

# Copernicus CLMS workshop

## Future of Copernicus

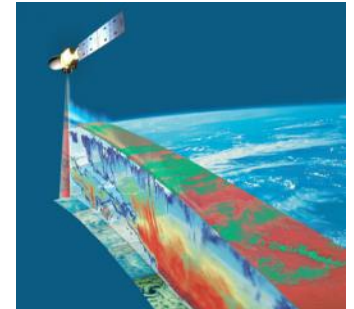
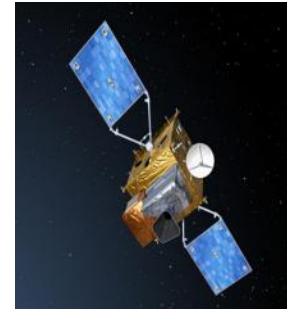
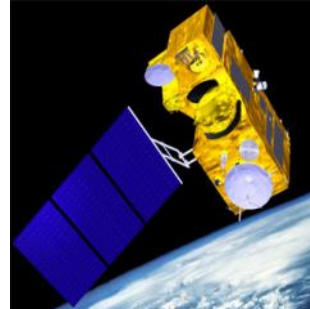


Jasper van Loon, Netherlands Space Office

# The satellites

## *Copernicus Evolution*





<b>Sentinel-1</b>	RADAR	(land and marine applications)	✓✓
<b>Sentinel-2</b>	Multispectral	(land applications)	✓✓
<b>Sentinel-3</b>	Hyperspectral	(marine applications)	✓✓
<b>Sentinel-4</b>	Multispectral	(atmosphere, geostationary orbit)	2021
<b>Sentinel-5P</b> 	Multispectral	(atmosphere, polar orbit)	✓
<b>Sentinel-5</b>	Multispectral	(atmosphere, polar orbit)	2021
<b>Sentinel-6</b>	Altimetry	(marine applications)	2020

**Free and open data, guaranteed stream of data**



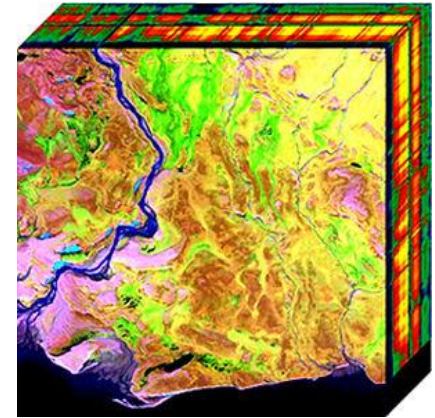
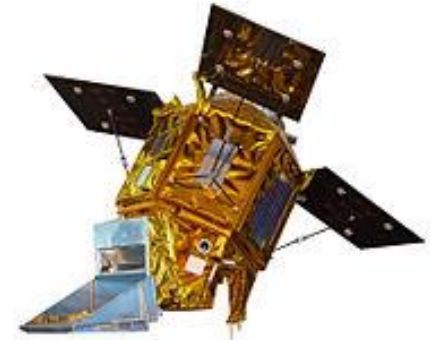
# Copernicus Evolution

- Sentinel **Continuation**  
S-1C/D, -2C/D, -3C/D, 5B/C
- Sentinel **Expansion:**  
New Sentinels next to S1-S6 -> S7, S8, S9, ...
- Sentinel **Next Generation:**  
Replacement of S1 – S9



# EC priorities Sentinel Expansion

- 1) CO2 anthropogenic emissions
- 2) SAR L-band imagery
- 3) High resolution Thermal Infrared Imager
- 4) High resolution radar imagery of ice
- 5) Sea ice parameters
- 6) Mean and time variable gravity field
- 7) Ice sheets and shelves elevation data
- 8) High resolution (10-30 m) hyperspectral data
- 9) Sea surface salinity (1 km)
- 10) Permafrost active layer thickness





# Mission ideas

- Anthropogenic CO2 Monitoring mission
- Land Surface Temperature mission
- Polar Ice and Snow Topographic mission
- Passive Microwave Imaging mission
- Hyperspectral Imaging mission
- L-band SAR mission
  
- Gravity mission
  
- Security mission
  
- L-band Passive Microwave



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6 x 2 parallel  
Phase A/B1-studies





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Phase A/B1-studies



- Gravity mission



7th category LTS  
ESA mission?  
Sentinel Next Generation?

- Security mission

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High level discussion

- L-band Passive Microwave



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6 x 2 parallel  
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- Gravity mission →
- Security mission →
- L-band Passive Microwave →

7th category LTS  
ESA mission?  
Sentinel Next Generation?

High level discussion

Sentinel Next Generation?

# EU Space Program

*MFF 2021 - 2027*





# EU Budget 2021 - 2027



**EU Commission shoots for stars with increased space budget**

**European Space Agency boss warns EU of rival agency risks**  
*ESA director general argues for more collaboration as EU ramps up investment in own space agency*

**EU Space Programme**

#EUBudget

*Wednesday 6th of June, 2018*



# EU Space Budget 2021 - 2027

EU Space Program	2014 - 2020	2021 - 2027
Galileo + EGNOS	6.8	9.7
Copernicus	4.3	5.8
SSA + GOVSATCOM	0.0	0.5
<b>Total</b>	<b>11.1</b>	<b>16.0</b>

*x billion euro's*



# Copernicus 2021 - 2027

- **CO2 monitoring system:** Paris Agreement
- **Agriculture:** CLMS. Smart farming? CAP? TIR mission, Hyperspectral mission
- **Polar regions:** Topographic mission, Passive Microwave Imager
- **Security:** Trafficking, border control. Security mission? Role of ESA (= civil)



# Time line 'Future Copernicus'

- Sep. 2017 : Priorities set by EC
- Nov. 2017 : Selection candidate missions
- April 2018 : Start Phase A/B1 studies ESA
- May 2018 : Budget proposal MFF 2021 - 2027
- June 2018 : EC: Budget Copernicus (Sentinels + services)**



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- Sep. 2017 : Priorities set by EC
- Nov. 2017 : Selection candidate missions
- April 2018 : Start Phase A/B1 studies ESA
- May 2018 : Budget proposal MFF 2021 - 2027
- June 2018 : EC: Budget Copernicus (Sentinels + services)**
  
- Q1 2019 : Brexit
- Oct 2019 : End Phase A/B1 studies
- Dec 2019 : ESA: Budget Copernicus (Sentinels)**
- Q1 2020 : Mission selection Sentinel 7,8,9,...
- 2025 -2027 : Launch of Sentinel 7,8,9...