

The Copernicus Space Component: Today's Status and the Future

Copernicus4Regions Info Session
European Parliament, Brussels, 20 January 2020

Simon L. G. Jutz

Head of the Copernicus Space Office
European Space Agency

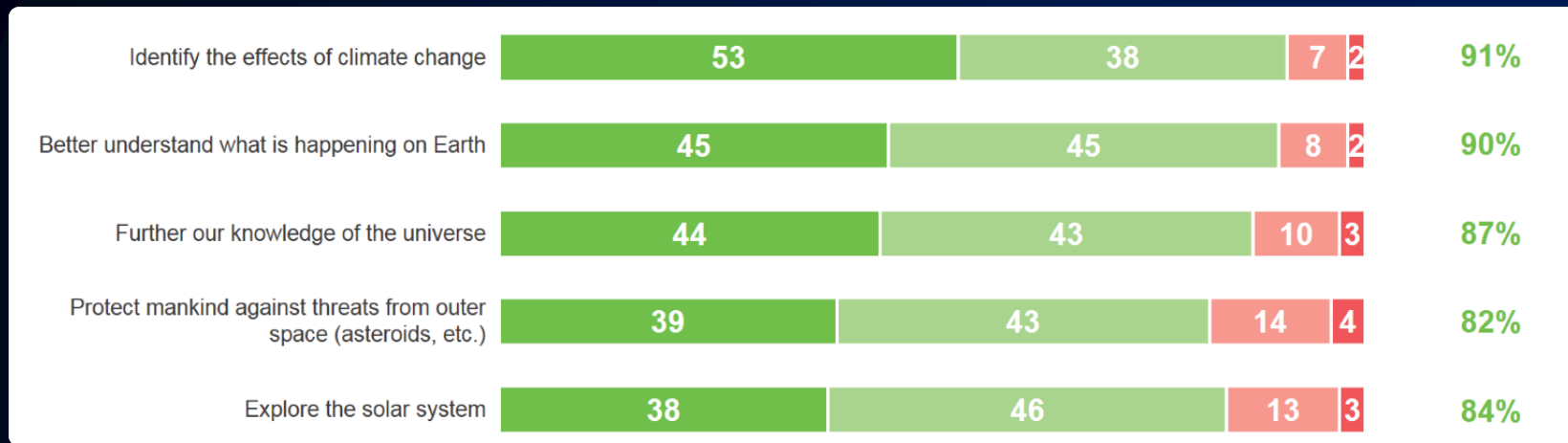
European Citizens' Priorities in Space



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



TOP 5 Priorities:



“In the eyes of 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**”

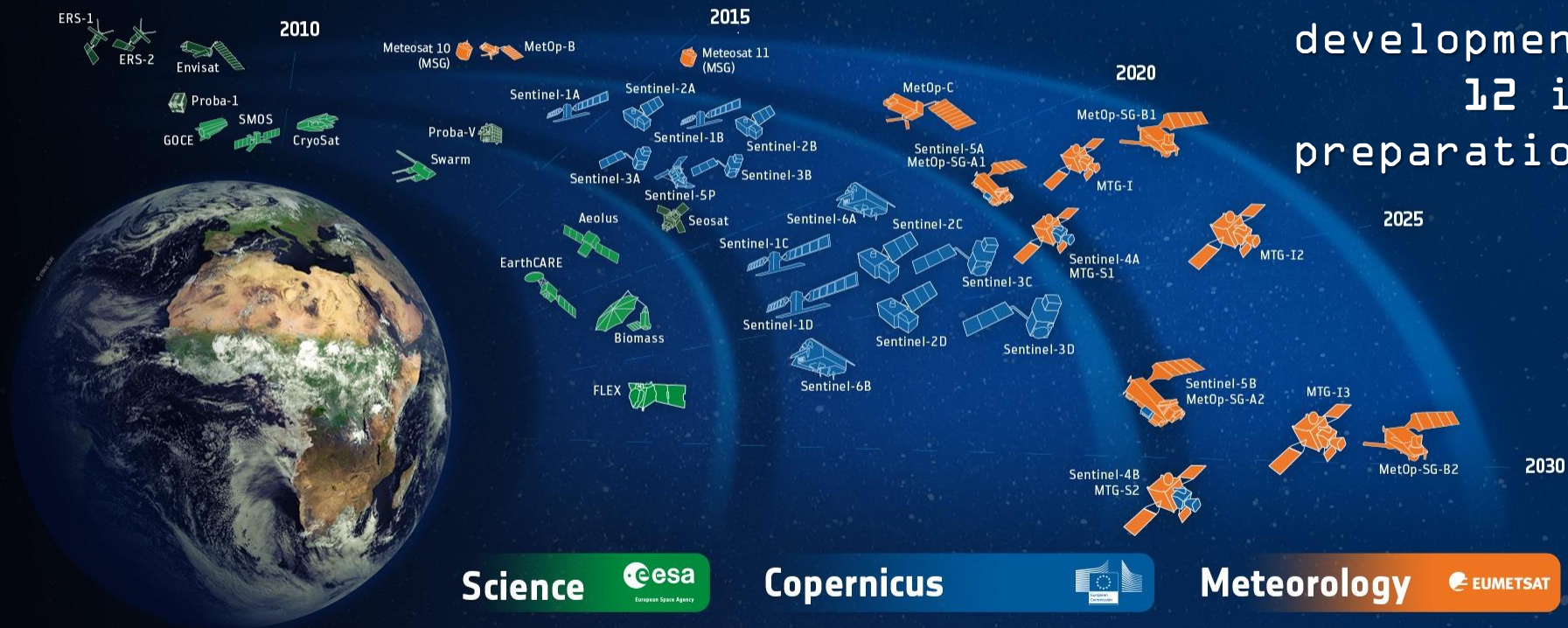


A successful Track-Record

ESA Developed Earth Observation Missions

esa
Satellites

15 in operation
25 under development
12 in preparation



Copernicus – Sentinels Status



S-1



Radar

A

3 Apr. 2014

B

25 Apr. 2016

C

2022/23

D

> 2022/23

S-2



High Res.
Optical

A

23 Jun. 2015

B

6 Mar. 2017

C

2022/23

D

> 2022/23

S-3



Medium Res.
Optical &
Altimetry

A

16 Feb. 2016

B

25 Apr. 2018

C

2023

D

> 2023

S-4



Atmospheric
Chemistry
(GEO)

A

2022

B

2032

S-5P



Atmospheric
Chemistry
(LEO)

A

13 Oct. 2017

S-5



Atmospheric
Chemistry
(LEO)

A

2023

B

2030

C

> 2030

S-6



Altimetry

A

2020

B

2025

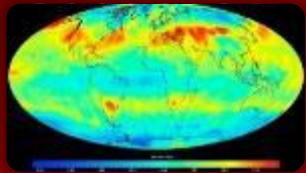


The Future

Copernicus 2.0 – New Monitoring Missions

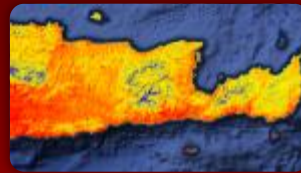


Anthropogenic CO₂ Mon. Mission



Causes of
Climate Change

Land Surface Temperature Mission



Agriculture & Water
Productivity

CRISTAL – Polar Ice & Snow Topography



Effects of
Climate Change

CHIME – Hyperspectral Imaging Mission



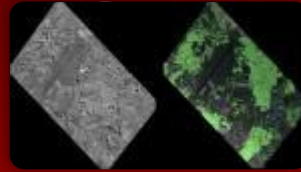
Food Security, Soil,
Biodiversity

CIMR – Passive Microwave Radiometer



Sea: Surface Temp.
& Ice Concentration

L-band SAR Mission



Vegetation & Ground
Motion & Moisture

ID	Task Name	2014	2015	2016	2017
1	Ministerial Council			Ministerial	
5	Microwave Imaging family				
6	Sentinel 1 A	Launch			
10	S1 B		Launch		
14	S1 C			SPR	
21	S1 D			SPR	
31	S1 M				

		Copernicus Space Component Long term Scenario																														
ID	Task Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
1	Ministerial Council																															
5	Optical Imaging Family																															
6	Sentinel 2 A	Launch																														
10	S2 B		Launch																													
14	S2 C			SPR																												
22	S2 D				SPR																											

To be updated according to funding availability & EU policy priorities

82	S3 NG-B Topo				
89	S6 /Jason-CS A				
96	S6 /Jason-CS B				
103	S6 NG-A				
110	S6 NG-B				
117					
118	PICE/CRISTAL A				
125	PICE/CRISTAL B				

100	LSTM A (Land Surface Temperature)																															
107	LSTM B (Land Surface Temperature)																															
114	Spectroscopic Atmosphere Measurement Family (*)																															
115	CO2M A (Anthropogenic CO2 Monitoring)																															
123	CO2M B (Anthropogenic CO2 Monitoring)																															
130	CO2M C (Anthropogenic CO2 Monitoring)																															
137	(*) S4 and S5 not shown																															



Roles and Funding of the Commission and ESA



MFF 2014-2020

- The EC is the overall Copernicus programme manager
- Copernicus Space Component is co-funded: 63:37% (EU:ESA)
- ESA is tasked to implement EU funding for the space component
- EU delegated funds to ESA in Copernicus Agreement: 3,244 B€

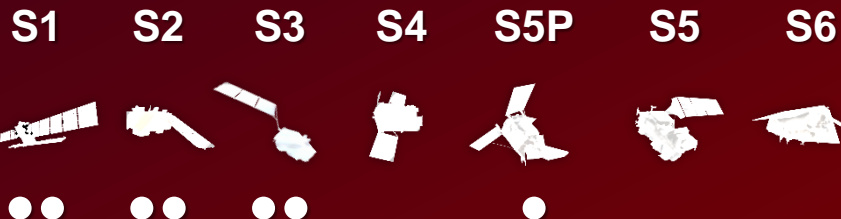
Copernicus 2.0 planned: 8 bn€ >> ESA 2 B€ and EU 6 B€ (6.6 B€ in c.e.c)

- ESA Member States subscription at Space19+: 1,811 bn€ for Phase 1 of CSC-4 programme (29% over-subscription), overall ESA funding for CSC-4 Phase 1,2,3 planned: 2,012 B€ within 2020-2027
- MFF 2021-2027
 - EC Space Programme Regulation Proposal: 5.8 B€ for entire Copernicus
 - Funding proposed by Finnish Presidency (MFF negotiation box): 4.6 B€

Space will be vital to implement «an Union that strives for more» and «the **Green Deal**» proposed by the European Commission. Copernicus is acknowledged as the world's leading earth observation programme providing unrivalled information for natural disaster recovery, climate change observations and forecast.

Copernicus: Global European Leadership in EO

Complete 1st Generation



Develop 6 new Missions



Prepare the next generation of Sentinels



- Largest EO data provider in the world
- **250 terabytes** of data distributed per day
- to **300.000 registered users** = tip of the iceberg
- 6 operational services



Generating Growth

From 2008 to 2020, the total investments in the Copernicus Programme are forecasted to reach 7.5 B€. Likewise, this investment will generate cumulated economic **benefits of 13.5 B€**.

Copernicus Market Report, PWC, 2016

During the period 2017 – 2035, Copernicus is expected to generate **67 to 131 B€ in benefits** to the European society, which is **10 to 20 times the cost of the programme**.

Copernicus Ex-Ante Benefits Assessment, PWC, 2017



Sao Paulo
Brazil



Los Angeles
United States



London
United Kingdom



Beijing
China



ESA UNCLASSIFIED – For Official Use

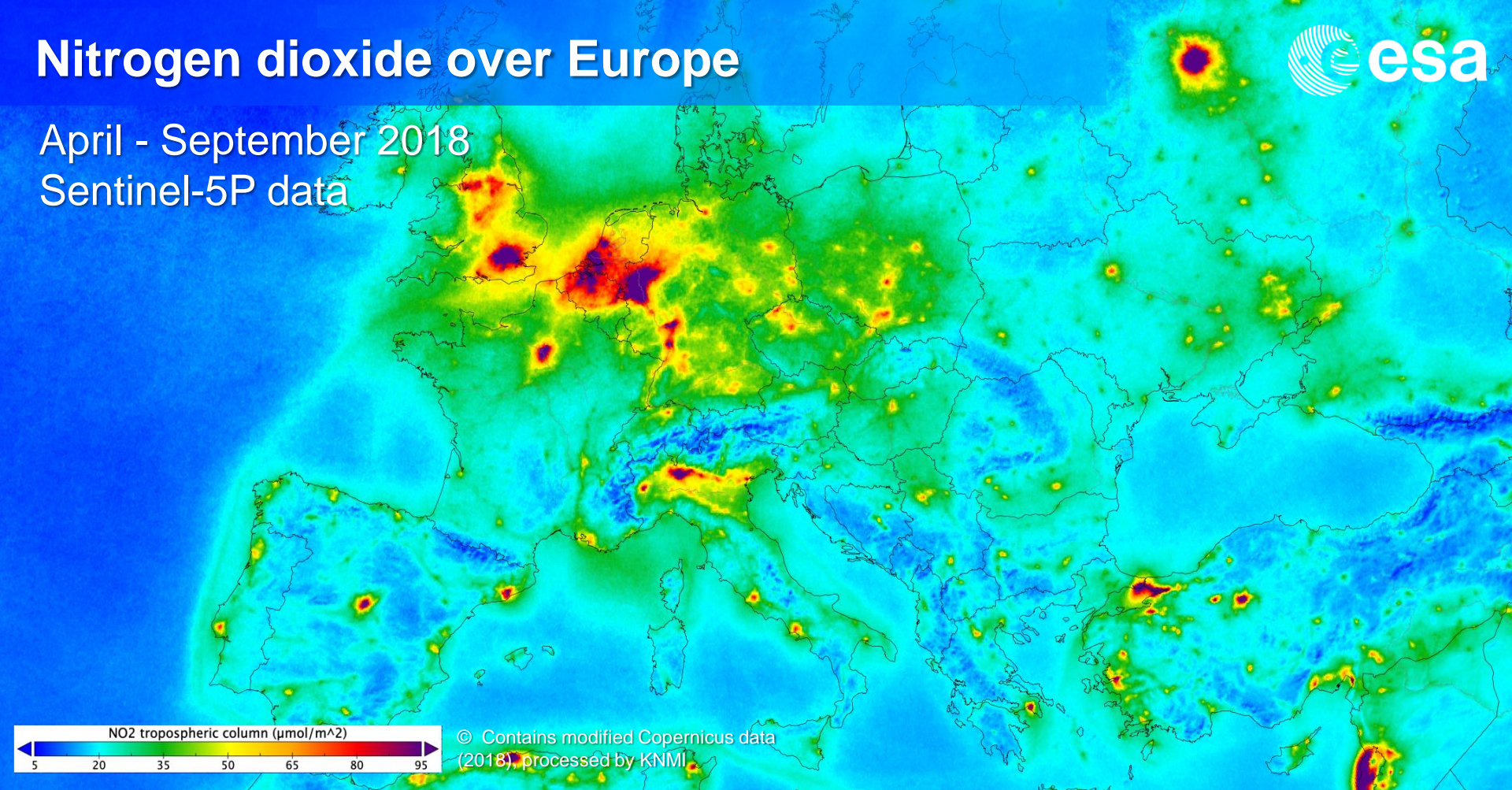


European Space Agency

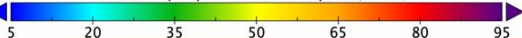
Nitrogen dioxide over Europe



April - September 2018
Sentinel-5P data



NO2 tropospheric column ($\mu\text{mol}/\text{m}^2$)



© Contains modified Copernicus data
(2018), processed by KNMI



European Space Agency

Deforestation

Rondonia, Brazil

Sentinel 2

5 June 2019



ESA DISCLAIMS LIABILITY for Official Use

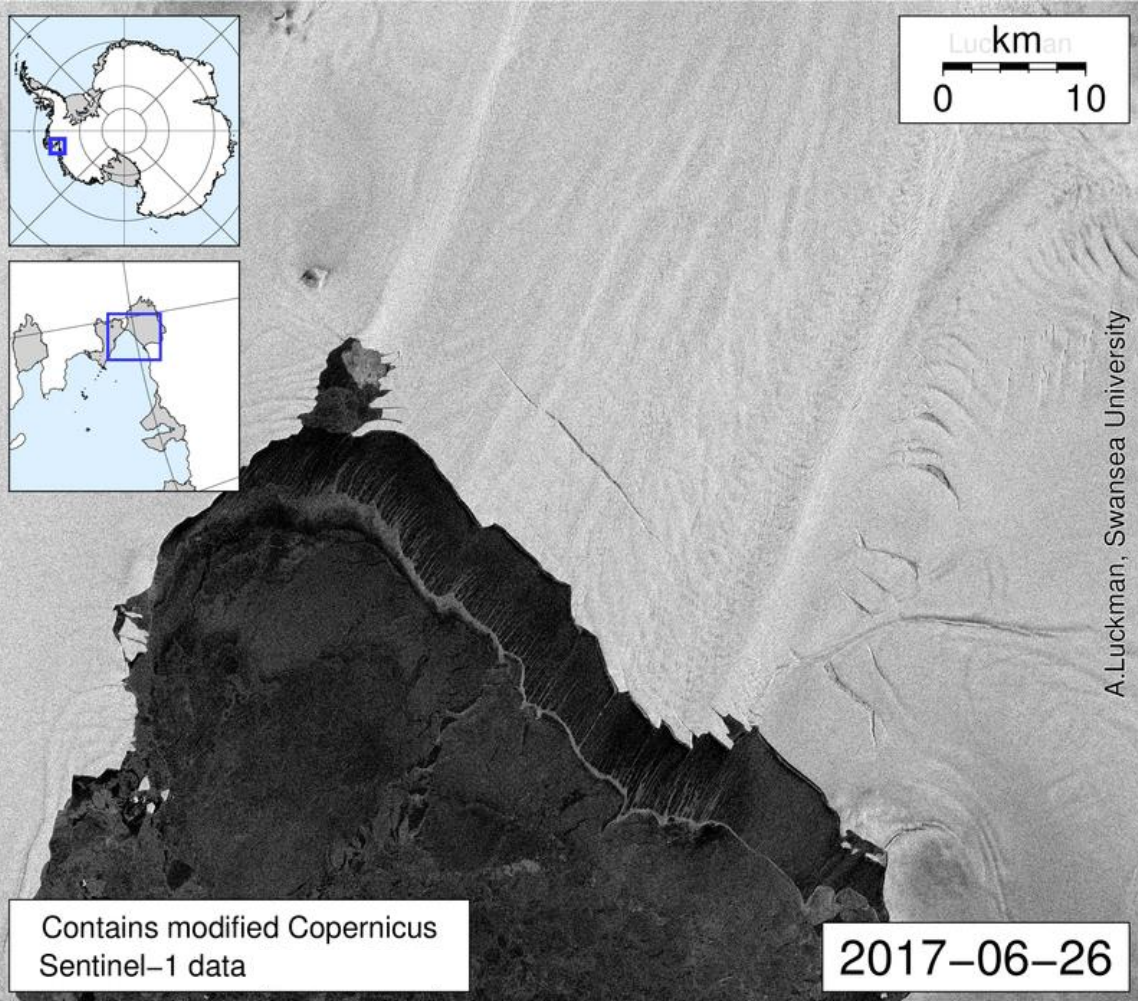


European Space Agency

Pine Island Glacier Antarctica

18 months of ice flow
& calving

Sentinel-1
June 2017 – January 2019



Taal Volcano Eruption

09Jan2020 - 16Jan2020
Sentinel-1 Descending T032

0.0 LOS Displacement (cm) 2.8



 **Jet Propulsion Laboratory**
California Institute of Technology

Contains modified Copernicus Sentinel data © 2020
European Space Agency

Slide 17



- Copernicus Programme: copernicus.eu
- Sentinel Online: sentinels.copernicus.eu
- ESA Sentinel app (iOS and Android)