

Space and Society

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Space serving the Global Agendas

Climate Action

Paris Agreement



Monitoring Climate Change & Understanding

Sustainable Development

2030 Agenda



Managing progress on sustainable development in all its facets

Disaster Risk Reduction

Sendai Framework



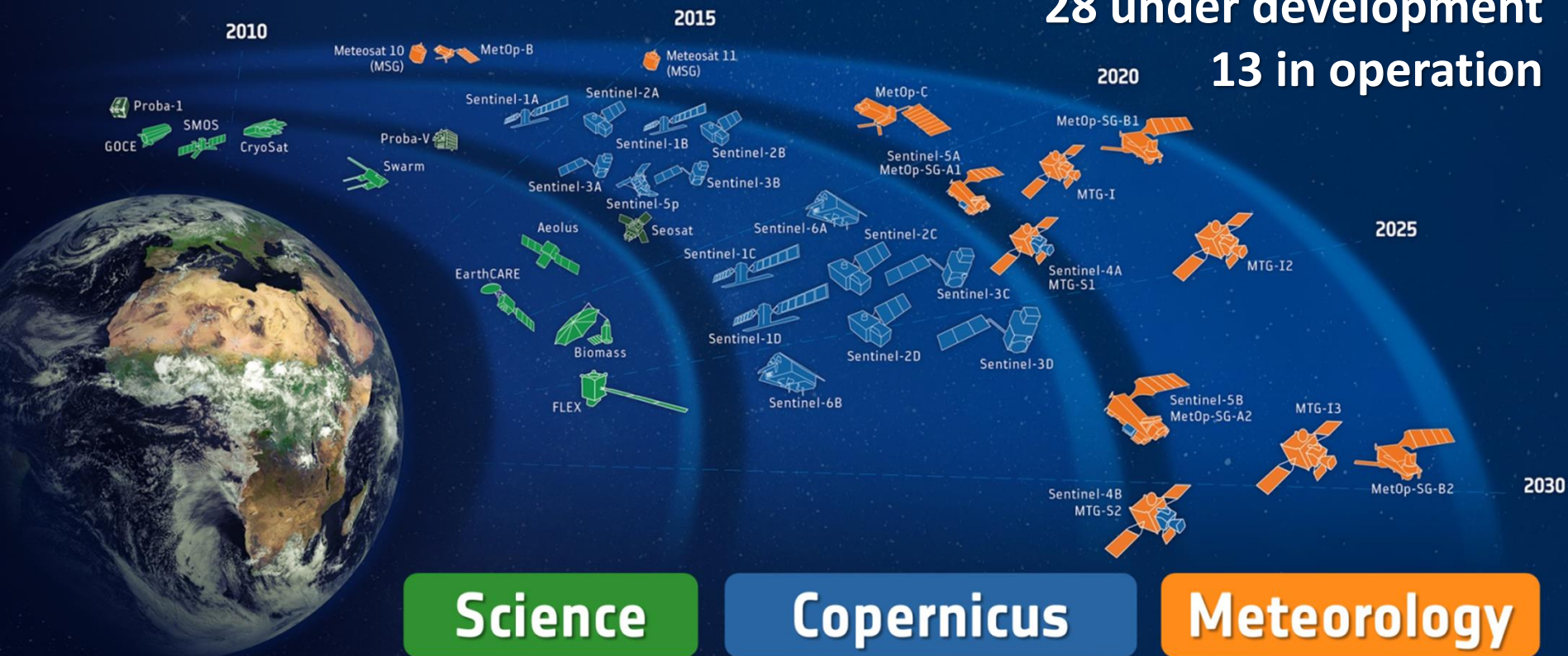
Supporting Disaster Resilient Societies

ESA-DEVELOPED EARTH OBSERVATION MISSIONS

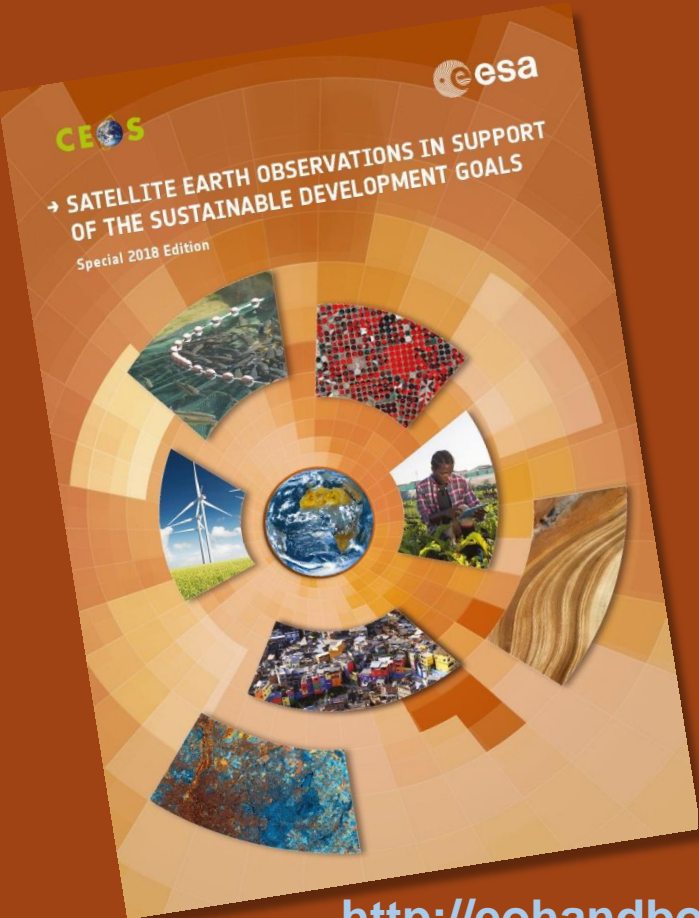
Satellites

28 under development

13 in operation



Satellite Earth Observations in support of the SDG's



*“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/>



EO contribution to specific SDG's

Earth Observations potential contribution to the SDG Targets and Indicators



SDGs on land and water with most opportunities for EO data

Analysis performed by the GEO EO4SDG initiative

Target		Goal	Indicator									
Contribute to progress on the Target yet not the Indicator per se			Direct measure or indirect support									
1.4	1.5	1	1.4.2									
2.3	2.4	2.c	2.4.1									
3.3	3.4	3.9	3.9.1									
		4										
		5.a	5.a.1									
6.1	6.3	6.4	6.5	6.6	6.a	6.b	6.3.1	6.3.2	6.4.2	6.5.1	6.6.1	
7.2	7.3	7.a	7.b				7.1.1					
		8.4										
9.1	9.4	9.5	9.a				9.1.1	9.4.1				
	10.6	10.7	10.a									
11.1	11.3	11.4	11.5	11.6	11.7	11.b	11.c	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			12.a.1				
	13.1	13.2	13.3	13.b				13.1.1				
14.1	14.2	14.3	14.4	14.6	14.7	14.a		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	15.1.1	15.2.1	15.3.1	15.4.1	15.4.2
							16.8					
17.2	17.3	17.6	17.7	17.8	17.9	17.16	17.17	17.18	17.6.1	17.18.1		



Commonly stated obstacles to scaling-up operational use of EO in the global sustainable development agendas

Restrictive data access policies (including cost)

Not enough “fit for purpose” products

Frequency of observations insufficient to track changes at appropriate scales

Needs for continuity of observations and long-term EO programs

Lack of standardisation of EO data processing methodologies

Lack of analysis ready data

Lack of clear and solid user-oriented methods and guidelines

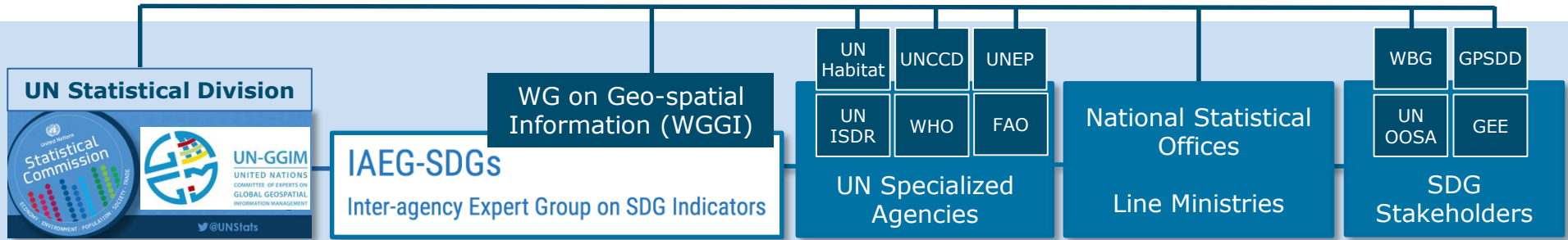
Capacity building and training

Difficulties to discover and access EO data

Insufficient solid track records of successful case studies



Space Agencies cooperating with global and national actors to maximize EO contribution to SDGs



**Water Bodies**

Lake and river water level

Lake surface water
temperature

Lake surface reflectance

Lake turbidity

Lake trophic state

Water Level

Copernicus Global Land Service*Water Bodies***Lake Water Quality***Lake Surface Water Temperature**Water Levels (Rivers & Lakes)*

Maturity

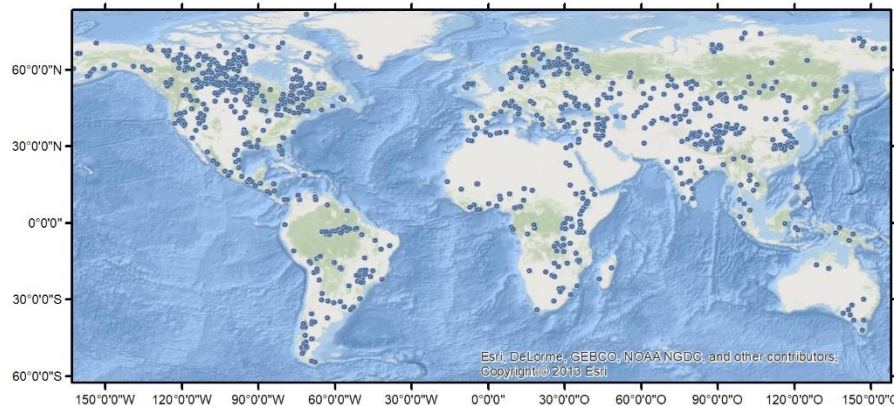
needs tailoring

Availability

1,000 lakes

Completeness

2002-12 16-19

**Spatial resolution**

- 300m, 1km
- 100m (in evolution)

Coverage

- 1,000 selected lakes

Temporal

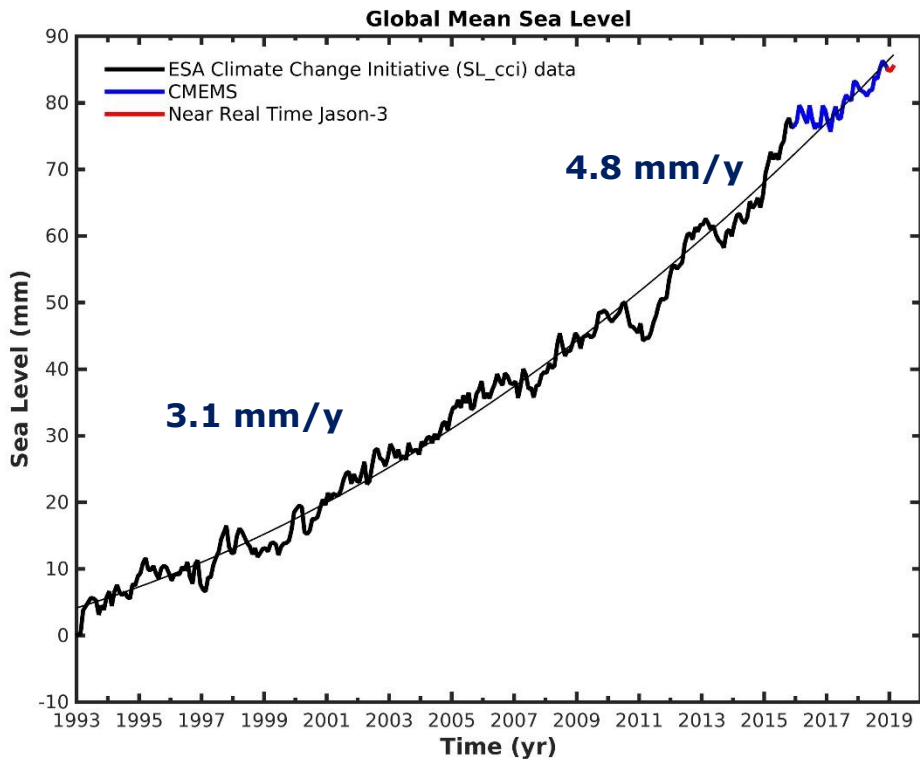
- 10days averages
- 2002 – 2012; 2016 - ongoing

Evolution

- Evolution towards a seamless global product covering all water bodies at 100m resolution



Rising Sea Levels



Sea level rise is accelerating. Sea levels could rise 1.3 meters in the next 80 years.

Proceedings of the National Academy of Sciences

February 2018



Copernicus => Global uptake -> Global impact



> **265.000**

registered users
= tip of the iceberg



Land



Atmosphere



Ocean



Climate



Disaster



Security

6 operational services

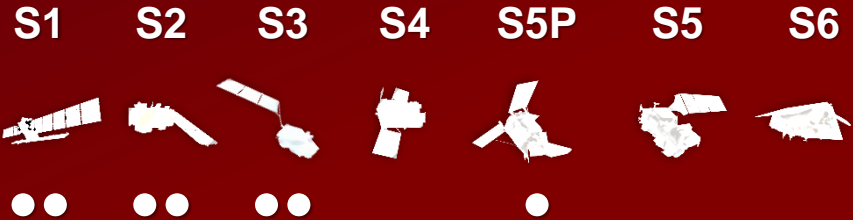


250 TB satellite data
distributed per day



full, free & open
data policy

7 satellites flying



preparing Copernicus 4.0

Space19+

<http://blogs.esa.int/space19plus/>

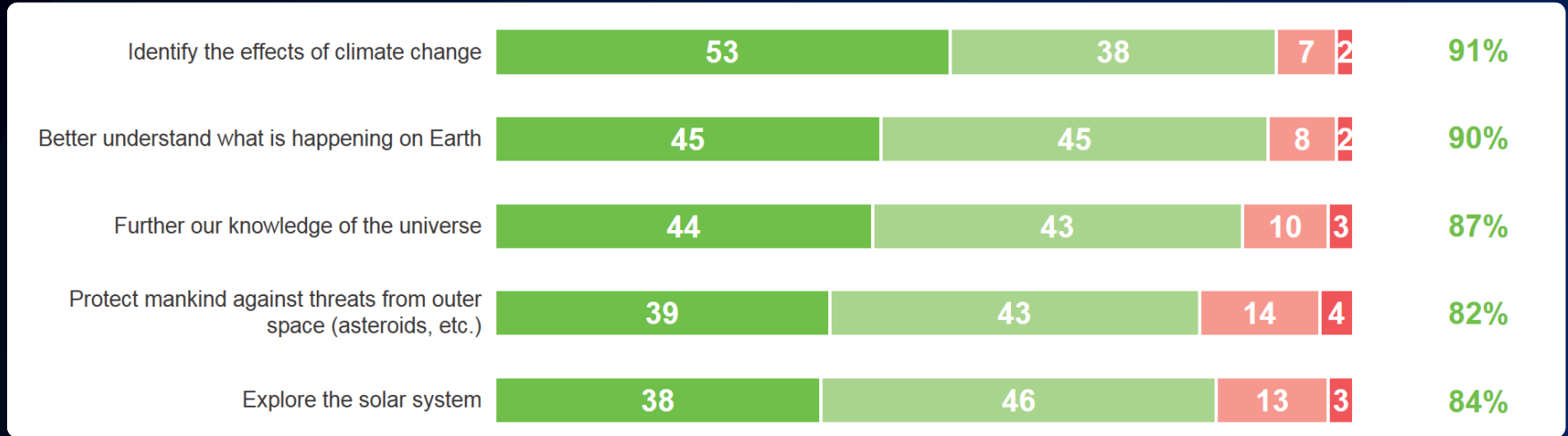
European Citizens' Priorities in Space (i)



Q: In the future, do you believe that priority should be given or not to space activities that allow us to ... ?



TOP 5 Priorities:



“For Europeans, the **primary area of progression** for space activities would be to **foster a better understanding of what is happening on Earth**, particularly regarding the **climate**”

ESA UNCLASSIFIED – For Official Use

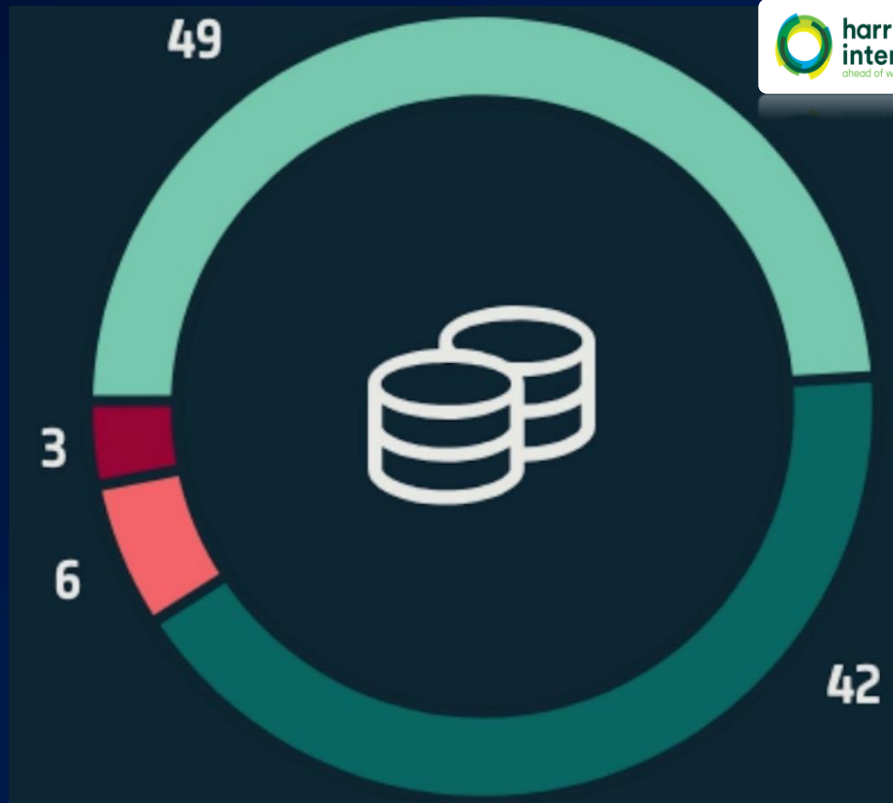


European Space Agency

European Citizens' Priorities in Space (i)

“How important for European countries to pool their resources for space activities?”

⇒ 91% think it's important to pool resources



-unimportant - somewhat unimportant

-somewhat important

-very important



Objectives by 2040

1. **Address key societal challenges** & deliver excellent science for Europe through novel observations from space
2. Expand the use of space products and services **into non-space sectors** both institutional and commercial
3. Foster **synergies between national, commercial and European** programmes through system-of-systems perspective
4. Make Europe's EO sector strongest and most **competitive globally**

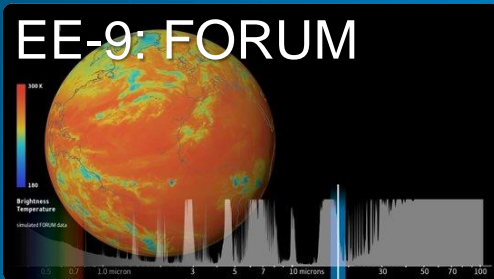
→ End-to-end Approach for World-class Earth Science and Operational Earth Observation

FutureEO – Elements of Innovation



Hardware & Technology

EE-9: FORUM



Scouts & Φ -Sats



HAPS

Operations

Increased Data
Diversity & Volumes



EO
AFRICA



Science & Applications

Machine
Learning



AI for Space
and EO

Safety & Civil Security

EO contribution to
ESA-wide pillar



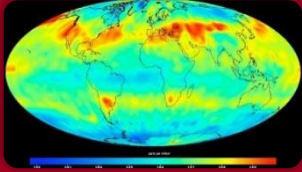
Cloud
Computing



Copernicus new Missions

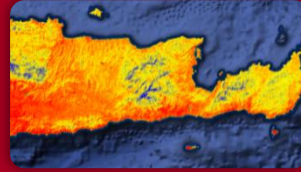


CO2M - Anthropogenic CO₂ Monitoring



Causes of
Climate Change

LST – Land Surface Temperature Mission



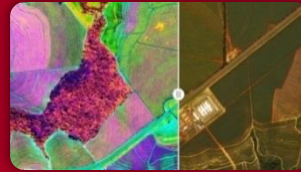
Agriculture & Water
Productivity

CRISTAL – Polar Ice & Snow Topography



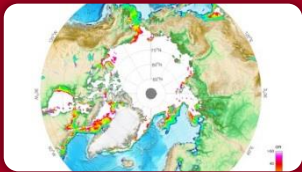
Effects of
Climate Change

CHIME – Hyperspectral Imaging Mission



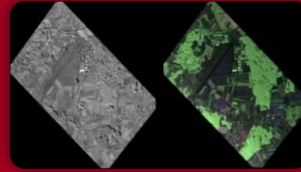
Food Security, Soil,
Minerals, Biodiversity

CIMR – Passive Microwave Radiometer



Sea: Surface Temp.
& Ice Concentration

ROSE-L – L-band SAR Mission



Vegetation & Ground
Motion & Moisture

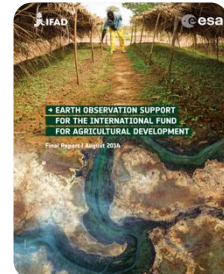
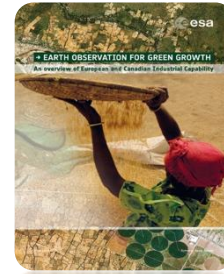
EO for Global Development Assistance

=> partnership with International Financing Institutions



The screenshot shows the World Bank website with a navigation bar and a main article. The article title is "Satellite Data Informs Development" under the "TECHNOLOGY" category. The text describes a partnership with ESA using satellite data for climate change, water quality, and coastal erosion. Below the article are several smaller images and a "RE SOURCES" section with links to "Civil Society", "Governments", "Businesses", "Investors", "Job Seekers", "Journalists", and "Students". There is also a "BLOGS" section with an article titled "Why Vehicle Safety Matters" and a "2013 Annual Meetings" section.

From demonstrations to mainstreaming:
Transferring EO into operational working processes & development financing as 'best-practice' source of geo-information



<http://eo4sd.esa.int>



Major Socio-Economic Impacts through long-term European Cooperation

Future EO

Customized EO

Operational EO

Operational Programmes



191 B€ benefits
2017 – 2035



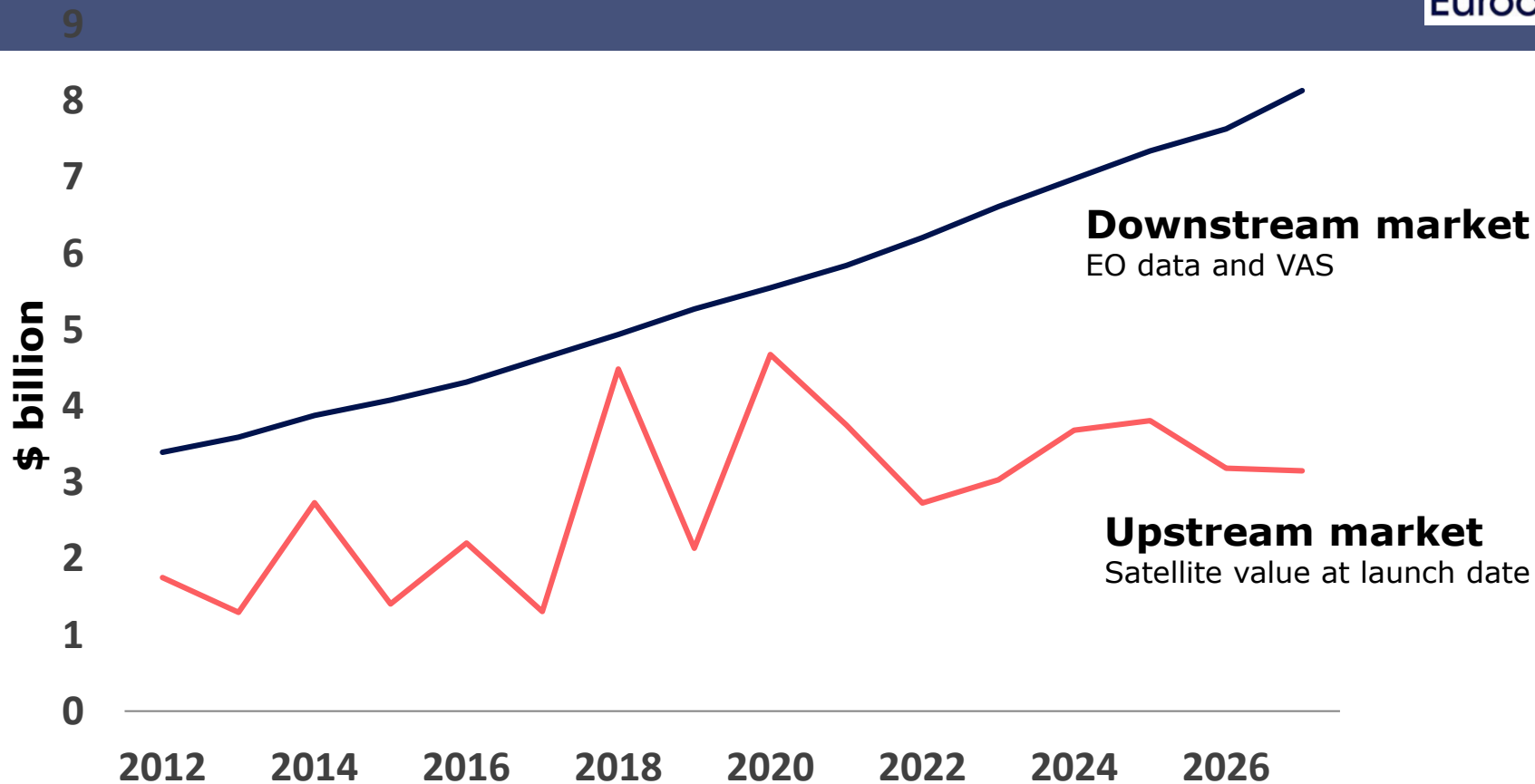
63 B€ benefits
2020 – 2040
(Metop-SG)

Global Markets

European
industry



EO UPSTREAM AND DOWNSTREAM MARKETS - 2012-2027



because they need it