JOURNEY OF A LITTLE PICTURE

Chris Stewart - ECMWF
Paul Fisher - ESA
Hayley Evers-King - EUMETSAT

23/10/2023

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AGENDA

1. The 3 Es: who are we and want do we do
2. Climate data visualization – rationale for using
3. Climate data visualization – lessons learned, tips and examples
    - EUMETSAT/Copernicus best practice guide
    - Little Pictures
4. The Making Of: Cracked Sea Ice Loss
    - Arctic sea ice – the science
    - Data visualisation – the inspiration and process
    - Getting the data
    - Non-coding option for visualization
    - Coding option
5. The Little Picture gallery and competition

INTRODUCING ESA, EUMETSAT, ECMWF

OBSERVATION	RESEARCH	KNOWLEDGE
Satellite mission development and operations	Generation of multi-mission CDRs for Essential Climate Variables	Climate services and tools to support decision-making

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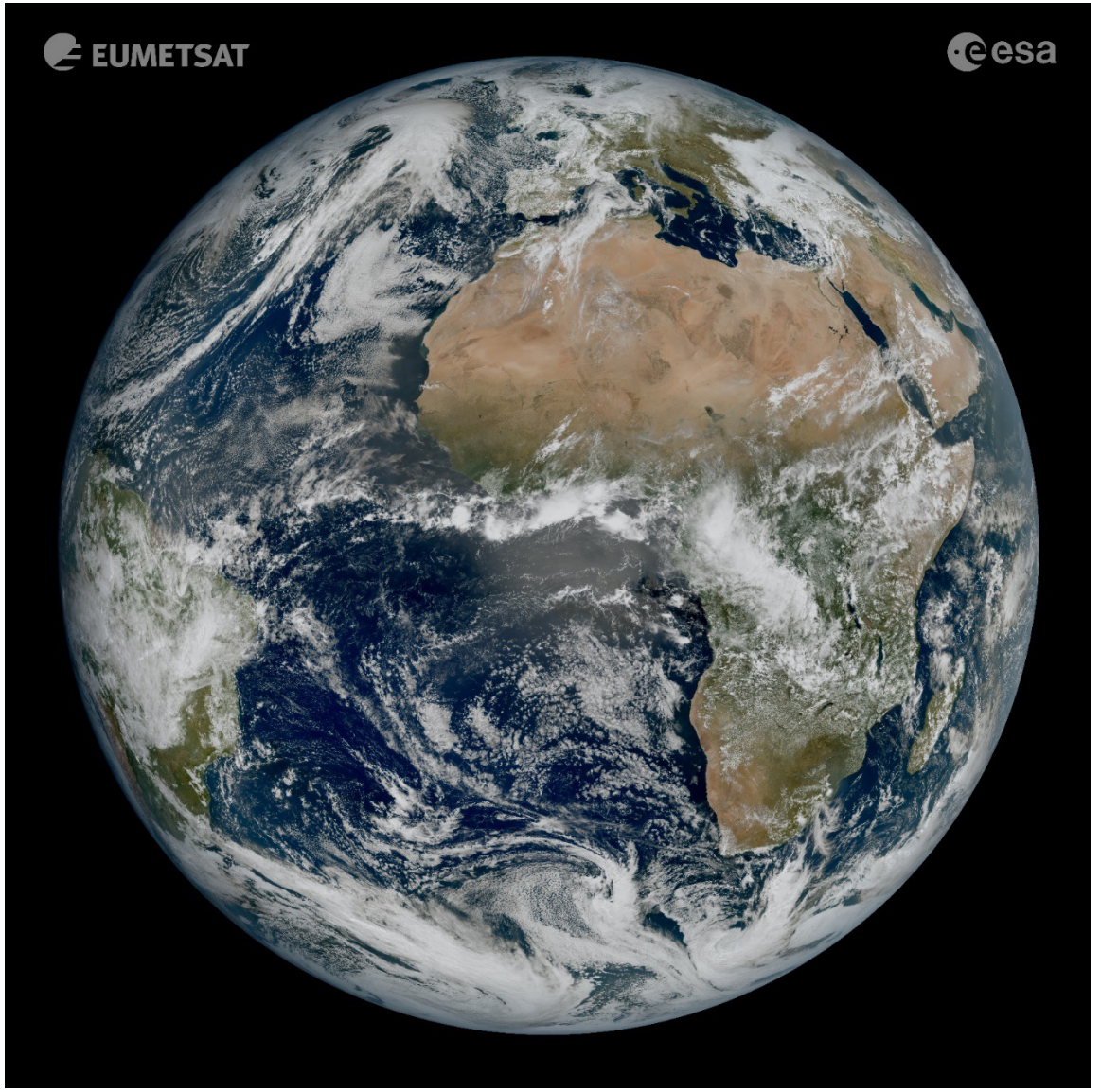
CLIMATE DATA VISUALIZATION – WHY?



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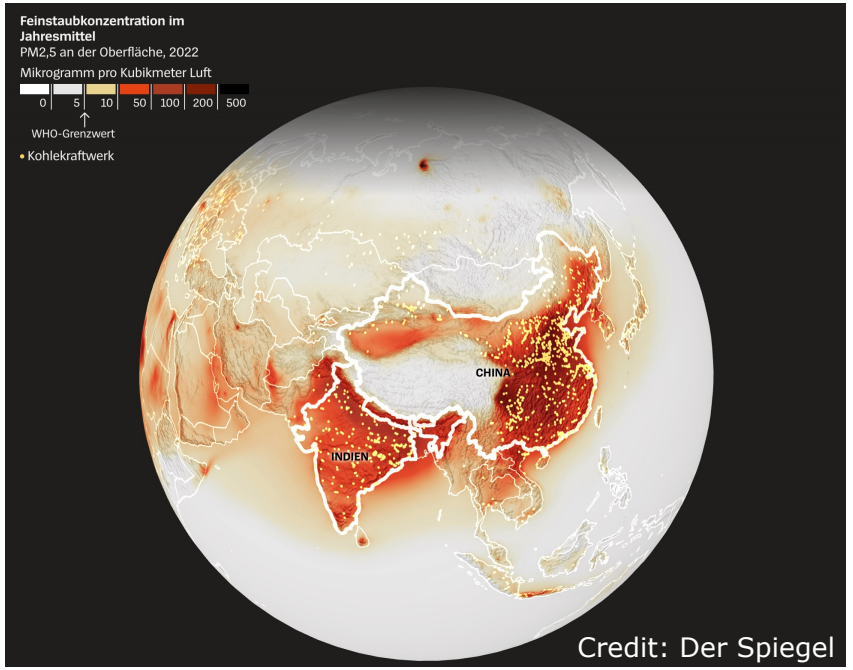
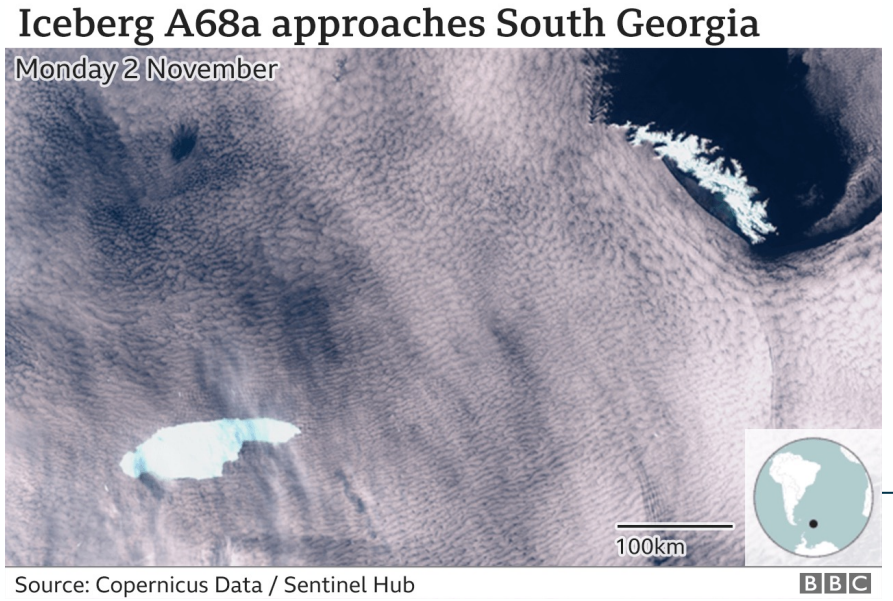


PROGRAMME OF THE EUROPEAN UNION · Copernicus · IMPLEMENTED BY ECMWF · Climate Change Service



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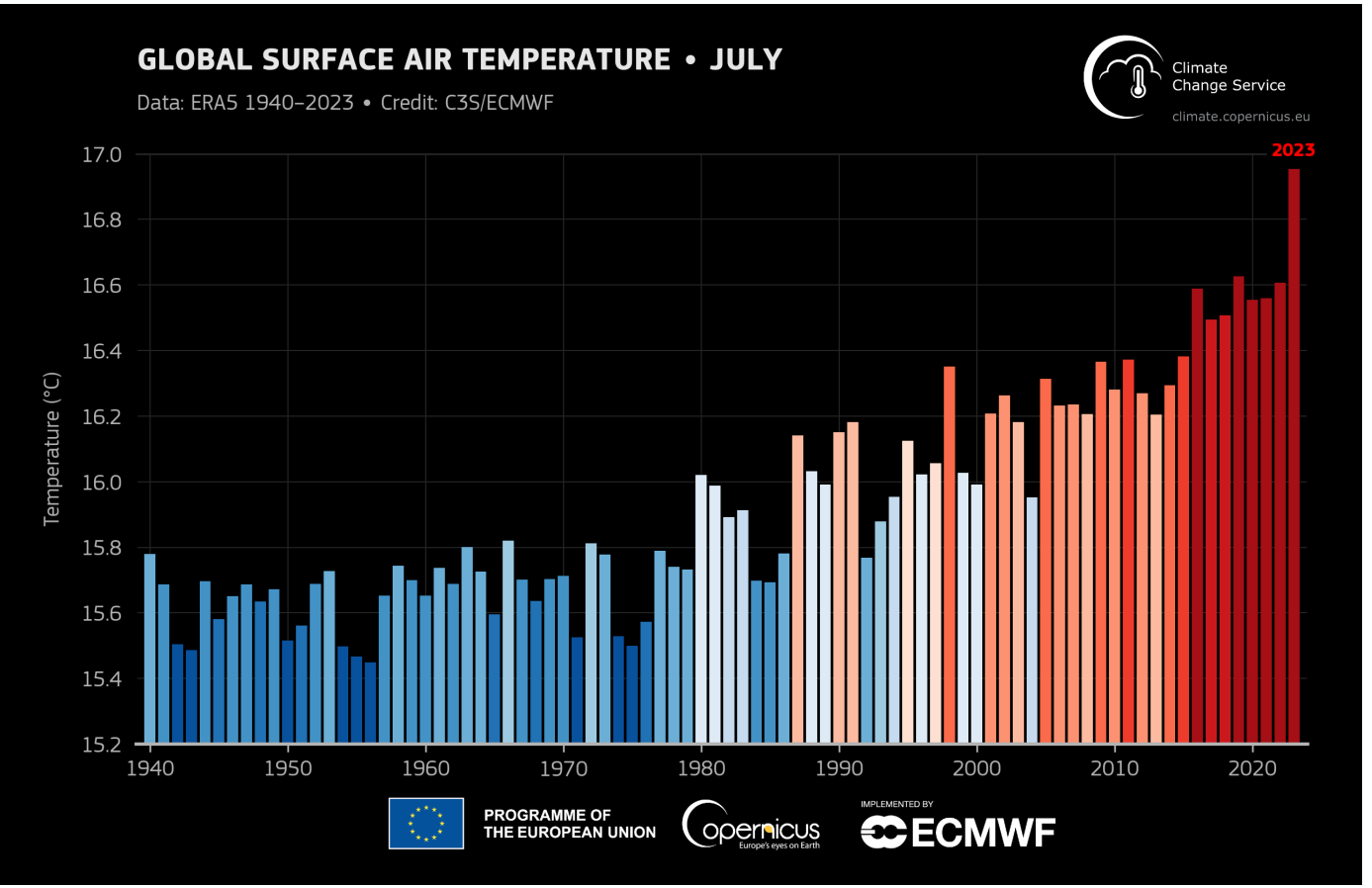
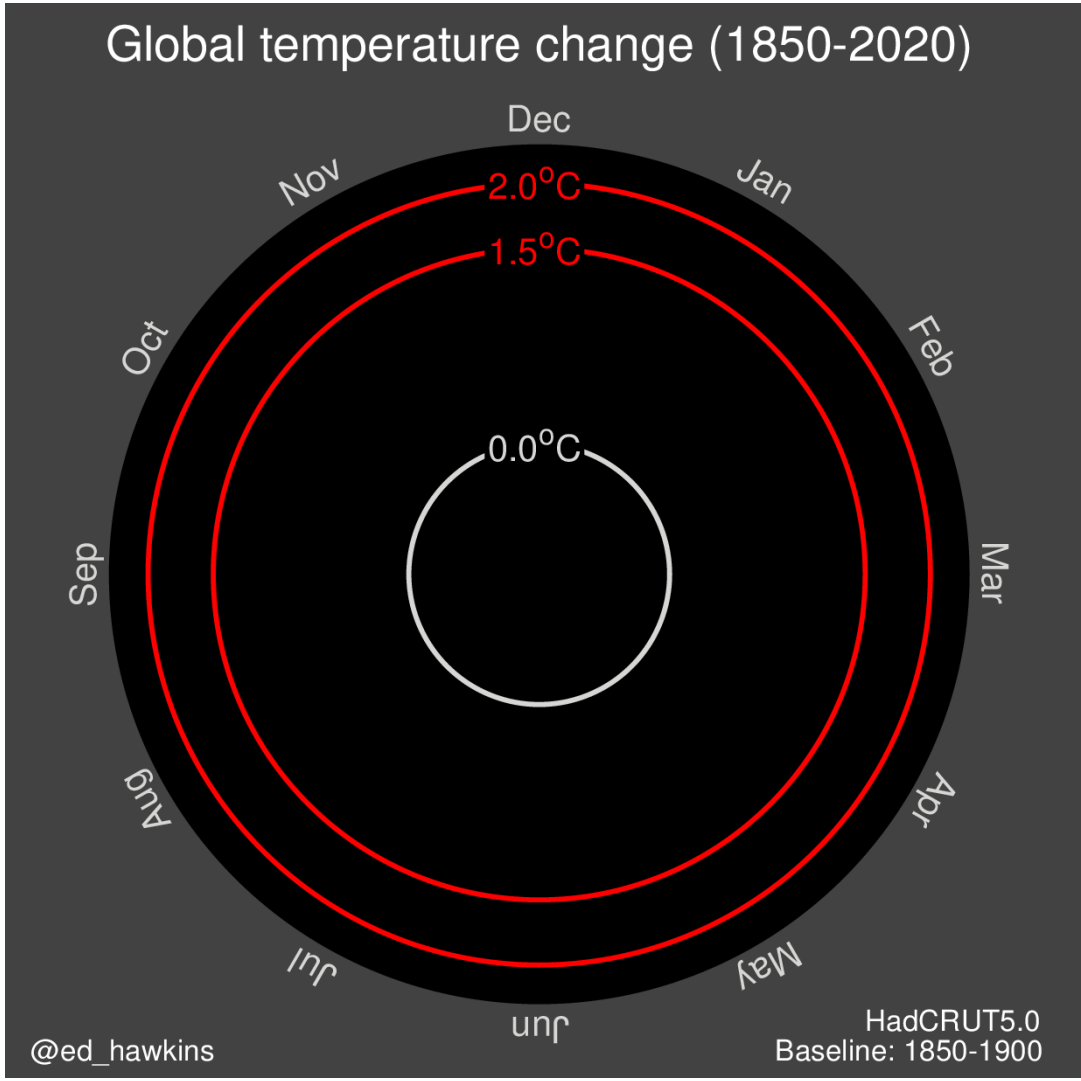
CLIMATE DATA VISUALIZATION – WHAT STORY DO WE WANT TO TELL?

Much to tell!





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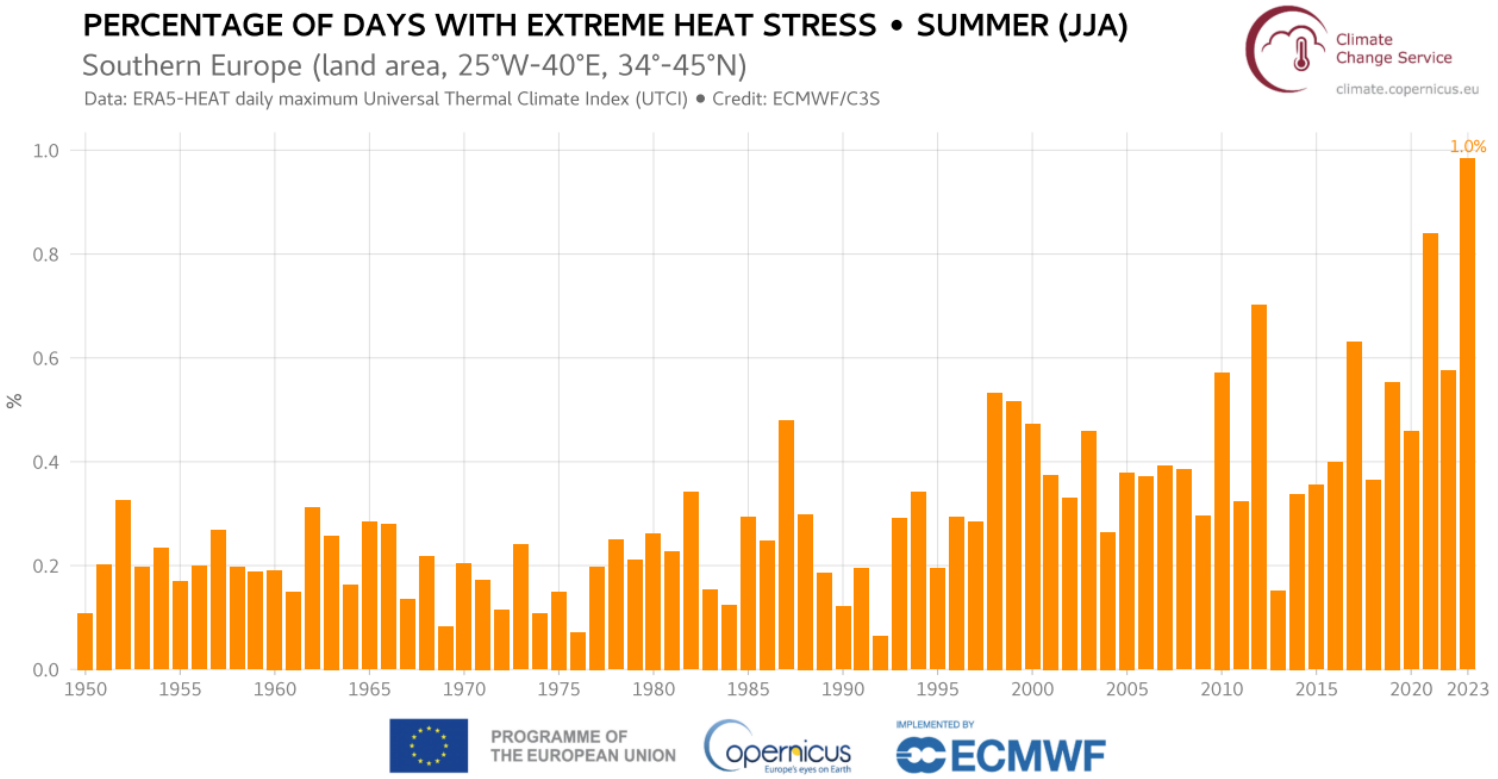
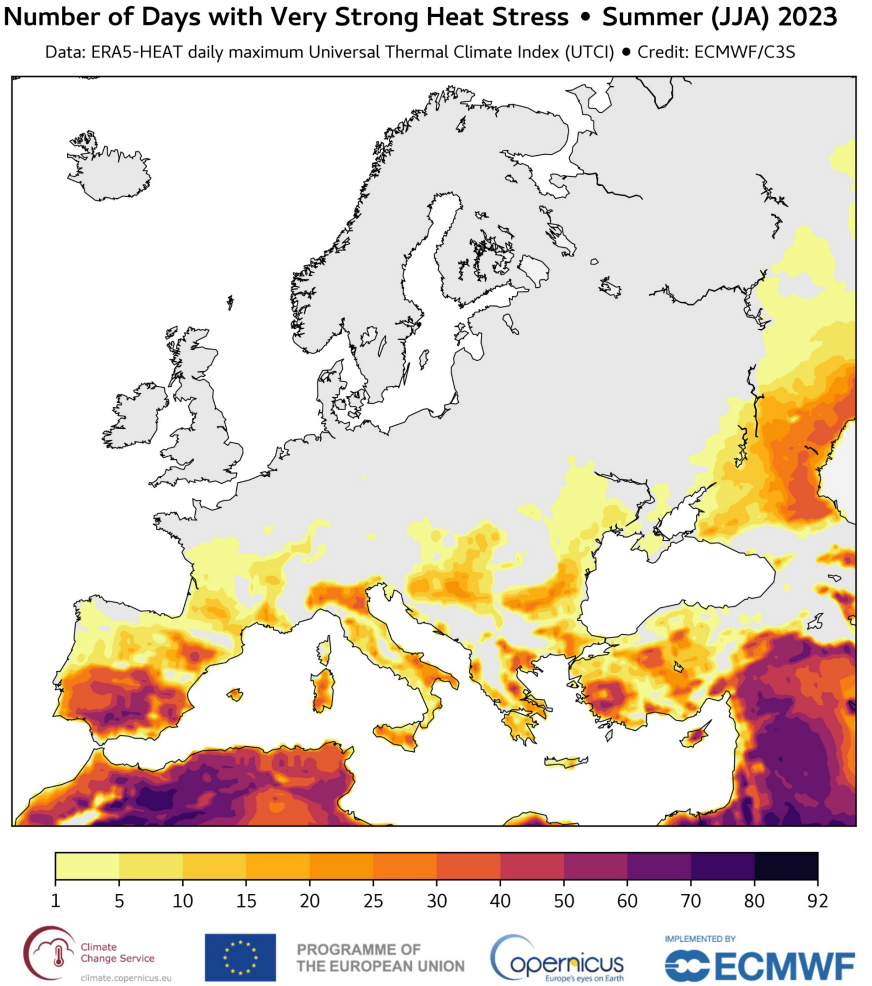
CLIMATE DATA VISUALIZATION – WHAT STORY DO WE WANT TO TELL?

Stories on impacts of global warming





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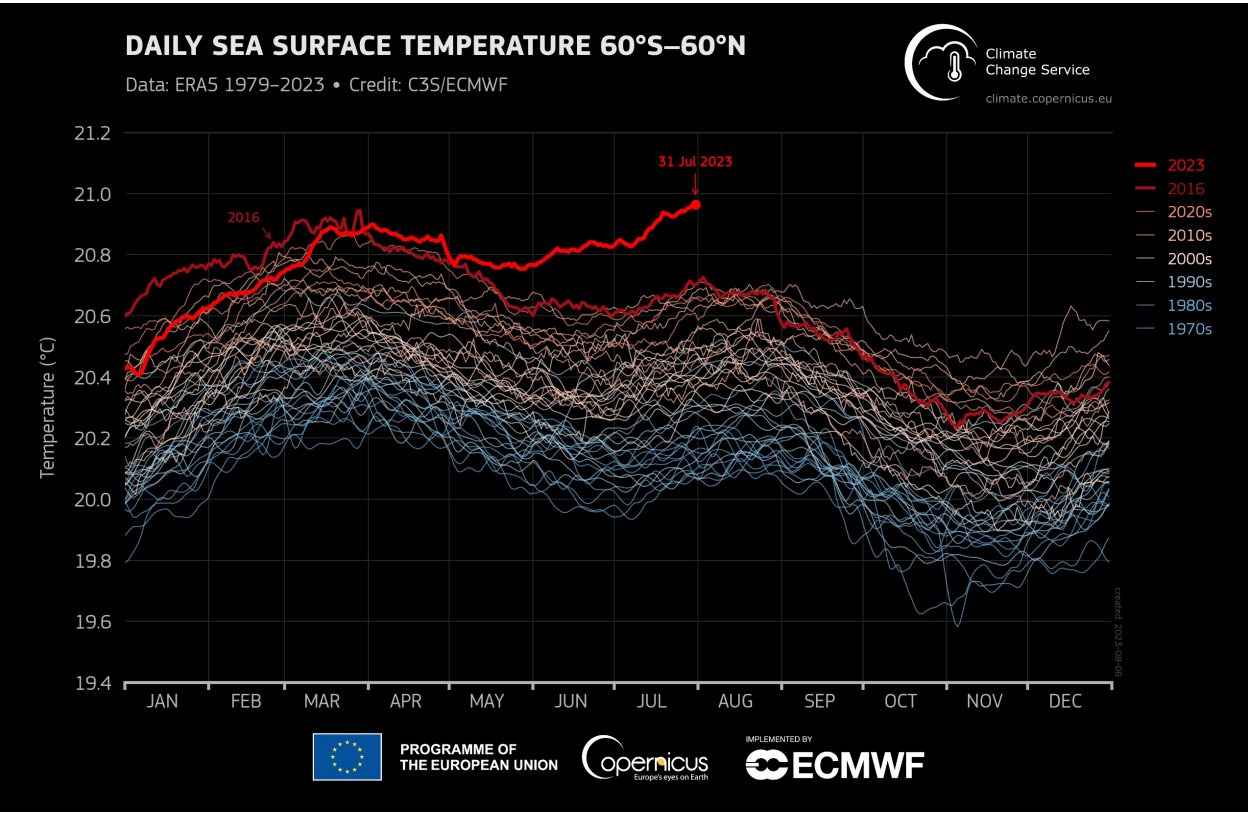
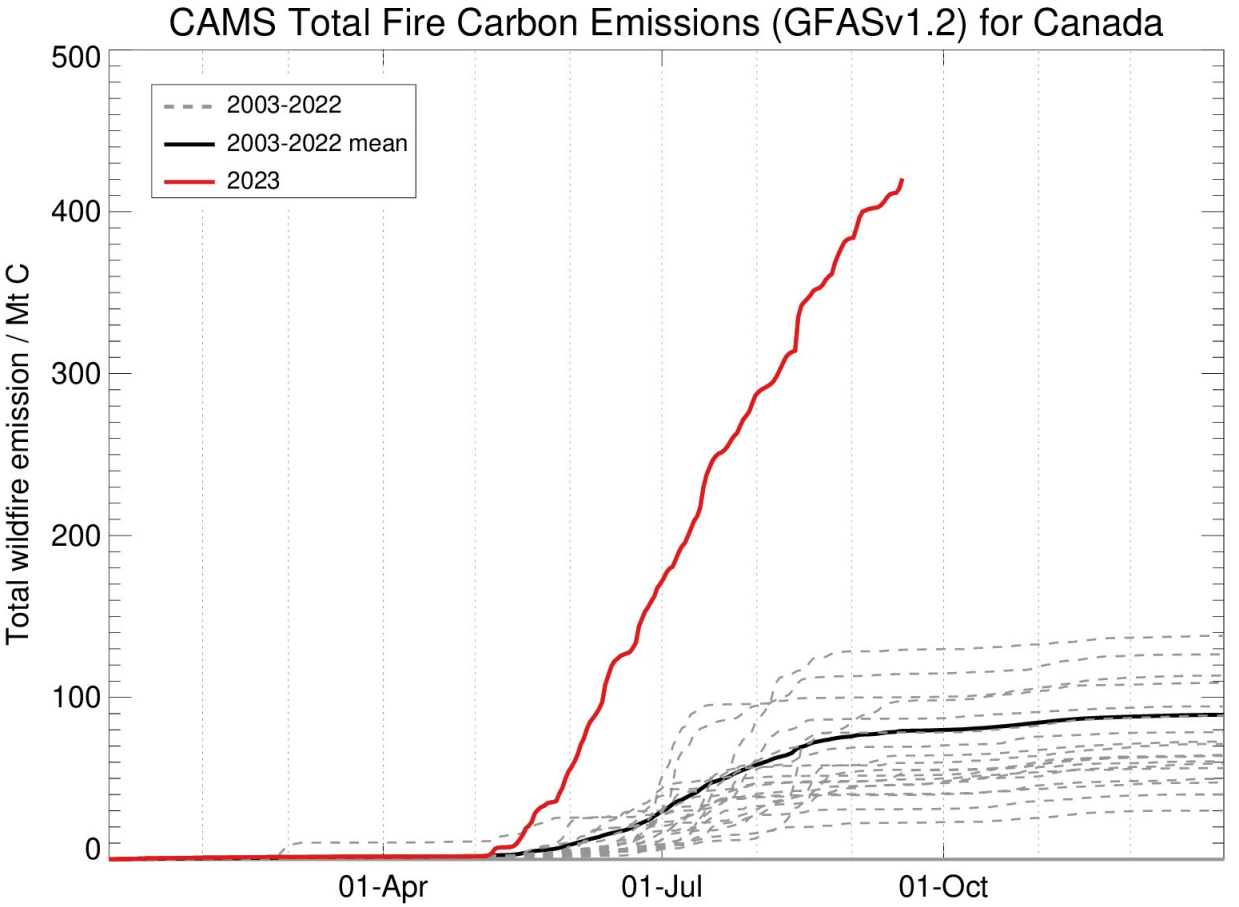
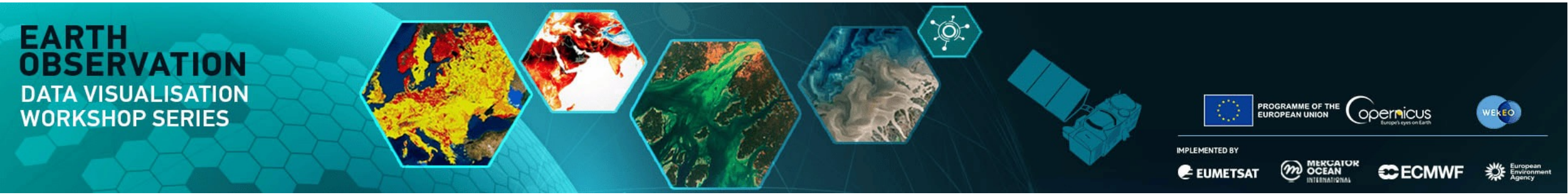
CLIMATE DATA VISUALIZATION – WHAT STORY DO WE WANT TO TELL?

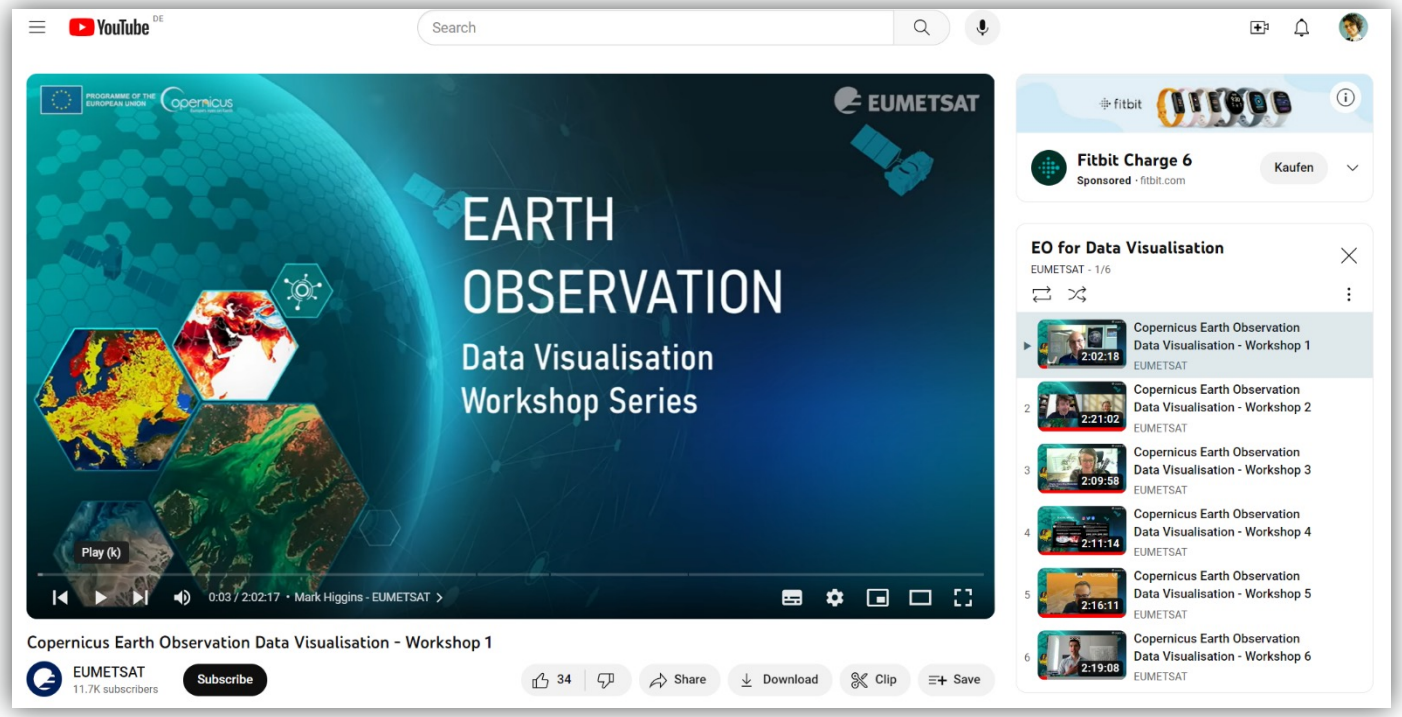
Ample material for stories other than air °C



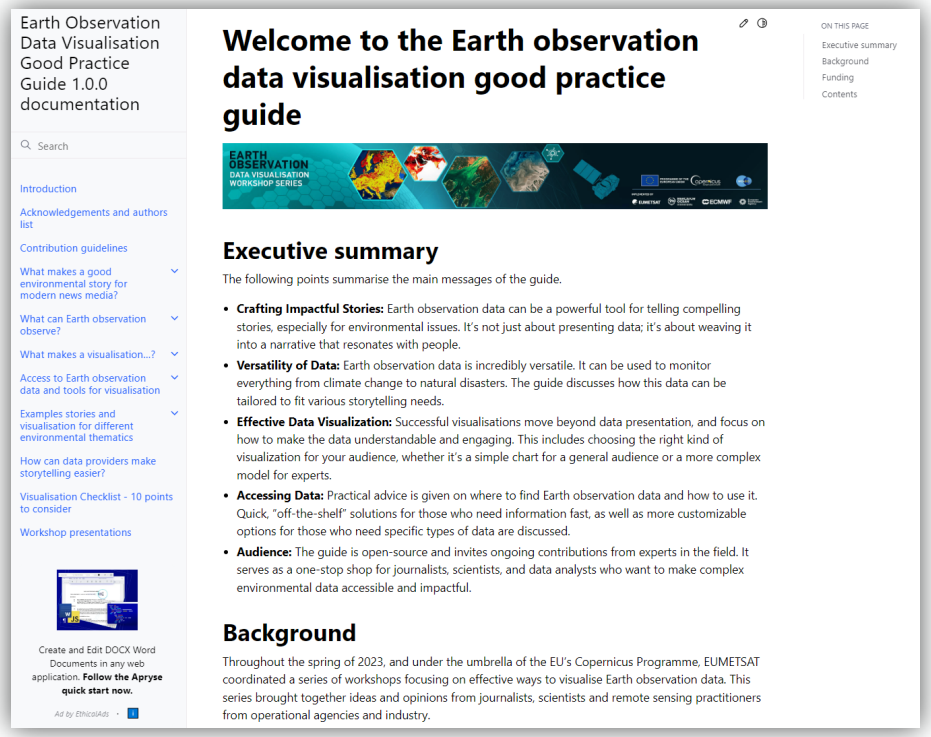


CLIMATE DATA VISUALIZATION – LESSON LEARNED, TIPS & TRICKS





youtube.com/@EUMETSAT1



eo-data-vis-good-practice-guide.readthedocs.io

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CLIMATE DATA VISUALIZATION – LESSON LEARNED, TIPS AND TRICKS

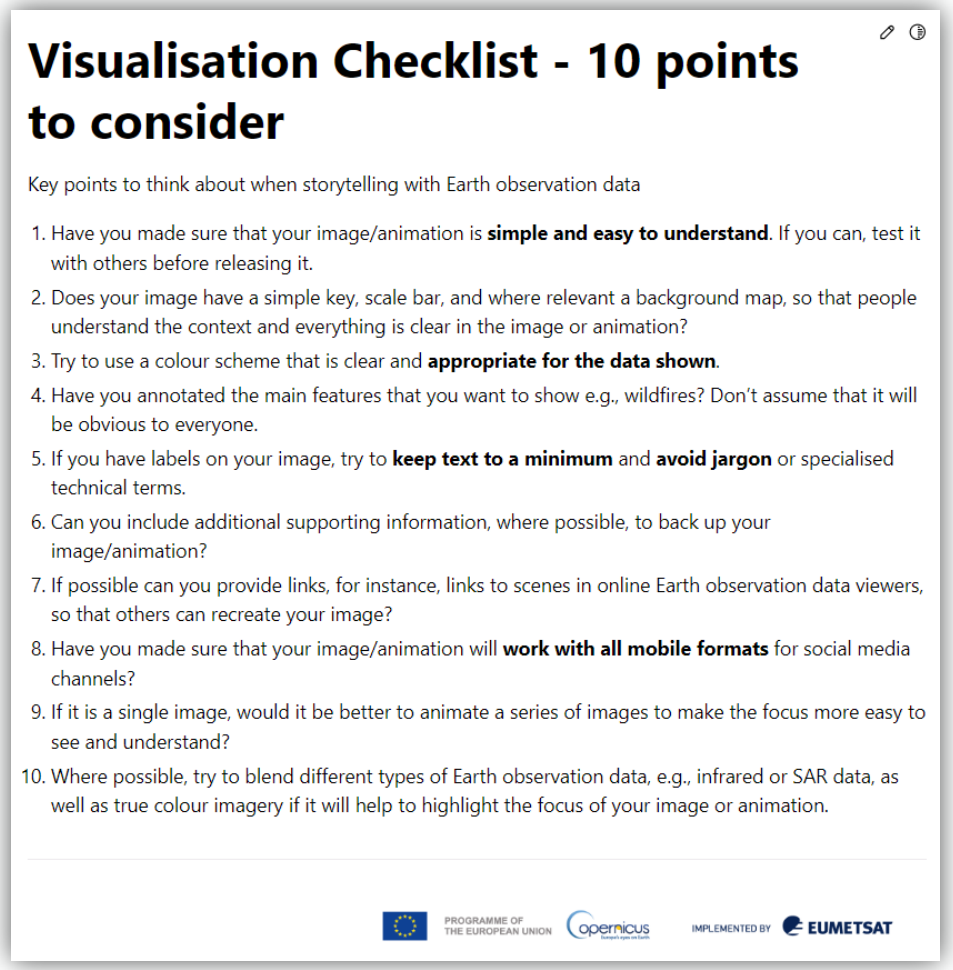
Key points for effective data visualization from recent workshop and Little Pictures experiences…

- Data must be appropriate for the story you are telling or…
  …the story you are telling must represent the data!
  - Does the data represent change in the right context?
  - Are you able to attribute change?
  - Is the data representative? Globally? Regionally?

- Ask data experts for support. Best data for a story is not always the easiest/most available (we work on this!)

- Technical visualizations should be clear on their own....
  ….more creative ones can provoke but should not mislead!

- For wide reaching impact, draw on concepts that people know:
  - Comparisons for scale
  - Viral memes
  - Familiar games, cultural references etc



Visualisation Checklist - 10 points to consider

Key points to think about when storytelling with Earth observation data

1. Have you made sure that your image/animation is **simple and easy to understand**. If you can, test it with others before releasing it.
2. Does your image have a simple key, scale bar, and where relevant a background map, so that people understand the context and everything is clear in the image or animation?
3. Try to use a colour scheme that is clear and **appropriate for the data shown**.
4. Have you annotated the main features that you want to show e.g., wildfires? Don't assume that it will be obvious to everyone.
5. If you have labels on your image, try to **keep text to a minimum** and **avoid jargon** or specialised technical terms.
6. Can you include additional supporting information, where possible, to back up your image/animation?
7. If possible can you provide links, for instance, links to scenes in online Earth observation data viewers, so that others can recreate your image?
8. Have you made sure that your image/animation will **work with all mobile formats** for social media channels?
9. If it is a single image, would it be better to animate a series of images to make the focus more easy to see and understand?
10. Where possible, try to blend different types of Earth observation data, e.g., infrared or SAR data, as well as true colour imagery if it will help to highlight the focus of your image or animation.

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COLOUR SCHEMES AND ACCESSIBILITY

Colour scales that are often illegible to those who are colour blind and can distort perceptions of data and alter the meaning by creating false boundaries between values. The tools and articles below help select appropriate palette.

Tools

Color Brewer - https://colorbrewer2.org – create colour schemes for maps and charts

HCL wizard - http://hclwizard.org:3000/hclwizard/ - GUI for viewing, manipulating, and choosing HCL (hue-chroma-luminance) colour palettes

Colorgraphical - http://vrl.cs.brown.edu/color - generate a palette with *n* colors

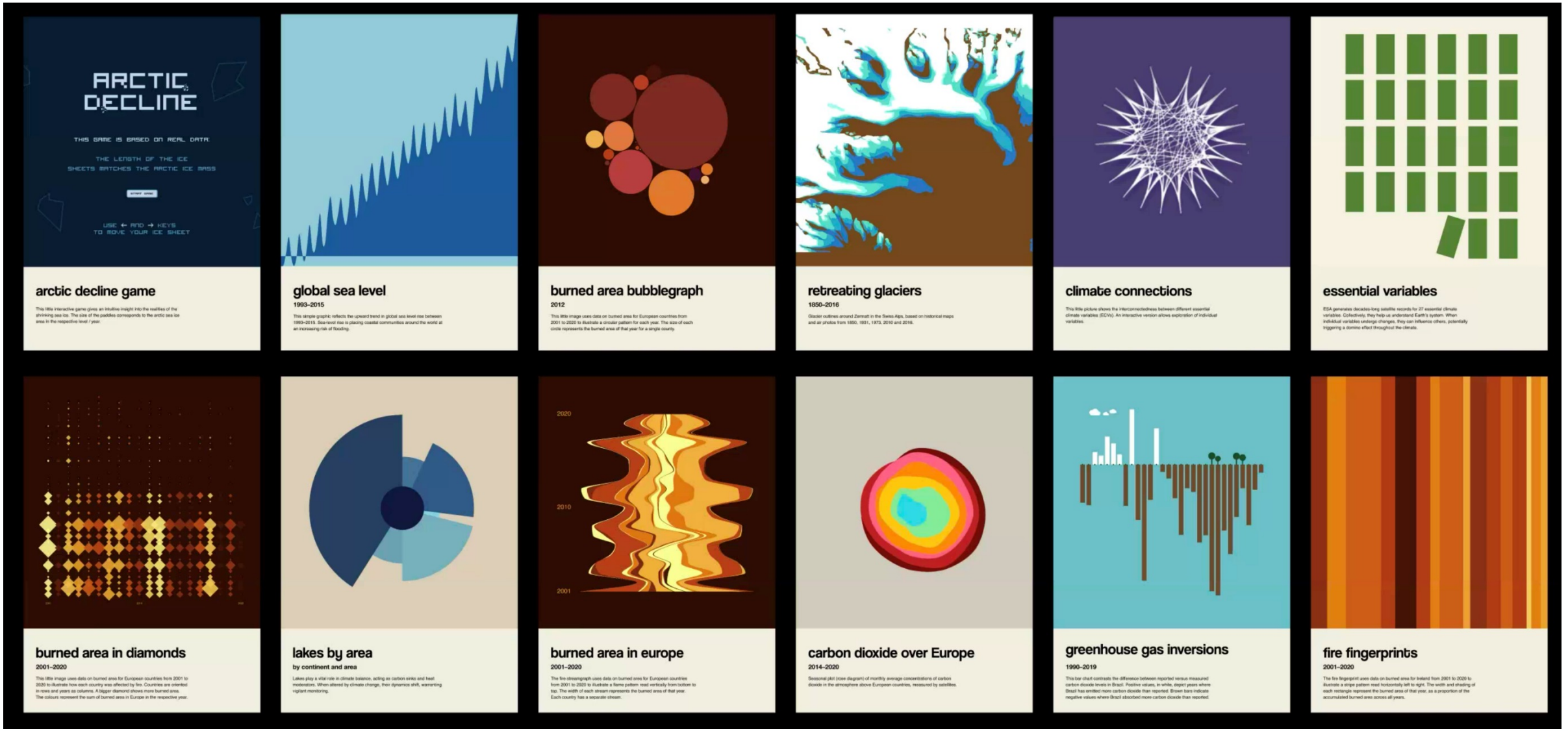
http://www.vischeck.com/ - see how your figures might appear to those who are colour blind.

Articles

Scrap rainbow colour scales - https://www.nature.com/articles/519291d - discussion advocating dropping rainbow colour scales in scientific communication

Visualizing Science: How Color Determines What We See https://eos.org/features/visualizing-science-how-color-determines-what-we-see

LITTLE PICTURES



https://climate.esa.int/littlepicturescompetition

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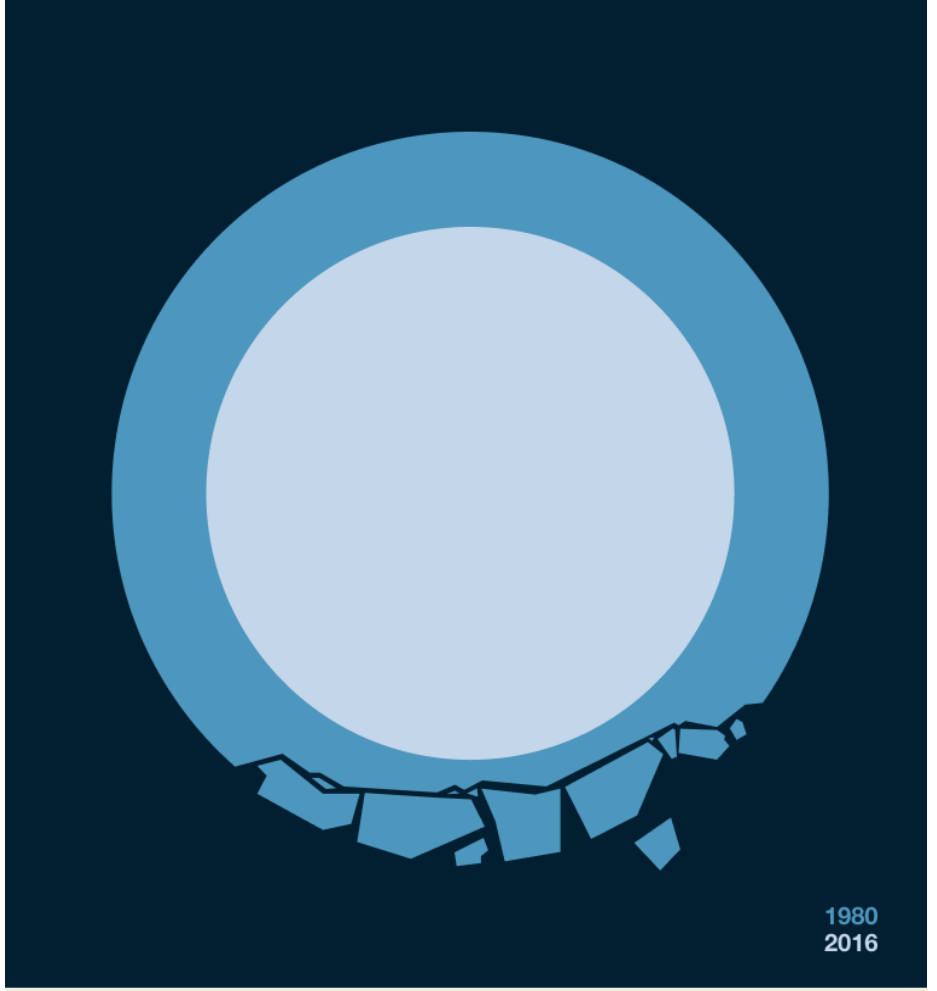
ANATOMY OF A LITTLE PICTURE



sea ice loss

1980 – 2016

This simple graphic depicting the reduction of Arctic sea ice between 1980 and 2016, highlights the urgency of the Arctic sea ice loss crisis. As our planet's temperature continues to rise due to climate change, the Arctic is losing sea ice.

← One message only

← Graphic design - art

← Data-driven by climate science data via EUMETSAT and ESA R&D(but don't use numbers)

← Emotive

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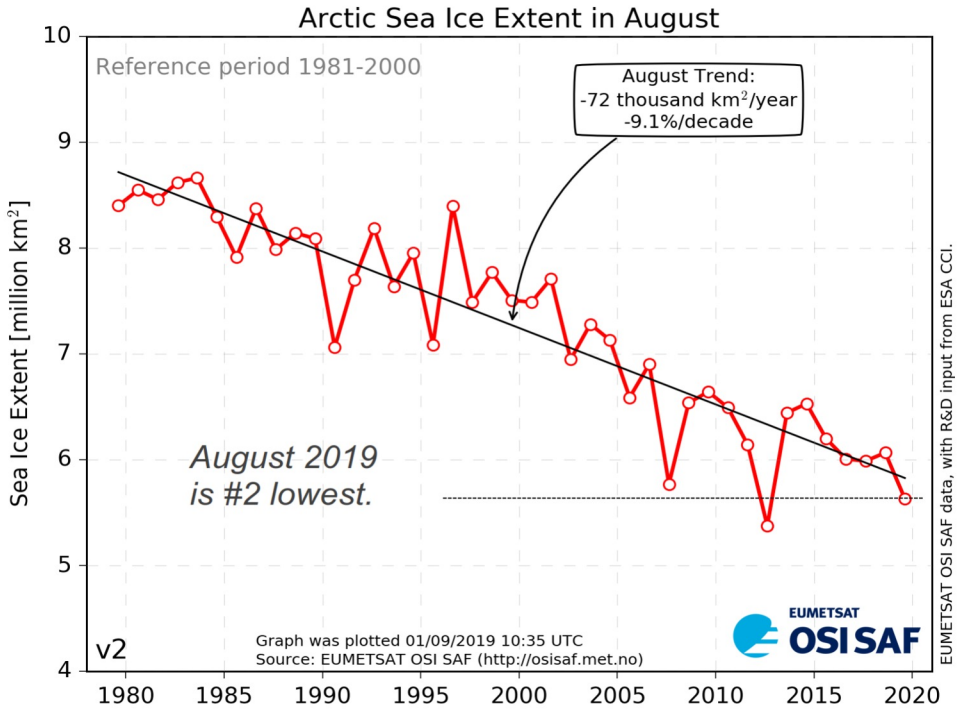
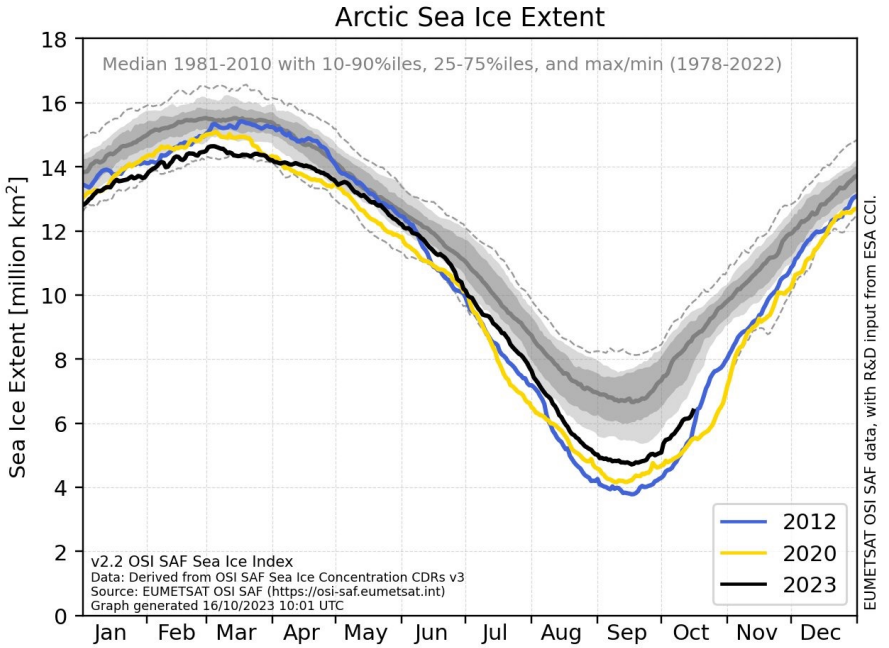
SCIENTIFIC GRAPHS: ARCTIC SEA ICE

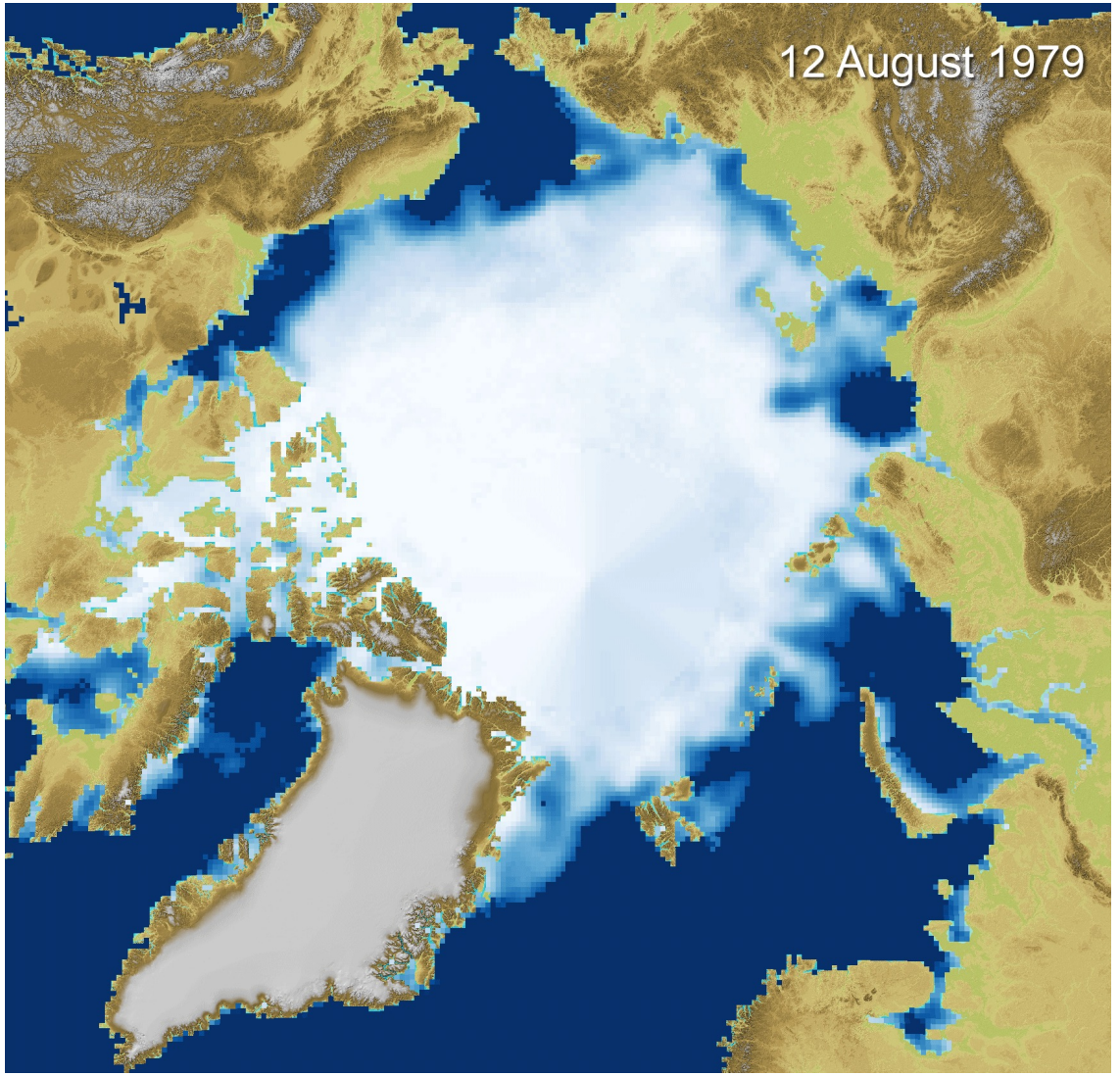
Sea Ice Concentration / Area / Extent

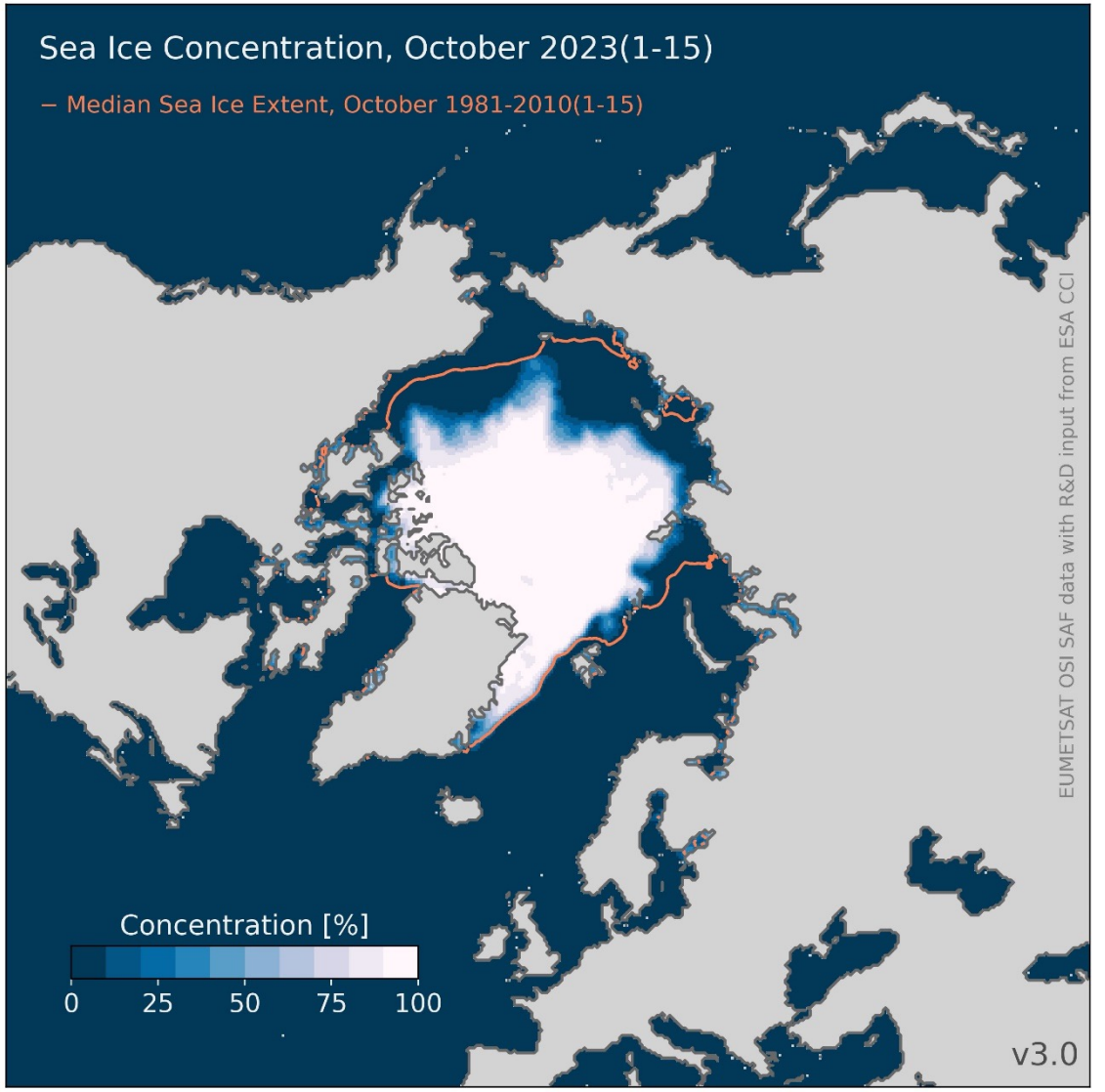




40+ years consistent sea ice extent

SCIENTIFIC MAPS: ARCTIC SEA ICE





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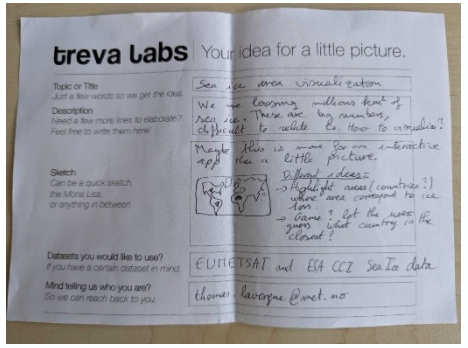
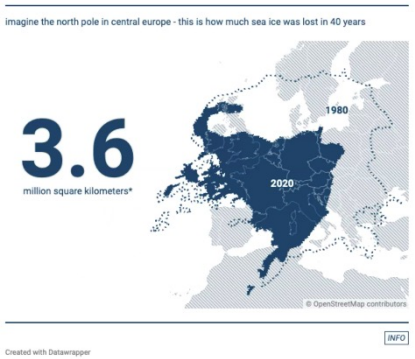
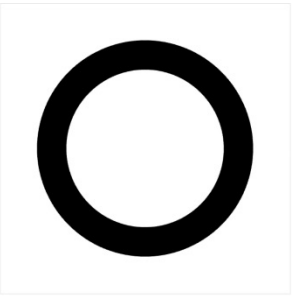
THE MAKING OF: CRACKED SEA ICE LOSS



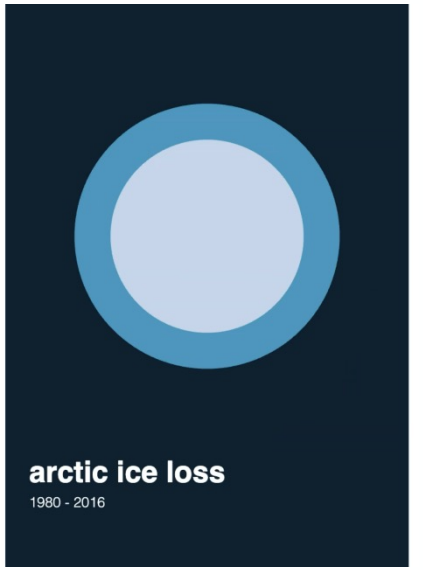
brainstorm



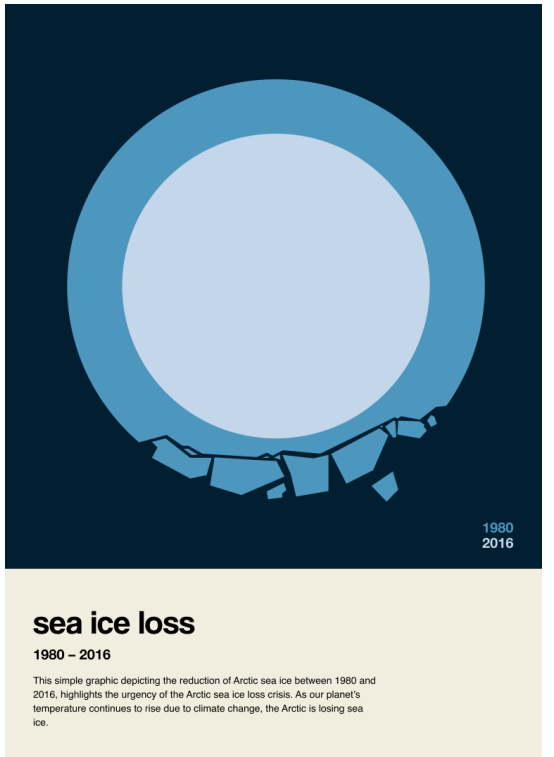
traditional map



minimal design



colour scheme



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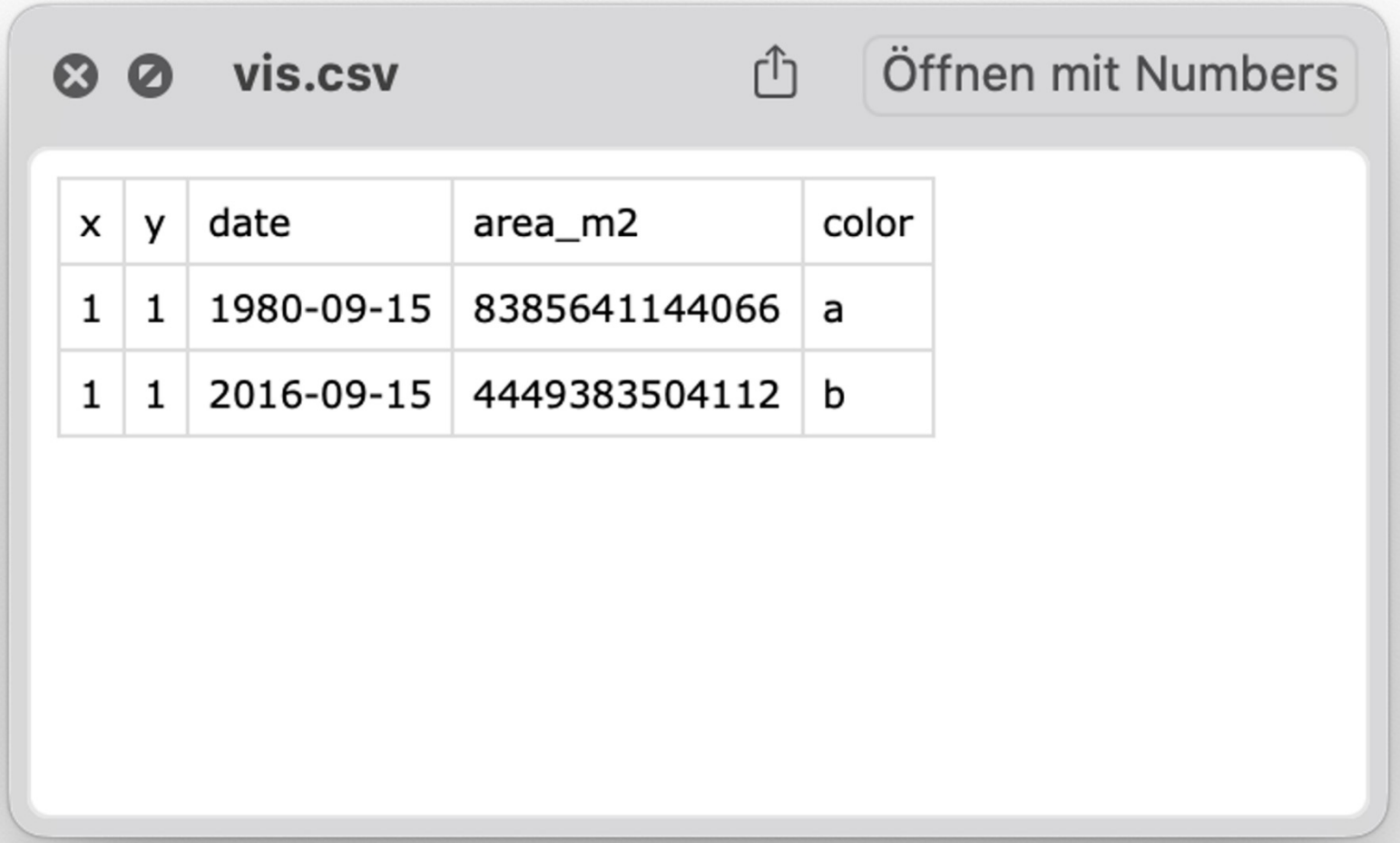
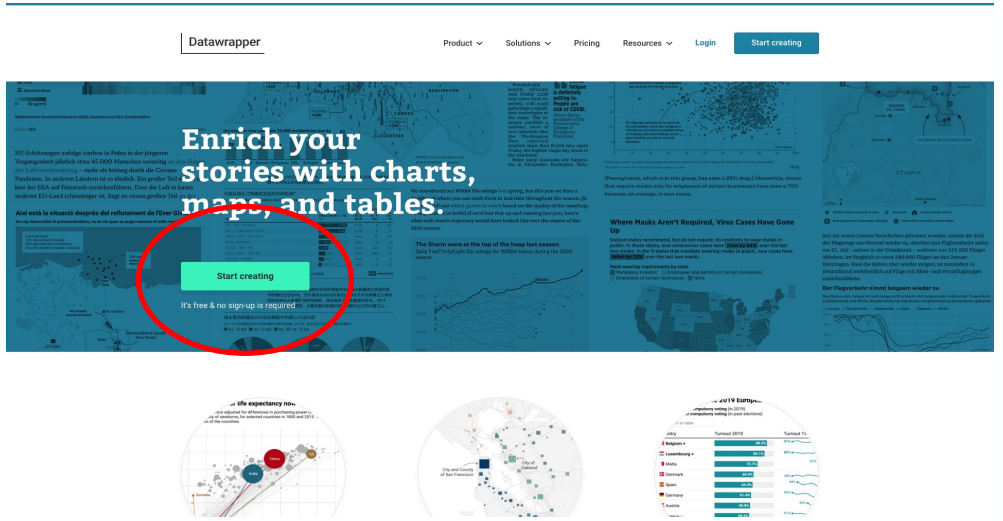
ACCCESSING THE DATA

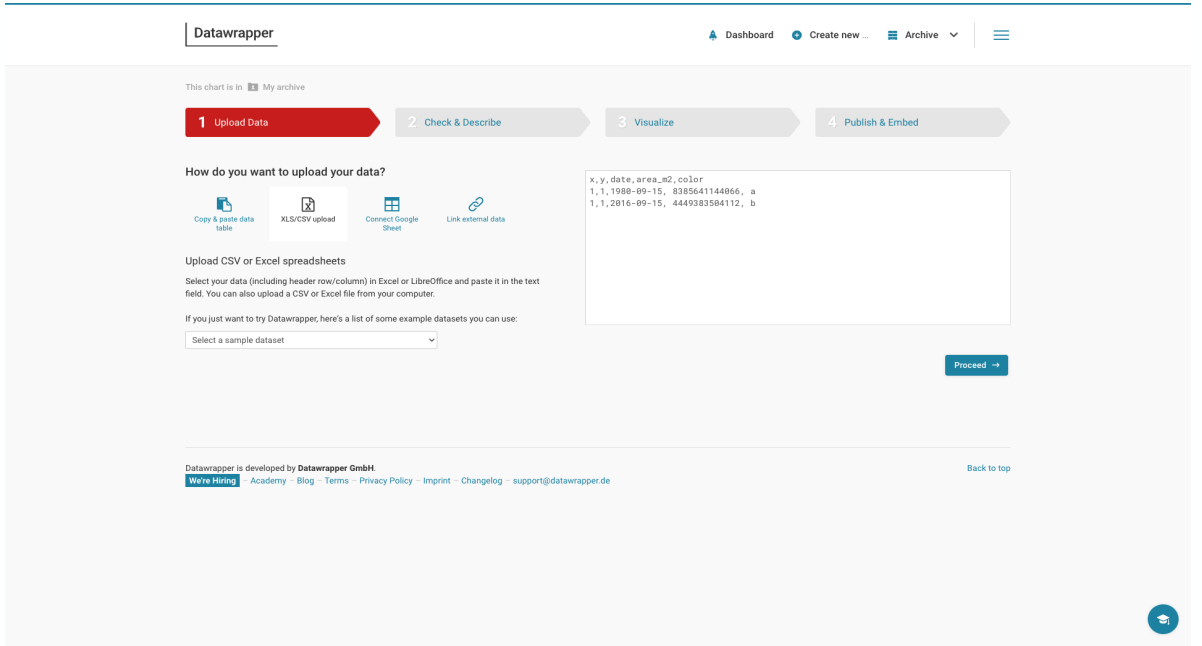


x	y	date	area_m2	color
1	1	1980-09-15	8385641144066	a
1	1	2016-09-15	4449383504112	b

→ eumetsat.int/eumetsat-data-store (full dataset)
→ climate.esa.int/littlepicturescompetition/ (github repository)

NO CODING VISUALISATION: DATAWRAPPER





4-step approach

1. **Add data** - copy n paste csv; check & describe, is it parsed correctly?
2. **Visualise** - Scatter Plot. Refine in the “Size” and the “Color” sections. Experiment with other settings to create different results
3. **Annotate**
4. **Publish & Embed** embed link or png for social media

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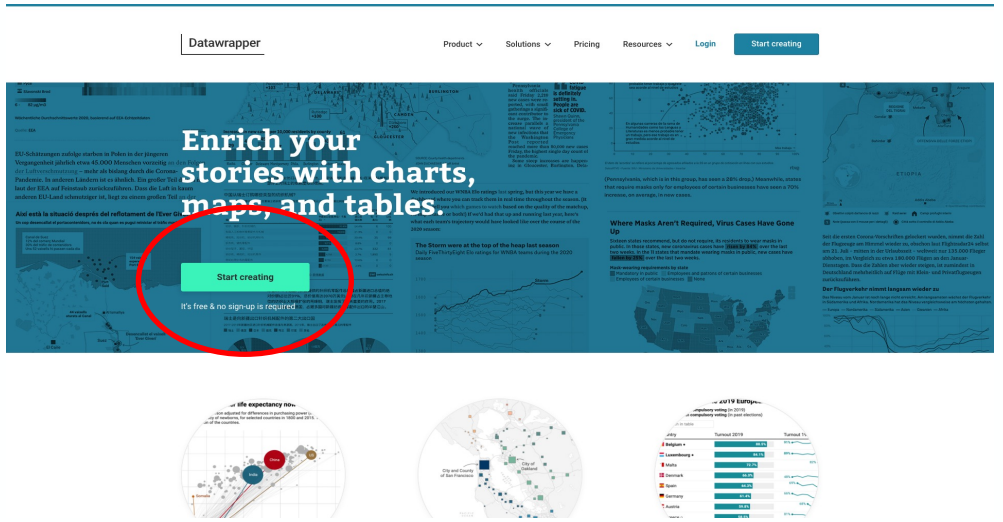

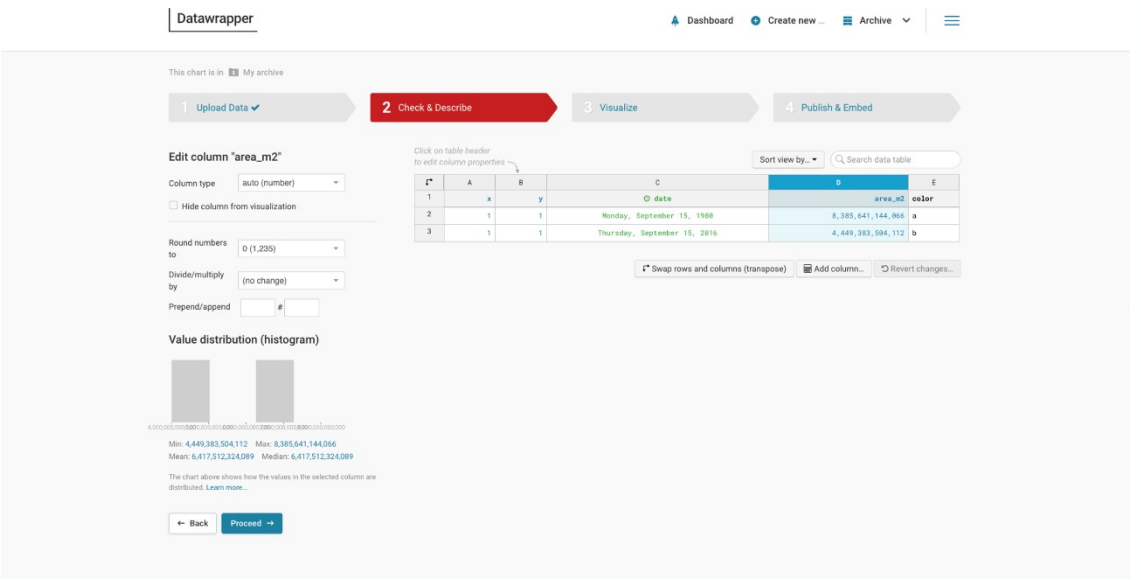

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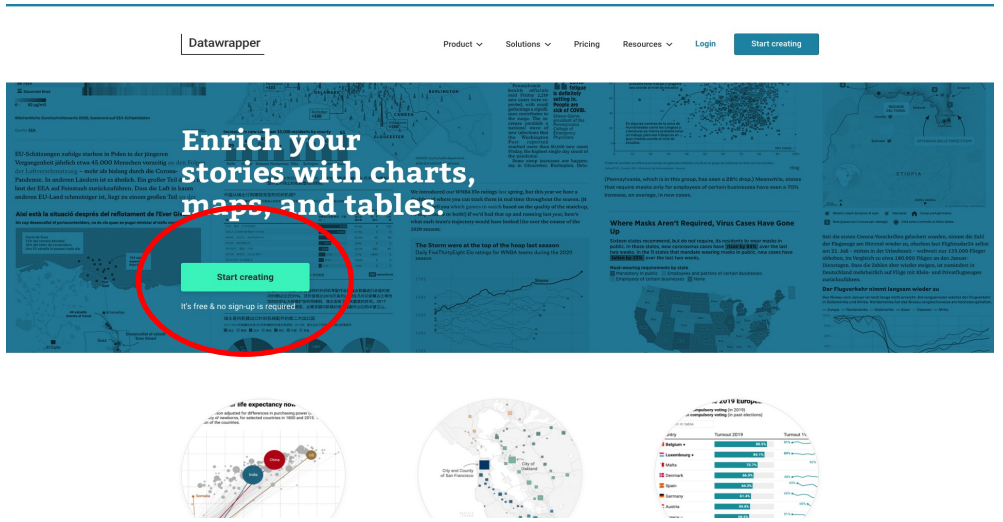

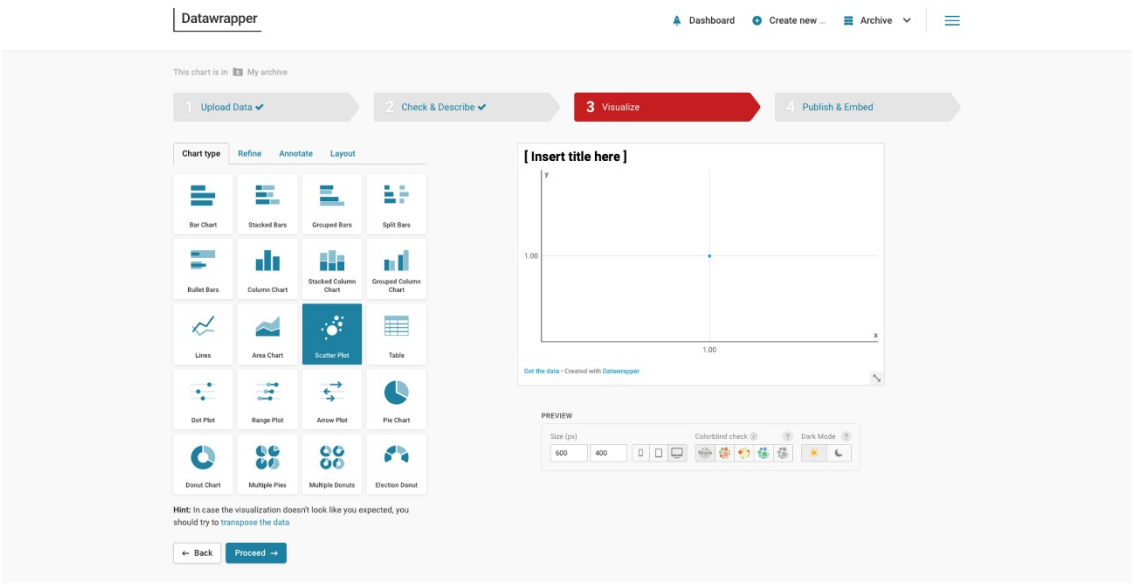

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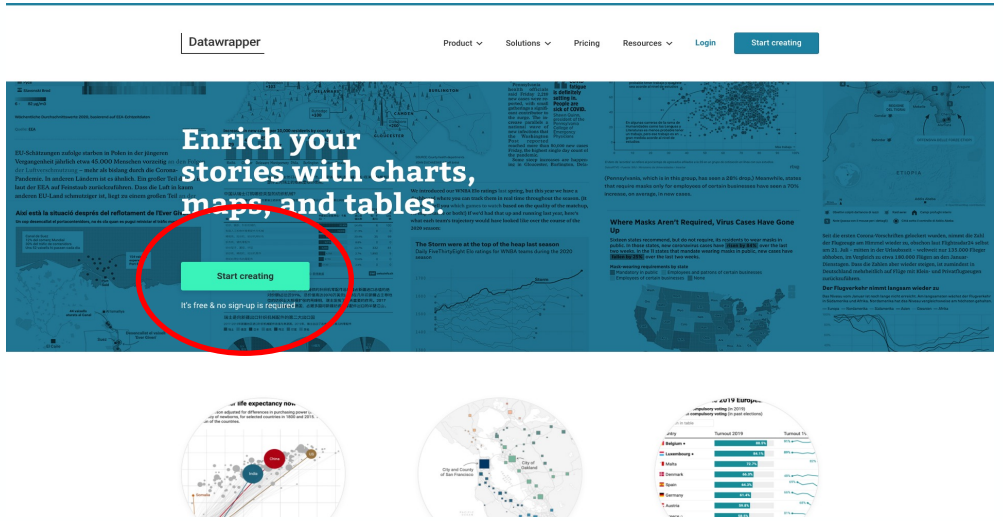

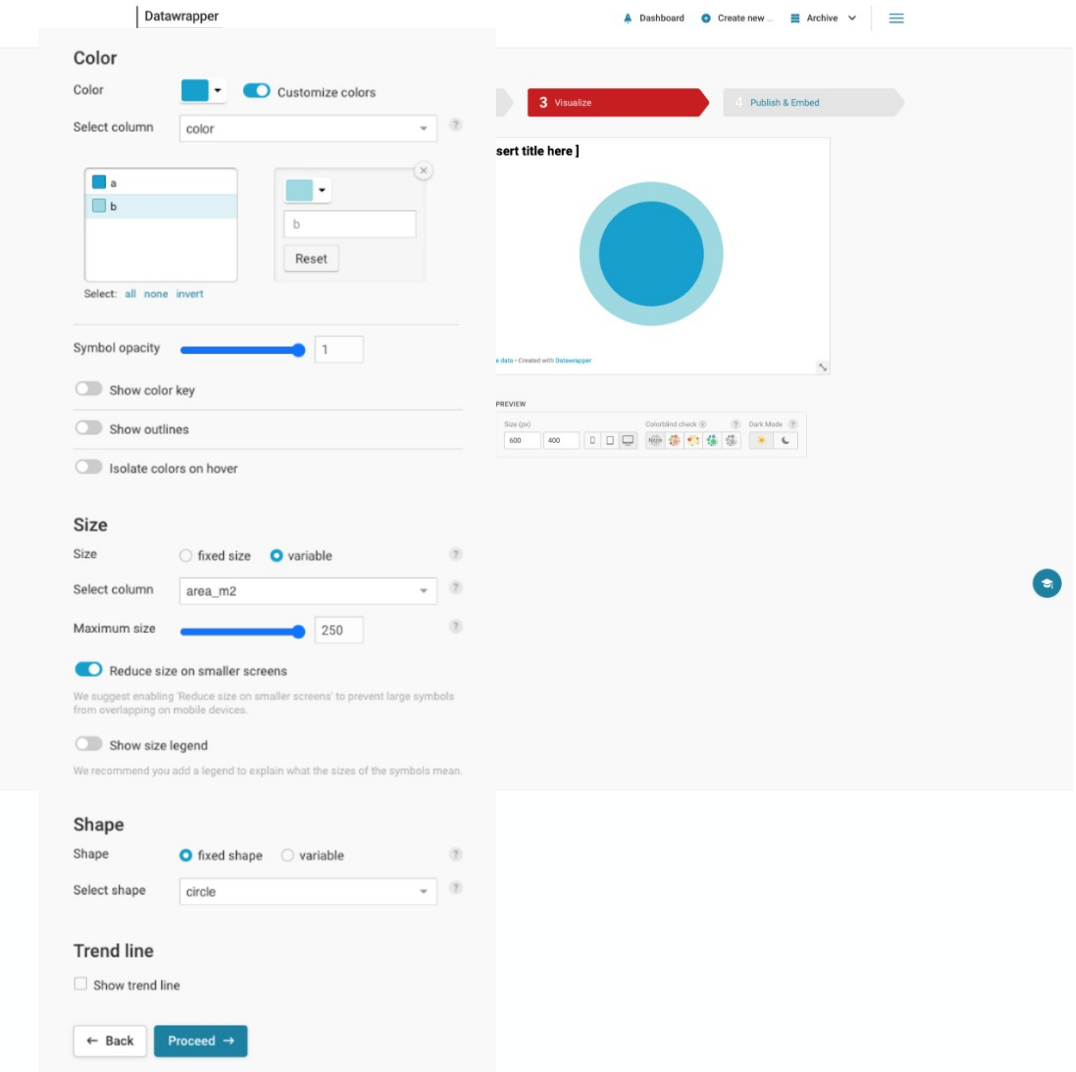

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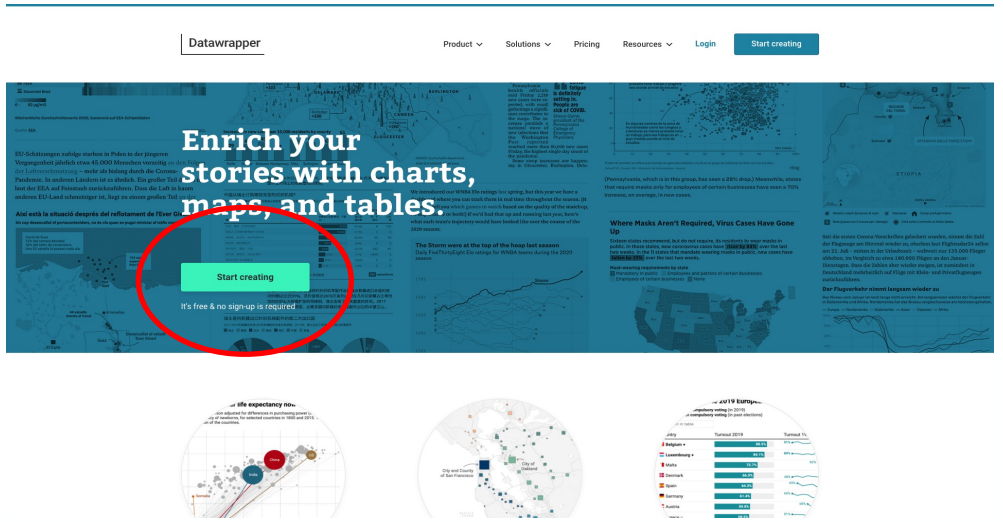

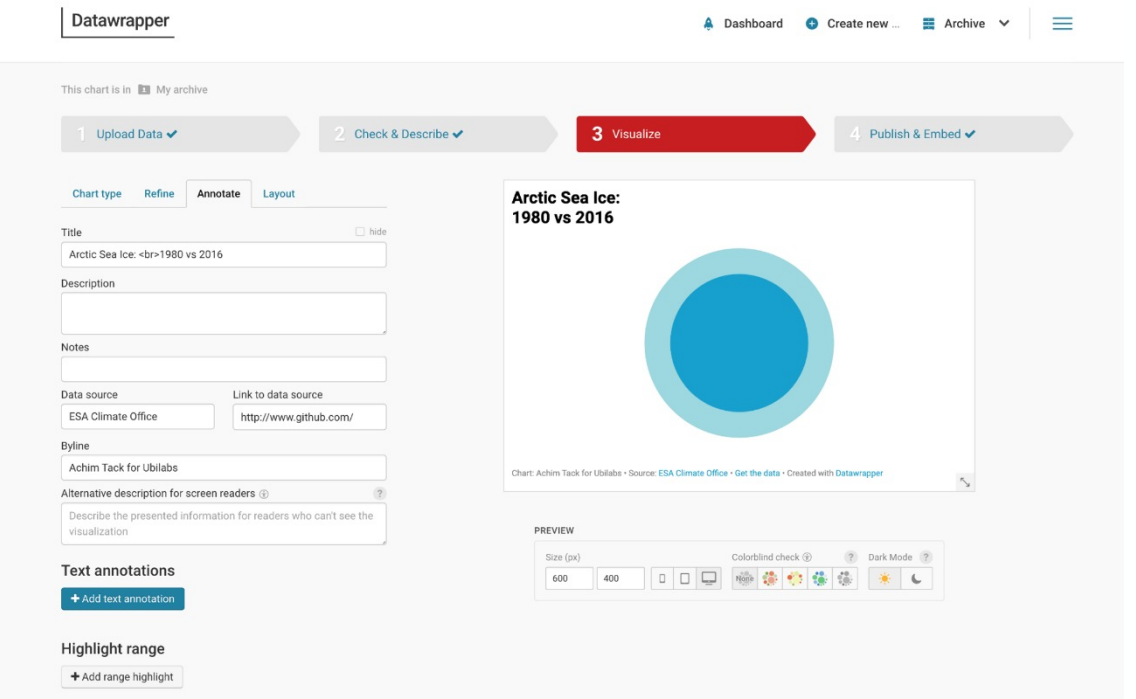

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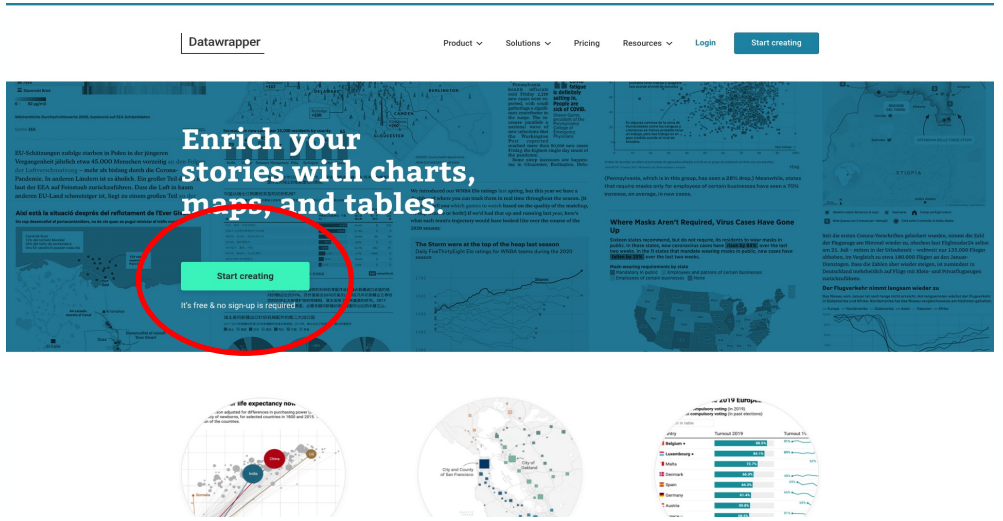

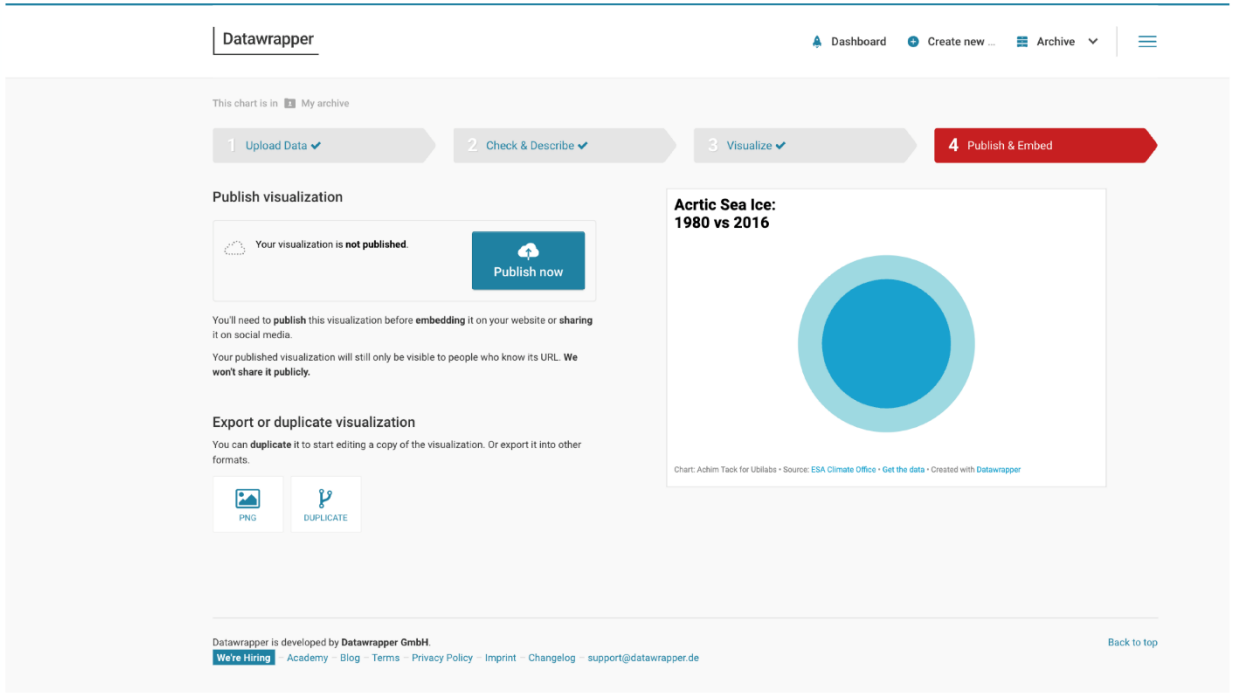

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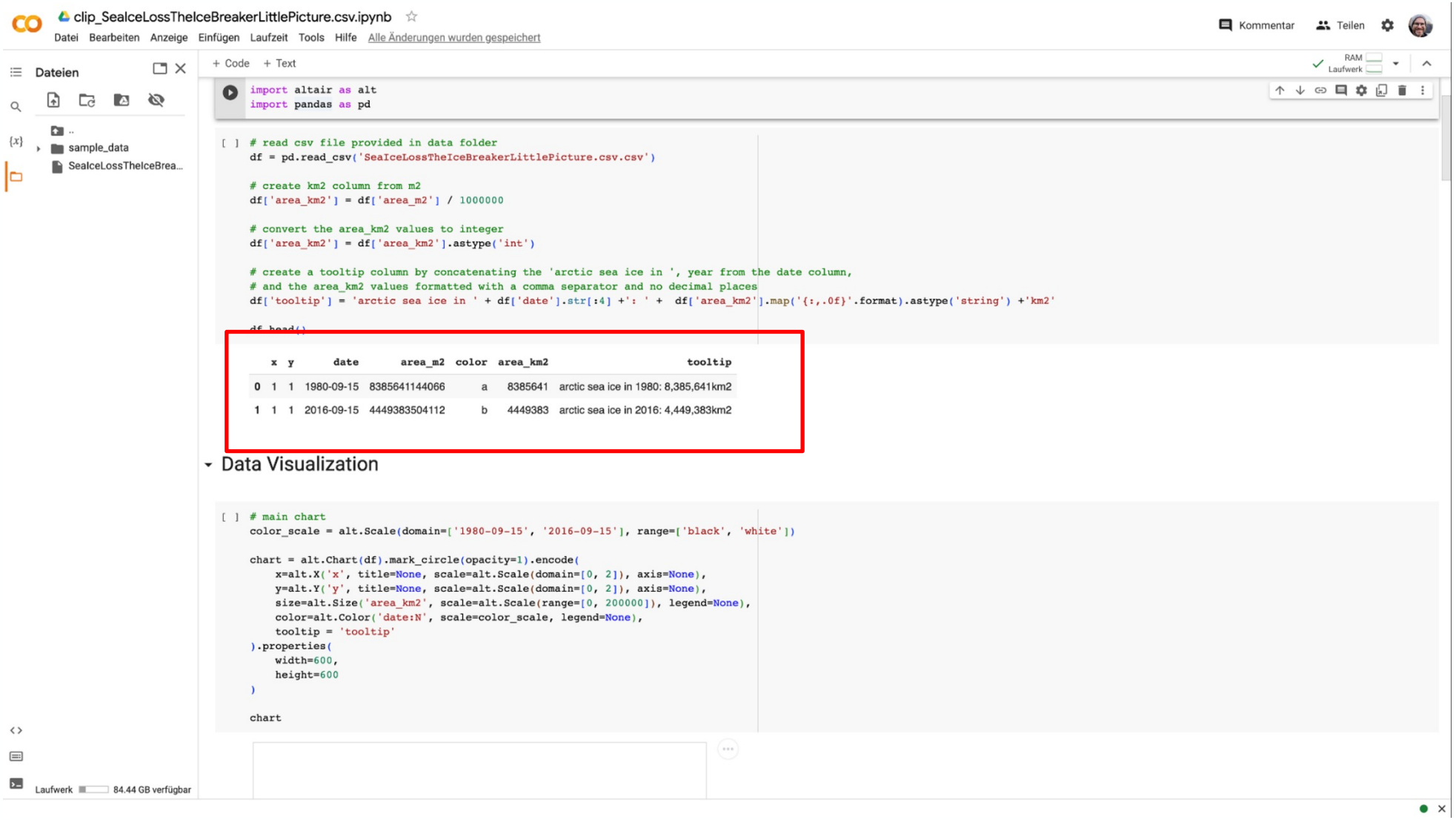
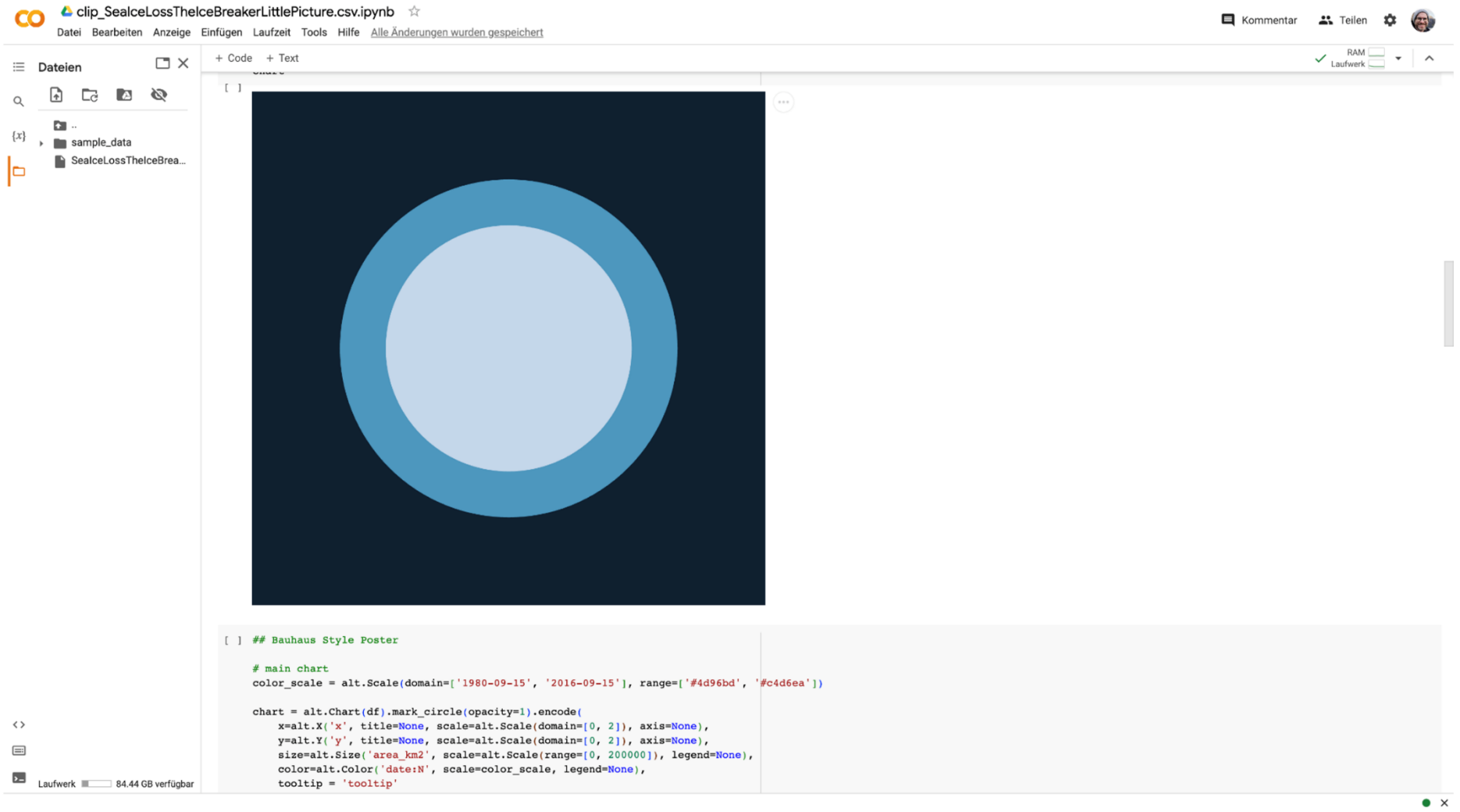
CODING YOUR LITTLE PICTURE - USE A PYTHON SCRIPT



1. Download & Open Jupyter notebook
2. Local or cloud environment (Google Colab or noteable.io)
3. Install altair python library - for creating and tweaking the charts
4. Add the data from the csv
5. Select “run all cells”

in-line commands and markup helps to guide you

CODING YOUR LITTLE PICTURE - USE A PYTHON SCRIPT



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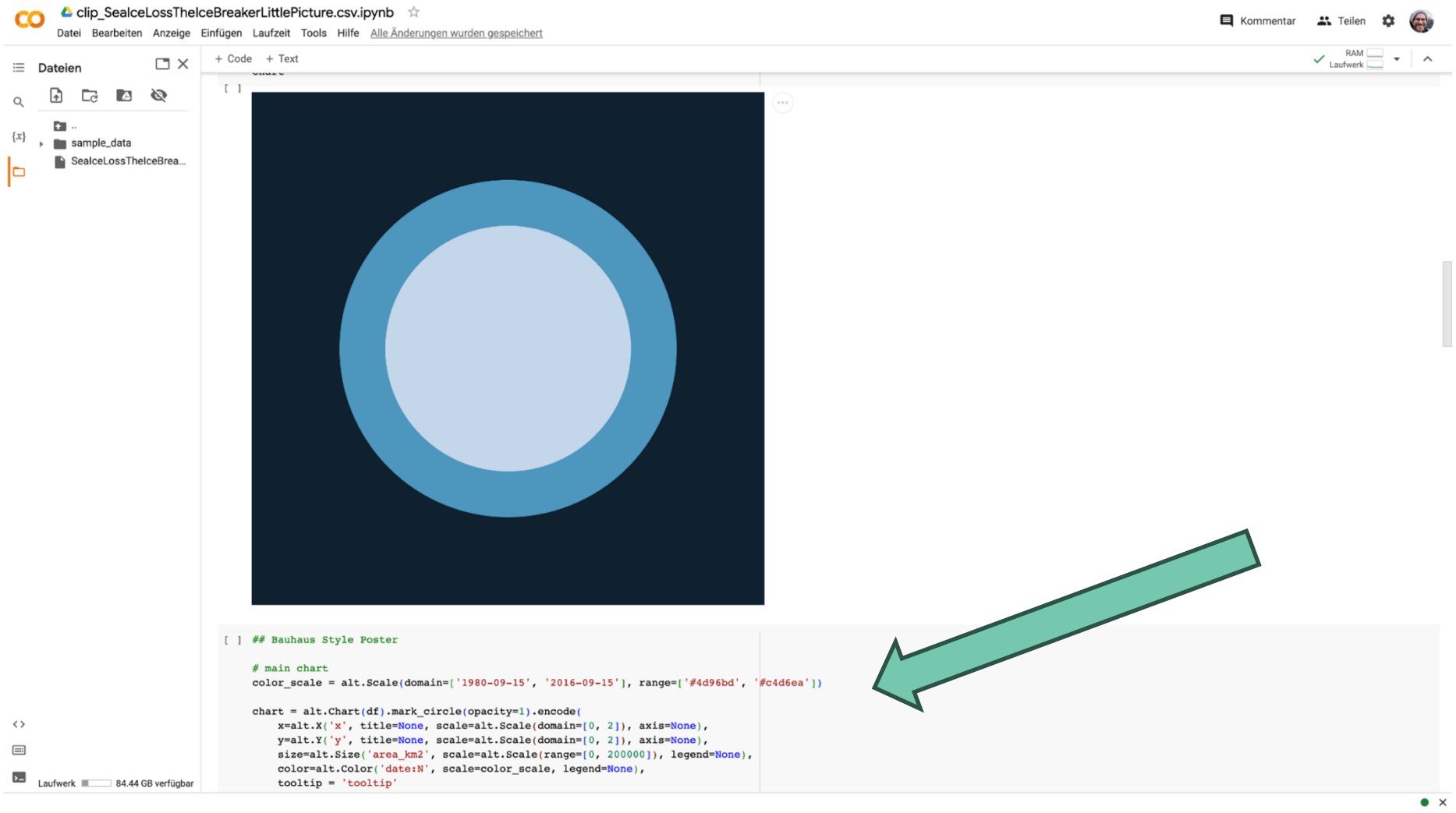
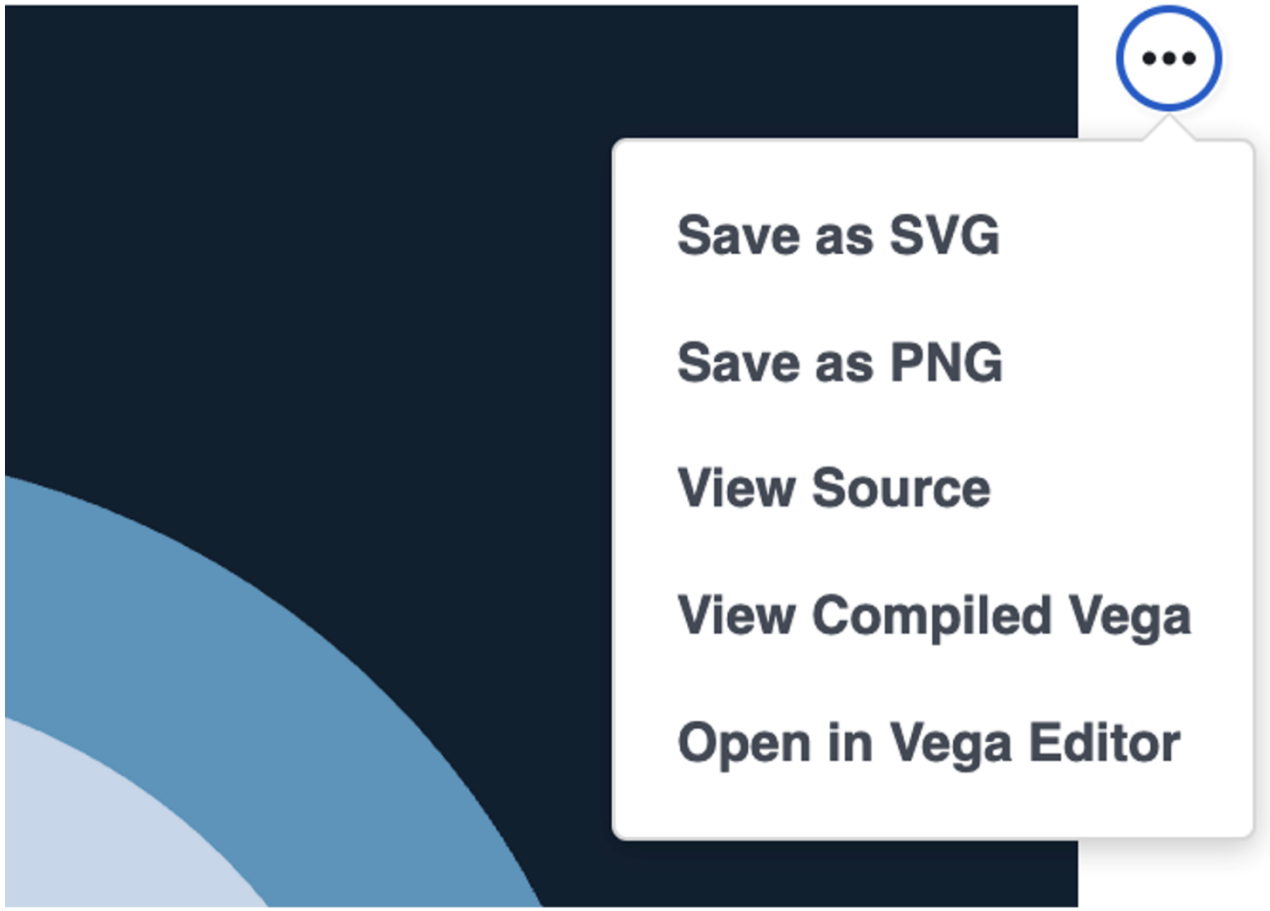
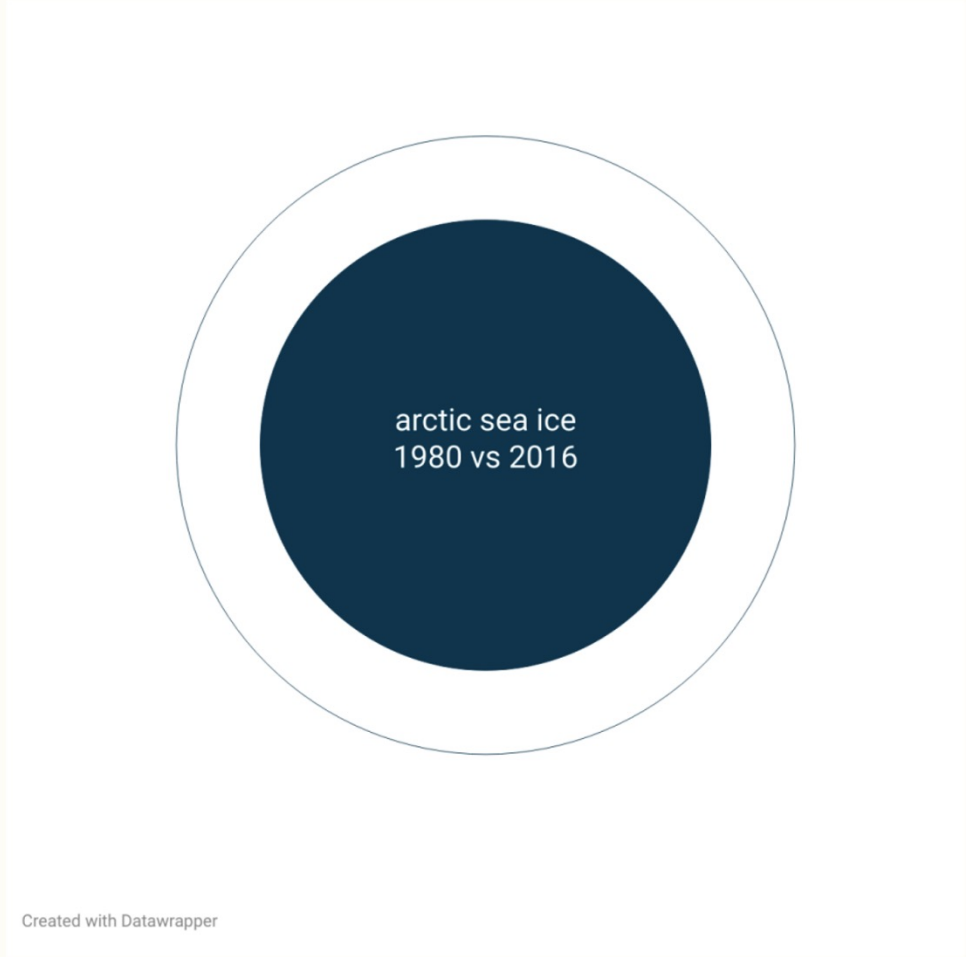
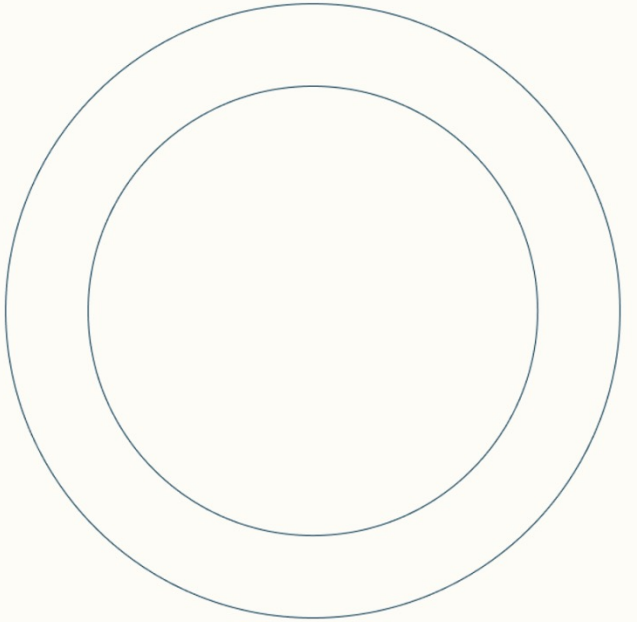



Save as SVG
Save as PNG
View Source
View Compiled Vega
Open in Vega Editor

SPICE THINGS WITH AN EMOTIONAL HOOK

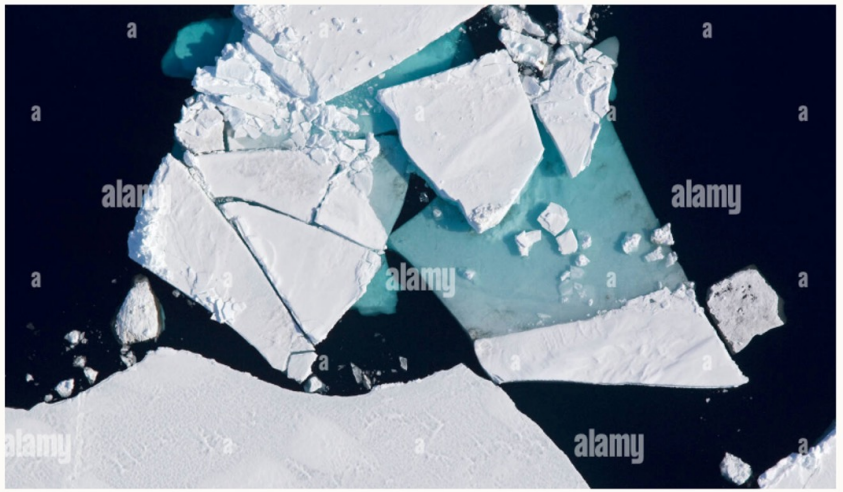


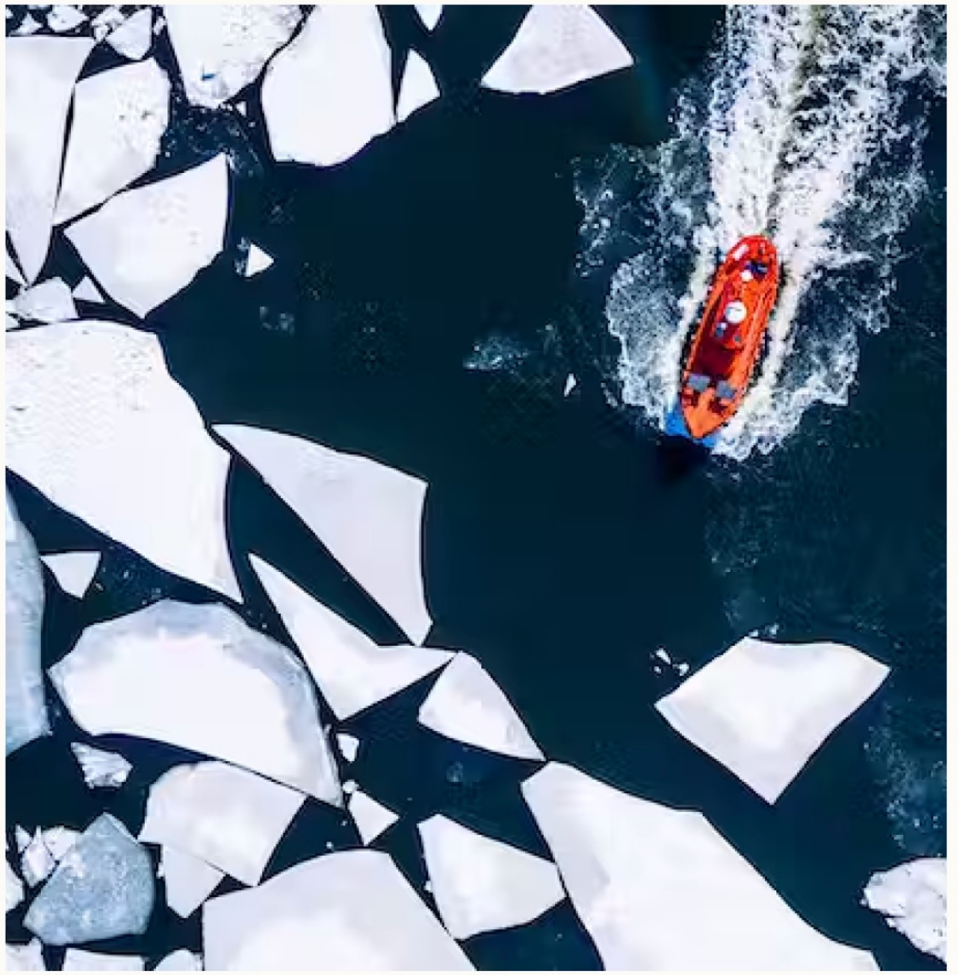


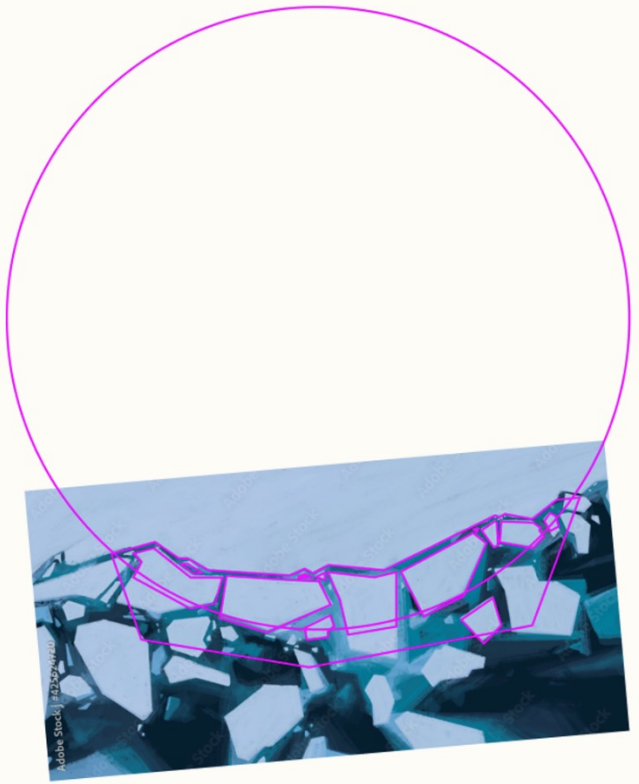
Free vector graphic packages eg Inkscape or GIMP

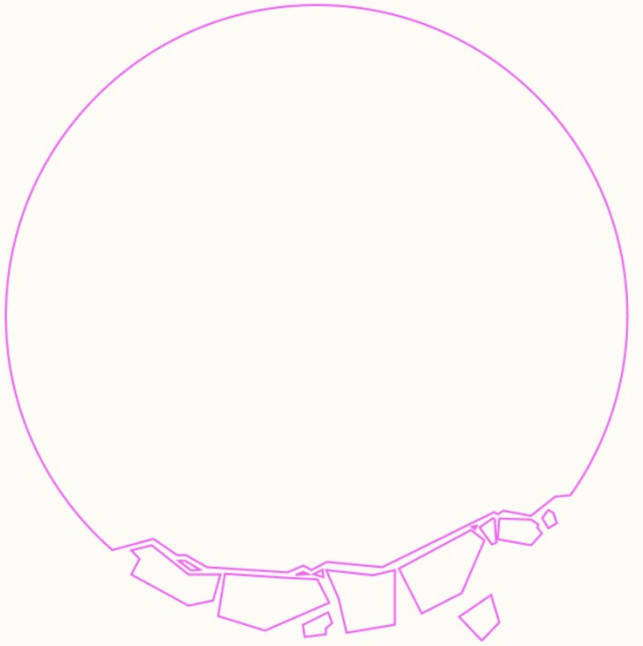
esa EUMETSAT ECMWF
EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

SPICE THINGS WITH AN EMOTIONAL HOOK

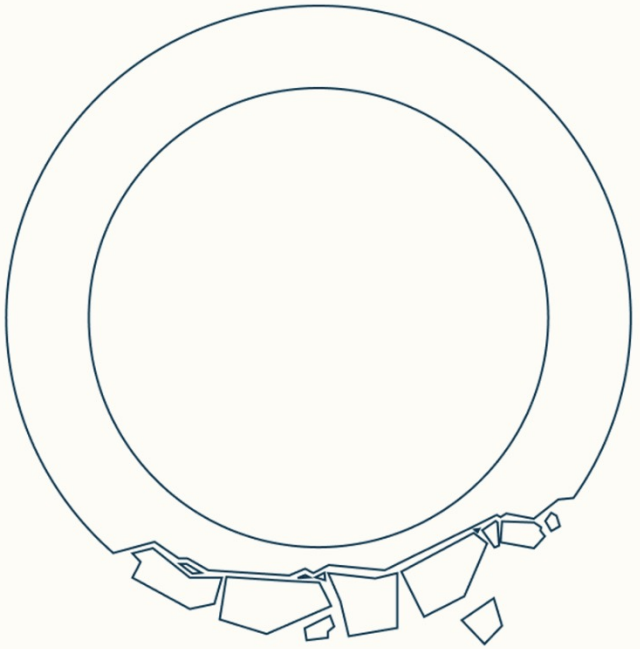


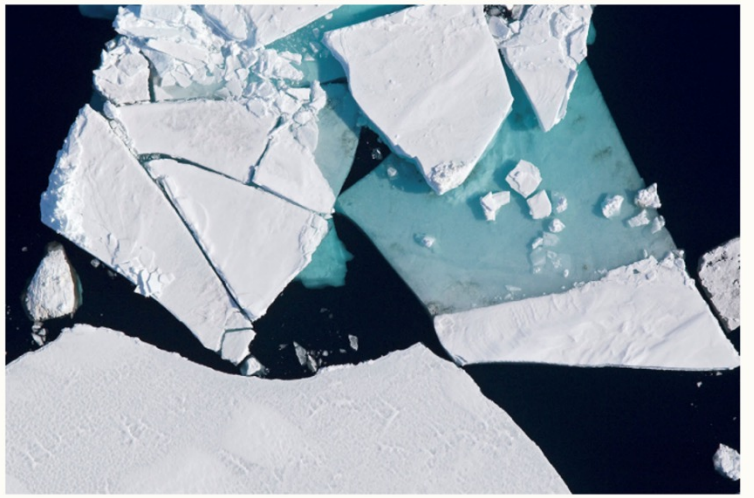


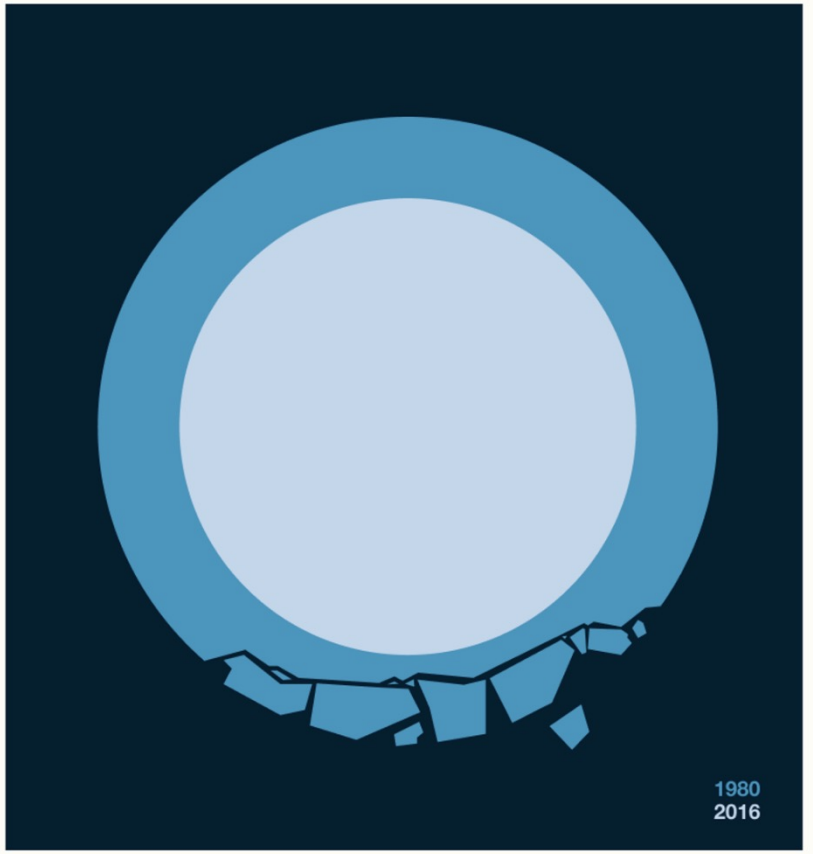




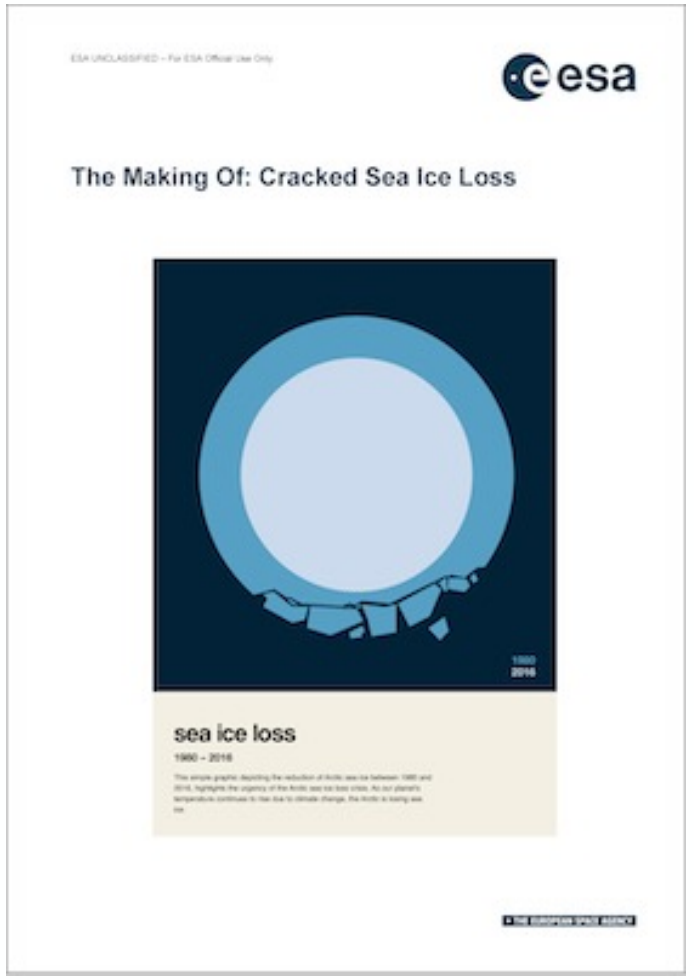
Free vector graphic packages eg Inkscape or GIMP

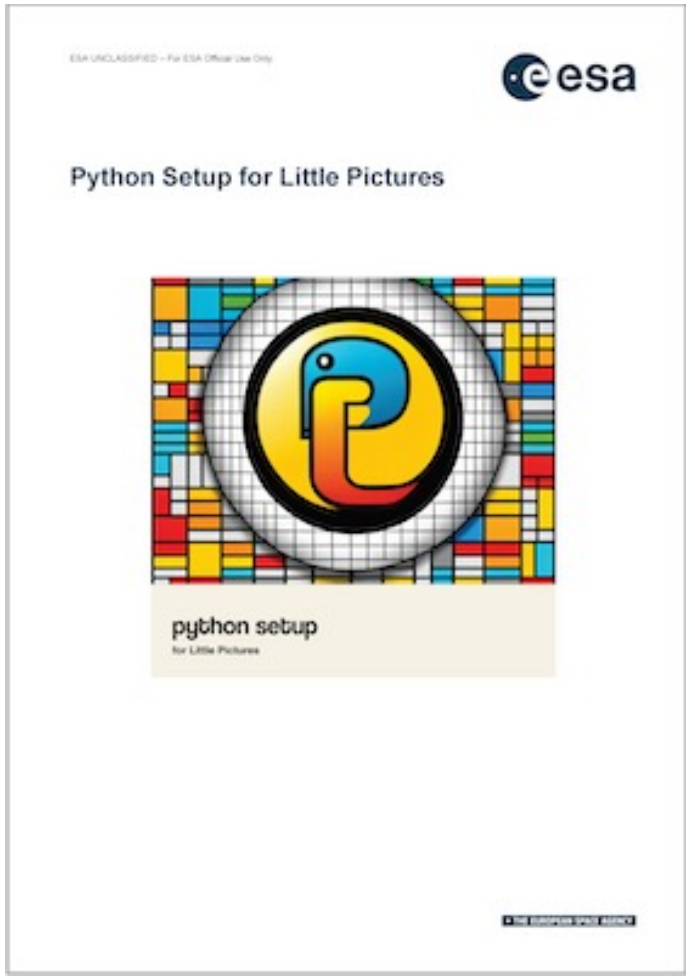





1980
2016

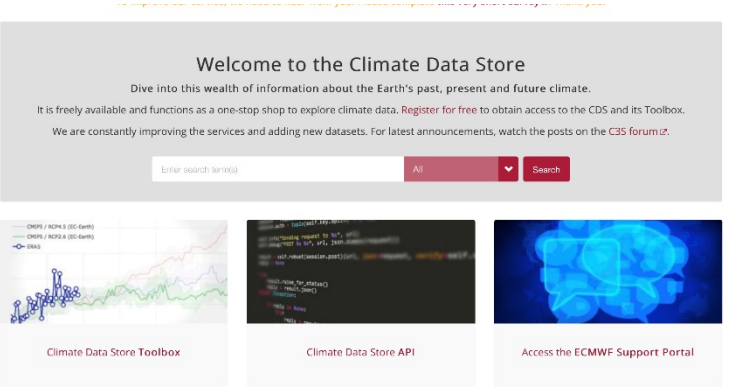
TUTORIALS





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

ACCESSING CLIMATE DATA



esa

- 25+ satellite CDRs
- Pre-operational prototypes
- R&D focus - latest algorithms

→ **climate.esa.int/data**

EUMETSAT

- Met, climate & ocean satellite data
- Near-Real Time, historic data & CDRs
- Extended operationally

→ **eumetsat.int/eumetsat-data-store**

Climate Change Service
climate.copernicus.eu

- Past, present & future
- Observations and model data
- Operational – temporal up-to-date

→ **cds.climate.copernicus.eu**

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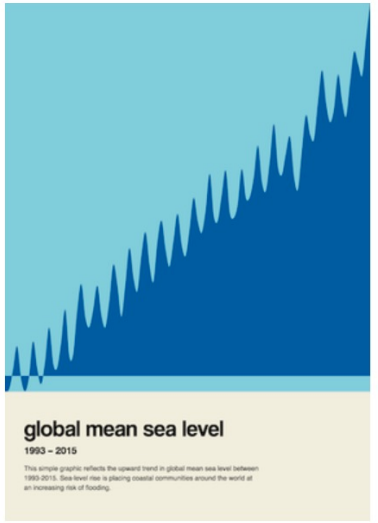
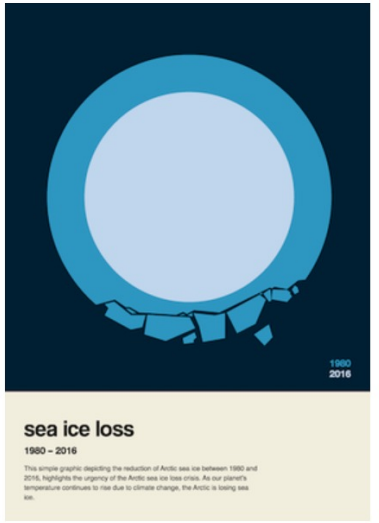
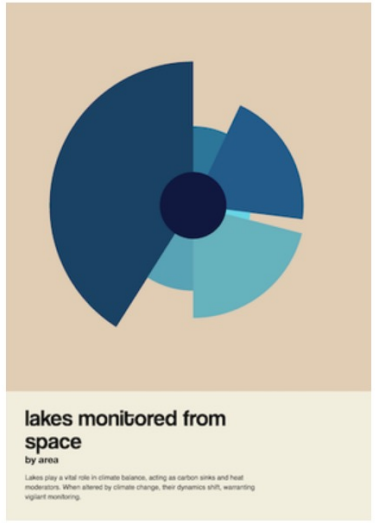
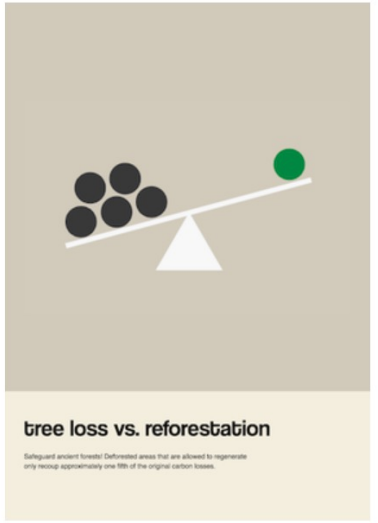
EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

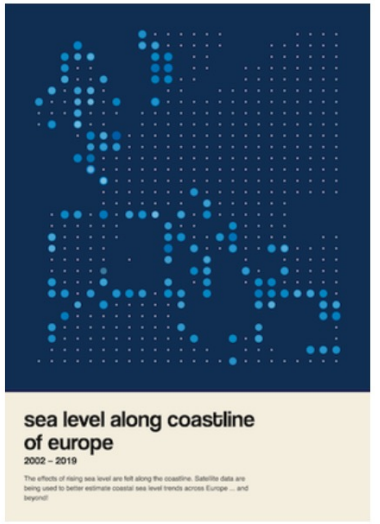
COMPETITION TIME – OVER TO YOU











Data
ESA, EUMETSAT, C3S/ECMWF

Winner
Displayed at COP28
Invited to ESA dataviz team (nr Rome)
10 runners up added to gallery

Judges inc.
Ed Hawkins #Showyourstripes
Mattias Stahl, Der Speigel

Deadline - 20 November

→ climate.esa.int/littlepicturescompetition

w climate.esa.int/littlepicturescompetition
e: climate.office@esa.int