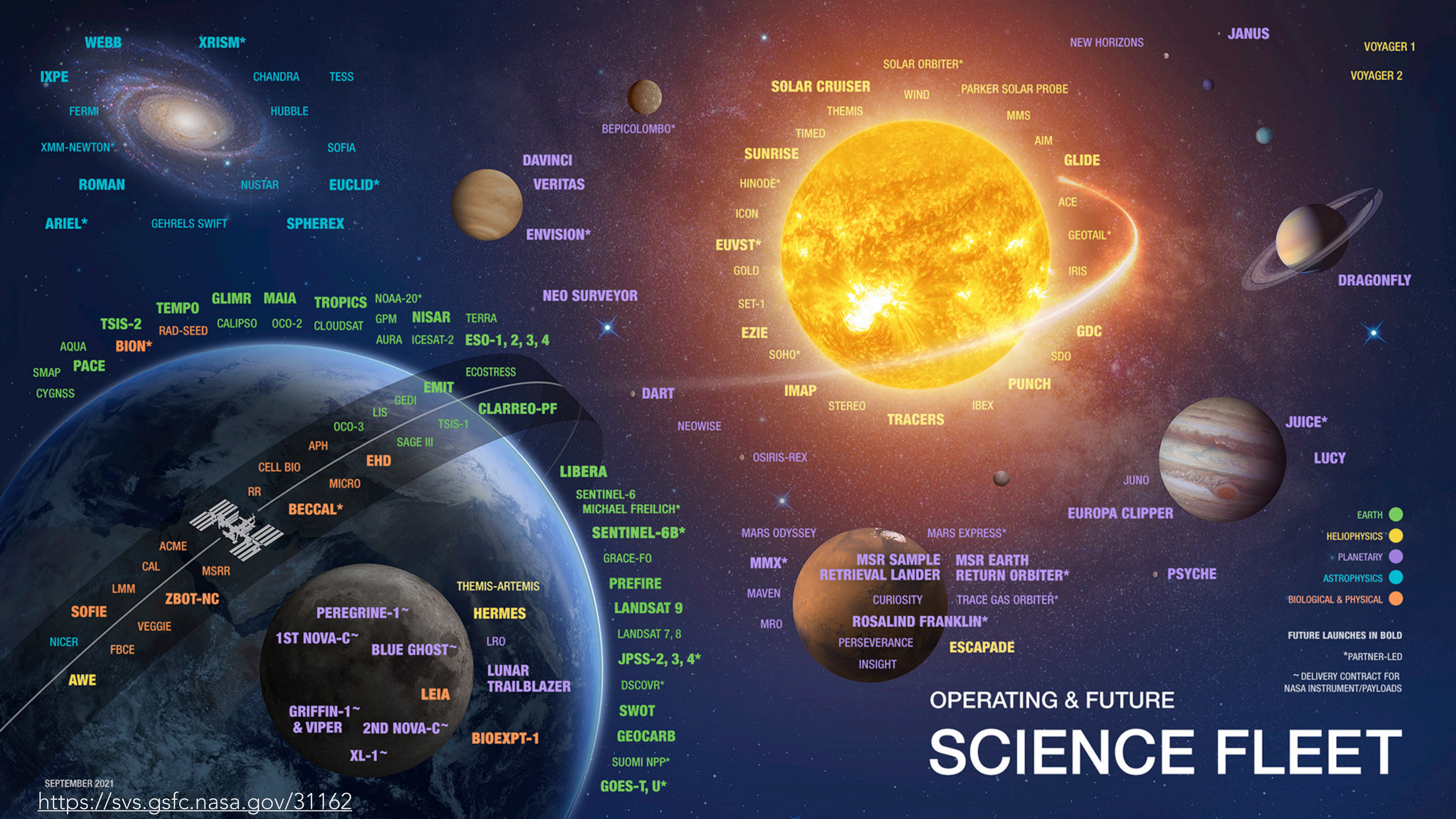
From Space-Born Sensors to the Public Eye:

Data as a visual message

Helen-Nicole Kostis
Scientific Visualization Studio, NASA/GSFC & USRA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Webb Telescope

Sep 22, 2021
MEDIA ADVISORY M21-117

NASA Invites Media to Webb Telescope Prelaunch Events in French Guiana

The James Webb Space Telescope is seen here being prepared for shipment to its launch site.
Credits: NASA/Chris Gunn

NASA invites members of the media to register their interest in attending events in French Guiana ahead of the launch of the James Webb Space Telescope, a mission led by NASA in partnership with the European and Canadian space agencies. Events will take place Nov. 4-6 at the launch site – Europe's Spaceport in Kourou, French Guiana, on the northeastern coast of South America – following the observatory's arrival and the start of prelaunch preparations.

Participating media will have the opportunity to view the Webb Telescope in its stow configuration from a visitor gallery outside the clean room. Access to the clean room will not be available. Participants also will tour the launch facilities and Ariane 5 control center, view the Ariane 5 VA256 rocket, and have an opportunity to interview members of the mission teams. Refer to itinerary of events for full details.

Media interested in attending these prelaunch events in French Guiana must provide their name and affiliation by 5 p.m. EDT Monday, Sept. 27, to Laura Betz at: laura.e.betz@nasa.gov and Alise Fisher at: alise.m.fisher@nasa.gov. Due to COVID-19 restrictions and space limitations, NASA and its mission partners may be unable to accommodate all requests for attendance.

Interested media should note the following travel information:

- Proof of vaccination for yellow fever is required for all travelers arriving in French Guiana.
- Proof of a negative COVID-19 test is required for travelers to French Guiana. Individuals who are not vaccinated against COVID-19 may also be required to quarantine for seven days in French Guiana upon arrival.
- COVID-19 levels are currently high in French Guiana. Local safety restrictions may include a daily curfew from 7 p.m. to 5 a.m. and restaurant closures.
- A limited number of hotel accommodations will be available in Cayenne, French Guiana, the nearest large city to the launch site, about 30 miles (48 kilometers) southeast of Kourou.

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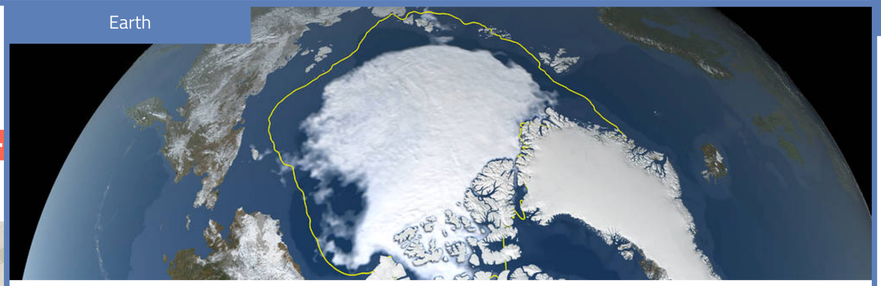


Sep 22, 2021

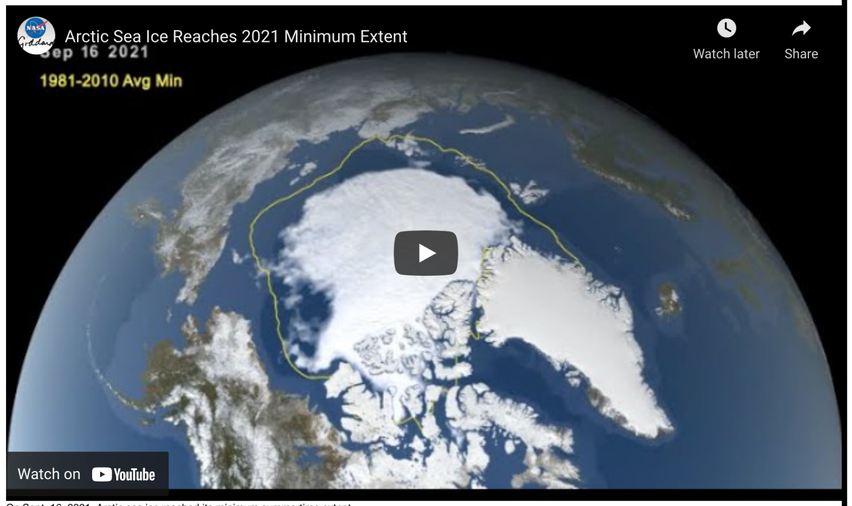
NASA Finds 2021 Arctic Summer Sea Ice 12th-Lowest on Record

Sea ice in the Arctic appears to have hit its annual minimum extent on Sept. 16, after waning in the 2021 Northern Hemisphere spring and summer. The summertime extent is the 12th-lowest in the satellite record, according to scientists at the NASA-supported National Snow and Ice Data Center and NASA.

This year, the minimum extent of Arctic sea ice dropped to 4.72 million square kilometers (1.82 million square miles). Sea ice extent is defined as the total area in which ice concentration is at least 15%.

The average September minimum extent record shows significant declines since satellites began measuring consistently in 1978. The last 15 years (2007 to 2021) are the lowest 15 minimum extents in the 43-year satellite record.

This visualization, created at NASA's Goddard Space Flight Center in Greenbelt, Maryland, shows data provided by the Japan Aerospace Exploration Agency (JAXA), acquired by the Advanced Microwave Scanning Radiometer 2 (AMSR2) instrument aboard JAXA's Global Change Observation Mission 1st-Water "SHIZUKU" (GCOM-W1) satellite.



On Sept. 16, 2021, Arctic sea ice reached its minimum summertime extent.
Credits: NASA's Goddard Space Flight Center/Scientific Visualization Studio
Download this video from NASA Goddard's Scientific Visualization Studio

Banner image: *A still image visualizing Arctic sea ice on Sept. 16, 2021, when the ice appeared to reach its yearly minimum extent. On this date, the extent of the ice was 4.72 million square miles (1.82 million square kilometers).* ***Credit:*** *NASA's Scientific Visualization Studio*

By Roberto Molar Candanosa
NASA's Earth Science News Team

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Landsat

Sep 27, 2021
RELEASE 21-126

NASA Launches New Mission to Monitor Earth's Landscapes

The United Launch Alliance (ULA) Atlas V rocket with the Landsat 9 satellite onboard launches, Monday, Sept. 27, 2021, from Space Launch Complex 3 at Vandenberg Space Force Base in California. The Landsat 9 satellite is a joint NASA/U.S. Geological Survey mission that will continue the legacy of monitoring Earth's land and coastal regions.
Credits: NASA/Bill Ingalls

Landsat 9, a NASA satellite built to monitor the Earth's land surface, successfully launched at 2:12 p.m. EDT Monday from Vandenberg Space Force Base in California.

A joint mission with the U.S. Geological Survey (USGS), Landsat 9 lifted off on a United Launch Alliance Atlas V rocket from Vandenberg's Space Launch Complex 3E. Norway's Svalbard satellite-monitoring ground station acquired signals from the spacecraft about 83 minutes after launch. Landsat 9 is performing as expected as it travels to its final orbital altitude of 438 miles (705 kilometers).

"NASA uses the unique assets of our own unprecedented fleet, as well as the instruments of other nations, to study our own planet and its climate systems," said NASA Administrator Bill Nelson. "With a 50-year data bank to build on, Landsat 9 will take this historic and invaluable global program to the next level. We look forward to working with our partners at the U.S. Geological Survey and the Department of the Interior again on Landsat Next, because we never stop advancing our work to understand our planet."

"Today's successful launch is a major milestone in the nearly 50-year joint partnership between USGS and NASA who, for decades, have partnered to collect valuable scientific information and use that data to shape policy with the utmost scientific integrity," said Secretary of the Interior Deb Haaland. "As the impacts of the climate crisis intensify in the United States and across the globe, Landsat 9 will provide data and imagery to help make science-based decisions on key issues including water use, wildfire impacts, coral reef degradation, glacier and ice-shelf retreat, and tropical deforestation."

The first Landsat satellite launched in 1972. Since then, NASA has always kept a Landsat in orbit to collect images of the physical material covering our planet's surface and changes to land usage. Those images allow researchers to monitor phenomena including agricultural productivity, forest extent and health, water quality, coral reef habitat health, and glacier dynamics.

"The Landsat mission is like no other," said Karen St. Germain, director of the Earth Science Division at NASA Headquarters in Washington. "For nearly 50 years, Landsat satellites observed our home planet, providing an unparalleled record of how its surface has changed over timescales from days to decades. Through this partnership with USGS, we've been able to provide continuous and timely data for users ranging from farmers to resource managers and scientists. This data can help us understand, predict, and plan for the future in a changing climate."

Landsat 9 joins its sister satellite, Landsat 8, in orbit. Working in tandem, the two satellites will collect images spanning the entire planet every eight days.

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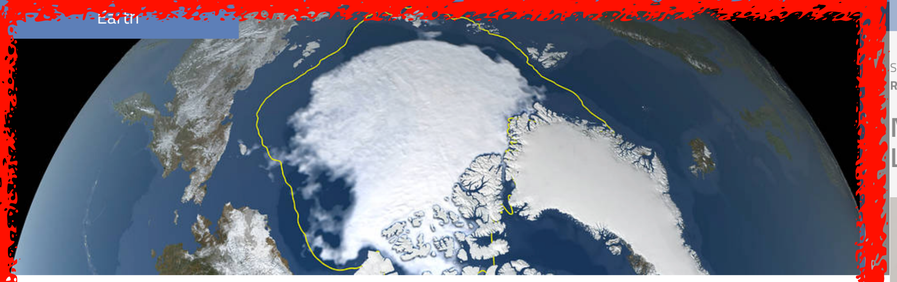
Earth



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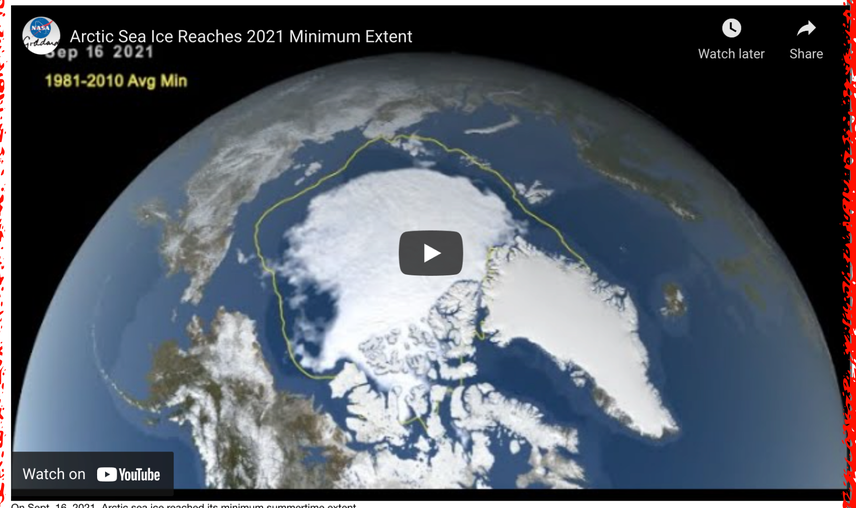

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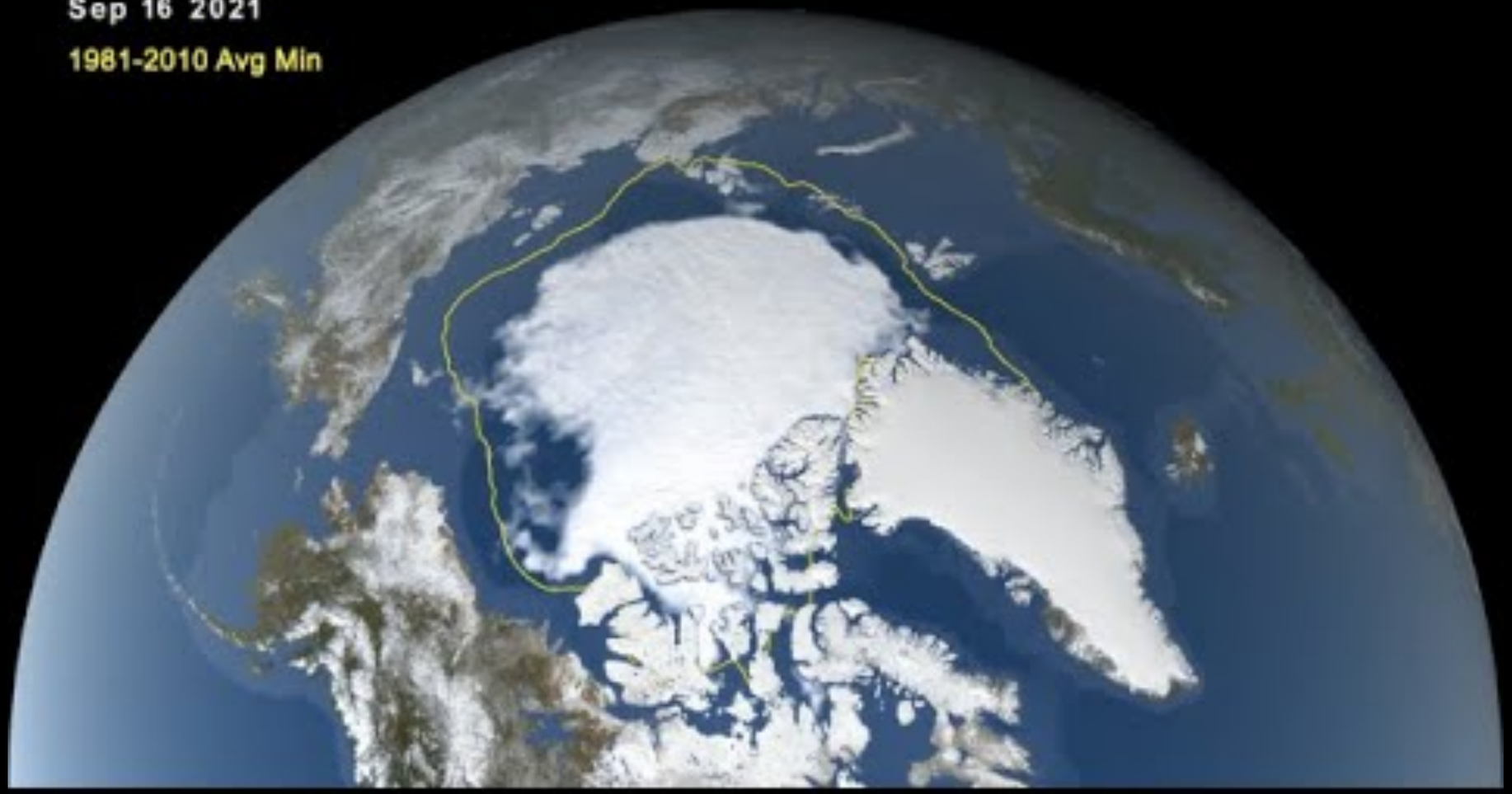
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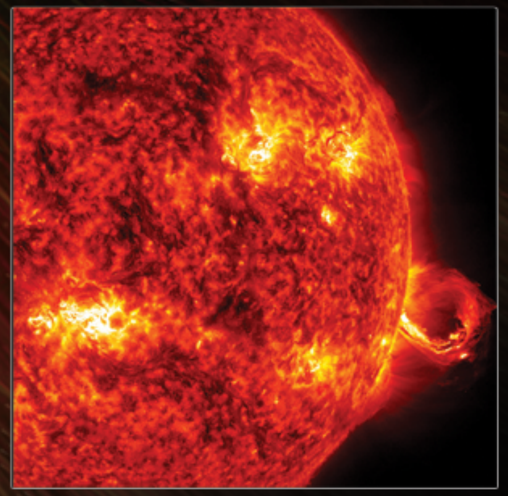
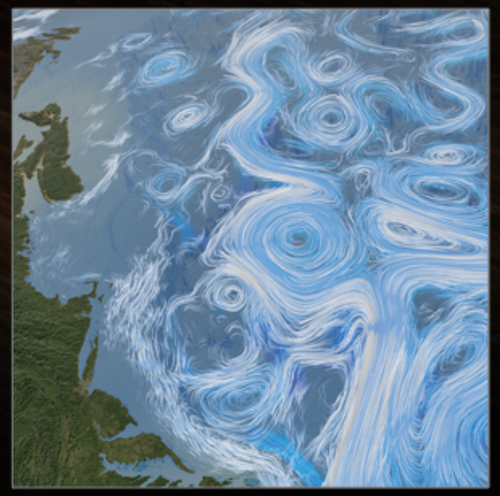
Sun



Earth



Planets & Moons

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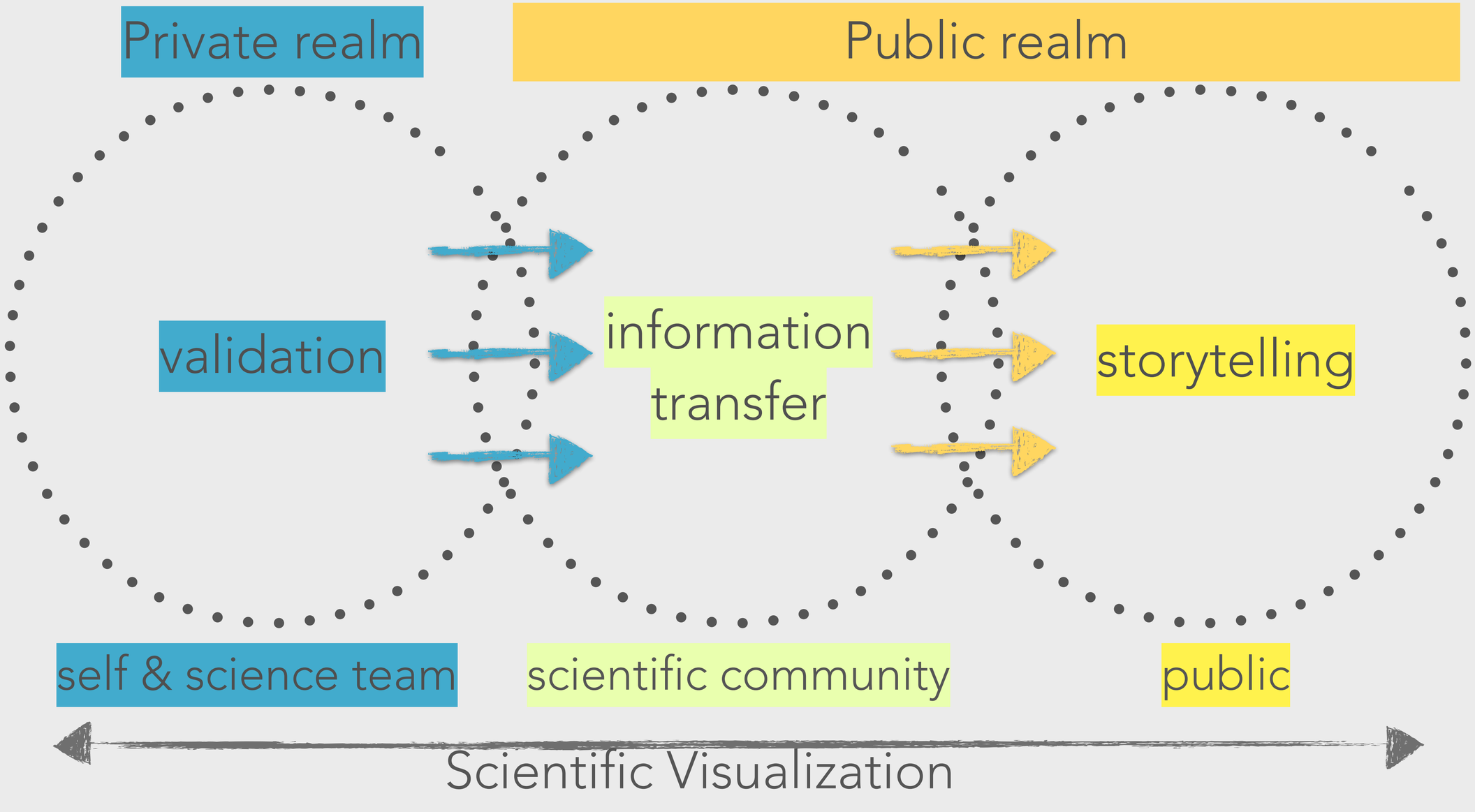
Science Storytelling Team

NASA's Scientific Visualization Studio...

Our visualizers work with scientists to unearth stories from data, pushing our boundaries of knowledge.

Science Results in the Private and Public Realms



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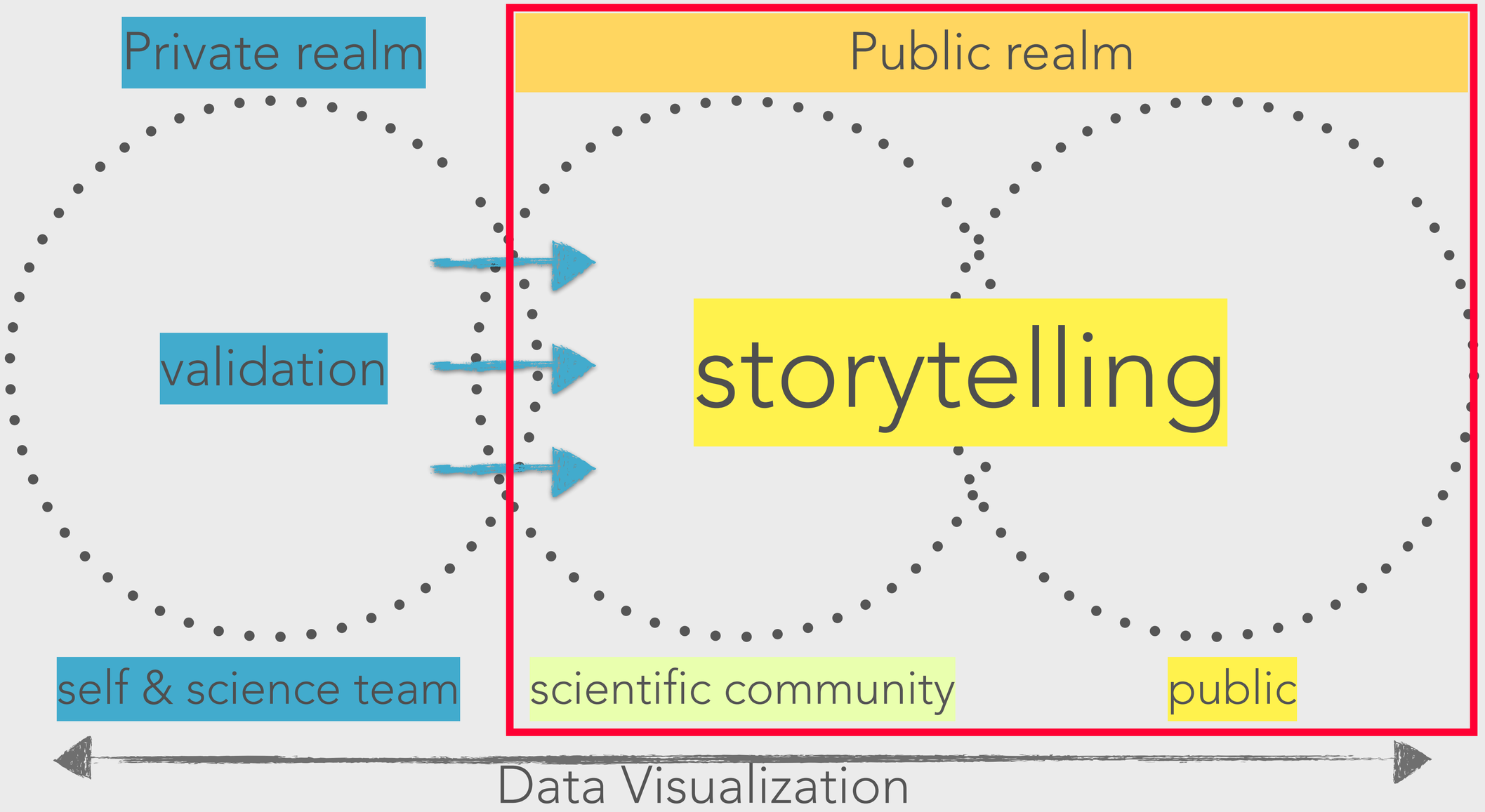


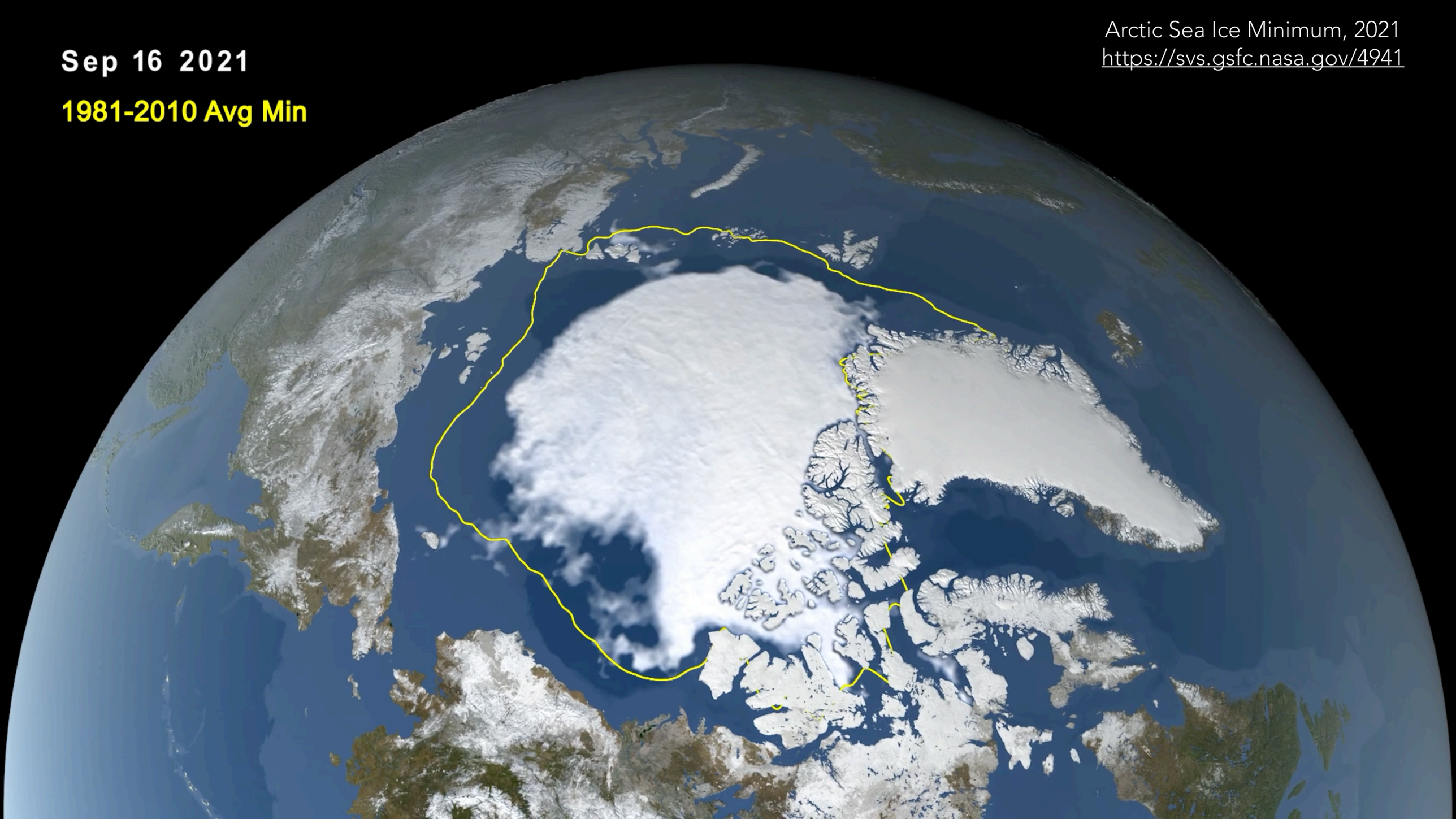
The Scientific Visualization Studio practice

- **Definition:** Cinematic Scientific Visualization
- **Focus:** Story, preservation of data, scientific integrity
- **Recipe:** Collaboration between scientist, visualizer, producer, science writer
- **Method**: Iterative Approach
- **Expertise:** Seamless fusion of data from multiple sources
- **Content:** Multiple formats, HD, UHD, hyper walls, dome shows, 360

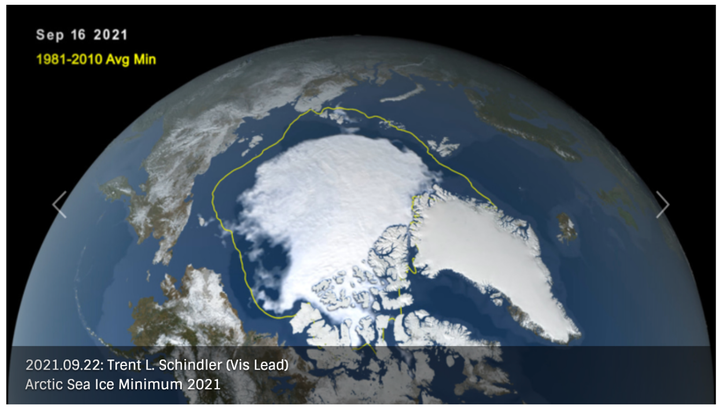
The SVS practice

- **Toolbox**
  - Storyboard
  - Animation: Maya, Houdini
  - Rendering: Pixar's Renderman, Mantra & SVS in-house shaders
  - Registration: IDL, in-house, commercial tools
  - Data Processing: IDL, python, scripts, programming
- Scientist approval for accuracy
- Integral component of the journey of science

Arctic Sea Ice Minimum, 2021
https://svs.gsfc.nasa.gov/4941



Take our visualization tour: "Illuminating the Invisible"



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Our Mission

The Scientific Visualization Studio wants you to learn about NASA programs through visualization. The SVS works closely with scientists in the creation of visualizations, animations, and images in order to promote a greater understanding of Earth and Space Science research activities at NASA and within the academic research community supported by NASA.

All the visualizations and multimedia products created by the SVS, CI Lab, and Goddard Media Studios are accessible to you through this web site, and free to download! Please note that this is not an all-inclusive repository of NASA images and movies. You are welcome to try NASA's Data Portal.

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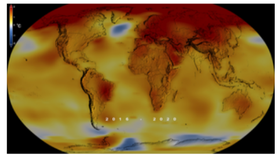

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Conceptual Image Lab

NASA's CI Lab is an award-winning studio with artists who work closely with astronomers, scientists and engineers to bring scientific theory, design and concepts to life in an accurate, yet visually compelling way.

Goddard Media Studios

With a passionate commitment for broadly sharing NASA's bold research initiatives, The Goddard Media Studio tells stories like no one else in the universe. Fielding an impressive team of producers, animators, editors, and more, The Studio fuses hard science with exciting imagination to explain, translate, and ultimately inspire.

Scientific Hyperwall Presentations

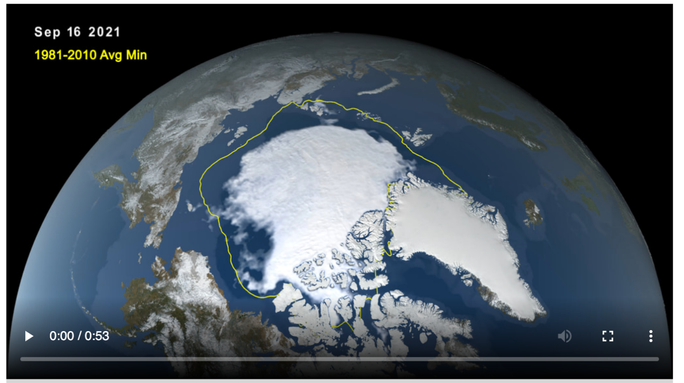
The Hyperwall is a big beautiful "wall" of high-definition screens used to display NASA's latest and greatest data visualizations, images, videos, and other presentation material, and is a primary outreach platform for NASA's Science Mission Directorate. Existing Hyperwall stories highlight themes in Earth science, heliophysics, planetary science, and astrophysics. The Scientific Visualization Studio developed the Hyperwall software.

Scientific Visualization Studio
SEARCH GALLERIES HELP

Earth ID: 4941

Arctic Sea Ice Minimum 2021

Visualizations by Trent L. Schindler Released on September 22, 2021

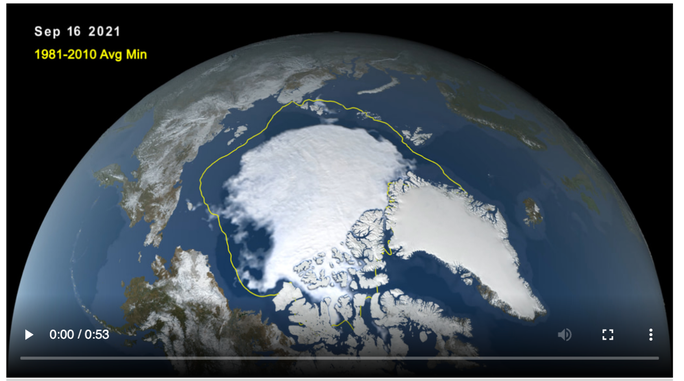


Arctic Sea Ice Minimum 2021, Animation | Download Options

Satellite-based passive microwave images of the sea ice have provided a reliable tool for continuously monitoring changes in the Arctic ice since 1979. Every summer the Arctic ice cap melts down to what scientists call its "minimum" before colder weather begins to cause ice cover to increase. An analysis of satellite data by NASA and the National Snow and Ice Data Center (NSIDC) at the University of Colorado Boulder shows that the 2021 minimum extent, which was likely reached on Sept. 16, measured 1.82 million square miles (4.72 million square kilometers).

The Japan Aerospace Exploration Agency (JAXA) provides many water-related products derived from data acquired by the Advanced Microwave Scanning Radiometer 2 (AMSR2) instrument aboard the Global Change Observation Mission 1st-Water "SHIZUKU" (GCOM-W1) satellite. Two JAXA datasets used in this animation are the 10-km daily sea ice concentration and the 10 km daily 89 GHz Brightness Temperature.

In this animation, the daily Arctic sea ice and seasonal land cover change progress through time, from the yearly maximum ice extent on March 21 2021, through its minimum on September 16 2021. Over the water, Arctic sea ice changes from day to day showing a running 3-day minimum sea ice concentration in the region where the concentration is greater than 15%. The blueish white color of the sea ice is derived from a 3-day running minimum of the AMSR2 89 GHz brightness temperature. The yellow boundary shows the minimum extent averaged over the 30-year period from 1981 to 2010. Over the terrain, monthly data from the seasonal Blue Marble Next Generation fades slowly from month to month. The faint circle that appears periodically close to the pole is an artifact of the visualization process, and does not represent a real feature.



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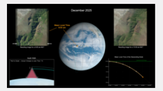
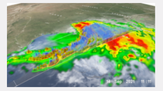
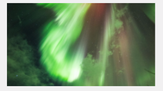


Terra Orbit Drift

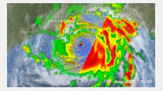
The VIPER Landing Site



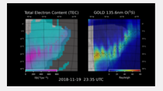
Hurricane Nicholas Brings More Heavy Rain to the Northern Gulf Coast



Explore Auroras



NASA/JAXA GPM Satellite Examines Hurricane Ida's Eye



Comparing Atomic Oxygen Emission Observed by GOLD with Ionospheric Total Electron Content (TEC)

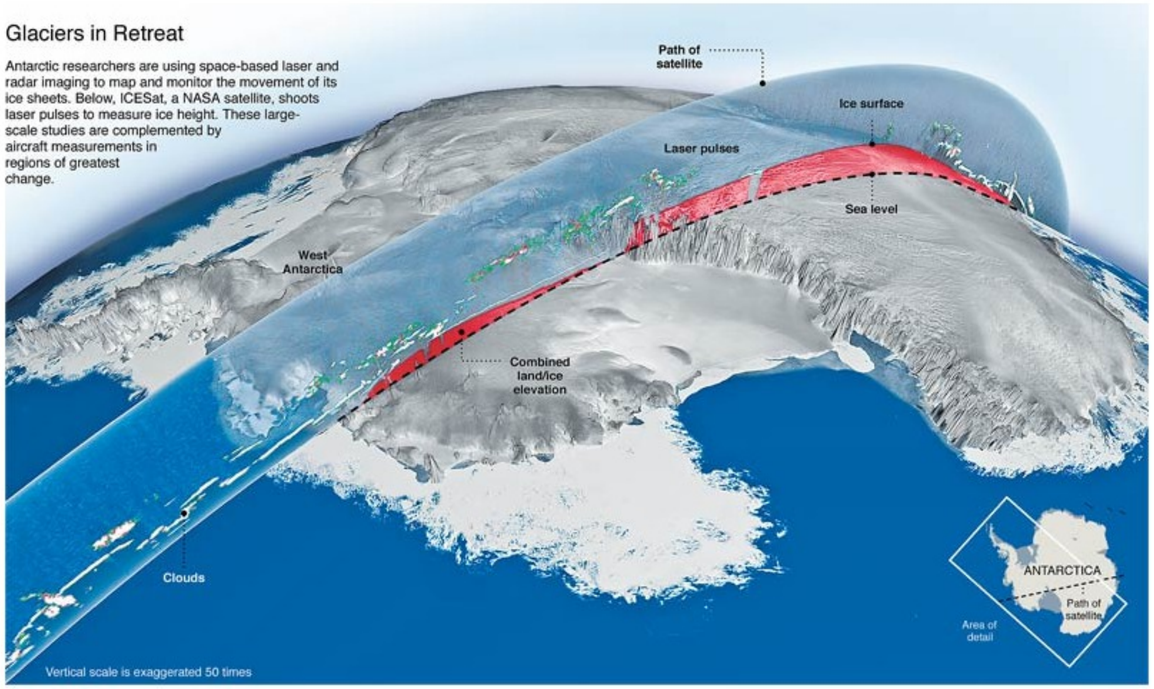
The New York Times > Science > Image > Glaciers in Retreat - Mozilla Firefox

The New York Times

January 24, 2005

Glaciers in Retreat

Antarctic researchers are using space-based laser and radar imaging to map and monitor the movement of its ice sheets. Below, ICESat, a NASA satellite, shoots laser pulses to measure ice height. These large-scale studies are complemented by aircraft measurements in regions of greatest change.



Western Ice Sheets Are Shrinking . . .

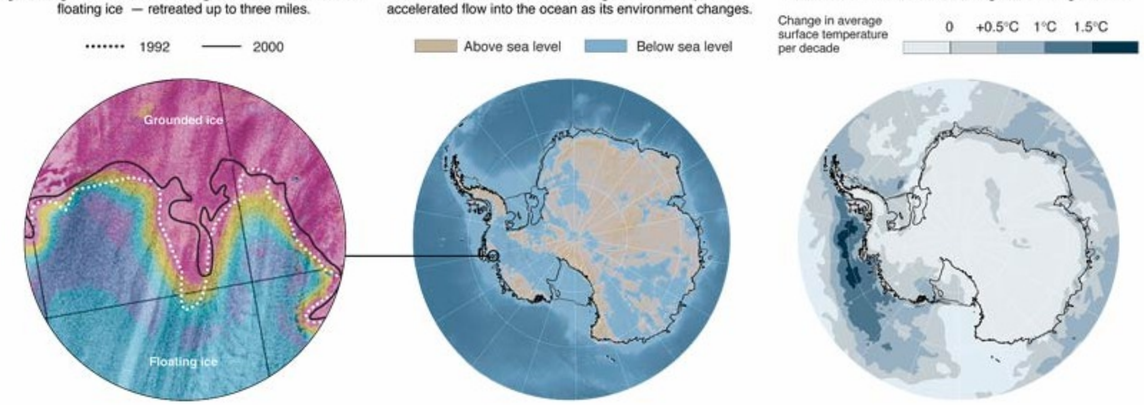
Recent satellite data suggest that the Pine Island Glacier in West Antarctica is thinning rapidly. From 1992 to 2000, the grounding line — the line where ground-based ice turns to floating ice — retreated up to three miles.

. . . Partly Because of Low Land Levels . . .

While the East Antarctic ice sheet covers mostly land at or above sea level, much of the land under the western ice sheet is below sea level — making the ice susceptible to accelerated flow into the ocean as its environment changes.

. . . and Rising Temperatures

Although most of Antarctica has experienced cooling in the last 20 years, satellite data show warming along the coasts, which is believed to be weakening and thinning the ice.



Sources: Waleed Abdalati, Dr. Josefino C. Comiso and the Scientific Visualization Studio, NASA Goddard Space Flight Center; Eric Rignot, NASA Jet Propulsion Laboratory; Canadian Space Agency

David Constantine/The New York Times

2020 TV-14 1 Season HD AD

"Clouds"

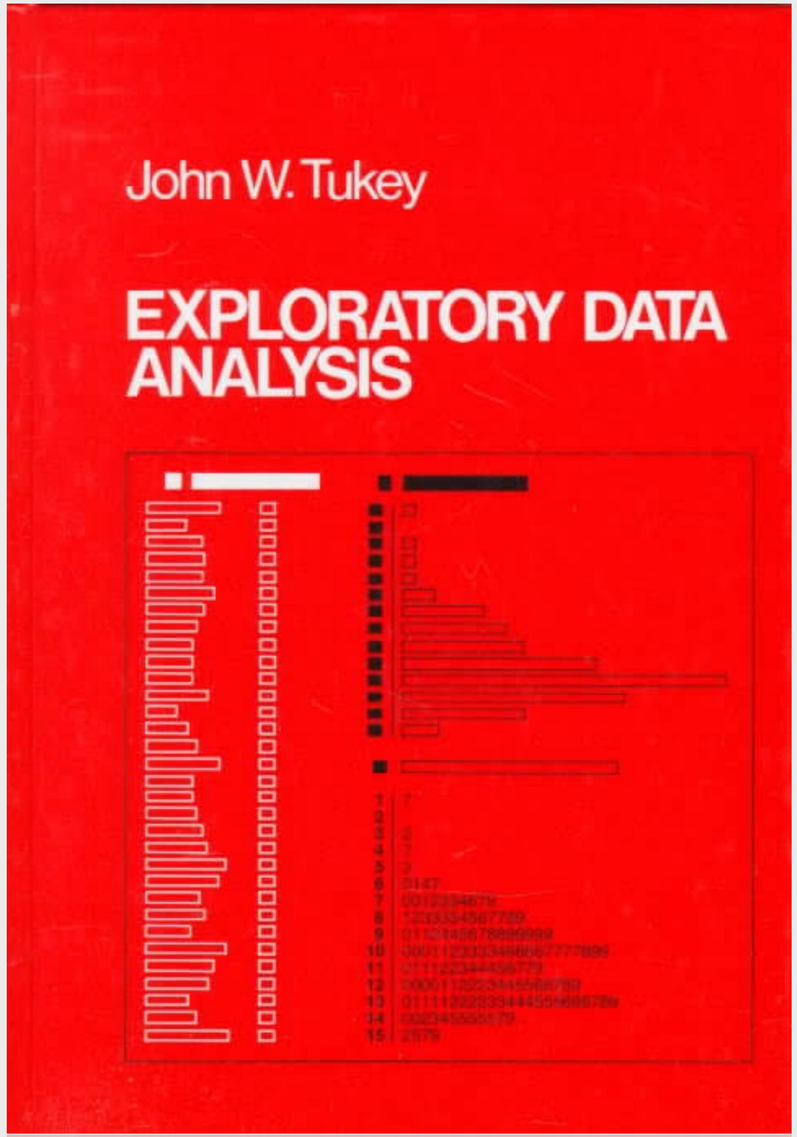
How does the cloud above your head connect to the cloud that stores your data? The answer involves a shipwreck and a shark-proof garden hose.

Cast: Latif Nasser

Genres: Science & Nature Docs, Science & Nature TV, Docuseries

This show is: Witty, Investigative

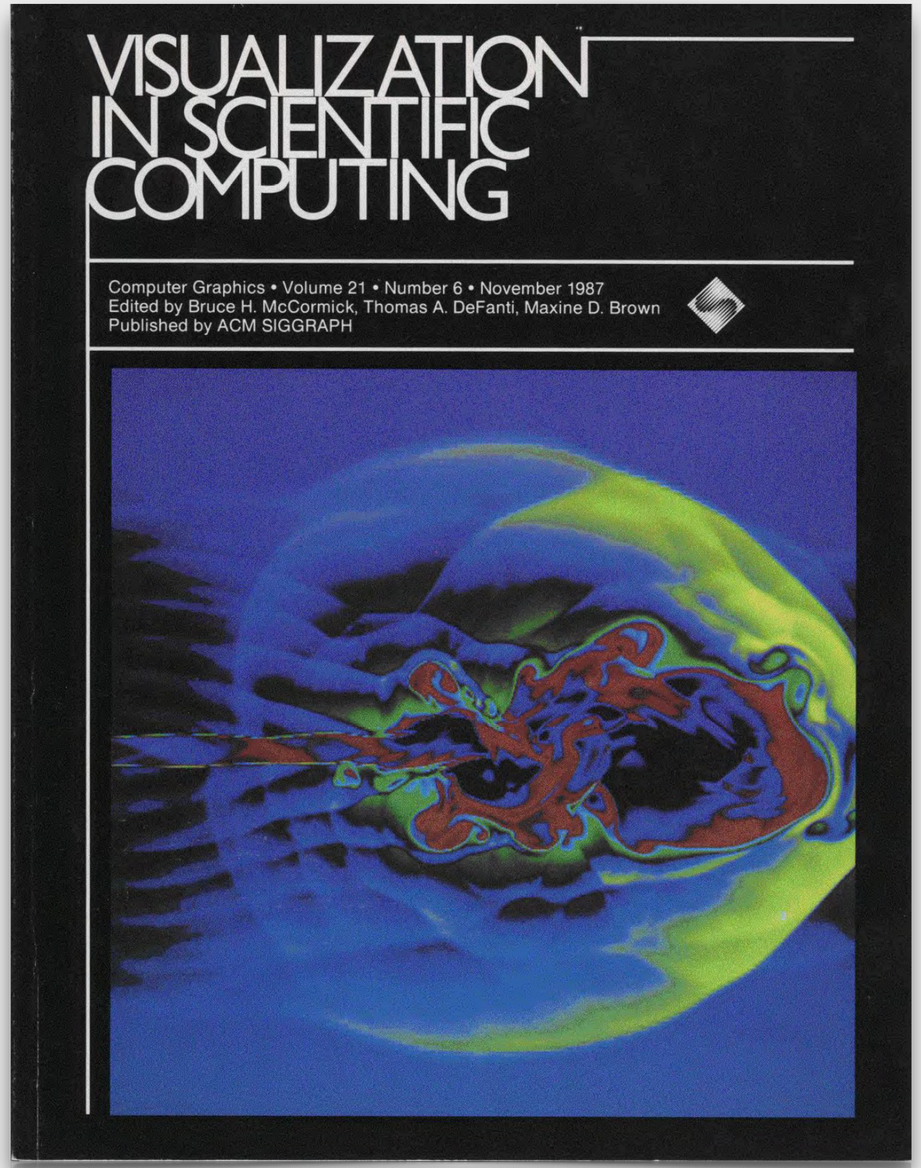
A few *thoughts* on the future of our practice



1977

"..In an essence it is an attitude:
The willingness to look for what can be seen, whether or not anticipated."

–David DiBiase, 1990



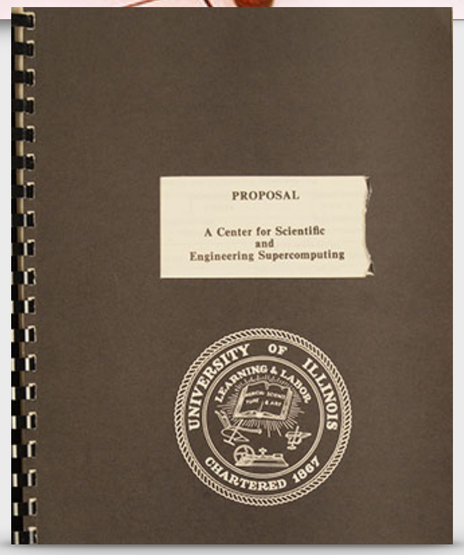
1987

"Visualization is the method of seeing the unseen."

–Thomas DeFanti, Maxine Brown and Bruce McCormick

1970s

1986



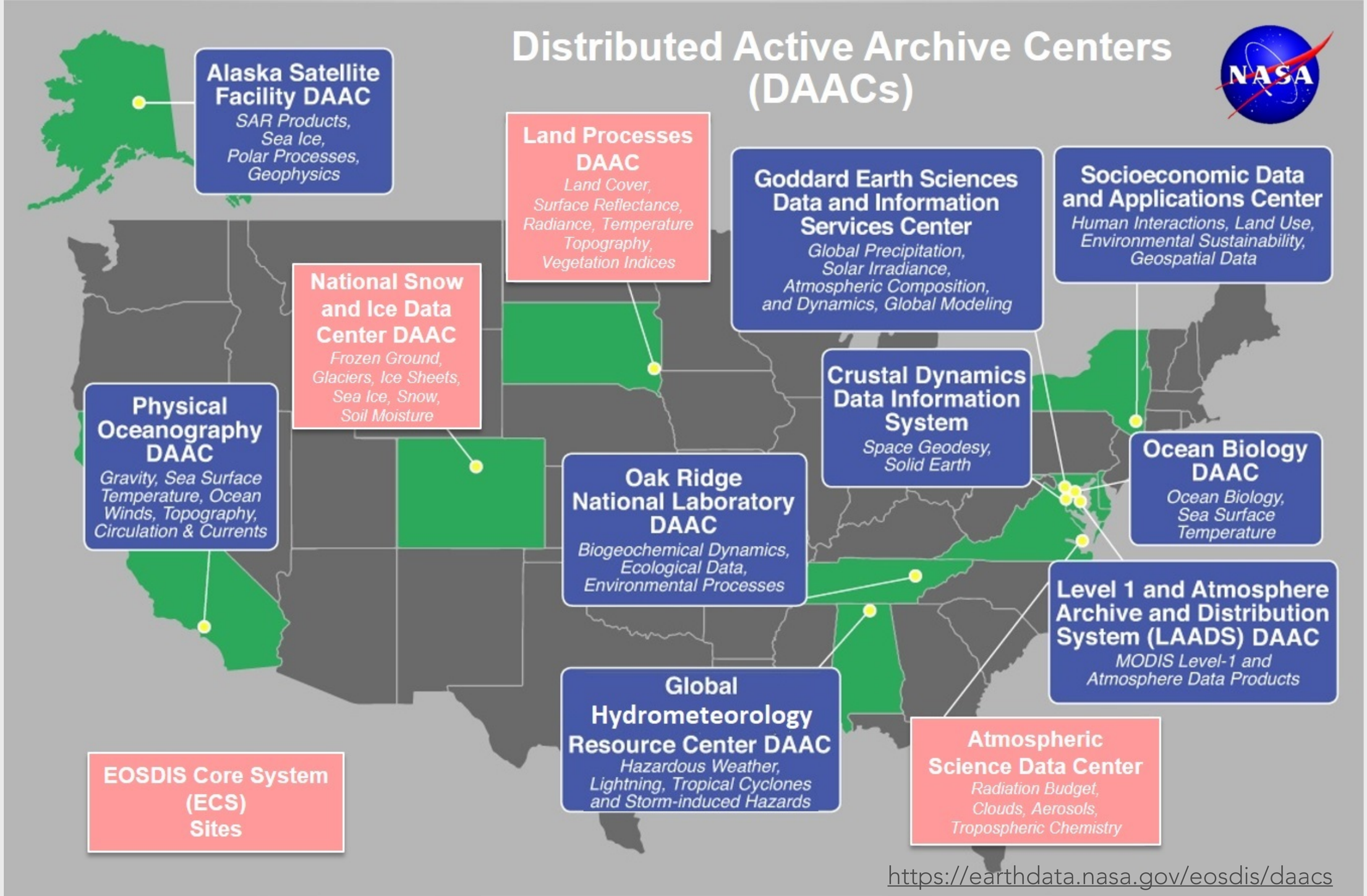
1983

2002

exploratory confirmatory explanatory

The challenges of developing visualizations for broad audiences may also lay outside the strict academic barriers that fields and academic institutions build on purpose and require **us** to consciously engage in two set of praxes:

transparency paired with openness & synthesis



https://earthdata.nasa.gov/eosdis/daacs

Transparency and Openness Framework

- Declare number of data sources
- For each data source
  - Source Economy
  - Source Nature
  - Source Interpretation
  - Visualization Interpretation
  - Release and point to the source
- Release Visualization products
- Create persistent reference to Released Product

Based on practices:

- NASA
- Scientific Visualization Studio
- Data biographies, Krause (2019)

Transparency and Openness Framework

Declare number of data sources

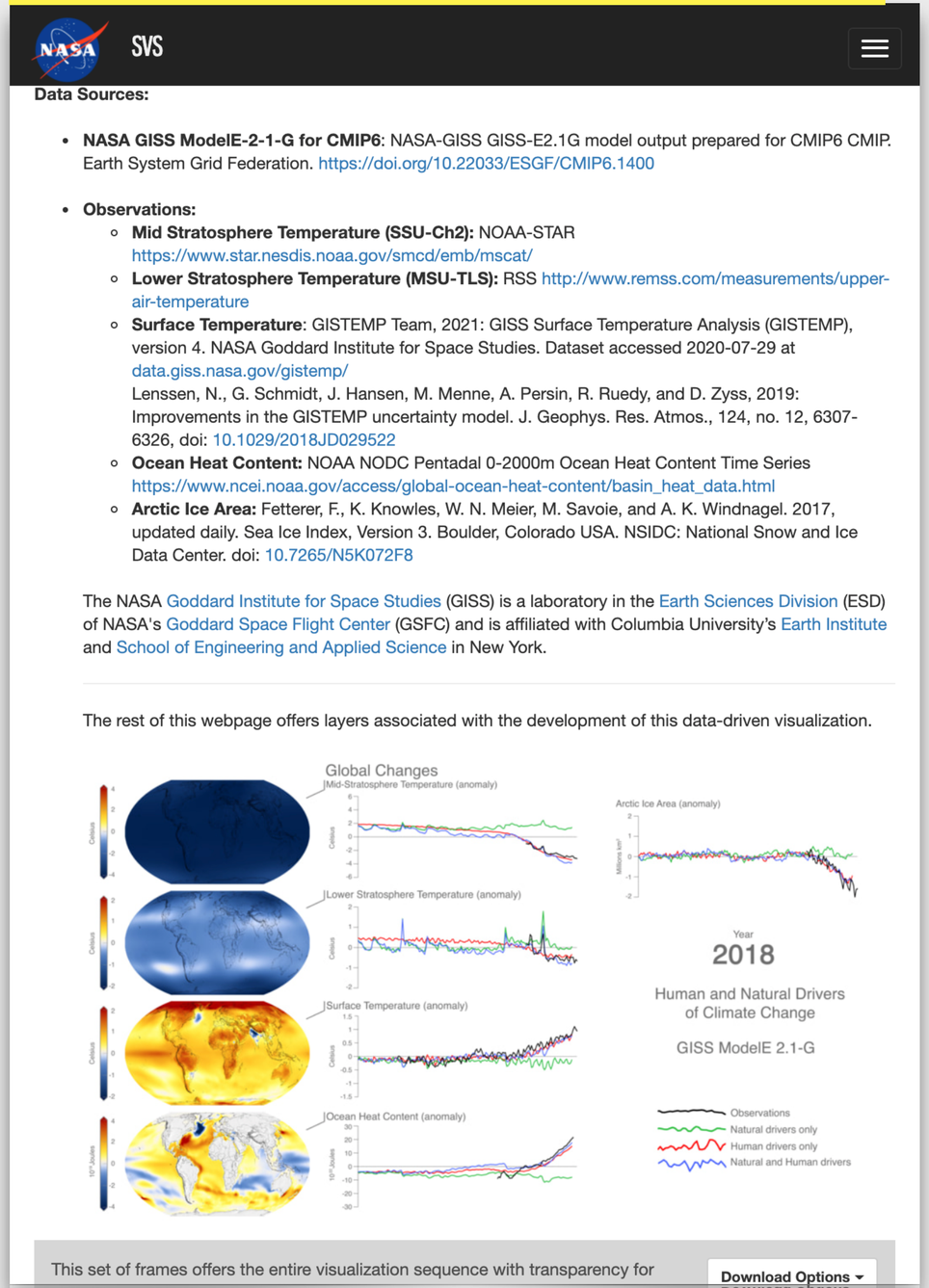
For each data source

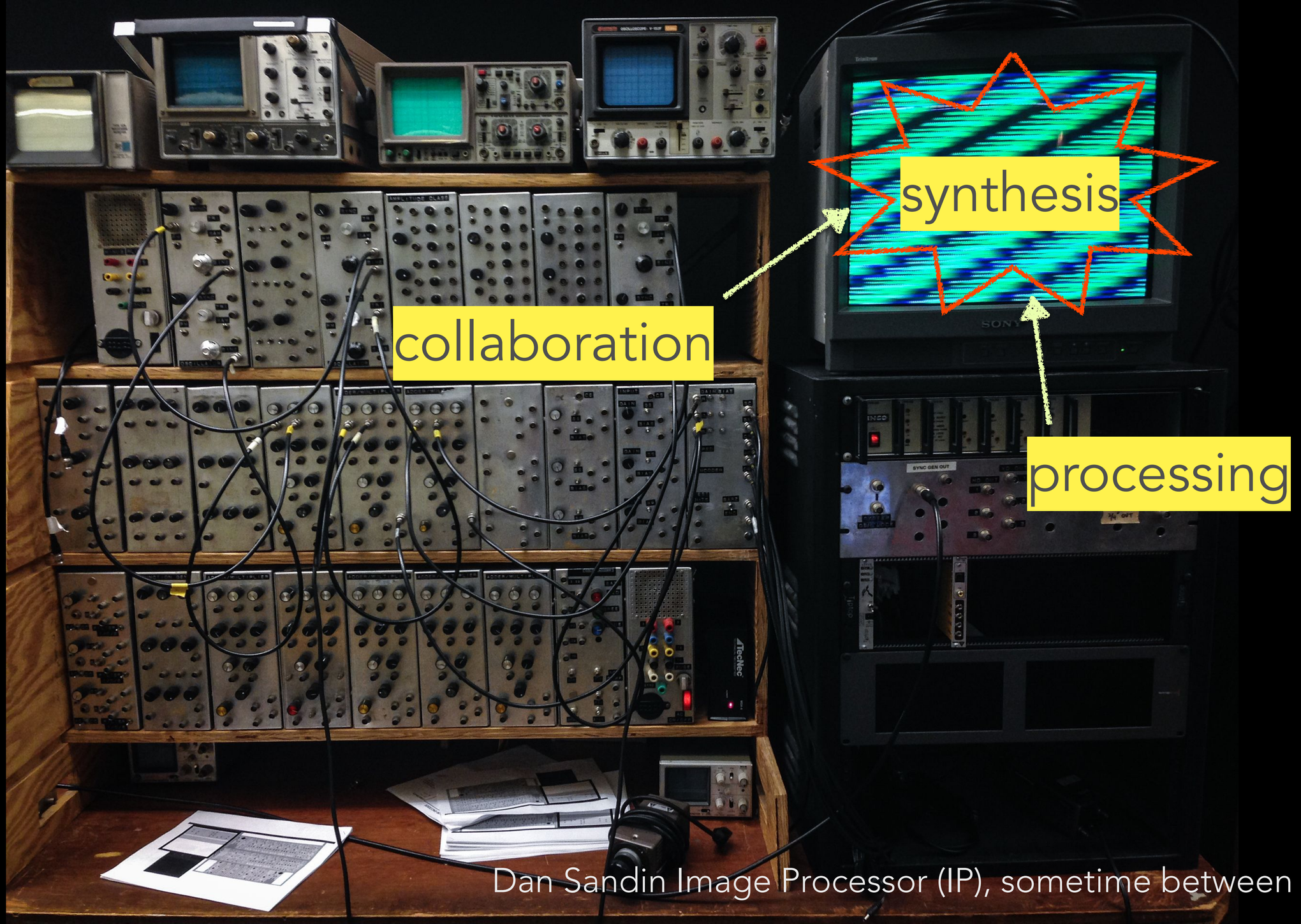
- Source Economy
- Source Nature
- Source Interpretation
- Visualization Interpretation
- Release and point to the source

Release Visualization products

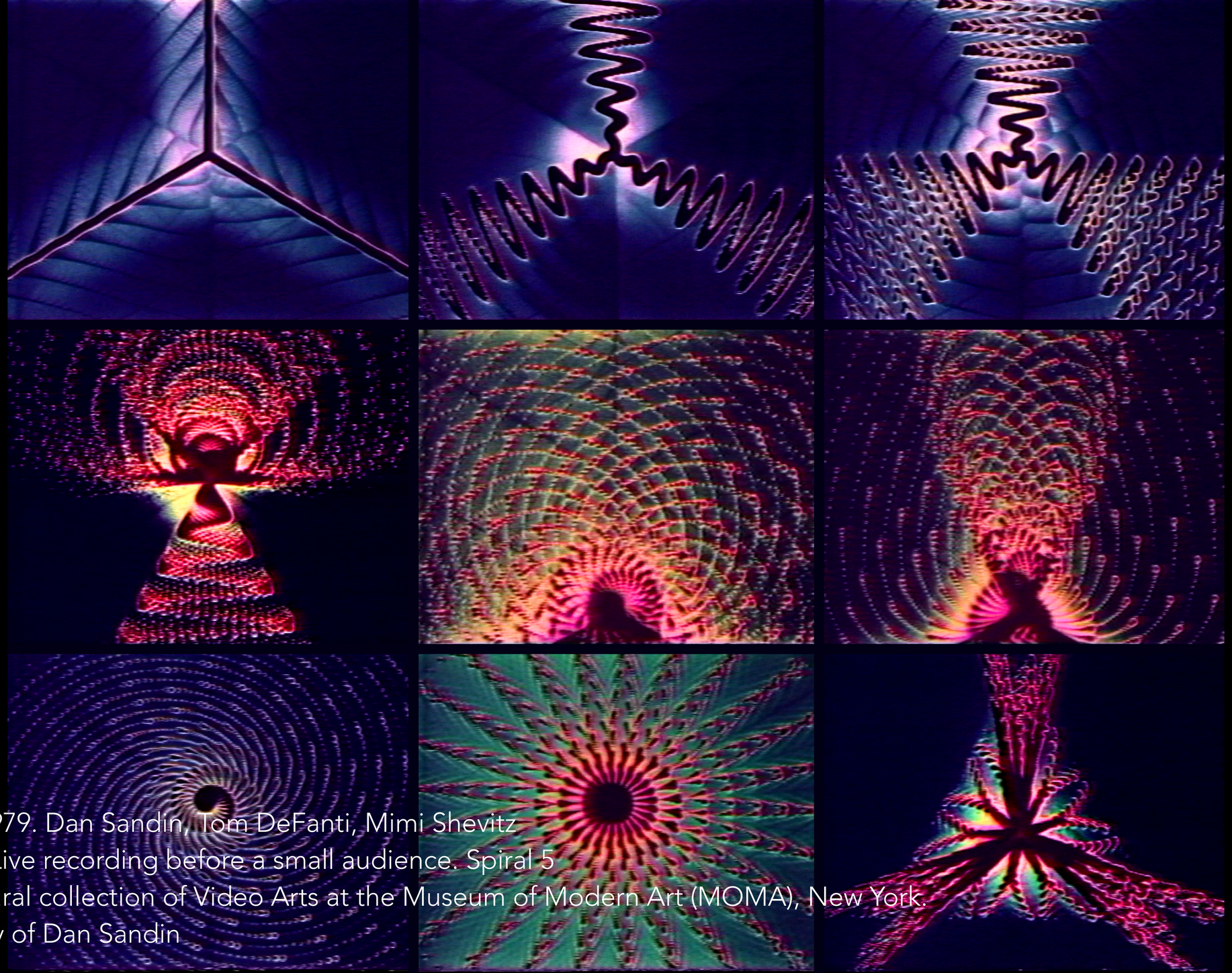
Create persistent reference to Released Product

https://svs.gsfc.nasa.gov/4908





Dan Sandin Image Processor (IP), sometime between 1969-1973



Spiral 5 PTL, 1979. Dan Sandin, Tom DeFanti, Mimi Shevitz
(Visual Music) Live recording before a small audience. Spiral 5
is in the inaugural collection of Video Arts at the Museum of Modern Art (MOMA), New York.
Image courtesy of Dan Sandin

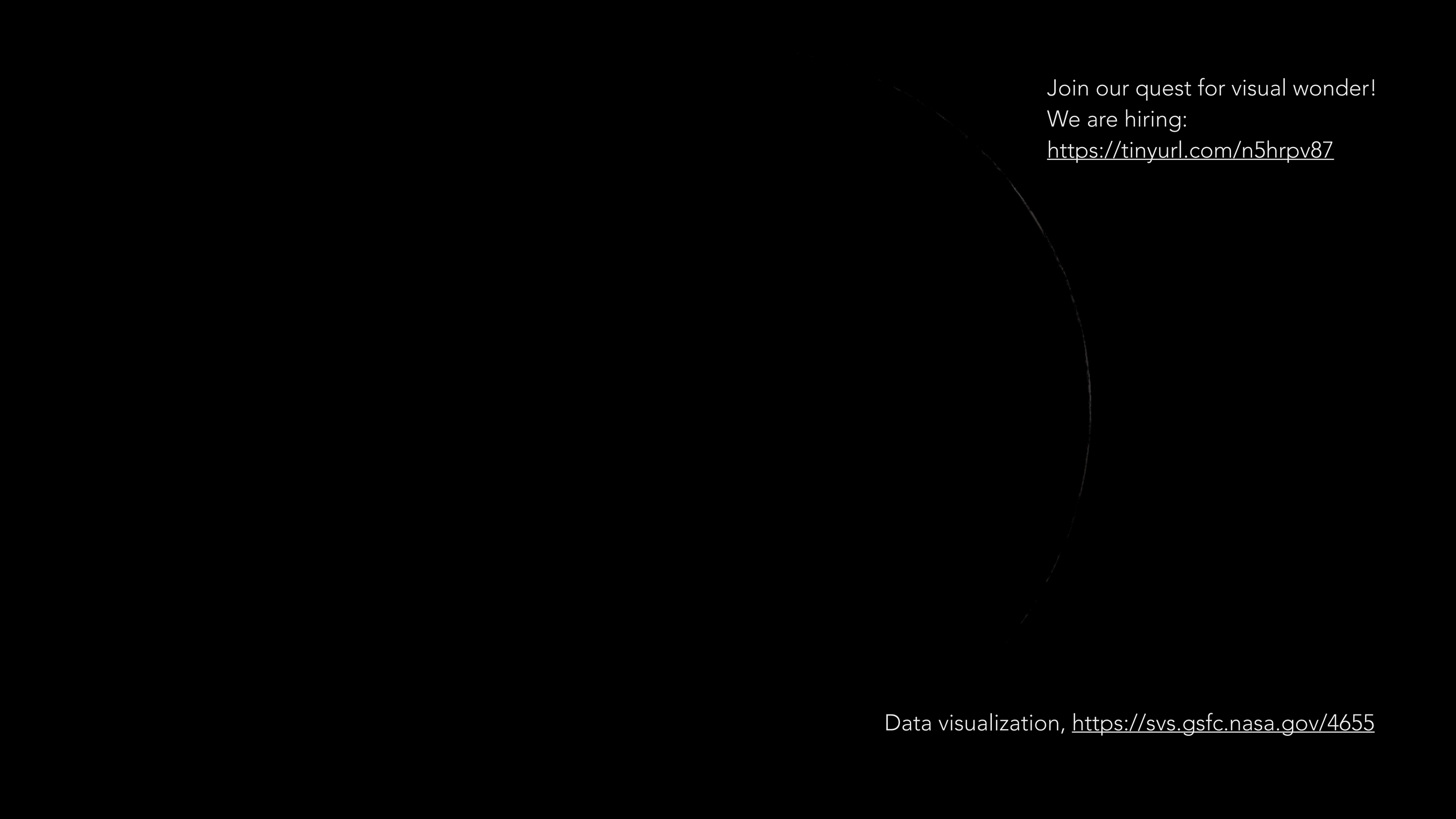
Virtual Reality artwork: *Particle Dreams in Spherical Harmonics*, Dan Sandin
Image courtesy of Dan Sandin

Iceberg (r11io1), 2004. Inigo Maglano-Ovalle
Museum of the Art Institute of Chicago

iceberg

NASA Earth Day events, Washington, DC

NASA Earth Day events, Washington, DC



Join our quest for visual wonder!
We are hiring:
https://tinyurl.com/n5hrpv87

Data visualization, https://svs.gsfc.nasa.gov/4655

Acknowledgements & big thanks

Scientific Visualization Studio, NASA/GSFC

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Michael Bottinger

Donna Cox and AVL

Benjamin Moreno

Drew Berry

Tobias Isenberg

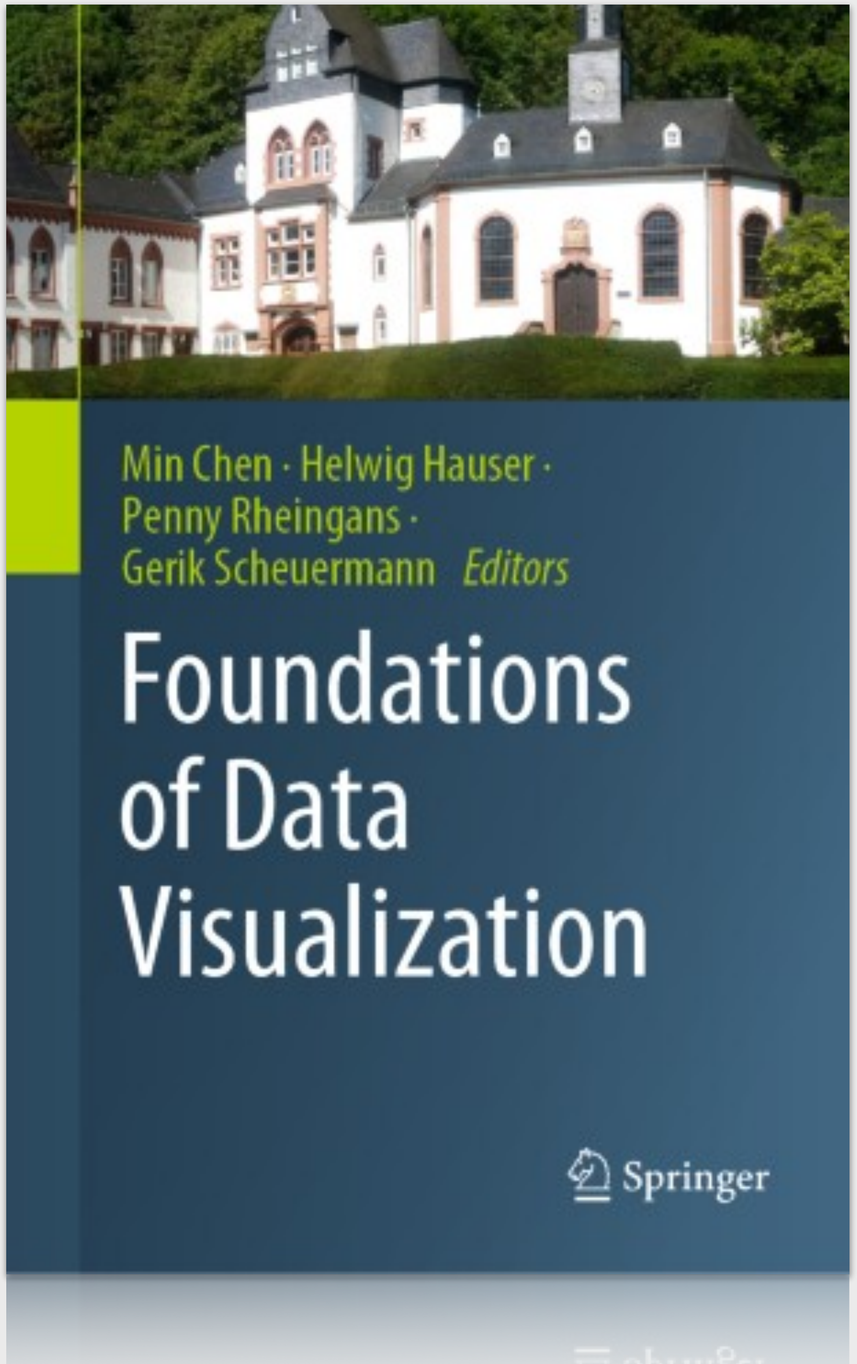
Roxanna Bujack

Heather Krause

Bernadette Woods Placky

Scientific Visualization Studio, NASA/GSFC
https://svs.gsfc.nasa.gov/

Helen-Nicole (Eleni) Kostis
helen-nicole.kostis@nasa.gov



Chapters 18, 20, 21

Transparency and Openness Framework

Declare number of data sources

For each data source

- Source Economy
  - How was the data collected or derived?
  - Who collected the data?
  - Why was the data gathered?
- Source Nature
- Source Interpretation
- Visualization Interpretation
- Release and point to the source

Release Visualization products

Create persistent reference to Released Product

Transparency and Openness Framework

Declare number of data sources

For each data source

- Source Economy
- Source Nature
  - Temporal/spatial
  - Scale (local, regional, global)
  - Dimensions
- Source Interpretation
- Visualization Interpretation
- Release and point to the source

Release Visualization products

Create persistent reference to Released Product

Transparency and Openness Framework

Declare number of data sources

For each data source

- Source Economy
- Source Nature
- Source Interpretation
  - Data issues/limitations/completeness
  - Data assumptions you had to make
  - Data uncertainty
- Visualization Interpretation
- Release and point to the source

Release Visualization products

Create persistent reference to Released Product

Transparency and Openness Framework

Declare number of data sources

For each data source

- Source Economy
- Source Nature
- Source Interpretation
- Visualization Interpretation
  - Processing
  - Abstraction
  - Design
  - Key findings and limitations
- Release and point to the source

Release Visualization products

Create persistent reference to Released Product