



COPERNICUS AN EU SUCCESS STORY

#PROUDETOBEEUROPEAN





Copernicus

COPERNICUS HISTORY

Baveno Manifesto

1998

GMES – Flagship of EU Space Policy

2005

EC-ESA Agreement on GMES

2008

Copernicus Regulation and Data Policy

2013

GMES → Copernicus

Gothenburg EU Summit

2001

EC - GMES Bureau

2006

Start of GMES GIO

2011

Start of Full service operations

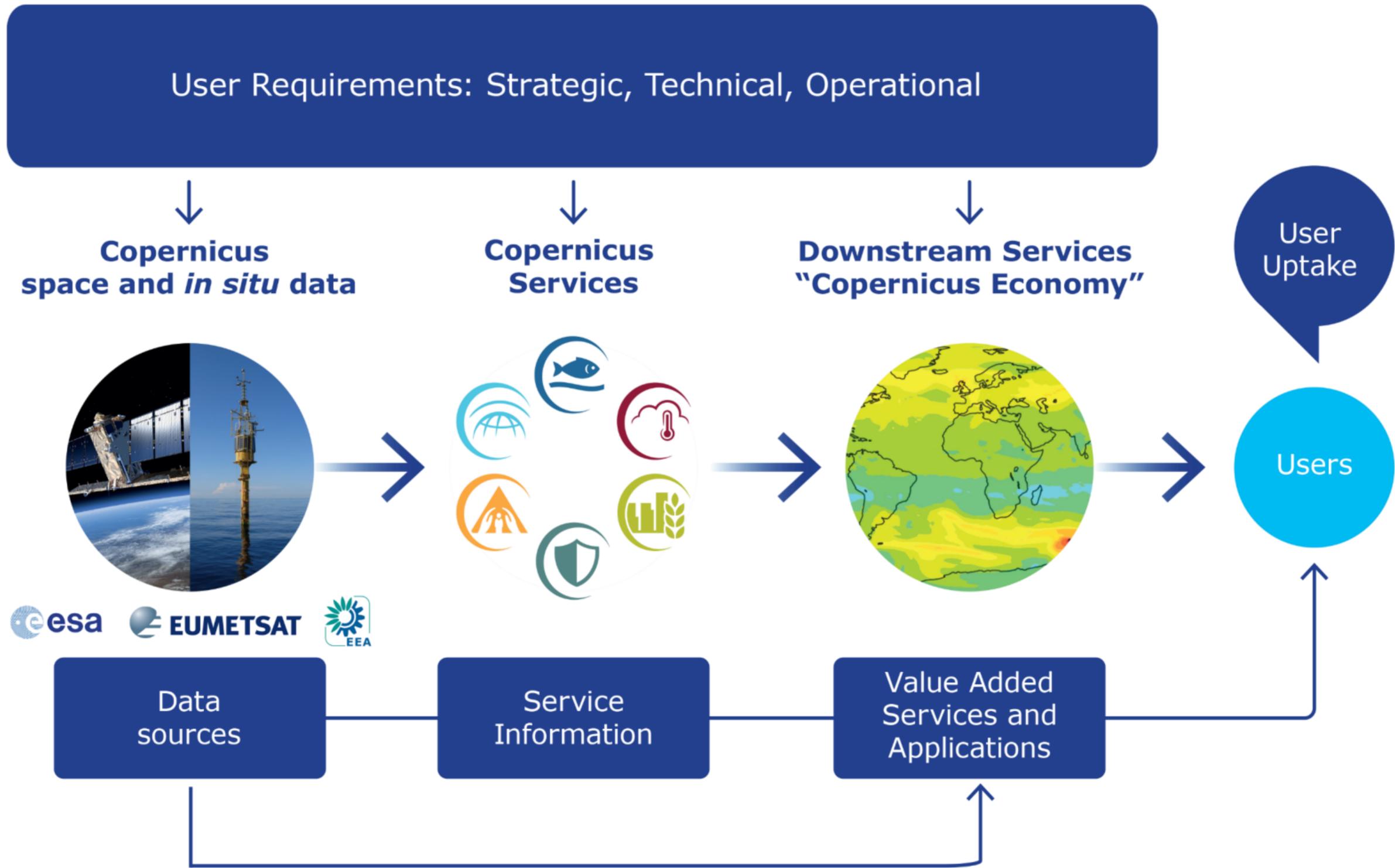
2014

GIO = GMES Initial Operation



Copernicus

COPERNICUS IS DRIVEN BY THE USERS



COPERNICUS GOVERNANCE

6 COPERNICUS SERVICES DELEGATED TO ENTRUSTED ENTITIES USING EARTH OBSERVATION DATA



SENTINELS

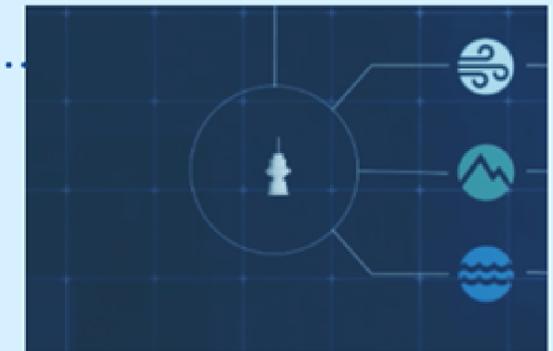
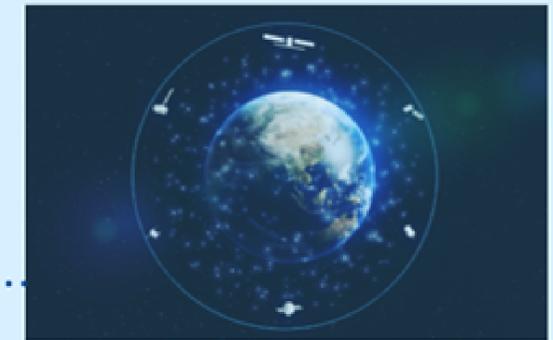


INFORMATION

PROCESSED DATA

PRODUCTS

3d PARTY DATA



IN SITU SENSORS

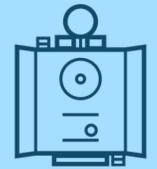
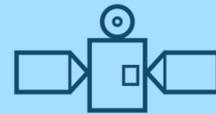
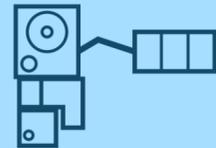
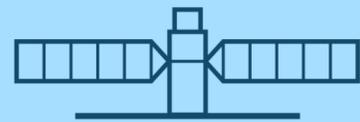


7

COPERNICUS SENTINELS IN ORBIT

	<i>Key Features</i>	<i>Mission</i>	<i>In Orbit</i>
SENTINEL-1A AND -1B	Polar-orbiting, all-weather, day-and-night radar imaging	9-40m resolution, 6 days revisit at equator	✓
SENTINEL-2A AND -2B	Polar-orbiting, multispectral optical, high-res imaging	10-60m resolution, 5 days revisit time	✓
SENTINEL-3A AND -3B	Optical and altimeter mission monitoring sea and land parameters	300-1200m resolution, <2 days revisit	✓
SENTINEL-4 (2022)	Payload for atmosphere chemistry monitoring on MTG-S	8km resolution, 60 min revisit time	
SENTINEL-5P	Mission to reduce data gaps between Envisat, and S-5	7-68km resolution, 1 day revisit	✓
SENTINEL-5 (2021)	Payload for atmosphere chemistry monitoring on MetOp 2 nd Gen	7.5-50km resolution, 1 day revisit	
SENTINEL-6 (2020)	Radar altimeter to measure sea-surface height globally	10 days revisit time	

MAIN USES OF COPERNICUS SENTINELS



SENTINEL-1

All-weather, day and night observations to support services for sea-ice monitoring, marine environment surveillance, ship detection, land-surface motion risks, mapping of forest, water and soils, humanitarian aid and crisis management

SENTINEL-2

Agriculture/vegetation monitoring, soil and water cover, forest management, border and maritime surveillance, emergency management: floods, fires

SENTINEL-3

Ocean forecast, climate change and **operational oceanography**: sea surface height, ocean color, oceanic carbon fluxes, monitoring river or lakes level

SENTINEL-4

Continuous monitoring of **atmospheric composition** focused on air quality over Europe, with main products Ozone (O₃), Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂), Formaldehyde (HCHO) and aerosol properties

SENTINEL-5

(Precursor of Sentinel-5) daily global monitoring of the main **atmospheric pollutants** (CH₄ and O₂ NO₂ CO₂ HC HO, SO₂) and two major **greenhouse gases** (CH₄ and tropospheric O₃)

SENTINEL-5P

Daily global monitoring for **climate, air quality and ozone/surface UV applications**, with key parameters O₃, NO₂, SO₂, HCHO, CHOCHO, Aerosols, CH₄ and stratospheric Ozone

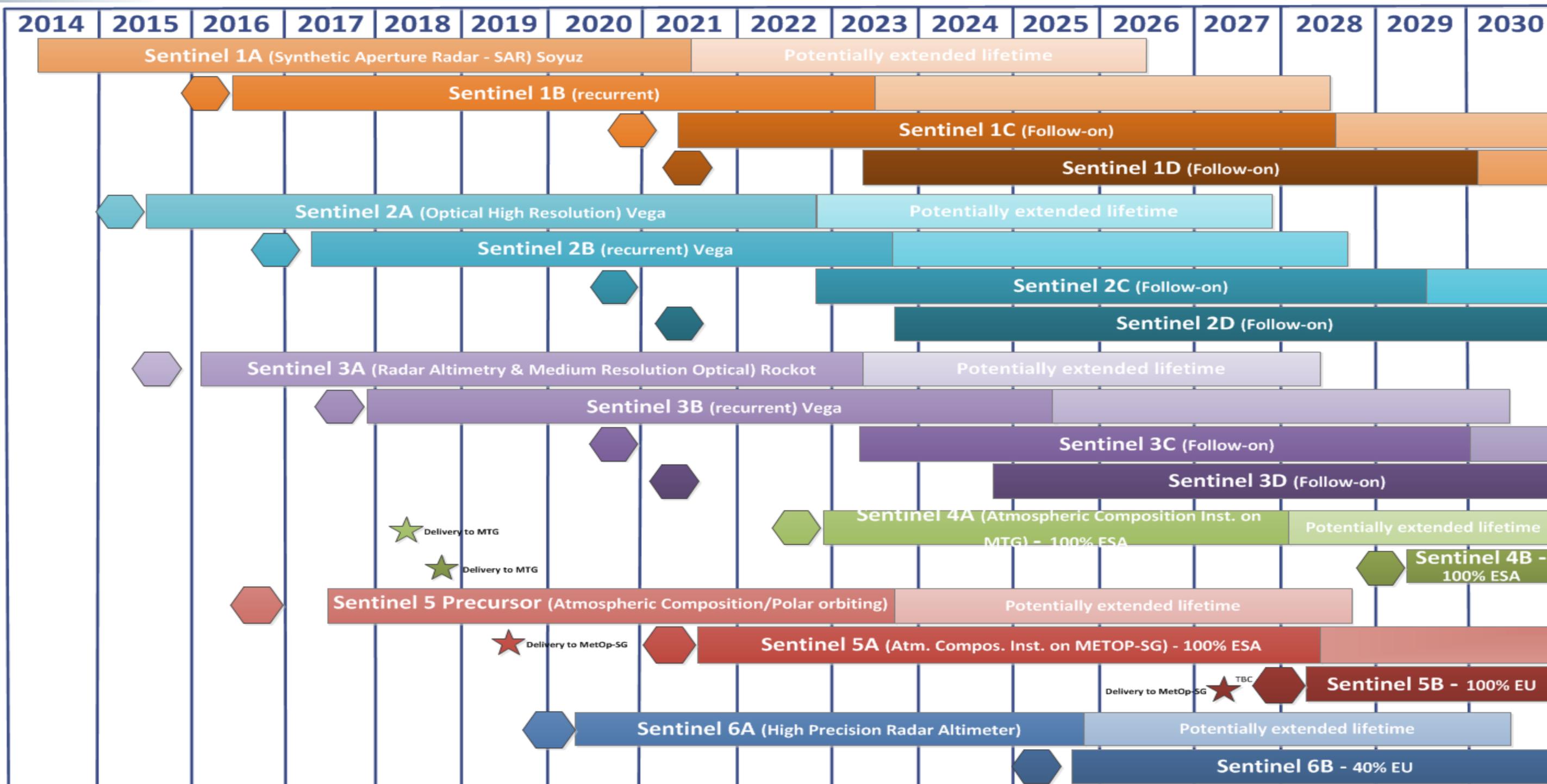
SENTINEL-6

Ocean forecast, climate change and **real time ocean topography**: wave height, ocean surface, wind speed



Space Component

SENTINEL FAMILY DEPLOYMENT SCHEDULE



Legend: Flight Acceptance Review

#SPACE_COMPONENT EVOLUTION

- **2025-onwards: Copernicus Expansion Missions / High-Priority Candidate Missions (HPCMs)**

Proposed by ESA leveraging on the User Requirements activity (NEXTSPACE) managed by EC/DG GROW

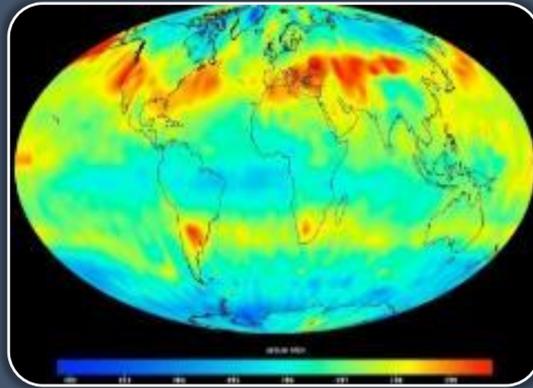
- **2030-onwards: Copernicus Space Component Second Generation**

Enhanced continuity of current Sentinels

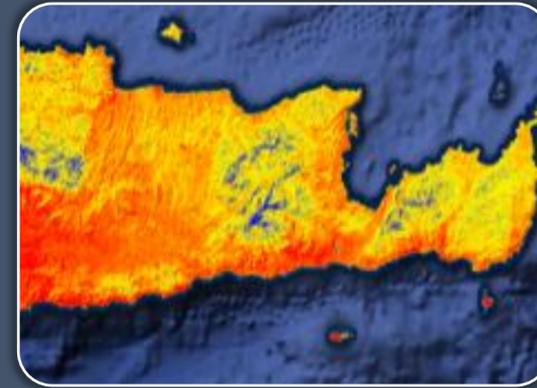
ESA architecture studies for both HPCMs and Second Generation Sentinel are currently on-going

#SPACE_COMPONENT EVOLUTION

6 candidate missions (HPCM)



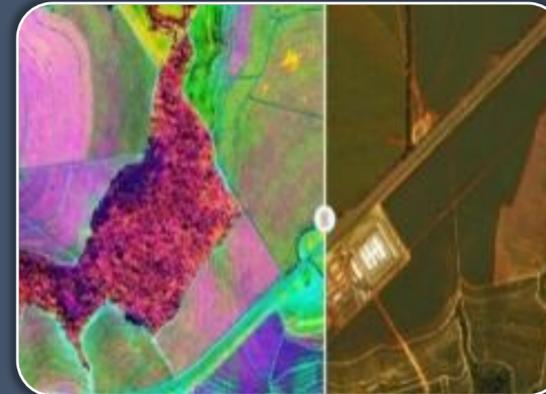
Anthropogenic CO₂
Monitoring



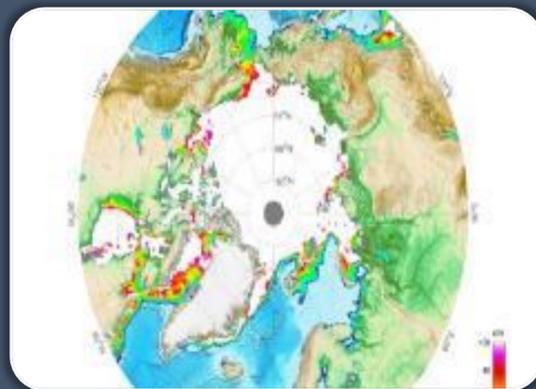
High Resolution
Surface Temp



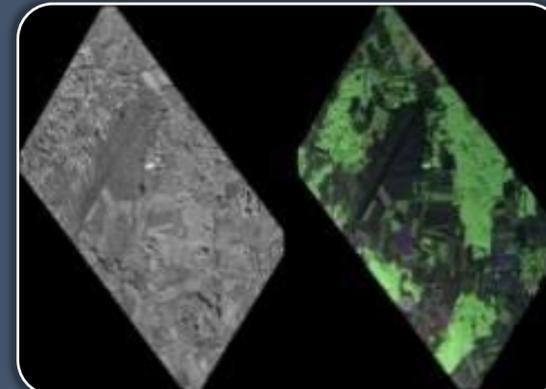
Polar Ice & Snow
Topography



HyperSpectral
Imaging



Passive Microwave
Imaging



L-band
SAR

972.343.516.863 TB

COPERNICUS DATA POLICY

NEED TO DISTINGUISH BETWEEN DATA POLICY FOR:

- SENTINEL DATA (FREE, FULL AND OPEN)
- COPERNICUS SERVICE PRODUCTS (FREE, FULL AND OPEN)
- 3RD PARTY DATA (DATA POLICY OF THE PROVIDER)

EXCEPTIONALLY, SOME SECURITY RESTRICTIONS MAY APPLY TO PROTECT THE SECURITY INTERESTS OF THE UNION OR ITS MEMBER STATES
THE COMMISSION HAS UNDERTAKEN AN ASSESSMENT OF THE COPERNICUS SECURITY FRAMEWORK WITH THE ASSISTANCE OF EXTERNAL CONSULTANTS.



34,000 products ingested in the last 24h
100,000 downloads in the last 24h

#DATA_VOLUMES

150+ TB data downloaded every day
150 PB archive since start
87 PB downloaded (November 2018)



DATA DISSEMINATION MEANS

HUB TO HUB
CONNECTIONS

EUMETCAST IN
AFRICA

COOPERATION
WITH
DG CNECT ON
SPECIFIC
INFRASTRUCTURE

PARTNERSHIP
WITH DIAS

RED CLARA (SOUTH
AMERICA)

DISTRIBUTION OF
COPERNICUS DATA VIA
GEANT NETWORK

TRANSATLANTIC CABLE

COPERNICUS DATA ACCESS OVERVIEW



NO MORE LARGE FILES DOWNLOADS
NO MORE STORAGE ISSUES

THE DIAS & WHERE TO REACH THEM

WWW.CREODIAS.EU WWW.MUNDIWEBSERVICES.COM WWW.ONDA-DIAS.COM

WWW.SOBLOO.EU

WWW.WEKEO.EU



MORE THAN 320.000 USERS

March 2019

#USER_UPTAKE

**ESA « OPEN ACCESS HUB »
208,000 registered users (March 2019)
33,000 « active users » (Nov 2017)**

Grapes

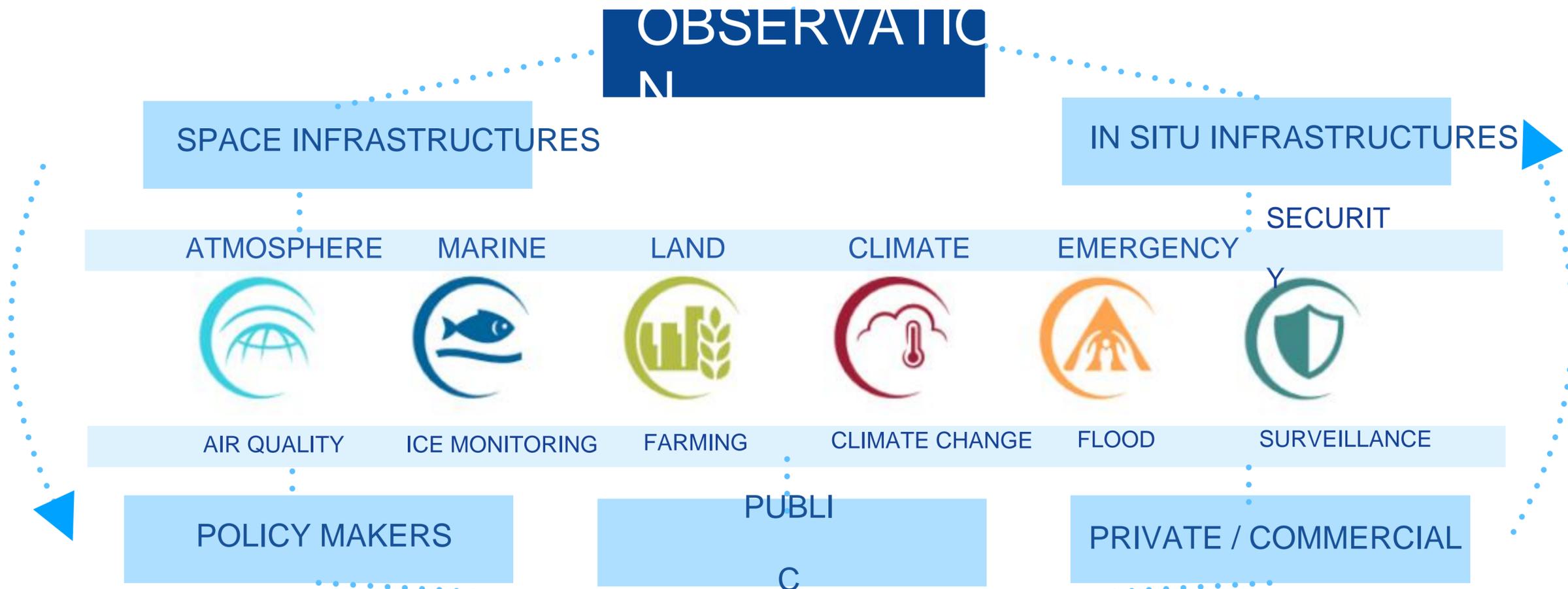
Size, ha

38

#USER_UPTAKE

Does not include

- National Mirror Sites (e.g. CODE-DE, PEPS)
- AWS, Google, Planet
- Private platforms (e.g. Visioterra, EO Browser, Adam Platform)
- Users of services information
- Users of Copernicus-enabled applications (e.g. Meteo Pollen, Plume Labs)
- End-user and field users (e.g. English Environment Agency Water Patrol)
- DIAS (Ramping Up)



USER DRIVEN APPROACH



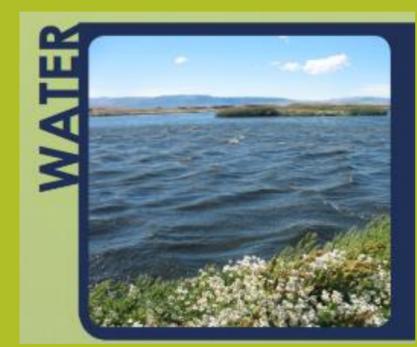
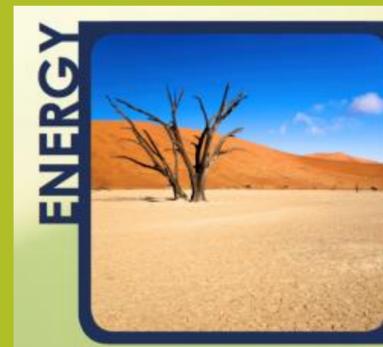


Land
Monitoring

Benefit areas and products examples

- Ecosystems
- Biodiversity
- Agriculture
- Forestry
- Energy
- Natural Resources
- Water
- Urban planning

Global



Pan-European

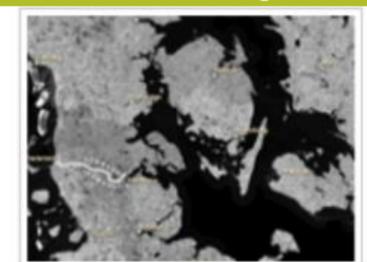


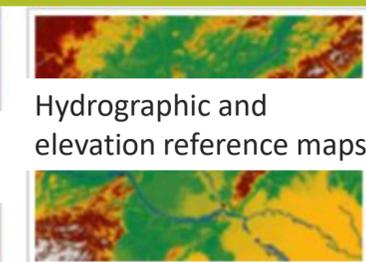
Image Mosaics



CORINE Land Cover



High Resolution Layers

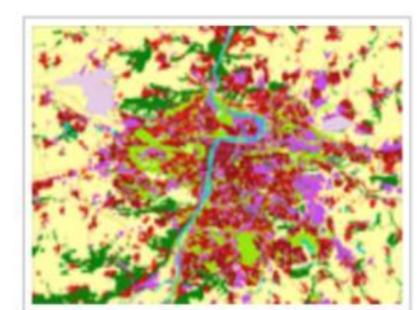


Reference Data

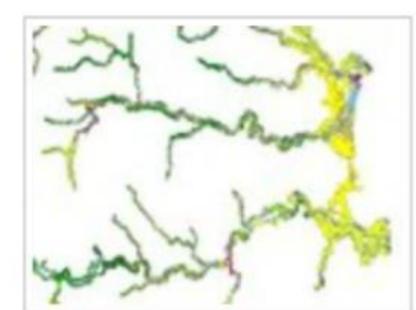


Related Pan-European products

Local



Urban Atlas



Riparian Zones



Natura 2000 (N2K)



Benefit areas and products examples

Marine safety

Marine resources

Coastal and marine
environment

Climate and
meteorological
forecasting

Other: Transport,
Tourism, Environment,
Pollution, Energy, etc.



Sea Level

Ocean Salinity

Ocean Temperature

Sea Ice

Wind and Waves

Ocean Currents

Ocean Colour / Biogeochemistry (e.g.
optics, chlorophyll, biology, chemistry)



Benefit areas and products examples

Health

Air Quality and Atmospheric Composition



Environment

Climate forcing



Pollution

Ozone layer & UV



Climate

Solar radiation



Renewable Energy

Emissions and surface fluxes





Climate
Change

Benefit areas and products examples

Climate change

Mitigation and
adaptation

Weather forecast

Pollution

Environment

Health

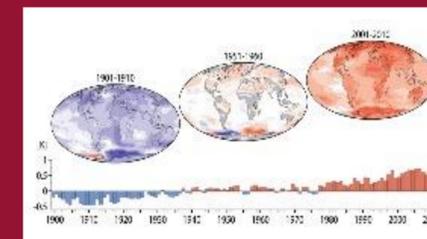
Consistent Estimates of the
Essential Climate Variables (ECVs)



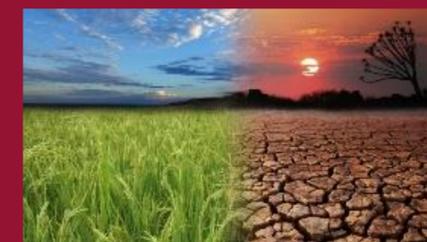
Support to Mitigation and
Adaptation Strategies



Global and Regional
Reanalyses



Seasonal Forecasts
And Climate Projections





Disaster Emergency Situations

Humanitarian Crises



Risk & Recovery Mapping:

- Reference Maps
- Pre-disaster Situation Maps
- Post-disaster Situation Maps

Rapid Mapping:

- Reference Maps
- Delineation Maps
- Grading Maps

Early Warning:

- Floods: EFAS & GFAS
- Forest Fires: EFFIS & GWIS
- Droughts: EDO & GDO

*EFAS = European Flood Awareness System;
EFFIS=European Forest Fire Information System*



Security

Border Surveillance

- Coastal monitoring
- Pre-frontier monitoring
- Reference mapping



Maritime Surveillance

- Maritime surveillance of an area of interest
- Vessel detection
- Vessel tracking and reporting
- Vessel anomaly detection



Support to EU External Action

- Road network status assessment
- Conflict damage assessment
- Critical infrastructure analysis
- Reference map
- Support to evacuation plans
- Crisis situation map
- Border map
- Camp analysis



#COPERNICUS_SERVICES

Additional services will be considered to meet unsatisfied or emerging needs (non-exhaustive):

- Monitoring CO2 to estimate anthropogenic emissions (priority)
- Climate Change and sustainable development
- Changes in the Arctic
- Cultural Heritage
- Agriculture

COPERNICUS SERVICES APPLICATIONS



URBAN PLANNING



TRANSPOR



TOURISM



SECURITY & DEFENCE



HEALTH



FORESTRY



INSURANCE & DISASTER MGT.



ENERGY & NATURAL RESOURCES



DEVELOPPMENT & COOPERATION



CLIMATE CHANGE & ENVIRONMENT



BLUE ECONOMY

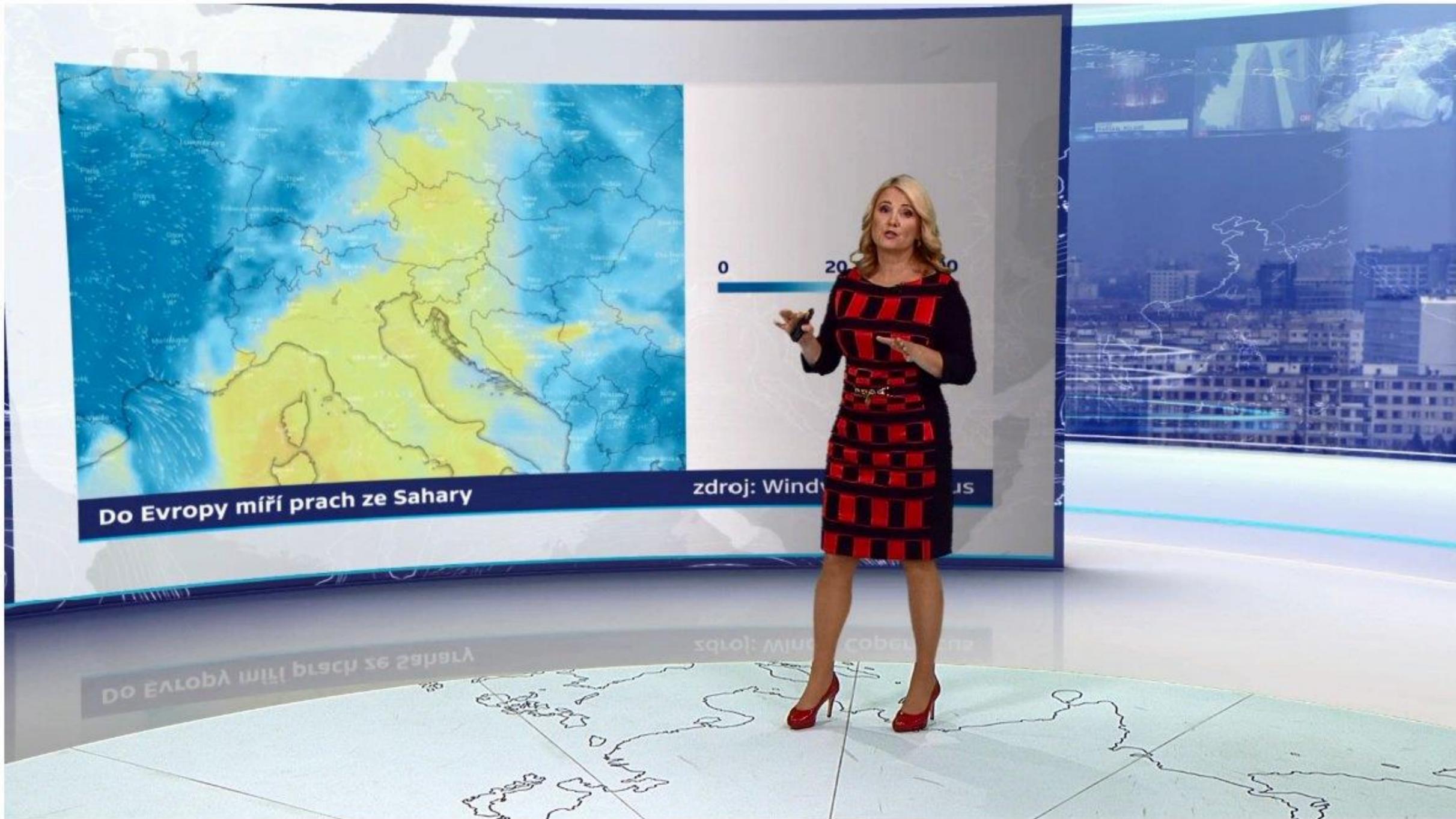


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“COOL” APPLICATIONS: NEWS

Neděle 9. června

PREMIÉRA: dnes v 18:55 na ČT1





Copernicus

“COOL” APPLICATIONS: NEWS

NEWS

Detention

Mistakes

Identity

From above

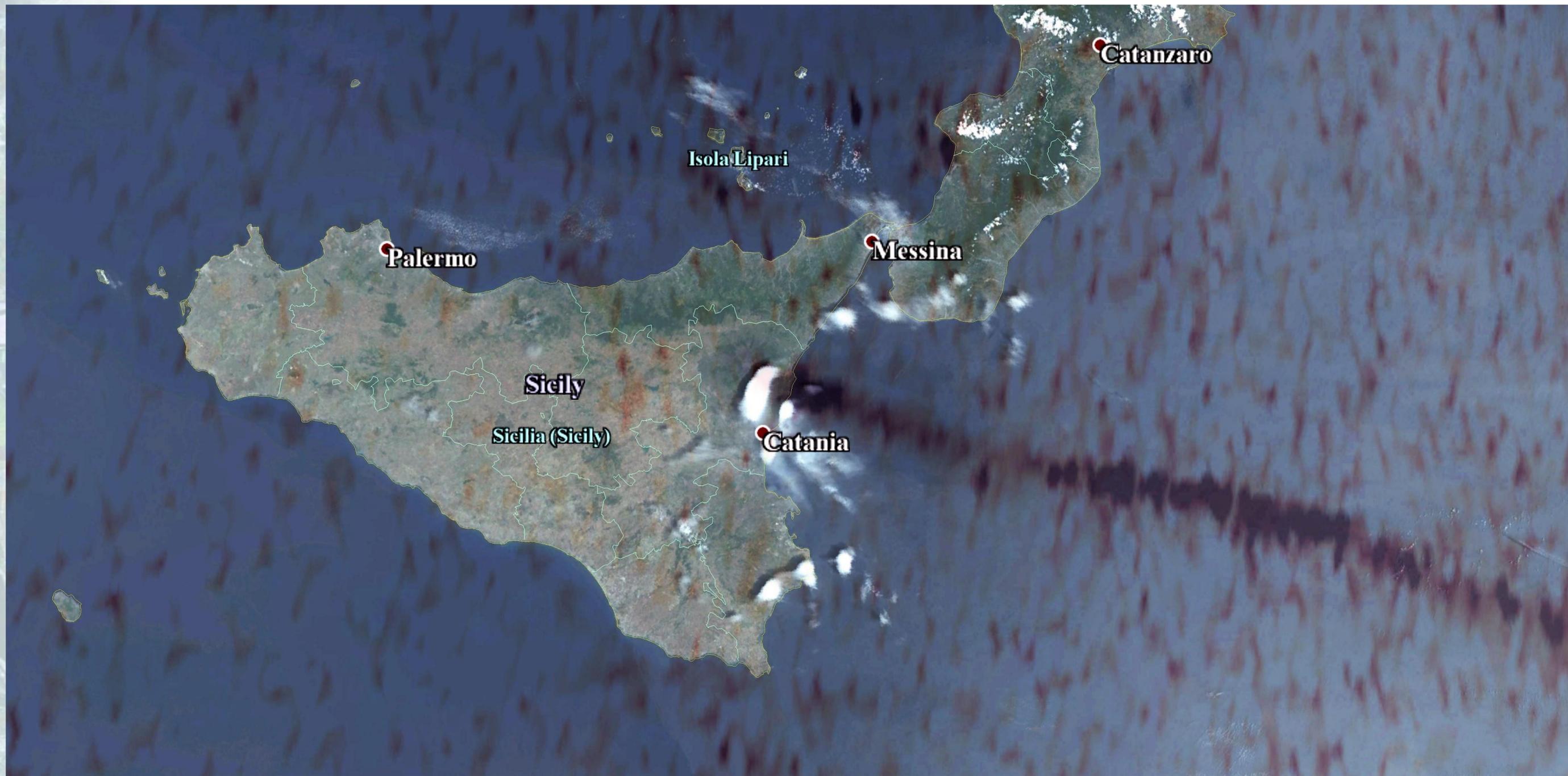


This image, taken by Sentinel Images in October 2018, shows how quickly the site has been developed



Copernicus

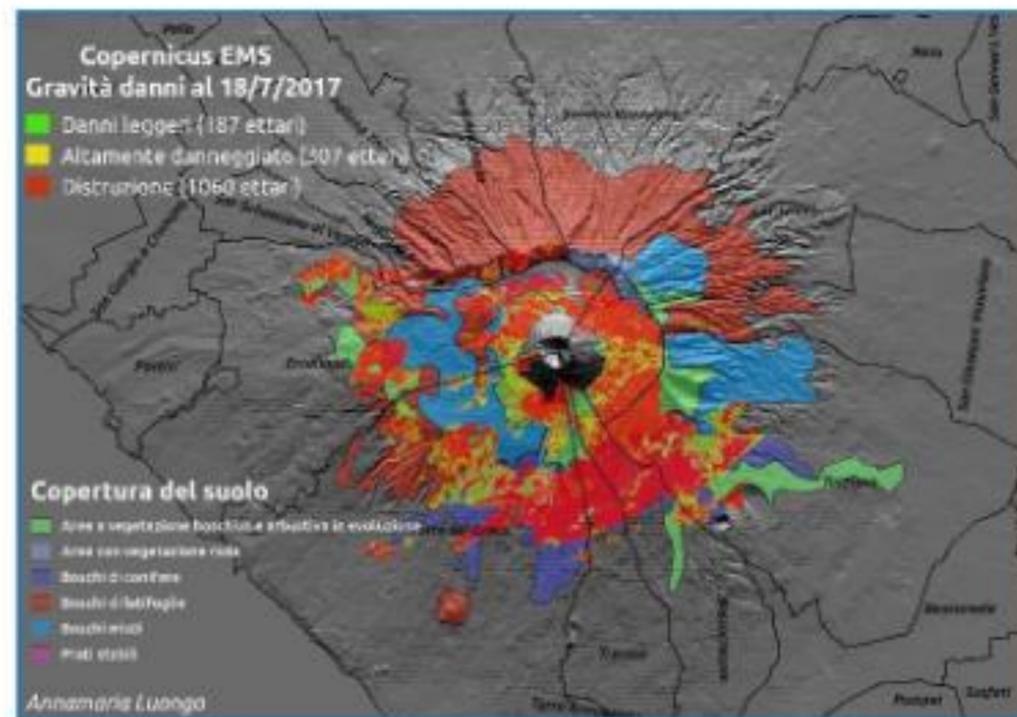
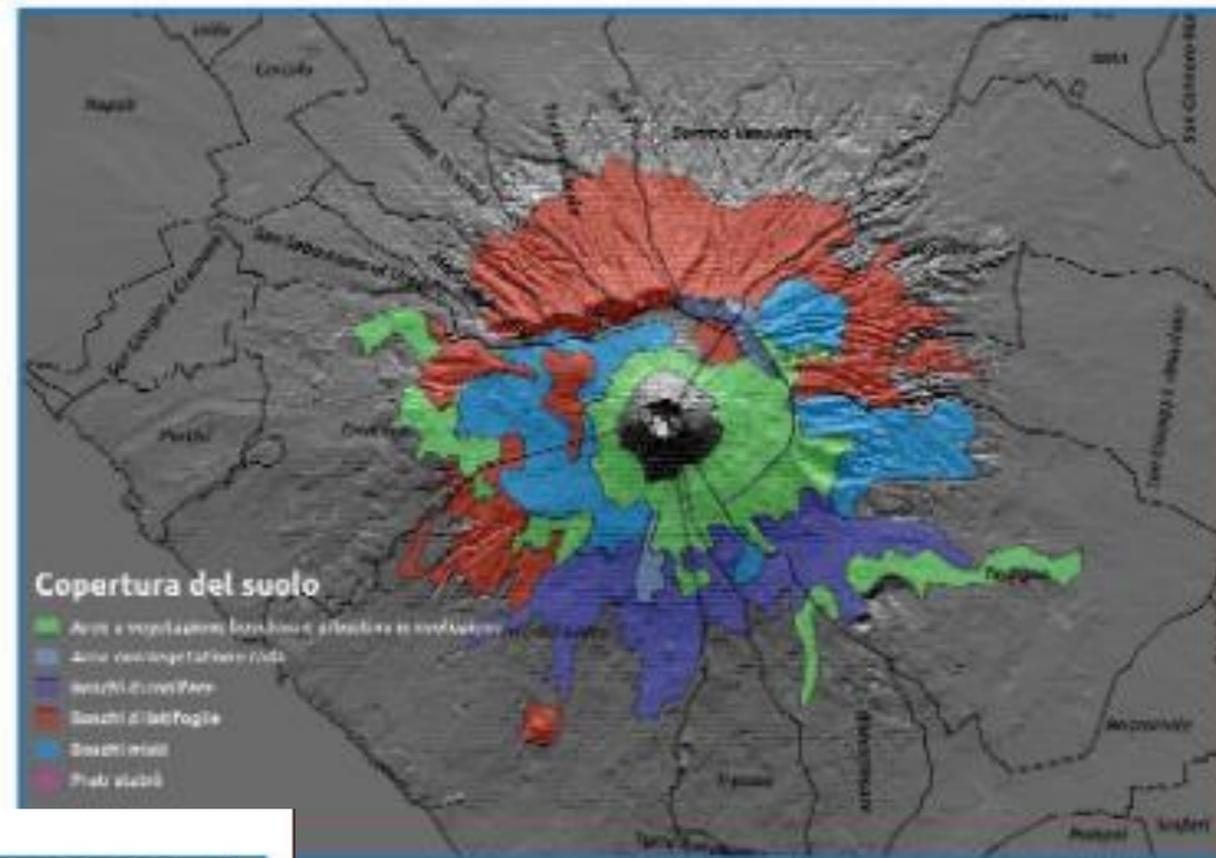
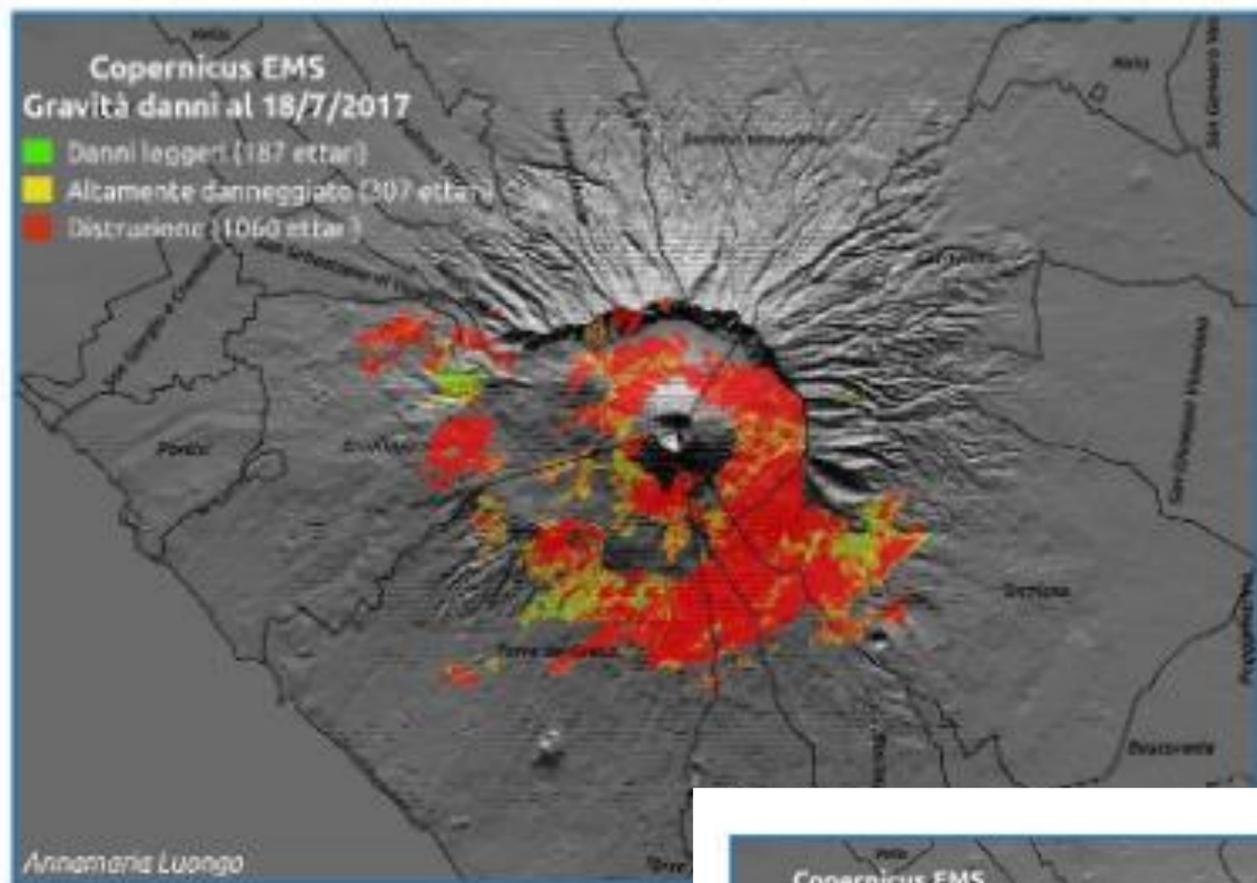
“ COOL ” APPLICATIONS: FUSION





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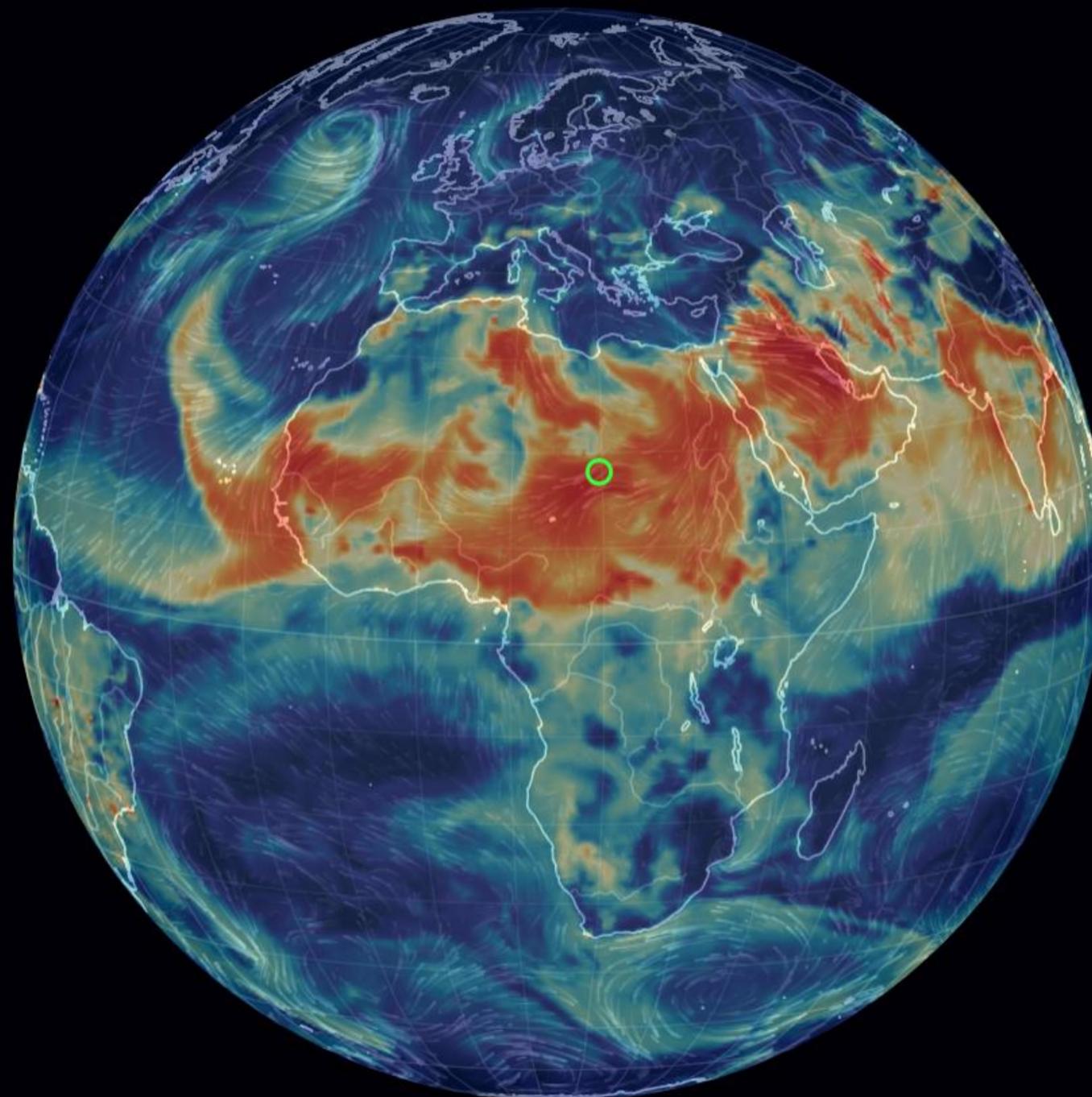
“COOL” APPLICATIONS: FUSION





Copernicus

“COOL” APPLICATIONS: VISUALISATION



17.95° N, 19.61° E ×

50° @ 34 km/h

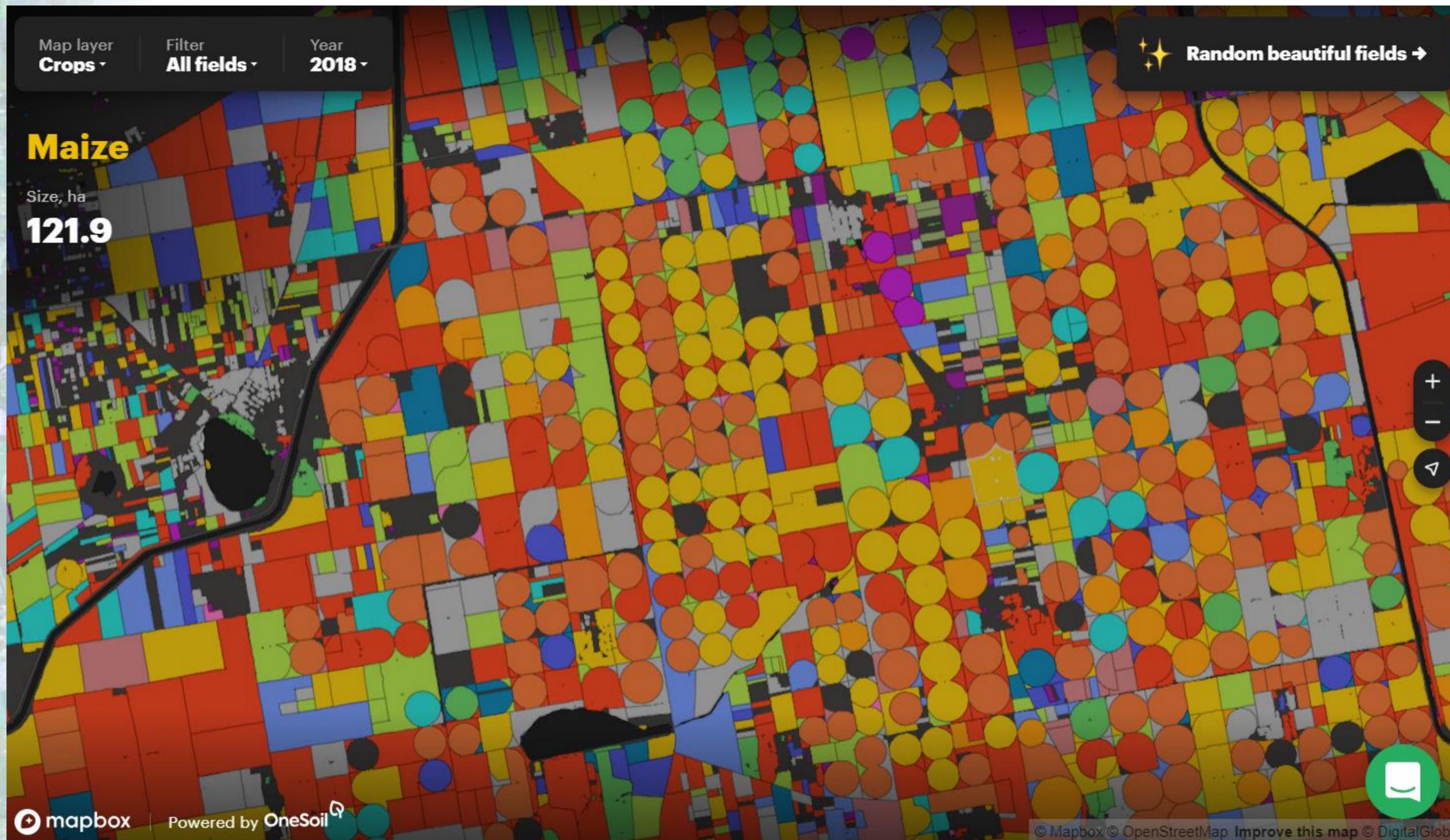
173 $\mu\text{g}/\text{m}^3$

earth



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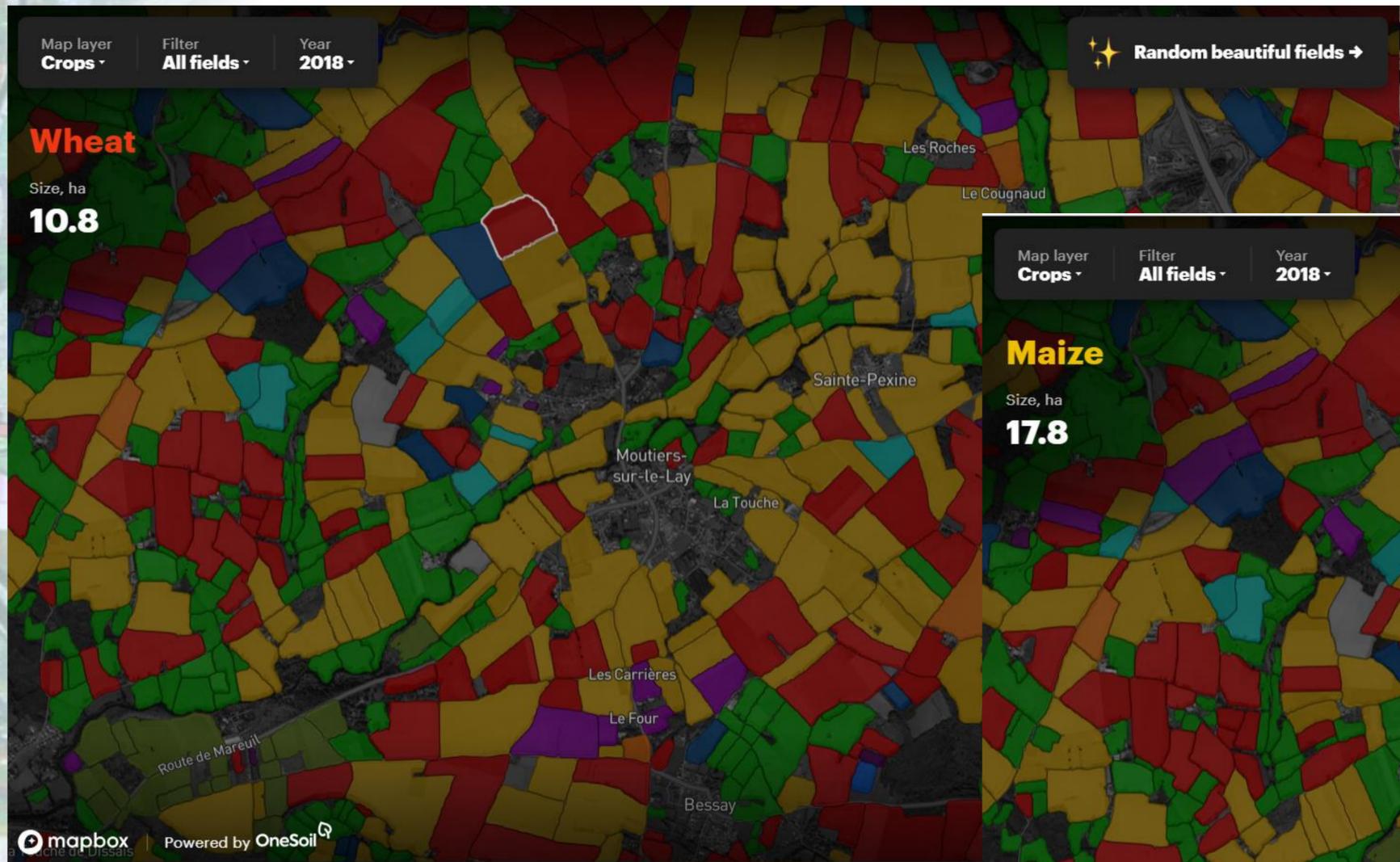
“ COOL ” APPLICATIONS: VISUALISATION





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“ COOL ” APPLICATIONS: AI/ML



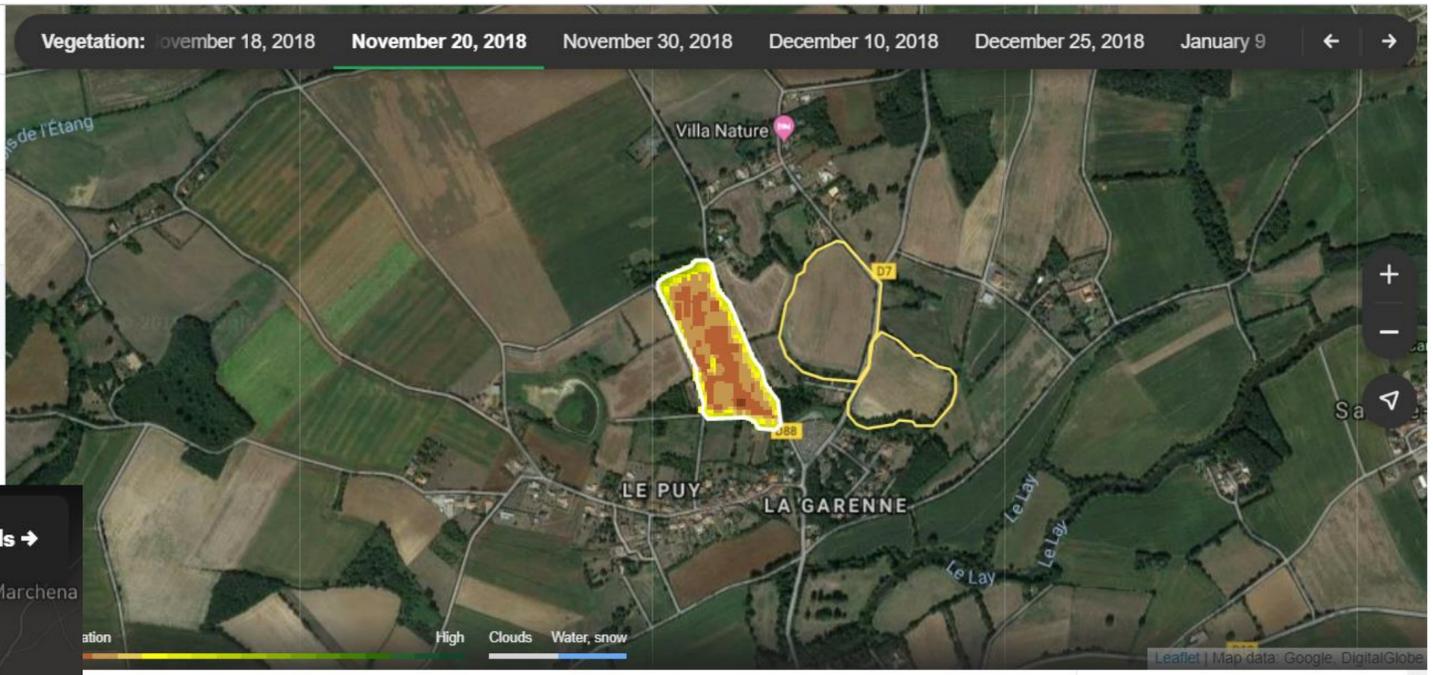


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“COOL” APPLICATIONS: AI/ML

Fields

- 1. Field, 4 ha
Barley, spring
- 2. Field, 6 ha
Wheat soft, spring
- 3. Field, 6 ha
Maize silage



Weather now 10:56

+9°

Wind 4 m/s
Humidity 84%
Dew point +6°
Pressure 762 mm
Cloud cover 0%

3. Field, 6 ha
Maize silage

Actions

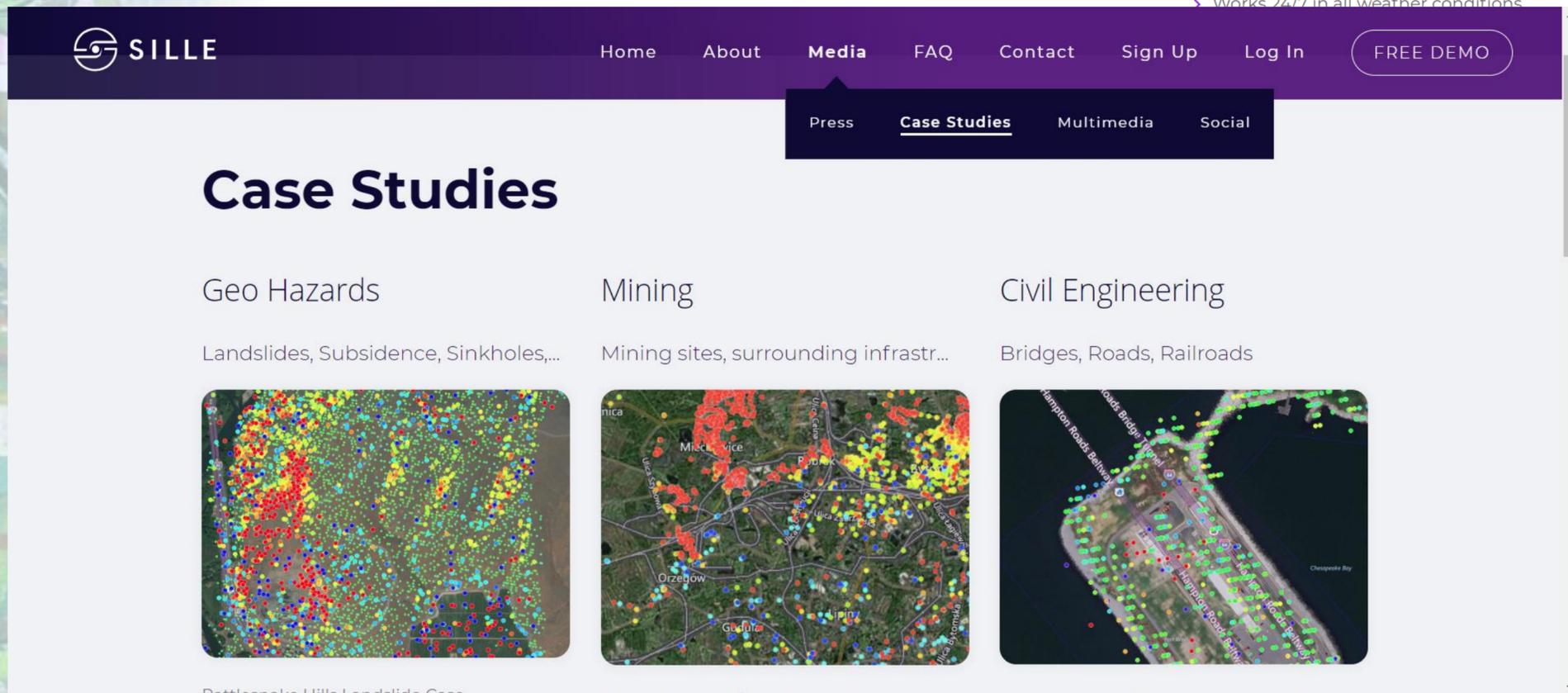
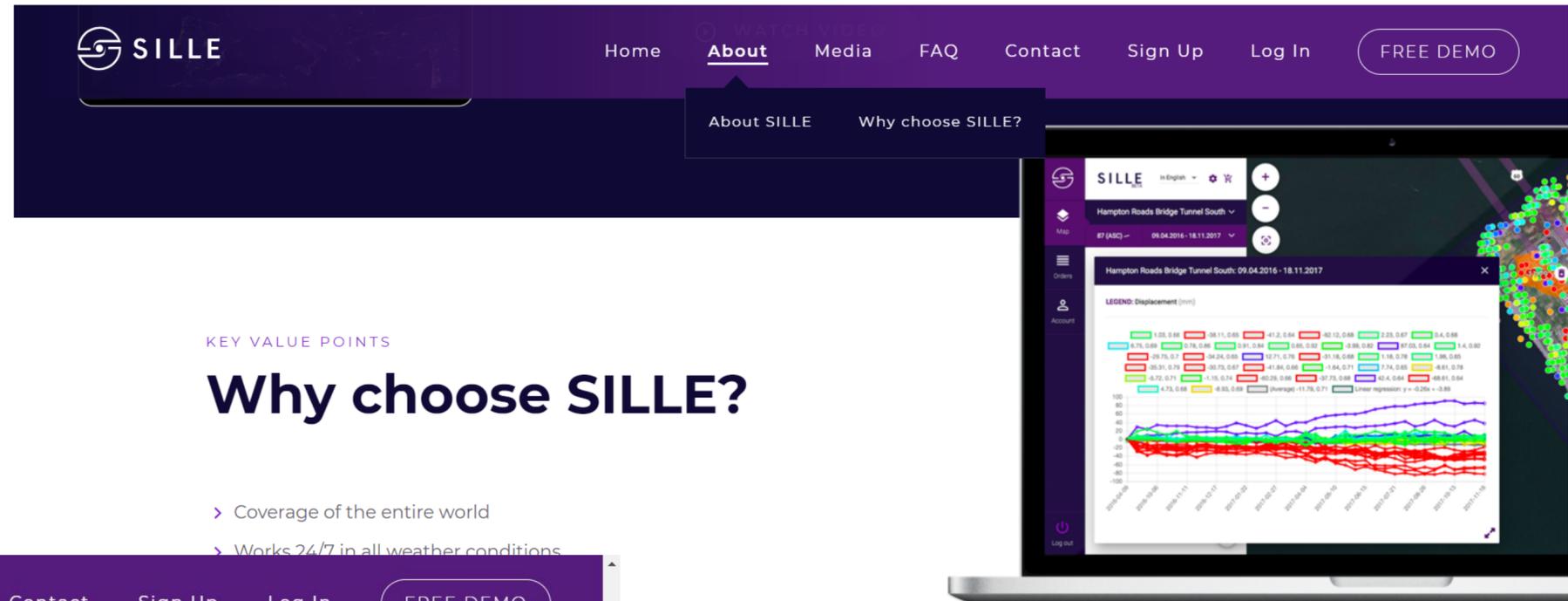
- Edit info
- Phosphorus-potassium application
- Nitrogen application

Weather forecast > All notes >



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“COOL” APPLICATIONS: STARTUPS





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“COOL” APPLICATIONS: STARTUPS

euronews. Europe World Business Sport Culture Style Sci-tech Travel Video ☰ Programmes ▾

SHARE THIS ARTICLE



Plume Labs Air Report - a successful app prompting users to adapt their behavior to pollution levels



Air report by Plume Labs (Copyright Plum Labs)



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“ COOL ” APPLICATIONS: STARTUPS



Discover how to keep your skin looking young and healthy

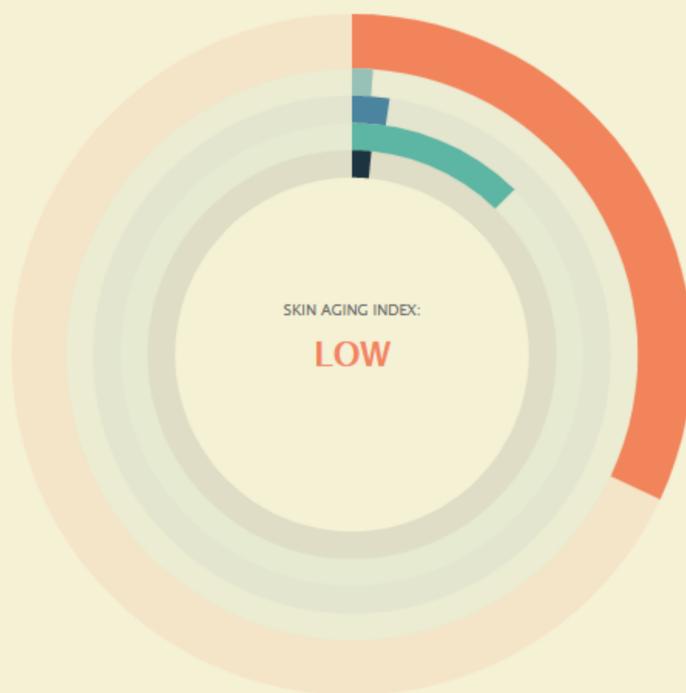
Find location...

Find

11:00

Elsene, Belgium

Latitude:50.832908
Longitude:4.358734



O3 +
0.0380 mg/Kg

NOX +
9.9700 mg/cbm

UV +
0.2500

PM +
0.0143 mg/cbm

SKIN AGING +

Find out the effects of pollution in your city every hour together with a set of recommendations for how to best protect your skin.

Ozone (O3)

Ozone is a greenhouse gas present in high altitudes that blocks some of the dangerous UV rays to arrive at the earth's surface. However, when it is present in the air we breathe, it is very toxic since it has a very strong oxidative effect, which plays a major role in the skin ageing process. O3 is generated when contaminants such as NOx are present in the smog and interact with sunlight.

Effects on the skin:

- O3 is a powerful oxidizing agent which can be dangerous at high concentrations. Believe it or not, it can cause urticaria, eczema, and contact dermatitis!
- O3 is responsible for premature skin ageing, depleting/degrading collagen (extracellular matrix components) and elastin.

Recommendations:

- Apply pomegranate topically as this antioxidant-rich fruit has an anti-aging effect. It helps the skin to create more collagen and speeds skin healing. You can take 2 tablespoons of pomegranate peel powder and add to it 1 tablespoon each of lemon juice and honey. Mix well to form a smooth paste. Apply this to your face and neck and leave it on for 15 minutes. Wash with lukewarm water. This face pack can remove dark spots and treat pigmentation and even brighten the skin naturally
- Collagen helps give our skin its tone and is crucial for reducing fine lines and wrinkles. Since production

Powered by



Contains modified Copernicus Atmosphere Monitoring Service Information 2018



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“COOL” APPLICATIONS: COPERNICUS4CITIZENS



Wim Zwijnenburg

@wammezz

Follow



Latest [#Sentinel2](#) imagery picked up a fire at an [#oil](#) well site near Buqan, [#Deirezzor](#) in SDF controlled areas close to frontline with ISIS wikimapia.org/#lang=en&lat=3 ... via [@sentinel_hub](#)



12:59 PM · 14 Jan 2019



Copernicus

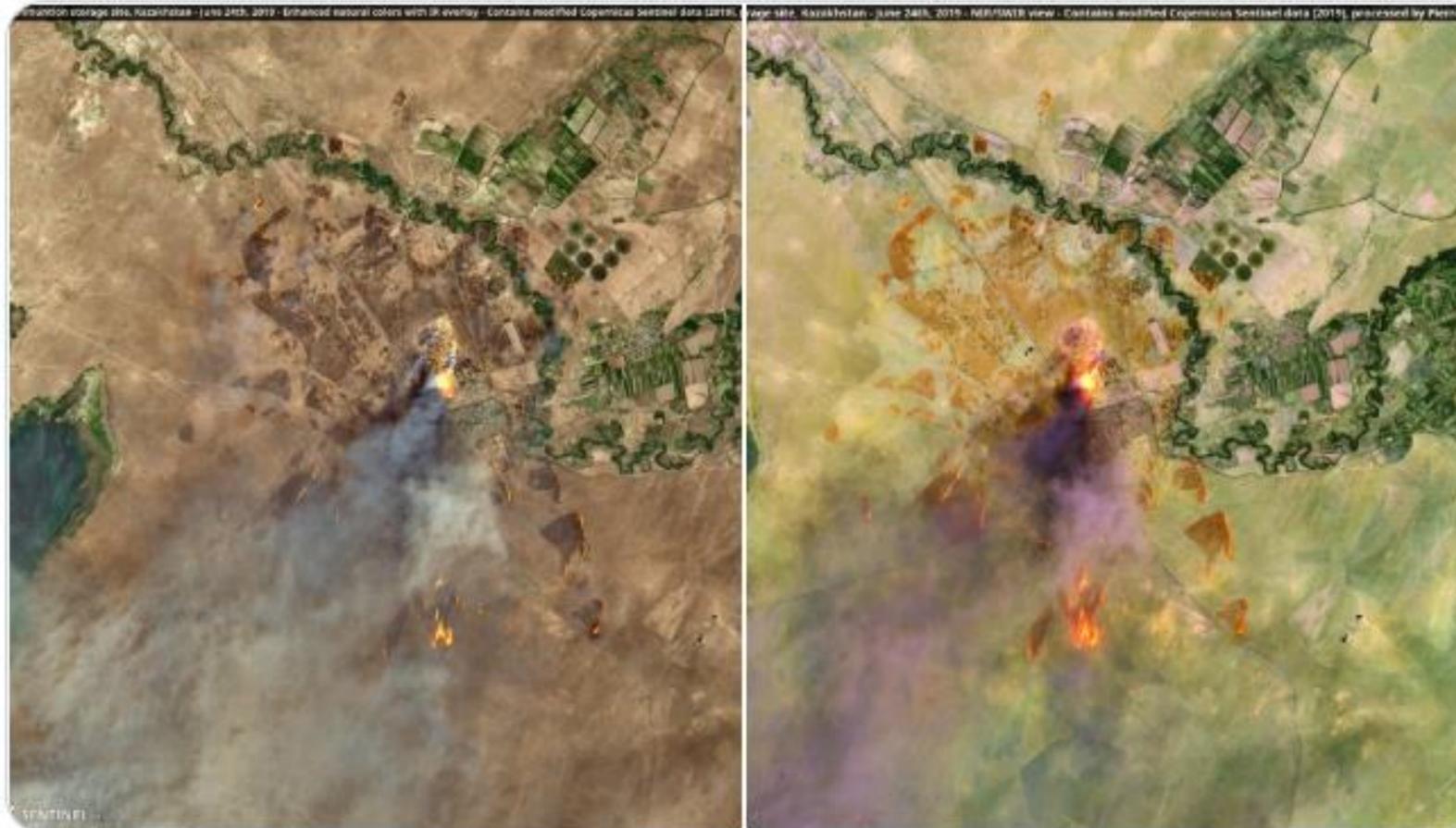
“COOL” APPLICATIONS: COPERNICUS4CITIZENS



Pierre Markuse @Pierre_Markuse · 19h

Replying to @wammezz @CopernicusEU and @sentinel_hub

Hi @wammezz, made two bigger and clearer versions of it. Arys ammunition storage site in #Kazakhstan 🇰🇿 24 June 2019 Enhanced natural colors with IR overlay and NIR/SWIR view. Full-size: flic.kr/p/2gjFJjA + flic.kr/p/2gjFTpm
#RemoteSensing #Arys



You and 7 others





Copernicus

“COOL” APPLICATIONS: COPERNICUS4CITIZENS



Pierre Markuse

@Pierre_Markuse

Following

● New blog post: "Satellite Image Guide for Journalists and Media", answering a few questions and giving some hopefully useful information for satellite image usage in media pierre-markuse.net/2018/12/18/sat ...
#RemoteSensing #Journalism #Media
#EarthObservation

Satellite Image Guide for Journalists and Media

Tips when using/creating satellite images for media

December 18th, 2018 11:13am • Pierre Markuse

Remote Sensing, Science • Leave a comment



Using satellite images

A picture is worth a thousand words. Most journalists will agree that this still holds true, and therefore satellite images can be worth a lot to journalists and media outlets.

So you would like to use a satellite image in your article and you would like to explain it to your viewers? Here is a short guide covering some of the most frequently asked questions and giving some general explanations on satellite images. It by no means covers all aspects, as there are far too many types of satellite images, but should give you a good start to find out more on your own and maybe motivate you to create your own images, which has become quite easy and quick even with no prior knowledge of it.



Landstar 8 image of the Camp Fire – informative and catchy at the same time

11:42 AM - 18 Dec 2018



“COOL” APPLICATIONS: COPERNICUS4CITIZENS

Copernicus

Analytics Home Tweets Audiences Events More

Copernicus EU

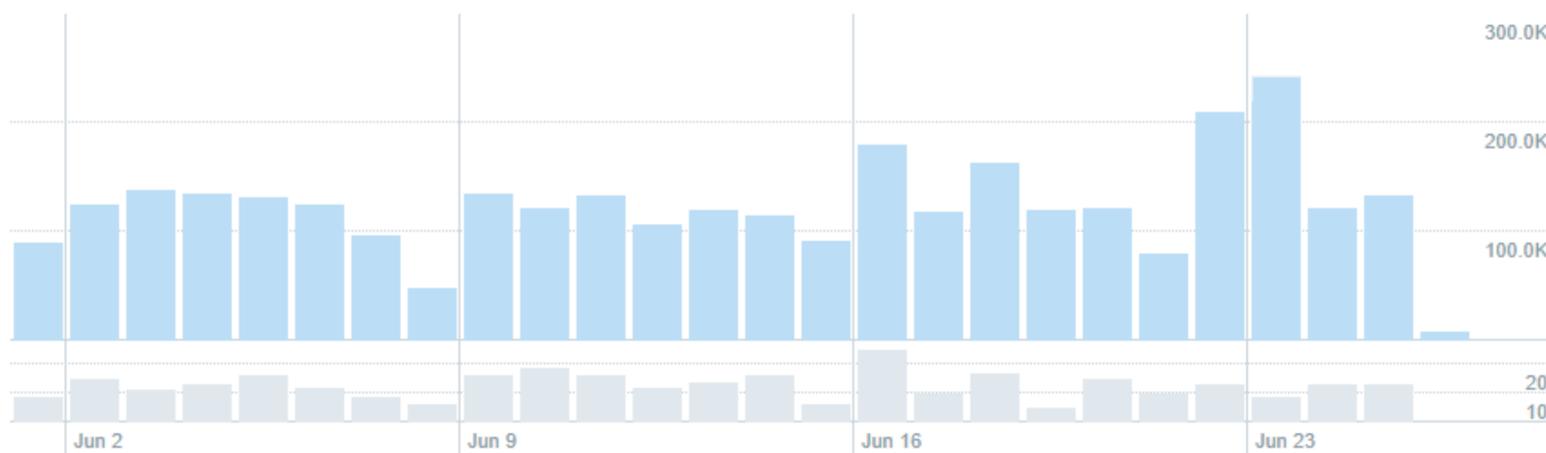
Sign up for Twitter Ads

Tweet activity

Jun 1 – Jun 26, 2019

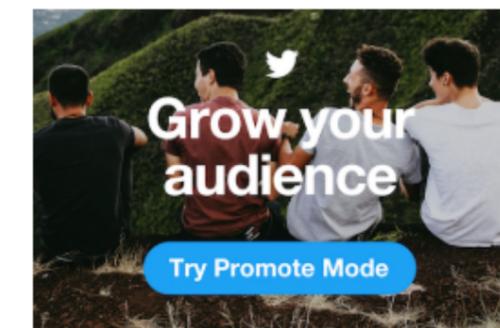
Export data

Your Tweets earned **3.3M impressions** over this **26 day** period



YOUR TWEETS

During this 26 day period, you earned **123.5K impressions** per day.



Tweets **Top Tweets** Tweets and replies Promoted Impressions Engagements Engagement rate

Tweet	Impressions	Engagements	Engagement rate
Copernicus EU @CopernicusEU · Jun 22 The changing looks of the rice fields in the #Ebro delta es, as seen by #Sentinel2 EU ✨ pic.twitter.com/UFxAPbR9cj View Tweet activity	283,263	15,834	5.6%
Copernicus EU @CopernicusEU · Jun 6 📍 Our first tweet with a capture from the @windyforecast visualisation of our @CopernicusECMWF Air Quality products! Here are the nitrogen dioxide levels for next Sunday 4:00 am Amazing to look at the impact of shipping lanes, on top of industrial and urban centres 🍌🍌🍌 pic.twitter.com/6BEFxbYVVJ View Tweet activity	64,443	2,340	3.6%

Engagements

Showing 26 days with daily frequency



Link clicks





Copernicus

The Copernicus Startup Programme

Copernicus
masters

Copernicus
hackathons

Copernicus
accelerator

OPEN CALL

START-UPS PER YEAR
50

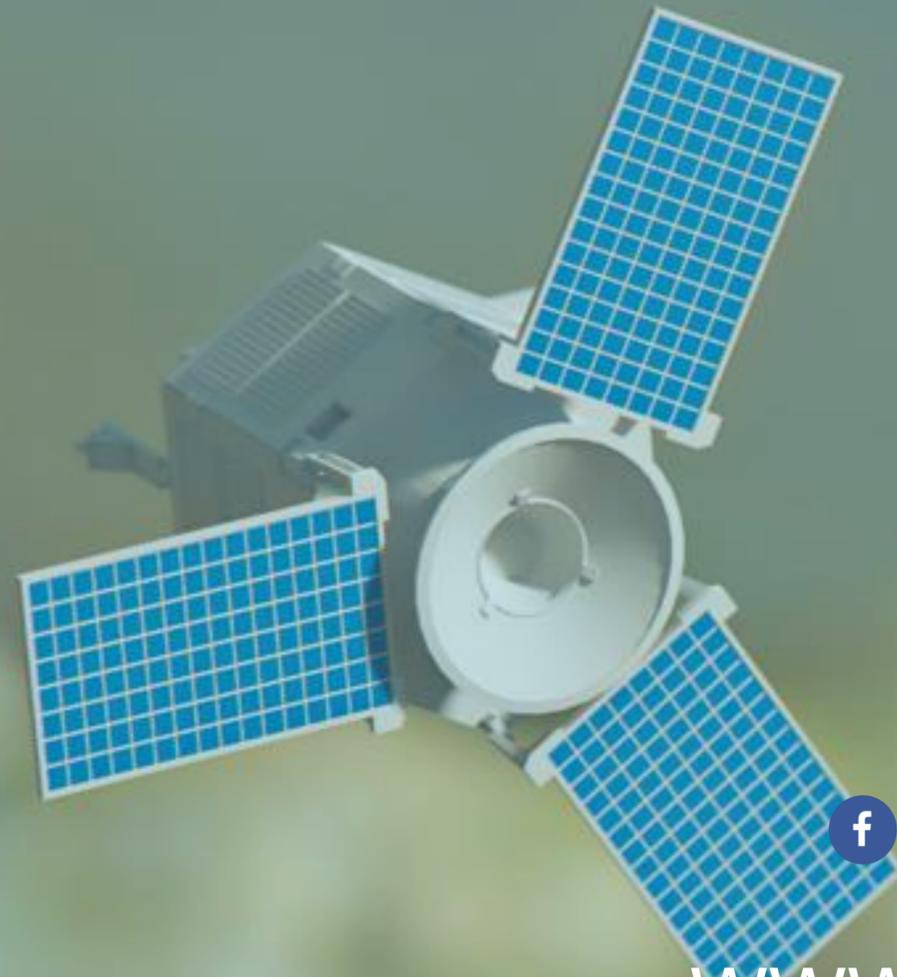
Copernicus
accelerator

START-UPS PER YEAR
20

Copernicus
incubation
programme

Other
Accelerators
& Incubators





COPERNICUS EU

WWW.COPERNICUS.EU

