

COPERNICUS AN EU SUCCESS STORY

#PROUDTOBEEUROPEAN





Copernicus

C O P E R N I C U S H I S T O R Y

Baveno
Manifesto

1998

GMES – Flagship
of EU Space
Policy

2005

EC-ESA
Agreement on
GMES

2008

Copernicus Regulation
and Data Policy

2013

GMES →
Copernicus

2001

Göteborg EU
Summit

2006

EC - GMES
Bureau

2011

Start of GMES
GIO

2014

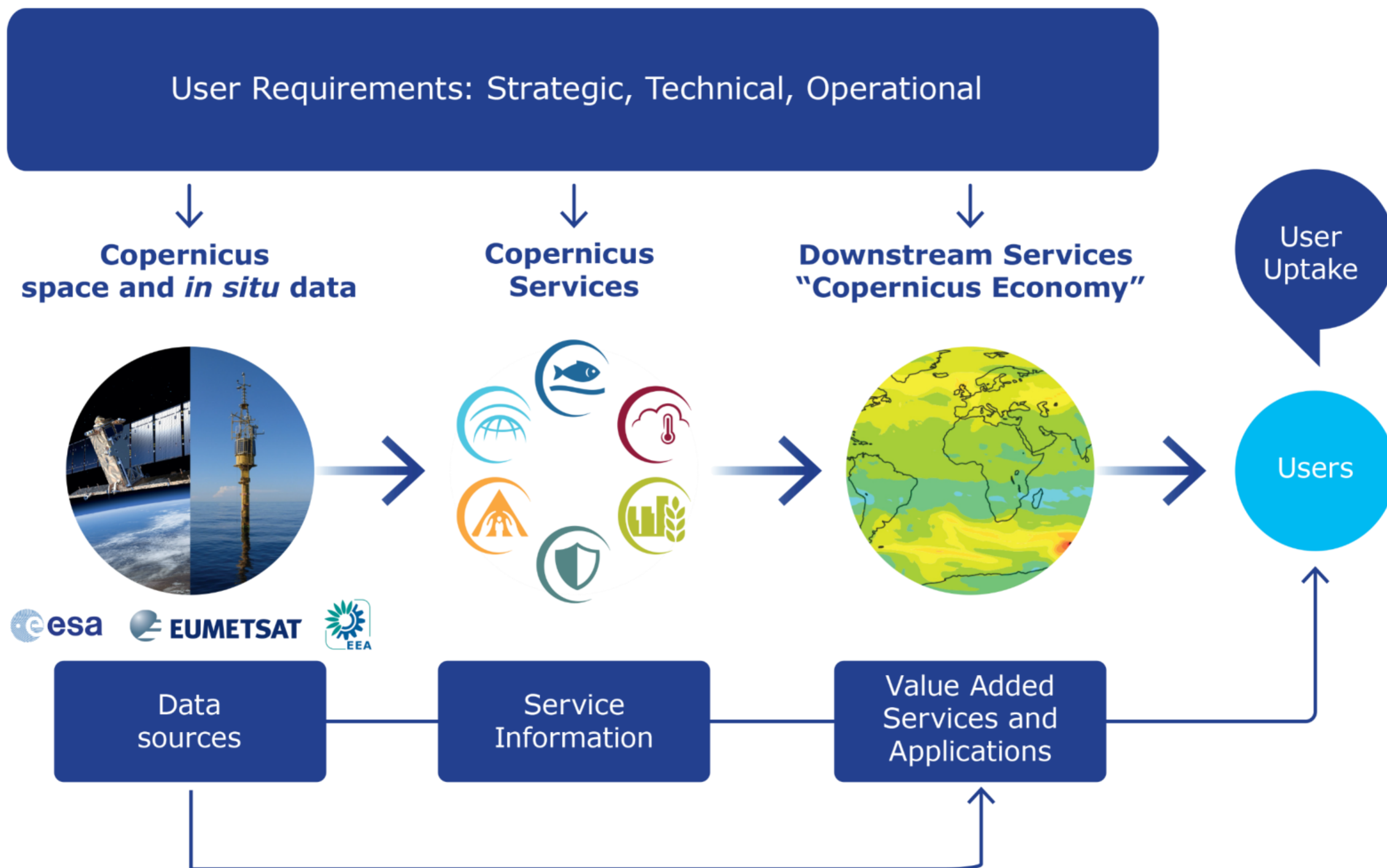
Start of
Full service
operations

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

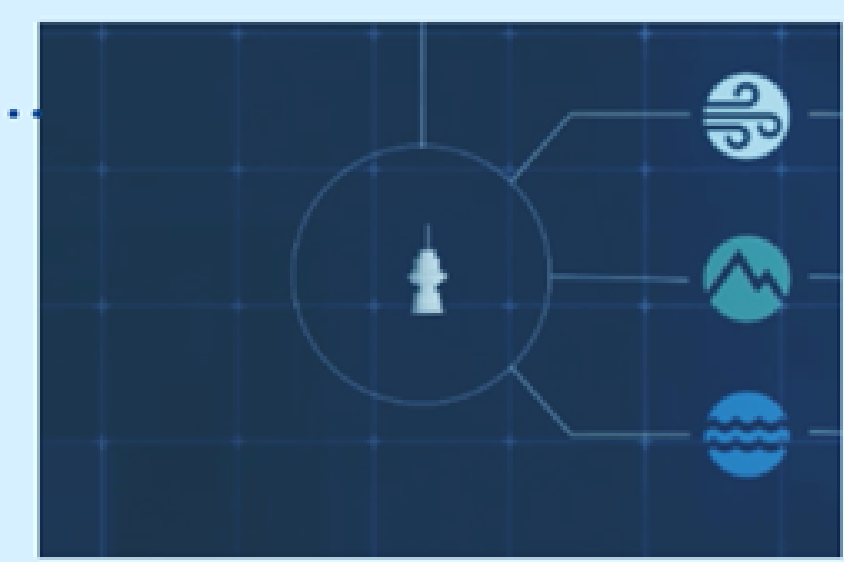
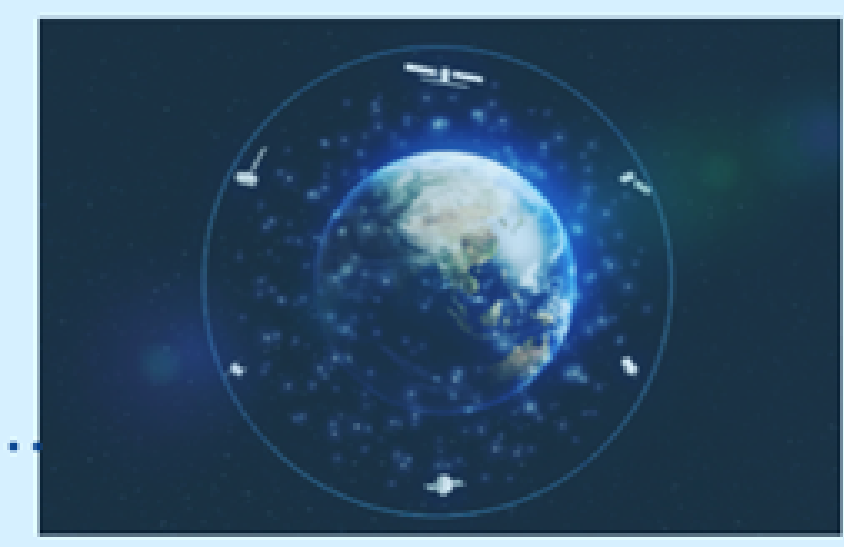


INFORMATION

PROCESSED DATA

PRODUCTS

3d PARTY DATA



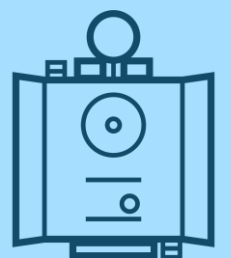
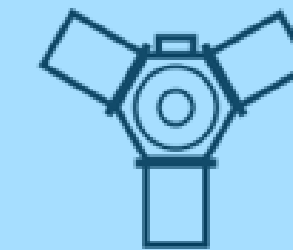
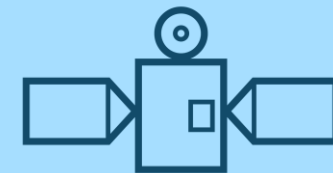
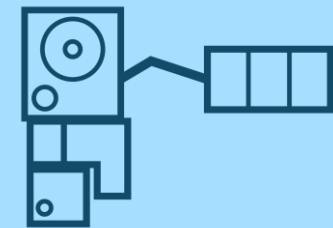
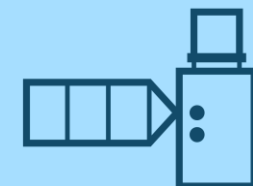
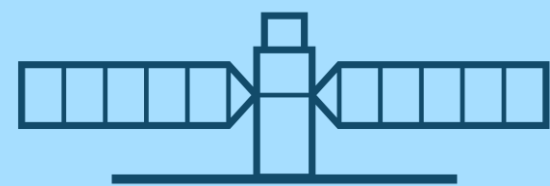
IN SITU SENSORS



7 COPERNICUS SENTINELS IN ORBIT

	Key Features	Mission	In Orbit
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

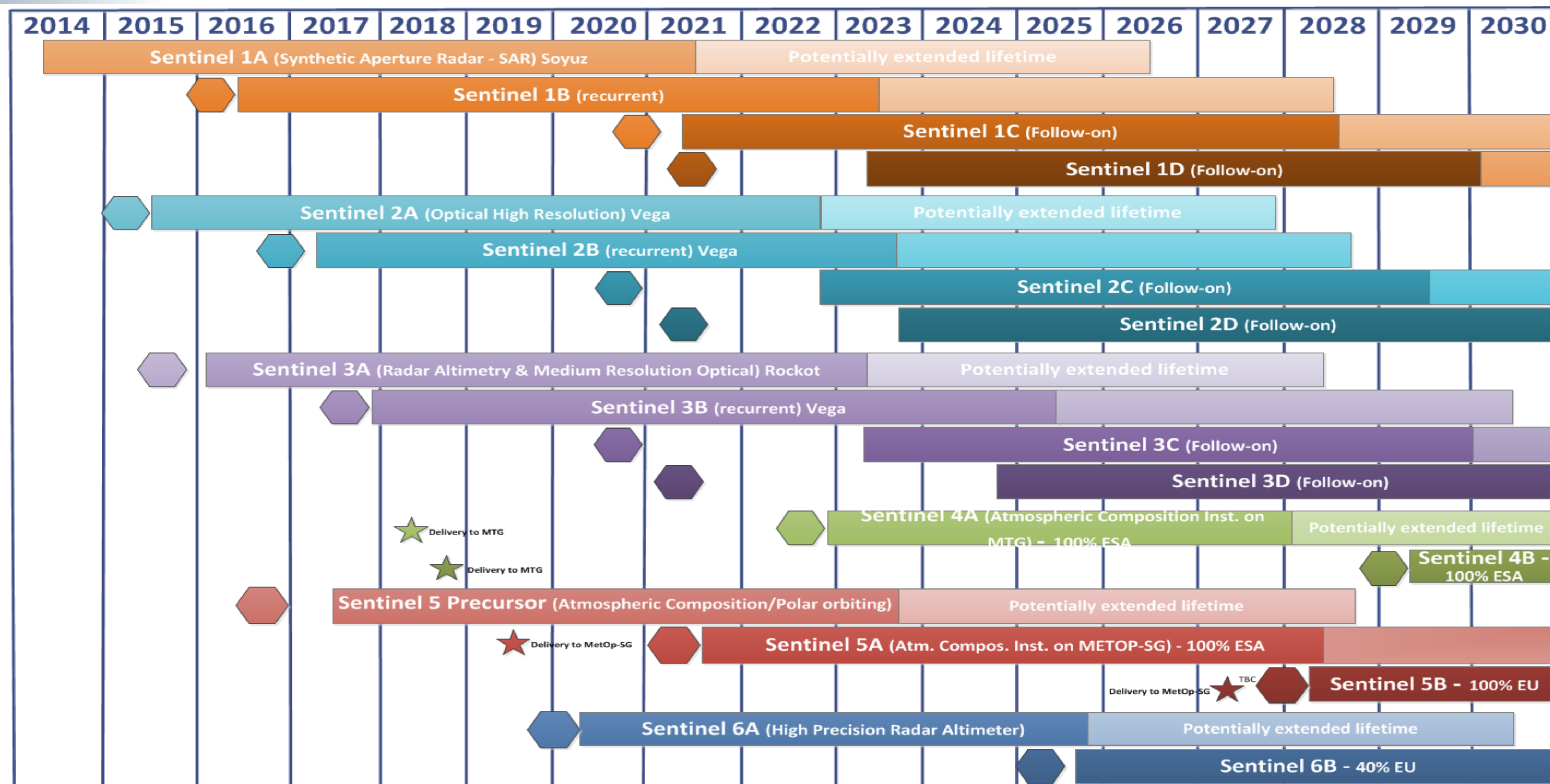
SENTINEL-6

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

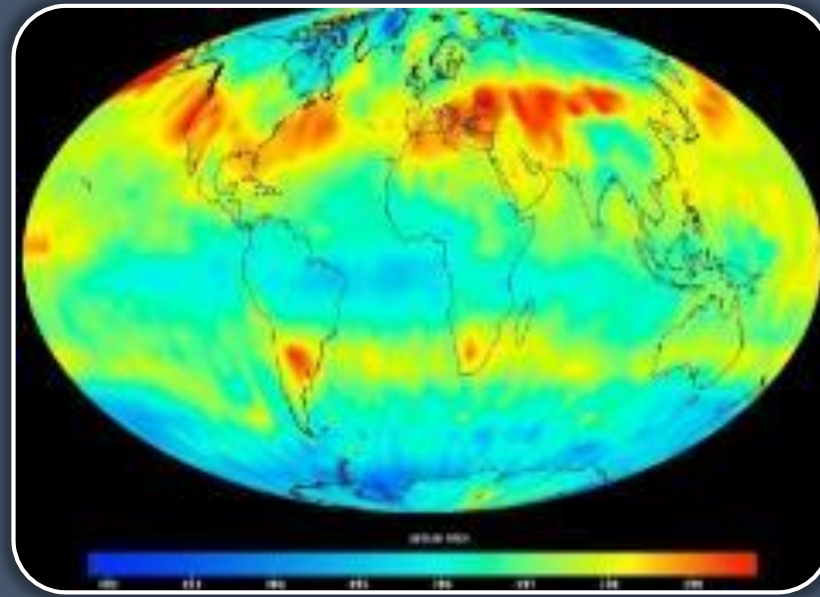
- 2030-onwards: Copernicus Space Component Second Generation

Enhanced continuity of current Sentinels

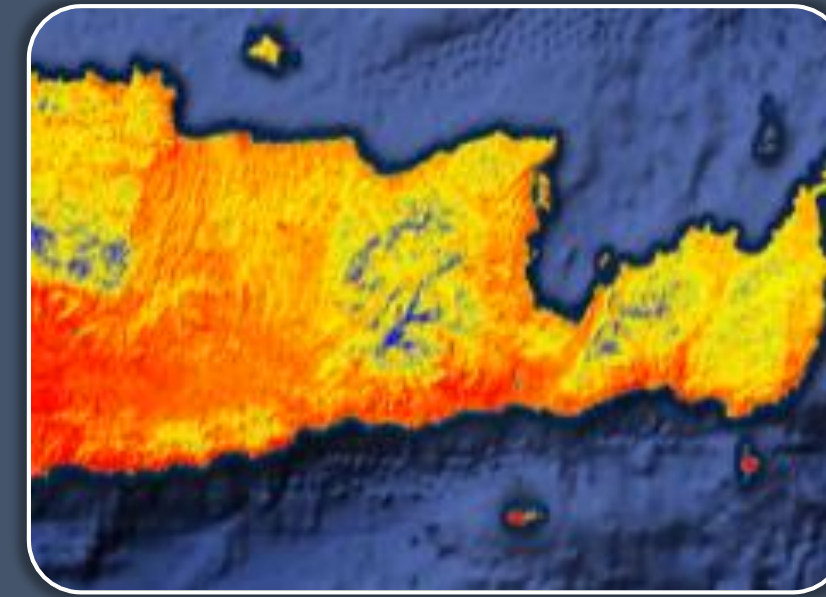
ESA architecture studies for both HPCMs and Second Generation Sentinel are currently on-going

#SPACE_COMPONENT EVOLUTION

6 candidate missions (HPCM)



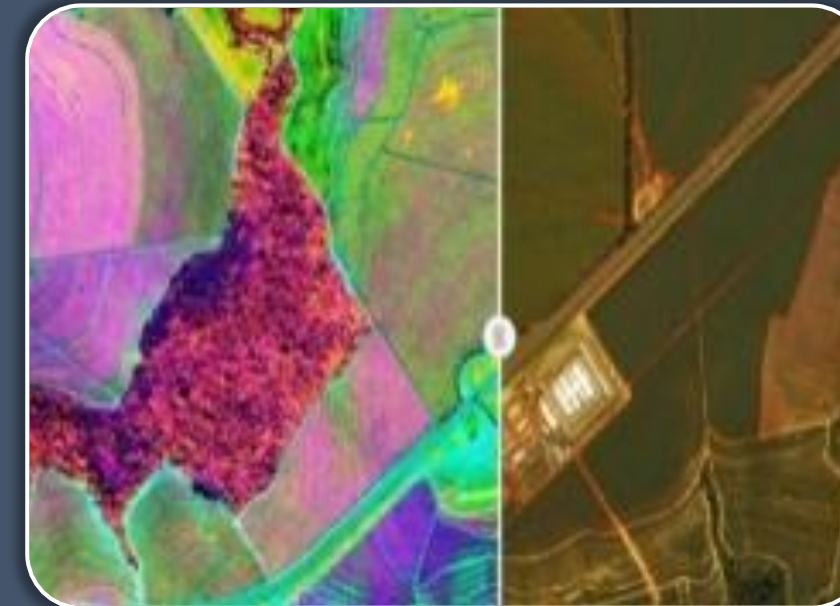
Anthropogenic CO₂
Monitoring



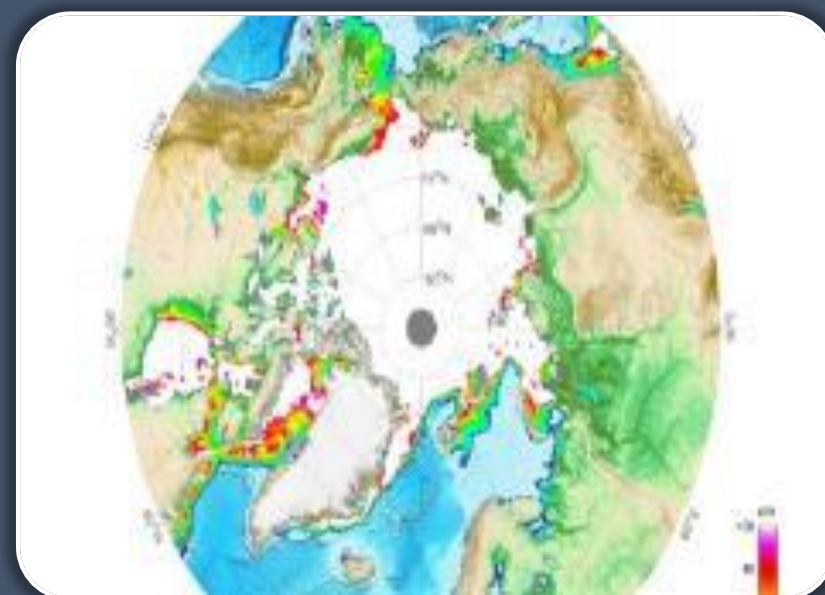
High Resolution
Surface Temp



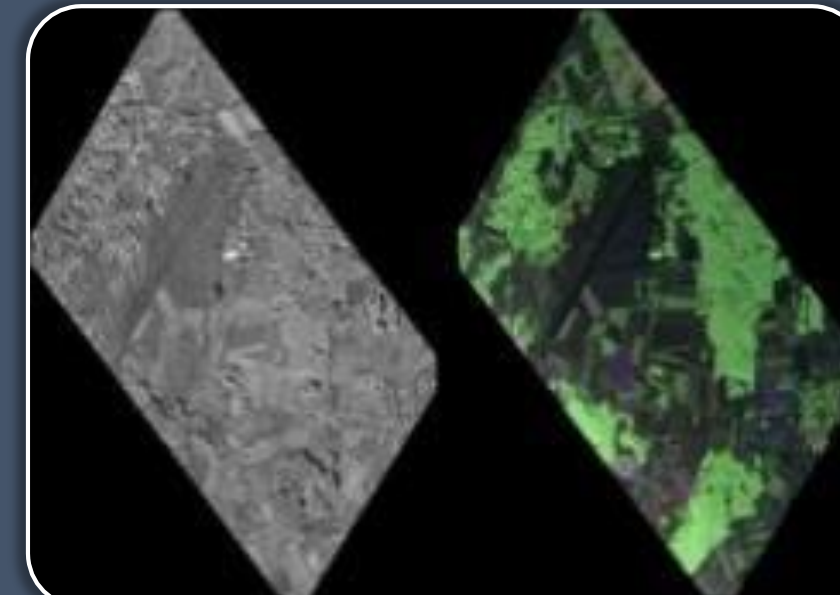
Polar Ice & Snow
Topography



HyperSpectral
Imaging



Passive Microwave
Imaging



L-band
SAR

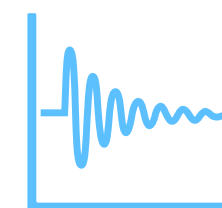
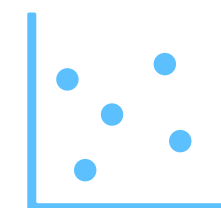
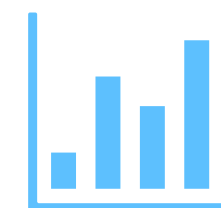
972.343.516.863 TB

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

CREODIAS

 **mundi**
WEB SERVICES

 ONDA

sobloo

 **WEkEO**
by COPERNICUS

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

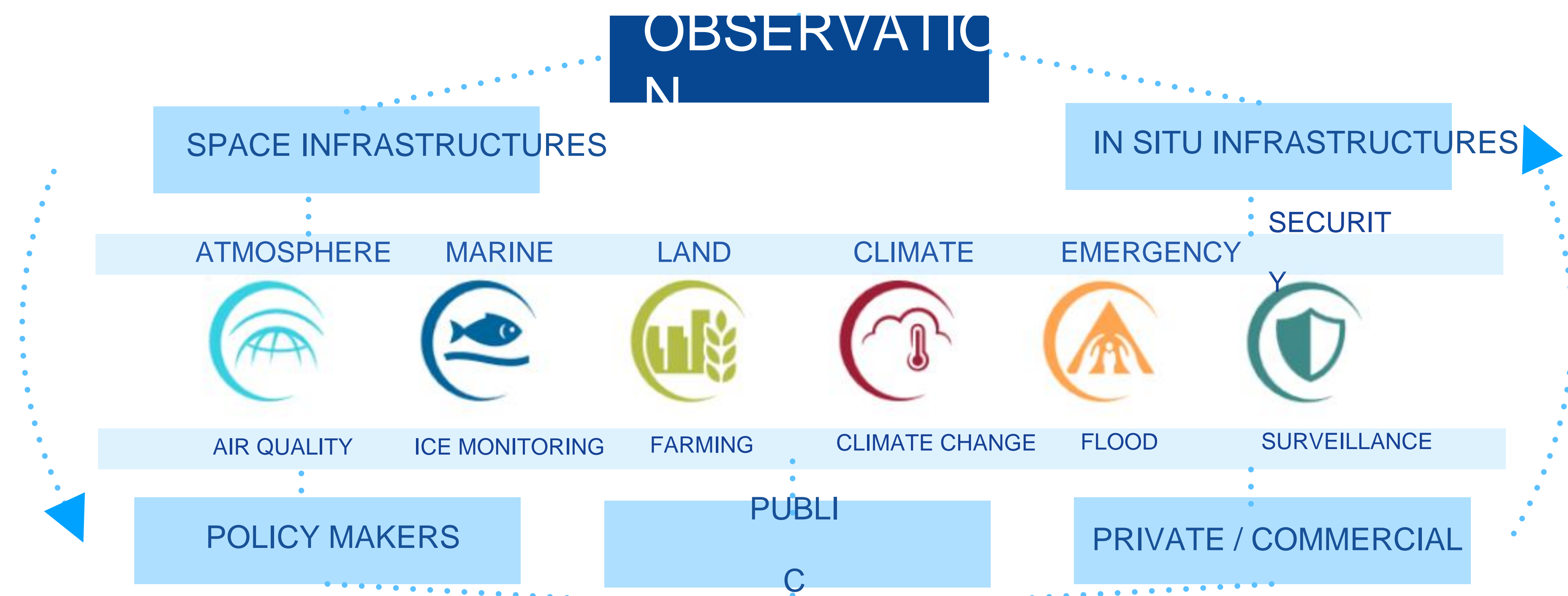
Size, ha

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)



USE
USER DRIVEN
APPROACH





Land
Monitoring

Benefit areas and products examples

Ecosystems

Biodiversity

Agriculture

Forestry

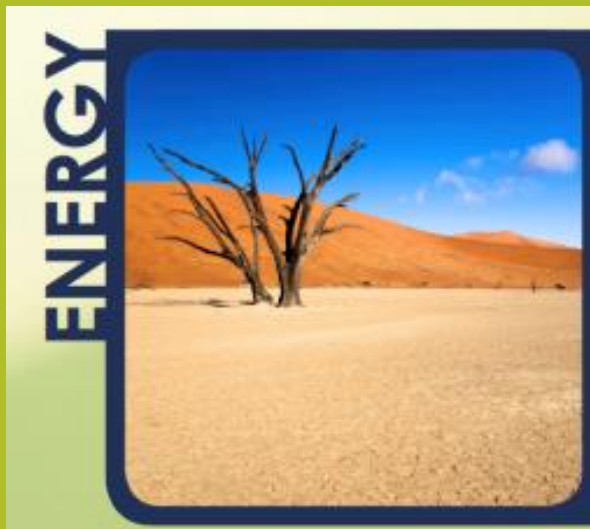
Energy

Natural Resources

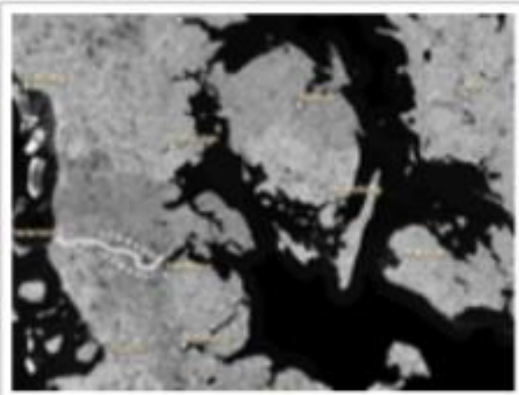
Water

Urban planning

Global



Pan-European



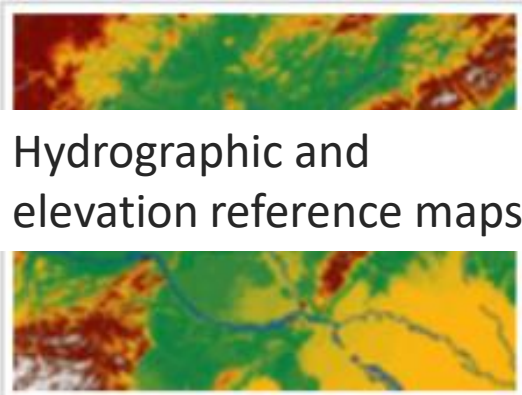
[Image Mosaics](#)



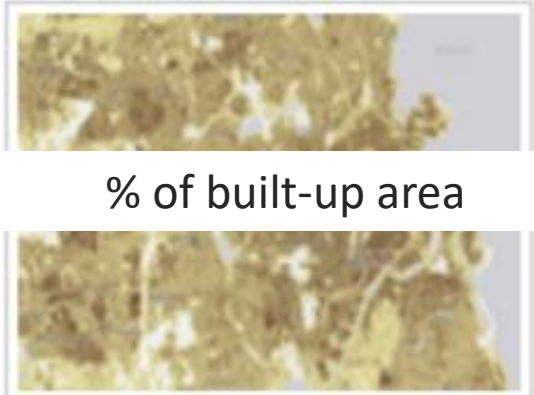
[CORINE Land Cover](#)



[High Resolution Layers](#)



[Reference Data](#)

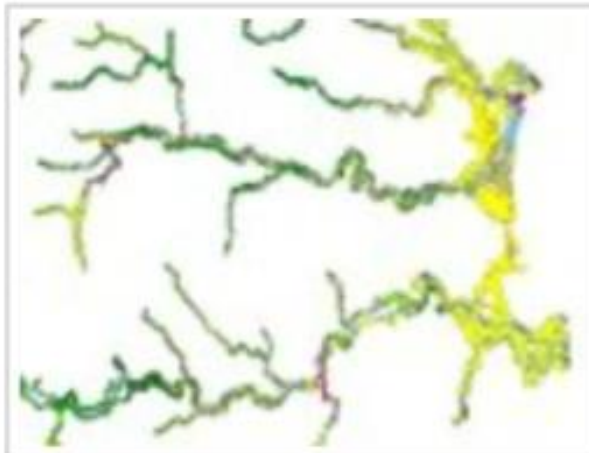


[Related Pan-European products](#)

Local



[Urban Atlas](#)



[Riparian Zones](#)



[Natura 2000 \(N2K\)](#)



Benefit areas and products examples

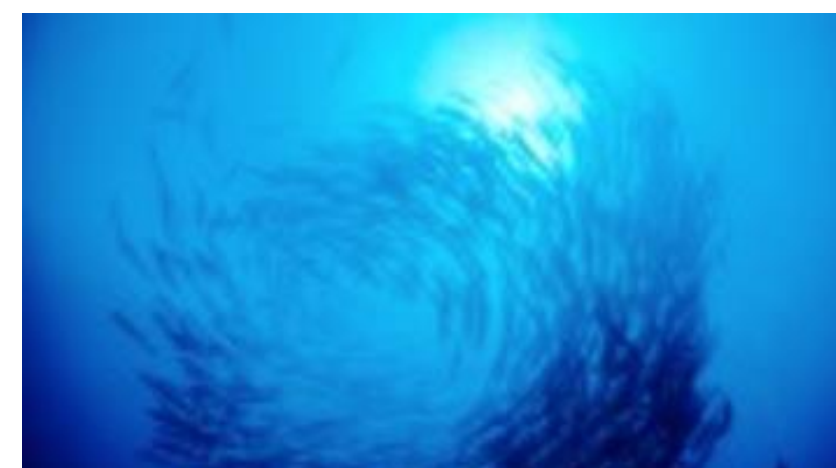
Marine safety

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)



Atmosphere
Monitoring

Benefit areas and products examples

Health

Environment

Pollution

Climate

Renewable Energy

Air Quality and Atmospheric Composition



Climate forcing



Ozone layer & UV



Solar radiation



Emissions and surface fluxes





Climate
Change

Benefit areas and products examples

Climate change

**Mitigation and
adaptation**

Weather forecast

Pollution

Environment

Health

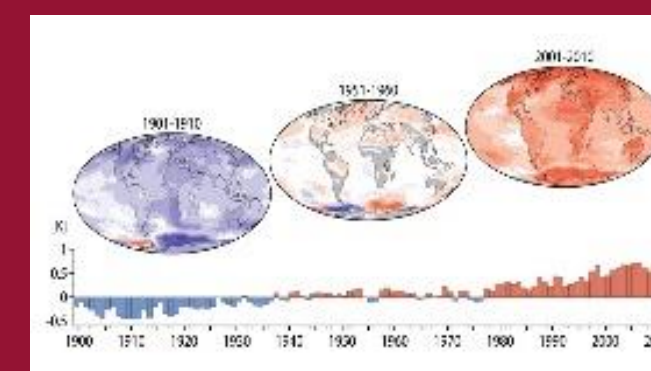
**Consistent Estimates of the
Essential Climate Variables (ECVs)**



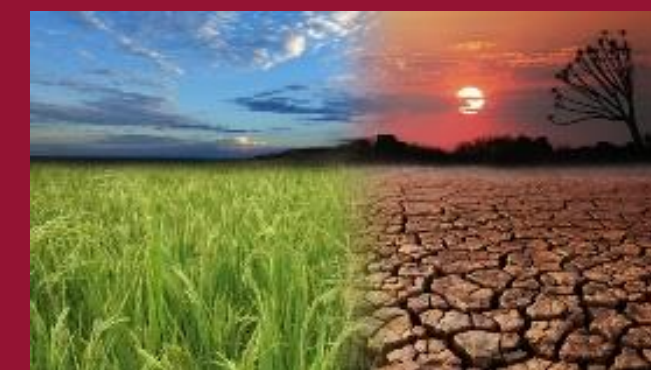
**Support to Mitigation and
Adaptation Strategies**



**Global and Regional
Reanalyses**



**Seasonal Forecasts
And Climate Projections**





Benefit areas and products examples

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

Benefit areas and products examples

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



HEALTH



DEVELOPMENT & COOPERATION



TRANSPOR



FORESTRY



CLIMATE CHANGE & ENVIRONMENT



TOURISM



INSURANCE & DISASTER MGT.



BLUE ECONOMY



SECURITY & DEFENCE



ENERGY & NATURAL RESOURCES



Copernicus

“COOL” APPLICATIONS: NEWS

BBC Sign in News Sport Weather Shop Reel Travel More

NEWS

Home Video World UK Business Tech Science Stories Entertainment & Arts

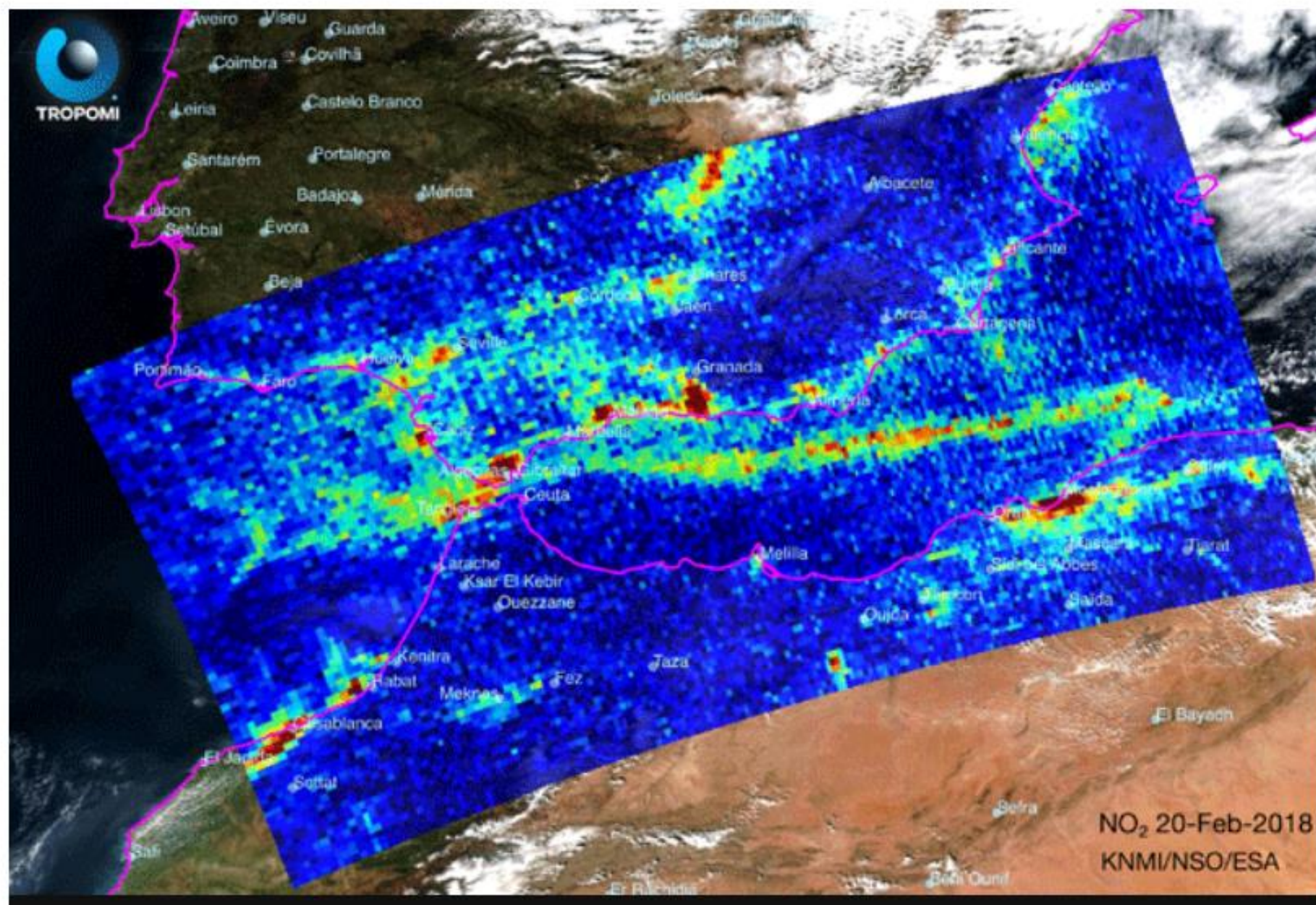
Science & Environment

Sentinel tracks ships' dirty emissions from orbit

By Jonathan Amos
BBC Science Correspondent

🕒 27 April 2018

f 🗨️ 🐦 ✉️ Share



BBC Sign in News Sport Weather Shop Reel Travel More

NEWS

Home Video World UK Business Tech Science Stories Entertainment & Arts

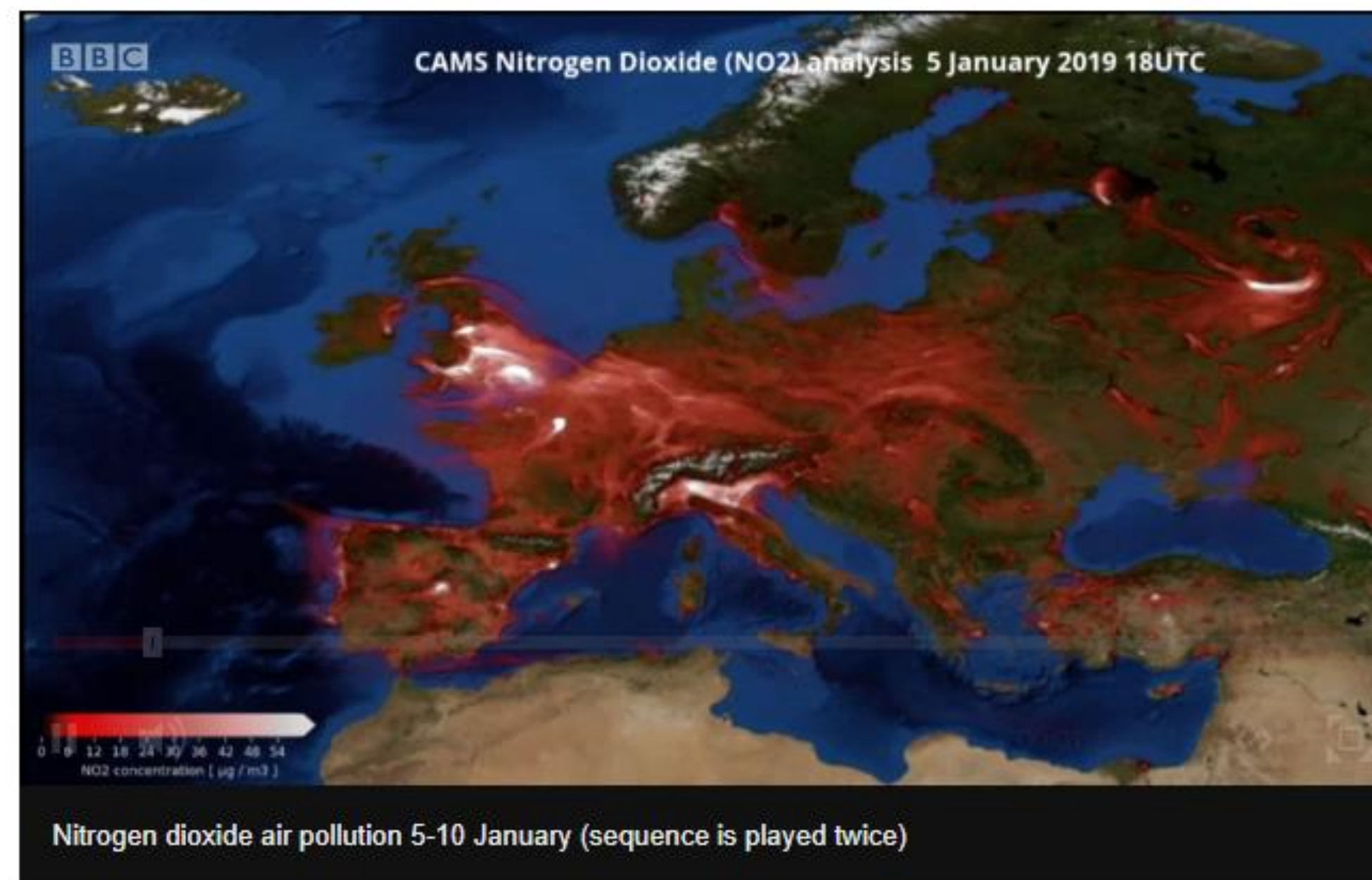
Science & Environment

Watch how air pollution moves across Europe

By Jonathan Amos
BBC Science Correspondent

🕒 14 January 2019

f 🗨️ 🐦 ✉️ Share



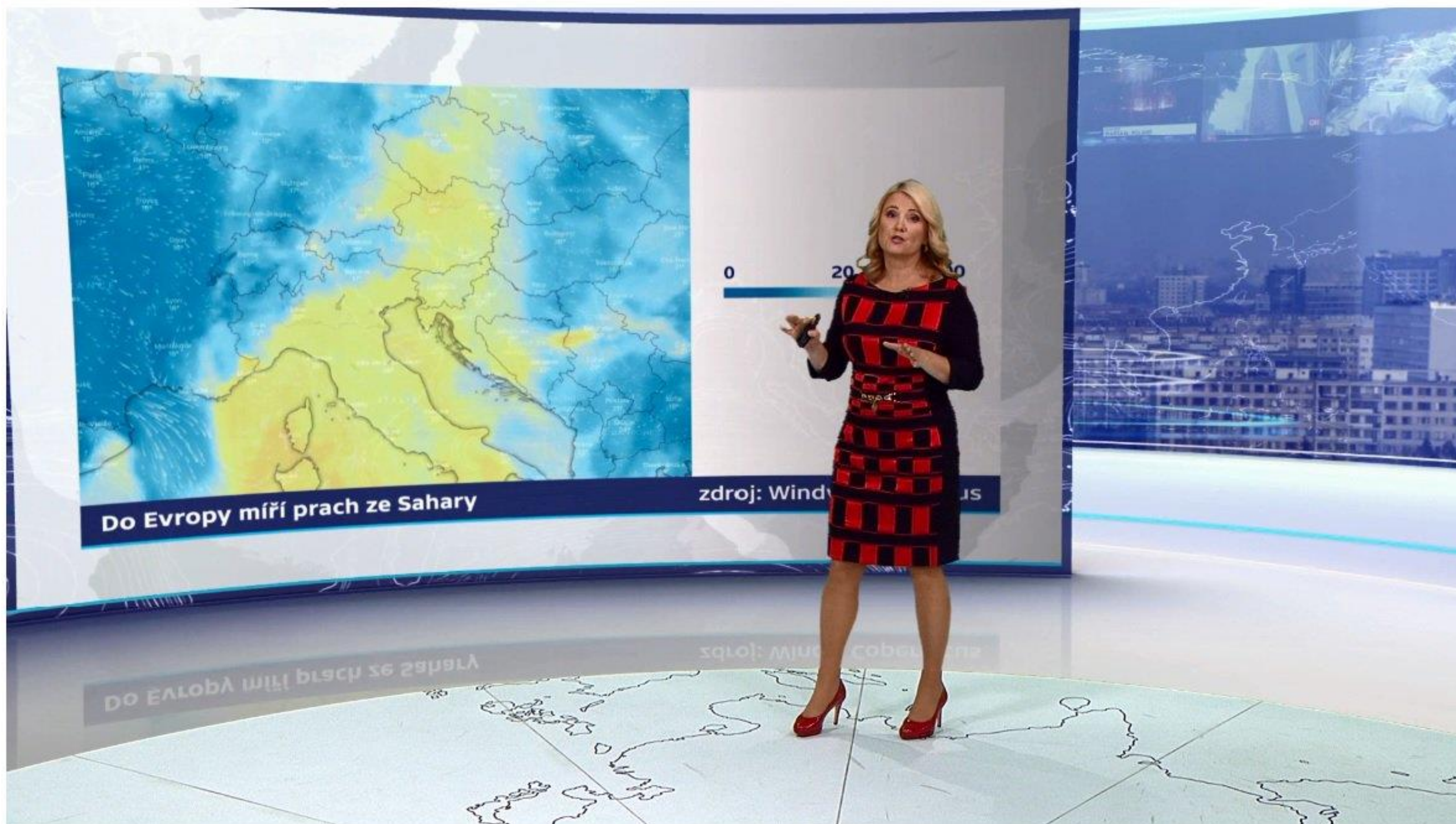


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“COOL” APPLICATIONS: NEWS

Neděle 9. června

PREMIÉRA: dnes v 18:55 na ČT1





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“COOL” APPLICATIONS: NEWS

NEWS

Detention

Mistakes

Identity

From above

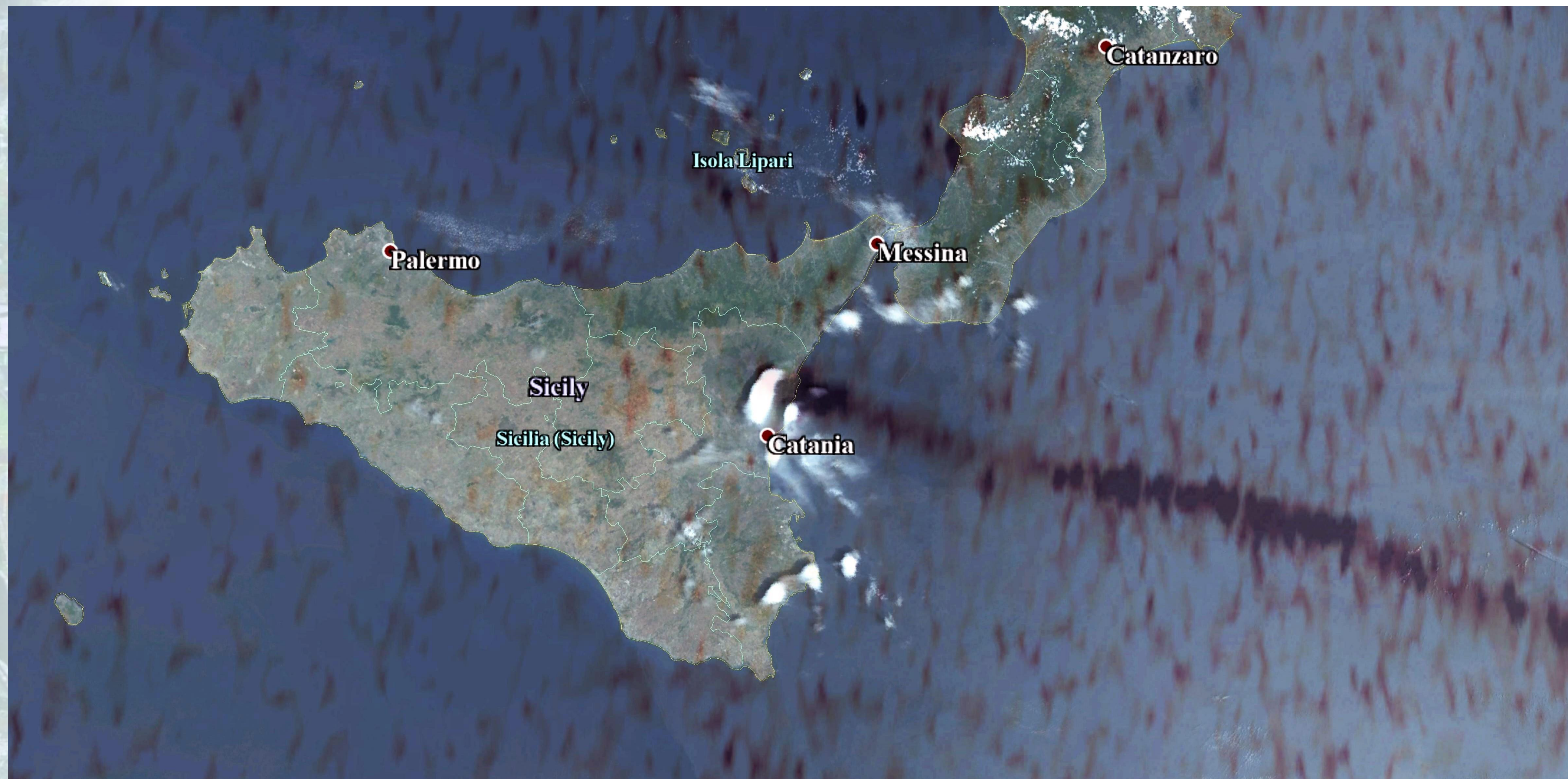


This image, taken by Sentinel Images in October 2018, shows how quickly the site has been developed



Copernicus

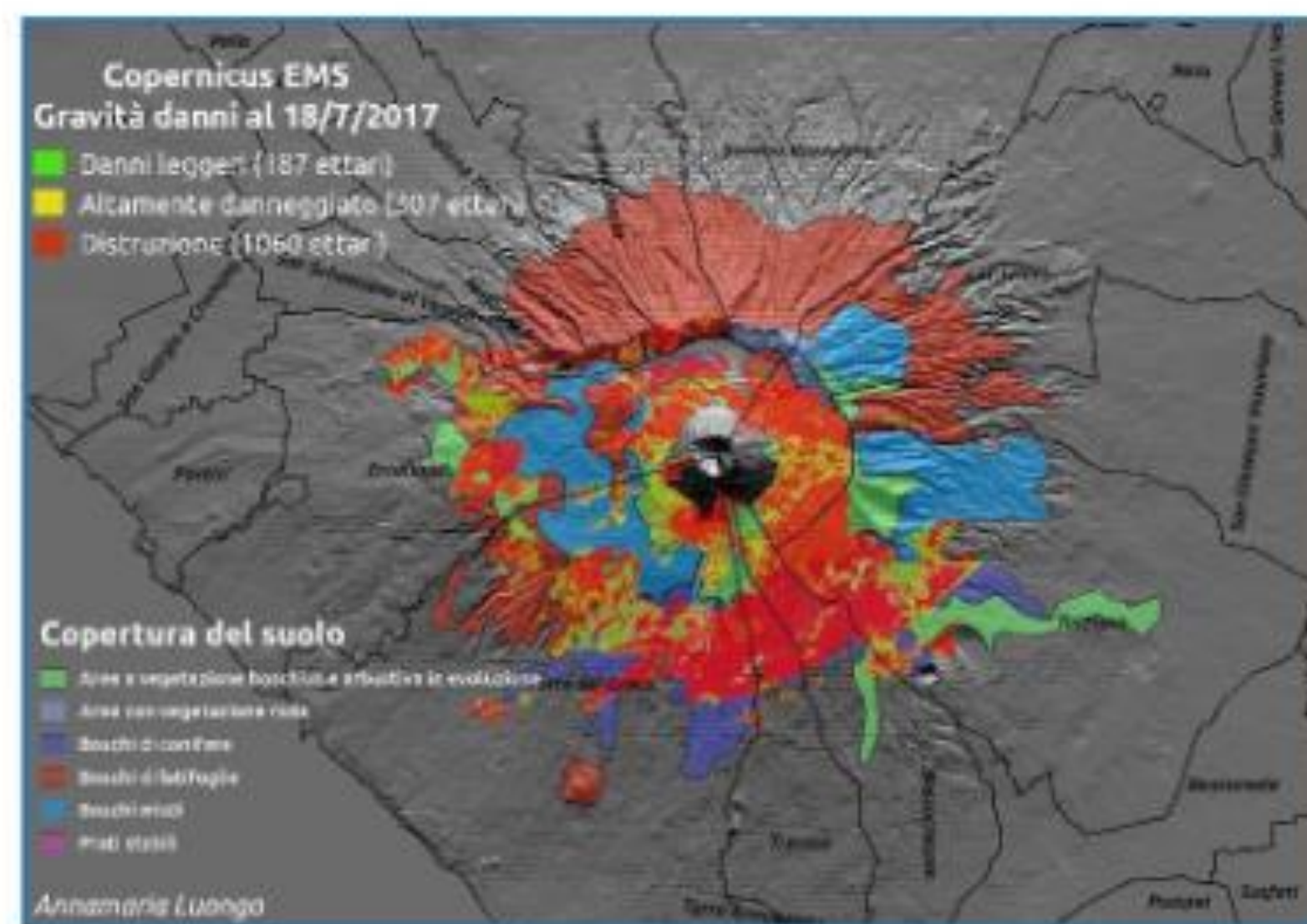
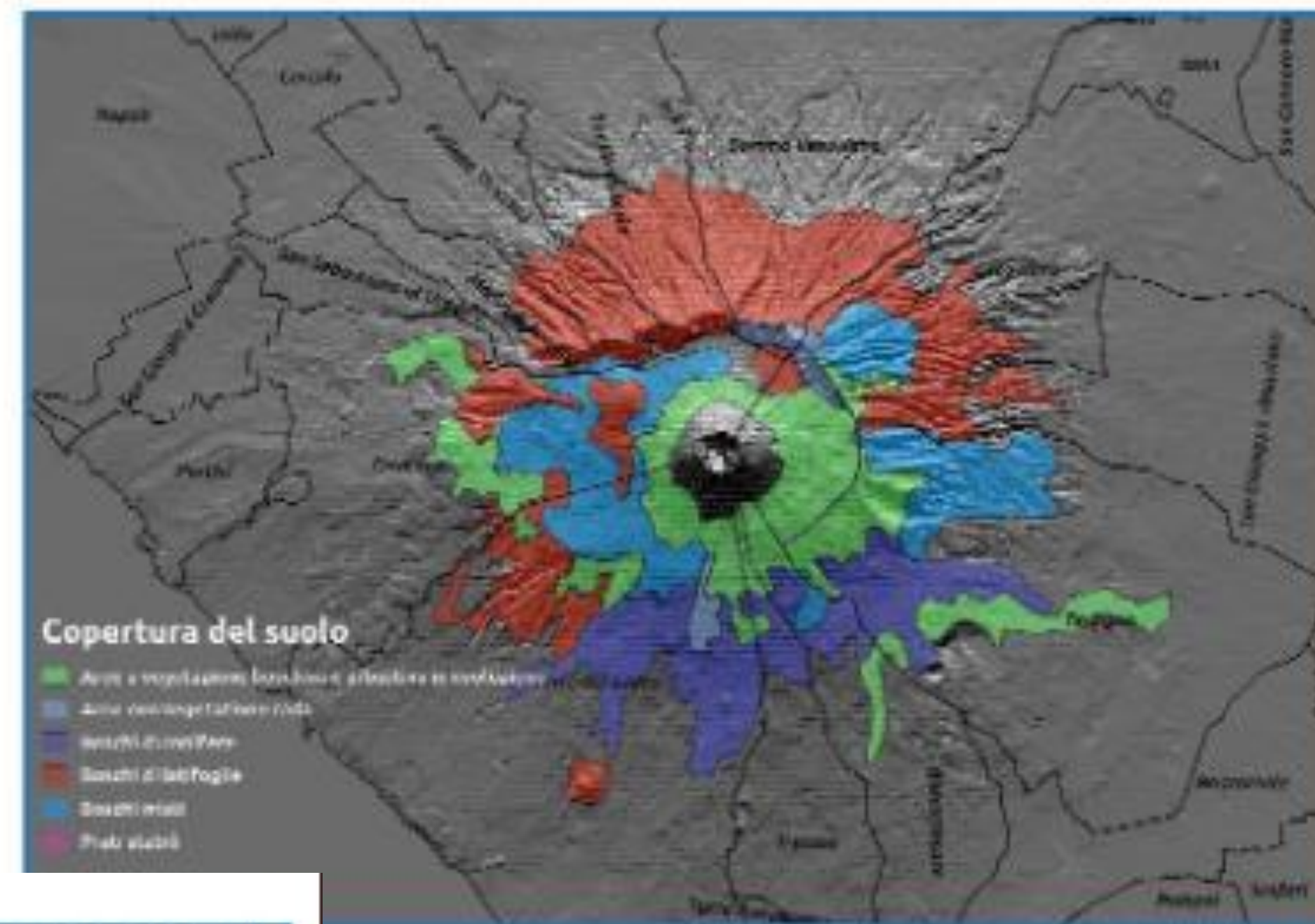
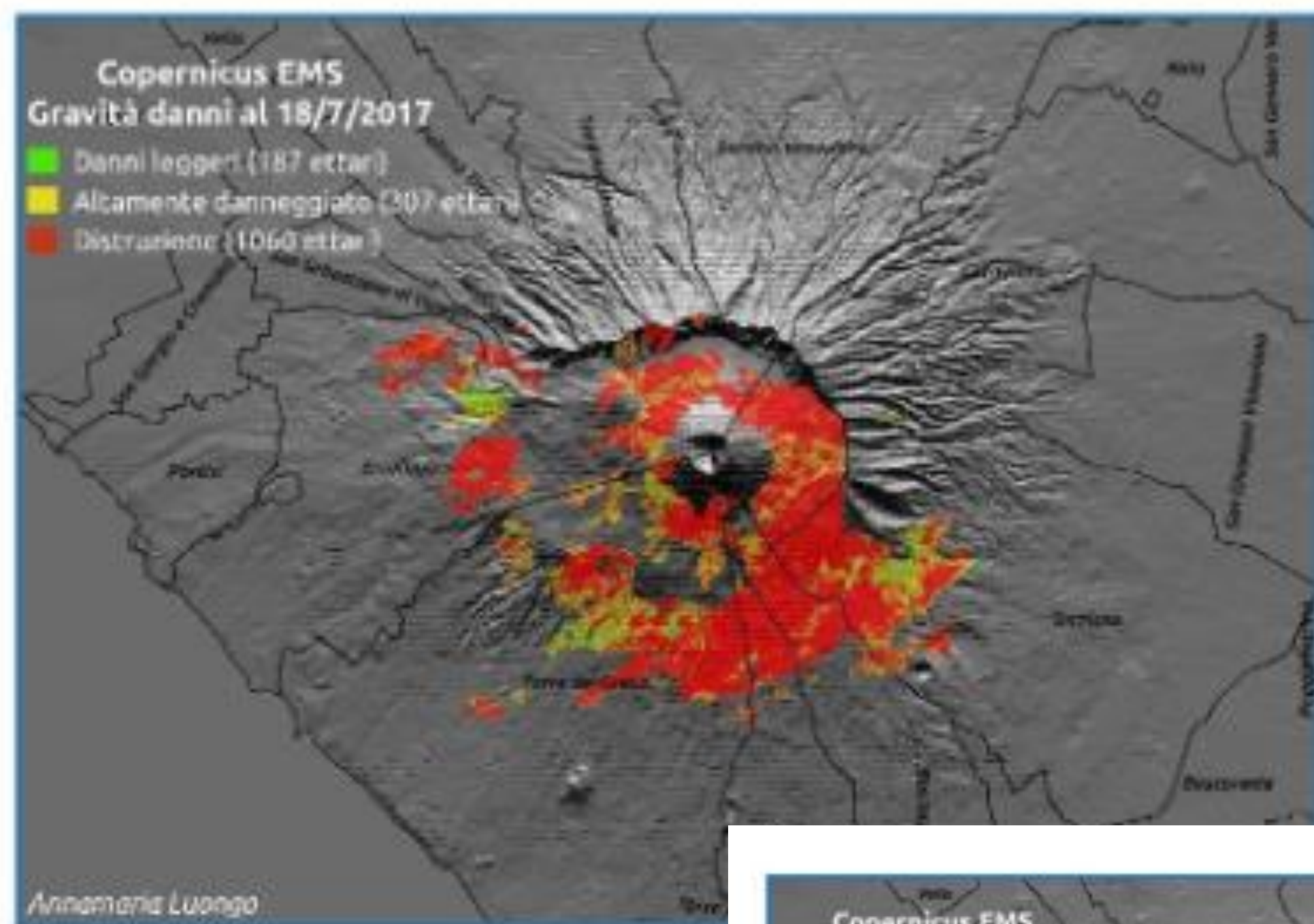
“COOL” APPLICATIONS: FUSION





Copernicus

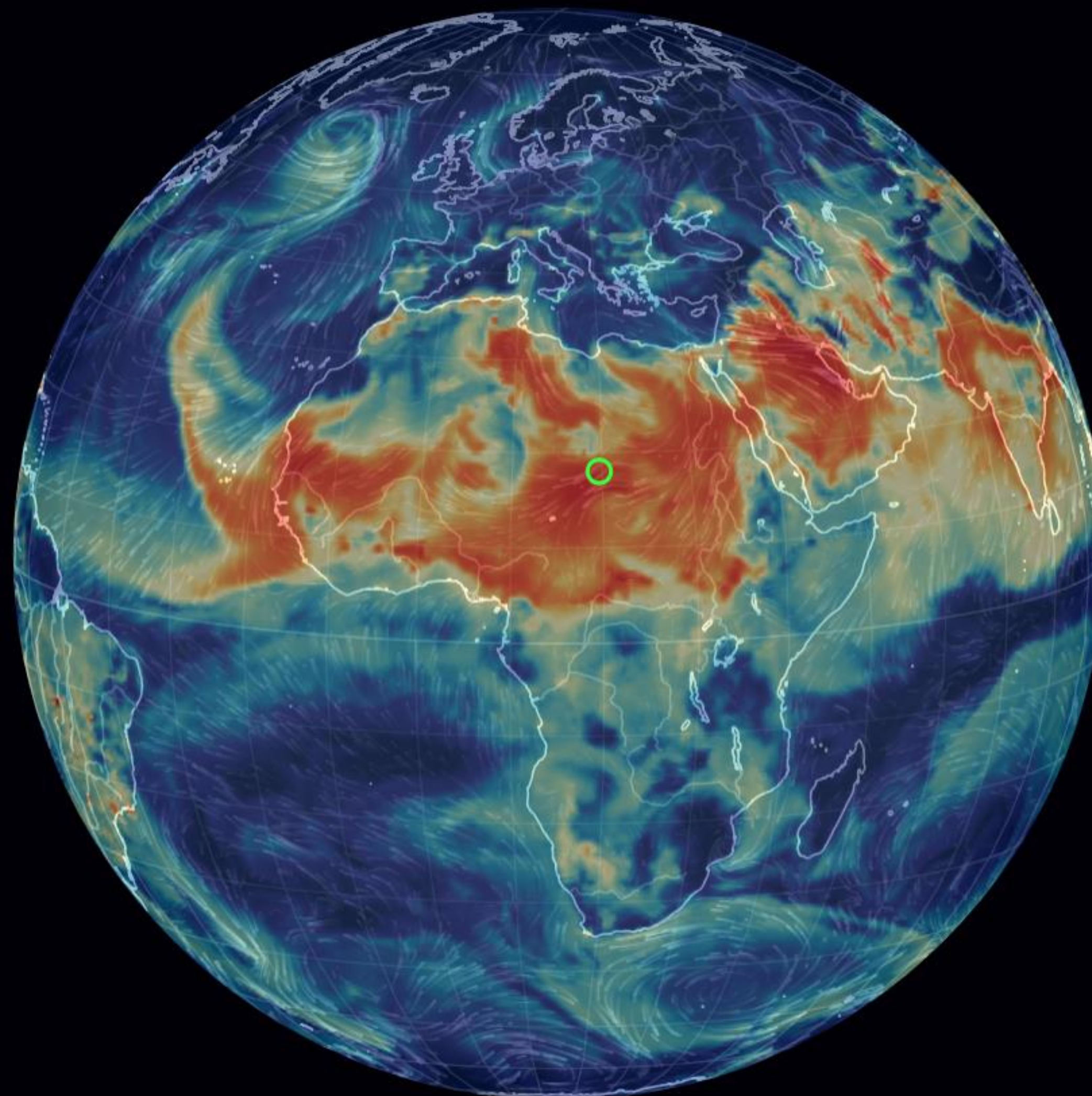
“COOL” APPLICATIONS: FUSION





Copernicus

“COOL” APPLICATIONS: VISUALISATION



17.95° N, 19.61° E ×

50° @ 34 km/h

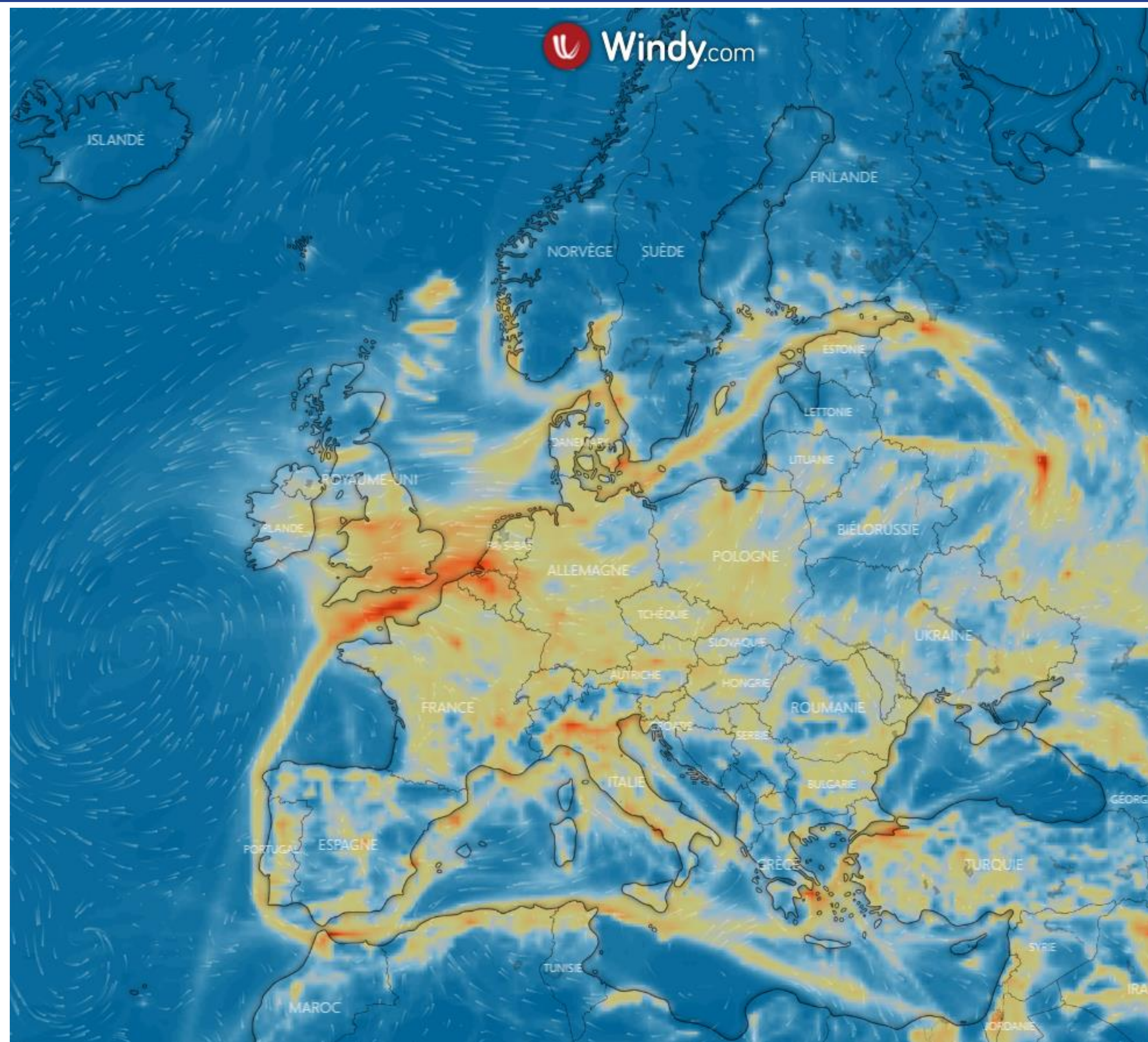
173 $\mu\text{g}/\text{m}^3$

earth



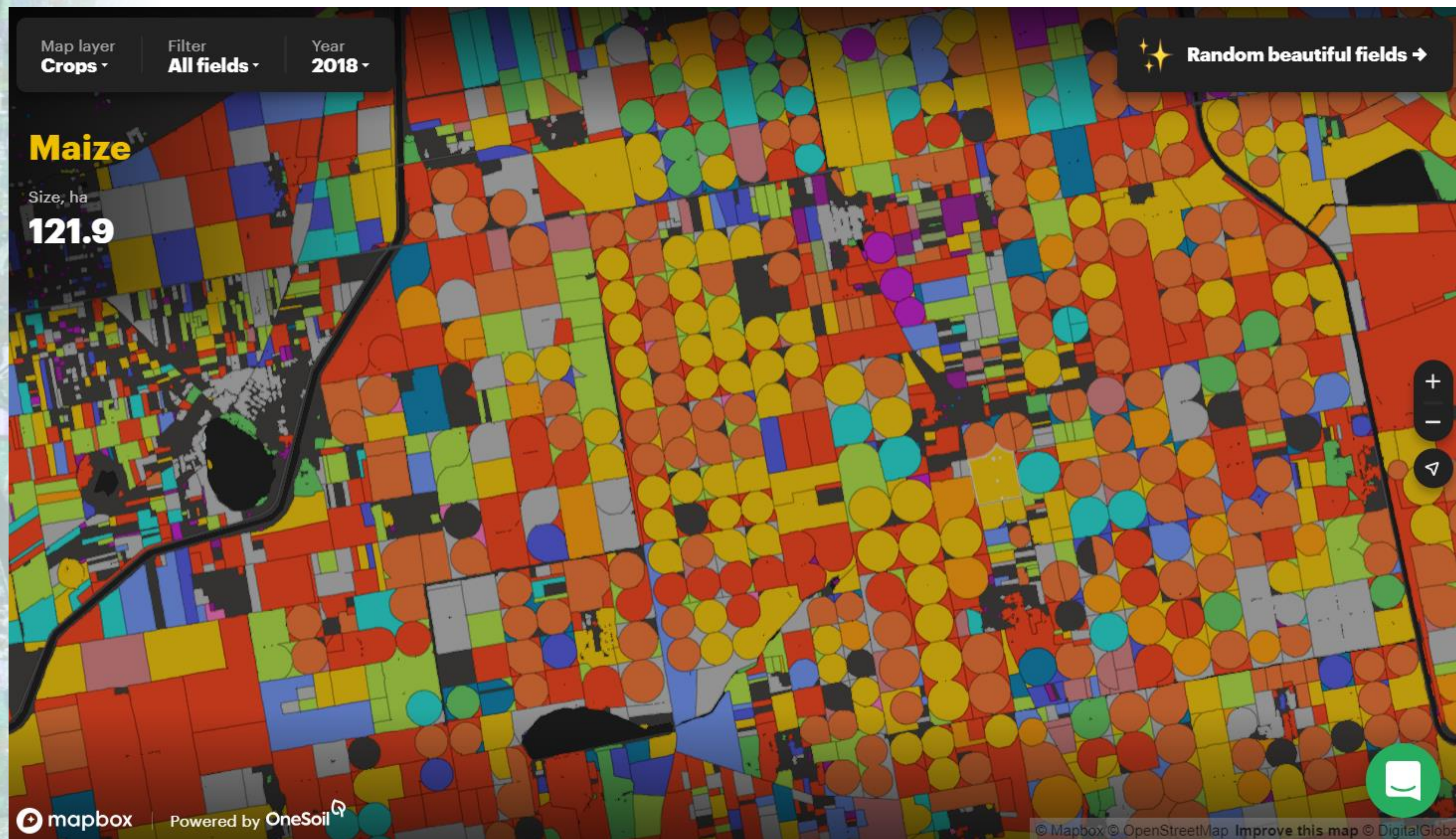
Copernicus

“COOL” APPLICATIONS: VISUALISATION





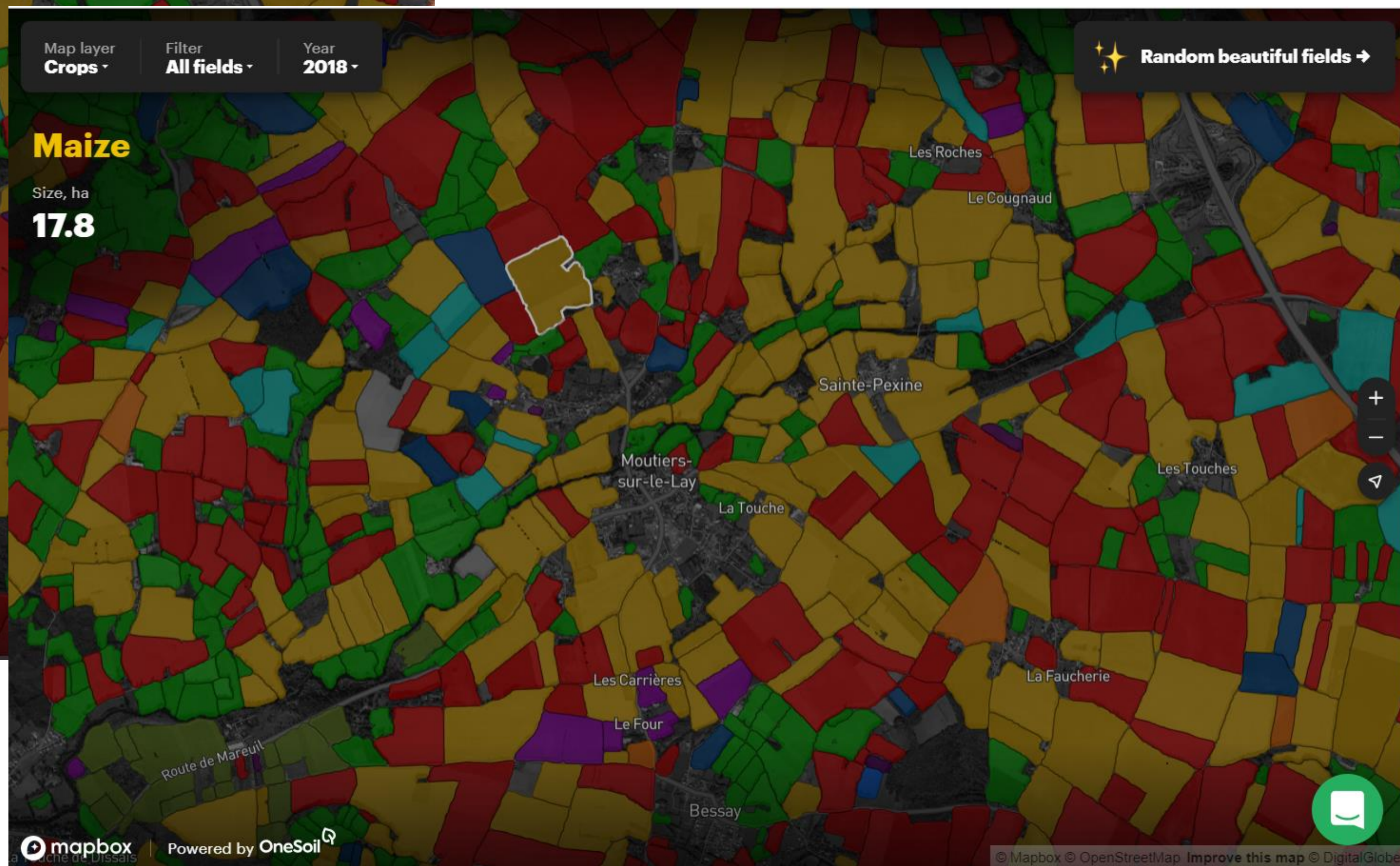
"COOL" APPLICATIONS: VISUALISATION





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“ COOL ” APPLICATIONS: AI/ML






Copernicus


“ COOL ” APPLICATIONS: AI/ML

☰

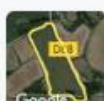
Fields



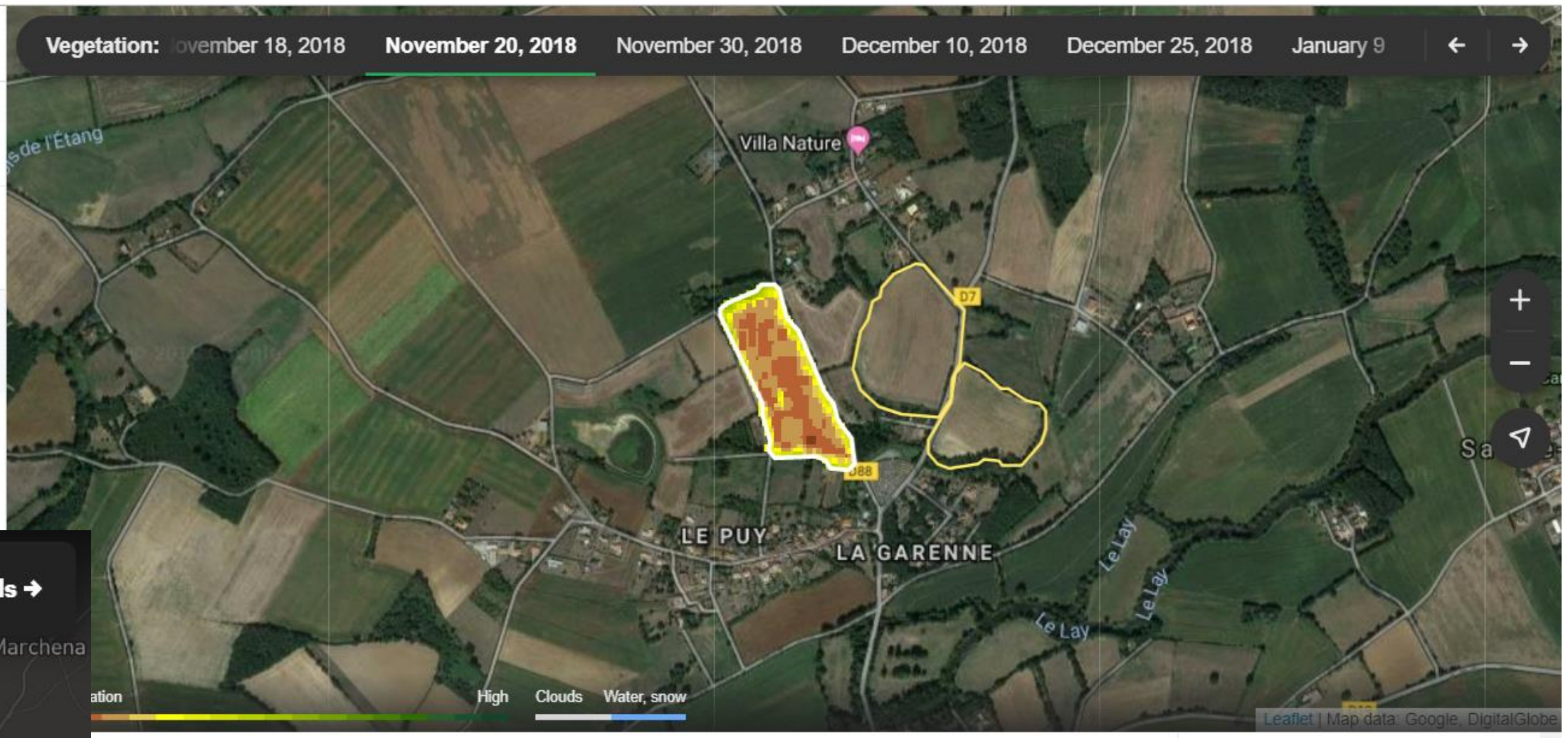
1. Field, 4 ha
Barley, spring ?



2. Field, 6 ha
Wheat soft, spring ?



3. Field, 6 ha
Maize silage ?



Map layer
Crops

Filter
Rice

Year
2018

Andalusia

Rice size, ha
42.3K

Random beautiful fields →



Weather now 10:56

 **+9°**

Wind
4 m/s ↘

Humidity
84 %

Dew point
+6°

Pressure
762 mm

Cloud cover
0 %

Weather forecast >

3. Field, 6 ha
Maize silage ?

Actions

[Edit info](#)

[Phosphorus-potassium application](#)

[Nitrogen application](#)

[Crop rotation](#)

st notes

All notes >

mapbox

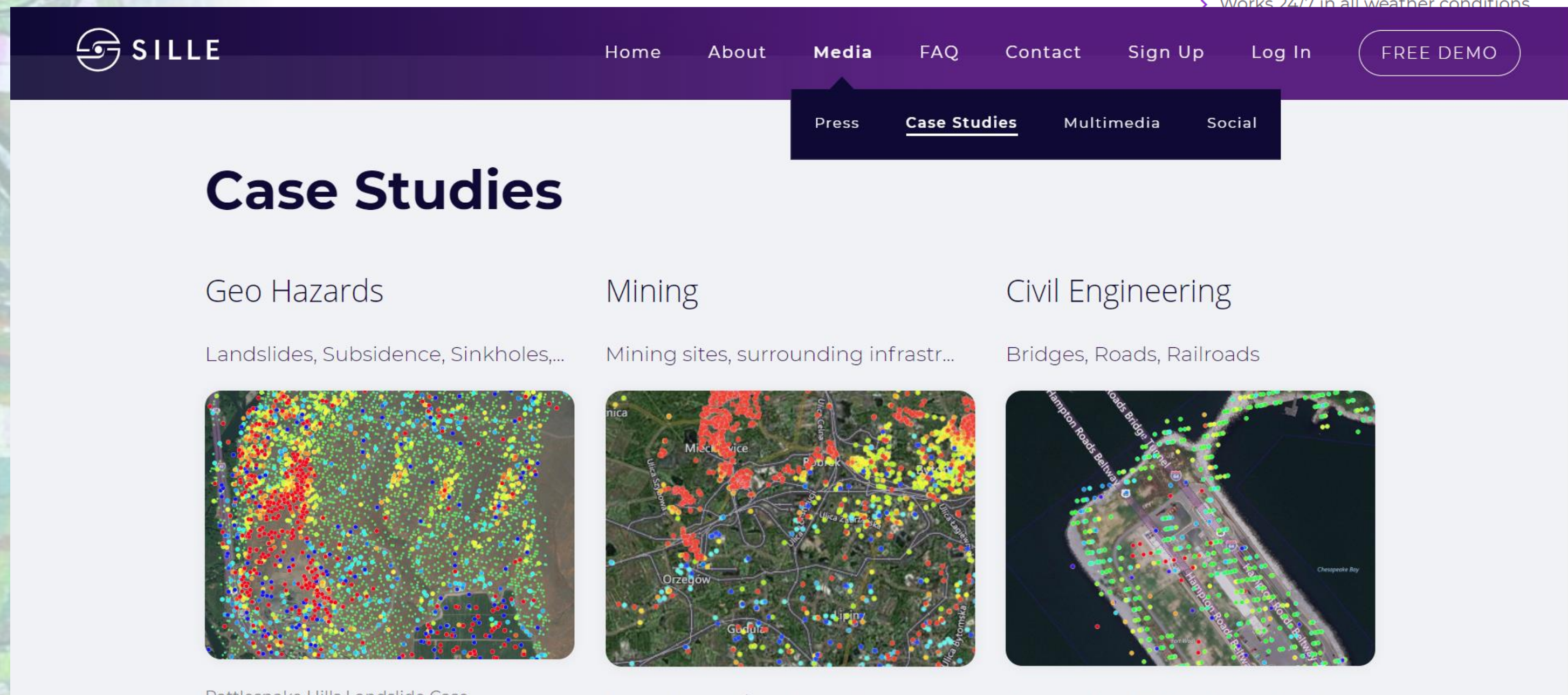
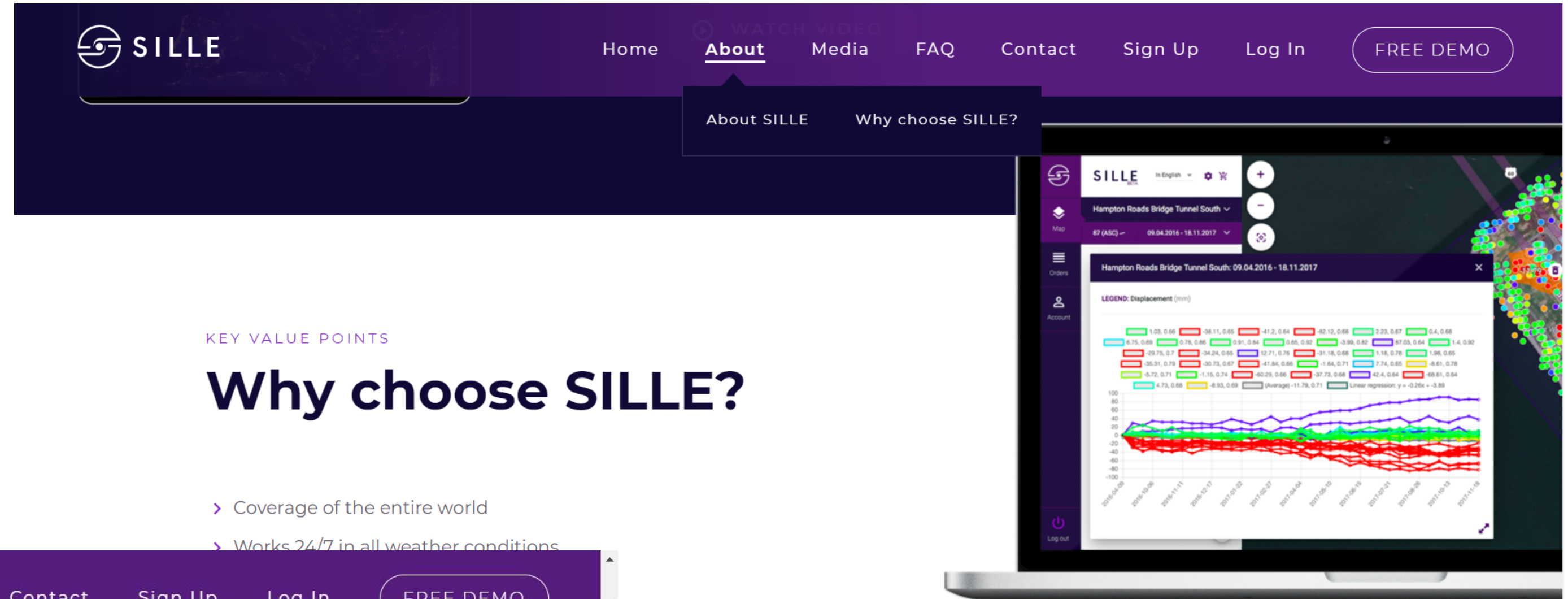
Powered by OneSoil

© Mapbox © OpenStreetMap Improve this map © DigitalGlobe



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“COOL” APPLICATIONS: STARTUPS





Copernicus

“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)



Copernicus

“COOL” APPLICATIONS: STARTUPS



Discover how to keep your skin looking young and healthy

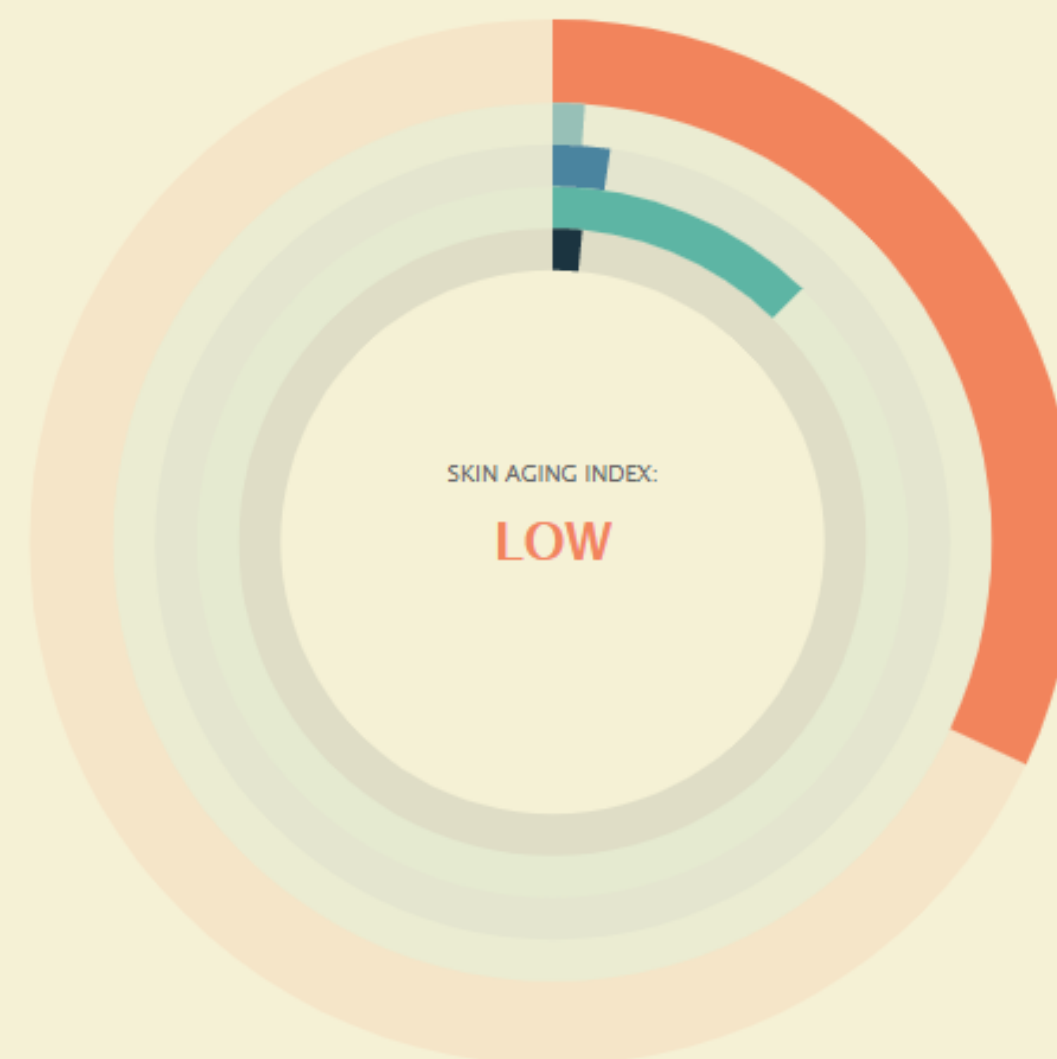
Find location...

Find

11:00

Elsene, Belgium

Latitude:50.832908
Longitude:4.358734



SKIN AGING +

O3 +
0.0380 mg/Kg

NOX +
9.9700 mg/cbm

UV +
0.2500

PM +
0.0143 mg/cbm

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

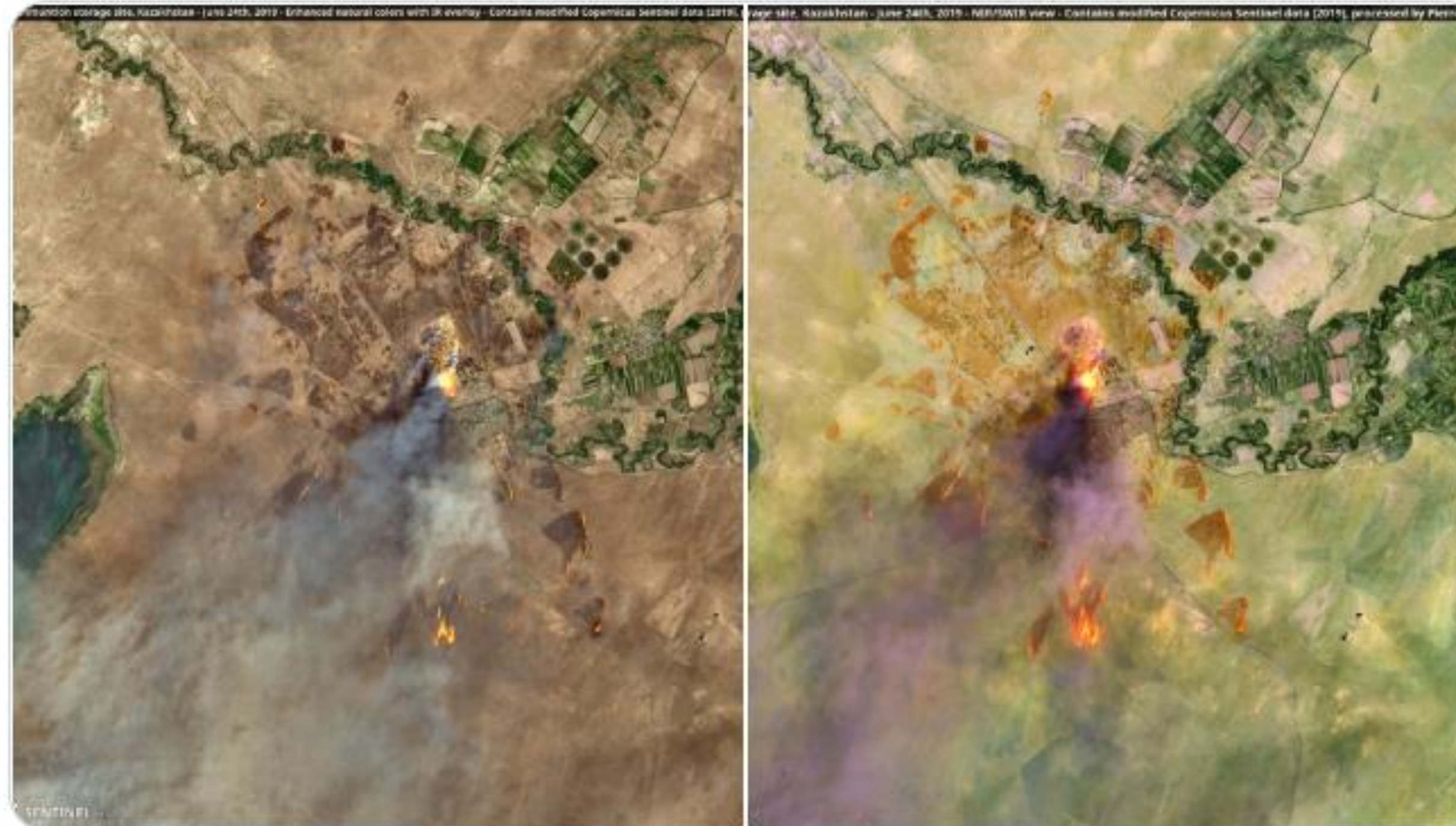
“COOL” APPLICATIONS: COPERNICUS4CITIZENS



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





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“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.



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

11:42 AM - 18 Dec 2018



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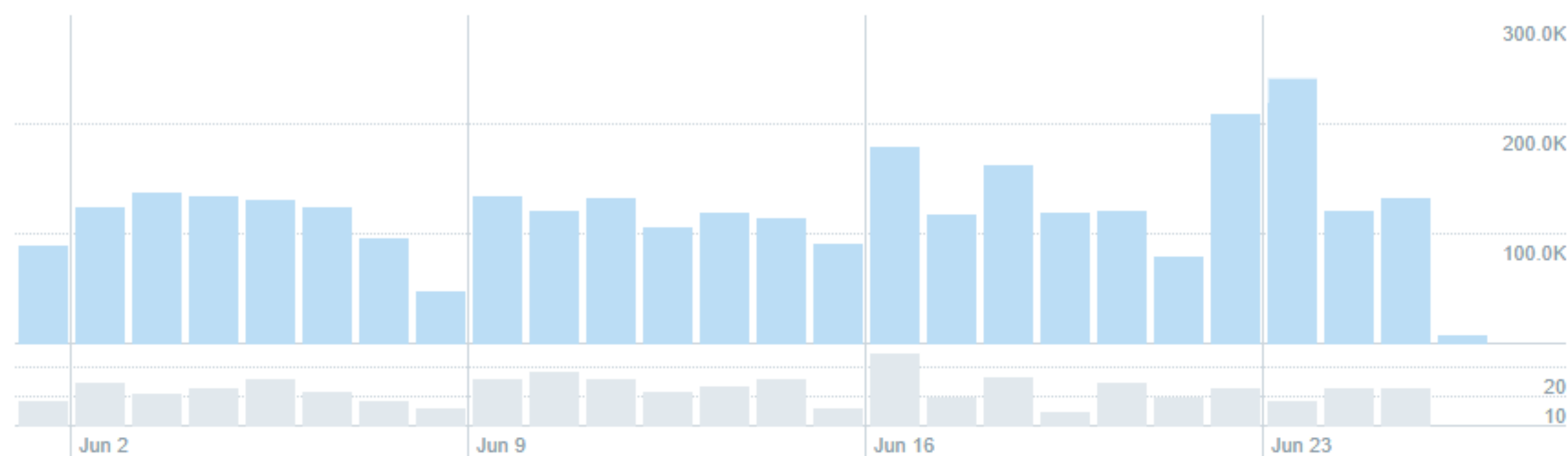
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Jun 1 – Jun 26, 2019 ▾

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Tweets **Top Tweets** Tweets and replies Promoted

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

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283,263

15,834

5.6%

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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

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64,443

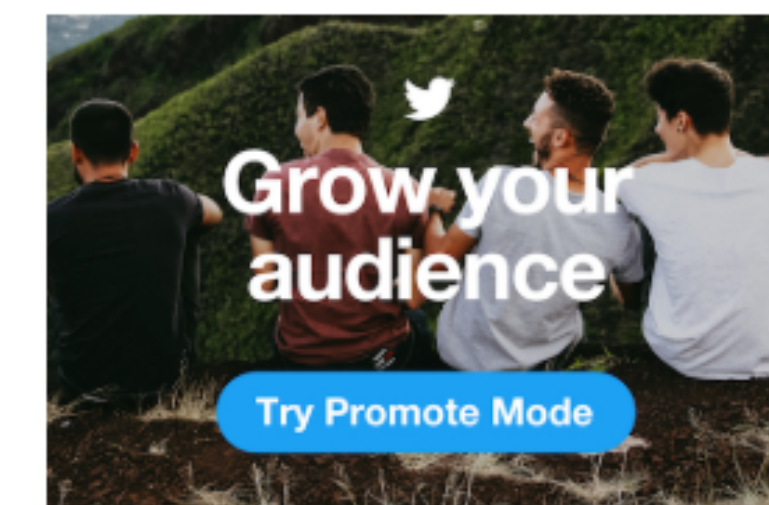
2,340

3.6%

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



Engagements

Showing 26 days with daily frequency

Engagement rate

1.2%

Jun 26
1.5% engagement rate



Link clicks

5.0K

Jun 26
10 link clicks





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START-UPS PER YEAR
50

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accelerator

START-UPS PER YEAR
20

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