WP1: LAND DATA ASSIMILATION METHODOLOGY FOR REANALYSIS

Co-leads: Filipe Aires (Estellus), Pete Weston (ECMWF)

CERISE kick-off meeting, 17th January 2023

WP1 team and resources (covering T+0 -> T+42)

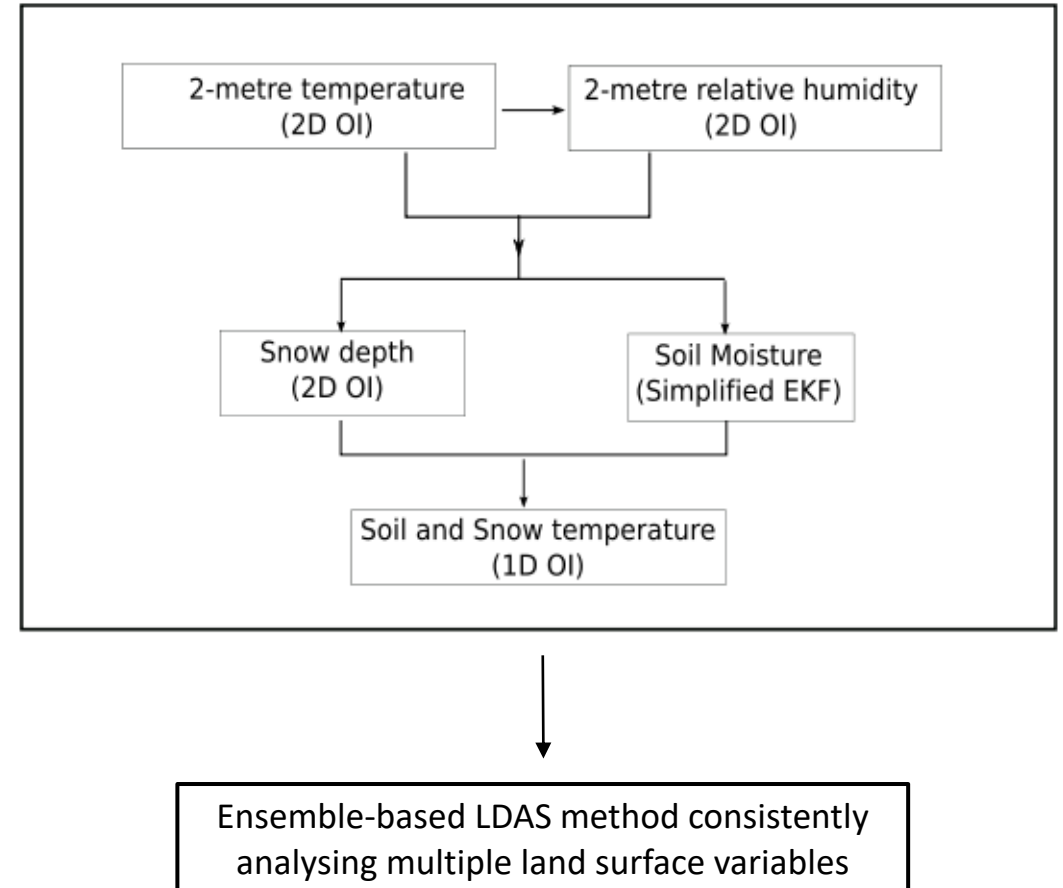| Institute	Resources (person months)
ECMWF	46
SMHI	39
Estellus	29.7
Met Norway	28
Total	**142.7**

Technical and scientific motivations and aims
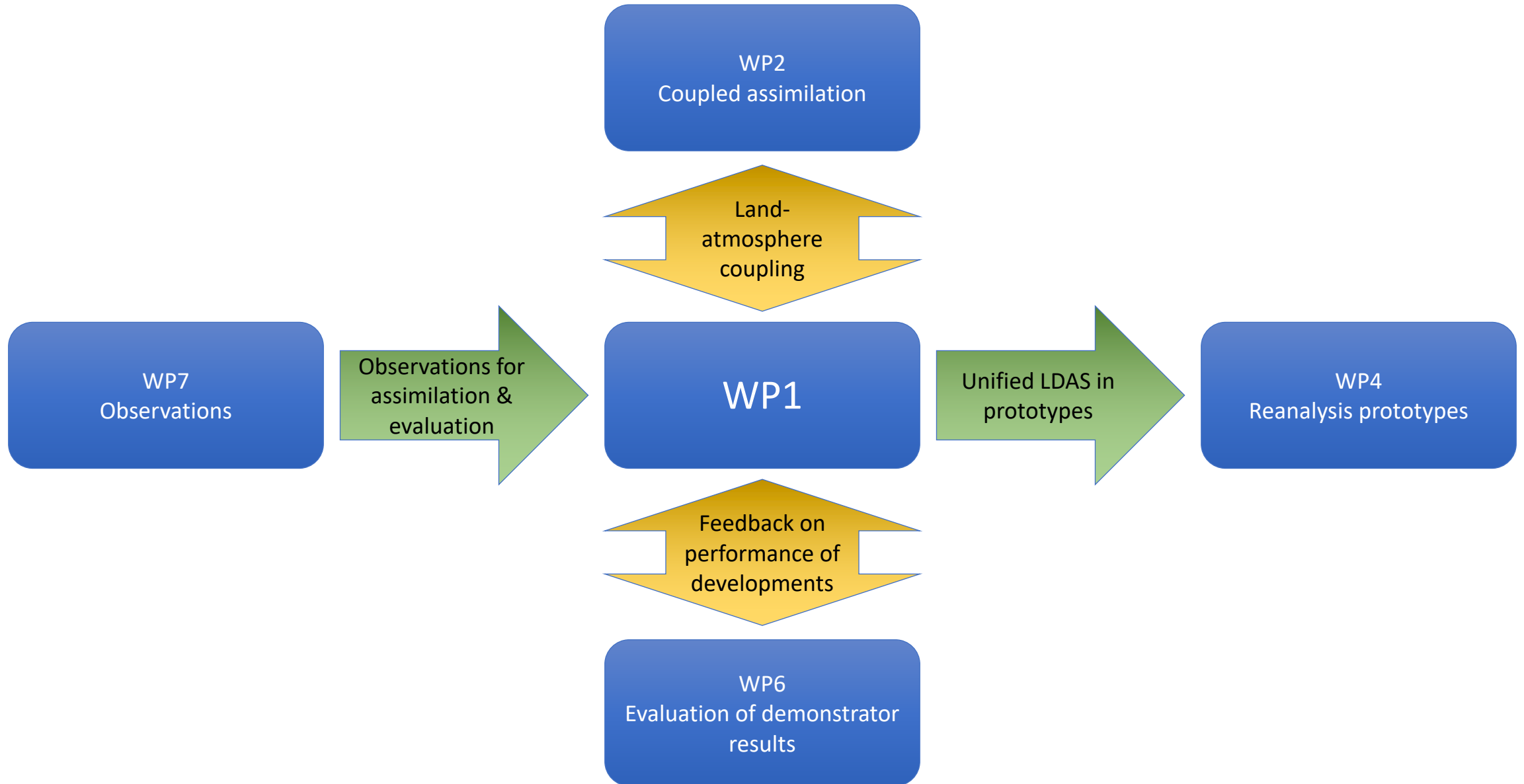
Technical and scientific motivations:

- Current land surface data assimilation systems use a diverse set of methodologies
  - Each task produces separate, uni-variate analyses
  - Challenging to maintain, develop and couple to other Earth system components
- Ensemble information is under-exploited
- Observations over land, snow and sea-ice are currently under-exploited
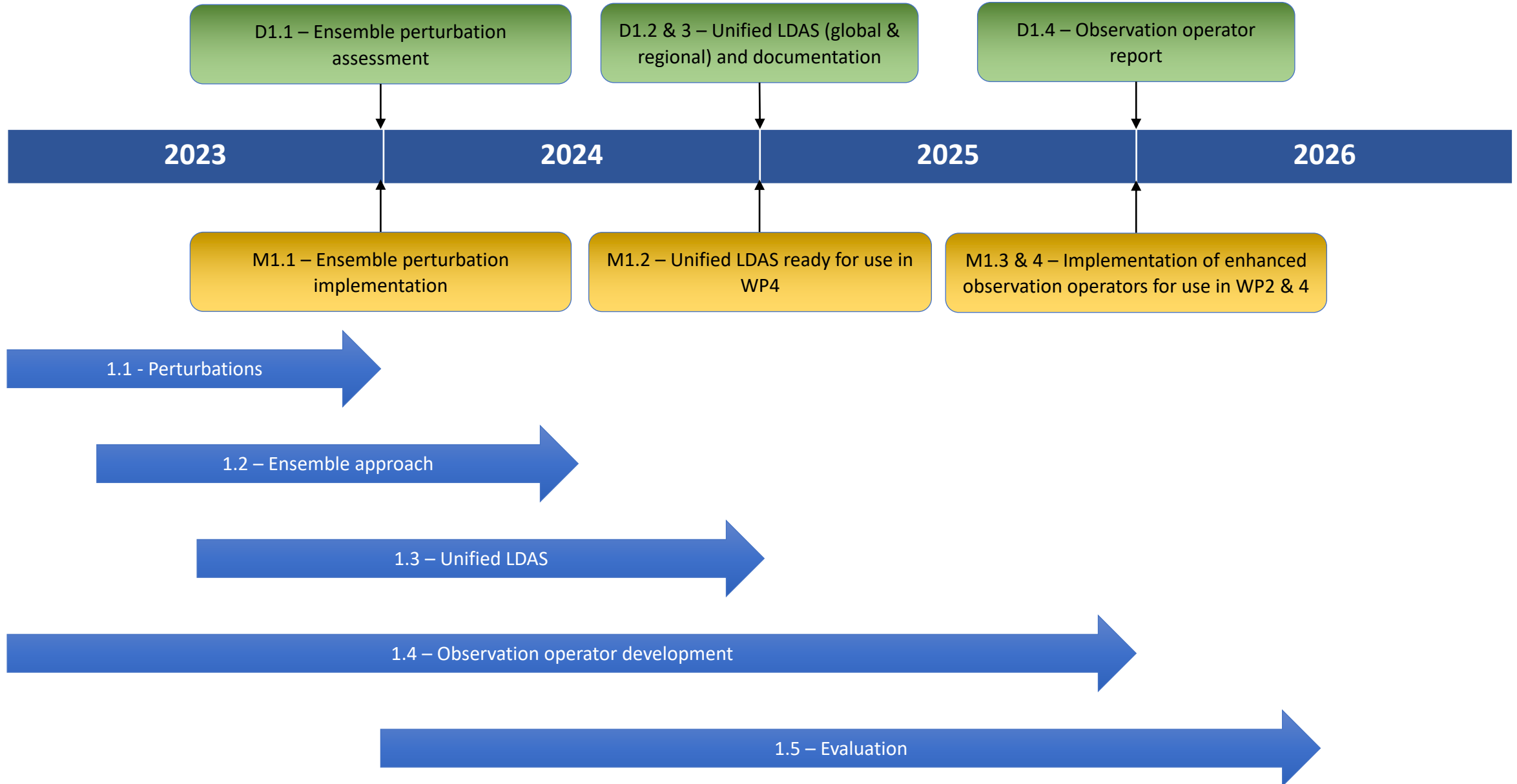
Aims:

- Develop and implement unified land data assimilation systems for global and regional reanalysis systems
  - Producing consistent multi-variate land surface analysis
  - Enhanced use of ensemble perturbations and background errors
- Develop a novel observation operator enabling improved use of observations over land, snow and sea-ice

Links to other WPs

Timeline and deliverables (T+0 -> T+42)

| D1.1 – Ensemble perturbation assessment | D1.2 & 3 – Unified LDAS (global & regional) and documentation | D1.4 – Observation operator report |

| **2023** | **2024** | **2025** | **2026** |

| M1.1 – Ensemble perturbation implementation | M1.2 – Unified LDAS ready for use in WP4 | M1.3 & 4 – Implementation of enhanced observation operators for use in WP2 & 4 |

1.1 - Perturbations

1.2 – Ensemble approach

1.3 – Unified LDAS

1.4 – Observation operator development

1.5 – Evaluation

WP1 Land Data Assimilation Methodology

Aims: To unify the land data assimilation systems (LDAS) used for regional and global reanalyses and develop ensemble-based methods for the reanalysis prototypes (WP4)

- Task 1.1 (Lead - Met Norway): Investigate land surface perturbation generation methods for Land DA systems (T0-12)

- Task 1.2 (Lead - SMHI): Develop ensemble-based filter LDAS approaches for soil moisture (T3-18)

- Task 1.3 (Lead - ECMWF): Unify the LDAS by extending the ensemble-based system to assimilate in-situ screen level and snow depth observations instead of using separate 2D-OI, to analyse screen level variables, soil moisture, soil temperature and snow variables consistently. (T6-24)

- Task 1.4 (Lead - Estellus): Develop land surface forward modelling for the low frequency passive MW (1.4-36GHz) enabling MW Tbs to be linked to multiple model variables simultaneously (link to WP2) (T0-36)

- Task 1.5 (Lead - ECMWF): Independent validation and evaluation of the new approaches (e.g. IFS experiments, link to WP6 & WP7) (T12-42)

Thank you

ECMWF, MetNorway, SMHI, Météo-France, DWD, CMCC, BSC, MetOffice, DMI, ESTELLUS, IPMA, NILU