

EO Applications & EO AFRICA

ESA EO Info Day 2021

9th March 2021

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→ THE EUROPEAN SPACE AGENCY

Policy drivers and excellence in EO innovation

Key policy stakeholders & mechanisms

(public entities, international policy groups, public conventions and agreements, initiatives...)



EXPANDING THE PUBLIC SECTOR BENEFIT

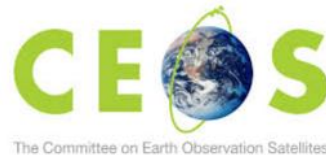
- Pioneer new applications
- Advance the uptake of EO
- Excellence in EO innovation

EO value adding industry and academia



International EO dialogue

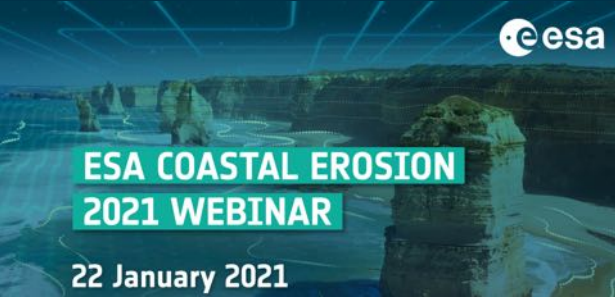
GEO GROUP ON
EARTH OBSERVATIONS



Amplification of user communities with the support of cutting-edge ICT

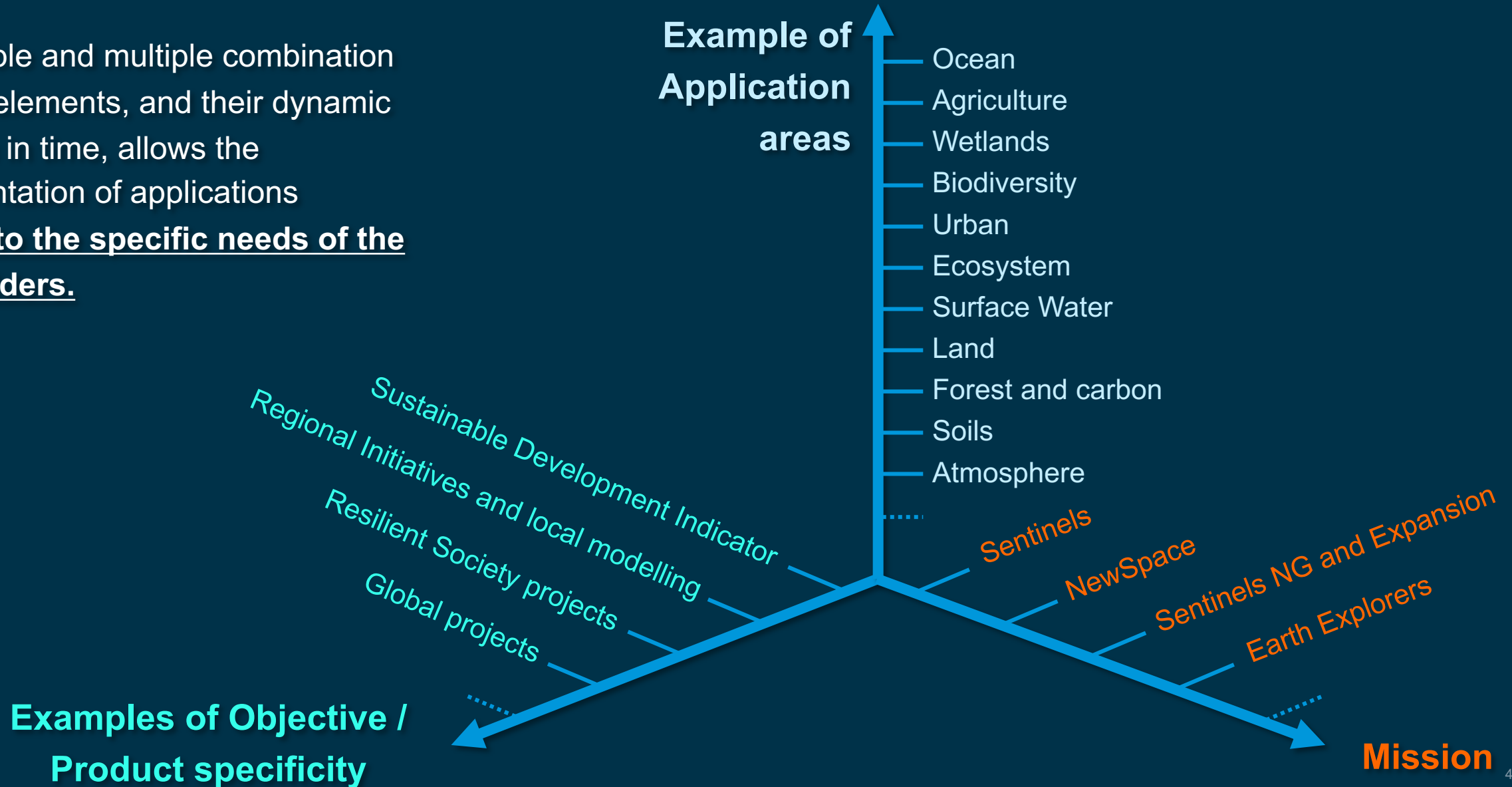


User communities at the heart of the activities



Actions & project dimensions

The flexible and multiple combination of these elements, and their dynamic evolution in time, allows the implementation of applications tailored to the specific needs of the stakeholders.



Opportunities of upcoming ITTs

Brief description: The World Emission project shall be conceived as EO application project that aims at developing innovative EO products and methods in response to authoritative end-user requirements. The project aims at **evaluating emission estimates** from satellite observations by using products from latest satellite technology, which allows **high spatial and temporal resolution and the rapid availability of these estimates to users**. Specifically the activity will cover the assessment of methane (**CH₄**) emissions from major anthropogenic sources and the development of top-down estimates from satellite retrievals. Emission estimates for Volatile Organic Compounds (**VOC**), the apportionment between anthropogenic and biogenic sources and their role in Ozone pollution episodes (VOCs/NO_x ratio) shall be studied. Further, there will be a focus on ammonia (**NH₃**) release close to the surface related to agricultural practice like fertilization the investigation of high resolution measurements of water vapour (**H₂O**), high resolution measurements of Nitrogen dioxide (**NO₂**) and Sulfur dioxide (**SO₂**) from Sentinel-5p and the potential combination with Carbon dioxide CO₂ measurements. Another focus will be on the development of **CO₂** emission estimates in tropical regions.

Following up efforts of the ESA GlobEmission project, the project will ensure strong collaboration with user groups, e.g. EEA, national authorities. The project shall **prepare the ground for a long-term exploitation by large user communities**, and is expected to provide substantial and concrete benefits to target user communities.

Status: ITT launch in Q2/2021.

Duration: 24 months.

Budget: 1 Meuro.

Brief description: ESA's contribution to the international **Global Peatland Initiative** (GPI). Project objective is to prototype **improved mapping and monitoring** of intact, degraded and cultivated peatlands for conservation, management and restoration **in the tropics**. It shall derive **best practice guidance** and standardized methods used for the assessment of peatlands and their changes based on EO data and add dedicated modules to existing open source software tool boxes (e.g. GlobWetland, SWOS) to enhance national and regional capacities for peatland monitoring.

User organisations: UNEP, Greifswald Mire Centre, CIFOR, RAMSAR Convention, UNFCCC, Wetlands International, FAO, Indonesian Peatland Restoration Agency (BRG), Ministries of Environment from DRC, Rep. of Congo and Peru.

Status: ITT launch Q2 2021.

Duration: 18 months.

Budget: 500 Keuro.



www.globalpeatlands.org

Brief description: ESA's contribution to the international **Global Forest Observations initiative (GFOI)**, which is an informal partnership to help coordinate international support to developing countries on forest monitoring and greenhouse gas accounting for REDD+ and related activities. Project objective is to support the **R&D in GFOI** with a component manager in its role to **co-lead the efforts, and prioritise and catalyse research activities towards the development of operational forest monitoring**. Tasks comprises amongst others interaction with international forest and biomass research community, review of research priorities, identification of needs and gaps, establishment of an R&D plan, organisation of dedicated expert meetings and interaction with other GFOI components to enhance the consideration and uptake of novel approaches in national forest monitoring efforts.

Status: **ITT launch Q2 2021.**

Duration: **36 months.**

Budget: **300 Keuro.**

GFOI
www.gfoi.org



2030 Agenda for Sustainable Development: 17 goals, 169 targets, 232 Indicators

New norms to integrate the principles of sustainable development into country policies and programs

EO importance for the SDG's

Earth Observations potential contribution to the SDG Targets and Indicators



SDGs with most opportunities for EO data

Analysis performed by the GEO EO4SDGs initiative

Target <i>Contribute to progress on the Target yet not the Indicator per se</i>								Goal	Indicator <i>Direct measure or indirect support</i>				
			1.4	1.5				1 NO POVERTY	1.4.2				
		2.3	2.4	2.c				2 ZERO HUNGER	2.4.1				
		3.3	3.4	3.9	3.d			3 GOOD HEALTH AND WELL-BEING	3.9.1				
								4 QUALITY EDUCATION					
								5 GENDER EQUALITY	5.a.1				
						5.a		6 CLEAN WATER AND SANITATION					
6.1	6.3	6.4	6.5	6.6	6.a	6.b		7 AFFORDABLE AND CLEAN ENERGY	6.3.1 6.3.2 6.4.2 6.5.1 6.6.1				
		7.2	7.3	7.a	7.b			8 DECENT WORK AND ECONOMIC GROWTH	7.1.1				
							8.4	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE					
		9.1	9.4	9.5	9.a			10 REDUCED INEQUALITIES	9.1.1 9.4.1				
			10.6	10.7	10.a			11 SUSTAINABLE CITIES AND COMMUNITIES					
11.1	11.3	11.4	11.5	11.6	11.7	11.b	11.c	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	11.1.1 11.2.1 11.3.1 11.6.2 11.7.1				
			12.2	12.4	12.8	12.a	12.b	13 CLIMATE ACTION	12.a.1				
			13.1	13.2	13.3	13.b		14 LIFE BELOW WATER	13.1.1				
		14.1	14.2	14.3	14.4	14.6	14.7	15 LIFE ON LAND	14.3.1 14.4.1 14.5.1				
15.1	15.2	15.3	15.4	15.5	15.7	15.8	15.9	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	15.1.1 15.2.1 15.3.1 15.4.1 15.4.2				
							16.8	17 PARTNERSHIPS FOR THE GOALS					
17.2	17.3	17.6	17.7	17.8	17.9	17.16	17.17	17.18	17.6.1 17.18.1				








*“The integration of statistics, geospatial information, **Earth observations**, and other sources of Big Data, **combined with new emerging technologies**, analytics and processes, are **becoming a fundamental requirement for countries** to measure and monitor local to global sustainable development policies and programs”*

UN-GGIM co-chairs





<http://eohandbook.com/sdg/>




The SDG programmatic element is composed of the following 4 main components:

	1. SDG PATHFINDERS	 
	<p>Development of innovative and robust EO methods, addressing new areas of EO uptake in SDG methodologies.</p>	
	2. SDG SCALING-UP	 
	<p>Ramp up of EO methodological approaches to promote EO best practices across countries for synoptic monitoring and reporting on SDGs.</p>	
	3. SDG ENGINES	 
	<p>Customisation of EO exploitation platforms to support cost-effective SDG implementation by countries (priority to European infrastructures such as TEP and DIAS).</p>	
	4. SDG ENGAGEMENT	 
	<p>Stakeholder Engagement (scientific workshops, SDG MOOCs) to raise awareness and facilitate country appropriation.</p>	   

ITT in 2021 Q2 of overall contract value ~1.5 M Including :

SDG-1 	SDG 15.3.1 Pathfinder SEN4LDN	Develop and showcase new methodologies that exploit the high frequency and spatial resolution of the Sentinels to increase the spatial details of national assessments of land degradation and restoration and provide synoptic information for countries to plan LDN interventions at appropriate scales.	1 contract of ~400K
SDG-2 	SDG 11.1.1 Pathfinder Informal Settlement Mapping	Develop advanced AI-based models to automatically identify, delineate and characterise the spatial extent of slums, and support countries monitoring progress on the proportion of urban population living in informal settlements .	1 contract of ~300K
SDG-3 	SDG Engines EO Platform Solutions for SDG monitoring	Integrate EO data processing and data analytics engines on existing EO exploitation platforms for seamless integration into national SDG monitoring systems .	3 contracts of ~150K
SDG-4 	SDG 15.2.1 Pathfinder EO for Sustainable Forest Management	Develop innovative EO approaches in partnership with FAO for the production of indicators on the sustainable management of natural, semi-natural and planted forests, addressing the changes in extent and conditions for use in national and global forest assessment.	1 contract of ~400K

ITT in 2021 Q4 of contract value ~500 K

<div>SDG-5</div> <div></div>	<i>SDG 6.6.1 Scaling up Global Wetland Inventory</i>	In partnership with UNEP and Ramsar, scale up EO best practices on wetland inventory using a participatory and platform-based approach and deliver EO solutions for a global wetland monitoring that supports countries in the production of national data on the changes in spatial extent of water related ecosystems.	1 contract of ~500K
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Fostering
Partnership



Facilitating
R&D



Leveraging
Digital Tools



Reinforcing
Capacity



Enhancing
Data Accessibility

EO AFRICA: EO African Framework for Research, Innovation, Communities and Applications

Objective: Develop an African-European R&D partnership to facilitate the sustainable uptake of Earth Observation and related space technology in Africa.



EO AFRICA

- **Build on Strategic Partnerships:** The African Union Commission (AUC), DG-Devco/DEFIS/JRC, UN agencies
- **Ensure African Ownership** by engaging African national authorities, institutions and private sector
- **Leverage Cloud Computing** technology for a comprehensive EO data accessibility in Africa
- **Facilitate EU-Africa R&D collaborations** to evolve and innovate EO applications with Africans for Africans
- **Focus on urgent SDGs – Water & Food Security**
- **EO AFRICA scope – User driven & long-term vision**



EOAFRICA – Research & Development Facility



Objective: Facilitate **African-European R&D collaboration** and exchange in knowhow.

Major activities – identify **African research challenges**, launch **European-African research calls**, develop a **Digital Space Campus** for Africa as part of a bi-lingual African Space Academy (cooperation with e.g. UN training centers, Pan-African Space University, national space agencies), and build partnership programs with **African innovation hubs** (e.g. AfriLabs, AIMS)

Status: KO on 1st March 2021.

Duration: 3 years.

Budget: **750 Keuro still to be allocated via open research calls**

EOAFRICA – Continental Rangeland Monitoring



Objective: Continental rangeland monitoring over Africa at 10 meters addressing **African regional livestock management under climatic pressure.**

Major activity: Develop and demonstrate algorithms based on S1&2 for rangeland extent, status and livestock carrying capacity. Core users engaged: FAO, WFP, International Livestock Research Institute (ILRI, Kenya), GEOGLAM RAPP (Rangeland and Pasture Productivity), JRC

Planning: **ITT just launched.**

https://emits.sso.esa.int/emits/owa/emits_online.showao?typ1=8856

Duration: **2 years.**

Budget: **1.2 Meuro**

EOAFRICA – National Incubators



Objective: National Incubators facilitating the adoption of EO for **sustainable agricultural practices and drought monitoring** with national R&D partners in selected African countries.

Major activity: Develop, demonstrate and validate algorithms and EO products at national scale in close collaboration with African experts.

Planning: **ITT launch Q3 2021**

Duration: **2 years.**

Budget: **3 x 500 Keuro for National Incubators**

Objective: Test experimental techniques and new EO data sources such as airborne P-band SAR, high-resolution thermal ECOSTRESS observations and innovative **multi-missions data sets for water resources management.**

Major activity: Develop & transfer algorithms, perform scientific experiments & campaigns, publish results

Planning: **ITT launch Q3 2021**

Duration: **1-2 years.**

Budget: **up to 3 x 300 Keuro for Explorers**

EOAFRICA – African Data Accessibility



Objective: African EO Data accessibility focused on the definition and prototyping of free complementary data services and cloud resources collocated with the Copernicus Sentinels data over Africa (e.g. 3D visualization with DEM data in format and protocols adapted to low bandwidth and fast data exploitation)

Planning: ITT launch Q3-4 2021. Through Ground Segment Department.

Budget: 3.6Meuros

Additional possible pilot implemented over the Network of Resources (NoR) supporting African and European research institutions access to cloud computing resources.

Ad-hoc bilateral meetings