Towards a European operational observing system to monitor fossil CO_2 emissions

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14/10/2016

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Opportunity for a CO_2 space capacity

Political context & challenges

Mitigating Climate Change requires **reducing GHG emissions**, in particular CO_2 (IPCC AR 5)

Ambitious plans from the EU Member States for reduction targets at horizon 2020 and 2030 through COP-21

PARIS2015

CO_2 emission reporting is based on bottom up approach using national statistics (mainly on fuel consumption) in Kyoto-Annex I countries. **Independent** datasets would help improving periodicity & reliability as well as reducing uncertainty of the self-reporting exercise

Support countries in evaluating their Nationally Determined Contributions in the CO_2 budget and the **effectiveness of their CO_2 emission reduction strategies**

Opportunity for a CO_2 space capacity

Political context & challenges

European Parliament
2014-2019

TEXTS ADOPTED
Provisional edition

P8_TA-PROV(2015)0359

Towards a new international climate agreement in Paris

European Parliament resolution of 14 October 2015 on Towards a new international climate agreement in Paris (2015/2112(INI))

53. Points out that the use of space-based assets should be considered in the implementation of measures aimed at mitigating and adapting to climate change, particularly through the monitoring and surveillance of GHG emissions; urges the Commission to actively contribute to a global monitoring system for CO_2 and CH_4; calls on the Commission to promote efforts towards developing an EU system of measuring GHG emissions in an autonomous and non-dependent manner, using and expanding the missions of the Copernicus programme;

Roadmap to operational system

ESA proposed to its member states a **generic roadmap** for the evolution of the Copernicus Space Component

CO_2 monitoring is in the top priority list and used as first case to explore implementation, see **CO_2 Roadmap**

ESA and the European Commission jointly established by nomination a **CO_2 Monitoring Task Force** of experts (Task A on space component)

The system requires a broad international support and in the task force involves other space agencies

Annex 1a - CSC Evolution DRAFT CO2 Roadmap

	2015	
Oct.	**CO2 Report published by DG GROW**	COM
	2016	
Feb.	**Nomination of Task Force of experts**	COM/ESA
Jul./Sep	Kick-off of EC/ESA **End-to-end Architecture Studies** for CO_2 emissions monitoring system	COM/ESA
Apr. – Dec.	**Draft CO_2 Mission MRD**	COM/ESA
	2017	
Dec.	**Detailed technical requirements for the overall CO_2 System**	ESA/EUM/ECMWF
	2018	
	Phase A/B1	ESA
	2019	
	Phase B2	ESA
	2020	
	Instrument QM development	ESA
	2022	
	Procurement of recurrent units of CO_2 Mission	ESA
	2024/2025	
Jan.-Dec.	**First (Pre-) operational CO2 mission** launched	ESA
	2030	
Nov.	**Constellation of operational CO2 missions launched**	ESA

Opportunity for a CO_2 space capacity

Copernicus context

The **Copernicus programme** constitutes the appropriate frame for supporting an operational European CO_2 space initiative. Possibly implementing it as one of its Sentinel missions

Providing the European Union a **unique and independent** source of actionable information, which would address multiple stages of the policy cycle

EU wants to be independent to assess the impact of the international climate agreements

Space based CO_2 measurement objectives

Space component

Atmospheric CO_2 from space for fossil CO_2 emissions monitoring:

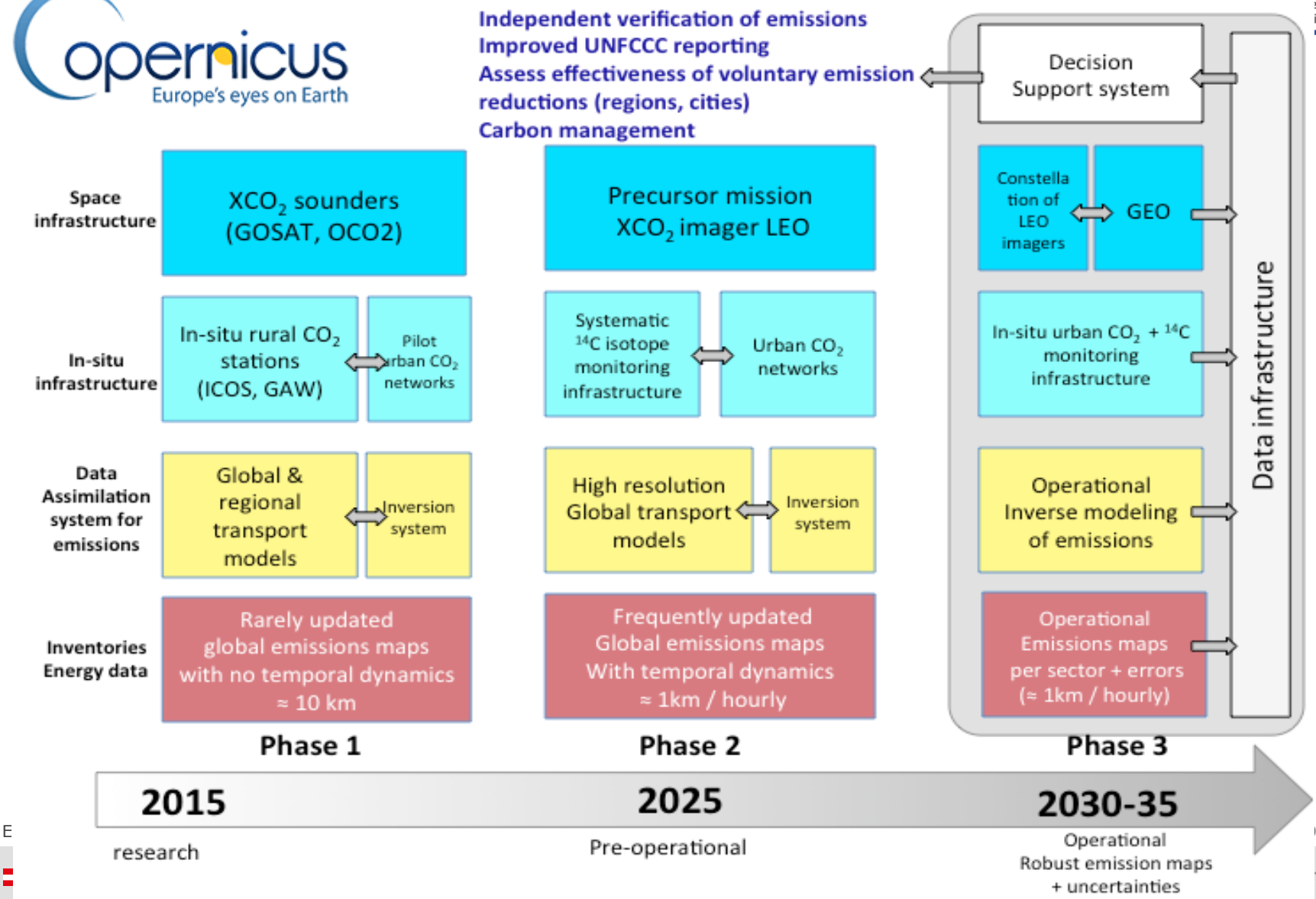
- to verify the trends of the emissions of emitting hot spots at global scale
- to detect newly upcoming hot spots (e.g. new oil production sites)
- to assess whether the global emission reduction promised by the "stocktake" is actually measurable in the atmosphere.
- to acquire uniform, homogeneous and indisputable global datasets made openly available to monitor man-made CO_2 emissions and therefore support national/local emission reduction strategies

Primary mission objective: support to monitoring of fossil CO_2 emissions

Operational mission: ensure robustness & reliability

Space based CO_2 measurement objectives

Proposed strategy



Space based CO_2 measurement objectives

Proposed strategy

By **2025** a possible European carbon mission delivering column CO_2 (with high resolution, high accuracy and imagery).

By **2030** an end-to-end operational system to monitor fossil CO_2 emissions (an integrated system using all available European and non-European data).

Conditioned by appropriate financing beyond 2020 (next MFF)

Nomination of a CO_2 monitoring task force with two interactive WPs:

- **Task A** (co-convened by ESA-EC): Focus on the space component - more specifically a CO_2 pre-operational mission;
- **Task B** (convened by EC): Focus on ground-based infrastructure –an end-to end operational emission monitoring system.

Take home

1. European Union intends to establish an operational CO_2 emission monitoring system by 2030. This system should support countries in monitoring their efforts to reduce CO_2 emissions down to the scale of major cities and power plants
2. This system will require bottom-up emission maps, an operational Fossil Fuel Data Assimilation System and adequate space-based and in-situ CO_2 observations, being pre-operational with a first satellite CO_2 imagery mission launched around 2025
3. This system should be part of the Copernicus programme, and will be complementing similar efforts of third parties and be the European contribution to an international CO_2 monitoring framework ("virtual constellation") at global level