

Copernicus CAMS workshop

Work Programme 2019



Jasper van Loon, Netherlands Space Office



CLIMATE CHANGE



MARINE MONITORING



ATMOSPHERE MONITORING



LAND MONITORING



SECURITY



EMERGENCY MANAGEMENT



Time line discussion WP2019

2018

- 6 February: User Forum: New products – First thoughts
- 21 March: Committee: New products – First thoughts
- 24 April: User Forum: Discussion WP19 (no budget)
- **19 June: Committee: Discussion WP19 (incl. budget)**
- Summer: Consultation Entrusted Entities, DG's EC
- 13 Sept.: User Forum: Not on agenda
- 1 October: Committee: Approval final version



Services

	2016	2017	2018	2019
Atmosphere	9.128	9.570	9.000	20.000
Land	19.325	13.148	27.105	29.250
Ground motion	0	0	1.000	0
Marine	19.455	20.385	21.000	32.000
Climate Change	32.380	33.945	30.000	56.700
Emergency	10.524	8.900	8.500	10.000
Security	19.083	19.040	25.200	30.540
Totaal:	109.895	104.988	121.805	178.490

In 1.000 euro



New services WP 2019

- Integration of S3 and S5P CAMS
- Continuation of 'use case' programme CAMS
- Migration of portfolio in Climate Data Store CAMS



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- Migration of portfolio in Climate Data Store CAMS
- Climate Data Store operational Climate Change
- 22 ECV's monitored Climate Change
- Initial attribution service Climate Change
- Initial decadal prediction Climate Change



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- Climate Data Store operational Climate Change
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- Initial attribution service Climate Change
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- Ground Motion Service Land
- Phenology product Land
- Coastal Zone product Land
- Phytoplankton type Marine
- Wake detection Security



Data (space + in situ)

	2016	2017	2018	2019
Space Segment Development	144.054	160.333	203.293	351.276
Sentinel Launches	12.243	6.447	0	0
Sentinel Operations	159.571	160.079	171.738	175.637
Data distribution	9.391	21.550	28.315	33.740
Kosten ESA	55.400	61.200	63.100	62.710
Kosten EUMETSAT	13.894	17.317	15.754	18.929
Contributing Missions	61.261	54.999	32.017	54.708
In situ netwerk	878	4.187	1.395	1.750
Totaal:	456.692	486.113	515.612	698.750

In 1.000 euro



Communication, user requirements, etc.

	2016	2017	2018	2019
Communicatie, education, etc.	11.589	7.970	9.908	11.050
Programme evaluation	0	1.161	600	840
Evolution / user requirements	2.000	500	500	506
Space Surveillance and tracking	3.400	4.100	4.400	4.900
Totaal:	16.989	13.731	15.408	17.196

In 1.000 euro



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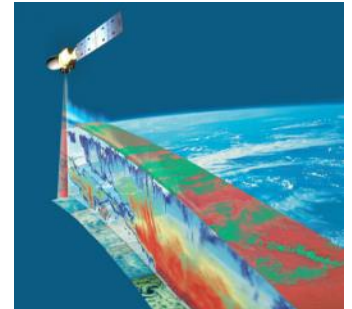
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Copernicus Evolution



Jasper van Loon, Netherlands Space Office



Sentinel-1	RADAR	(land and marine applications)	✓✓
Sentinel-2	Multispectral	(land applications)	✓✓
Sentinel-3	Hyperspectral	(marine applications)	✓✓
Sentinel-4	Multispectral	(atmosphere, geostationary orbit)	2021
Sentinel-5P 	Multispectral	(atmosphere, polar orbit)	✓
Sentinel-5	Multispectral	(atmosphere, polar orbit)	2021
Sentinel-6	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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6 x 2 parallel
Phase A/B1-studies



7th category LTS
ESA mission?
Sentinel Next Generation?



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6 x 2 parallel
Phase A/B1-studies



- Gravity mission →

7th category LTS
ESA mission?
Sentinel Next Generation?

- Security mission →

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
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Sentinel Next Generation?

High level discussion

Sentinel Next Generation?



Anthropogenic CO₂ mission (Sentinel-7)

Goal:

- Paris Agreement -> accountable system national contributions
- Detection and monitoring 'hot spots', emission changes

System:

- Satellites (3?) + in situ measurements
- Spatial resolution: 4 km²
- Precision: 0.5 – 0.7 ppm
- Revisit time: 3 days
- Auxiliary data: CO, NO₂, aerosols, CH₄ (?)



Time line Copernicus Evolution

- 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



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- 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...