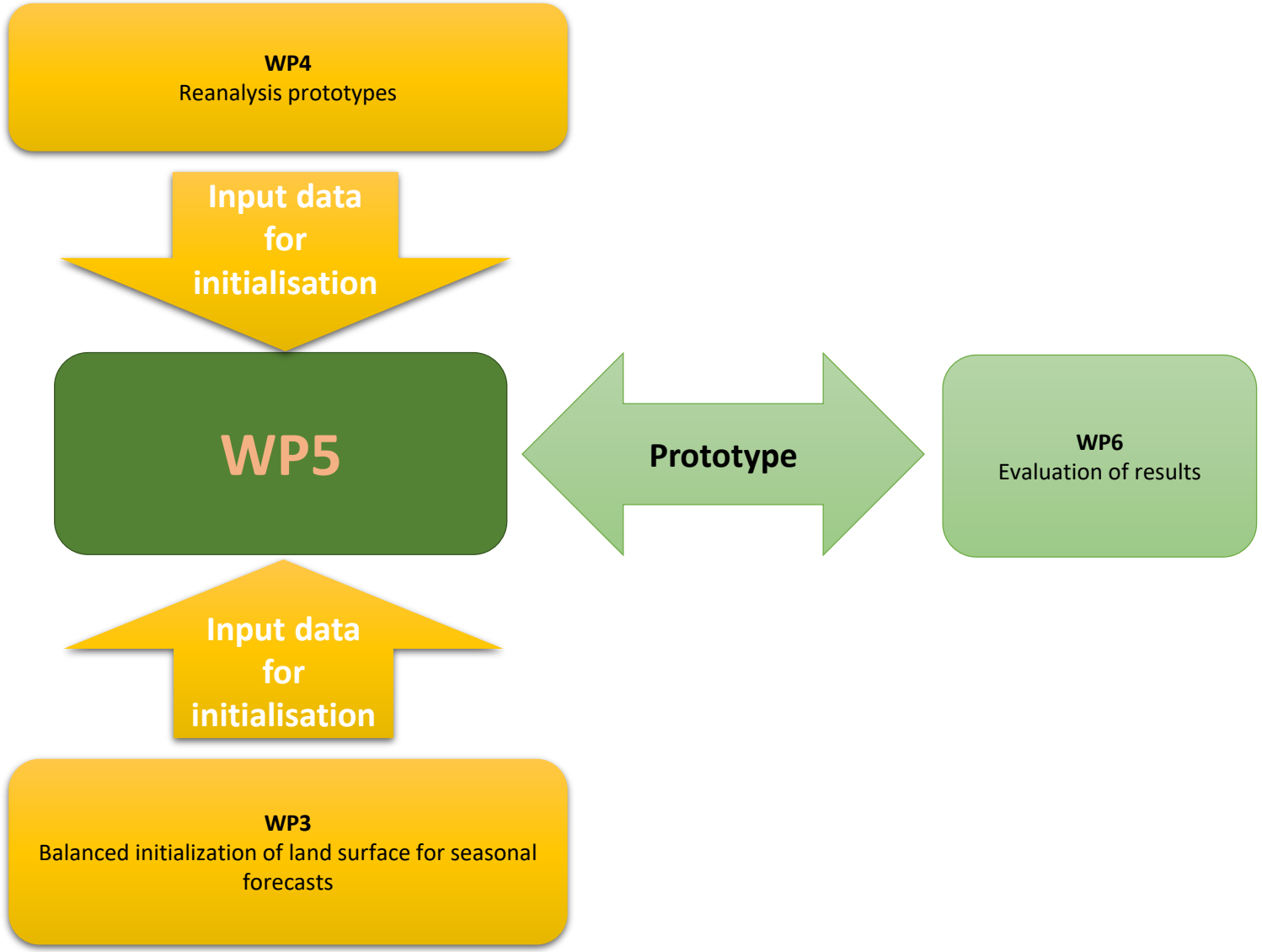
BSC	46.0 pm
ECMWF	36.0 pm
DWD	20.0 pm
CMCC	10.0 pm
Météo-France	7.5 pm
Met Office	6.0 pm
TOTAL	125.5 pm ~ 2.6 FTE (months 1-48)

WP5 role and objectives

WP5 will **coordinate** the **production** of seasonal forecast demonstrators designed to **test** options for land surface initialization in the operational systems participating in the C3S seasonal multi-system and perform a general common evaluation.

- Coordinate the set up of experimental protocol for seasonal forecast demonstrators
- Produce initialised ensemble retrospective forecasts (=reforecasts) aligned to the agreed protocol
- Collect, disseminate, curate the forecast data resulting from the demonstrators, for the duration of the project
- Design, implement, perform general, common evaluation of the resulting predictions, as a first step in the assessment of the impact of improved land initial conditions on forecast quality (bias and skill).

Links to other WPs



WP5 timeline

	M1	...	M6	...	M12	M13	...	M24	M25	...	M36	M37	...	M46	M47	M48
Task 5.1					ID											
Task 5.2											D5.1-5					
Task 5.3														D5.6		
Task 5.4																
Phases					P0			P1			P2					
Milestones					M5.1						M5.2					

Task 5.1: Design seasonal reforecast set benchmark, protocol, data management (M1-M12)
Task 5.2: Produce ensemble forecasts following experiment design (M6-M42)
Task 5.3: Assess changes to standard quality metrics and scores between successive demonstrators (M6-M48)
Task 5.4: Additional simulations to assess impact of specific enhancements (M1-M46)

Deliverables

ID: Experimental protocol for forecast demonstrators and for forecast performance assessment metrics (M12)
D5.1 to D5.5: Output of CMCC, DWD, ECMWF, Météo-France and Met Office demonstrators in the data archive (M36)
D5.6: Conclusions of the common assessment of the impact of improvements in land initialization on forecast performance (M46)

Milestones

M5.1: Completion of phase 0 demonstrator (M12)
M5.2: Completion of phase 2 demonstrator (M36)

Task 5.1 Design seasonal reforecast set benchmark, protocol, data management

- From M1 to M12
- Lead: BSC; contributing partners: CMCC, DWD, ECMWF, Météo-France and Met Office
- Internal deliverable (M12)

Demonstrators will be ensemble forecasts, initialised a few times in each year of a contiguous past period.

The experiment protocol - to be agreed between **WP5 and WPs 3 and 6,** in a dedicated meeting - will cover:

- period, integration length and the ensemble size;
- specification of the data to be submitted for analysis in task 5.3 and all other relevant tasks of the project; this includes variables, temporal and spatial resolution of output;
- specification of standards for encoding the data for submission, including documentation of the output data format and the forecast systems (initialisation)

Each seasonal forecast producer will select the most adequate initialisation options for their prototypes, and the timing for the completion of each demonstrator, but all choices should be appropriately documented.

Task 5.2 Produce ensemble forecasts following experiment design

- From M6 to M42
- Lead: ECMWF; contributing partners: CMCC, DWD, ECMWF, Météo-France and Met Office
- Deliverables **D5.1 to D5.5**: Output of CMCC, DWD, ECMWF, Météo-France and Met Office in the data archive (M36)

Following the experimental protocol defined in T5.1, each partner will select the initialisation methods and schedule the production of their forecast demonstrators, in line with the following steps:

- **phase 0**; the benchmark. It can be the current version of the system archived at C3S - thus be readily available from the beginning of the project - or a new set of simulations using a more up-to-date version of the model than that in C3S operations. This phase to be completed in **the first project year**;
- **phase 1** and **phase 2** – to be completed approximately by end of **year 2** and **year 3**, respectively. Phases 1 and 2 will use methods/datasets prepared in other WPs by agreed deadlines.

Specifics on these demonstrators (for each of the participants) are available on the project webpages.

Task 5.3: Assess changes to standard quality metrics and scores between successive demonstrators

- From M6 to M48
- Lead: BSC; contributing partners: ECMWF
- Deliverable **D5.6:** Conclusions of the common assessment (M46)

Aim: General evaluation of the resulting predictions from Task 5.2
What: A common forecast quality assessment at the global scale to the output of the seasonal demonstrators, focusing on atmospheric and land surface variables

How:

- calculating metrics for probabilistic and deterministic forecast products (RPS(S), CRPS(S), etc and correlation of ensemble mean, mean bias, etc., respectively),
- evaluating how significant the changes are with respect to the systems used in phase 0 (benchmark), using more than one (global) observation-based dataset (e.g. ERA5, JRA55, GPCP) as reference to illustrate uncertainty due to the reference

Where & who: The assessment will be performed on ECMWF's HPC with the evaluation software developed and deployed by BSC
When: Every time after the end of each phase 0, 1 and 2.
Result: Scores – through a searchable interface accessible to all partners – and reports of main findings.

Task 5.4 Additional simulations to assess impact of specific enhancements

- From M1 to M46
- Lead: ECMWF; contributing partners: to be determined during the project
- No deliverables

The task will cover simulations testing developments in other work packages, during the project.

Participation will be determined depending on results of the early-stage analyses and on the likelihood of the individual enhancements tested being applicable in the real-time, operational system in the foreseeable future.

These additional simulations will include:

- sensitivity experiments on the effect of time-varying vegetation and land data assimilation on forecast quality. The experiment design will be finalised in T6.2; the analysis will take place in WP6. ECMWF and Met Office will take part in this test;
- simulations to test initialisation of ECMWF's forecast system with data from reanalysis with outer-loop coupling (output of T4.3 - ERA7-Pv1).

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Thank you

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