SEEDS - Sentinel EO-based Emission and Deposition Service
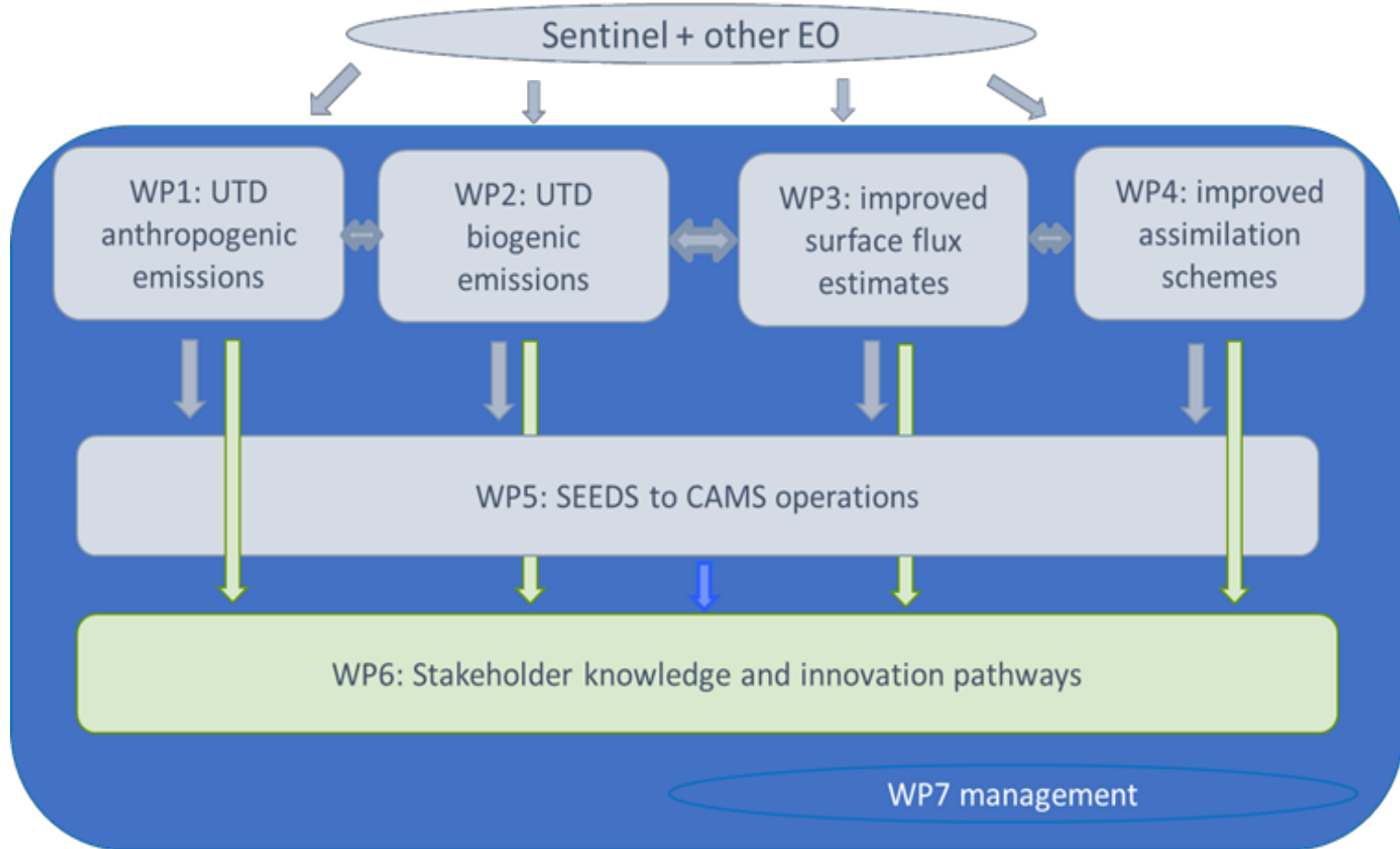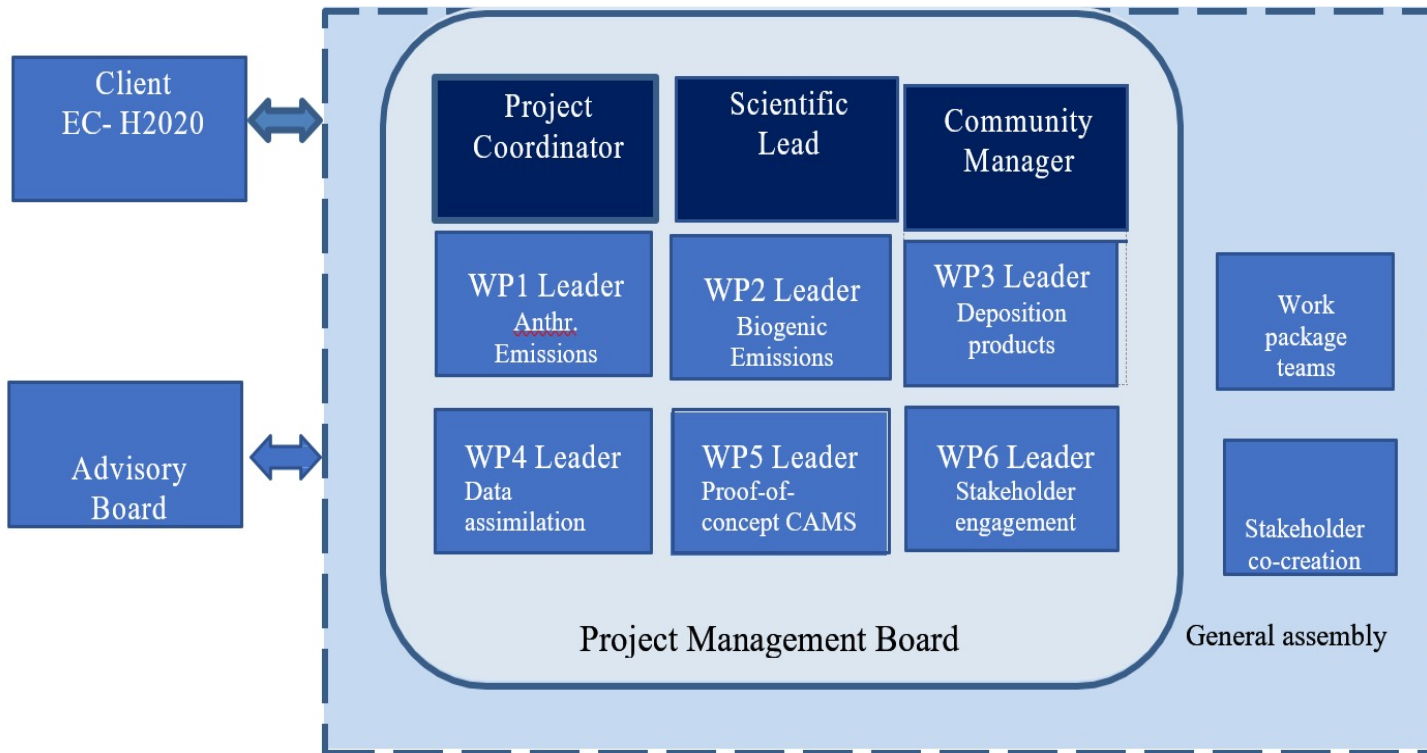

On-line Kick-off meeting - 19th January 2021

SEEDS – Workpackages

SEEDS workpackage structure – Nitrogen and BVOCs

SEEDS – Management

SEEDS Consortium

NILU - Norwegian Institute for Air Research

KNMI - Royal Netherlands Meteorological Institute

BIRA- IASB - Royal Belgian Institute for Space Aeronomy

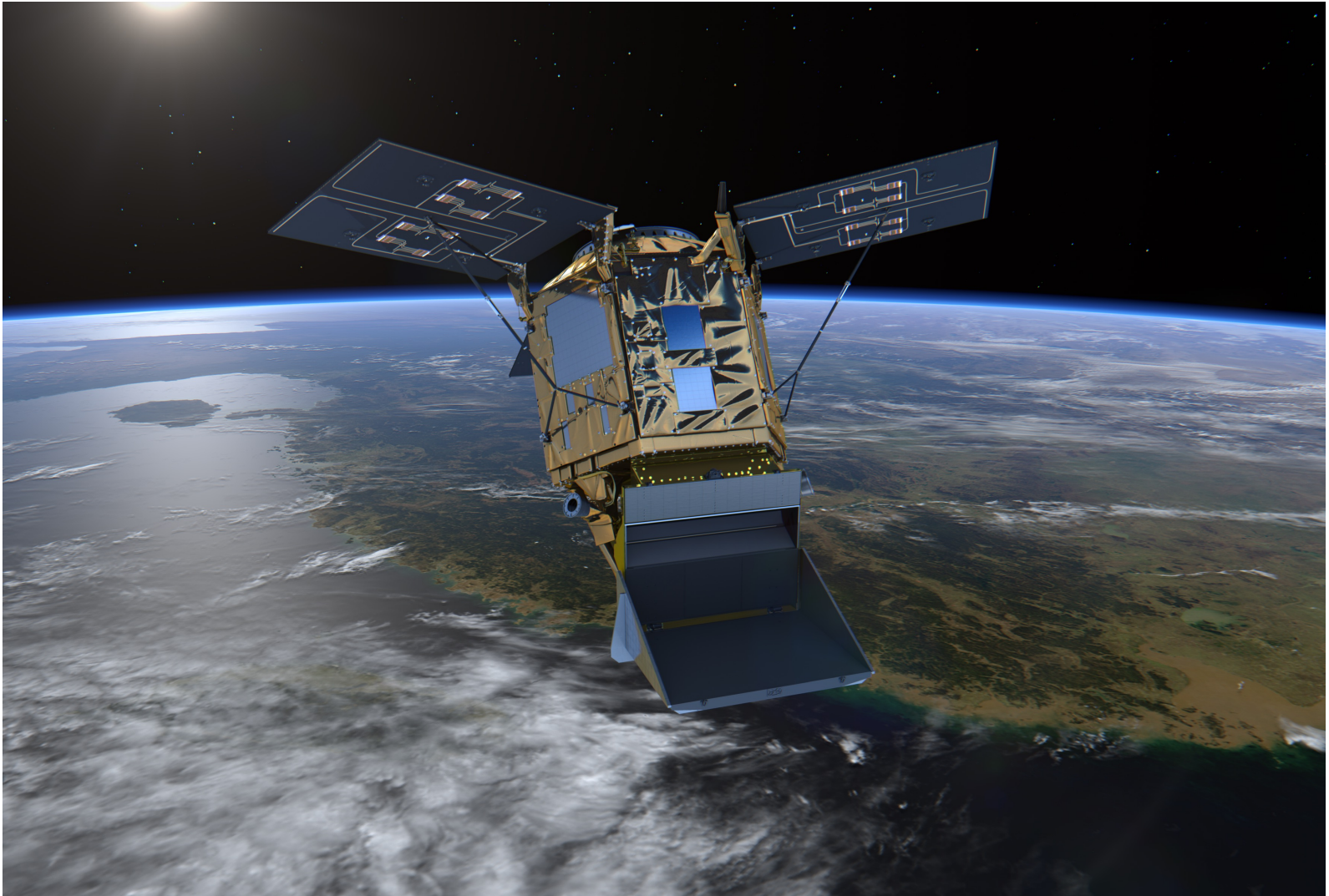CERFACS - Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique

MF-CNRM - Météo France – Centre National de Recherches Météorologiques (Météo-France + CNRS)

ISAT – isardSAT SL (ISAT + Lobelia Earth SL)

Sentinel 5P and Sentinel 4 (TROPOMI and IASI)

SEEDS
Sentinel EO-based Emission and Deposition Service

The main objective of SEEDS it to develop an "add-on" service to the Copernicus Atmospheric Monitoring Service (CAMS) on pollutant emissions and depositions that will enhance the use of satellite observations and provide new products to boost European competitiveness in air quality (AQ) management, precision agriculture and industrial sector applications.

➢ Focus on NOx, NH3, ozone, biogenic VOCs

- Improved Up-to-date emissions

- Improved depositions embedded in the land—surface production chain.

- DA algorithm for enhanced use of Sentinel 4 data

SEEDS – New products

SEEDS is closely linked to CAMS and aims to enable the future evolution of the service.

The new products proposed by SEEDS are:

➢ **Up-to-date top-down emissions** improved by exhaustive use of EO and inverse modelling- both for anthropogenic and biogenic emissions. (DECSO and MAGRITTE models)

➢ Inclusion of LAI data assimilation in a land surface model capable of dynamic simulation of vegetation phenology and coupling to bottom-up emission and **deposition modelling** (based on SURFEX-LDAS-MONDE)

➢ Open-source code for application of the advanced **4DEnVar data assimilation** algorithm to prepare for better exploitation of the hourly data from Sentinel 4.

The CAMS Entrusted Entity (ECMWF) is involved in SEEDS through its Advisory Board:
Vincent-Henri Peuch is part of the SEEDS Advisory Board and as such is expected to help guide the work and review the main outputs for future use in CAMS

SEEDS – Demonstration

- All products in SEEDS are open, stand-alone & modular

- Dedicated WP5 for **Demonstration of the capabilities of the SEEDS products and data for the CAMS operational system**

- **Dedicated WP6 for co-creation, uptake and demonstration of SEEDS products** - WP6 focuses on "Stakeholder engagement and innovation pathways"

  - ➢ Industry – Oil and gas

  - ➢ Agriculture - WGE + DAGRI

  - ➢ Urban Management – Barcelona as Case Study

SEEDS products target operationalization beyond the end of the project

SEEDS Advisory Board

The SEEDS **Advisory Board (AB)** is to provide additional insight and strategic advice into the development of the project and is expected to play a key role in the promotion of the results from SEEDS.

It consists of 5 renowned experts (in alphabetic order)::

- Dr Chris Dore - Director, Aether Ltd- TFEIP Chair – Links to Emissions experts

- Dr. Isaura Rabago – Ciemat – Chair to CLRTAP/WGE – Links to ecosystem experts (depositions)

- Dr. Jessica Seddon- World Resources Institute – Links to Climate Change

- Dr. Vincent-Henri Peuch -ECMWF – Links to CAMS

- Dr. Les White - AErisEurope – Links to Industry

SEEDS Budget

SEEDS STAFF EFFORT - 3 YEARS								
	WP1	WP2	WP3	WP4	WP5	WP6	WP7	TOTAL
1. NILU	0	5	15		2	4	6	32
2. KNMI	34	5	0	0	1	3	1	44
3. BIRA-IASB	5	21	0	0	1	1	1	29
4. CERFACS	0	0	0	16	1	1	1	19
5. MF-CNRM	0	0	6	1	14	1	1	23
6. ISAT	0	0	0	0	1	19	3	23
TotalPersonMonths	39	31	21	17	20	29	13	170

Budget allocation per institute	Total
NILU	400 125,0
KNMI	339 250,0
BIRA - IASB	273 000,0
CERFACS	172 500,0
MF-CNRM	170 000,0
ISAT - LOBELIA	144 000,0
TOTAL	1 498 875,0

SEEDS Expected impact

✓ *SEEDS products will be tested extensively in the current CAMS system to propose **improvements and demonstrate pathways for the Copernicus Atmospheric Monitoring Service evolution***

✓ ***SEEDS** proposes to make extensive use of S5p TROPOMI observations and IASI or CRIS data for atmospheric reactive gases, and in addition LAI from PROBA_V satellite, soil moisture from S1 C- SAR and SIF data, thus contributing to the **integration of different observation capacities** and aiming to a clear demonstration of an increase in the service performance*

✓ ***SEEDS will contribute to increased coverage of EU policies**, in particular by better understanding of core emissions, as better information about emissions is at the core of the EU sustainability policy.*

SEEDS Kick-off discussion

Workplan discussion - the work package presentation and discussion slots follow all the same structure:

➢ Understanding each work package

➢ Identifying links between work packages

➢ Planning the next 6 months

➢ Open questions for discussion at the start the project

➢ Discussion and comments from Advisory Board

SEEDS Kick-off meeting - Agenda

09:00 - 09:05	Welcome and presentation round
09:05 - 09:15	SEEDS goals and ambition (Leonor Tarrasón, SEEDS coordinator)
09:15 - 09:25	The SEEDS project and Horizon Europe (Monika Kacik, Project Officer, REA)
09:25 - 09:30	*Introduction to Workplan discussion*
09:30 – 10:00	**WP 1**: Up-to-Date (UTD) Anthropogenic Top-down Emissions (Ronald van der A, KNMI)
10:00 – 10:30	**WP 2**: Up-to-Date (UTD) Biogenic Emissions (Jenny Stavrakou, BIRA-IASB)
10:30 – 11:00	**WP 3**: Improved Land Surface Data and Deposition Fluxes (Paul Hamer, NILU)
11:00 -11:15	*On-line break*
11:15 – 11:45	**WP4:** Improved Data Assimilation Schemes (Emanuele Emili, CERFACS)
11:45- 12:15	**WP5**: SEEDS to CAMS operations (Virginie Marecal, MF-CNRM)
12:15 -12:45	**WP6:** Stakeholder Knowledge and innovation pathways (Aytor Naranjo, Lobelia Earth)
12:45 - 13:05	**WP7:** Managing SEEDS implementation (Leonor Tarrasón, NILU)
13:05 - 13:15	Next steps
13:15	*End of kick-off meeting*

WP 1 - KNMI -Anthropogenic emissions

- NOx (TROPOMI)
- HCHO (TROPOMI)
- NH3 (IASI, CrIS)

- Anthropogenic NOx: energy sector, policy makers, CO2 precursor
- Biogenic NOx: agricultural sector
- NH3: nitrogen cycle, agricultural cycle
- High resolution up-to-date emissions: regional CAMS modelling
- 3 hourly NOx emissions: S4 preparation

WP2. Natural top-down emissions over Europe

Natural emissions : large source of uncertainty for air quality forecast and climate models (large spatiotemporal variability, strong EF variability, extrapolation of local measurements to larger scales)

Isoprene

Fire emissions

Soil NOx emissions

Narrowing-down the uncertainty for these emissions : added-value for CAMS