Session 5 – CCI Knowledge Exchange | 11:30 – 13:30

Chairs – Ed Pechorro (ESA Climate Office) & Carsten Brockmann (Brockmann Consult)

CCI Colocation 2022

Working Together on Knowledge Exchange

Susanne Mecklenburg (ESA) & Samantha Burgess (ECMWF)

CCI Colocation 2022

Communicating Science & Operations

ESA & ECMWF

Stronger Together

Journey of a Pixel

ESA | ECMWF | EUMETSAT

ESA-ECMWF-EUMETSAT | LPS-22

Journey of a Pixel – Agora. Susanne Mecklenburg, Paolo Ruti & Carlo Buontempo giving a tour of climate pixel of Valencia. From satellite. To research. To operations. To user.

Journey of a Pixel – Masterclass. Leading ESA, EUMETSAT & ECMWF climate data engineers sharing their wisdom through a harmonized Jupyter tour of the climate pixel.

Journey of a Pixel – One-to-Ones. Meeting ESA, EUMETSAT & ECMWF climate data engineers to discuss the journey, the three agencies, and how we work together.

Journey of a Pixel – Game.
"*You've been on the journey. Now play the game.*"

ESA-ECMWF-EUMETSAT | treva labs

Treva Labs is a collective of climate data visualisation creatives in Europe, brought together by the desire to make a big impact with little pictures*.

**A little picture is a picture rendered through frameworks, tools and technologies used by data journalism for the dynamic visualisation of a climate data layer.*

Founded & Chaired by ESA & ECMWF & EUMETSAT.

Partnered with Brockmann Consult, Ubilabs, Planetary Visions & Imperative Space.

Your 'little picture' ideas welcome. Details shortly.

ESA-ECMWF-EUMETSAT | More

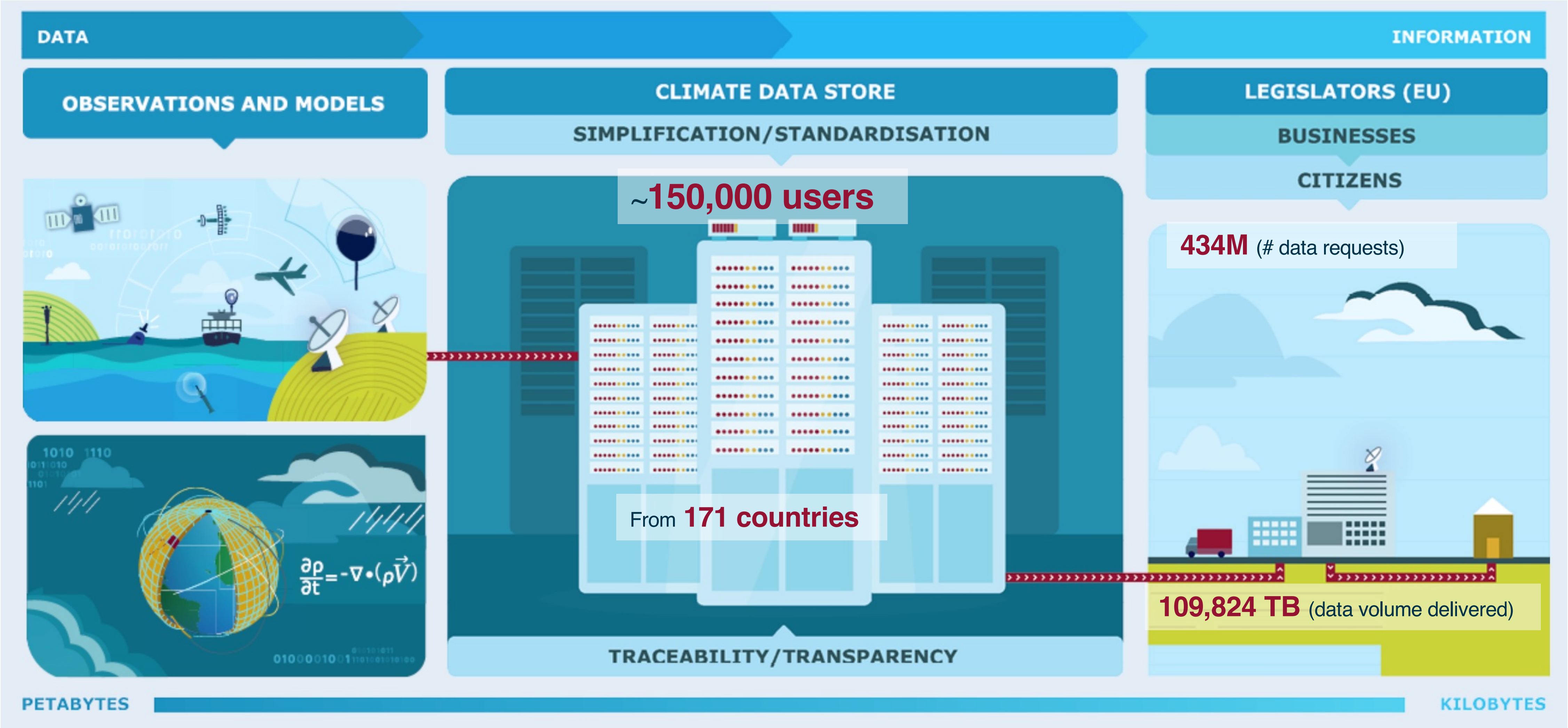
CCI-C3S Bridge. A dataset-level metadata bridge is being built between CCI and C3S as part of CCI Knowledge Exchange, kindly supported by ECMWF.

The Journey Continues. A *Journey of a Kigali Pixel* has been proposed to WCRP for the WCRP Open Science Conference, 23-27 October 2023 in Kigali.

- *Journey of a Kigali Pixel – Masterclass.* ESA, ECMWF and EUMETSAT together take participants on the journey of a climate pixel of Kigali, explore the changing lands of Rwanda to understand the past, observe the present, & model the future.
- *Journey of a Kigali Pixel – Game*. Throughout conference, a competition to build the most impactful 'little picture' of Rwanda climate.

ECV Data Standards. ESA & ECMWF continue to collaborate.

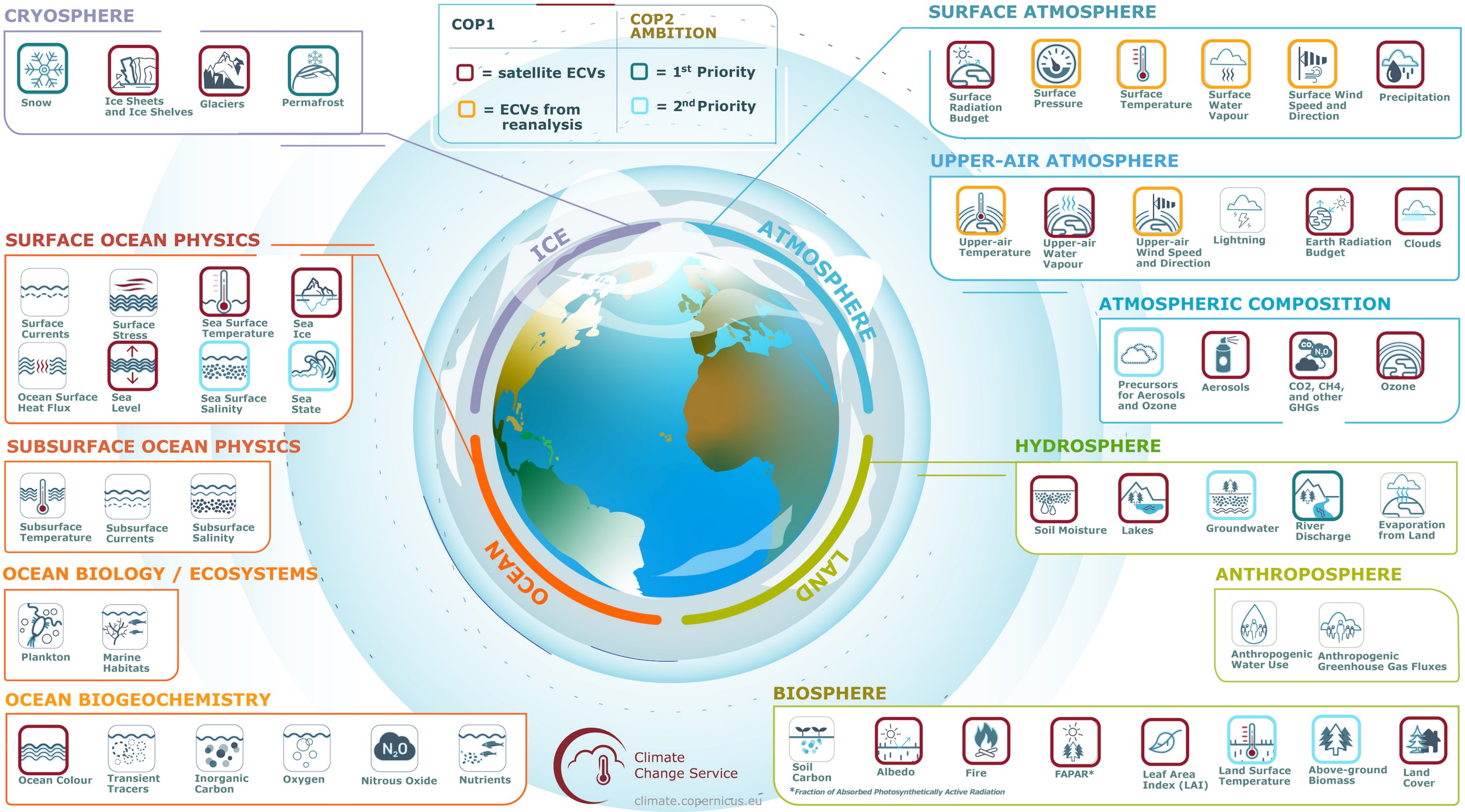
C3S: Nexus between climate data and society



https://cds.climate.copernicus.eu

139 Datasets | **35** public applications

Improving our understanding of the Earth system



Climate monitoring products and partnerships

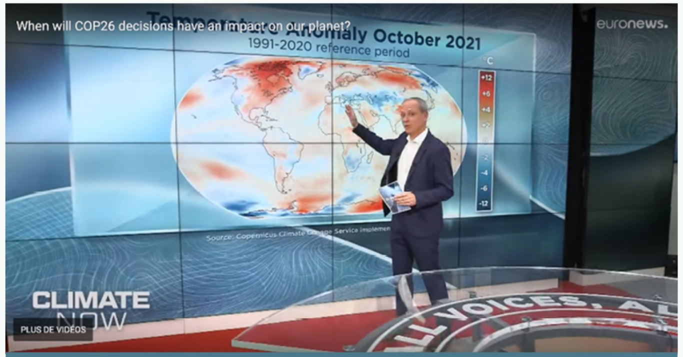
C3S data are used by broadcasters for their climate-related updates and content, reaching public audiences worldwide.

European Commission | Copernicus

C3S communication activities reach millions through numerous channels, including TV media collaborations, monthly bulletins and newsflashes, social media presence, data training, dedicated briefings and events, and leading coverage in mainstream newspapers worldwide.

C3S has media partnerships with broadcasters CNN and Euronews, reaching millions of people from across the world. The C3S climate bulletins provide information, maps and data for the CNN climate update and Euronews Climate Now programme, so audiences have the latest analysis of the climate each month.

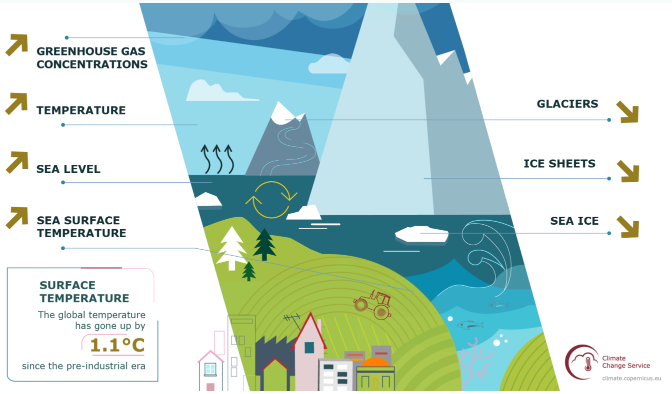
Monthly update programme ©*CNN*



Climate Now programme ©*Euronews*

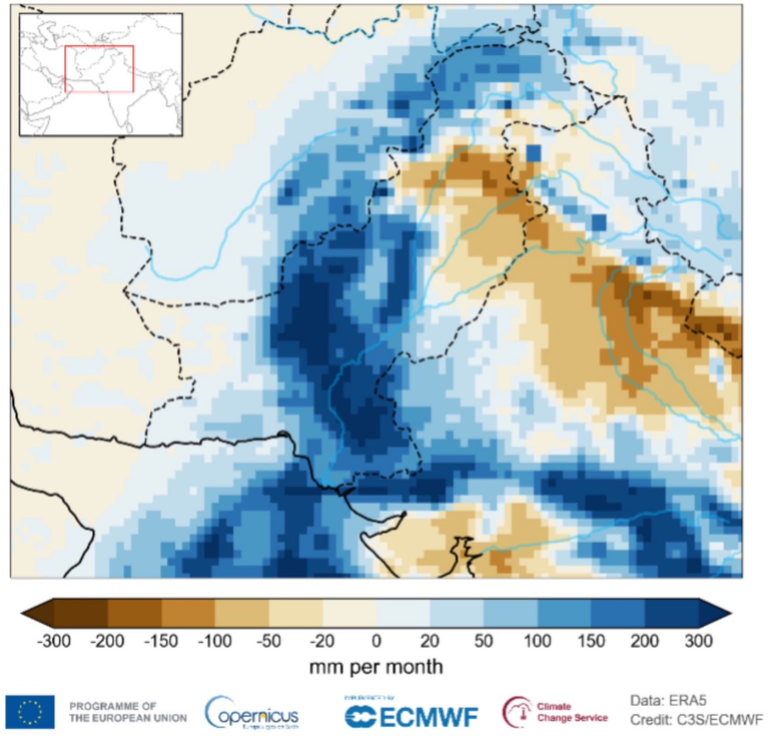
Broadcast in 9 languages, C3S content was seen 157 million times in Europe via the Euronews Climate Now show.

C3S maps and data have been seen by 225 million people around the world via CNN's climate updates.



Total precipitation anomaly for August 2022

Reference period: 1991-2020



Communicating Science & Operations

ESA & ECMWF

Stronger Together

| ECV Data Standards | Journey of a Pixel | Treva Labs | Games | Interoperability | Masterclass | Agoras | More…

CCI Knowledge Exchange Products – Listening & Responding To What People Want

Ravi Kapur (Imperative Space), Alison Waterfall (CEDA) & Philip Eales (Planetary Visions)

CCI Colocation 2022

Website

Toolbox

Climate from Space

Open Data Portal

Knowledge
Exchange
Climate
Change
Initiative

CCI-KE Products – Listening and Responding

Overview & WP1000 - Communications

Ravi Kapur (Imperative Space)

Brockmann Consult GmbH · ubilabs · UKRI Science and Technology Facilities Council · Telespazio a Leonardo and Thales company · imperative space · Planetary Visions · Deutscher Wetterdienst Wetter und Klima aus einer Hand DWD · Universidad de Alcalá · UCLouvain · eodc

CCI KE products & activities so far

- Complex set of challenges addressed in first three years - technical, infrastructural, creative and educational
- Opportunity now to further amplify this work through process of listening, refining and adding to the existing products.
- The product areas so far include:
    - Website
    - Toolbox
    - Climate From Space
    - Open Data Portal
    - *Educational Resource Packs*
    - *MOOC*

Formal user requirements process

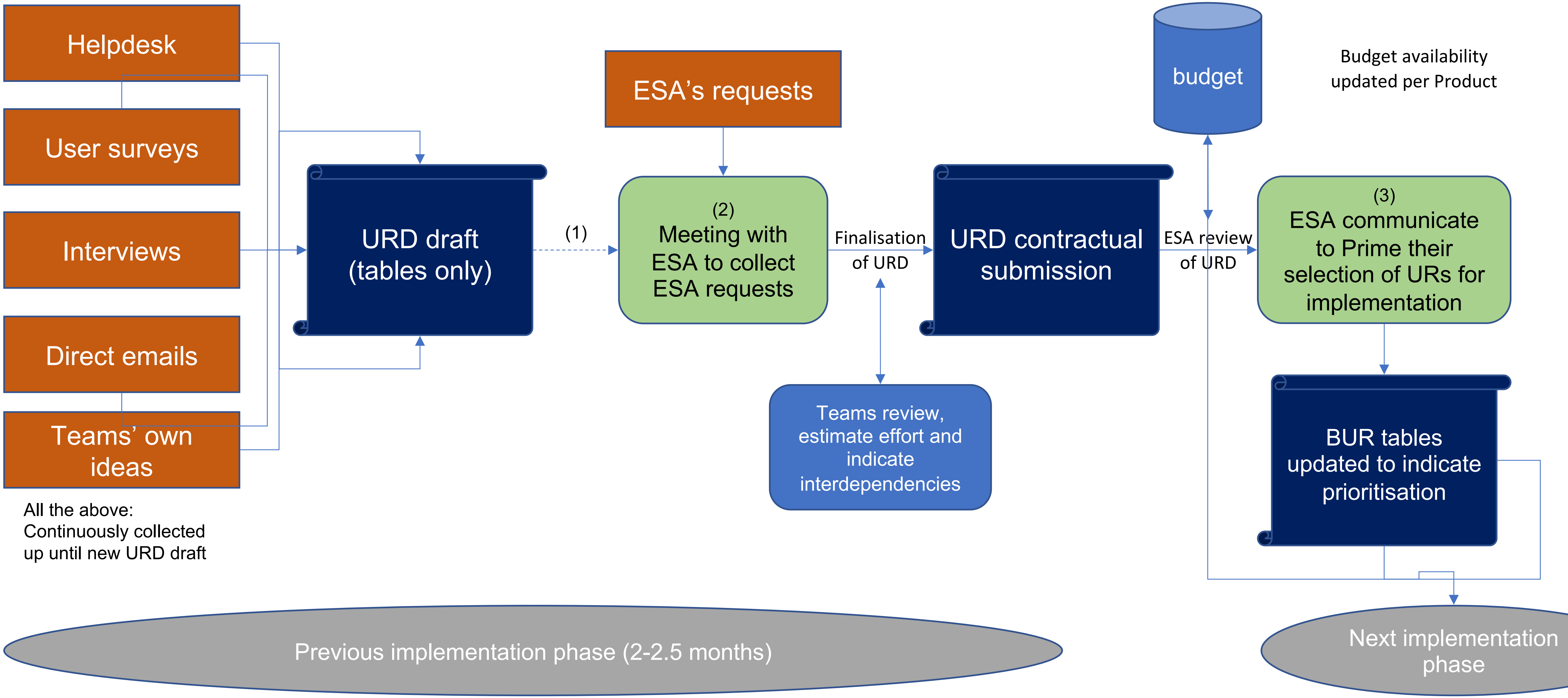
- Six main sources of incoming URs
- Helpdesk, user surveys (anonymous), interviews, direct emails & teams' own ideas → collected throughout the 3 month iteration cycle
- Continuous dialogue with ESA team and quarterly meetings to review and assess feasibility of all URs
- All new URs are listed - nothing is excluded

DD -3 months | DD -2.5 months | DD -10 d up to -5d | delivery date (DD) | DD +10 d.

Timeline

Quarterly process for new UR collection, prioritisation and implementation

Your Logo

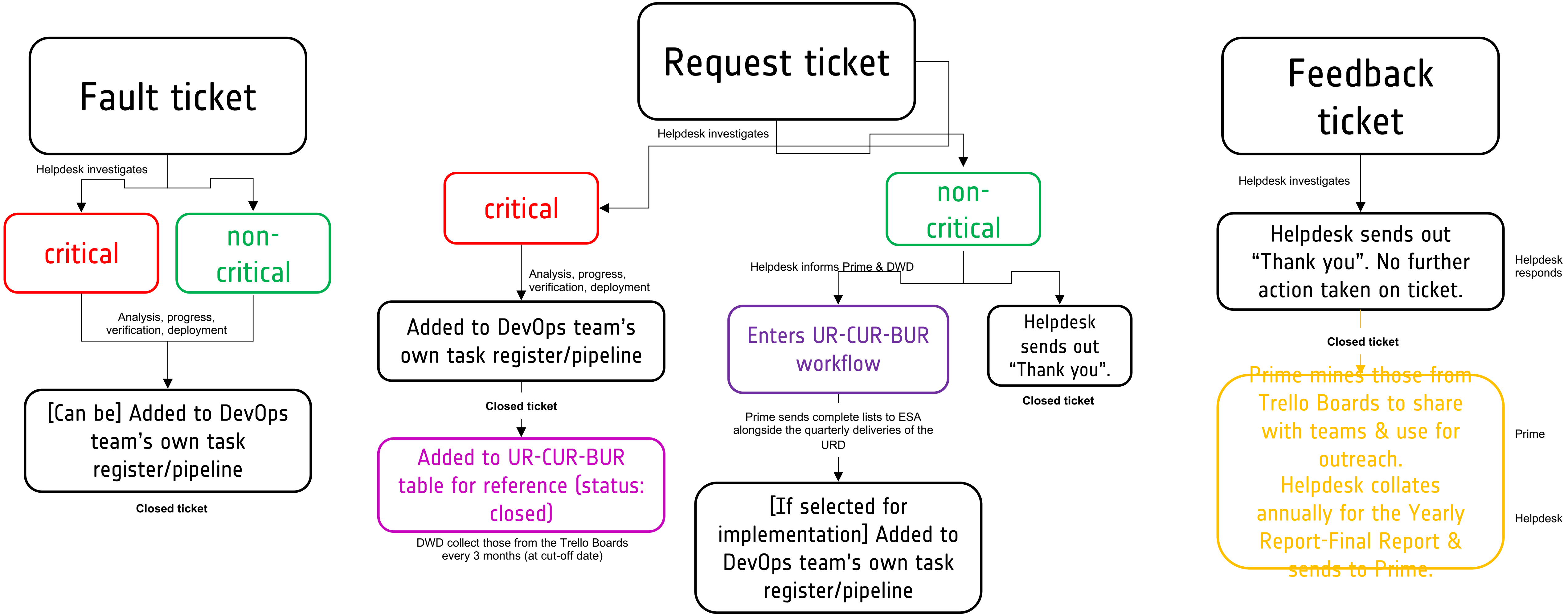


(1) URD draft may be shared with ESA ≤ 2 working days before meeting, upon ESA's request.
(2) Meeting with ESA takes place between 5 and 10 working days before the contractual submission.
(3) ESA communicate to Prime within 10 working days from URD submission their selection of URs.

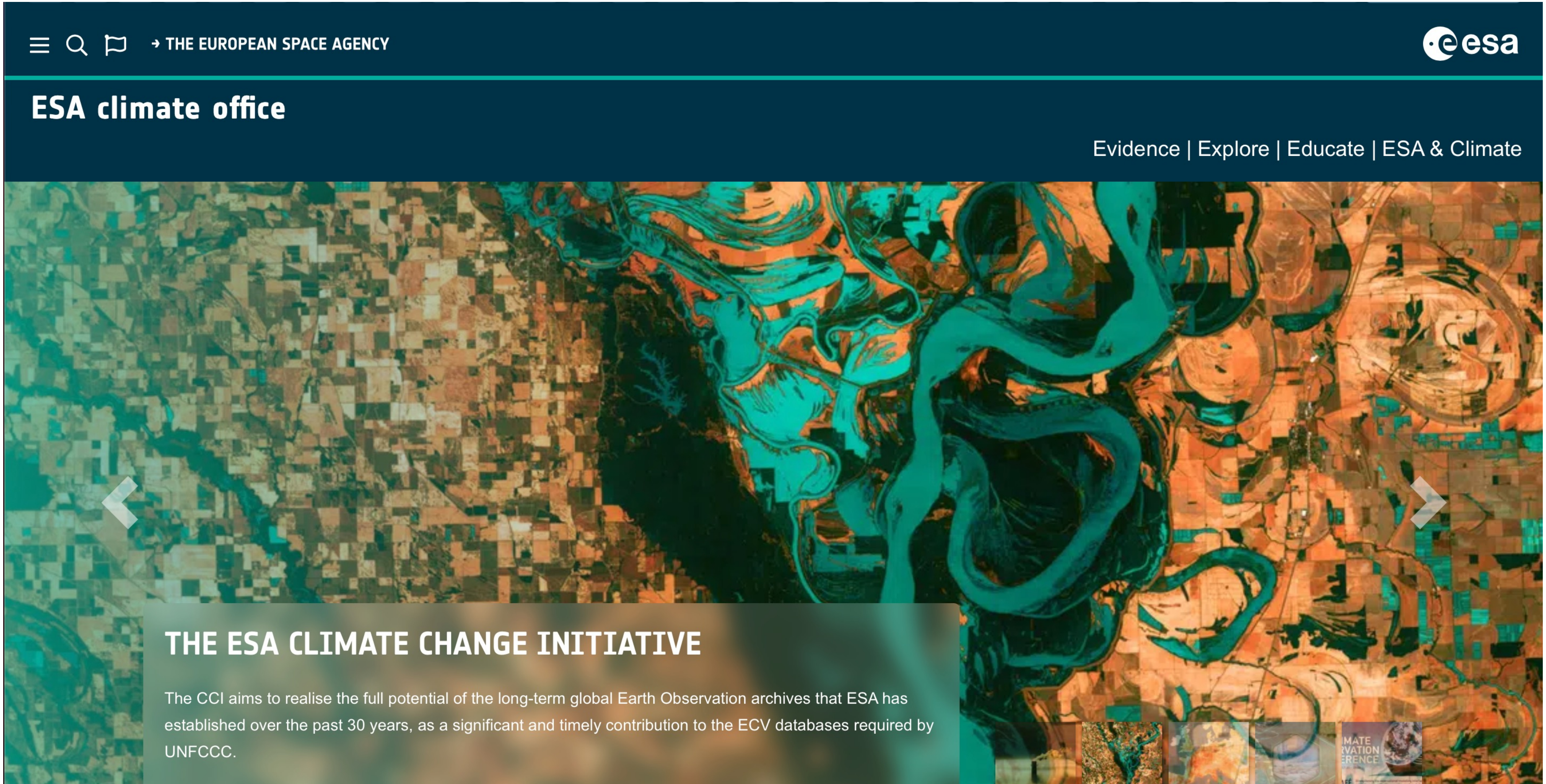
Helpdesk

- Available via website
- New signposting planned
- 3 types of Helpdesk tickets:
  - Fault → fixed within a certain time frame
  - Request → these become new URs
  - Feedback

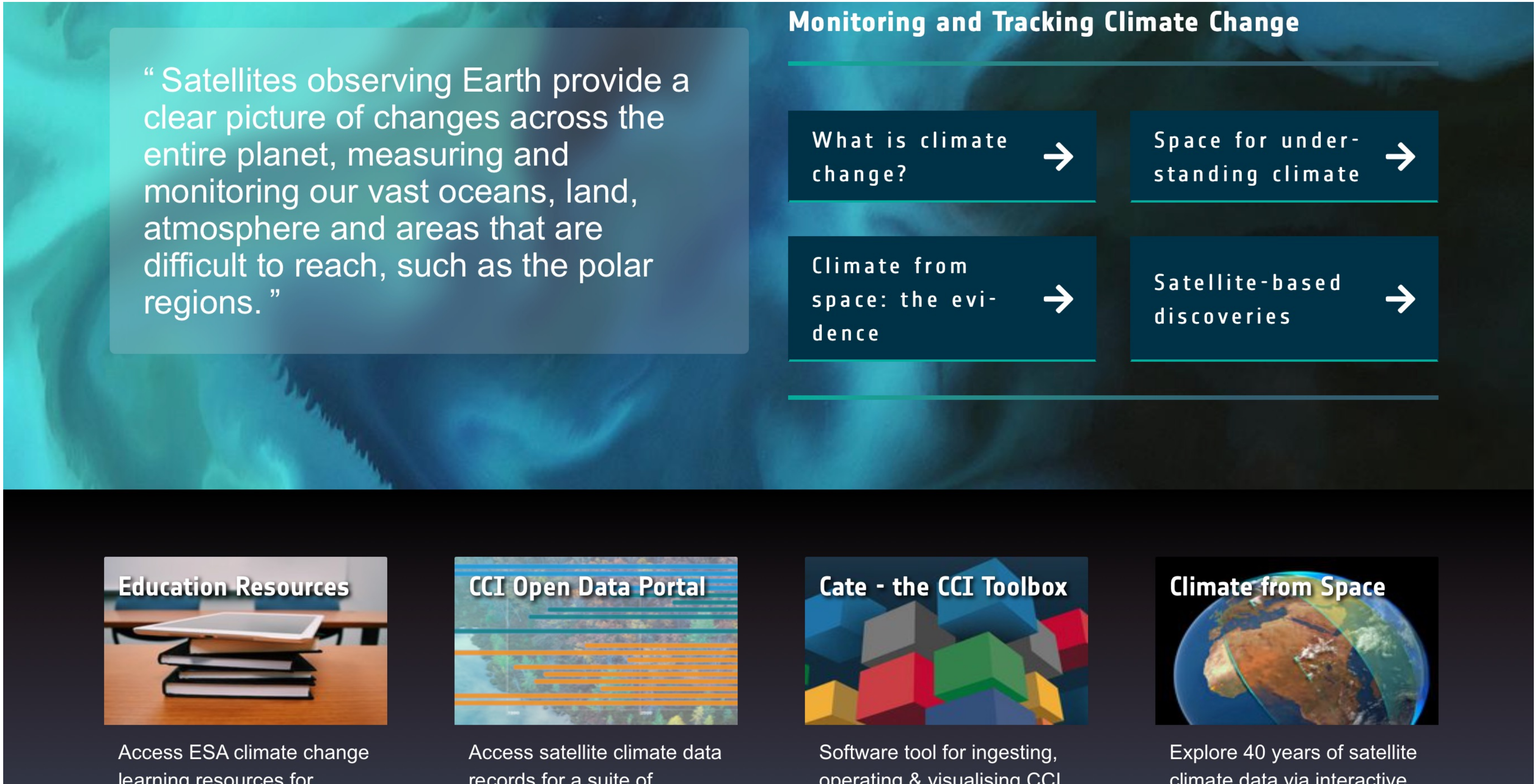
Lifecycle of Helpdesk tickets, per ticket class



Helpdesk


THE EUROPEAN SPACE AGENCY
esa
ESA climate office
Evidence | Explore | Educate | ESA & Climate
THE ESA CLIMATE CHANGE INITIATIVE
The CCI aims to realise the full potential of the long-term global Earth Observation archives that ESA has established over the past 30 years, as a significant and timely contribution to the ECV databases required by UNFCCC.

Helpdesk


“ Satellites observing Earth provide a clear picture of changes across the entire planet, measuring and monitoring our vast oceans, land, atmosphere and areas that are difficult to reach, such as the polar regions. ”
Monitoring and Tracking Climate Change
What is climate change?
Space for understanding climate
Climate from space: the evidence
Satellite-based discoveries
Education Resources
Access ESA climate change
CCI Open Data Portal
Access satellite climate data
Cate - the CCI Toolbox
Software tool for ingesting,
Climate from Space
Explore 40 years of satellite

Helpdesk

ESA's Climate Office is based in Harwell and can be contacted about the Climate Change Initiative.

Content publisher: paul.fisher@esa.int

General enquiries: climate.office@esa.int

For enquiries about accessing CCI data, please contact the CCI Open Data Portal Helpdesk.

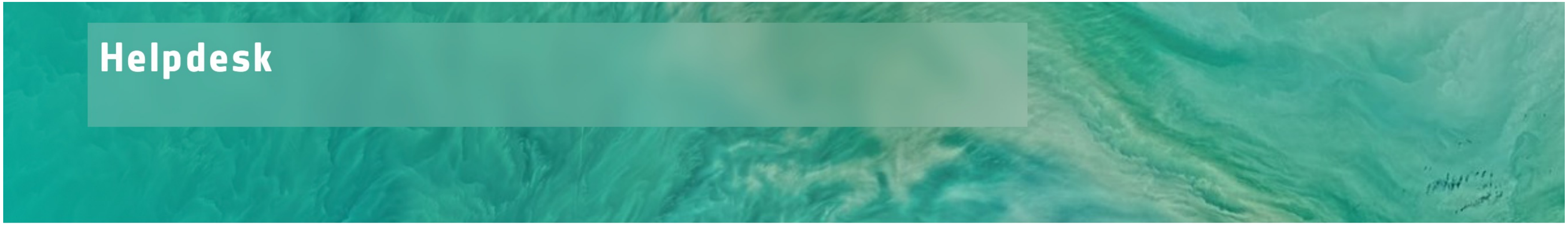
If you would like to sign up to individual ECV team mailing lists, please complete this form.

Address: ESA Climate Office, European Space Agency (ESA), ECSAT, Fermi Avenue, Harwell Campus, Oxfordshire OX11 0FD, United Kingdom.

How to reach us

Map of the Harwell Campus

Helpdesk



Welcome to the CCI Helpdesk. We will aim to respond to your enquiry as quickly as possible. To help us achieve this, please ensure your request is as accurate and complete as possible.

Product *

Climate Office Website

Enquiry type *

Fault

Summary *

Description *

Listening and adjusting

- Essentially two types of ‘knowledge exchange’ addressed through the project:
    - Science-focussed, technical and infrastructure-based solutions
    - Public-facing, educational, ‘inspirational’ and ‘policy support’ related outputs

- But we also need two types of listening and responsiveness:
    - Careful attention to end-user needs - including insights from you!
    - Use the range of inputs to inform ways of facilitating **unpredictable** use cases - especially from ‘intermediaries’

Enabling the intermediaries

- Curated resources
- Thematic links
- Tools to enable easier content creation with the data
- Clearer signposting to pre-prepared data, imagery and animation

- Increasing the chances of creators using the right data in the right way:
    - TikToker
    - Newsroom journalist
    - Game developer
    - Artist

Please get in touch

- There are currently live discussions about immediate ways to improve and create new forms of gathering input
- But we are here to listen
- Philip - walk through of the creative process of responding to URs with content creation
- Alison - the challenges of converting URs into practical implementation

Summary

- CCI KE aims to be more ambitious in achieving greater reach in the next phase - informed by better insights into user needs
- Public understanding is changing - but the need for clear, targeted information and data access is greater than ever
- Your insights and experience are highly valued!
- Please get in touch - via Helpdesk, interviews with Steffen (DWD), or any of us here today

Website

Toolbox

Climate from Space

Open Data Portal

Knowledge Exchange Climate Change Initiative

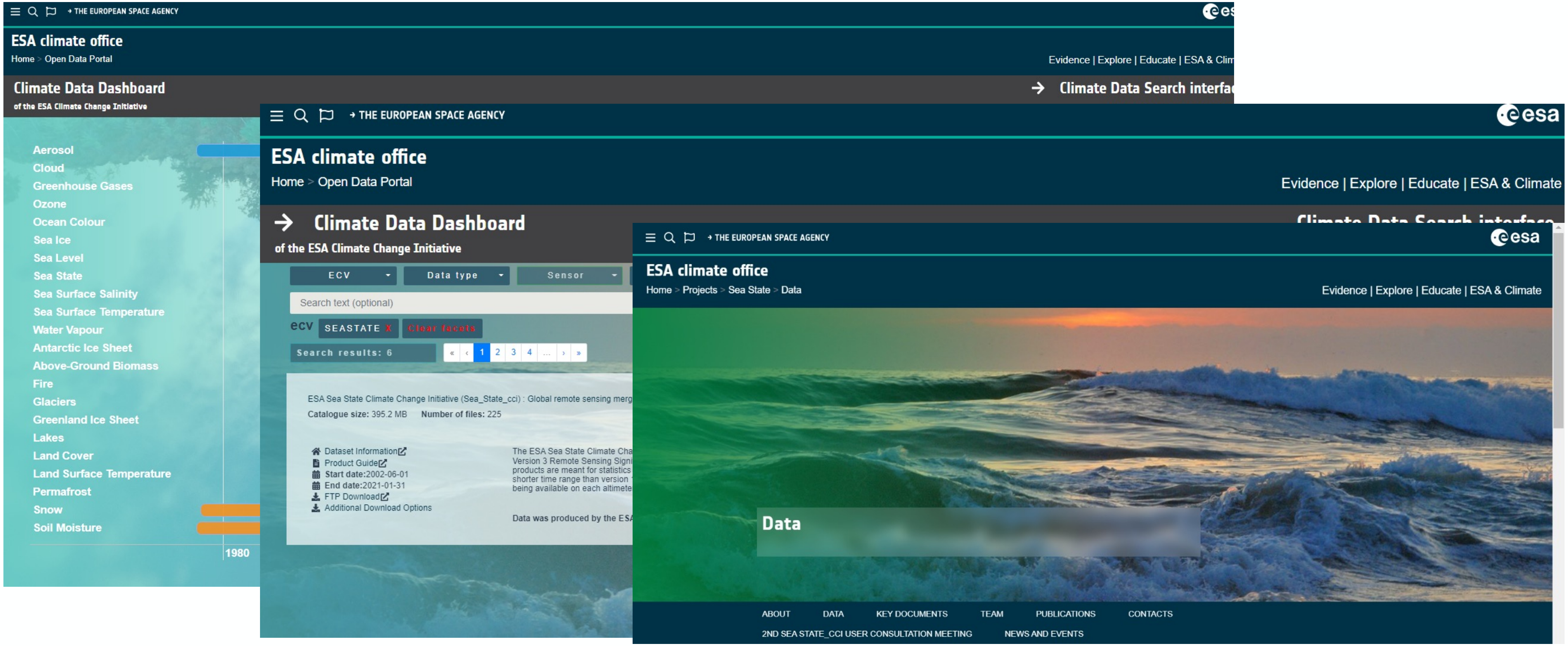
CCI KE products: Listening and Responding

Open Data Portal, Toolbox, Website

Brockmann Consult GmbH · ubilabs · UKRI Science and Technology Facilities Council · Telespazio a Leonardo and Thales company · imperative space · Planetary Visions · Deutscher Wetterdienst Wetter und Klima aus einer Hand DWD · Universidad de Alcalá · UCLouvain · eodc

Improved navigation to data

- User feedback -> can be hard to find how to access data / awareness of access methods
- As part of UX focused refresh of website, will be a specific refresh of the CCI ODP dashboard/search



‘Data access in Cate is too slow’

CCI Toolbox has been looking at providing Zarr data

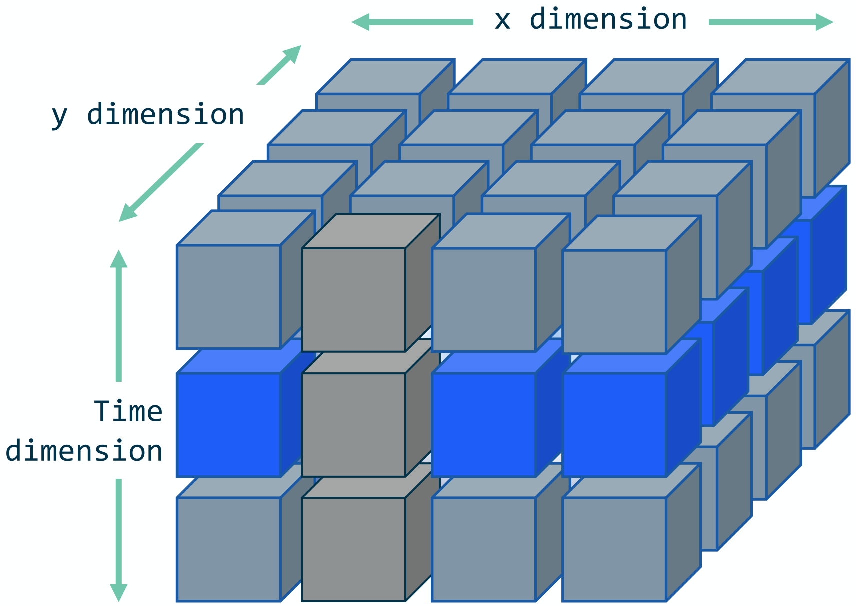
⇒ Zarr is an optimised format for cloud access

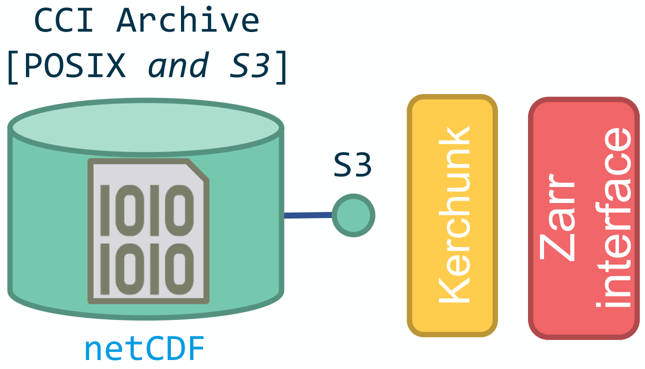
⇒ Trial of selected Zarr datasets in Phase 3 was a "game changer" for users in terms of providing much faster data access.

⇒Currently accessible from "Zarr store" in Cate

⇒ currently looking at how to make this available for suitable datasets in an integrated way with the Open Data Portal (alongside original format data)

⇒ testing ways to see if possible to provide a zarr interface to the netcdf => ideal solution





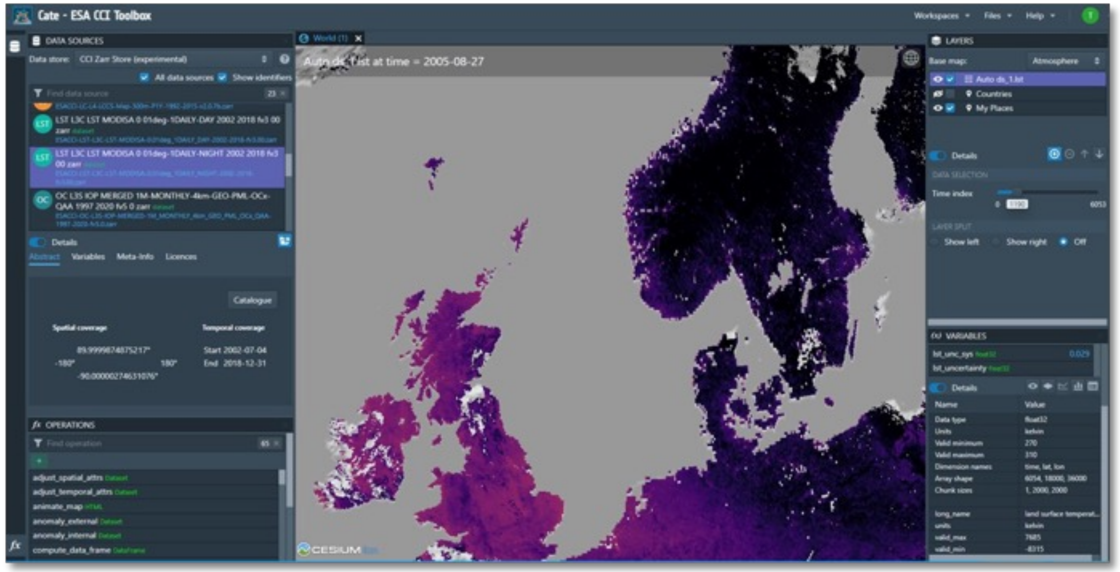
Knowledge
Exchange
Climate
Change
Initiative

CCI Toolbox is not intuitive on initial use

Solutions:

Updates to Cate:

- e.g. High level operations + hide advanced operation parameters.



Training materials:

- Four short demonstration videos were developed to help new users get started with Cate

https://vimeo.com/user177428613

- The Cate Quick Start Guide is being updated
- Demo of Cate at CCI ECV projects ongoing

Jupyter notebooks:

- Cate users can also access Cate (Jupyter) Lab, where they can run their own notebooks using direct access to data on the Open Data Portal (all CCI datasets).

We also continue to address other user requirements….

For example:

- Improvements to the Content Management System (CMS) of the Climate Office website based on user (i.e. Editors) needs

- Relationship between versions of CCI / C3S data isn't clear
    - 'Metadata bridge' => see upcoming talk: " An ESA-ECMWF Collaboration On FAIR Data Access Across CCI & C3S"

Website

Toolbox

Climate from Space

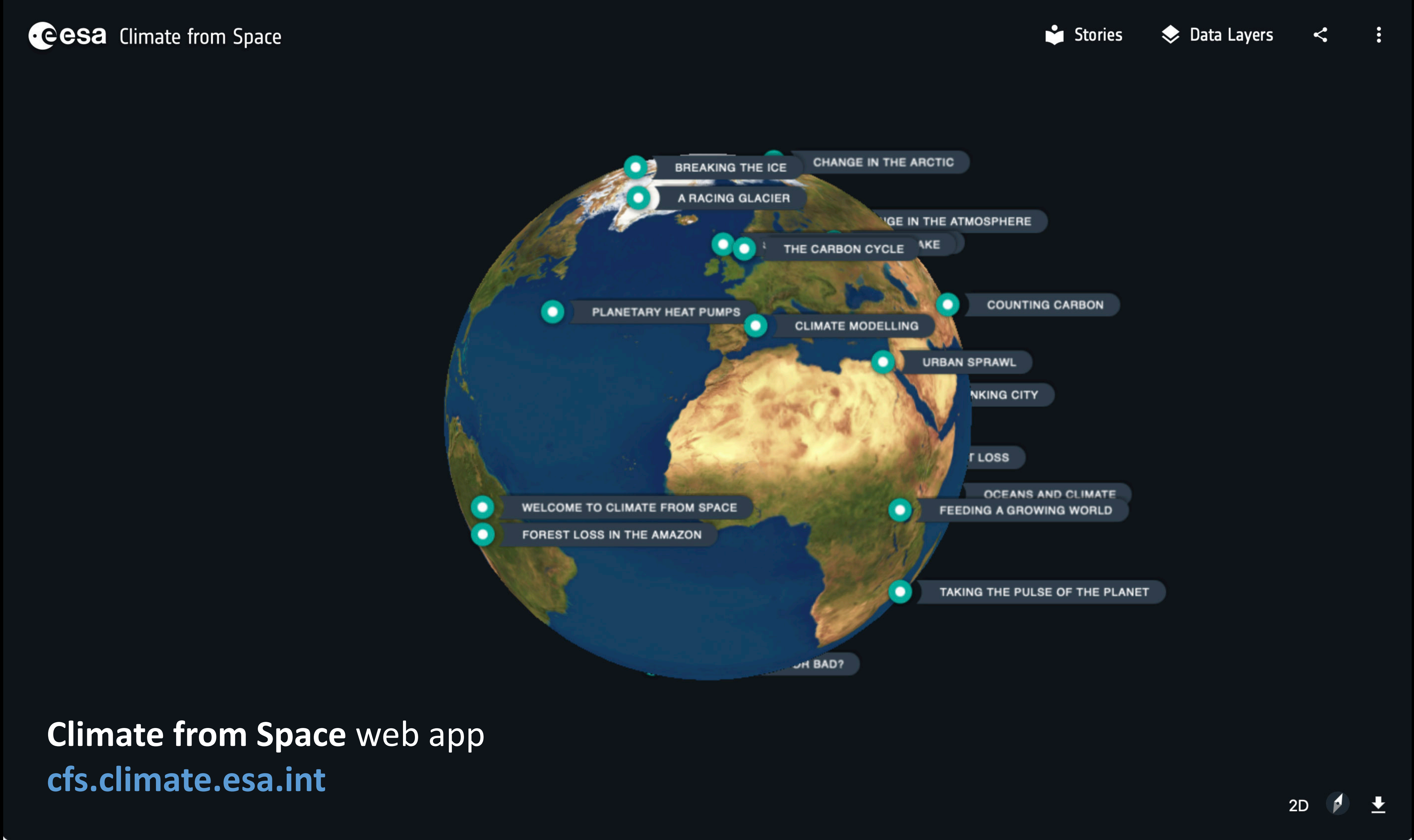
Open Data Portal

Knowledge
Exchange
Climate
Change
Initiative

CCI-KE Products – Listening and Responding

WP2000 Climate from Space

Philip Eales (Planetary Visions) / Patrick Mast (Ubilabs)

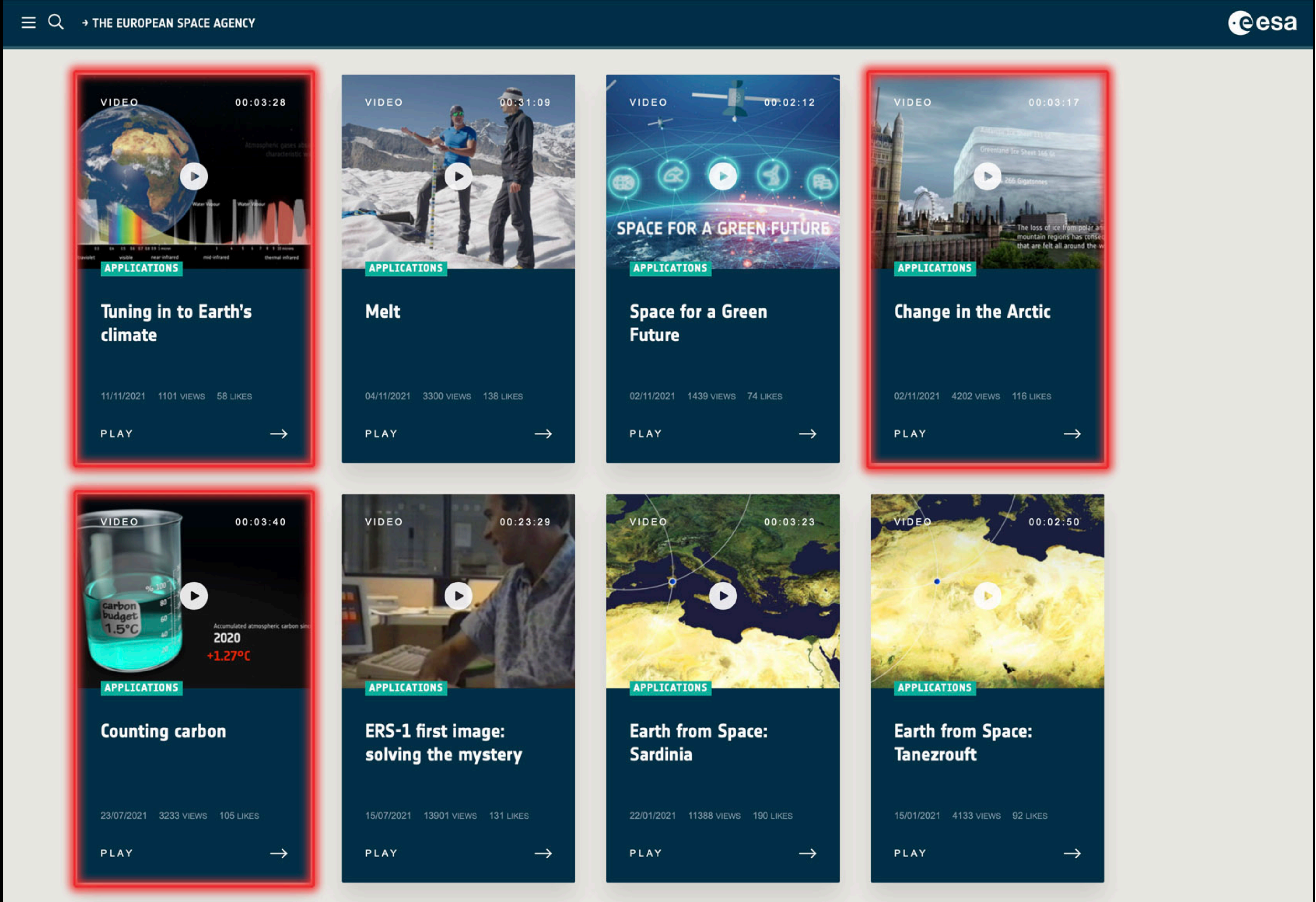


Climate from Space web app

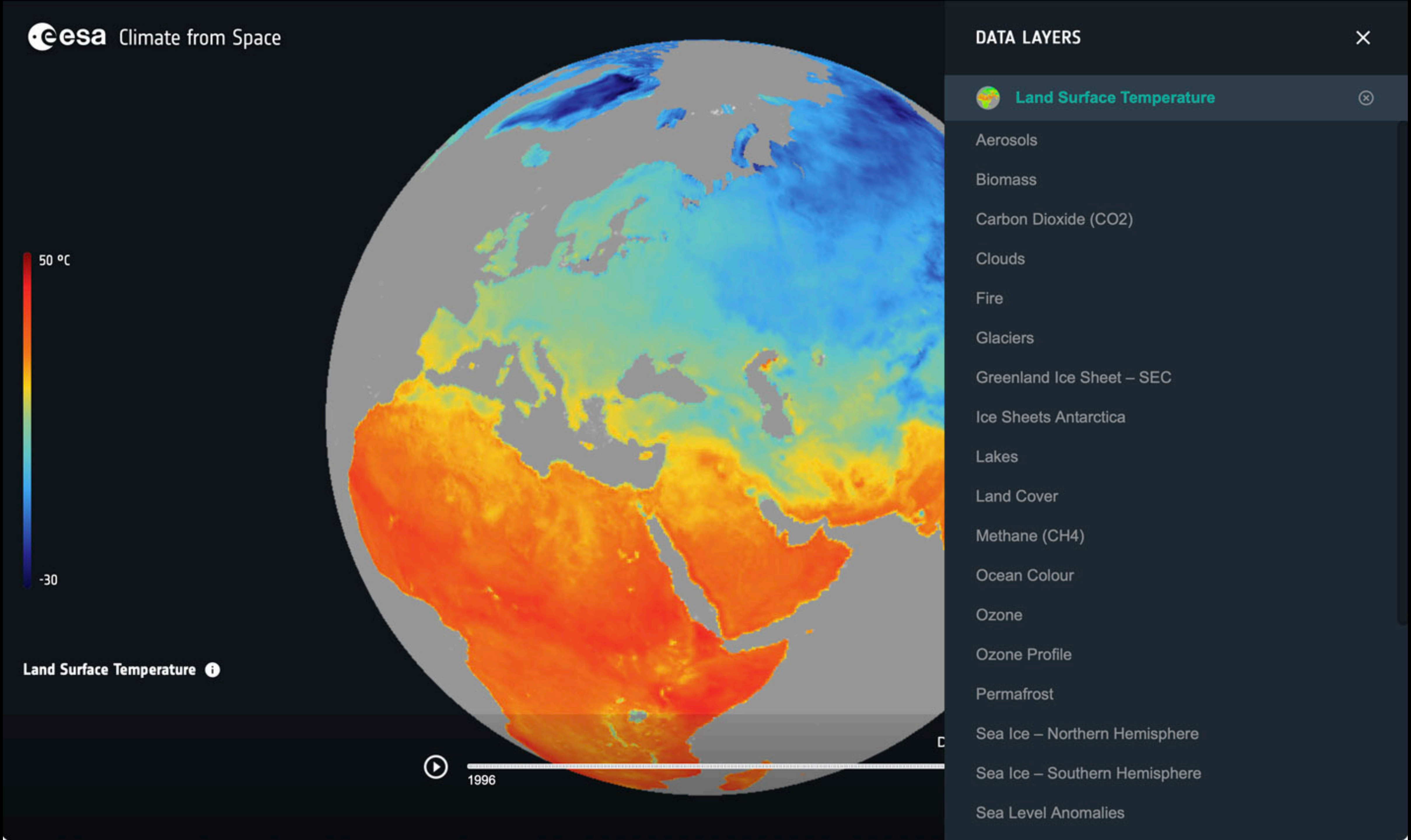
cfs.climate.esa.int

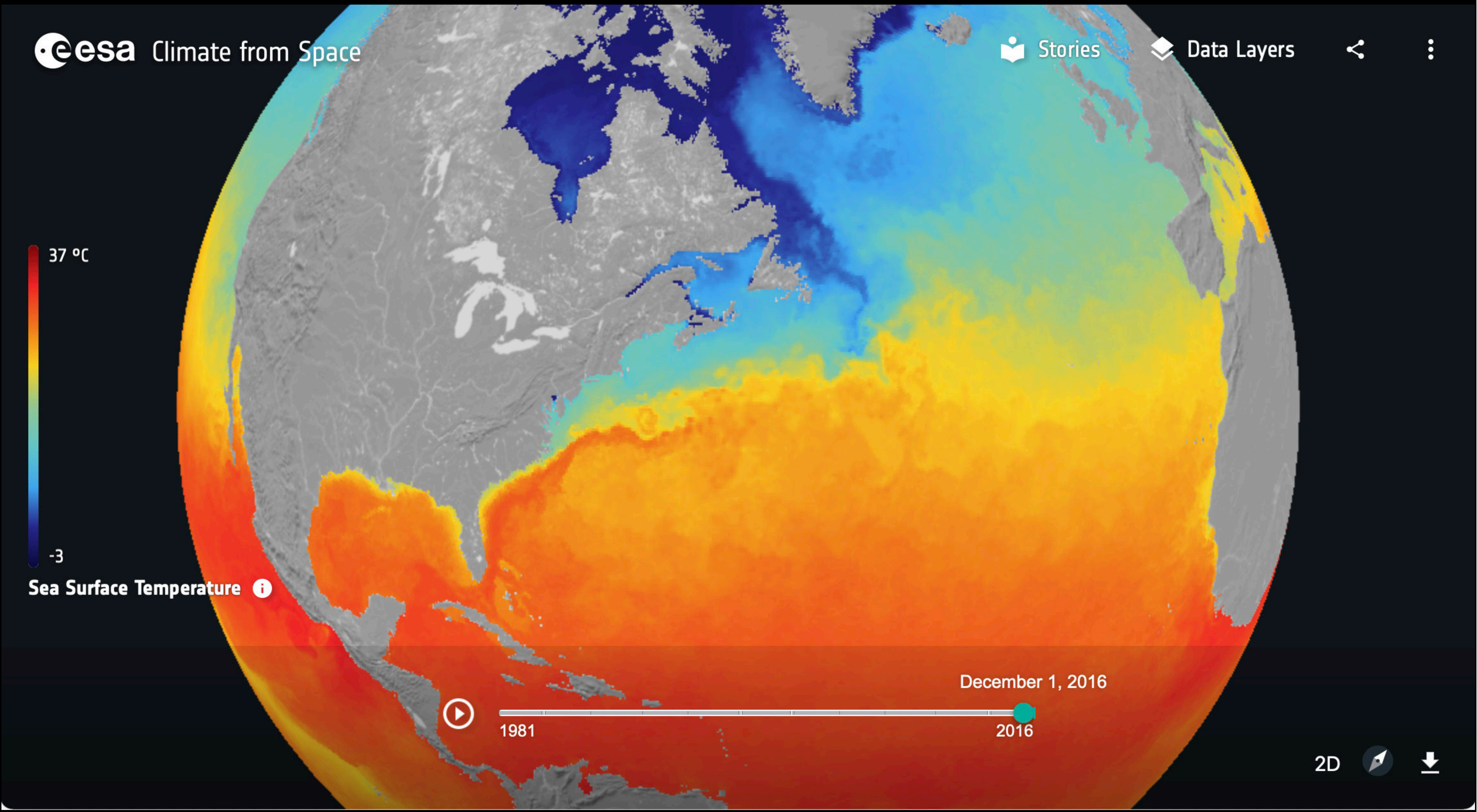

Ozone
Changes in ozone concentration and the ozone hole are caused by complex meteorological and chemical processes. Satellites monitor these changes to understand our climate and protect human health.
Ozone Concentration (1979 - 2019)
Source: ESA's Climate Change Initiative
100
DU
500
esa

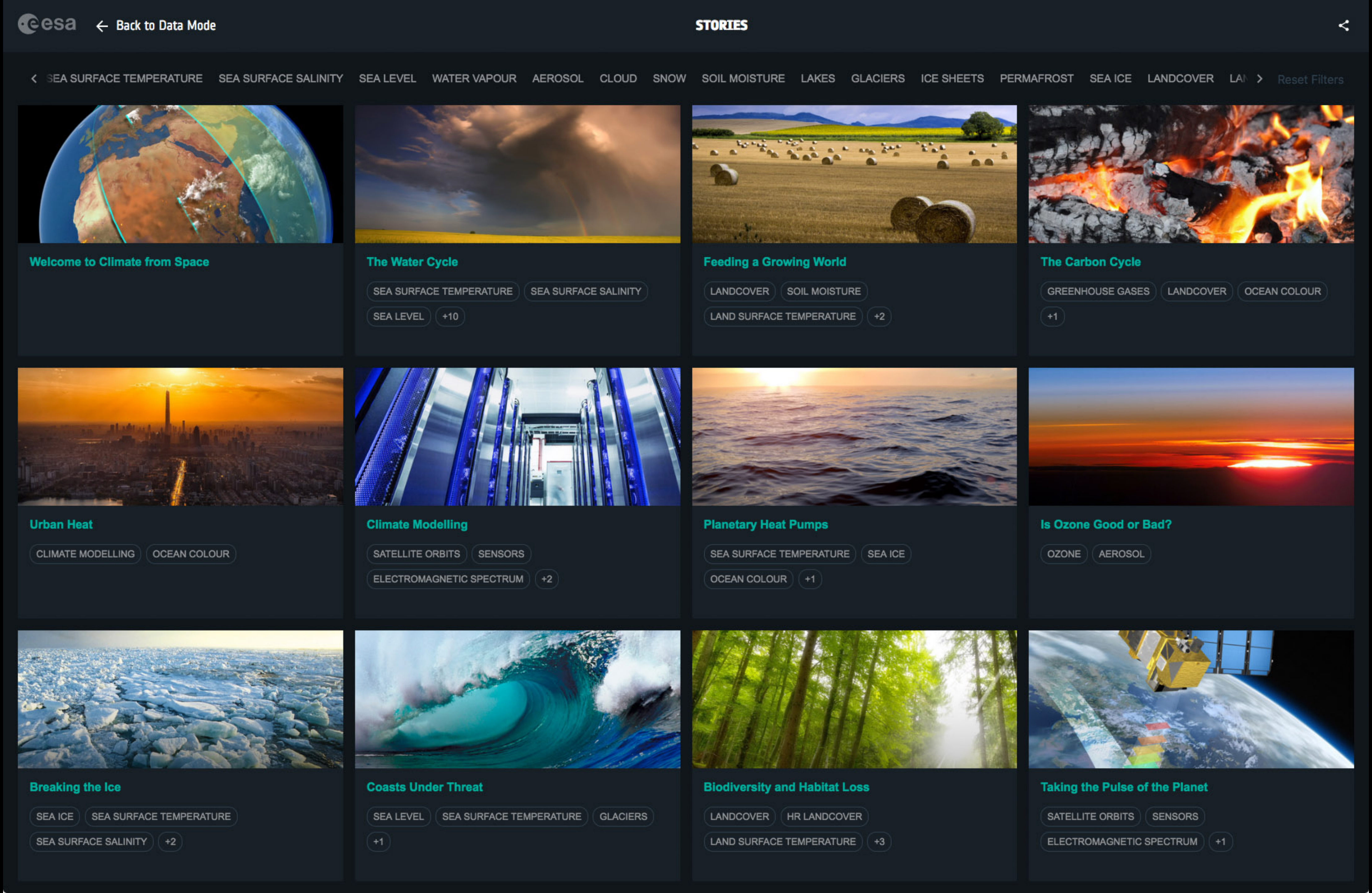
Graphics


THE EUROPEAN SPACE AGENCY
esa
VIDEO 00:03:28
APPLICATIONS
Tuning in to Earth's climate
11/11/2021 1101 VIEWS 58 LIKES
PLAY
VIDEO 00:31:09
APPLICATIONS
Melt
04/11/2021 3300 VIEWS 138 LIKES
PLAY
VIDEO 00:02:12
SPACE FOR A GREEN FUTURE
APPLICATIONS
Space for a Green Future
02/11/2021 1439 VIEWS 74 LIKES
PLAY
VIDEO 00:03:17
APPLICATIONS
Change in the Arctic
02/11/2021 4202 VIEWS 116 LIKES
PLAY
VIDEO 00:03:40
carbon budget 1.5°C
2020
+1.27°C
APPLICATIONS
Counting carbon
23/07/2021 3233 VIEWS 105 LIKES
PLAY
VIDEO 00:23:29
APPLICATIONS
ERS-1 first image: solving the mystery
15/07/2021 13901 VIEWS 131 LIKES
PLAY
VIDEO 00:03:23
APPLICATIONS
Earth from Space: Sardinia
22/01/2021 11388 VIEWS 190 LIKES
PLAY
VIDEO 00:02:50
APPLICATIONS
Earth from Space: Tanezrouft
15/01/2021 4133 VIEWS 92 LIKES
PLAY

Animations


esa Climate from Space
50 °C
-30
Land Surface Temperature
1996
DATA LAYERS
Land Surface Temperature
Aerosols
Biomass
Carbon Dioxide (CO2)
Clouds
Fire
Glaciers
Greenland Ice Sheet – SEC
Ice Sheets Antarctica
Lakes
Land Cover
Methane (CH4)
Ocean Colour
Ozone
Ozone Profile
Permafrost
Sea Ice – Northern Hemisphere
Sea Ice – Southern Hemisphere
Sea Level Anomalies


esa
Climate from Space
Stories
Data Layers
37 °C
-3
Sea Surface Temperature
December 1, 2016
1981
2016
2D


esa
Back to Data Mode
STORIES
SEA SURFACE TEMPERATURE SEA SURFACE SALINITY SEA LEVEL WATER VAPOUR AEROSOL CLOUD SNOW SOIL MOISTURE LAKES GLACIERS ICE SHEETS PERMAFROST SEA ICE LANDCOVER
Reset Filters
Welcome to Climate from Space
The Water Cycle
SEA SURFACE TEMPERATURE SEA SURFACE SALINITY SEA LEVEL +10
Feeding a Growing World
LANDCOVER SOIL MOISTURE LAND SURFACE TEMPERATURE +2
The Carbon Cycle
GREENHOUSE GASES LANDCOVER OCEAN COLOUR +1
Urban Heat
CLIMATE MODELLING OCEAN COLOUR
Climate Modelling
SATELLITE ORBITS SENSORS ELECTROMAGNETIC SPECTRUM +2
Planetary Heat Pumps
SEA SURFACE TEMPERATURE SEA ICE OCEAN COLOUR +1
Is Ozone Good or Bad?
OZONE AEROSOL
Breaking the Ice
SEA ICE SEA SURFACE TEMPERATURE SEA SURFACE SALINITY +2
Coasts Under Threat
SEA LEVEL SEA SURFACE TEMPERATURE GLACIERS +1
Biodiversity and Habitat Loss
LANDCOVER HR LANDCOVER LAND SURFACE TEMPERATURE +3
Taking the Pulse of the Planet
SATELLITE ORBITS SENSORS ELECTROMAGNETIC SPECTRUM +1

Living With the Sea

The island nation of Kiribati in the Pacific Ocean is past the point of no return. No matter what happens to greenhouse gas emissions in the future, it is expected to be, within a few decades, the first country to become uninhabitable due to climate change.

The islands of Kiribati are small and low-lying, mostly scattered across 32 coral atolls, where they surround saltwater lagoons rich in marine life. Polynesian people have inhabited the islands for thousands of years, living in close harmony with nature and the ocean around them. Life for the 115,000 islanders revolves around the rise and fall of the tides, which dictate the timing of fishing and the availability of transport. But now the rising ocean is their biggest threat.

The islands are only a few tens to hundreds of metres wide and typically rise no higher than two metres above sea level. This makes Kiribati one of the countries most vulnerable to the effects of climate change, especially sea level rise. But tropical islands are not the only places at risk.

Global Problem

680 million people live in low-lying coastal zones, a number that is rising with an increasingly urban population and expected to reach one billion by 2050. Every centimetre of sea level rise puts 3 million more people at risk of annual coastal flooding.

Sea level rise is amplified by high tides and storm surges. Climate change is increasing the intensity and frequency of storms, so the risk of flooding events such as those that devastated New Orleans in 2005 and hit New York in 2012 is growing. In some regions extreme sea level events previously seen only once a century are likely to occur every year by 2050.

Blackout in New York after Hurricane Sandy, October 2012. The storm coincided with a "spring" high tide, resulting in a storm surge almost five metres above mean low water. Road tunnels, subways and electrical substations were flooded in lower Manhattan, and almost 2 million people were left without power across New York and New Jersey. (Iwan Baan/Getty Images)

Highs and Lows

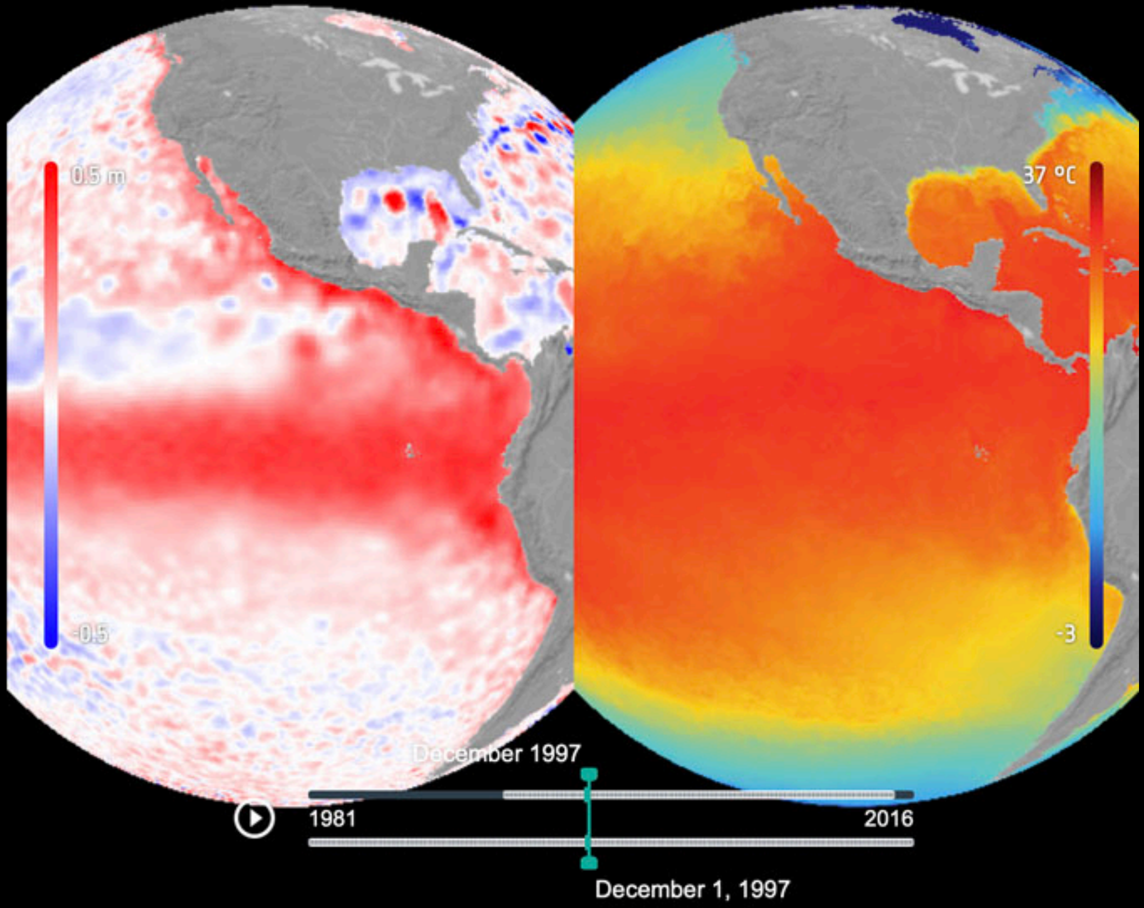
Earth observation satellites can use radar to accurately measure the height of the sea surface, allowing us to investigate how it varies through time and across the globe. In some areas, sea level rise can be five times that of the global average. This is mostly because variations in the amount of heat stored lead to uneven thermal expansion. This and other factors tend to amplify the sea level rise in tropical regions such as the central Pacific. Differences in salinity and local gravity also play a part.

Absolute measurements of sea level show the trend over years and decades. Changes from month to month show up more clearly if we work out sea level anomalies by calculating the difference between the level each month and a reference level. On the interactive globe this baseline is the average sea surface height at each point over the period 1993 to 2009. Run through the timeline to see where the sea is unusually high or low compared with mean sea level for a particular month.

The most extreme sea level variations are usually around strong ocean currents, such as the Gulf Stream in the North Atlantic and the Kuroshio Current in the North Pacific, where the motion of the current on the rotating Earth causes a slope in the sea surface. These currents are also clearly visible in the sea surface temperature data, shown on the other globe.

There is a seasonal cycle due to thermal expansion: sea levels are higher in the summer when the sea surface temperature increases. Sea level is, therefore, a good way of tracking the movement of heat around the oceans as well as the movement of water itself. Unlike measurements of the temperature of the sea surface, measurements of sea level are sensitive to changes integrated over the ocean's depth.

The globes also show variation between years, such as changes caused by the warming of the Pacific Ocean surface during El Niño events. Check out the El Niño years of 1997, 2003, 2010 and 2015 to see how much the sea level rises around Kiribati in the central Pacific.

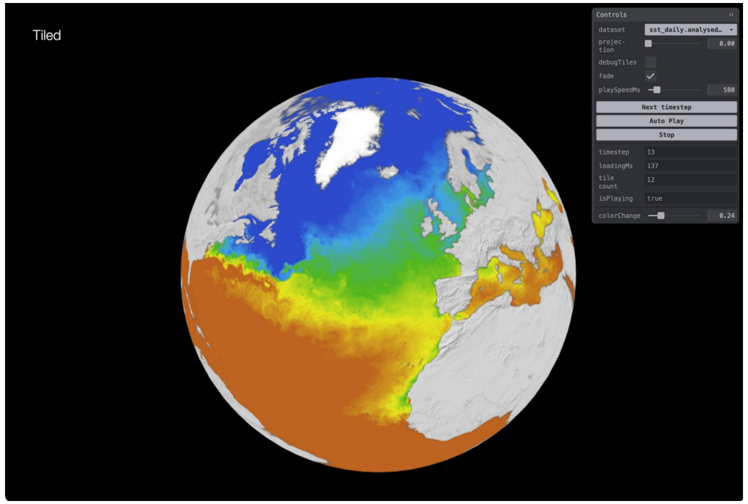


CCI Sea Level Anomaly compared with Sea Surface Temperature

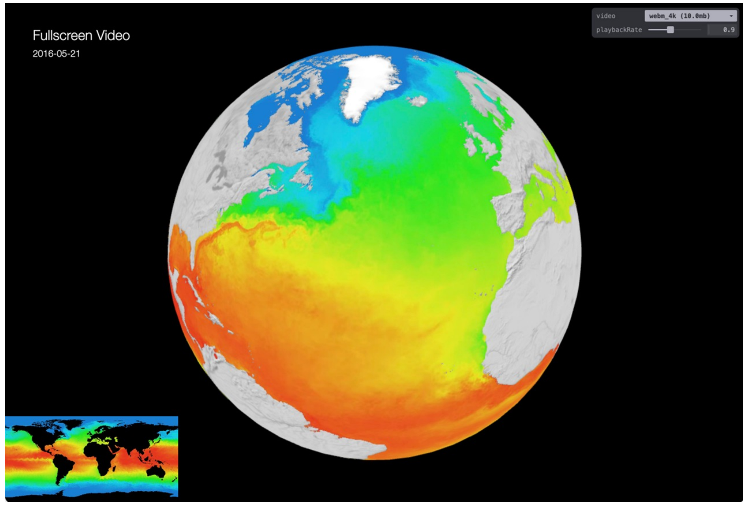
Climate from Space Software

Feedback

- Exhibition and Tablet versions gave different content and user experience
- Large data package to download for updates
  - → single app with full data and stories, seamless data updates, on web
- Data viewer offers too much freedom to museum visitors (Museon)
  - → customised version focusing on the stories
- YouTube player presents external content after playing animation (Museon)
- Video download for presentations not available with YouTube player (rep users)
  - → internal HTML5 video player?
- Requests for links between stories (science teams)
  - → internal hypertext links
- Off-the-shelf Cesium rendering engine is good for large static maps, but not suited to time sequences (product team, ESA)
  - → improved data playback with custom globe engine



Data Viewer: Tiled maps



Data Viewer: Video sequence

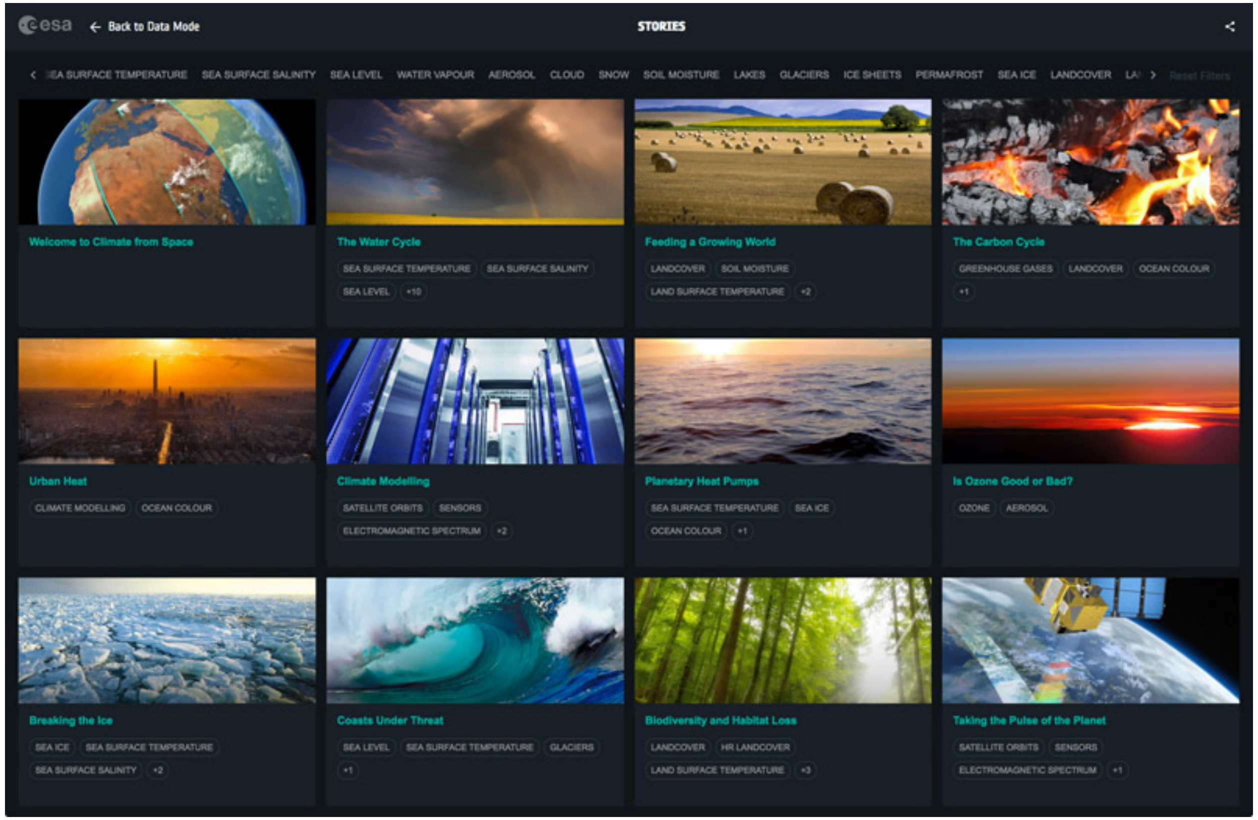
Knowledge Exchange Climate Change Initiative

Climate from Space Content

PLANETARY VISIONS

Earth system stories x12
Satellite image stories x5 (phi-Exp touchtable)
Animation stories x4

→ 21 stories



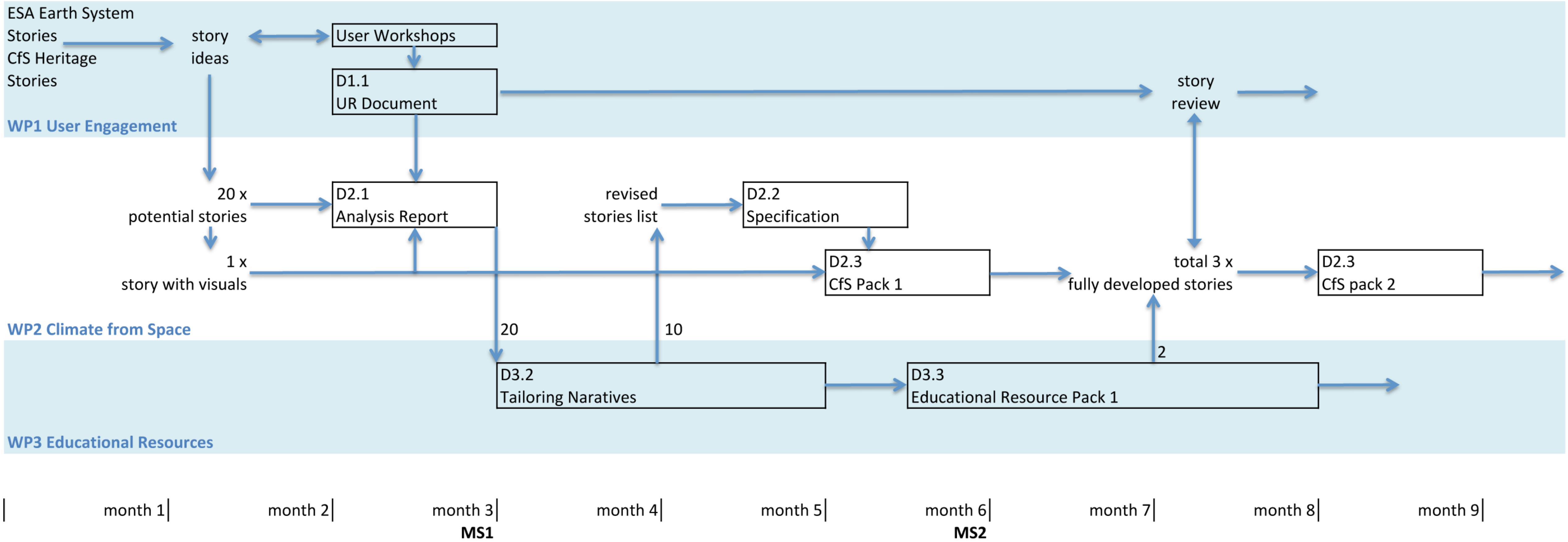
Feedback

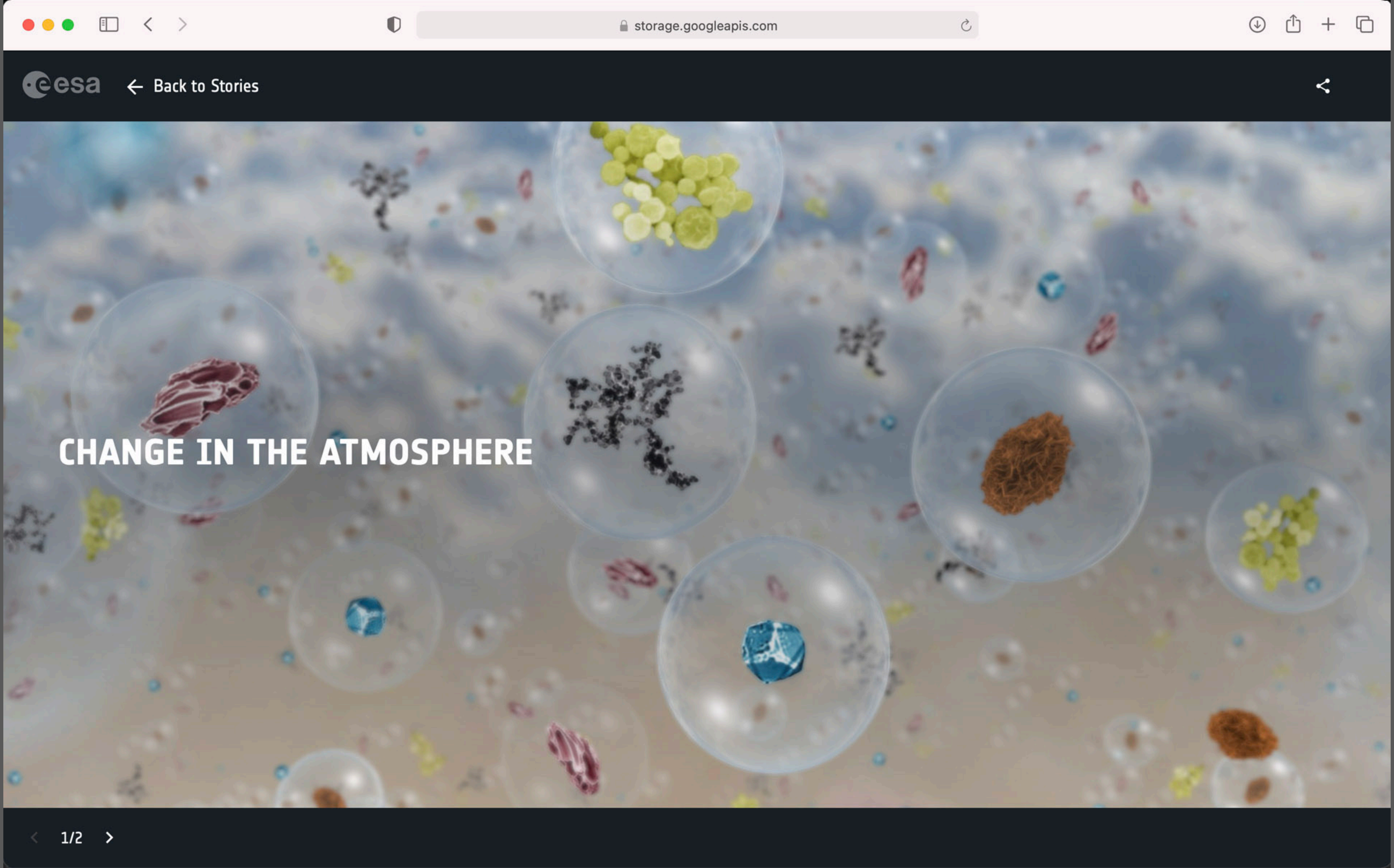
- Keep stories manageable length (Museon)
- Need for introduction/context (Museon, ESA)
  - → two new full stories
  - → single-page stories (animations, image galleries)
- Requests for links between stories (science teams)
  - → internal hypertext links
- Video download for user presentations not available with YouTube player (rep users)
  - → content solution: external links to ESA download page?
  - → software solution: Internal HTML5 video player?

Climate from Space Content

PLANETARY VISIONS

CfS Story Development




storage.googleapis.com
esa
Back to Stories
CHANGE IN THE ATMOSPHERE
1/2

Change in the Atmosphere

Human activity is changing the composition of the atmosphere through industrial pollution, power generation, agricultural practices and biomass burning. These activities add 35 gigatonnes of carbon dioxide to the atmosphere every year. Carbon dioxide, smoke and other atmospheric components have a major impact on the climate.

Aerosol particles (such as soot, sulphates, mineral dust, volcanic ash, pollen and sea salt) block energy from the Sun, leading to a net cooling of the atmosphere.

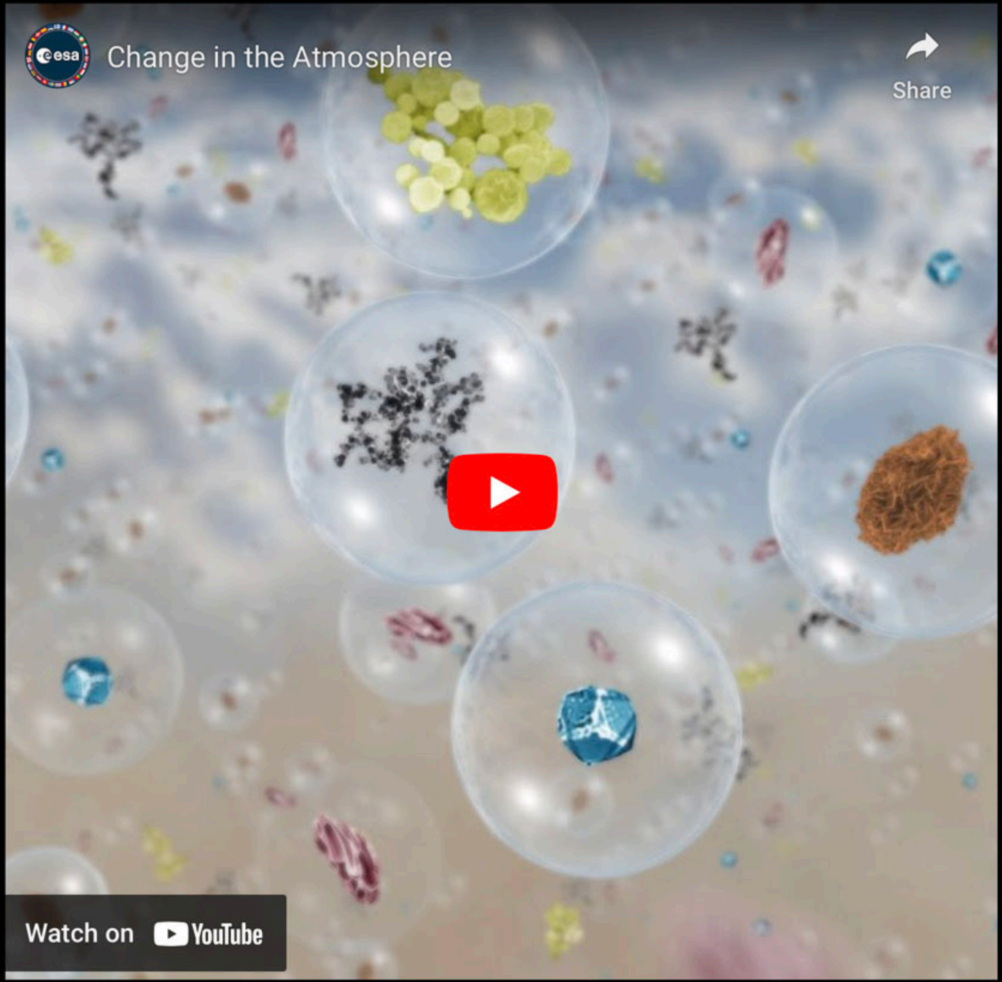
Aerosols also interact with clouds, providing the seeds for cloud formation. 20% of the Sun's energy is reflected by clouds, but they also absorb infrared emissions from the ground, trapping heat in the atmosphere.

Rising levels of greenhouse gases, such as carbon dioxide and methane, are largely due to human activity. They have already increased the Earth's average temperature by about 1°C since 1850.

Ozone is a powerful greenhouse gas, so its evolution is intimately coupled to climate change. Despite the recovery of the ozone hole, ozone is still being destroyed by pollutants, such as CFCs, which stay in the atmosphere for a long time.

ESA's Climate Change Initiative is using satellite observations going back more than thirty years to track these important atmospheric components and improve our understanding of their impact on the climate.

(Data from CCI Fire, Aerosol, Cloud, Greenhouse Gas and Ozone teams. Animation by Planetary Visions.)



Change in the Atmosphere

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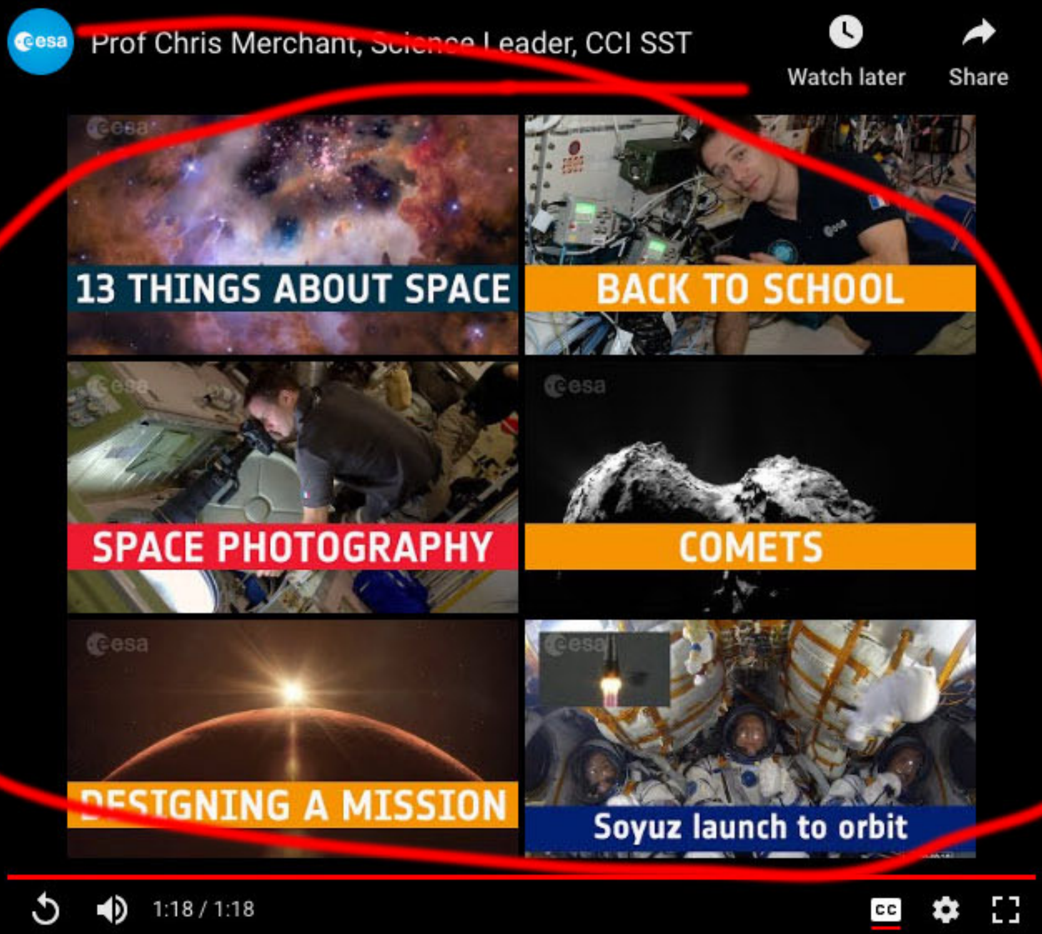
(Data from CCI Fire, Aerosol, Cloud, Greenhouse Gas and Ozone teams. Animation by Planetary Visions.)

CCI Sea Surface Temperature

It is likely that the upper ocean has been warming since the middle of the nineteenth century, and scientists have been able to measure the warming of the ocean surface from space since the 1970s. Satellite observations provide more detailed and even coverage, and more frequent repeats, than is possible from ships and floating instruments.

The CCI SST team has harmonised four trillion measurements from fourteen satellites spanning four decades. Combining the highly accurate, stable and well-calibrated measurements from new European sensors with the longer coverage of an older American system gives a complete, daily, stable, low-bias SST data set spanning 37 years.

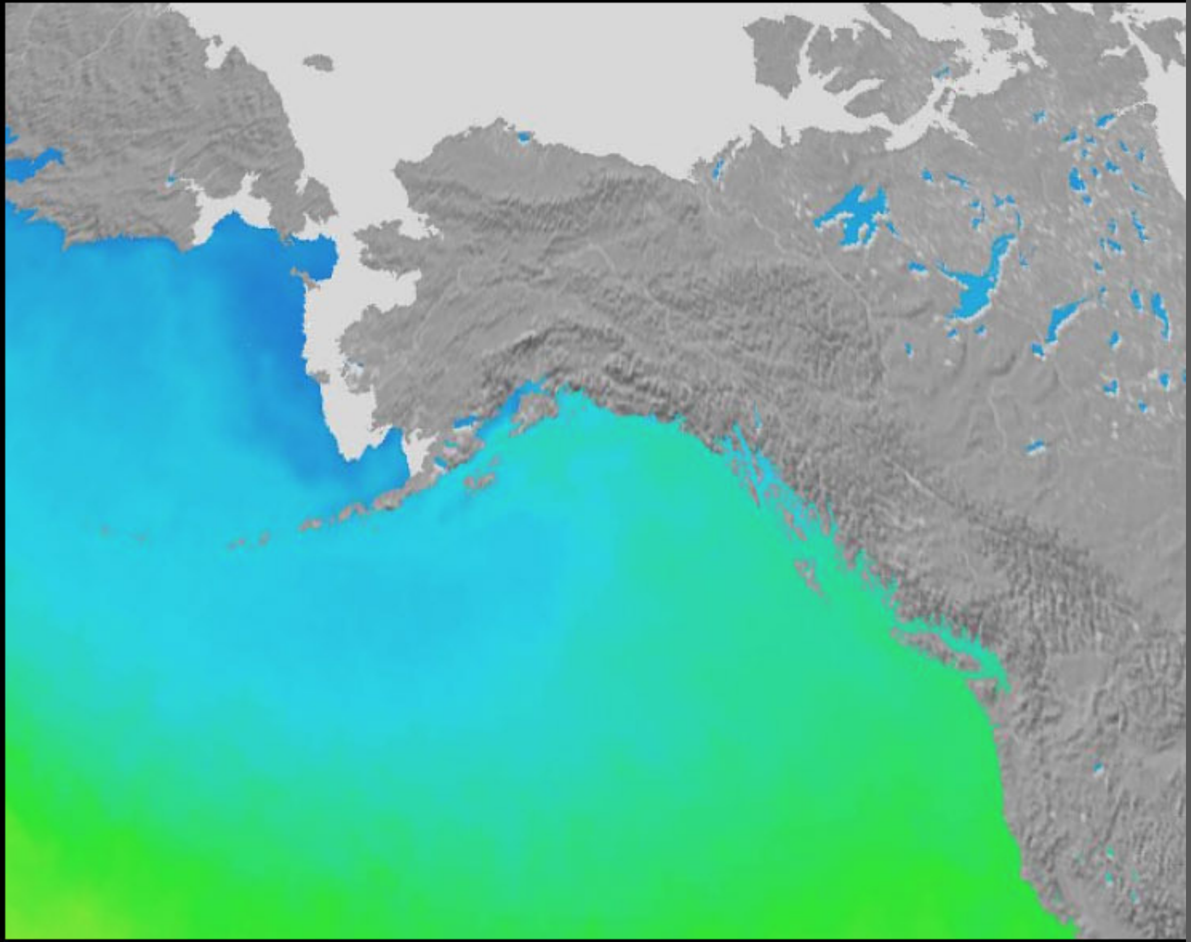


Der langsame Kohlenstoffkreislauf

Der Kohlenstoffaustausch zwischen der Atmosphäre und dem Ozean findet an der Meeresoberfläche statt. Kohlendioxid ist im Meerwasser gelöst, wird aber auch von Meerespflanzen - dem Phytoplankton - aufgenommen, die mit Hilfe von Chlorophyll Photosynthese betreiben, genau wie Pflanzen an Land. Ein Teil des Kohlendioxids wird schnell wieder in die Atmosphäre freigesetzt, so dass die Ozeane eine Rolle im schnellen Kohlenstoffkreislauf spielen, aber ein anderer Teil wird in die Tiefsee gemischt, wo er jahrhundertelang als Teil des langsamen Kohlenstoffkreislaufs verbleibt.

Ozeanische Lebensformen, vom Phytoplankton bis zu Korallen, Krustentieren und Walen, nehmen während ihres Wachstums Kohlenstoff auf und nehmen einen Teil davon mit auf den Meeresboden, wenn sie sterben. Dort wird der Kohlenstoff in Sedimentgestein, dem größten Kohlenstoffspeicher der Erde, gebunden. Unter bestimmten Bedingungen können sich Schichten aus organischem Kohlenstoff zu Lagerstätten fossiler Brennstoffe - Kohle, Öl oder Erdgas - aufbauen.

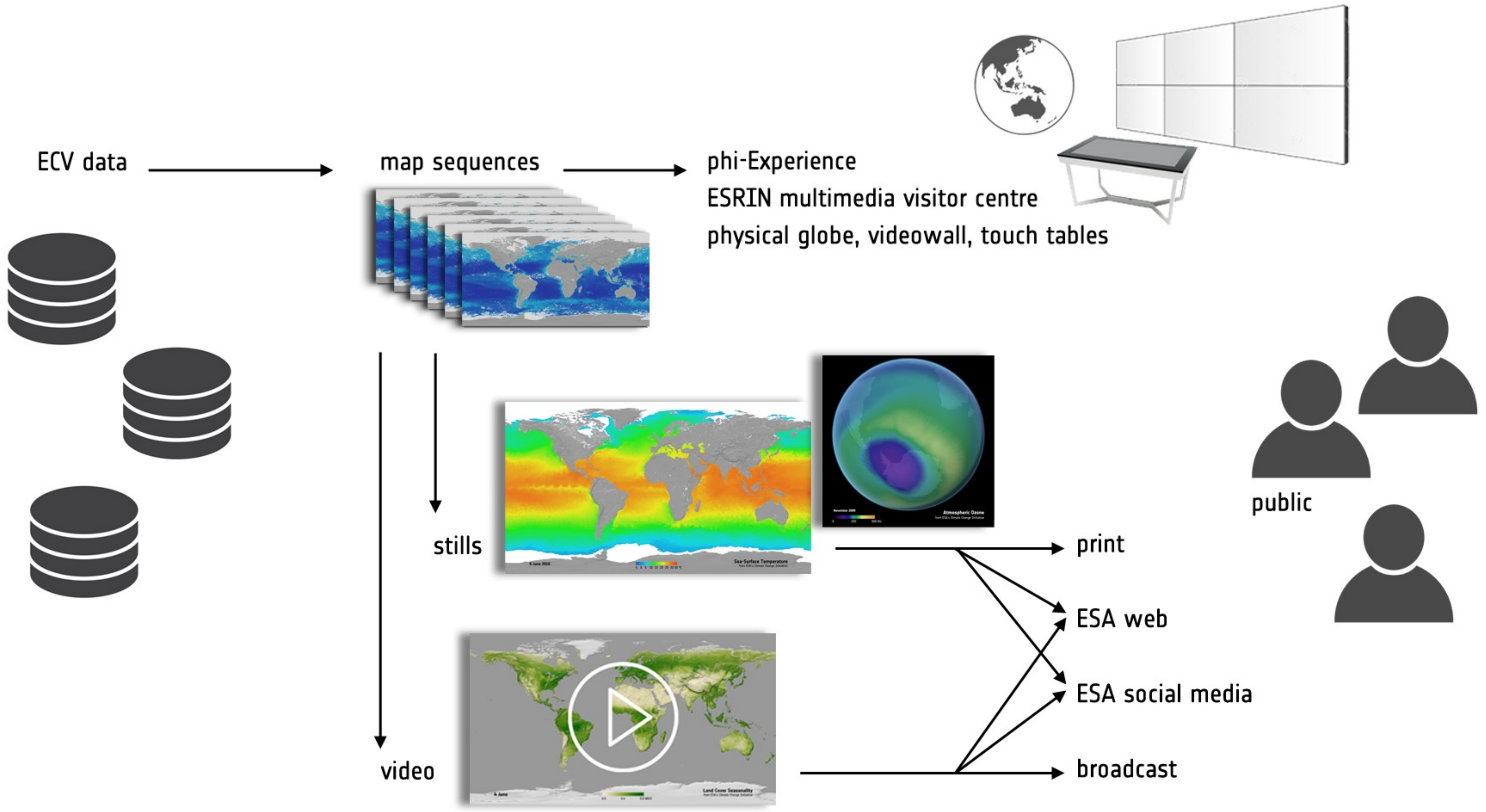
Der langsame Kreislauf führt den Kohlenstoff schließlich durch geologische Prozesse wieder in die Atmosphäre zurück. Kohlendioxid wird unter extremer Hitze und hohem Druck aus dem Gestein ausgestoßen und bei Vulkanausbrüchen in die Atmosphäre entlassen. Aus der Atmosphäre kann der Kohlenstoff in Form von schwacher Kohlensäure im Regenwasser gelöst an die Oberfläche zurückkehren, wo er bei der chemischen Verwitterung von Gestein und der Abgabe von Mineralien und Salzen an das Meer eine Rolle spielt.



Lorem ipsum dolor sit amet. Der japanische Satellit GOSAT folgte im Jahr 2009

-0:45

Climate from Space Graphics



Climate from Space Graphics

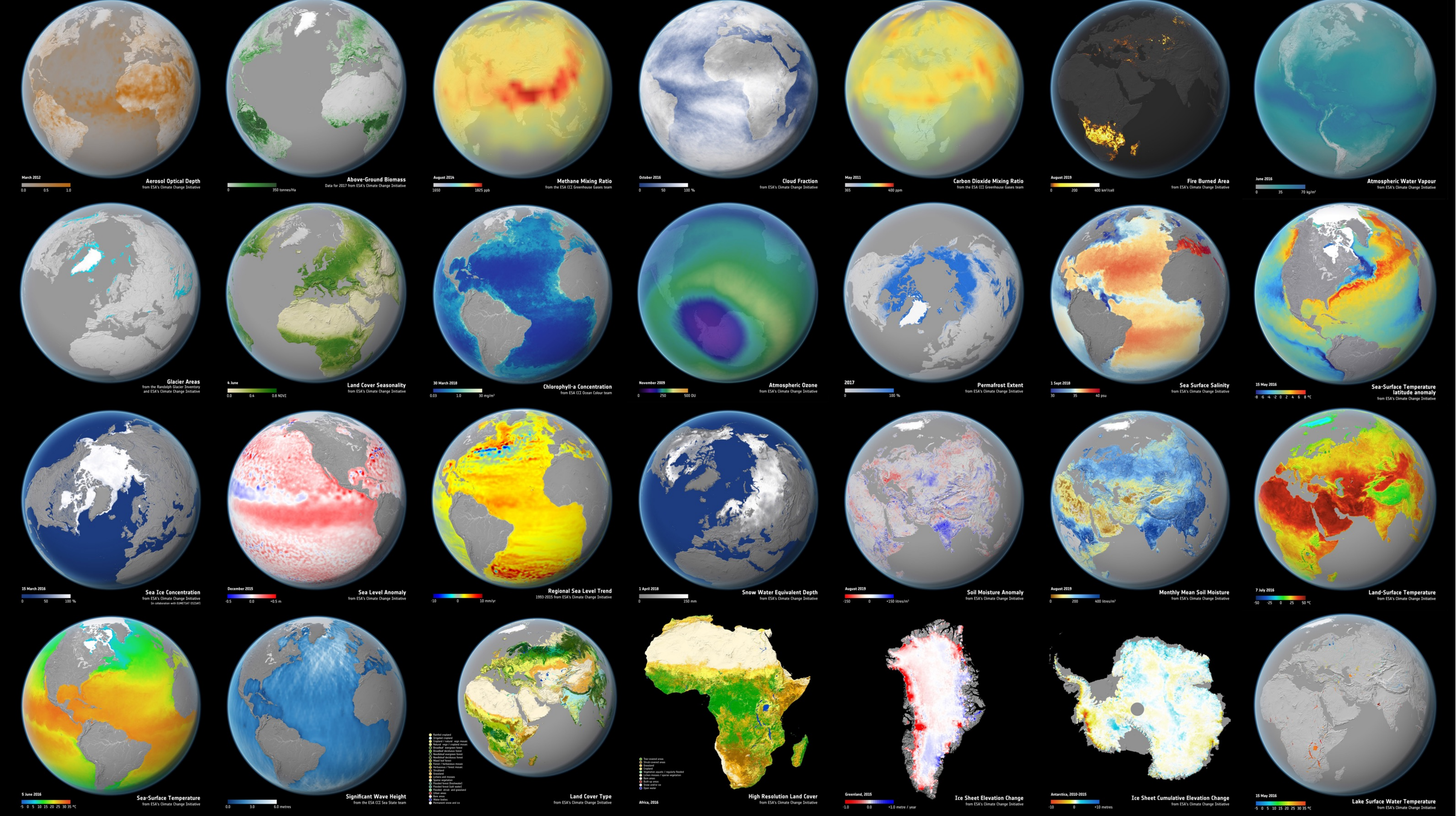
			CCI KE Year 1			Year 2				Year 3			
ECV	*parameter*		2020				2021				2022		
Aerosols	Aerosol AOD				V1.4								
	Aerosol AAI												
Clouds	Cloud Fraction				V3.0								
	other parameters												
GHG	GHG CO2				•								
	GHG CH4				•								
Ozone	Total Ozone			V2.1.1									
	Ozone Profile												
Water Vapour	Total Column WV											V3.1	
Fire	Fire BA					V5.1							
	Fire Annual BA												
Ice Sheets	Ice Sheets SEC												
	Ice Sheets IV											V1.0	
	Ice Sheets GMB				V1.1								
Land Cover	Land Cover Type								V2.1.1				
	Land Cover NDVI				NDVI			OGVI					
	Land Cover Close-Ups												
	Land Cover Surface Reflectance												
	Land Cover HR Africa												
Soil Moisture	Soil Moisture				V4.7								
	Soil Moisture Anomaly				V2.1								
Glaciers	Glacier Areas												
	Glacier Close-Ups												
LST	LST										V2.2.3		V2.2.3
Biomass	AGB						V1.0						
Permafrost	Permafrost Extent				V1.0			V2.0	V3.0				
Lakes	Lake Water Surface Temperature				V1.0							V2.0	V2.0.2
Snow	Snow Water Equivalent				V1.0								
HR Land Cover	Land Cover Type												
Ocean Colour	Ocean Colour				V4.0				V5.0				
Sea Ice	Sea Ice Concentration			V1.11		V2.1							
	Sea Ice Thickness			V1.11		V2.1							
Sea Level	Sea Level Anomaly				V2.0								
	Sea Level Trend												
SST	SST				V2.1								V2.1
	SST Anomaly				V2.1								
	SST Latitude Anomaly											V2.1	V2.1
CMUG	CMUG CO2 Flux												
	CMUG Med SL												
Sea State	Significant Wave Height				V1.1								
Salinity	Sea Surface Salinity			V1.8					V2.31				V3.21

Priorities

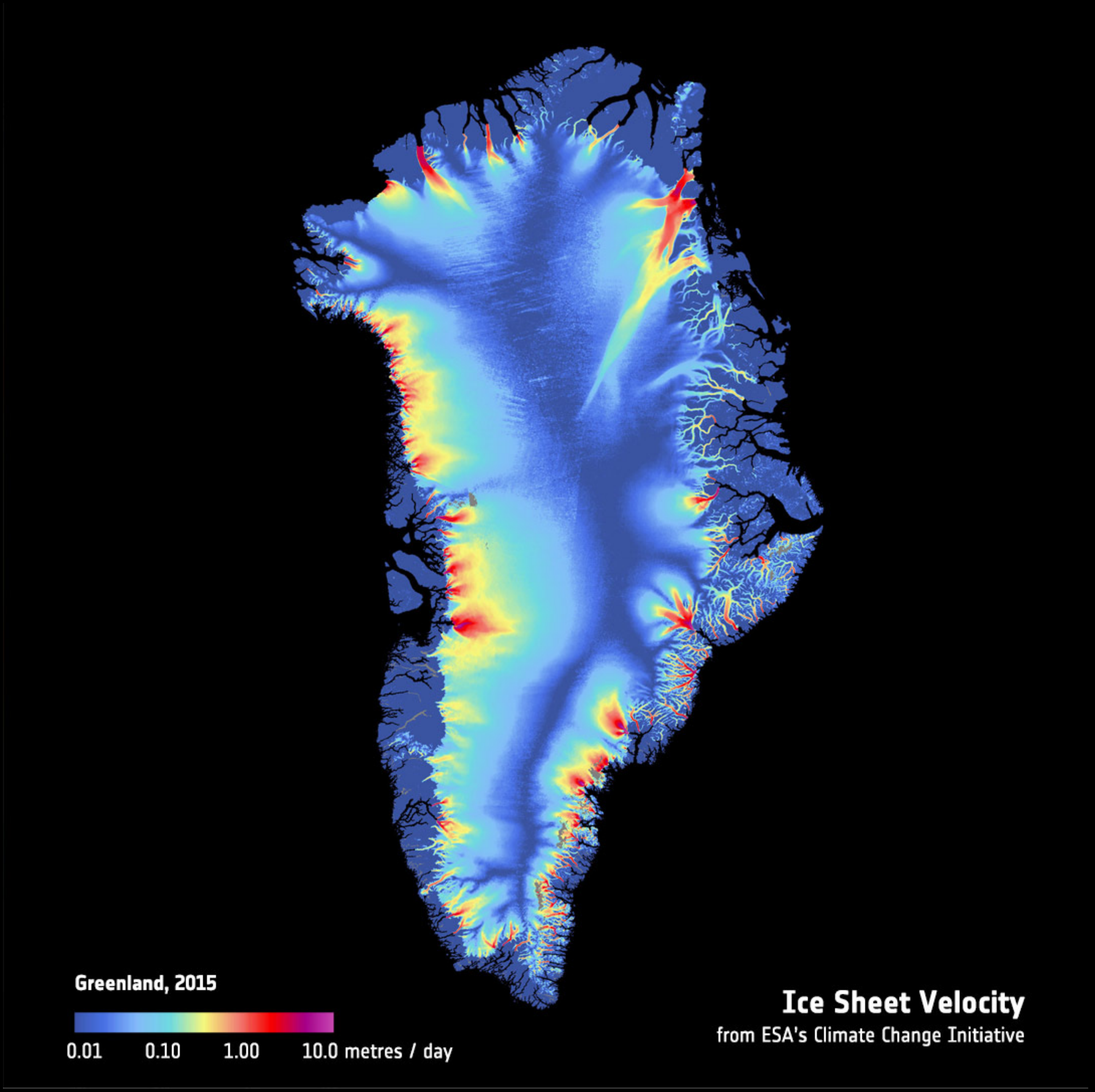
1. Show all ECVs
2. Show significant data updates
3. Show additional parameters or new visualisation styles

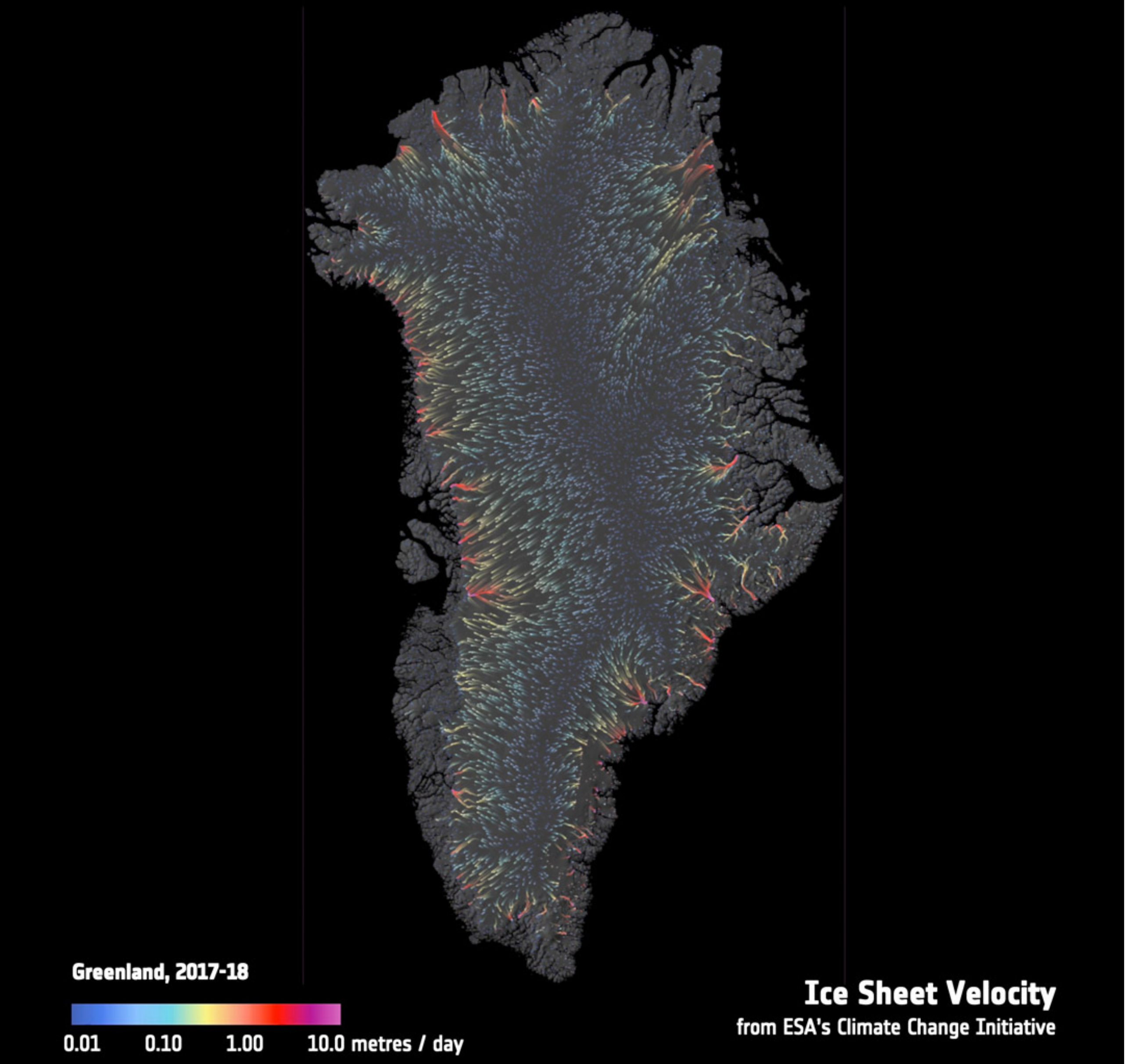
Feedback

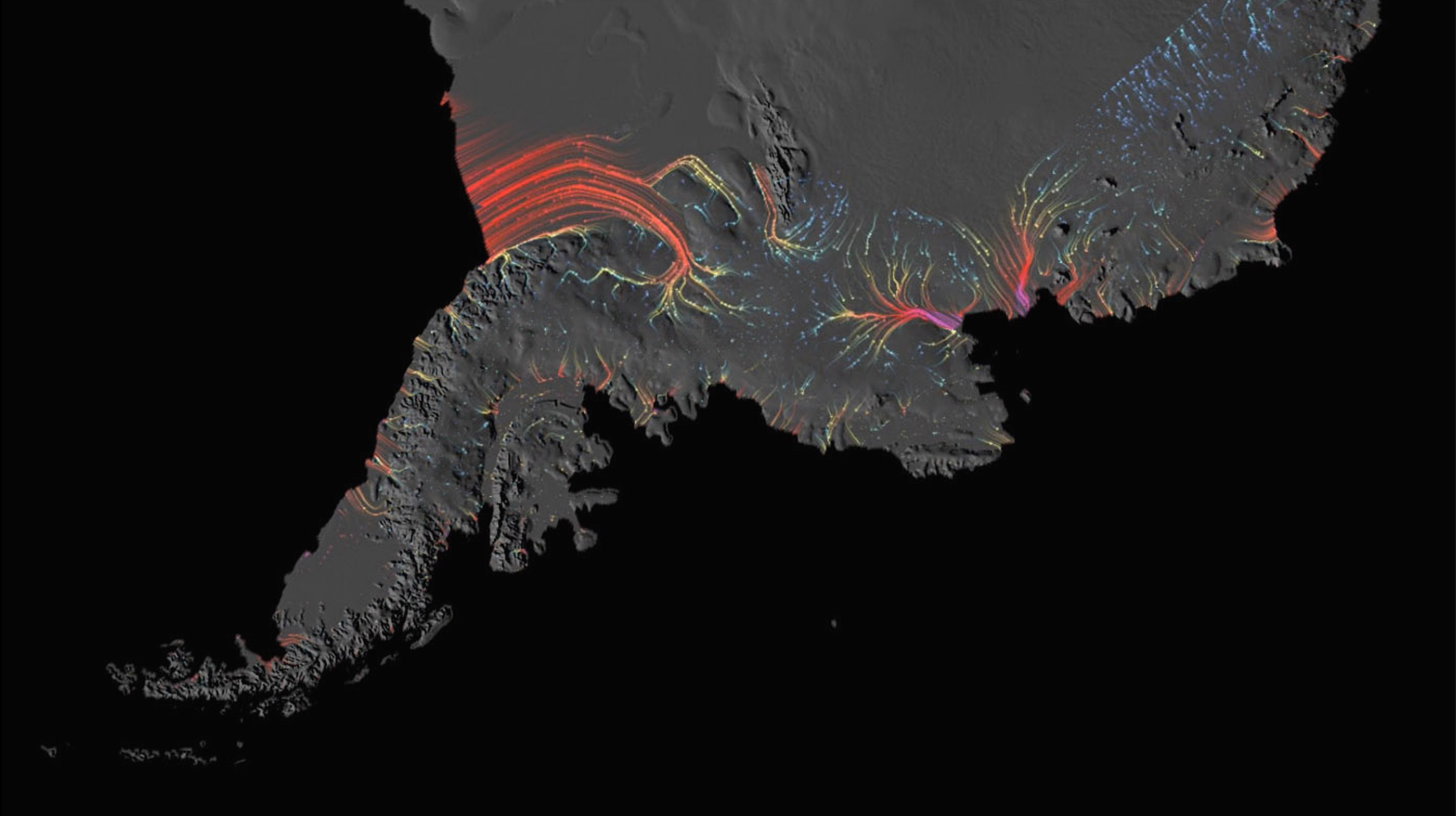
- Colour schemes (fire, ozone, SST,…)
- Ice velocity fields (science teams)
  → new streamline software written
- Global ice loss scale comparison (science teams)
  → cg ice cube composite with ISS photo; animated gif
  → physical ice cube inflatable
- Ice sheet data not available on phi-Exp globe (science teams)
  → combine regional Ice Sheet maps into global map
  → (also synchronise what is shown)
  → (also combine in CfS app?)



March 2012
0.0 0.5 1.0
Aerosol Optical Depth
from ESA's Climate Change Initiative
0 350 tonnes/Ha
Above-Ground Biomass
Data for 2017 from ESA's Climate Change Initiative
August 2014
1650 1825 ppb
Methane Mixing Ratio
from the ESA CCI Greenhouse Gases team
October 2016
0 50 100 %
Cloud Fraction
from ESA's Climate Change Initiative
May 2011
365 400 ppm
Carbon Dioxide Mixing Ratio
from the ESA CCI Greenhouse Gases team
August 2019
0 200 400 km²/cell
Fire Burned Area
from ESA's Climate Change Initiative
June 2016
0 35 70 kg/m²
Atmospheric Water Vapour
from ESA's Climate Change Initiative
Glacier Areas
from the Randolph Glacier Inventory
and ESA's Climate Change Initiative
4 June
0.0 0.4 0.8 NDVI
Land Cover Seasonality
from ESA's Climate Change Initiative
30 March 2018
0.03 1.0 30 mg/m³
Chlorophyll-a Concentration
from ESA CCI Ocean Colour team
November 2009
0 250 500 DU
Atmospheric Ozone
from ESA's Climate Change Initiative
2017
0 100 %
Permafrost Extent
from ESA's Climate Change Initiative
1 Sept 2018
30 35 40 psu
Sea Surface Salinity
from ESA's Climate Change Initiative
15 May 2016
-8 -6 -4 -2 0 2 4 6 8 °C
Sea-Surface Temperature
latitude anomaly
from ESA's Climate Change Initiative
15 March 2016
0 50 100 %
Sea Ice Concentration
from ESA's Climate Change Initiative
(in collaboration with EUMETSAT OSISAF)
December 2015
-0.5 0.0 +0.5 m
Sea Level Anomaly
from ESA's Climate Change Initiative
-10 0 10 mm/yr
Regional Sea Level Trend
1993-2015 from ESA's Climate Change Initiative
1 April 2018
0 150 mm
Snow Water Equivalent Depth
from ESA's Climate Change Initiative
August 2019
-150 0 +150 litres/m³
Soil Moisture Anomaly
from ESA's Climate Change Initiative
August 2019
0 200 400 litres/m³
Monthly Mean Soil Moisture
from ESA's Climate Change Initiative
7 July 2016
-50 -25 0 25 50 °C
Land-Surface Temperature
from ESA's Climate Change Initiative
5 June 2016
-5 0 5 10 15 20 25 30 35 °C
Sea-Surface Temperature
from ESA's Climate Change Initiative
0.0 3.0 6.0 metres
Significant Wave Height
from the ESA CCI Sea State team
Land Cover Type
from ESA's Climate Change Initiative
Africa, 2016
High Resolution Land Cover
from ESA's Climate Change Initiative
Greenland, 2015
-1.0 0.0 +1.0 metre / year
Ice Sheet Elevation Change
from ESA's Climate Change Initiative
Antarctica, 2010-2015
-10 0 +10 metres
Ice Sheet Cumulative Elevation Change
from ESA's Climate Change Initiative
15 May 2016
-5 0 5 10 15 20 25 30 35 °C
Lake Surface Water Temperature
from ESA's Climate Change Initiative


Greenland, 2015
0.01
0.10
1.00
10.0 metres / day
Ice Sheet Velocity
from ESA's Climate Change Initiative


Greenland, 2017-18
0.01
0.10
1.00
10.0 metres / day
Ice Sheet Velocity
from ESA's Climate Change Initiative



40gt Antarctic sea ice
329gt Arctic sea ice
284gt Ice shelves
111gt Antarctic Ice Sheet
166gt Greenland Ice Sheet
266gt Glaciers

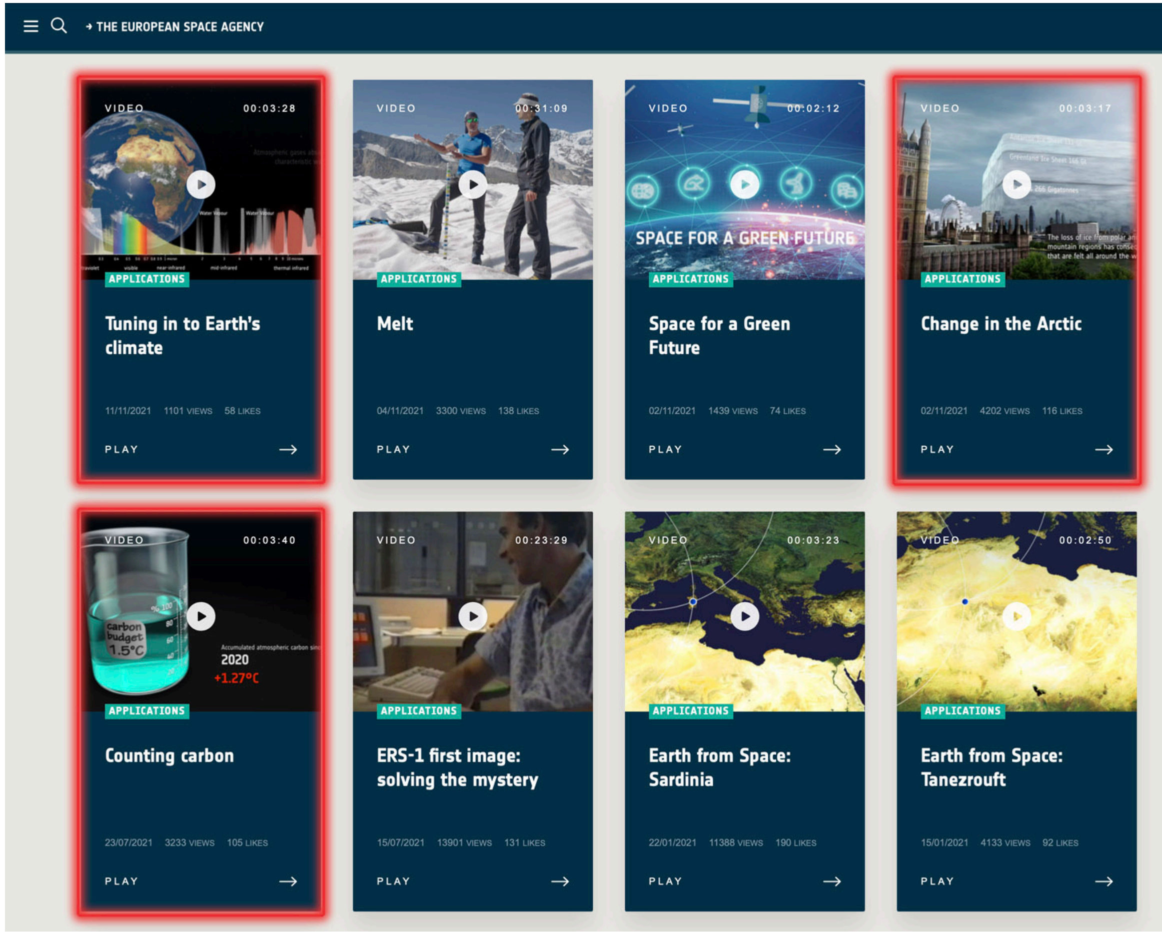
COP26 (Oct 31–Nov 13, 2021)

Climate from Space Animations

PLANETARY VISIONS

Computer graphic animations x5
Two more in Phase 4

- A5. Land Ice Dynamics ?
- A3. Coasts Under Threat ?



Feedback

- 3 min animations good for classroom use
- But some users prefer shorter animations (ESA Comms)
  → modular approach with several short sections
- Social media requirements (ESA Comms)
  → square, portrait formats in addition to widescreen
  → strict 1min time limit for Instagram
- Show things at human scale/local level (science team)
  → New York ice cube, London for COP26, Paris for IAC2022
- Show conceptual graphics (ESA)
  → Carbon budget “bucket“ (lab flask)
- Show results for the cross-cutting projects (ESA, science teams)
  → CMUG Carbon Flux animation
  → RECCAP-2 Counting Carbon update for COP27

Knowledge Exchange Climate Change Initiative

Climate from Space Animations

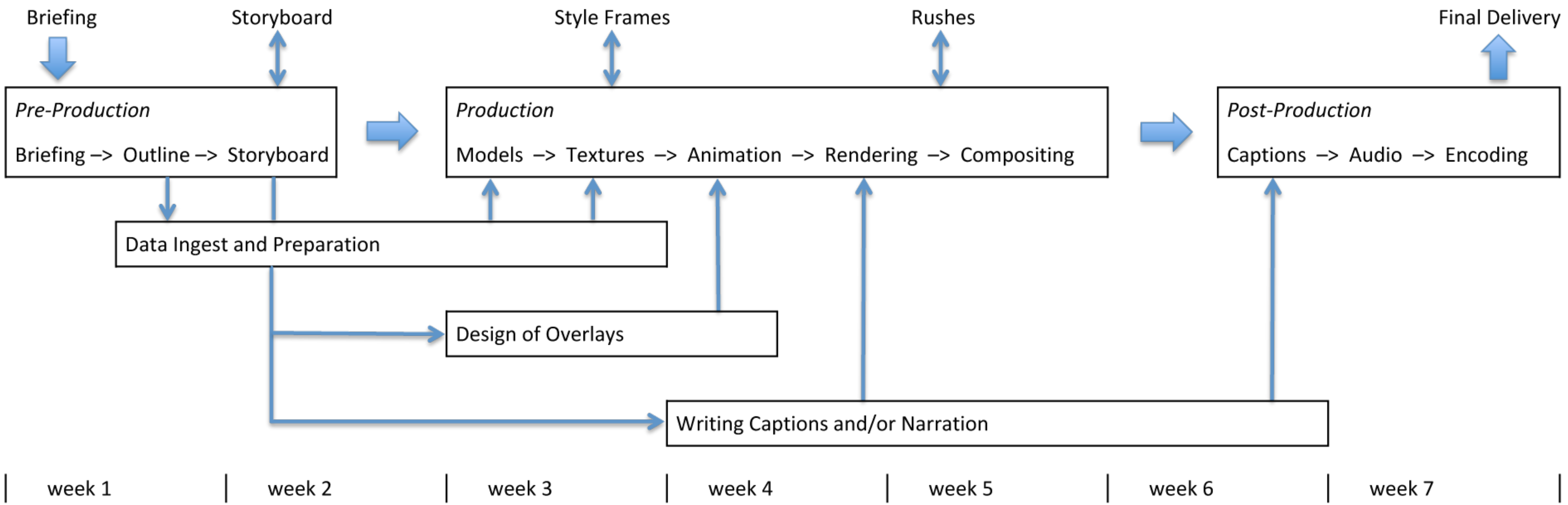
PLANETARY VISIONS

Animation Shortlist

		Glaciers	Land Cover	Soil Moisture	Fire	Ice Sheets	Snow	Permafrost	Land Surface Temperature	Biomass	Lakes	Sea Ice	Sea Surface Temperature	Ocean Colour	Sea Level	Sea Surface Salinity	Sea State	Ozone	Greenhouse Gases	Cloud	Aerosols	Water Vapour	Climate Modelling User Grou	RECCAP2	**Science Teams Total**	**Representative Users**	**Climate Office**	**TOTAL**
A2	Change in the Arctic	1				1						1													3	1	1	5
A4	Water Cycle			1		1							1			1						1			5			5
A7	Ocean Currrents			1									1	1											3	2		5
A9	Counting Carbon												1											1	2	1	2	5
A1	Electromagnetic Spectrum																								0	3	1	4
A5	Land Ice Dynamics	1				2																			3			3
A6	Measuring Vegetation (incl in A9)												1												**1**	**1**	**1**	**3**
A3	Coasts under Threat					1							1												2			2
A8	Greenhouse Effect																		1						**1**	**1**		**2**
A10	Taking the Pulse of the Planet (incl in A1)																								**0**	**1**	**1**	**2**

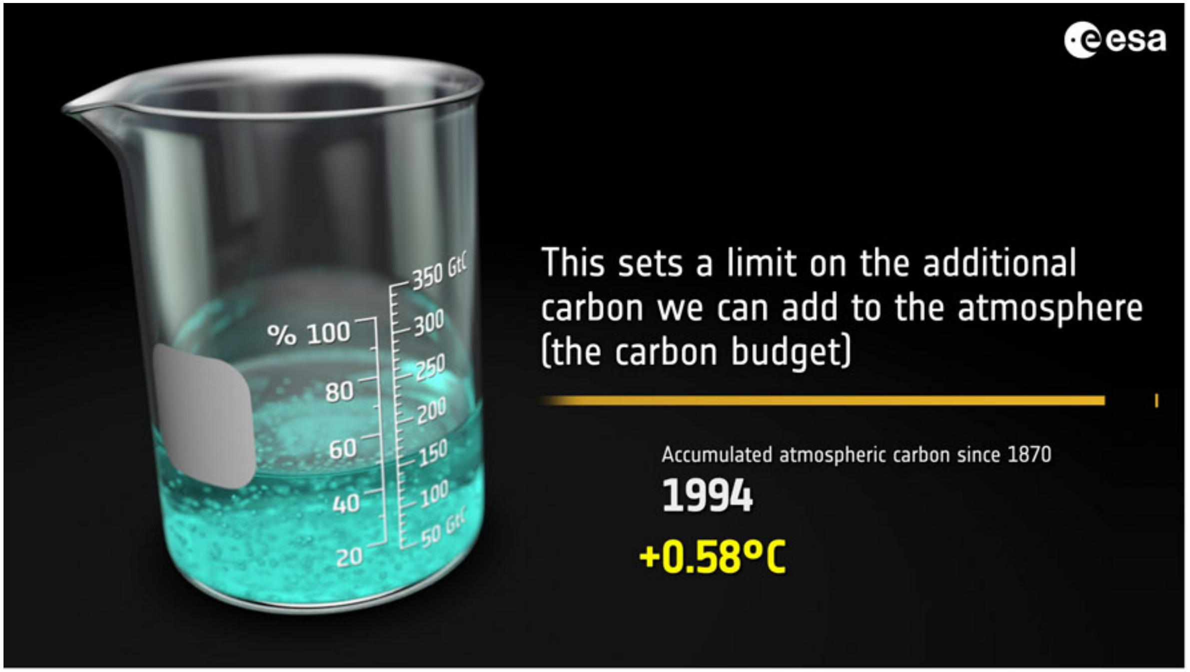
Climate from Space Animations

PLANETARY VISIONS



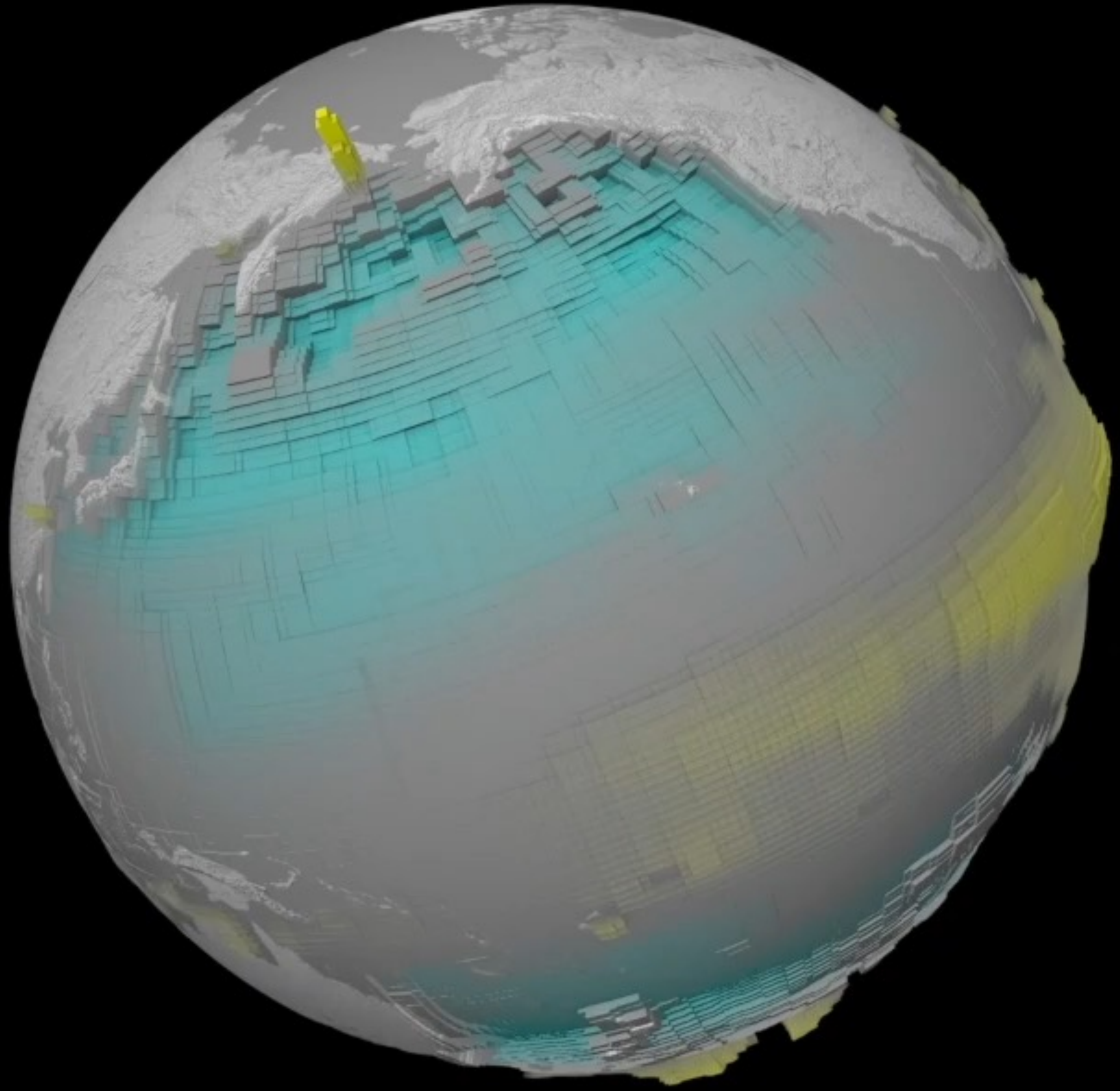
Climate from Space Animations

PLANETARY VISIONS



A9. Counting Carbon social media formats: widescreen, square, portrait

- Larger font, ESA social media branding
- Adjusted layout
- Caption edits for stand-alone clips
- 1 min time limit for Instagram
- Published by ESA 23 July, 4 Aug (2 clips in square+portrait, 4 in widescreen)



This will improve the precision of each greenhouse gas budget and help separate natural fluxes from agricultural and fossil fuel emissions

Apr 1982

Ocean Surface Carbon Flux

-40 GtC/m²/yr +40

Thank you. Any questions?

Impact

Paul Fisher (ESA Climate Office)

CCI Colocation 2022

ESA CLIMATE CHANGE INITIATIVE: AR6 CONTRIBUTION

AR6 WG1 report:
7 lead/coordinating authors

14 contributing authors

~10 expert reviewers

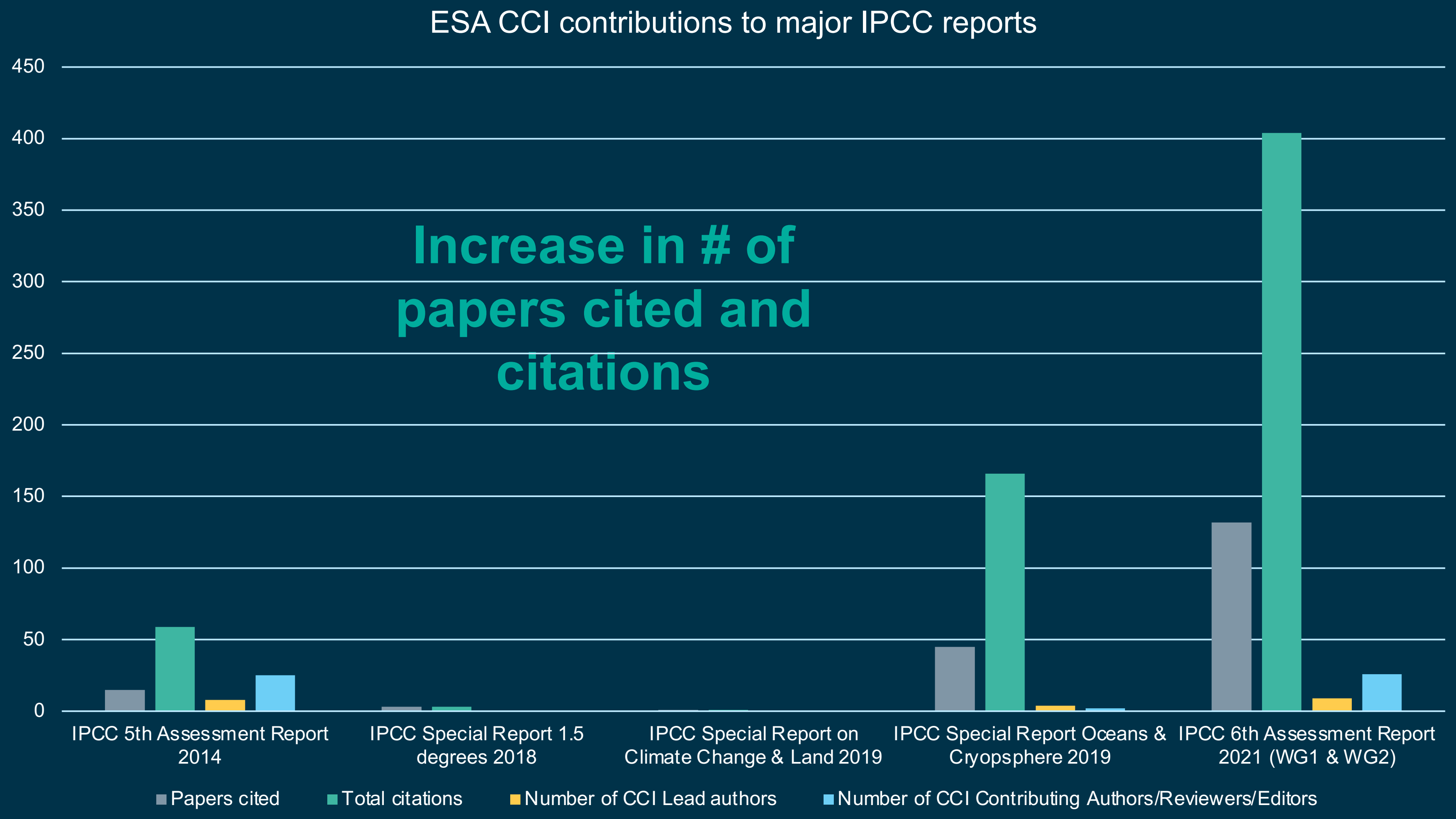
~100 papers cited

+340 in-text citations

AR6 WG2 report:
1 contributing author

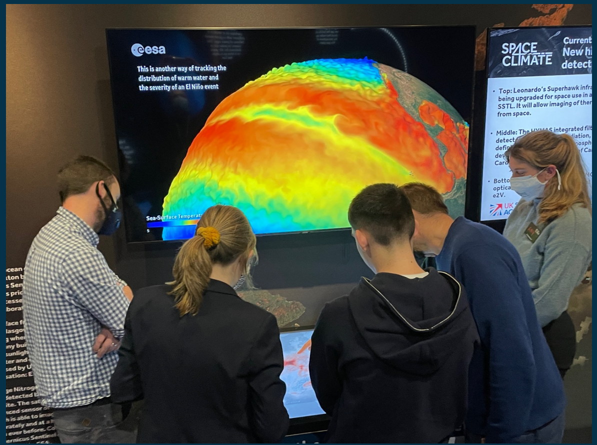
~30 papers cited

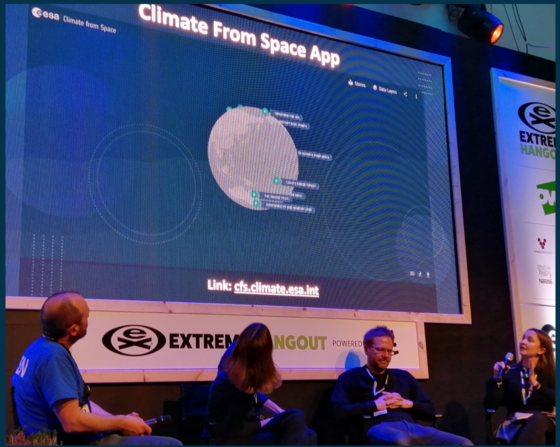
~70 in-text citations



IMPACT

COP26

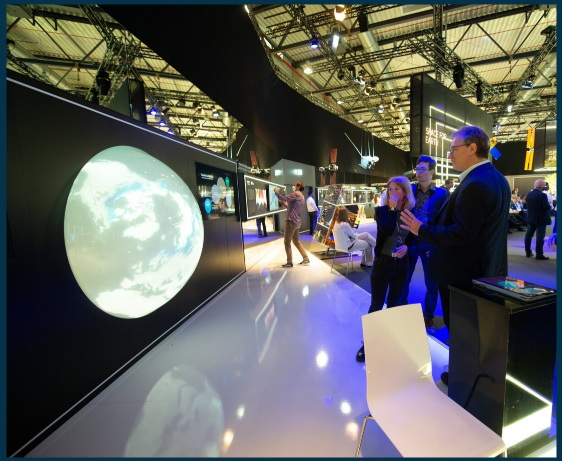




IAC'22

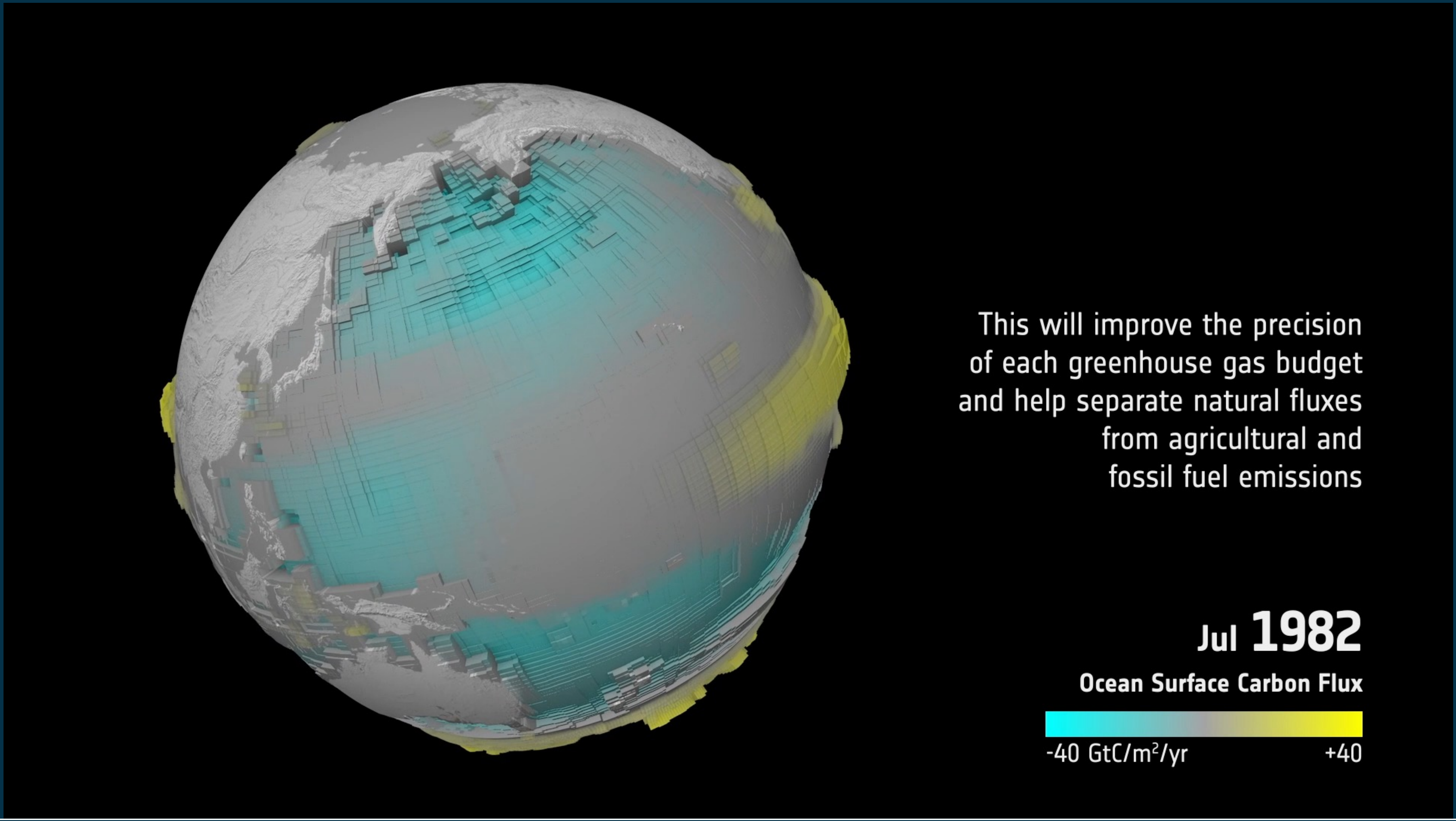
LPS'22

Forum
Météo et climat

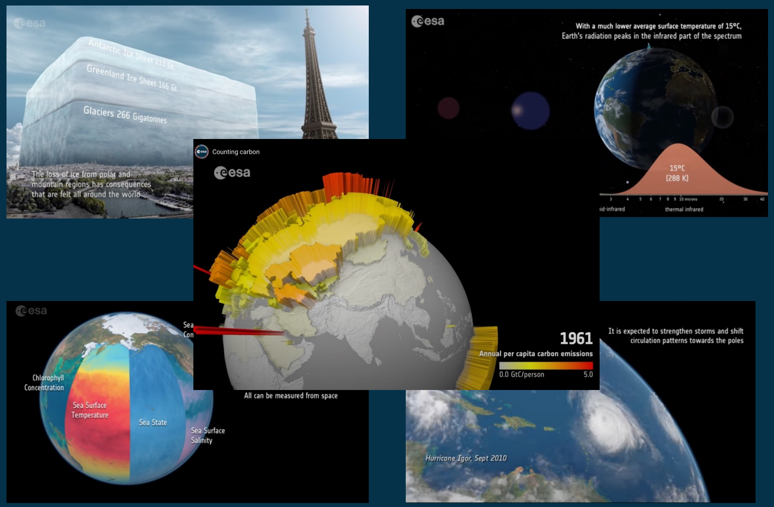


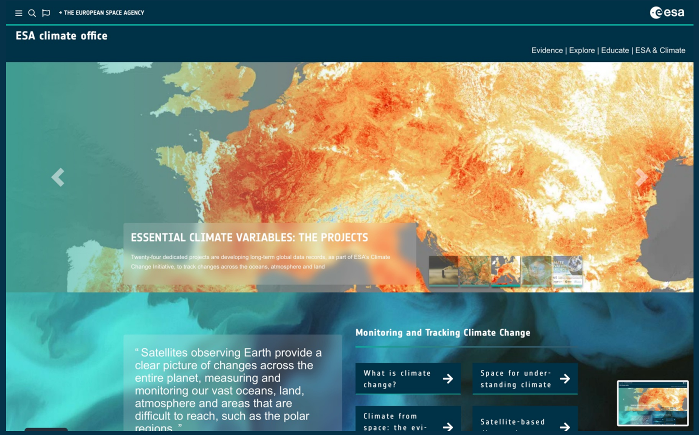
ILA
Berlin Airshow

COP27 – GLOBAL STOCKTAKE CREATIVE SPACE



ANIMATIONS, CLIMATE FROM SPACE & CLIMATE.ESA.INT





60,000 visits
2,000 likes
excl. social media!

7,300 visitors
76,800 page views

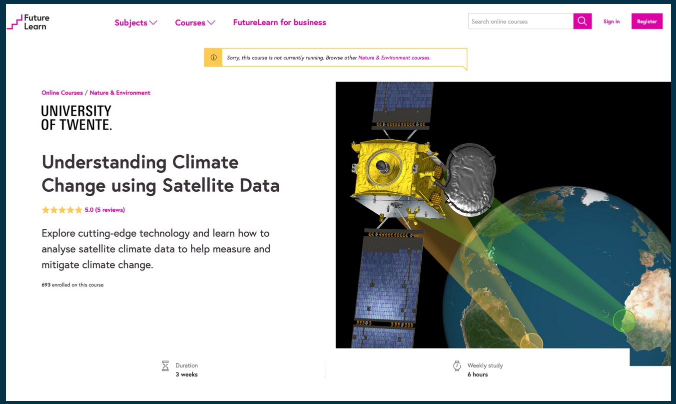
11min 22s average visit

12,000 visitors
35,000 page views

152 referrers

EDUCATION

- 1,500 teachers used education packs
- Mainly via UK ESERO
- Translated versions shared to FR DE NL & ES ESEROs
- ESA climate detectives



- MOOC: Understanding Climate Change using Satellite data
- ca. 700 registrations

Thank you

climate.esa.int | @esaclimate

Study Of ECV Processing Complementarity

Carsten Brockmann (Brockmann Consult)

CCI Colocation 2022

Rationale

ECV teams develop their production chains individually

Duplication of steps (data ingestion, formatting, …)

Multiple solutions for the same issue (preprocessing, production management, …)

Optimal solutions at single ECV level but not at programme level

Sharing knowledge and code is of limited attraction

Safeguarding IPR

Competitive contracts

Transfer from CCI to C3S is envisaged but not supported by current set-up

IP and legal issues

Technical issues

Study Objectives

Three obstacles:

Risk on shared delivery across CCI ECV project contract boundaries

Risk on inadvertently disclosing intellectual property

Risk on potential loss of future business opportunity to other parties.

Objectives

The Agency wishes to understand the feasibility of sharing the building, the hosting, the evolution and the maintenance of ECV processing chains across such boundaries, including unburdening ECV data producers on the above three obstacles.

11 Concerns to be addressed

Science feasibility and usefulness

Safeguarding intellectual property

Unlocking further science and cultivating future cross- CCI-ECV opportunities

Reducing the gap between Science & Operations between ESA and ECMWF

Understanding and mitigation of risk to UK involvement downstream in Copernicus

Cost effectiveness of public funding

Approach

1. A complementary team

Team member	Perspective	Science	Engineering	IPR
Christoph Reimer, StefanReimond, Richard Kidd, EODC, Soil moisture CCI	ECV data producer (private), microwave; algorithm development; user of platform	X	X	
Lucrecia Pettinari, Emilio Chuvieco, Univ. Alcala, Fire CCI	ECV data producer (public), optical & thermal, team leader	X		X
Céline Lamarche, Pierre Defourny, Univ. Louvain, Land Cover CCI	ECV data producer (public), optical, team leader	X		X
Carsten Brockmann, BC	ECV data producer (private), CCI and C3S overview	X		X
Tom Block, BC	Development and operation of processing chains, user of platforms		X	
Phil Kershaw, CEDA	Provision of platform services		X	

2. A Desktop study addressing all 11 concerns through a series of sprints

3. A proof of concept

4. A synthesis to update the Desktop study with the findings of the proof of concept

Desktop Study – Sprint Planning

Sprint A – October / November / December 2022

1 - Science feasibility and usefulness of sharing parts of different CCI ECV processing chains

2 - Science feasibility and usefulness of deploying those shared CCI ECV parts onto a common platform

3 - Unlocking further science from existing CCI ECV processing chains

4 - Further reducing the gap between Science & Operations between ESA and ECMWF in benefit to both agencies

Sprint B – January / February 2023

5 - Cultivating future cross- CCI-ECV opportunities, potentially beneficial to both ESA and ECMWF

6 - Cultivating future cross-ECV opportunities in light of the upcoming GCOS groupings of ECVs, therefore of potential mutual benefit to ESA and ECMWF

Sprint C – March 2023

7 - Safeguarding intellectual property of CCI ECV data producers

Sprint D – April / May 2023

8 - Further sustainability of ESA investment beyond the CCI programme in benefiting C3S

9 - Potentially de-risking ECMWF work downstream and providing potential cost-effectiveness to ECMWF downstream, therefore benefiting ESA since sustainability of ESA investment beyond the CCI programme is a key driver of the CCI programme

10 - Cost effectiveness of public funding from ESA member states

Sprint E – special working group

11 - A note on the understanding and mitigation of risk to UK involvement downstream in Copernicus, drawn verbatim from a survey of UK partners in the CCI community of ECV data producers. ESA shall define the survey questions. The Knowledge Exchange Coordinator will deploy a survey to UK partners through the CCI Science Leads group.

Proof of Concept - Generalisation of Processing Chain

1. Access to single or multiple satellite input data.
2. Access to auxiliary data; very often meteorological data from ECMWF are needed; other data can be DEM or engineering quantities for correct for instrument effects.
3. Instrument data pre-processing, such as corrections to the instrument issues or harmonisation of multi-instrument data.
4. Removal of atmospheric effects and other environmental pre-processing.
5. Thematic processing of single instruments data.
6. Thematic processing of multiple instrument data:
   there may be steps which are executed “offline”, e.g., collecting training data and updating algorithms, re-calibration of algorithms, etc.
7. Correction / harmonisation of time series or multiple input data; sensor bias correction, etc.
8. Projection to output grid.
9. Formatting

Proof of Concept (Jan – Jun 2023, M41 – M46)

- Develop concepts for a generalised architecture for ECV productions chains
  - Investigate 3 key chains and split into separately configurable and executable modules; perform brief check of applicability to other ECV chains
  - Investigate possible processing-schemes, i.e., pull- or push-processing
  - Investigate the design consequences with respect to triggering methods and the requirements on the platform services to implement these
  - Investigate is the handling of the module parametrisation and the definition of a serializable chain configuration

- Study options for implementing this architecture
  - Study the different virtualisation/containerisation concepts
  - Investigate on how the ECV production chains for Landcover, Soil Moisture and Fire allow a separation of the processing into individual steps

- Implement prototypes of critical elements of this architecture on a selected target platform
  - Common data access
  - Shared pre-processing
  - Common data formatting and output quality control

- Define and execute a series of tests to test and demonstrate the prototypes

Thank you for your attention

An ESA-ECMWF-EUMETSAT Collaboration On Data Visualisation

Patrick Mast (Ubilabs), Daniel Lee (EUMETSAT) & Chris Stewart (ECMWF)

CCI Colocation 2022

Journey of a Pixel

LPS22 | 26 May 2022

We take you on the journey of a climate pixel.

From satellite. To research. To operations. To user.

Via an agora, a masterclass, 1-to-1s and a game.

Brought to you by ESA, ECMWF & EUMETSAT

Get digital flyer.

contact: Ed Pechorro | ed.pechorro@esa.int

Facebook Twitter More

Home

Agora

Masterclass

1-to-1s

Game

esa EUMETSAT ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS Climate Change Service climate.copernicus.eu

Agora

Europa Stage | 14:05 to 15:05

We take you on the journey of a climate pixel. From satellite. To research. To operations. To user.

Join ESA Director of Earth Observation (Simonetta Cheli), EUMETSAT Chief Scientist (Paolo Ruti), ECMWF Director of the Copernicus Climate Change Service (Carlo Buontempo), & Head of ESA Climate Office (Susanne Mecklenburg), as we travel from space to user. From the Sentinels passing over south west Spain, to the streets of Valencia.

Home

Agora

Masterclass

1-to-1s

Game

Masterclass

Room H-01-03 | 15:30 to 16:30

Leading ESA, EUMETSAT & ECMWF climate data engineers share their wisdom through a Jupyter tour of a climate pixel.

We will explore the changing lands of Valencia, south western Spain, to understand the past, observe the present, and model the future. Along the way we will use the EUMETSAT Data Store, the ESA climate data portal and toolbox of the ESA Climate Change Initiative, and ECMWF data and tools from the Copernicus Climate Change Service.

See https://github.com/CCI-Tools/lps2022 and https://github.com/CCI-Tools/lps2022/blob/main/README.md .

2

Catching the Pixel - Showcasing EUMETSAT APIs

8.16 MB

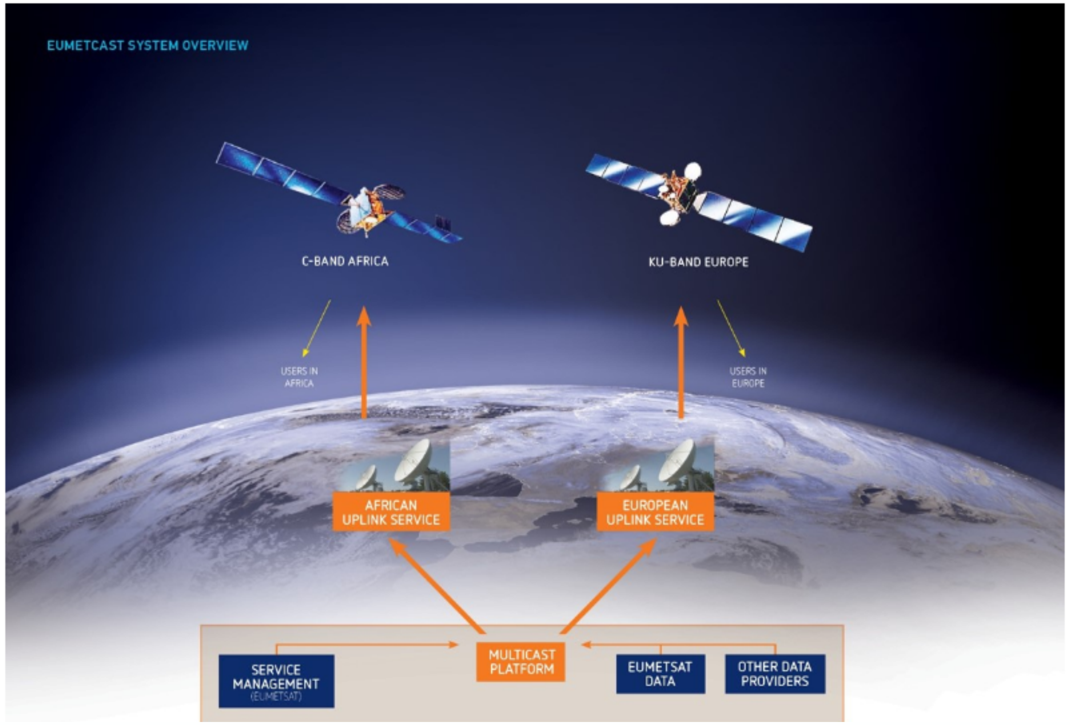
Download

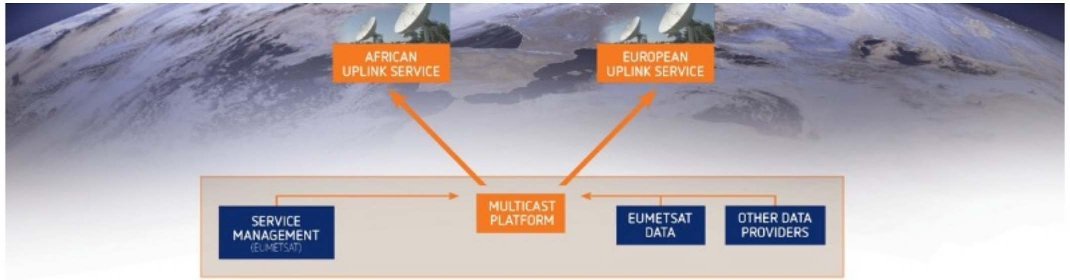
ESA LPS 2022 Masterclass - Journey of a Pixel

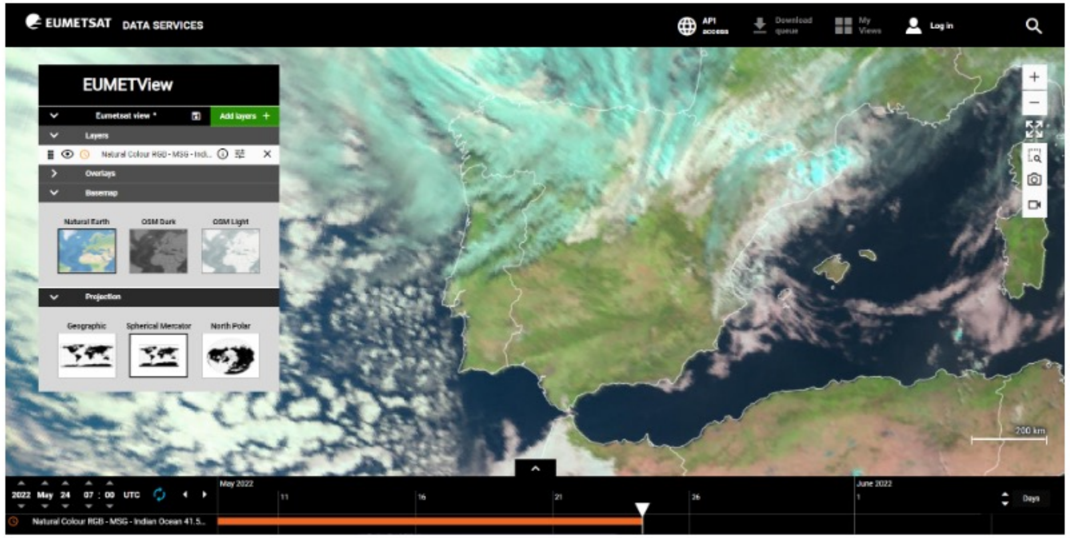
This Notebook has three main parts:

1. Catching the Pixel - Showcasing EUMETSAT APIs
2. Science on the Pixel - The ESA Climate Change Initiative (CCI)
3. Contextualising the Pixel - The Copernicus Climate Change Service (C3S)

Catching the Pixel - Showcasing EUMETSAT APIs







Science on the Pixel - the ESA Climate Change Initiative (CCI)

The pixel arrives in CCI's Open Data Portal (ODP)

Science on the Pixel - the ESA Climate Change Initiative (CCI)

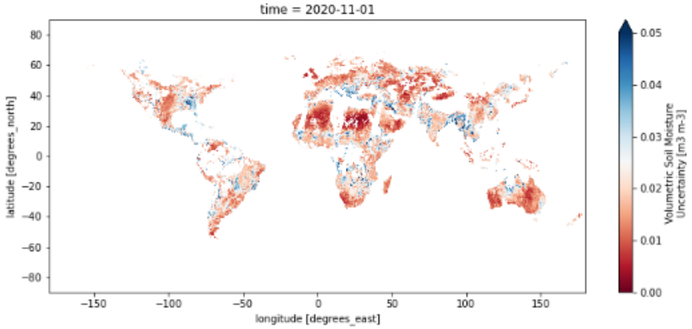
Science on the Pixel - the ESA Climate Change Initiative (CCI)

The pixel arrives in CCI's Open Data Portal (ODP)

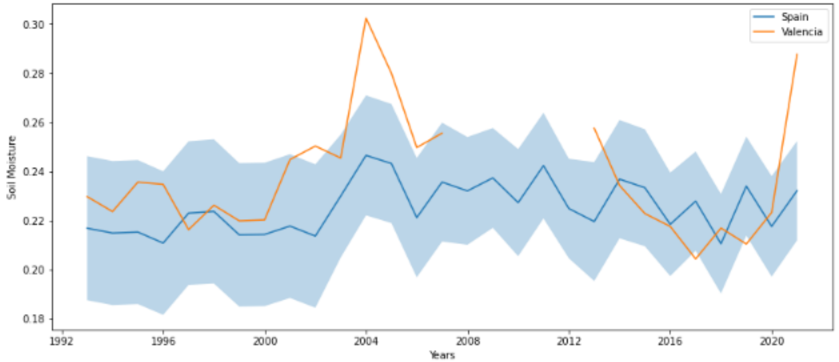
In [1]:
```
import json
import os.path
import numpy as np
import xarray as xr
import pandas as pd
import geopandas as gpd
import matplotlib.pyplot as plt
```

In [8]:
```
sm_dataset.sel(time="2020-11-01").sm_uncertainty.plot.imshow(cmap='RdBu',  vmin = 0, vmax =0.05, figsize=(12, 5))
```

Out[8]: <matplotlib.image.AxesImage at 0x7fd7967a0640>

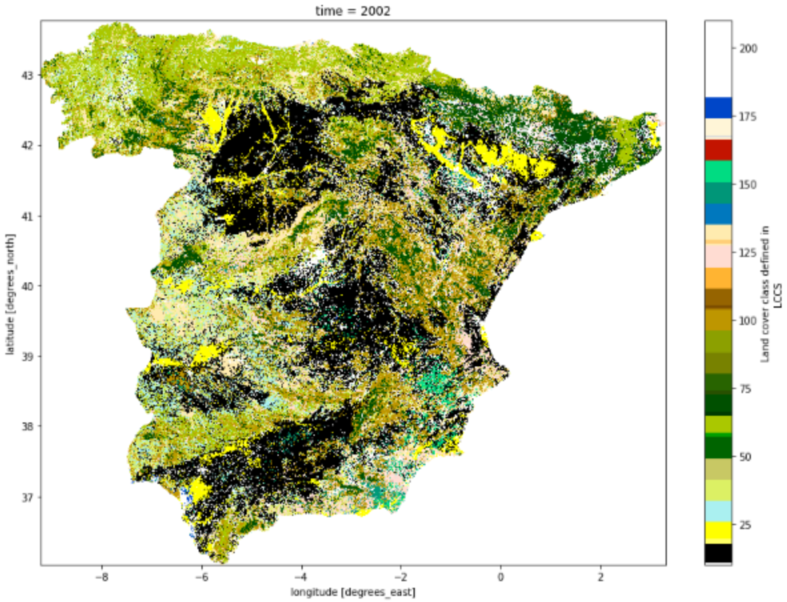


Out[17]: <matplotlib.legend.Legend at 0x7fd7942b1a90>



In [19]:
```
lc_dataset_subset = mask_dataset_by_geometry(lc_dataset, desired_geometry, all_touched=True)
lc_dataset_subset.sel(time=2002).lccs_class.plot.imshow(cmap='land_cover_cci', figsize=(14, 10))
```

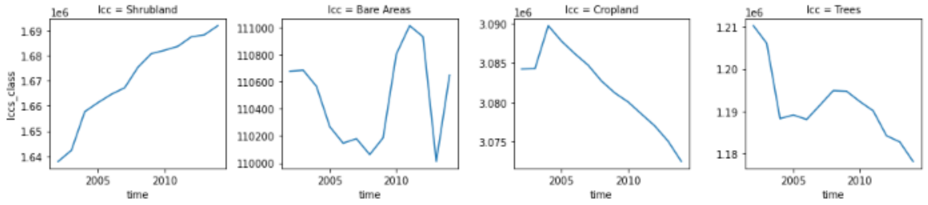
Out[19]: <matplotlib.image.AxesImage at 0x7fd7947aee20>



In [26]:
```
lc_timeseries = [get_lc_counts_timeseries(lc_mask) for lc_mask in lc_masks]
lc_ts = xr.concat(lc_timeseries, "lcc")
lc_ts = lc_ts.assign_coords(lcc=xr.DataArray(lc_mask_names, dims="lcc"))
```

In [27]:
```
lc_ts[:,10:23].plot.line(x="time", col='lcc', col_wrap=4, sharey=False)
```

Out[27]: <xarray.plot.facetgrid.FacetGrid at 0x7fd722f77f10>



ACTIVITY:
(1) Plot the time series of annual SM for those pixels which are cropland in 2015 (i.e. those pixels which were cropland all the time).
(2) Plot the time series of annual SM for those pixels which were cropland in 2002, but not in 2015.

Contextualising the Pixel - The Copernicus Climate Change Service (C3S)

PROGRAMME OF THE EUROPEAN UNION

IMPLEMENTED BY

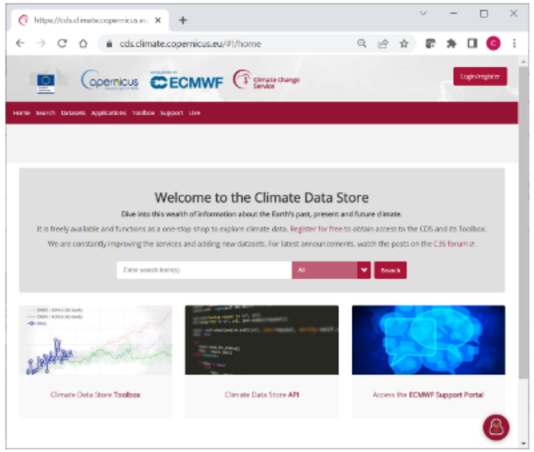
Contextualising the Pixel - The Copernicus Climate Change Service (C3S)

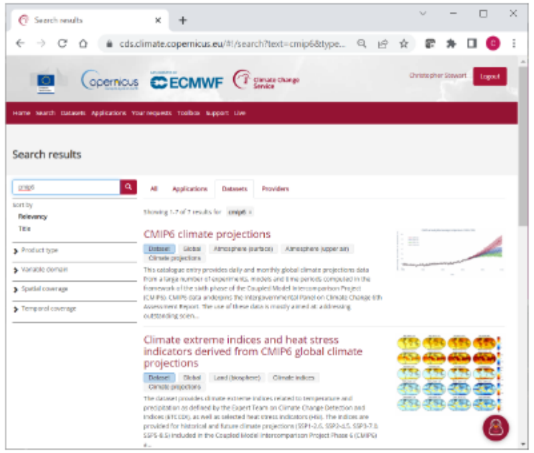
Having been captured by the satellite, validated and turned into a Climate Data Record (CDR), the pixel arrives at the European Centre for Medium-Range Weather Forecasts (ECMWF) to be further guided on its journey by the Copernicus Climate Change Service (C3S). C3S will escort the pixel through its process of integration and assimilation into operational and quality assured products to help it discover its overall climate context. It will ensure the pixel reaches maturity and wisdom before "passing the baton" to other entities who will further shape its development and specialisation. Or it may already accompany it to the doorsteps of the most influential decision makers. C3S helps the pixel achieve its full potential in making the greatest societal impact.

The pixel arrives at the Climate Data Store (CDS)

Let us look in more detail at this particular stage of the pixel's journey. We begin at the Climate Data Store (CDS) of C3S. The pixel becomes one of petabytes of quality assured and well documented global and regional datasets of a great number of Essential Climate Variables (ECVs). It may reside as a CDR derived from satellite or in-situ observations, or in gridded "maps without gaps" of observations assimilated into state of the art models ("reanalyses"), and used to provide invaluable climatologies from past decades. It may be a prediction of above/below average conditions for the next months as a seasonal forecast, or projected into future decades with its behaviour hypothesised under different globally defined scenarious (SSP). Whichever the product, the pixel will freely and openly lend its services to whomever wishes to access it. This leads us to our first task...

ACTIVITY:
Explore the wealth of quality assured climate data freely available on the Climate Data Store (CDS)! Search using keywords or through the filters on the left panel. Discover the types of data available, including variables over land, sea, atmosphere. Find out their temporal and spatial resolution, units, and any other information available. Can you comment on the variety of data that exists over our pixel?





The pixel is projected in time, according to different scenarios

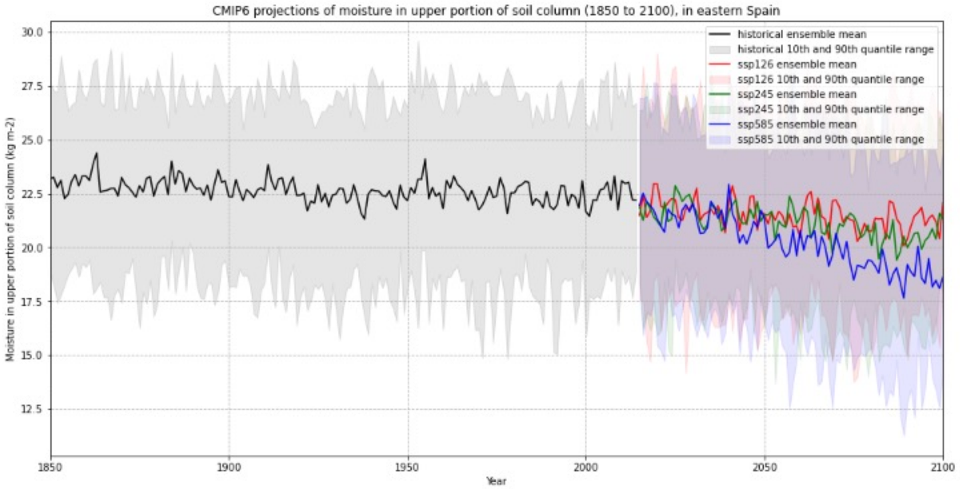
Create plot

```
In [33]:
fig, ax = plt.subplots(1, 1, figsize = (16, 8))

colours = ['black','red','green','blue']
for i in np.arange(len(experiments)):
    ax.plot(data_50.year, data_50[i,:], color=f'{colours[i]}',
            label=f'{data_50.experiment[i].values} ensemble mean')
    ax.fill_between(data_50.year, data_90[i,:], data_10[i,:], alpha=0.1, color=f'{colours[i]}',
            label=f'{data_50.experiment[i].values} 10th and 90th quantile range')

ax.set_xlim(1850,2100)
ax.set_title('CMIP6 projections of moisture in upper portion of soil column (1850 to 2100), in eastern Spain')
ax.set_ylabel('Moisture in upper portion of soil column (kg m-2)')
ax.set_xlabel('Year')
handles, labels = ax.get_legend_handles_labels()
ax.legend(handles, labels)
ax.grid(linestyle='--')

fig.savefig(f'./CMIP6_soil_moisture.png')
```



Notice how the models suggest, for the period 1850 to present, a very gradual decrease in the moisture in the upper portion of the soil column in the location of our pixel. In future decades on the other hand, even the most "optimistic" scenarios suggest an increasing decline, while the most "pessimistic" (SSP585) outlines a progressively sharper decline over time.

Further evolutions of the pixel

The analysis of the pixel we have carried out so far has benefitted from significant global modelling and collaboration activities to provide data in support to climate change related decision making. We have seen how this data can be turned into information in the form of graphical charts. C3S goes even further to provide ready to use information products which can be even more easily generated with the help of online applications, requiring no programming. These are available on the CDS.

ACTIVITY:
Explore the applications available on the CDS. In particular, experiment with the Satellite Soil Moisture application. In the 1992 to 2019 climatology for our pixel, in which month is the satellite derived soil moisture at its lowest level?

3

1-to-1s

Climate Hub @ ESA Stand
16:30 to 17:00

We'll bring the climate data engineers. You bring the questions.

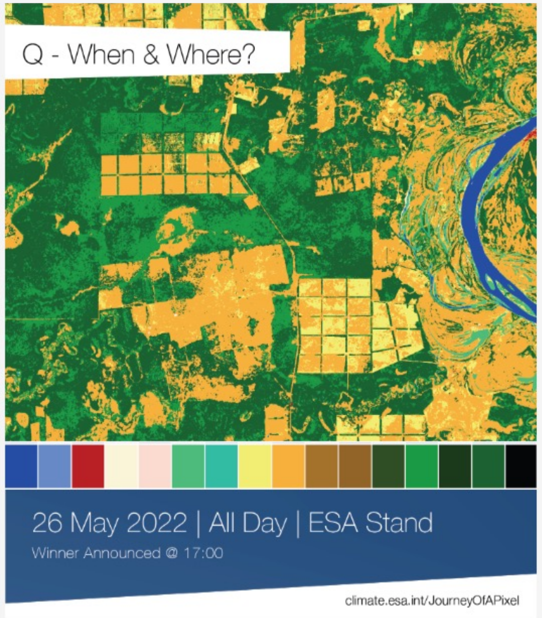
Join us to talk about the Journey of a Pixel, the ESA + ECMWF + EUMETSAT data and tools we use, how we work together, and the Masterclass python script. Feel free to bring your laptop.

Plus - there will be further clues to the Game.

Game

All Day | ESA Stand

You've been on the journey. Now play the game -



Home

Agora

Masterclass

1-to-1s

Game

esa EUMETSAT ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS Climate Change Service climate.copernicus.eu

Great collaboration between the “3 E’s”

Impact > sum of its parts

Journey of a pixel website:

https://climate.esa.int/en/JourneyOfAPixel/

Masterclass Jupyter notebook:

https://github.com/CCI-Tools/lps2022/blob/main/JourneyOfAPixel.ipynb

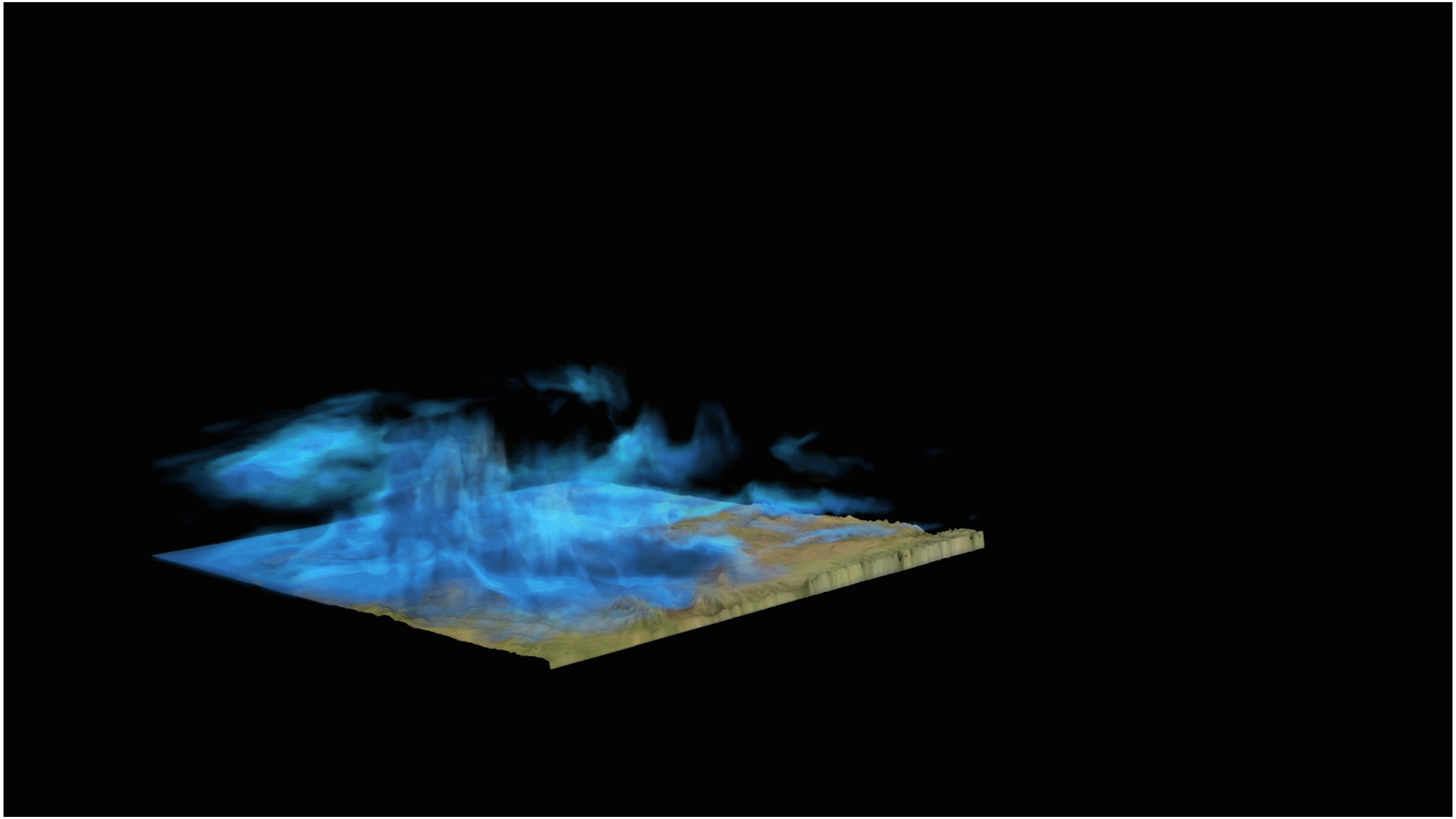
EUMETSAT

Why do we need data visualisation?

Daniel Lee
Data Access Systems Operations Manager

CCI colocation
26 October 2022

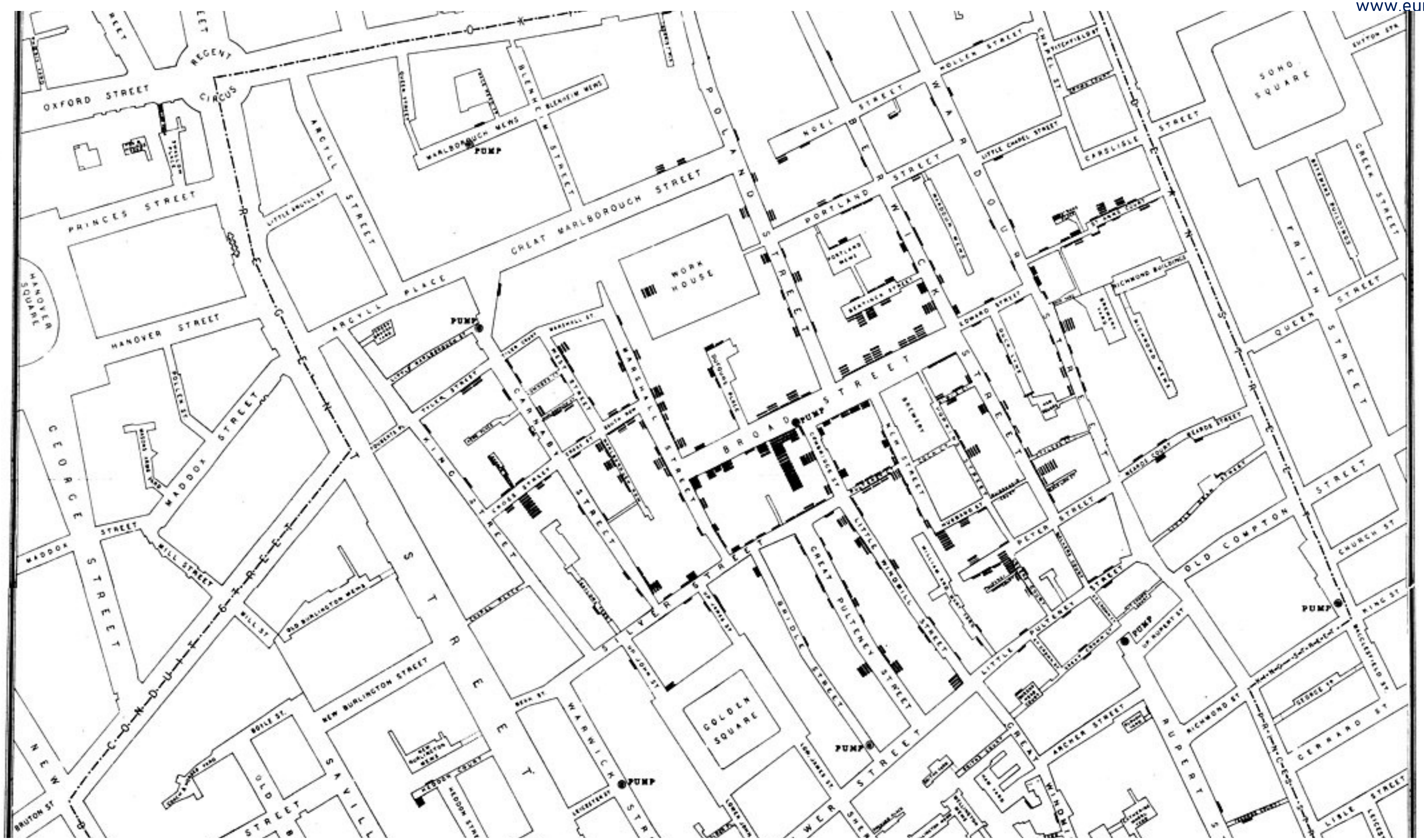
More data than ever: The 4D weather cube with MTG



When data changes the world

www.eumetsat.int

www.eumetsat.int



Accelerating time to results

PyTROLL

tableau

Datawrapper

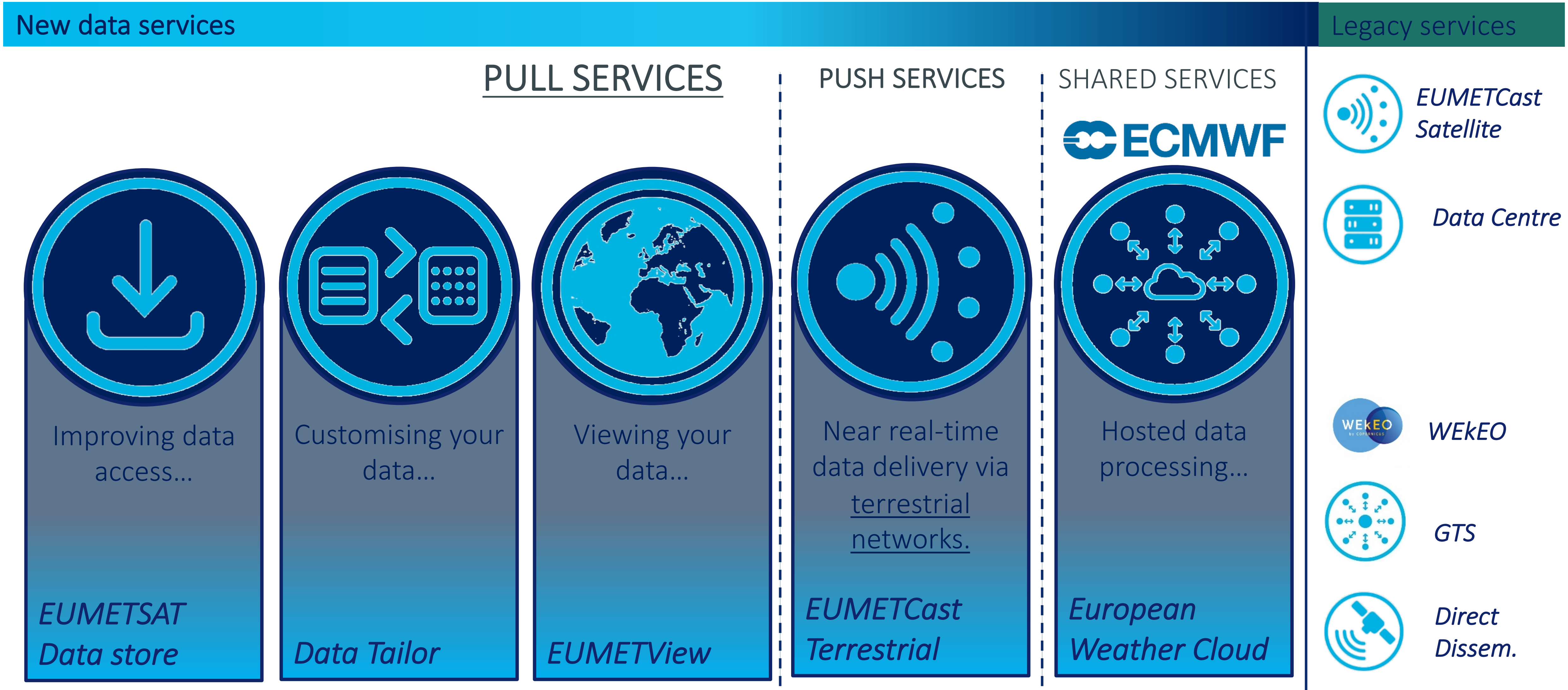
D3

matplotlib

cartopy

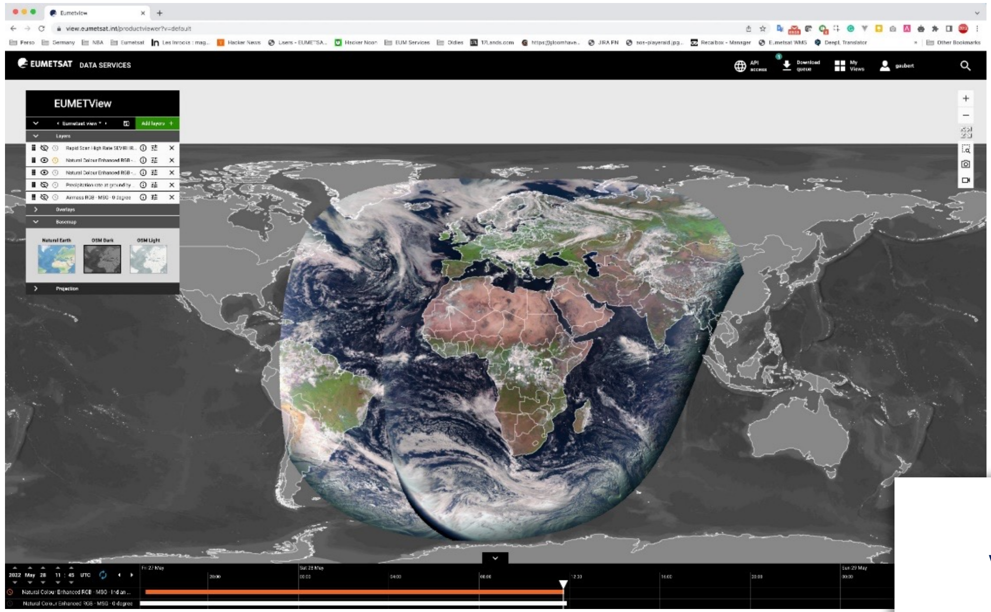
Observable

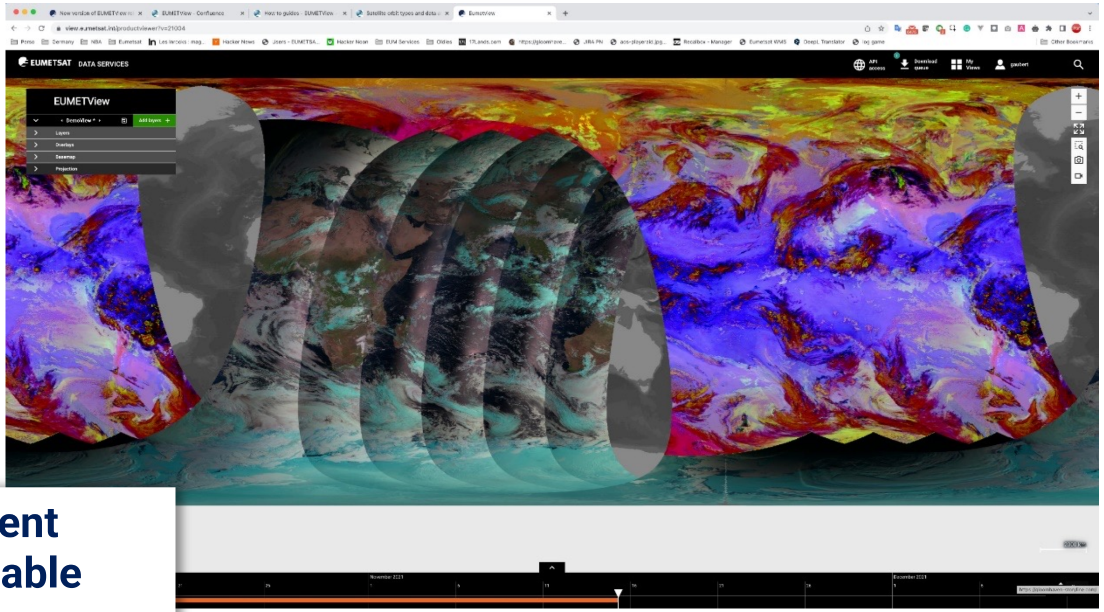
EUMETSAT data services ecosystem



EUMETView capabilities

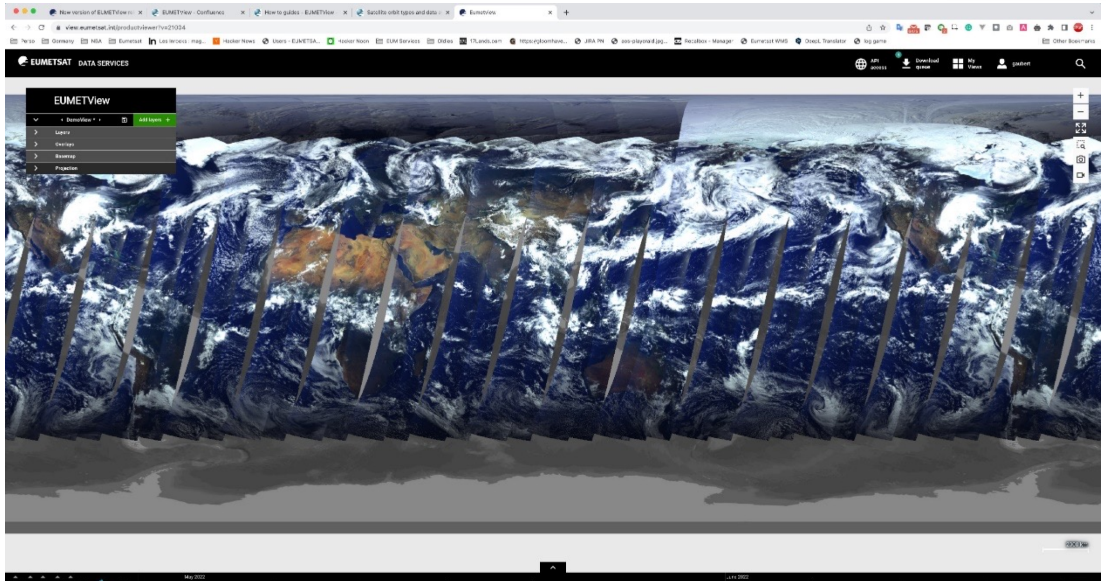
www.eumetsat.int



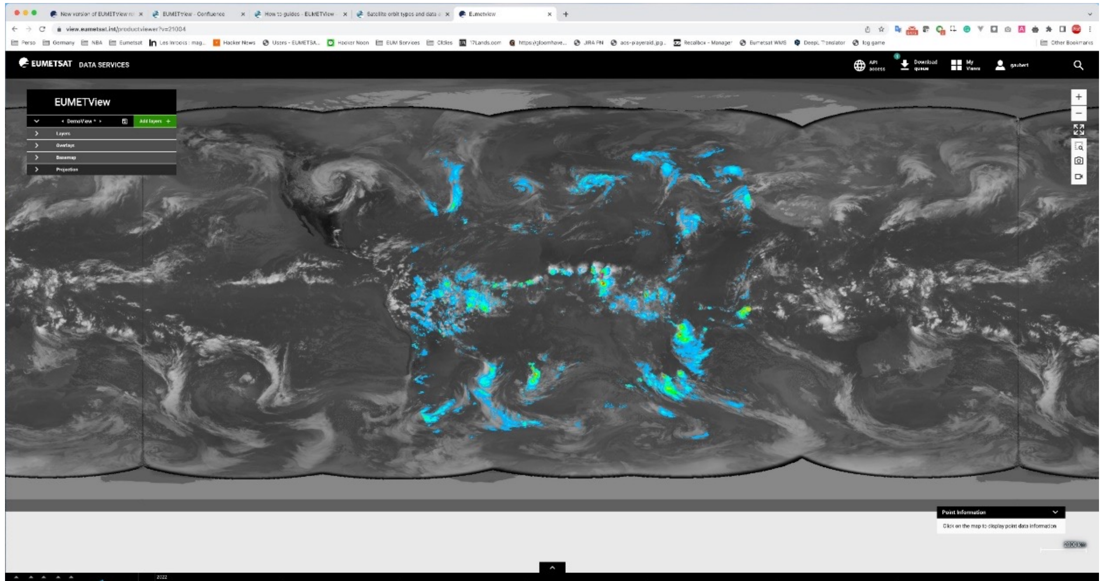


Metop

Around 100 different visualizations available



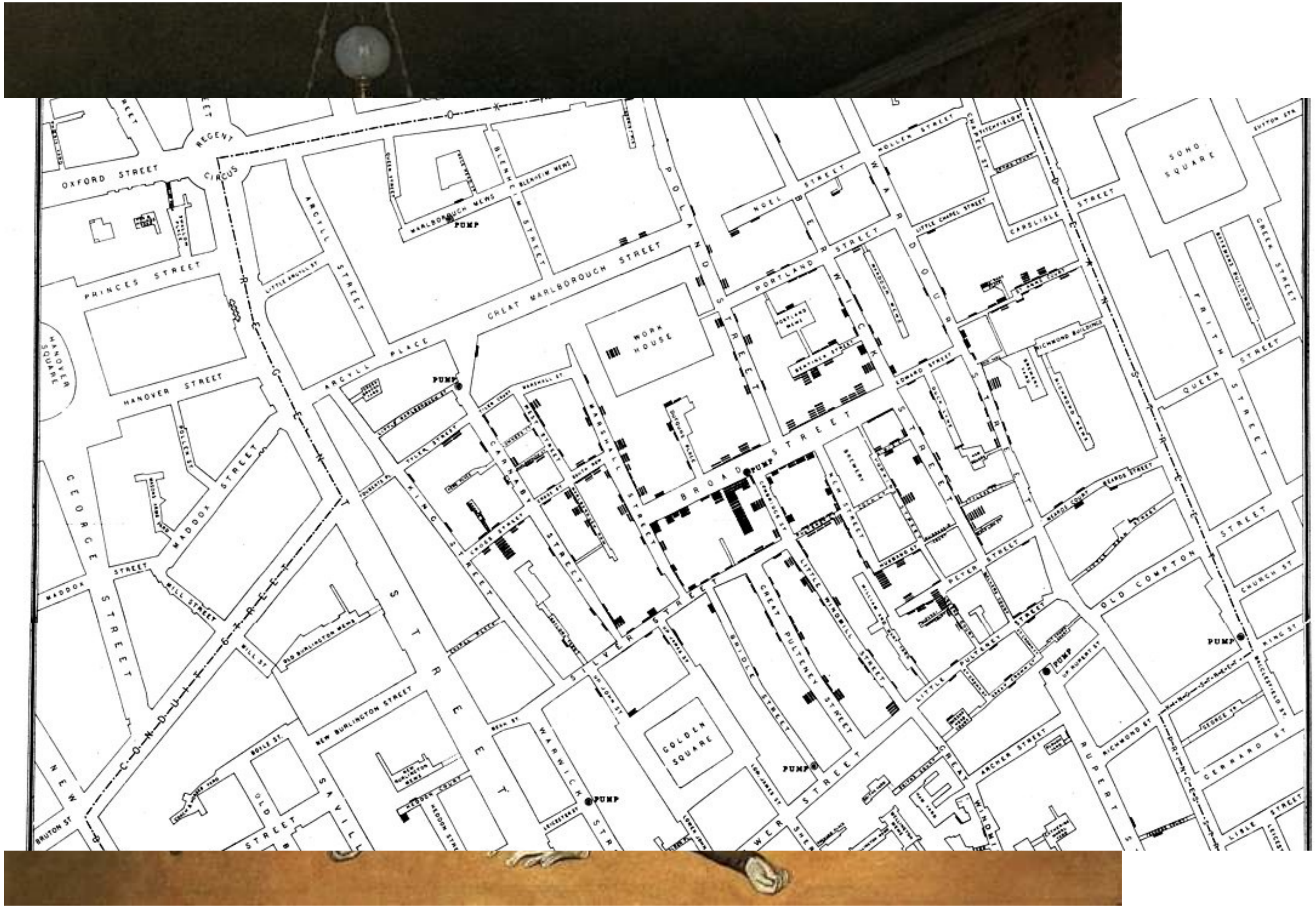
Copernicus



Georings

When does data add value?

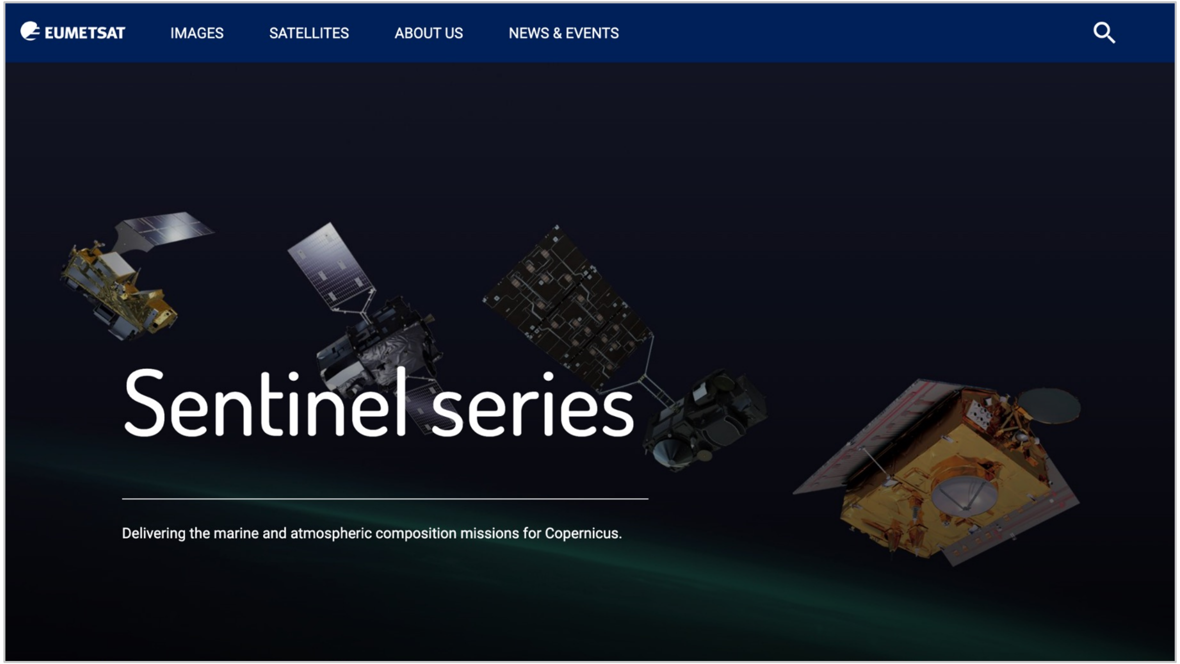
www.eumetsat.int

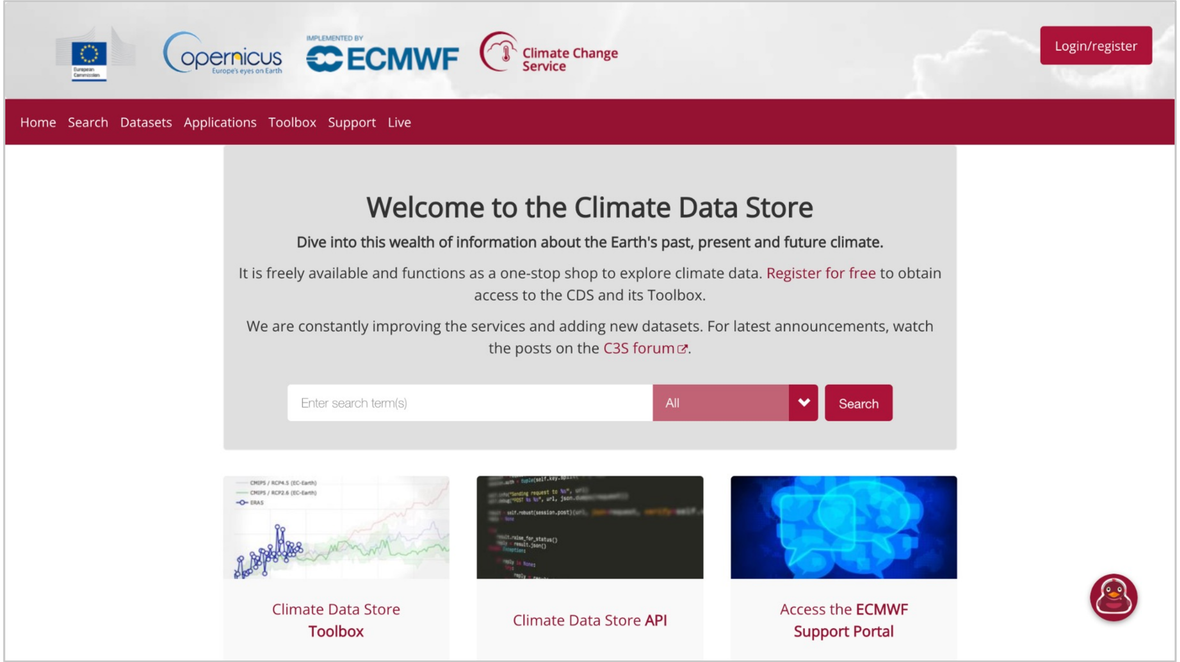


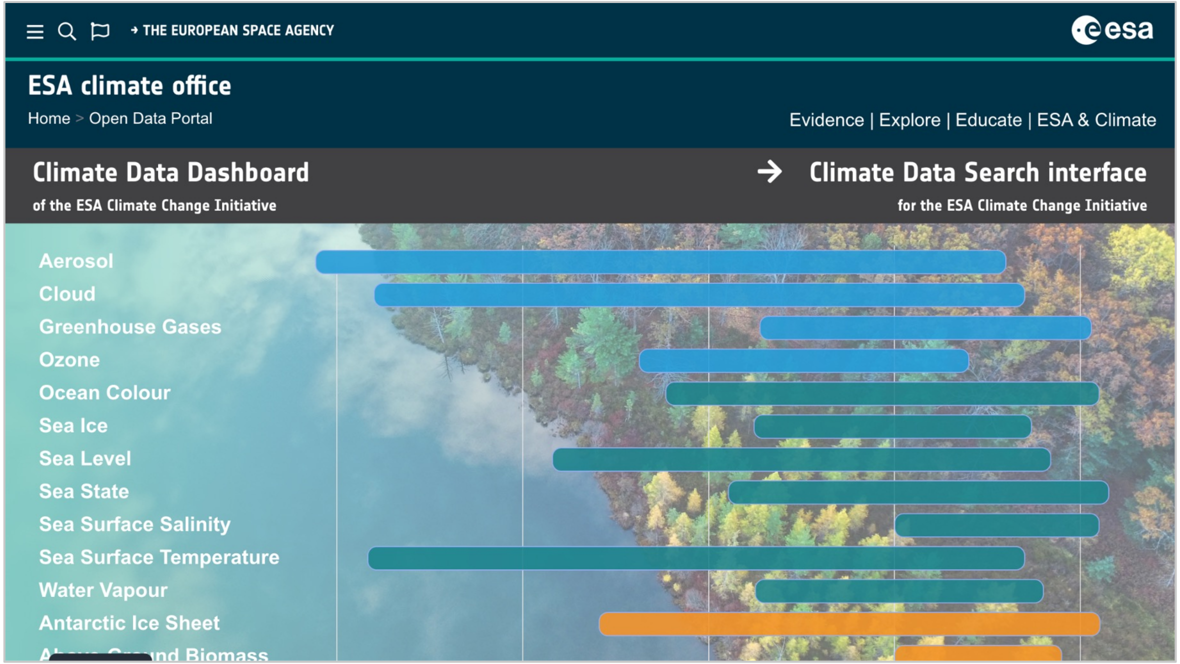
Thank you!

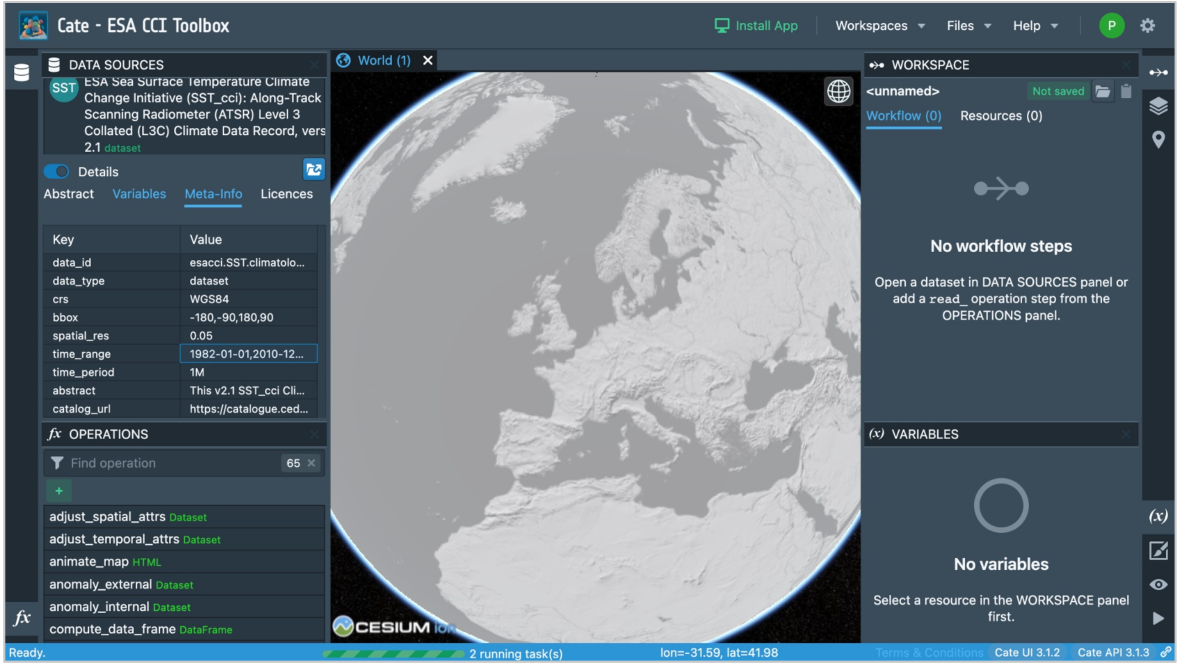
Questions are welcome.

ubilabs


EUMETSAT
IMAGES
SATELLITES
ABOUT US
NEWS & EVENTS
Sentinel series
Delivering the marine and atmospheric composition missions for Copernicus.


opernicus
ECMWF
Climate Change Service
Login/register
Home
Search
Datasets
Applications
Toolbox
Support
Live
Welcome to the Climate Data Store
Dive into this wealth of information about the Earth's past, present and future climate.
It is freely available and functions as a one-stop shop to explore climate data. Register for free to obtain access to the CDS and its Toolbox.
We are constantly improving the services and adding new datasets. For latest announcements, watch the posts on the C3S forum.
Enter search term(s)
All
Search
Climate Data Store Toolbox
Climate Data Store API
Access the ECMWF Support Portal


THE EUROPEAN SPACE AGENCY
esa
ESA climate office
Home > Open Data Portal
Evidence | Explore | Educate | ESA & Climate
Climate Data Dashboard
of the ESA Climate Change Initiative
Climate Data Search interface
for the ESA Climate Change Initiative
Aerosol
Cloud
Greenhouse Gases
Ozone
Ocean Colour
Sea Ice
Sea Level
Sea State
Sea Surface Salinity
Sea Surface Temperature
Water Vapour
Antarctic Ice Sheet


Cate - ESA CCI Toolbox
Install App
Workspaces
Files
Help
DATA SOURCES
ESA Sea Surface Temperature Climate Change Initiative (SST_cci): Along-Track Scanning Radiometer (ATSR) Level 3 Collated (L3C) Climate Data Record, vers 2.1 dataset
Details
Abstract
Variables
Meta-Info
Licences
Key
Value
data_id
esacci.SST.climatolo...
data_type
dataset
crs
WGS84
bbox
-180,-90,180,90
spatial_res
0.05
time_range
1982-01-01,2010-12...
time_period
1M
abstract
This v2.1 SST_cci Cli...
catalog_url
https://catalogue.ced...
OPERATIONS
Find operation
65
adjust_spatial_attrs Dataset
adjust_temporal_attrs Dataset
animate_map HTML
anomaly_external Dataset
anomaly_internal Dataset
compute_data_frame DataFrame
World (1)
CESIUM
WORKSPACE
<unnamed>
Not saved
Workflow (0)
Resources (0)
No workflow steps
Open a dataset in DATA SOURCES panel or add a read_ operation step from the OPERATIONS panel.
VARIABLES
No variables
Select a resource in the WORKSPACE panel first.
Ready.
2 running task(s)
lon=-31.59, lat=41.98
Cate UI 3.1.2
Cate API 3.1.3


WORLD BUSINESS
countries have


MEDIONmobile
5:31 PM
61 %
Netflix
Einstellungen
Wattpad
Fotos
Facebook
Kamera
Twitter
Instagram
Spotify
Mail
Nachrichten
YouTube
Sonntag
26
Kalender
Wetter
Unsplash
Spiele

treva labs

is a collective of climate data visualization creatives in Europe, brought together by the desire to make big impact with little pictures

is a collective of climate data visualization creatives in Europe, brought together by the desire to make big impact with little pictures

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CLIPs – Climate Little Pictures

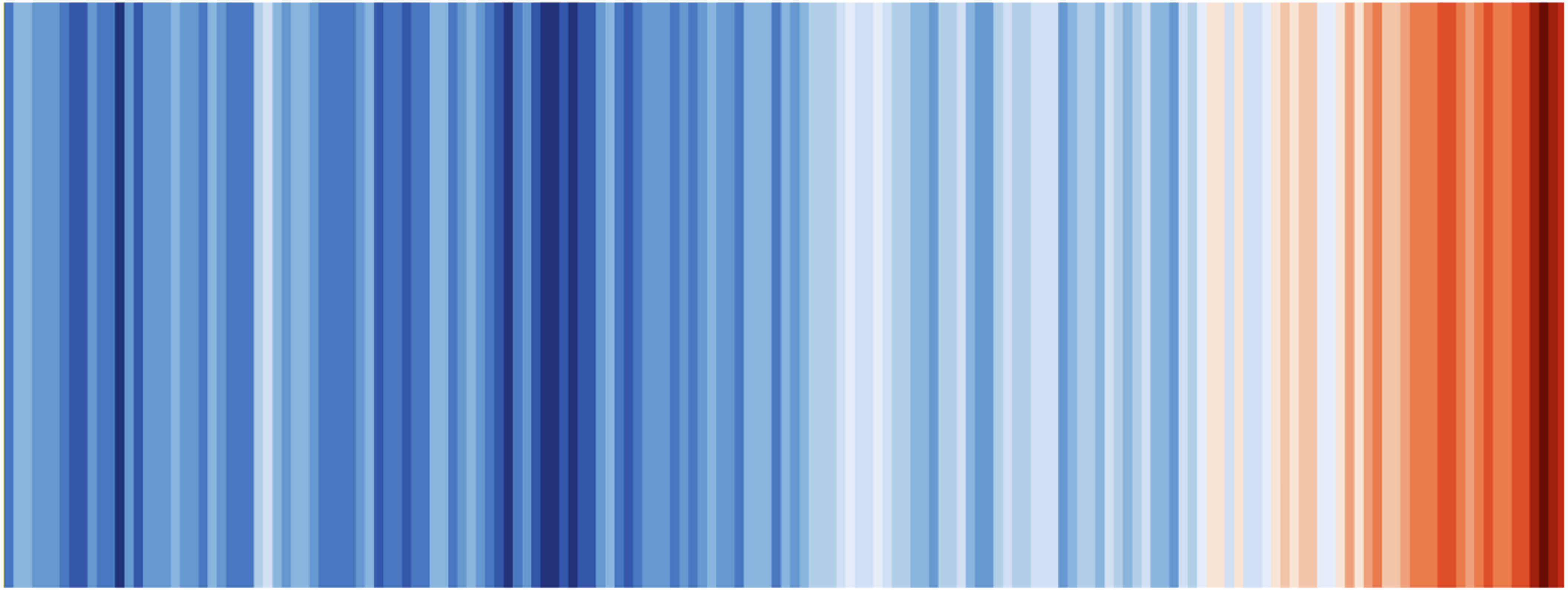
- Data driven
- Design-first
- Self-contained
- Rapidly-buildable
- Rapidly-deployable

Datawrapper

jupyter

GitHub

ubilabs



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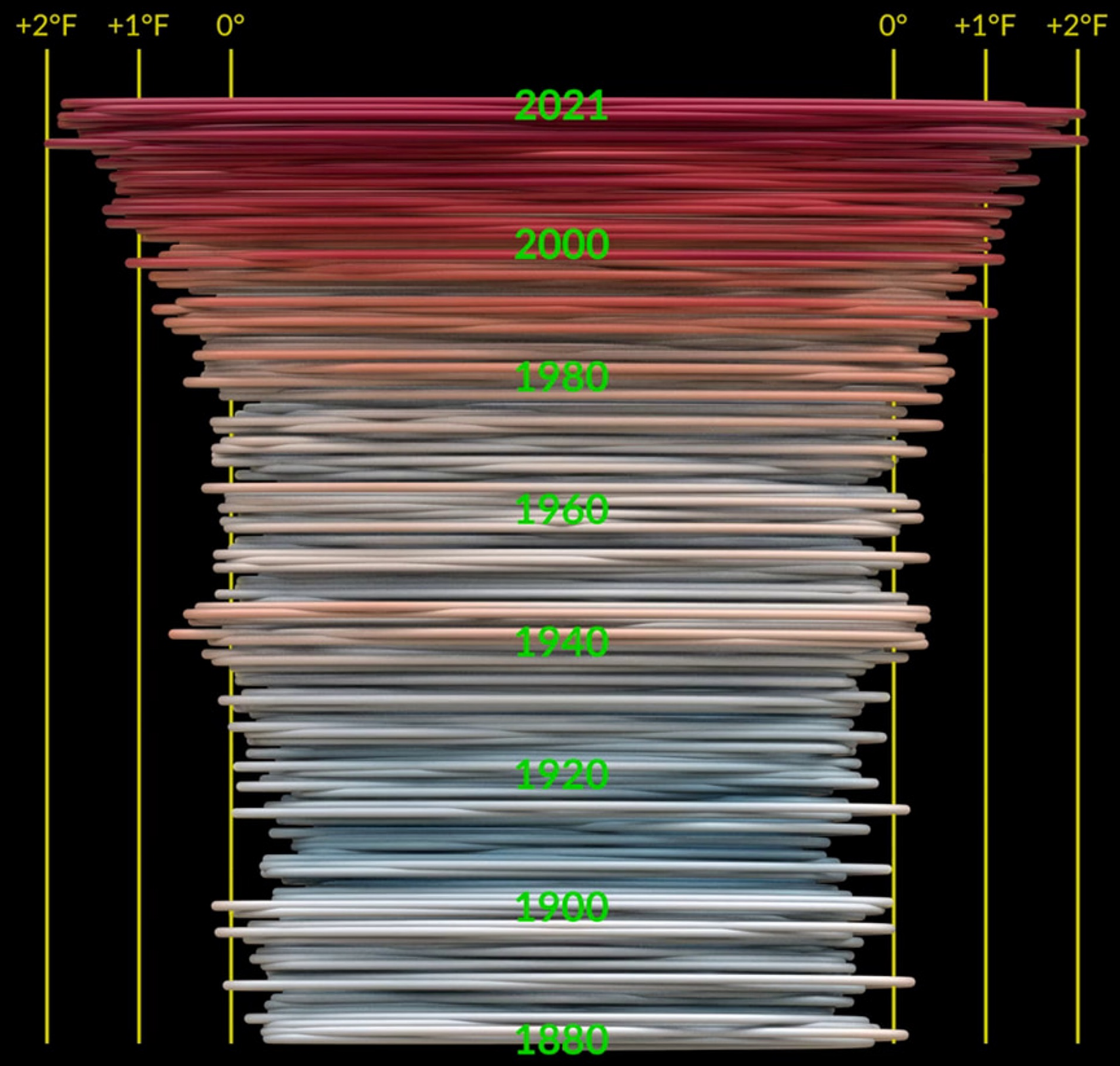
1990

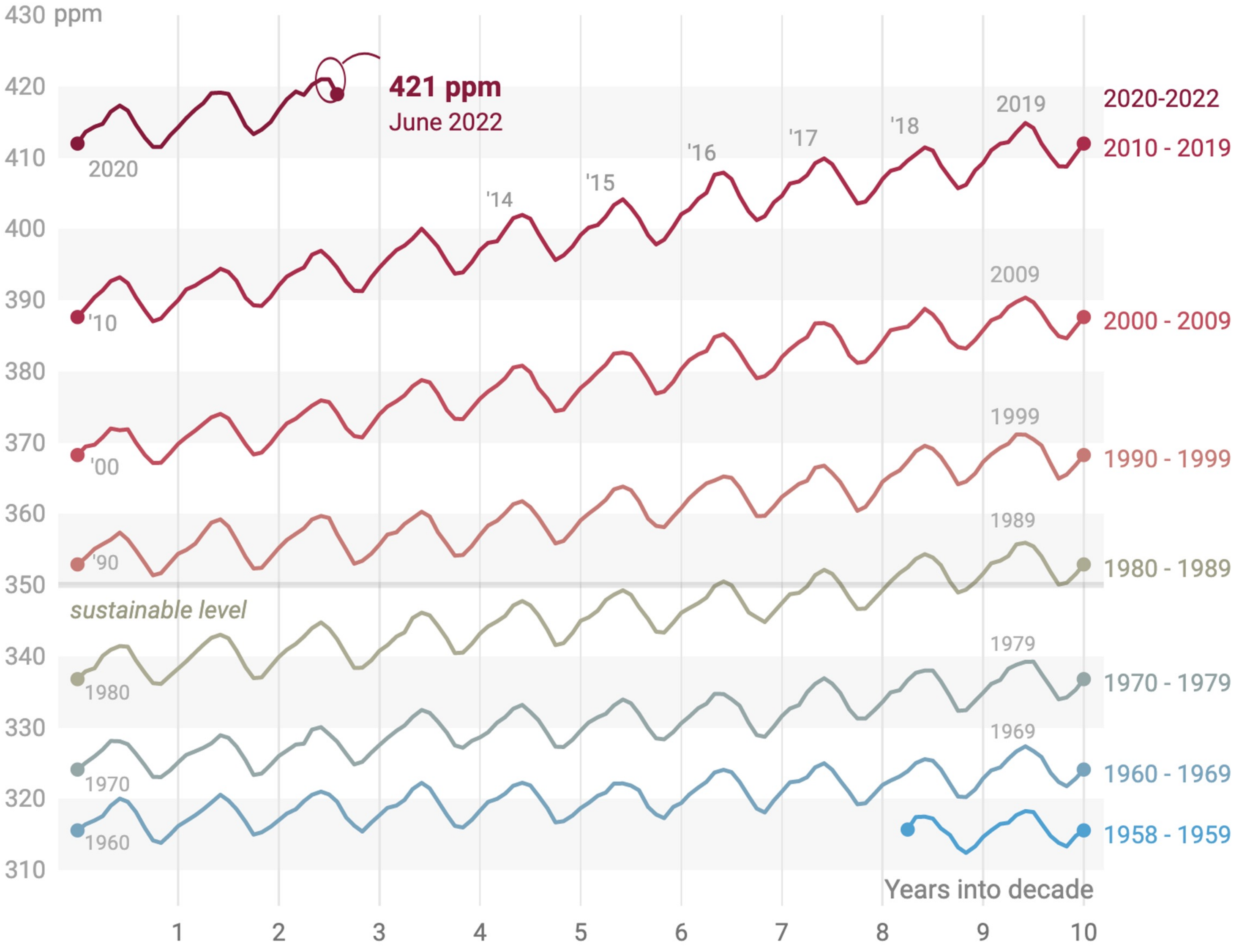

Glasgow 1884-2020
#ShowYourStripes



+2°F
+1°F
0°
0°
+1°F
+2°F
2021
2000
1980
1960
1940
1920
1900
1880

Six Decades of Carbon Dioxide Concentration in the Atmosphere

Each line represents one decade, from 1958 to 2022. CO2 concentration is measured in parts per million* (ppm).



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How do we move?

- target: 17 little picture in the next 12 months
  4 featuring the three E’s
- collect candidate ideas
- create them
- provide a sharing platform
- make them reproducible
- keep them linked to the data
- communicate them

treva labs is chaired jointly by

Creators

ubilabs

imperative space

PLANETARY VISIONS

+ others

Data Interfaces and Data Crunching

Brockmann Consult GmbH

Advisory Board

Gregor Aisch
Datawrapper (Ex-NYT)

Patrick Stotz
Data Journalist
Der Spiegel

Christina Elmer
Professor for Digital Journalism / Data Journalism

Erwan Rivault
Data / Spatial Journalist
BBC

???

???

ubilabs

We need your help

treva Labs | An idea for a little picture.

Topic or Title
Just a few words so we get the idea.

Description
Need a few more lines to elaborate?
Feel free to write them here!

Sketch
Can be a quick sketch,
the Mona Lisa,
or anything in between

Datasets you would like to use?
If you have a certain dataset in mind.

Mind telling us who you are?
So we can reach back to you.

An ESA-ECMWF Collaboration on FAIR Data Access Across CCI & C3S

Thomas Popp (DLR), Alison Waterfall (CEDA) & Joaquín Munoz Sabater (ECMWF)

CCI Colocation 2022

DATA ACCESS COLLABORATION CCI-C3S

Background

- GCOS as common basis, common set of ECVs
- Handover of ECV production from CCI to C3S since ~2016 / CCI+
- Programmatic level: CCI-C3S collaboration agreement 2018
- Contract change note #4 of „CCI Knowledge Exchange Phase 4“
- ESA / ECWMF
    - Share output from ESA CCN #4 with ECMWF
    - Advice each other on metadata, CCI-C3S mapping

DATA ACCESS COLLABORATION CCI-C3S

OVERALL NEEDS

- Best guidance for users‘ data access
- Bridge between CCI Open Data Portal (ODP) and C3S Climate Data Store (CDS)
- Visibility for CCI, C3S, providers
- Interoperable access to data
- Flexibility for different solutions of different ECVs
- Easy maintenance
- FAIR principles
    - **F**indability
    - **A**ccessibility
    - **I**nteroperability
    - **R**euse

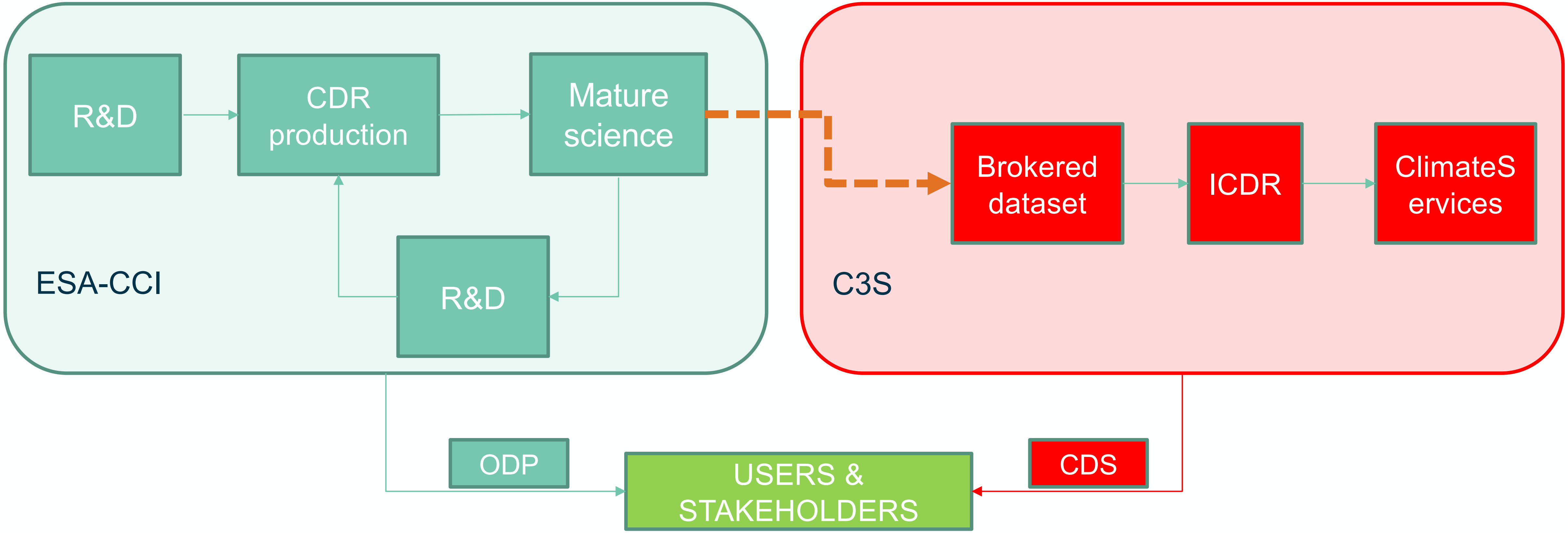
DATA ACCESS COLLABORATION CCI-C3S

Overview of Tasks (CCN #4)

- Building a bridge to guide users
    - On 3 levels: GCOS-defined ECVs / product categories / datasets
    - where CCI ODP and C3S CDS have common datasets or corresponding instances
- Identify a set of pilot ECVs
- Demonstrate the bridge
- Develop an Interoperability-supported process & means to keep the mapping updated
- Develop a front-end to CCI ODP
    - ECV-specific dashboard
    - inclusion in the output of CCI data search

CCI UPTAKE IN C3S

- Basic dataflow: CCI (R&D → mature science) → C3S (operations)

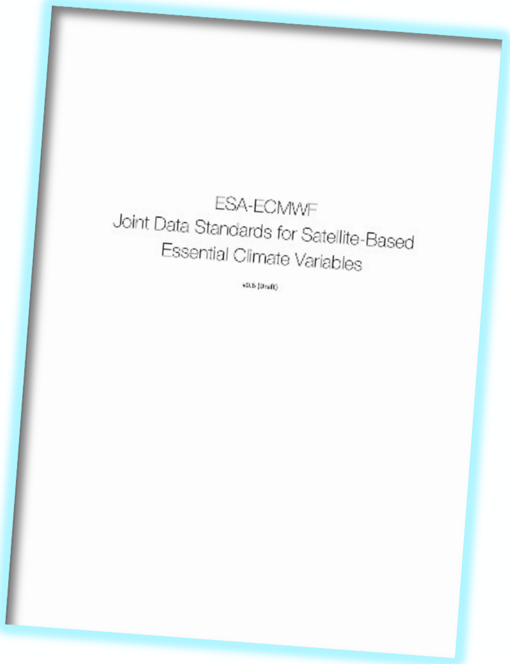


DATA ACCESS CCI / C3S

The user conflict: Where/How do I access the latest/longest data record?

- Need to increased clarity for users, recognised at CCI/C3S programmatic level

- ESA CCI – ECMWF C3S collaboration:
  → Joint data standards, including metadata mapping (addressed in CCN #4)
    - Global attributes on discovering metadata
    - Global attributes on usage information
    - Version numbering
    - Variables
  - Enhanced interoperability
  - Transparency, data provenance



DATA ACCESS CCI / C3S

The user conflict: Where/How do I access the latest/longest data record?

→ Cross signposting (links to CCI & C3S project/datasets)

→ information to users through ODP and CDS (eliminate unambiguity)

→ visibility of data provider through C3S CDS

→ more involvement in mutual procurement processes

- Avoid duplication of tasks
- New C3S requirements are channelled through CCI R&D
- Increase optimisation of resources
- Increase value for money (essential for budget holders)

→ Responding to FAIR principles

METADATA BRIDGE

As part of the new ESA CCI Knowledge Exchange contract -> pilot work-package for the development of a 'Metadata Bridge' tool. (Started Oct 2022).

This will consist of

1) Pilot mapping of the relationships between CCI and C3S ECV's for select datasets.

⇒ Definition of a metadata specification for the mapping + mapping vocabulary

⇒ Will follow a standards based approach where possible

2) A publicly accessible API to access the mapping metadata

- independent of other CCI KE services (not just for CCI)

3) Integration of the tool into the CCI ODP dashboard/search + toolbox

METADATA MAPPING – PLNNED STEPS

ECMWF

esa

Define the mapping metadata specification and vocabulary

Formulate the technical requirements for a 'metadata –bridge' tool

For 'pilot' ECV's populate the metadata

Development of Metadata bridge API tool

Integrate the metadata bridge tool into CCI tools (ODP dashboard/ search + CCI toolbox)

December 2022

May 2023

METADATA BRIDGE

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 - independent of other CCI KE services (not just for CCI)

3) Integration of the tool into the CCI ODP dashboard/search + toolbox

CHALLENGES FOR THE METADATA BRIDGE

New ECV datasets are being produced regularly:

- Full variety of relationships needs to be represented within the metadata. Definition of ‘dataset’ in CCI/C3S can differ, so potentially not a one-to-one mapping.

  e.g. data can be new versions, extended versions, new format, subsets, otherwise related..

- Will need to have a process in which the metadata bridge can be regularly updated when data are produced or released to CCI or C3S.

  ⇒ Needs to be an easy process to collect the information from both sides, otherwise it will quickly get out of date.

We welcome any feedback or suggestions.

Thank you

On The Front Line With The Public - A Data Journalist’s Perspective

Achim Tack (Der Spiegel & Ubilabs)

CCI Colocation 2022

DER SPIEGEL

On the Front Line with the Public

a data journalist's perspective

DER SPIEGEL

Data Journalist

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ubilabs

Consultant Data Analytics
(currently working on Treva Labs)

tack@ubilabs.com

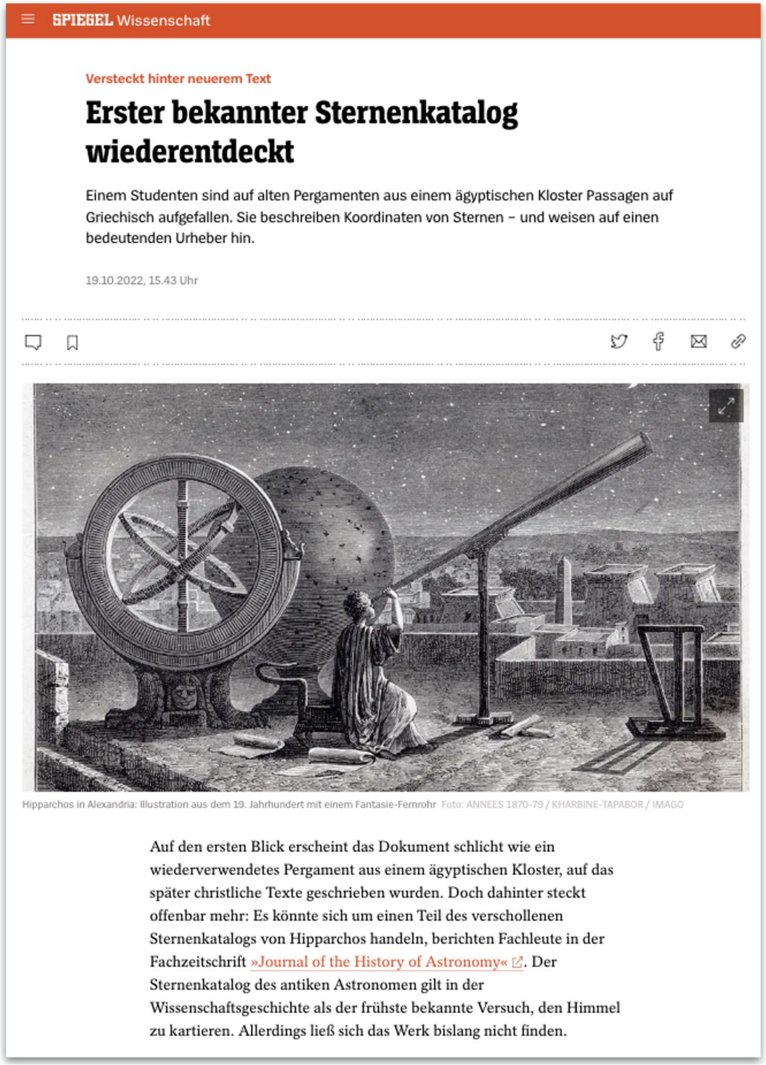
DER SPIEGEL

Topics of my talk:

- Nerds in the Newsroom
- Climate (Data) Journalism
- How to handle a Data Journalist
- Shout out to Climate Little Pictures

Nerds in the Newsroom

Science Journalism


SPIEGEL Wissenschaft

Versteckt hinter neuerem Text

Erster bekannter Sternenkatalog wiederentdeckt

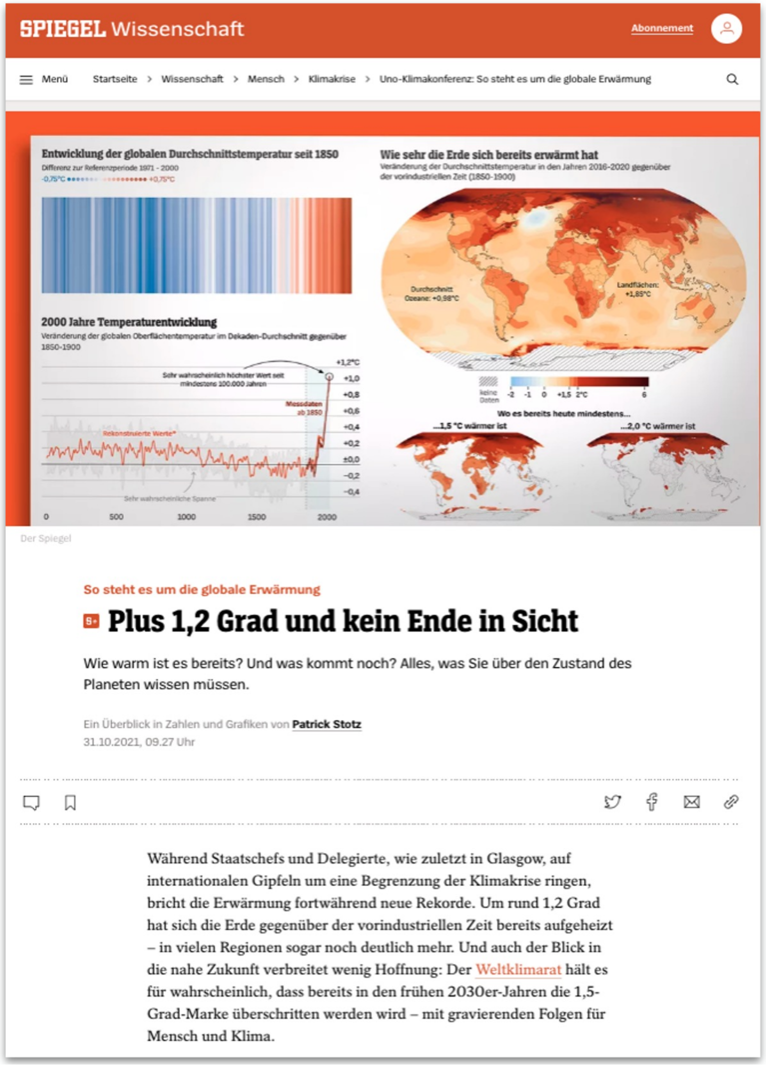
Einem Studenten sind auf alten Pergamenten aus einem ägyptischen Kloster Passagen auf Griechisch aufgefallen. Sie beschreiben Koordinaten von Sternen – und weisen auf einen bedeutenden Urheber hin.

19.10.2022, 15.43 Uhr

Hipparchos in Alexandria: Illustration aus dem 19. Jahrhundert mit einem Fantasie-Fernrohr Foto: ANNEES 1870-79 / KHARBINE-TAPABOR / IMAGO

Auf den ersten Blick erscheint das Dokument schlicht wie ein wiederverwendetes Pergament aus einem ägyptischen Kloster, auf das später christliche Texte geschrieben wurden. Doch dahinter steckt offenbar mehr: Es könnte sich um einen Teil des verschollenen Sternenkatalogs von Hipparchos handeln, berichten Fachleute in der Fachzeitschrift »Journal of the History of Astronomy«. Der Sternenkatalog des antiken Astronomen gilt in der Wissenschaftsgeschichte als der früheste bekannte Versuch, den Himmel zu kartieren. Allerdings ließ sich das Werk bislang nicht finden.

Data Journalism


SPIEGEL Wissenschaft

Abonnement

Menü Startseite › Wissenschaft › Mensch › Klimakrise › Uno-Klimakonferenz: So steht es um die globale Erwärmung

Der Spiegel

So steht es um die globale Erwärmung

Plus 1,2 Grad und kein Ende in Sicht

Wie warm ist es bereits? Und was kommt noch? Alles, was Sie über den Zustand des Planeten wissen müssen.

Ein Überblick in Zahlen und Grafiken von Patrick Stotz

31.10.2021, 09.27 Uhr

Während Staatschefs und Delegierte, wie zuletzt in Glasgow, auf internationalen Gipfeln um eine Begrenzung der Klimakrise ringen, bricht die Erwärmung fortwährend neue Rekorde. Um rund 1,2 Grad hat sich die Erde gegenüber der vorindustriellen Zeit bereits aufgeheizt – in vielen Regionen sogar noch deutlich mehr. Und auch der Blick in die nahe Zukunft verbreitet wenig Hoffnung: Der Weltklimarat hält es für wahrscheinlich, dass bereits in den frühen 2030er-Jahren die 1,5-Grad-Marke überschritten werden wird – mit gravierenden Folgen für Mensch und Klima.

Science Journalism

ELSEVIER

Resources, Conservation and Recycling

Volume 177, February 2022, 105983

Global projections of future wilderness decline under multiple IPCC Special Report on Emissions Scenarios

Fangzheng Li [a, 1] #, Wenyue Li [b, 1], Fengyi Li [c], Ying Long (*) [b], Shiyi Guo [d], Xiong Li [a], Chensong Lin [a], Jing Li [e]

Show more

+ Add to Mendeley   Share   Cite

https://doi.org/10.1016/j.resconrec.2021.105983   Get rights and content

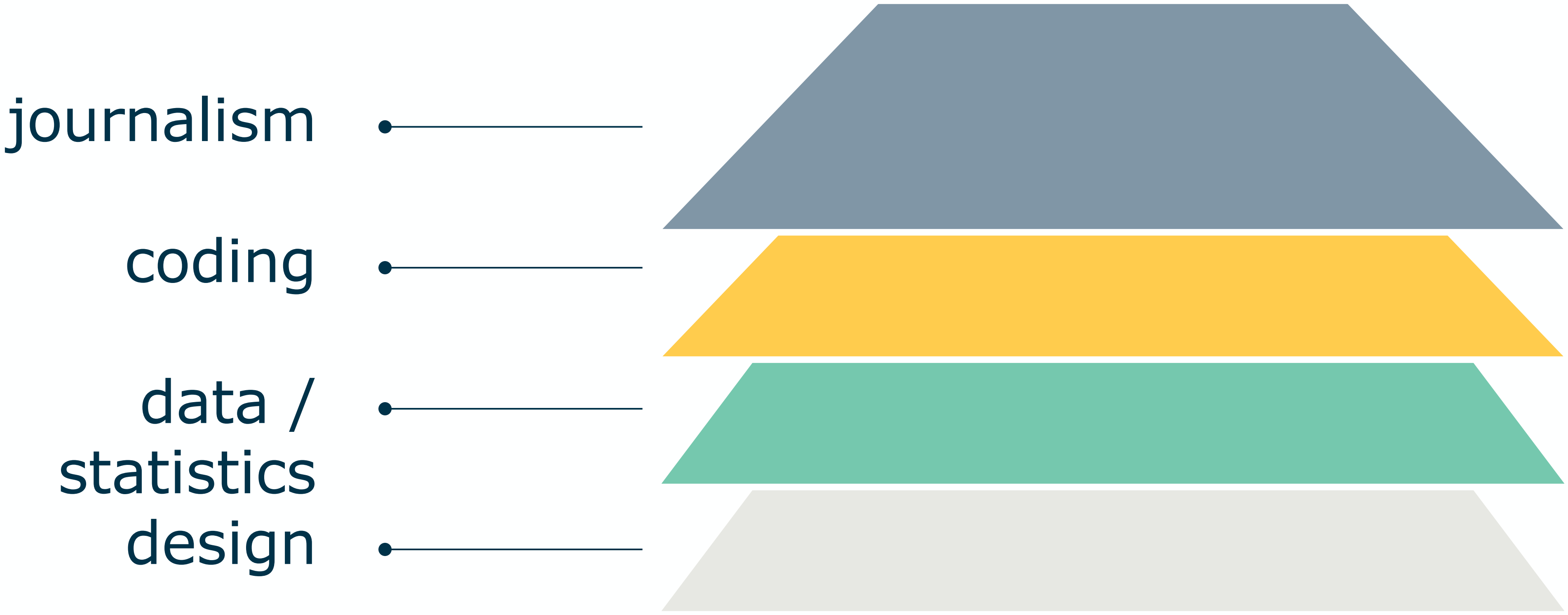
Data Journalism

Name	Bundesland	Fläche (qm)	Baujahr	Zustandsnote 03/2018	Geo UTM Ost
B 5 / Süderau	Schleswig-Holstein	63	1973	1,7	494241,4
B 5 / Bosbüller Sielzug	Schleswig-Holstein	49	1961	2,2	492728,0
B 5 / Dreiharder Gotteskoog Strom	Schleswig-Holstein	62	1905	2,7	492821,2
B 5 / Kleiner Strom	Schleswig-Holstein	63	1962	2,2	494364,0
B 5 / Geh- und Radweg Klixbüll	Schleswig-Holstein	82	1981	2,0	492424,0
Geh-/Radweg entl. B 5 / Dreiharder Gotteskoogstrom	Schleswig-Holstein	34	1986	1,7	492821,3
B 200 / L 16 [AS Flensburg-Duburg]/Rifa DK - Husum	Schleswig-Holstein	317	1967	2,5	526323,0
B 200 / L 16 [AS Flensburg-Duburg]/Rifa Husum - DK	Schleswig-Holstein	320	1967	2,7	526323,0
Gem.Str. "Frösleeweg" / B 200	Schleswig-Holstein	357	1967	2,4	526018,9
B 200 / Gem.Str. "Bauer Landstraße"/Rifa DK - Husum	Schleswig-Holstein	105	1966	2,7	526116,9
B 200 / Gem.Str. "Bauer Landstraße"/Rifa Husum - DK	Schleswig-Holstein	106	1966	2,7	526116,9
B 200 / Geh- und Radweg "Klueser Weg"	Schleswig-Holstein	89	1966	2,3	526519,1
K 12 [FL] / B 200 [AS Klues]	Schleswig-Holstein	583	1966	2,8	526737,7
B 200 / Geh- und Radweg "Klueser Forst"	Schleswig-Holstein	65	1967	2,0	526612,4
B 200 / Gem.Str./Rifa DK - Husum	Schleswig-Holstein	180	1966	2,8	526593,1
B 200 / Gem.Str./Rifa Husum - DK	Schleswig-Holstein	176	1966	2,1	526593,1
B 199 / Geh- und Radweg "Munkbrarup"	Schleswig-Holstein	66	1968	2,3	535766,0
B 199 / Munkbrarupau	Schleswig-Holstein	153	1953	2,0	535864,9
B 199 / Schulau	Schleswig-Holstein	94	1953	2,5	540255,5
B 199 / Geh- und Radweg "Oxbüll"	Schleswig-Holstein	116	1996	2,3	534440,3
B 5 / Soholmer Au	Schleswig-Holstein	299	1970	2,3	497185,8
B 5 / Lecker Au	Schleswig-Holstein	188	1976	2,0	493281,8
B 5 / Geh- und Radweg "Lindholm"	Schleswig-Holstein	54	1979	2,4	490948,2
B 199 / Lecker Au	Schleswig-Holstein	150	1963	2,1	498471,3
B 199 / Lecker Mühlenstrom	Schleswig-Holstein	50	1865	2,2	497827,9
B 199 / Pottgraben	Schleswig-Holstein	32	1984	2,0	494893,8
Geh- und Radweg entlang B 199 / Pottgraben	Schleswig-Holstein	14	1964	2,6	494893,8

So what do Data Journalists normally do?

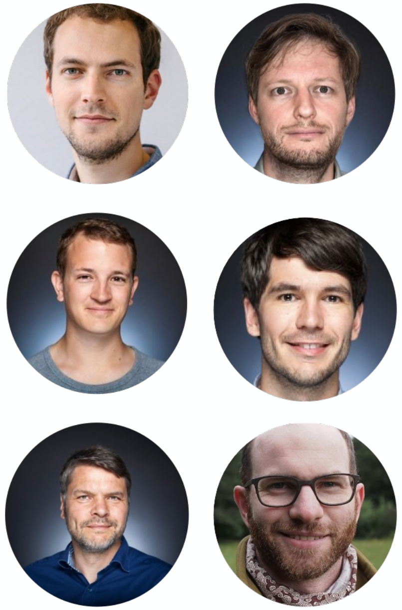
use data to find and tell stories	use statistical methods & models	use visual (interactive) elements in our articles	work transparently and reproducibly

Typical Data Journalism Skill Set



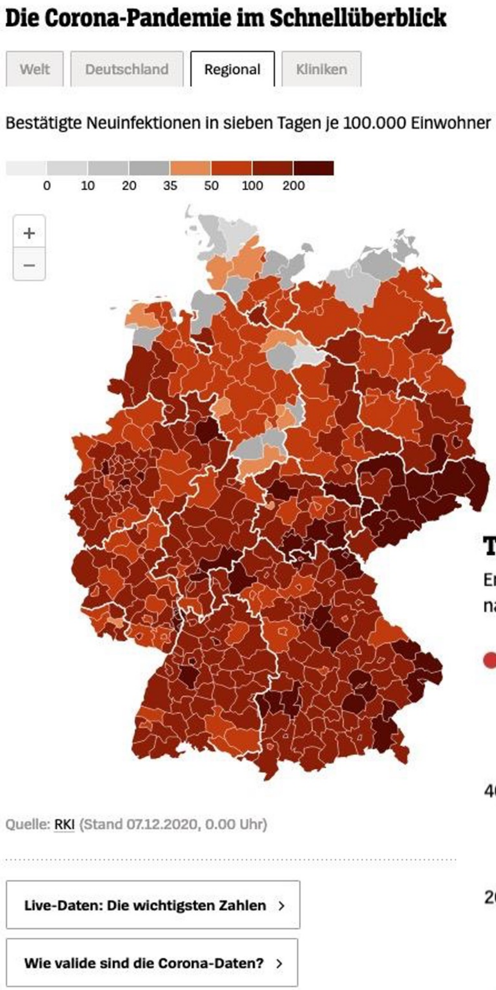
Data-Driven-Journalism at DER SPIEGEL

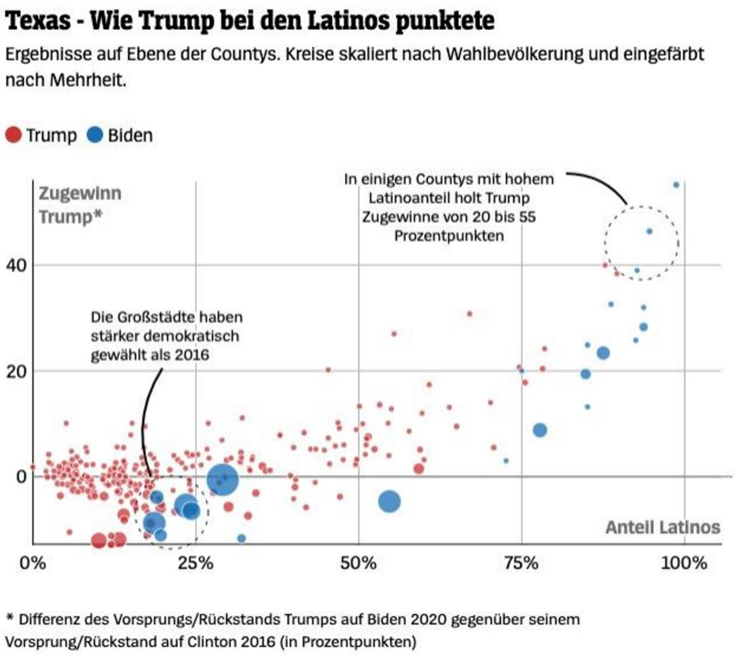
- 5-6 editors (currently sadly 100 % ♂)
- Mostly non-native journalists:
  Backgrounds in Physics, Mathematics,
  Urban Planning / Geodata
- Close cooperation
  with the Interactive/Graphics departement



Our Goals in DDJ

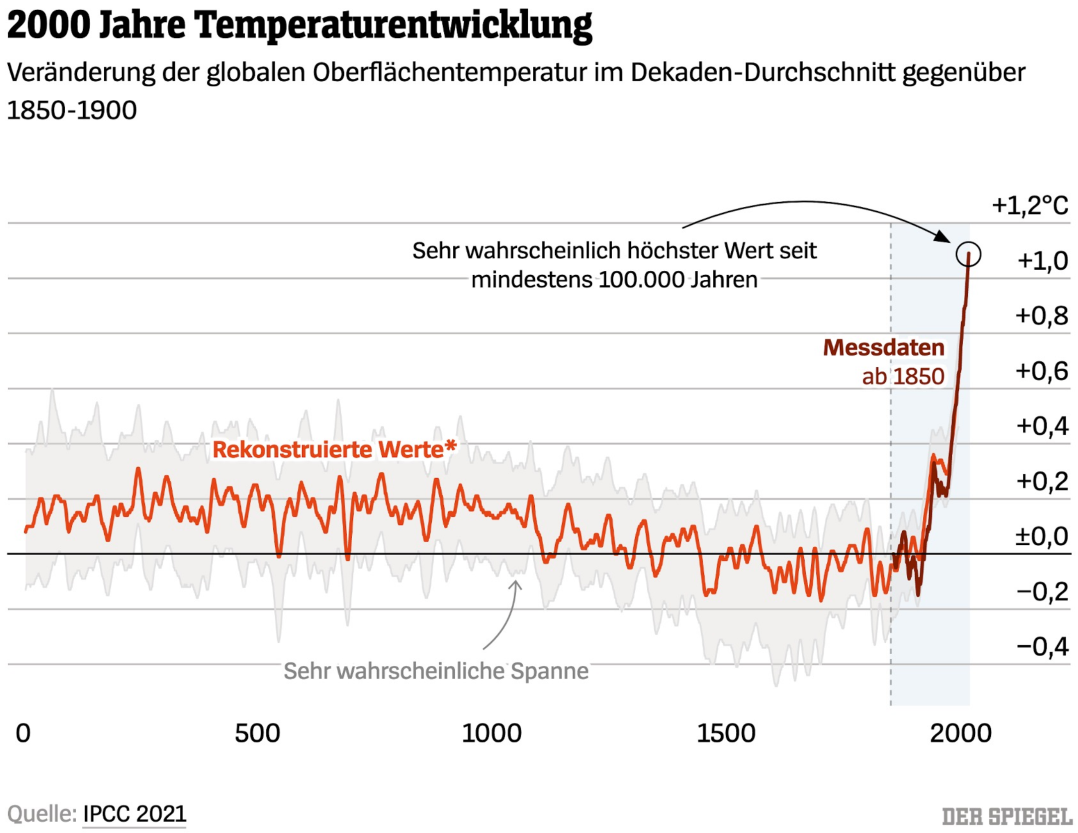
- Bringing more evidence to reporting
- Enabling new, relevant insights through deep analysis of (big) data
- Bringing modern, data-driven research methods to the mainstream
- Think and integrate text and visualizations together

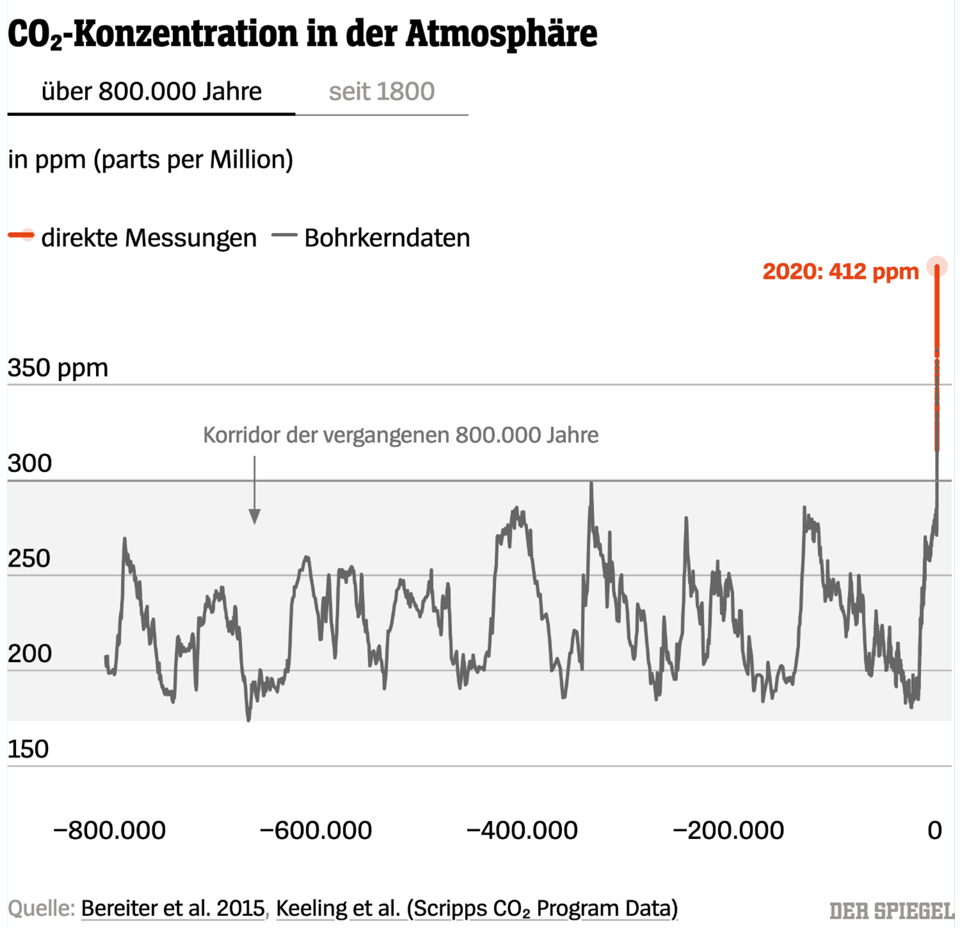




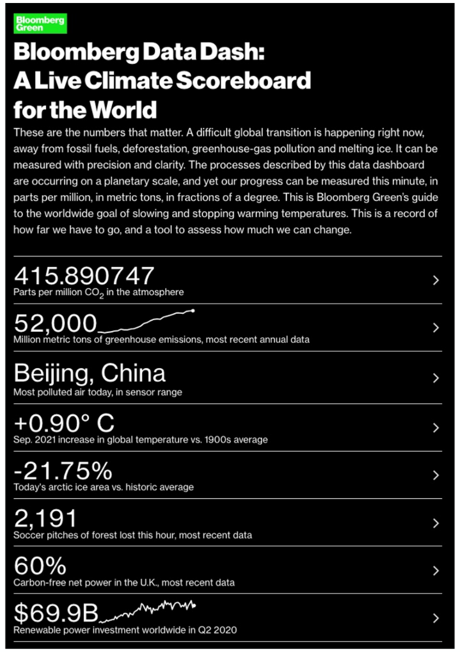
(Climate) Data Journalism

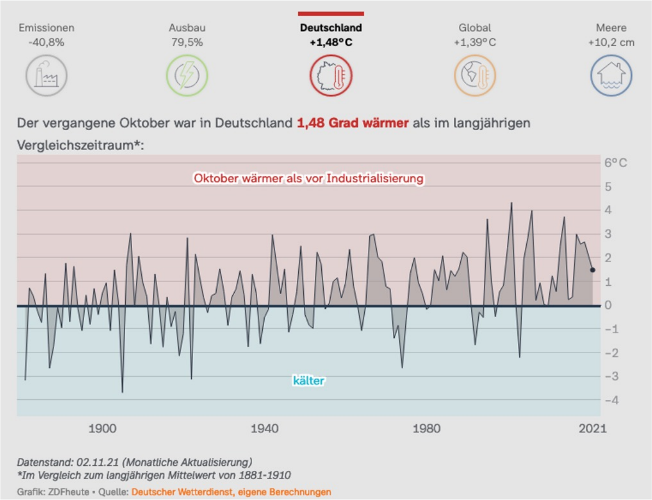
Annotated, interactive Charts help to visualize datasets



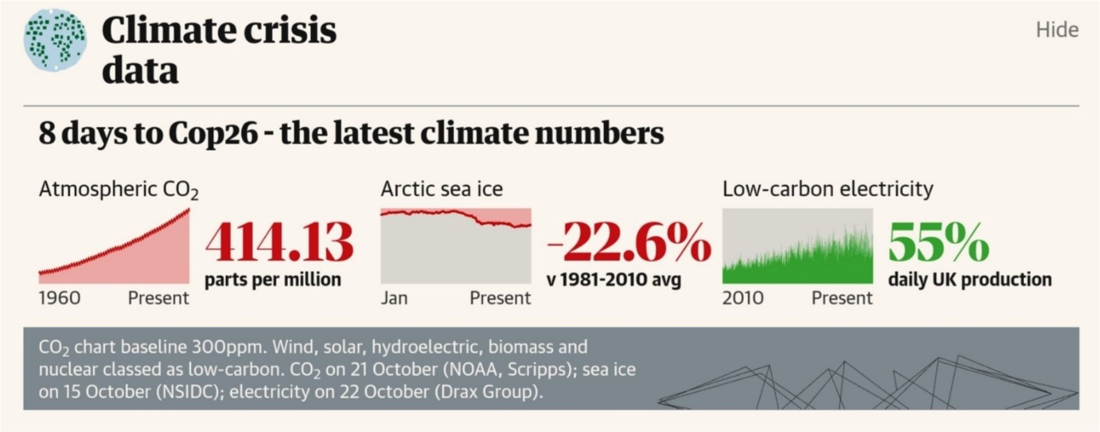


Bloomberg

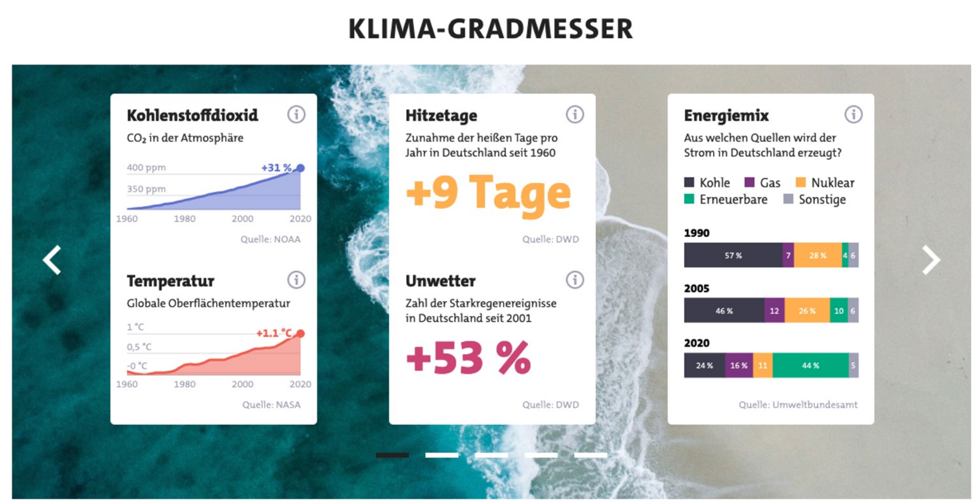




ZDF

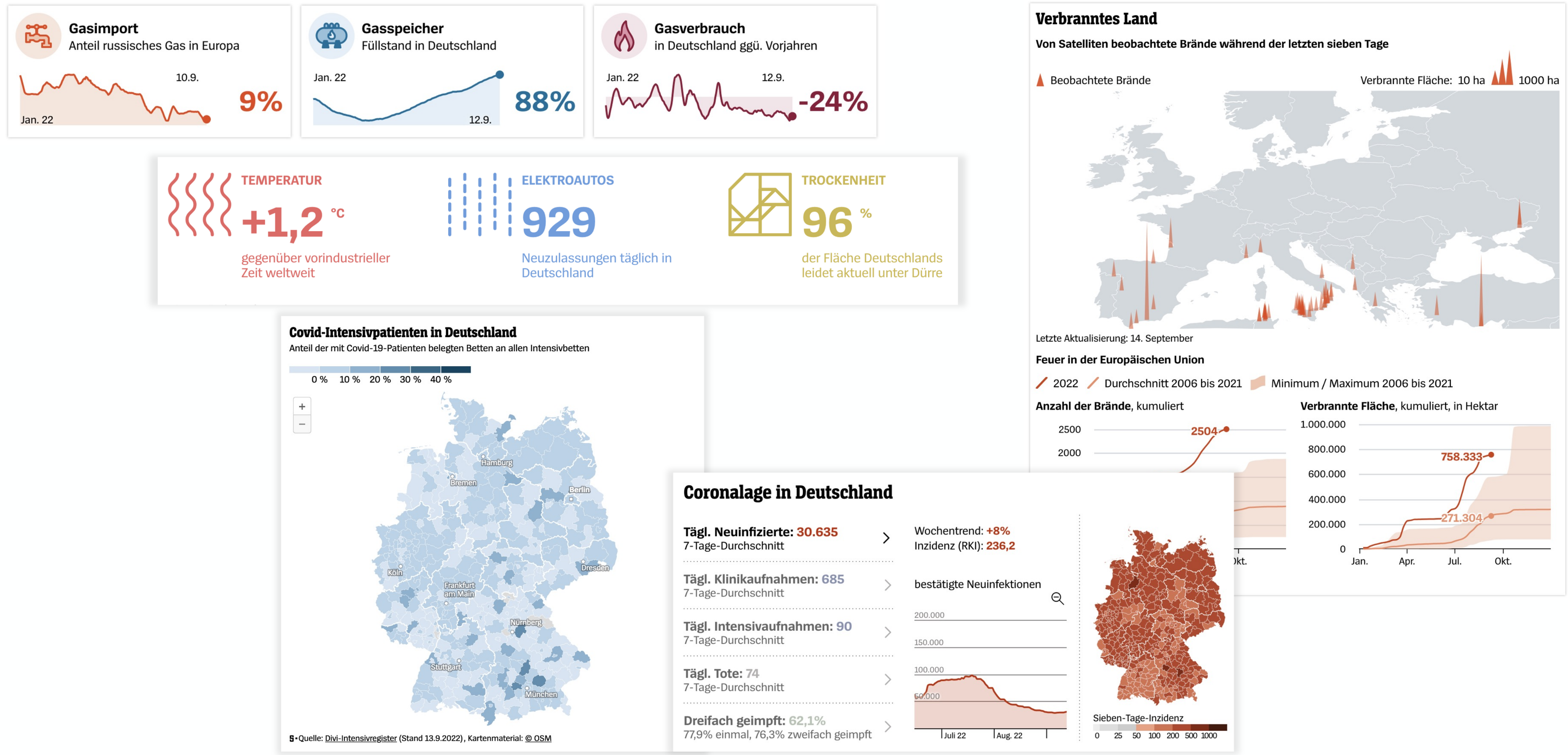


Guardian via @AlexSelbyB



ARD Alpha

Süddeutsche


Gasimport
Anteil russisches Gas in Europa
10.9.
Jan. 22
9%
Gasspeicher
Füllstand in Deutschland
Jan. 22
12.9.
88%
Gasverbrauch
in Deutschland ggü. Vorjahren
Jan. 22
12.9.
-24%
TEMPERATUR
+1,2 °C
gegenüber vorindustrieller Zeit weltweit
ELEKTROAUTOS
929
Neuzulassungen täglich in Deutschland
TROCKENHEIT
96 %
der Fläche Deutschlands leidet aktuell unter Dürre
Verbranntes Land
Von Satelliten beobachtete Brände während der letzten sieben Tage
Beobachtete Brände
Verbrannte Fläche: 10 ha 1000 ha
Letzte Aktualisierung: 14. September
Feuer in der Europäischen Union
2022 Durchschnitt 2006 bis 2021 Minimum / Maximum 2006 bis 2021
Anzahl der Brände, kumuliert
2500
2000
2504
Verbrannte Fläche, kumuliert, in Hektar
1.000.000
800.000
600.000
400.000
200.000
0
758.333
271.304
Jan.
Apr.
Jul.
Okt.
Covid-Intensivpatienten in Deutschland
Anteil der mit Covid-19-Patienten belegten Betten an allen Intensivbetten
0 % 10 % 20 % 30 % 40 %
Hamburg
Bremen
Berlin
Köln
Dresden
Frankfurt am Main
Nürnberg
Stuttgart
München
Quelle: Divi-Intensivregister (Stand 13.9.2022), Kartenmaterial: © OSM
Coronalage in Deutschland
Tägl. Neuinfizierte: 30.635
7-Tage-Durchschnitt
Tägl. Klinikaufnahmen: 685
7-Tage-Durchschnitt
Tägl. Intensivaufnahmen: 90
7-Tage-Durchschnitt
Tägl. Tote: 74
7-Tage-Durchschnitt
Dreifach geimpft: 62,1%
77,9% einmal, 76,3% zweifach geimpft
Wochentrend: +8%
Inzidenz (RKI): 236,2
bestätigte Neuinfektionen
200.000
150.000
100.000
50.000
Juli 22
Aug. 22
Sieben-Tage-Inzidenz
0 25 50 100 200 500 1000

Since October 2020 permanently anchored on the homepage of spiegel.de

TEMPERATUR

+1,2 °C

gegenüber vorindustrieller Zeit weltweit

ELEKTROAUTOS

1085

Neuzulassungen täglich in Deutschland

TROCKENHEIT

30 %

der Fläche Deutschlands leidet aktuell unter Dürre

AUSSERGEWÖHNLICHE WÄRME

4 %

der deutschen Wetterstationen meldeten dies zuletzt

ARKTISCHES MEEREIS

-8 %

gegenüber dem Durchschnitt von 1981 bis 2010

ÖKOSTROM

31,2 %

der aktuellen Stromerzeugung in Deutschland

CO_2-BUDGET

7,68 JAHRE

reicht das globale CO_2-Budget bis zur 1,5-Grad-Marke

MEERESSPIEGEL

25 CM

Anstieg seit dem Jahr 1880

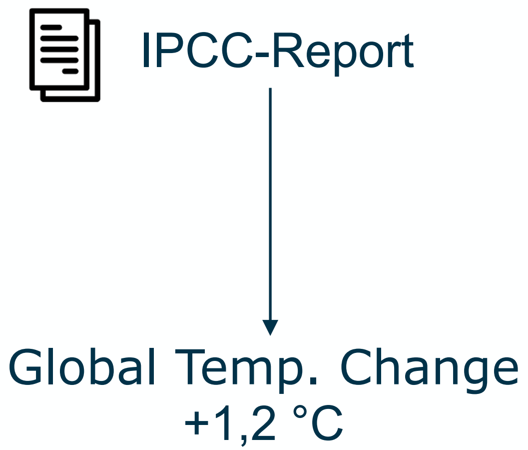
URWALD

345

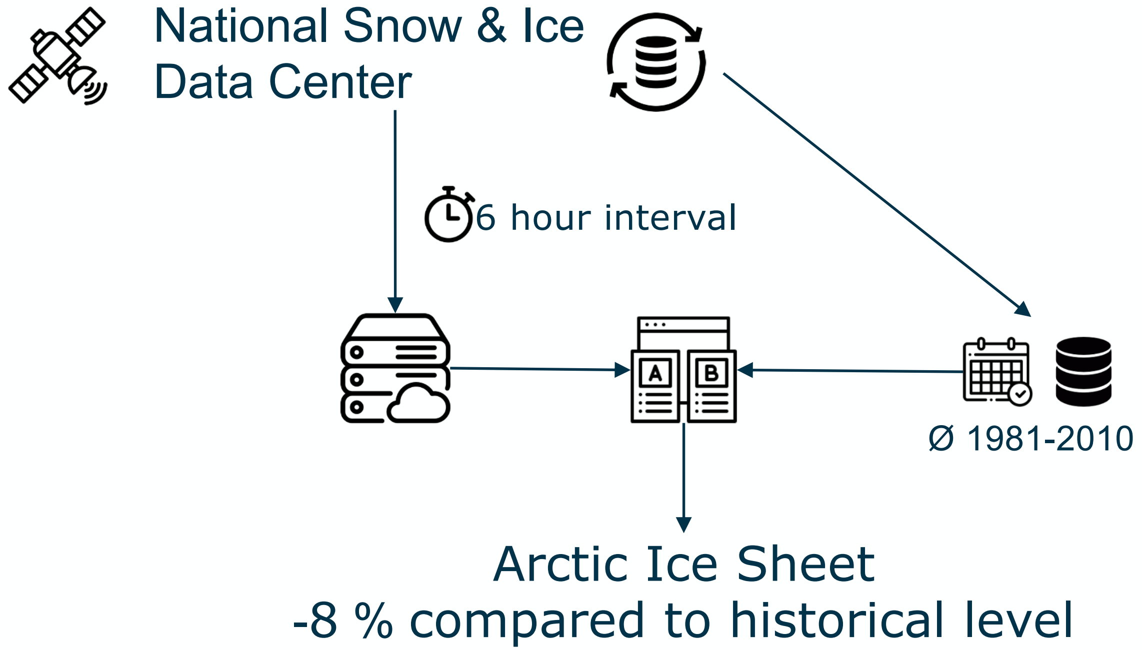
Fußballfelder wurden seit Beginn dieser Stunde vernichtet

The technology in the background

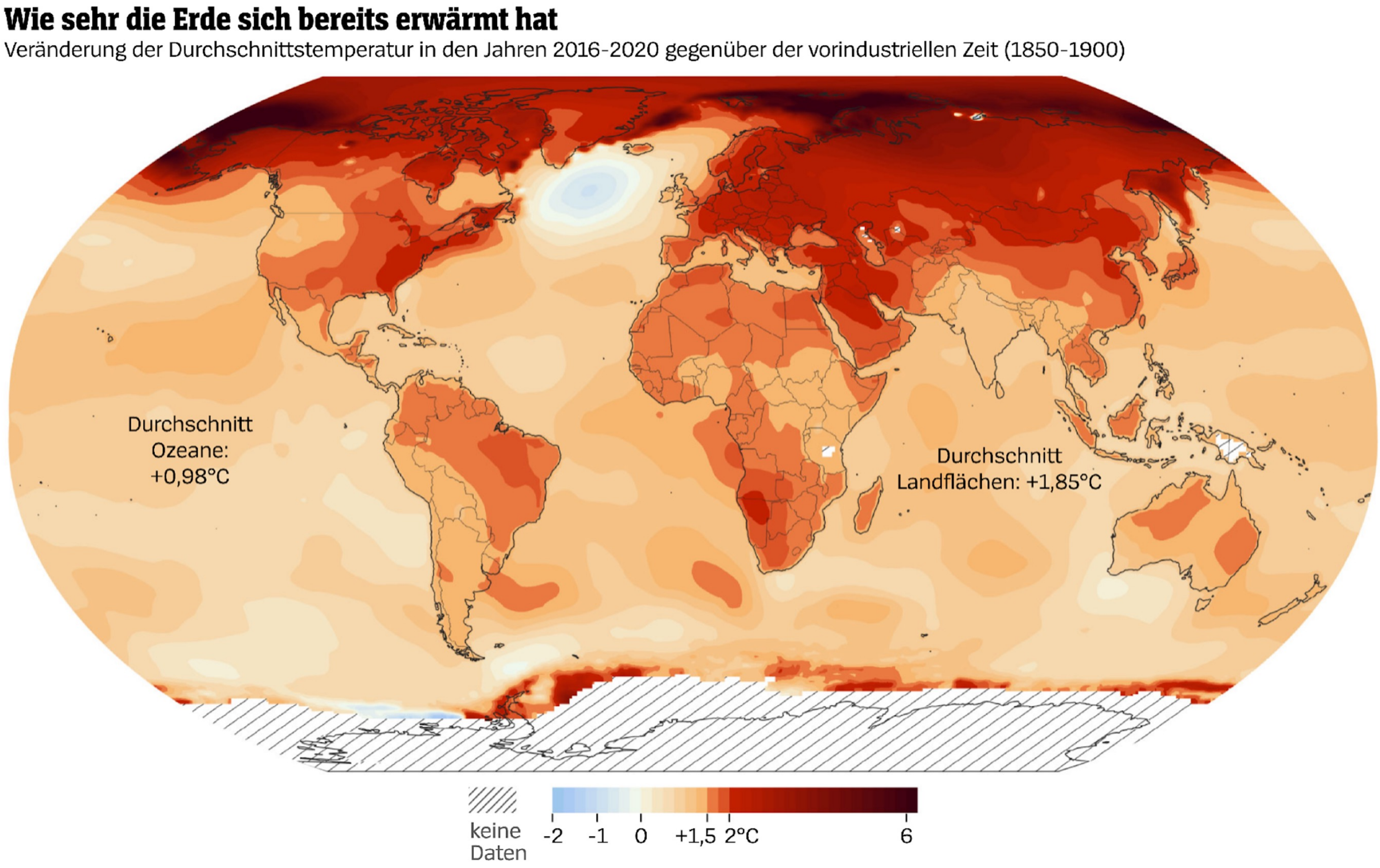
Static data which is rarely
and manually updated

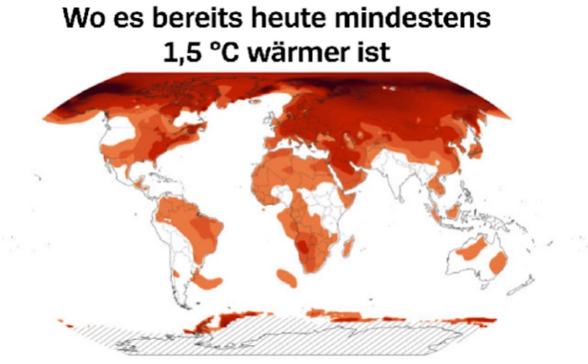


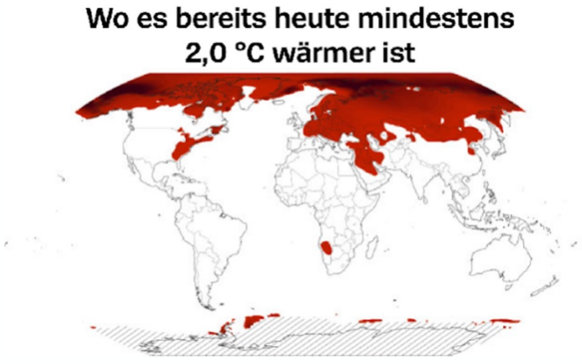
Dynamic data (continuously updated), including historical comparison or own calculations



Spatial datasets (maps) are always of interest







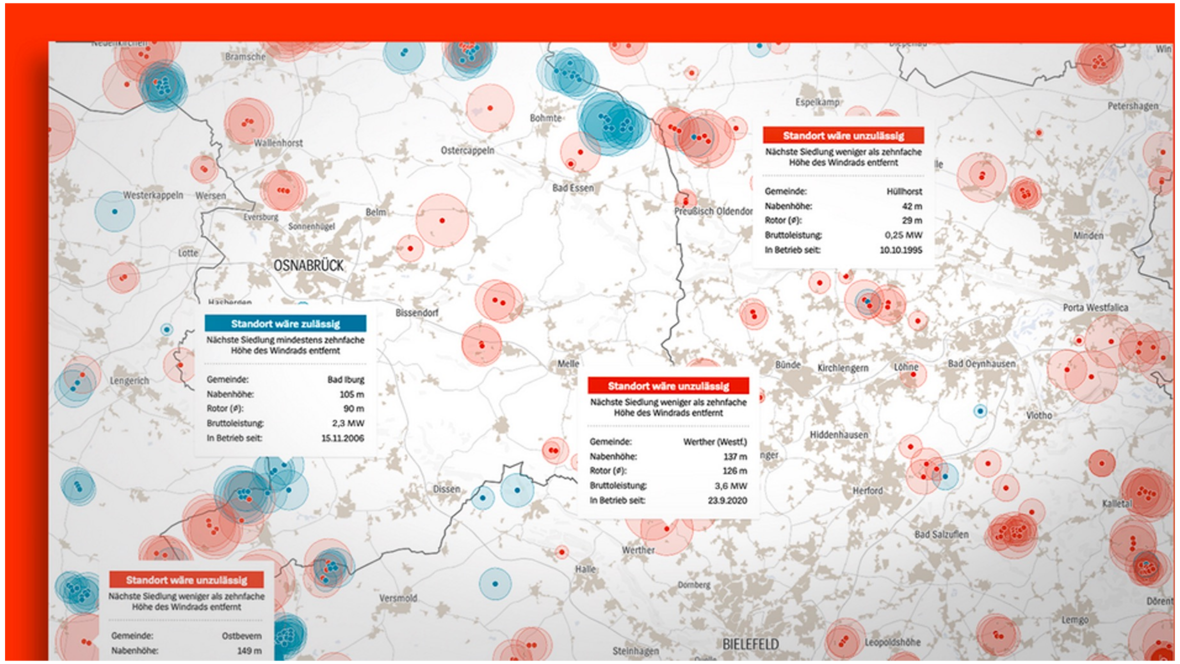
Spatial what-if scenarios

Streit über Abstandsregeln

Wie Bayern den Windkraftausbau blockiert

Die Energiewende wird zu einer Frage der nationalen Sicherheit. Doch was, wenn alle Bundesländer bei der Windkraft so strenge Regeln hätten wie Bayern?

- What-if all German federal states had the same (restrictive) wind energy laws as Bavaria?
- Corine Landcover & "Marktstammdatenregister"



How to handle a data journalist

(What to expect when we approach you…)

So you get an e-mail from a data journalist...

We will arrive with a (simplified) question

Expect us to talk tech but forgive us dumb / newbie questions

Expect us to ask for data behind your charts / maps

Expect us to ask for feedback

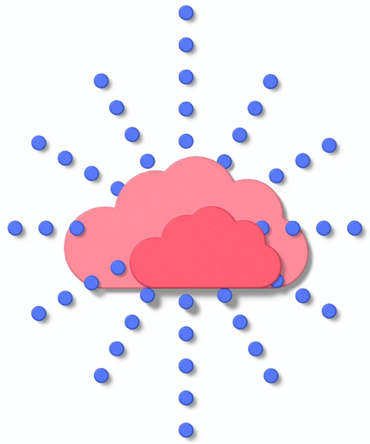
What datasets do we need to do our job?

- We prefer our data **preprocessed but still formable**:
  - preprocessed (geo-)datasets, or flat files that we can style and work on
  - long **time series data** is great for presenting comparisons
  - ready to be used in GIS or other software packages (python / r-stats)
- **Clear documentation with contact person** for the data sets is key
- Data does not have to be stored in central data portals
  (but it **must be googleable**…)
- Please provide **stable URLs or APIs**

A note on

Climate Little Pictures (CLIPs)

Tell us about your CLIP idea!



treva labs | An idea for a little picture.

Topic or Title
Just a few words so we get the idea.

Description
Need a few more lines to elaborate?
Feel free to write them here!

Sketch
Can be a quick sketch,
the Mona Lisa,
or anything in between

Datasets you would like to use?
If you have a certain dataset in mind.

Mind telling us who you are?
So we can reach back to you.

DER SPIEGEL

ubilabs

Thanks!

I'd be happy to talk more about climate & dataviz stuff :)

achim.tack@spiegel.de

tack@ubilabs.com