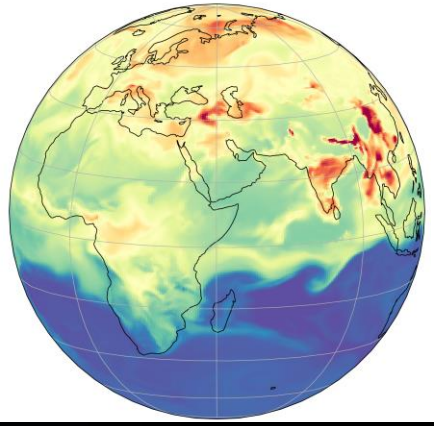
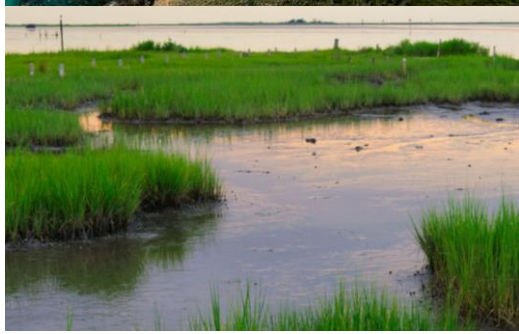
Process Attribution of Regional emISsions (PARIS)

Anita Ganesan on behalf of 17 institutions

VERIFY Annual Meeting

11 May 2022





Project scope

- HORIZON-CL5-2022-D1-02-01: Verification and reconciliation of estimates of climate forcers
- Improve the ability to reconcile top-down estimates of climate forcers against inventories
- Improve the attribution of fluxes (anthropogenic vs natural and by source)
- Includes all major climate forcers
- Builds on European infrastructure (ICOS, ACTRIS, etc)

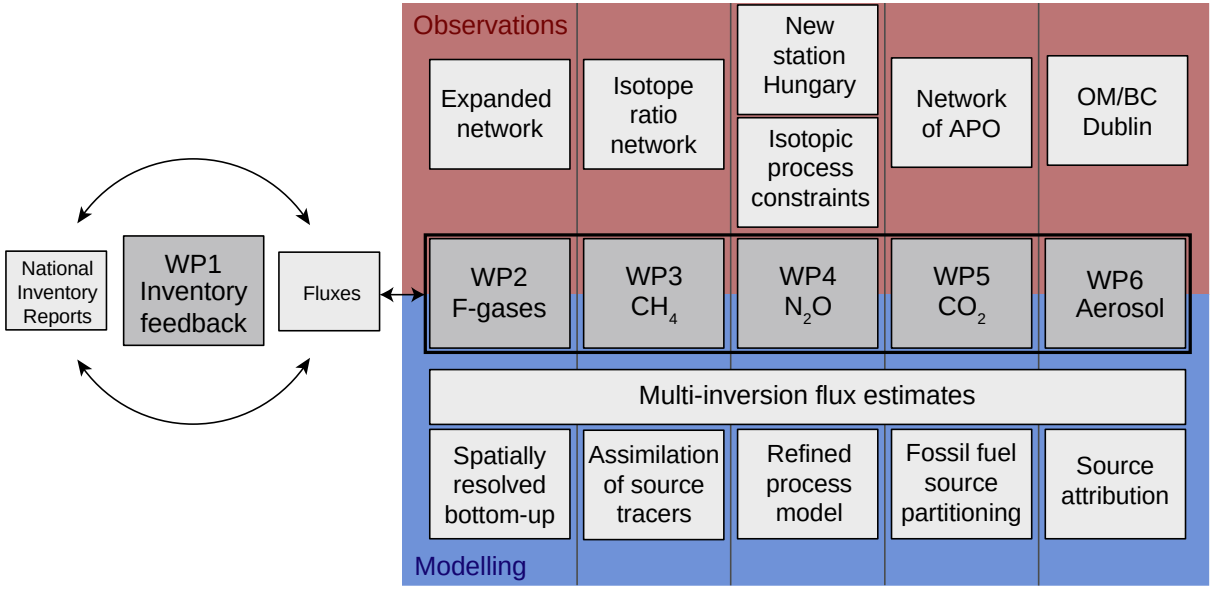
PARIS team

(in no particular order)

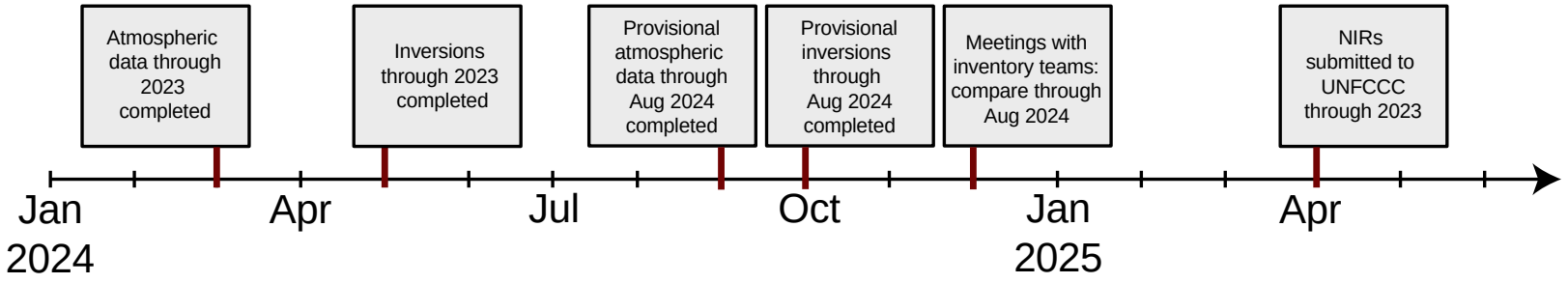
Country	Participants
United Kingdom	University of Bristol (coordinator) University of Edinburgh University of East Anglia Met Office
Netherlands	Wageningen University Utrecht University University of Groningen
Germany	University of Frankfurt DWD Karlsruhe Institute for Technology Oekorecherche
Norway	NILU
Italy	University of Urbino
Hungary	Institute for Nuclear Research (ATOMKI)
Switzerland	Empa Agroscope

Principles

- Observational and modelling advances for each climate forcer
- Advancement of existing/established methods and for countries already working towards top-down reporting
- Development of new national capability for countries aspiring to this goal
- Iterative exchange of information with national inventory compilers



Inventory engagement plan



- PARIS model is annual engagement with national inventory teams, each year preparing a draft Annex to the National Inventory Report, for gases targeted in that country
- PARIS has a national lead that will meet with the national inventory contact. A lead from another country will also be present to share practices across countries
- Sector-specific, *where possible*, to make some progress in speaking the language of inventories

National inventory compilers

Country	Substance	PARIS colleague to lead in-country inventory collaboration
United Kingdom	CO_2, CH_4, N_2O, F-gases	Alistair Manning
Ireland	CH_4, F-gases, Aerosol	Damien Martin
Netherlands	CO_2, CH_4, N_2O, F-gases	Wouter Peters
Germany	F-gases, CH_4, N_2O	Andrea Kaiser-Weiss
Switzerland	CH_4, N_2O, F-gases	Stephan Henne
Italy	F-gases, CH_4, Aerosol	Michela Maione
Norway	F-gases	Chris Lunder
Hungary	CH_4, N_2O, F-gases	László Haszpra

Objectives

Forcer	Major Objectives
F-gases	• Engage early with compilers on F-gases due to relatively simple sources • Develop new spatially disaggregated bottom-up information for Europe • Add 5 new observation stations through intensive (daily) flask sampling
CH4	• Work toward source-level estimation of emissions using isotopes and other tracers (ethane) • Expand isotopic ratio measurements with new *in situ* platforms and mobile platforms • Expand measurements and inverse modelling into Hungary
N2O	• Advance Tier 3 process-model approaches in Switzerland/Germany • Isotopically calibrate Tier 3 process models to better represent processes • Develop N_2O measurements in Hungary
CO2	• Implement new Atmospheric Potential Oxygen (APO) measurements in UK and Benelux • Work with inversion groups to determine the detectability of inventory errors in current methods and observations
Aerosol	• Focus on OM and BC aerosols source apportionment • Extend new aerosol mass spec measurements across Ireland

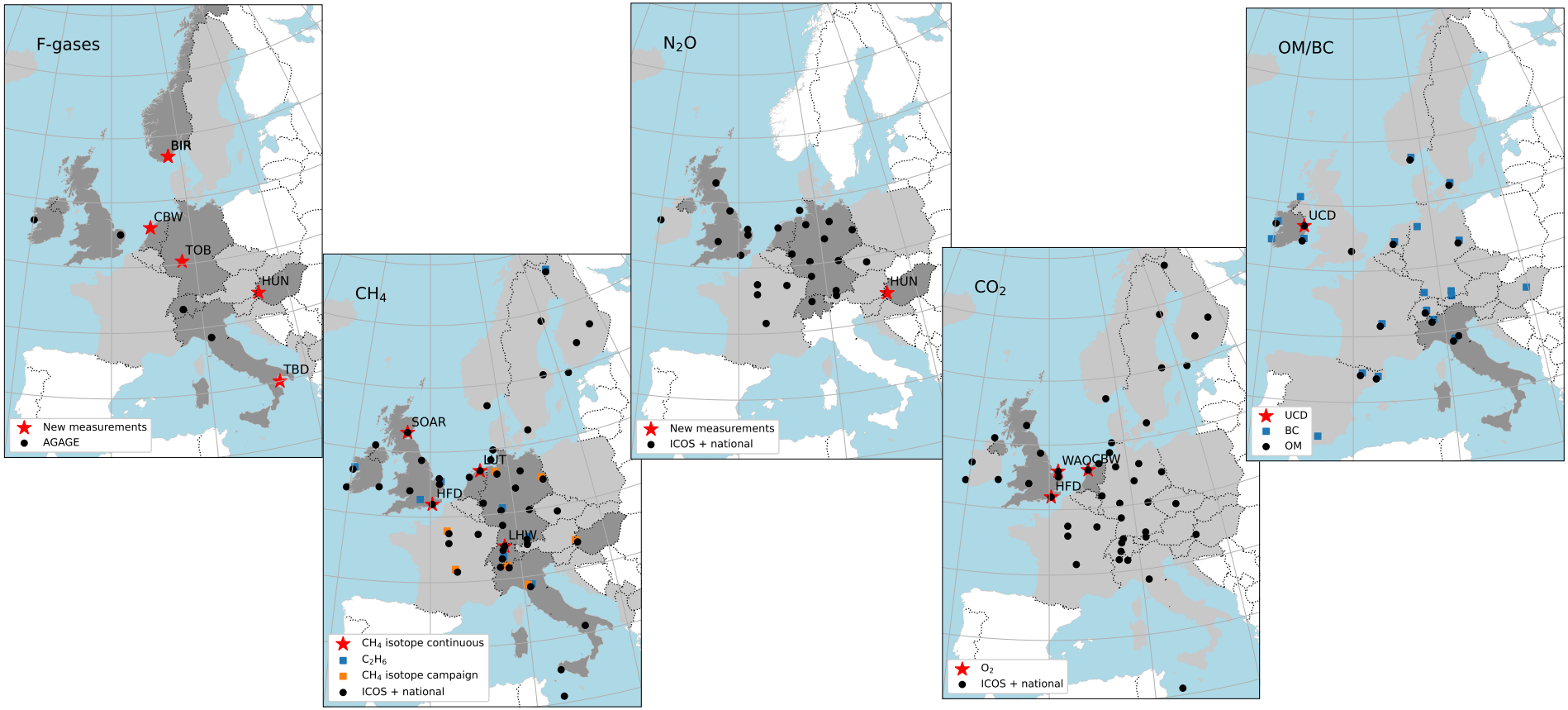
In all cases multi-model inversions will be used and in-country inversion capability developed

Measurements developed/extended in PARIS

Station Name	Country	ID	New/extended measurements
Birkenes	Norway	BIR	F-gases (flasks, analysed at NILU)
Cabauw	Netherlands	CBW	F-gases (flasks, analysed at UNIVBRIS), APO (in situ)
Dublin	Ireland	UCD	OM and BC
Heathfield	UK	HFD	$\delta^{13}C\text{-}CH_4$, $\delta D\text{-}CH_4$ (in situ)
Hegyhátsál	Hungary	HUN	F-gases (flasks, analysed at GUF) $\delta^{13}C\text{-}CH_4$ (in situ) N_2O (in situ)
Lutjewad*	Netherlands	LUT	$\delta^{13}C\text{-}CH_4$, $\delta D\text{-}CH_4$ (in situ)
SOAR Tower*	UK	SOAR	$\delta^{13}C\text{-}CH_4$, $\delta D\text{-}CH_4$ (in situ)
Taunus	Germany	TOB	F-gases (in situ)
TBD**	Italy	TBD	F-gases (flasks, analysed at UNIURB)
Weybourne	UK	WAO	APO (in situ)

- **Either the Lutjewad or SOAR tower will be equipped with an Aerodyne $^{13}CH_4$, CH_3D system**
- **** Location, from a selection of already-identified potential sites, to be determined based on an OSSE**

Measurements developed/extended in PARIS



"Focus countries" in dark grey