



Welcome to the course on

Public Engagement and Societal Impact of Science

6 – 9 February 2024

DAY 2



#PESI24

@AESISNET

OVERVIEW OF THE COURSE



Tuesday, 6 February

Introductions by AESIS – *Anika Duut van Goor*

Introducing Societal Impact and Public Engagement – *Anika Duut van Goor*

Public Engagement as a pathway to Social Impact – *Paul Manners*

Planning impactful Public Engagement – *Eric Jensen*

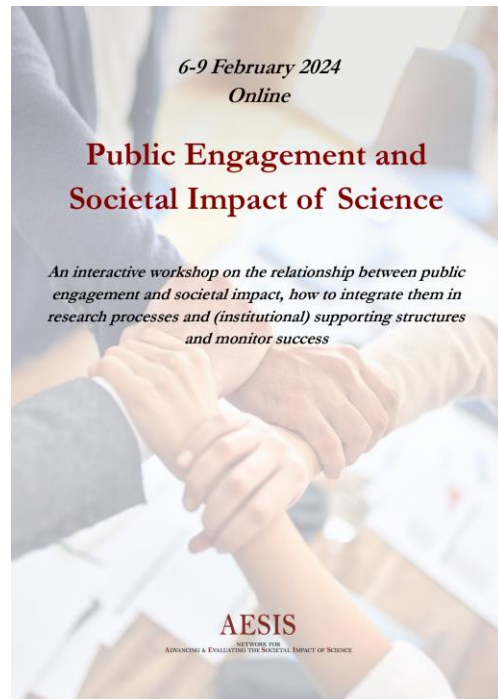
Wednesday, 7 February

Planning impactful Public Engagement – *Eric Jensen*

Building Supportive Cultures for Public Engagement – *Victoria McGuinness*

Strategy, Leadership & Internationalisation – *Mhairi Stewart*

OVERVIEW OF THE COURSE



Thursday, 8 February

Demonstrating PE activities using logic model with KPIs –

Fergus McAuliffe

Ethical & Inclusive Approaches in PE: Tuam Oral History
Project – *Sarah-Anne Buckley*

Data Visualisation in Public Engagement – *Kalina Borkiewicz*

Co-creation and Public Engagement – *Rajesh Tandon*

Friday, 9 February

Bridging knowledge culture – *Rajesh Tandon*

Participant Presentations

Final Words and Questions

Overview of Day 3



Demonstrating PE activities using logic model with KPIs

Fergus McAuliffe, Education, Public Engagement and Communications Manager, iCRAG, University College Dublin, Ireland

Ethical & Inclusive Approaches in PE: Tuam Oral History Project

Sarah-Anne Buckley, Associate Professor in History, University of Galway, Ireland

Data Visualisation in Public Engagement

Kalina Borkiewicz, Computer Graphics and Data Visualization Researcher, University of Utah, United States of America

Co-creation and Public Engagement

Rajesh Tandon, Founder-President, Participatory Research in Asia (PRLA), Co-Chair, UNESCO Chair on Community Based Research and Social Responsibility in Higher Education, India

Demonstrating PE activities using logic model with KPIs - Part I

Fergus McAuliffe



SFI RESEARCH CENTRE
IN APPLIED GEOSCIENCES



DR FERGUS MCAULIFFE,
ENGAGEMENT AND COMMUNICATIONS
MANAGER

A bit about me...

Communications &
Engagement Manager at

iCRAG SFI RESEARCH
CENTRE IN APPLIED
GEOSCIENCES



newSTALK



Learning outcomes

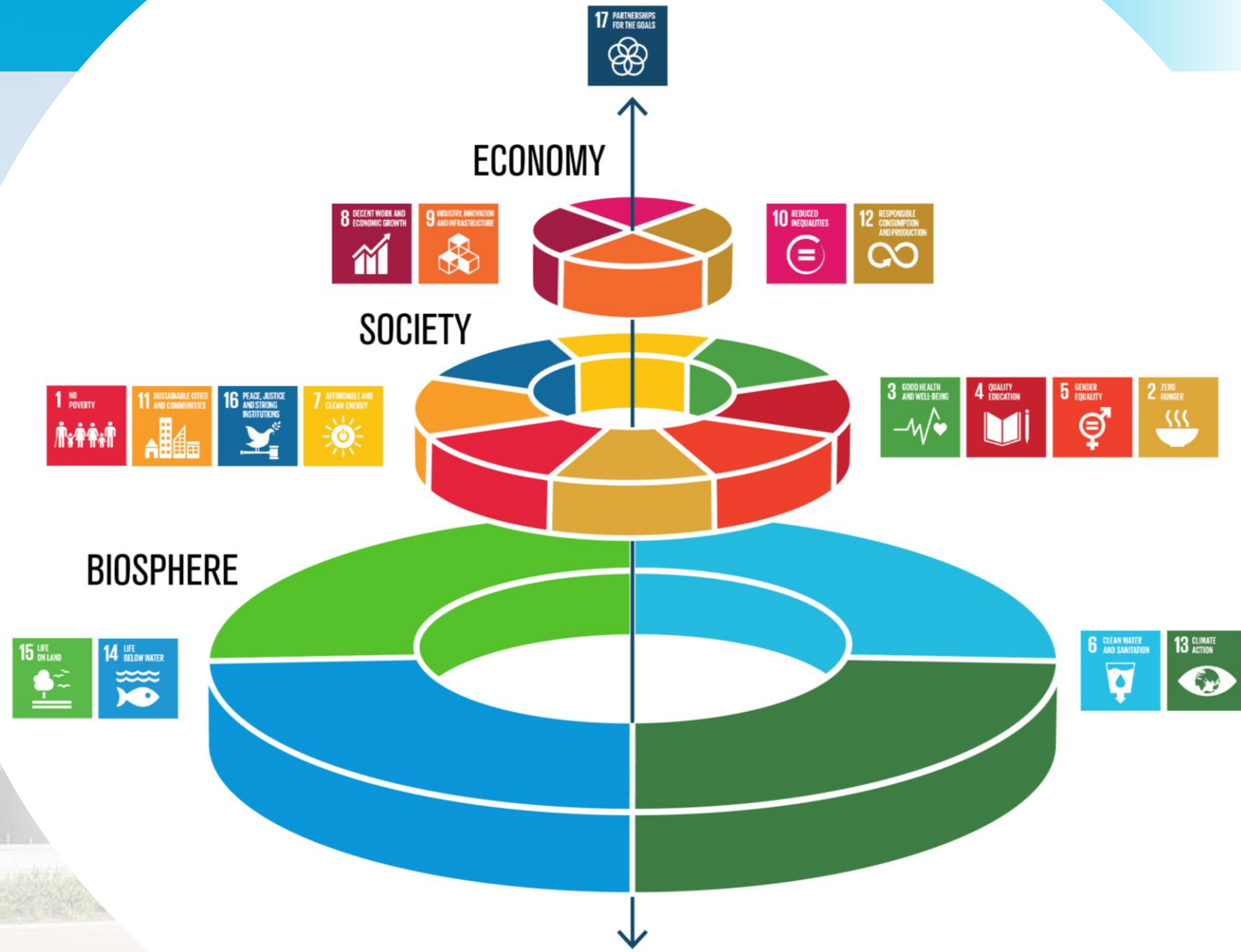
By the end of this session you will:

- understand how we do PE at iCRAG
- used design thinking
- understood an audience better
- created a SMART objective
- developed an achievable activity
- developed this into a funding pitch

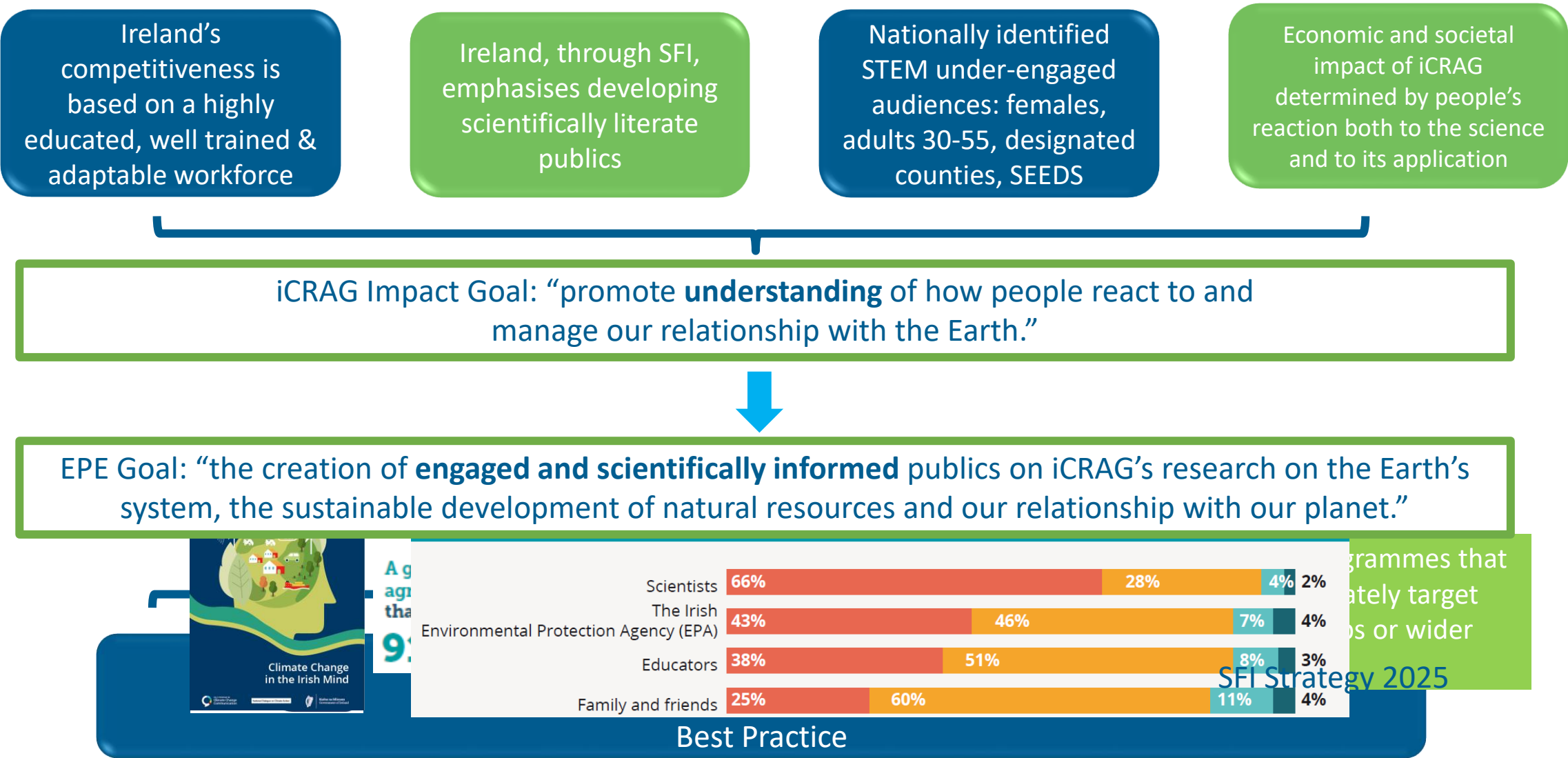
iCRAG is the SFI Research Centre in Applied Geosciences

A team of researchers
creating
solutions for a sustainable
society

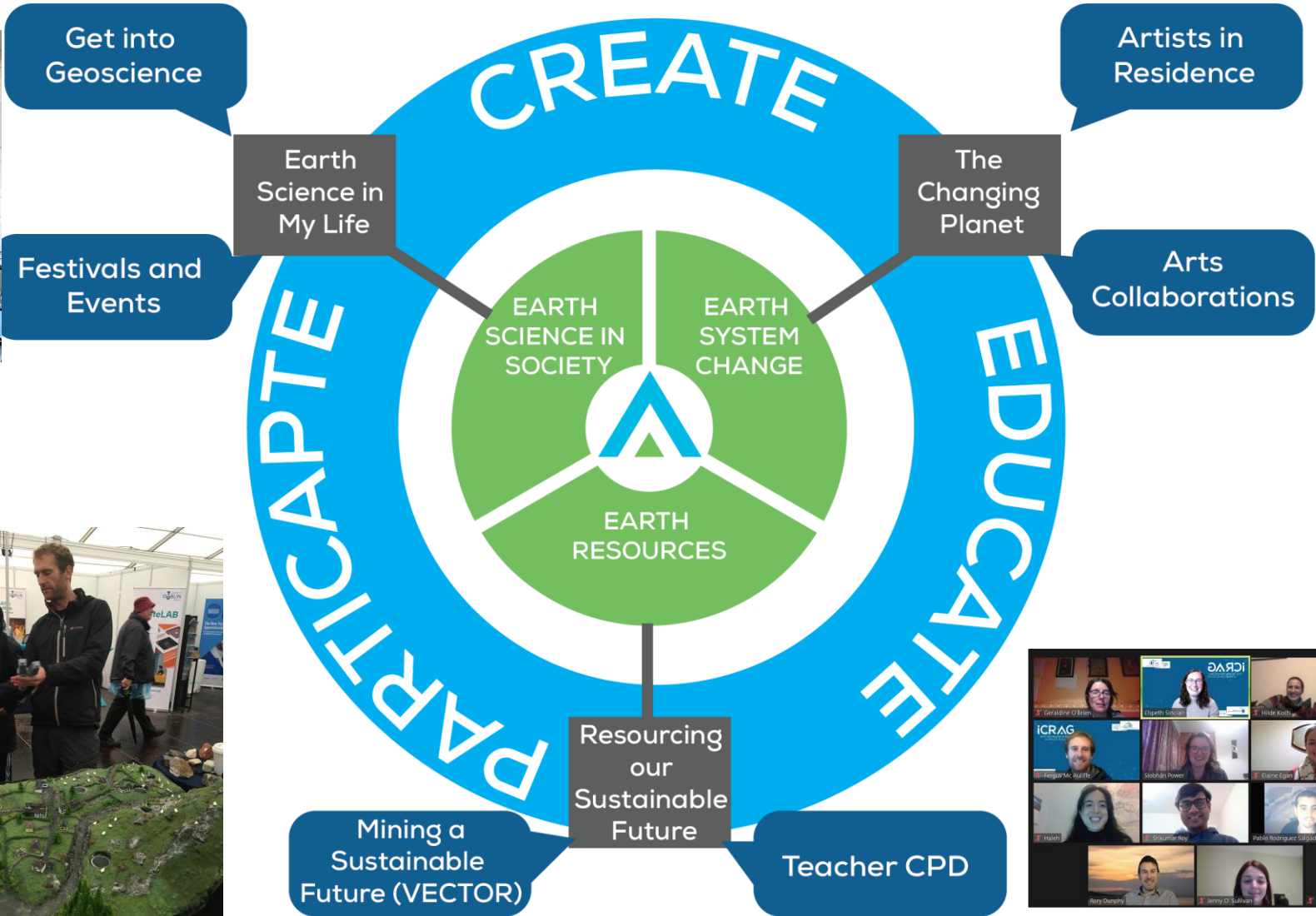
Hosted at University College Dublin,
Ireland



Context & rationale for the EPE programme

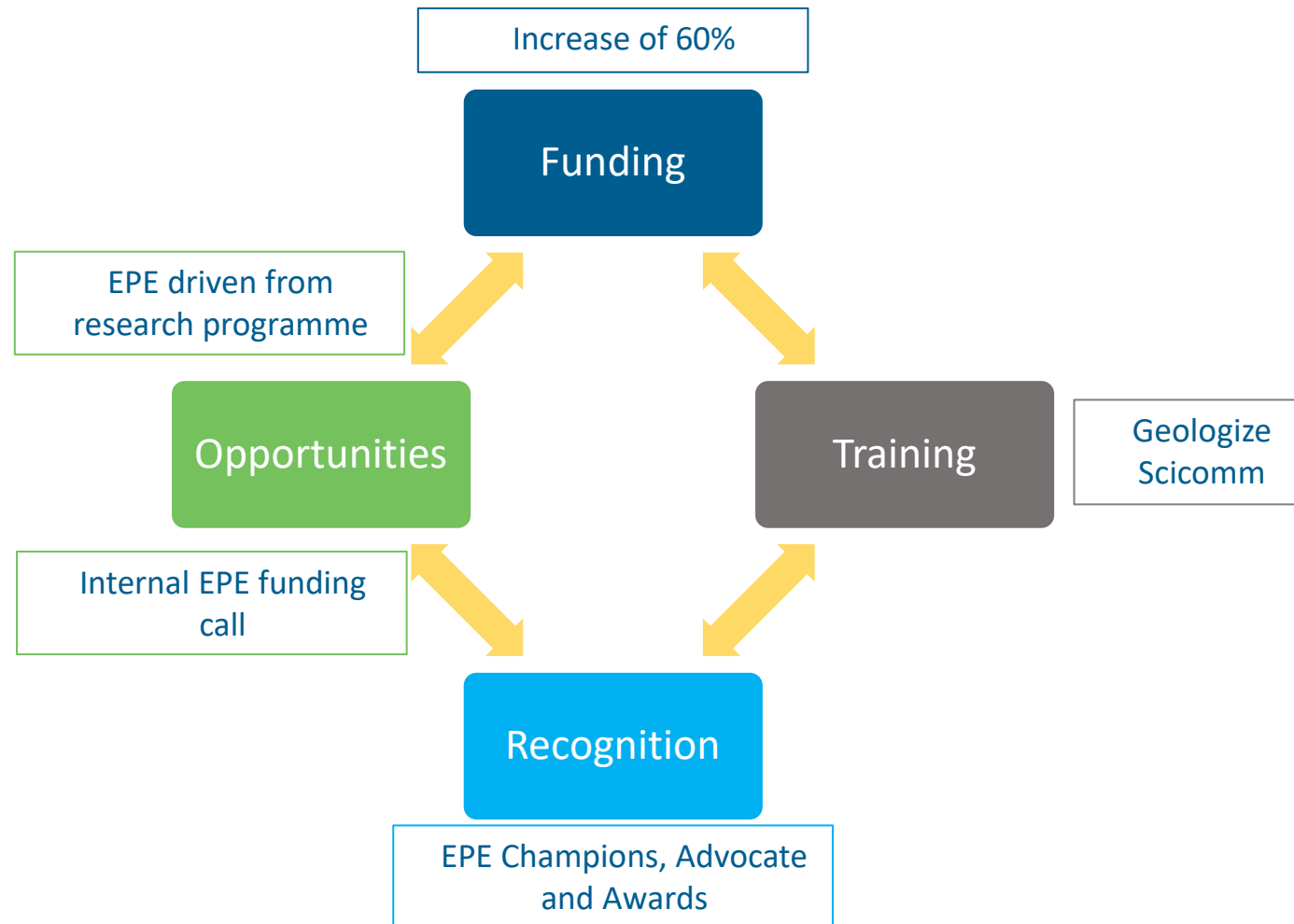


iCRAG's EPE strategy



Reach and Culture of Engagement

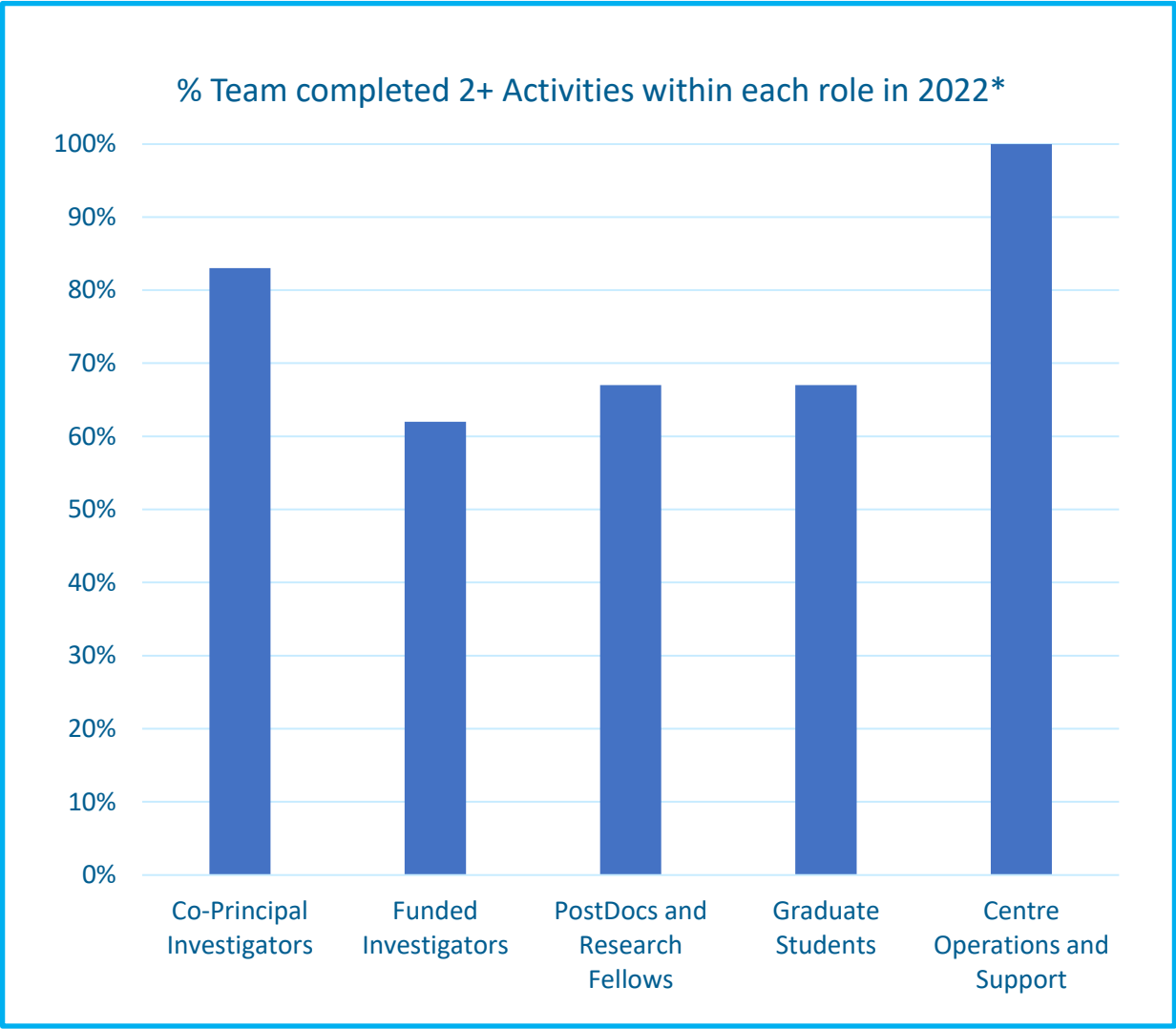
Enabling Factors:



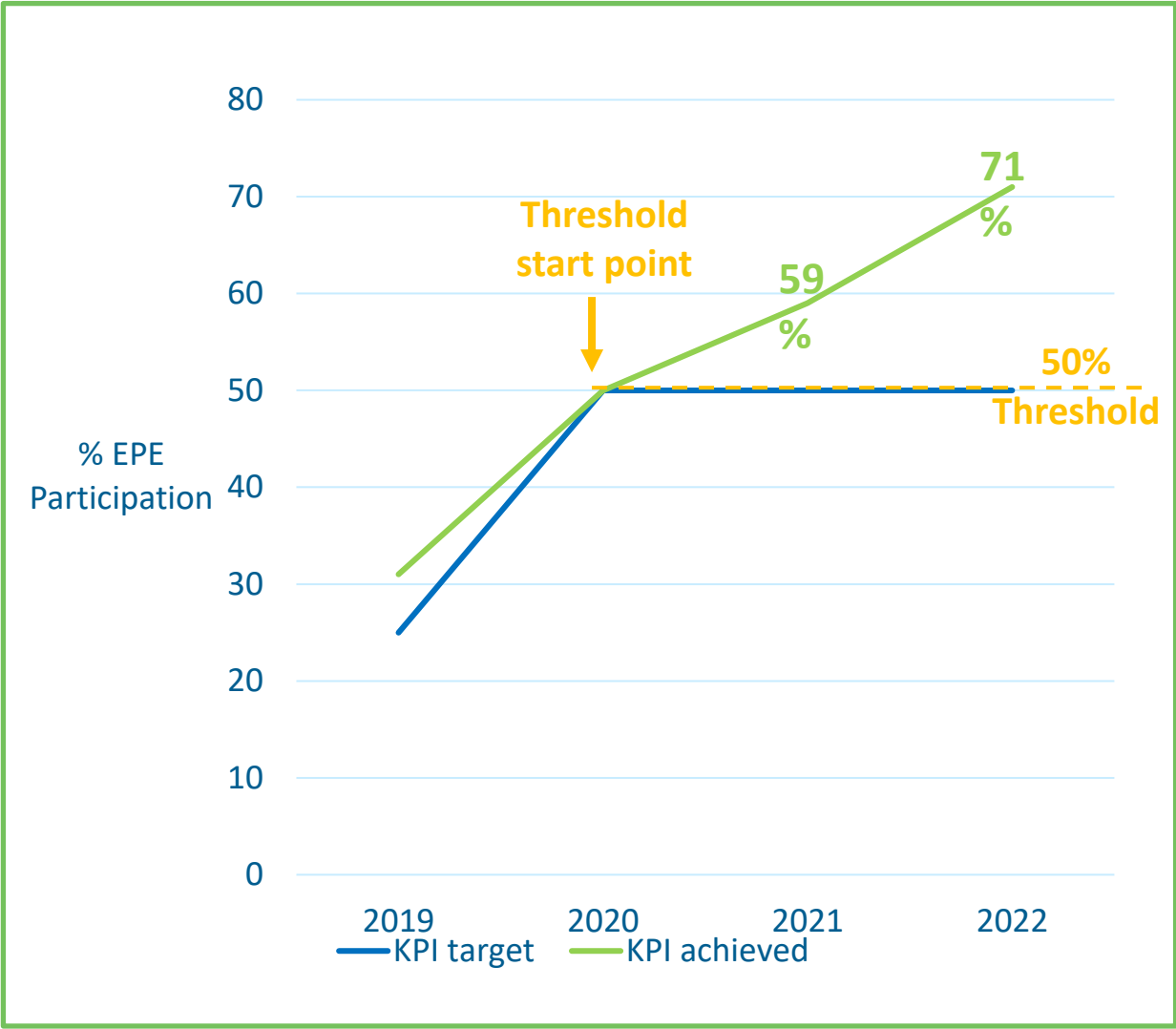
Culture of engagement



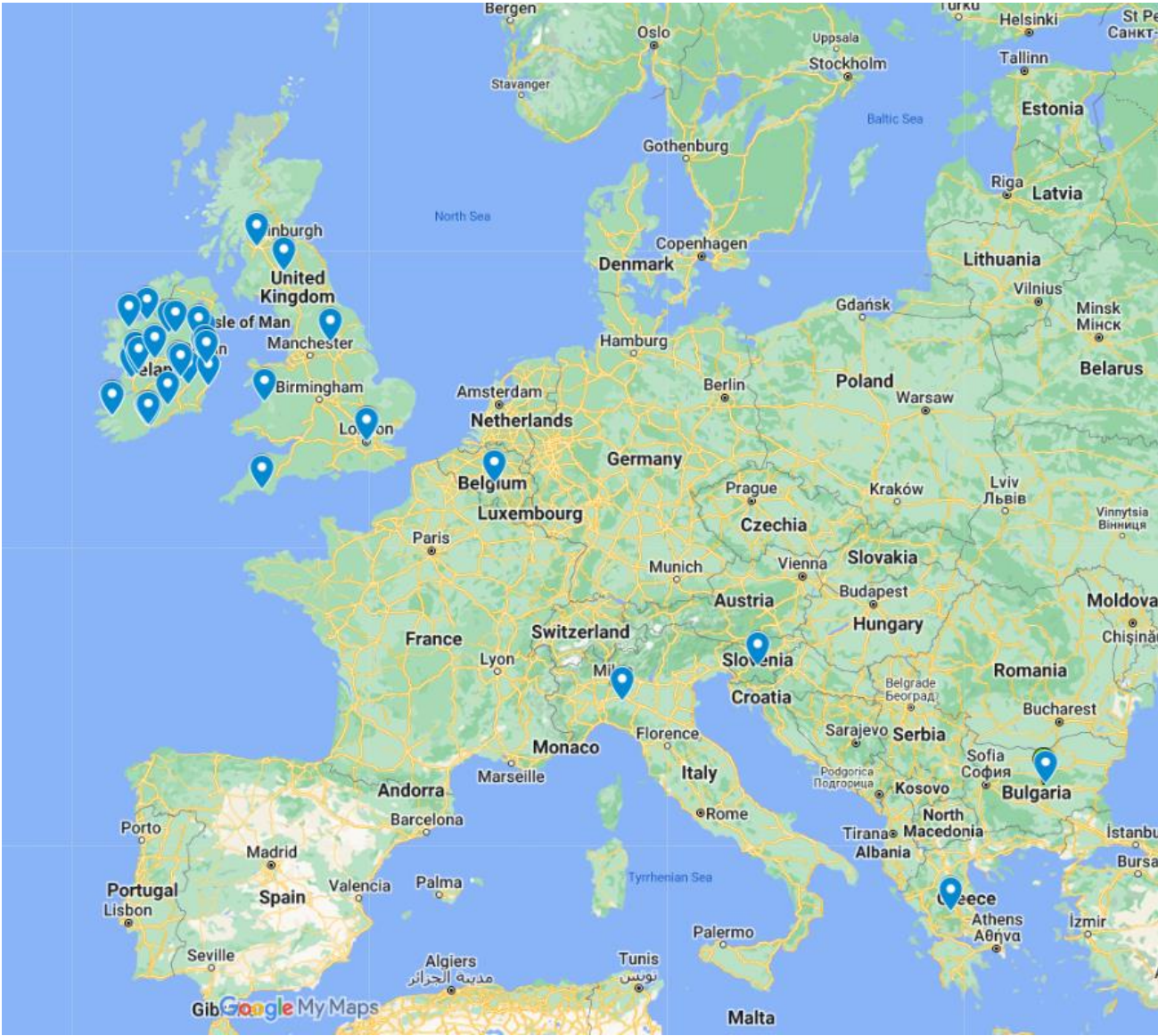
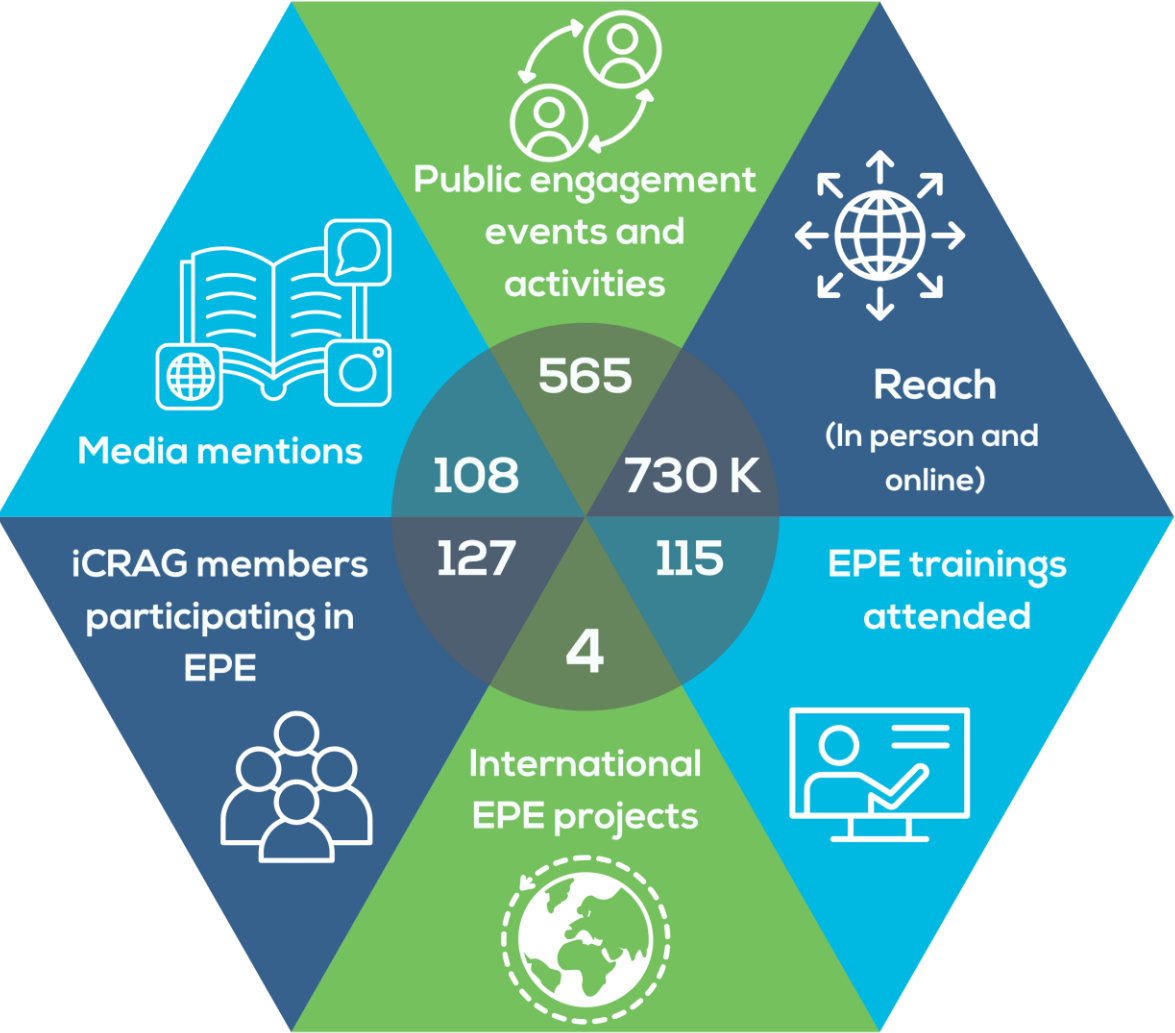
KPI Performance



*unvalidated

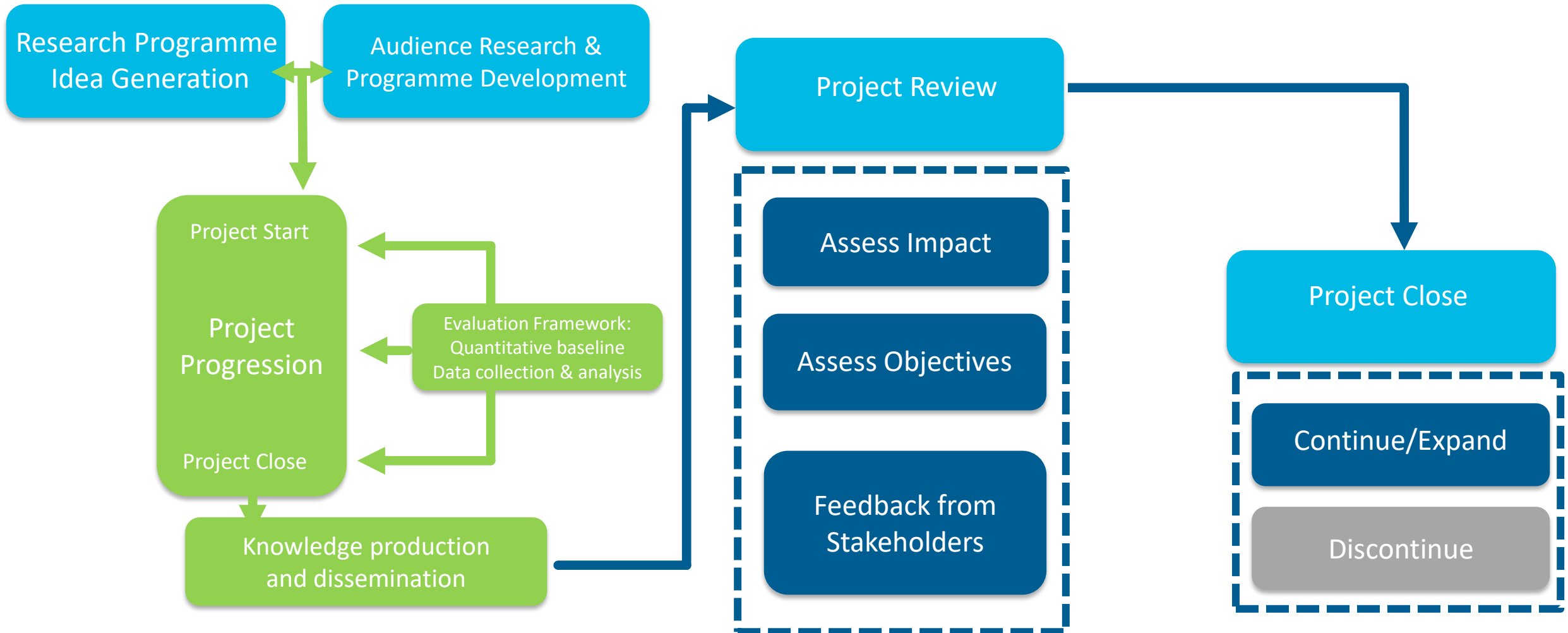


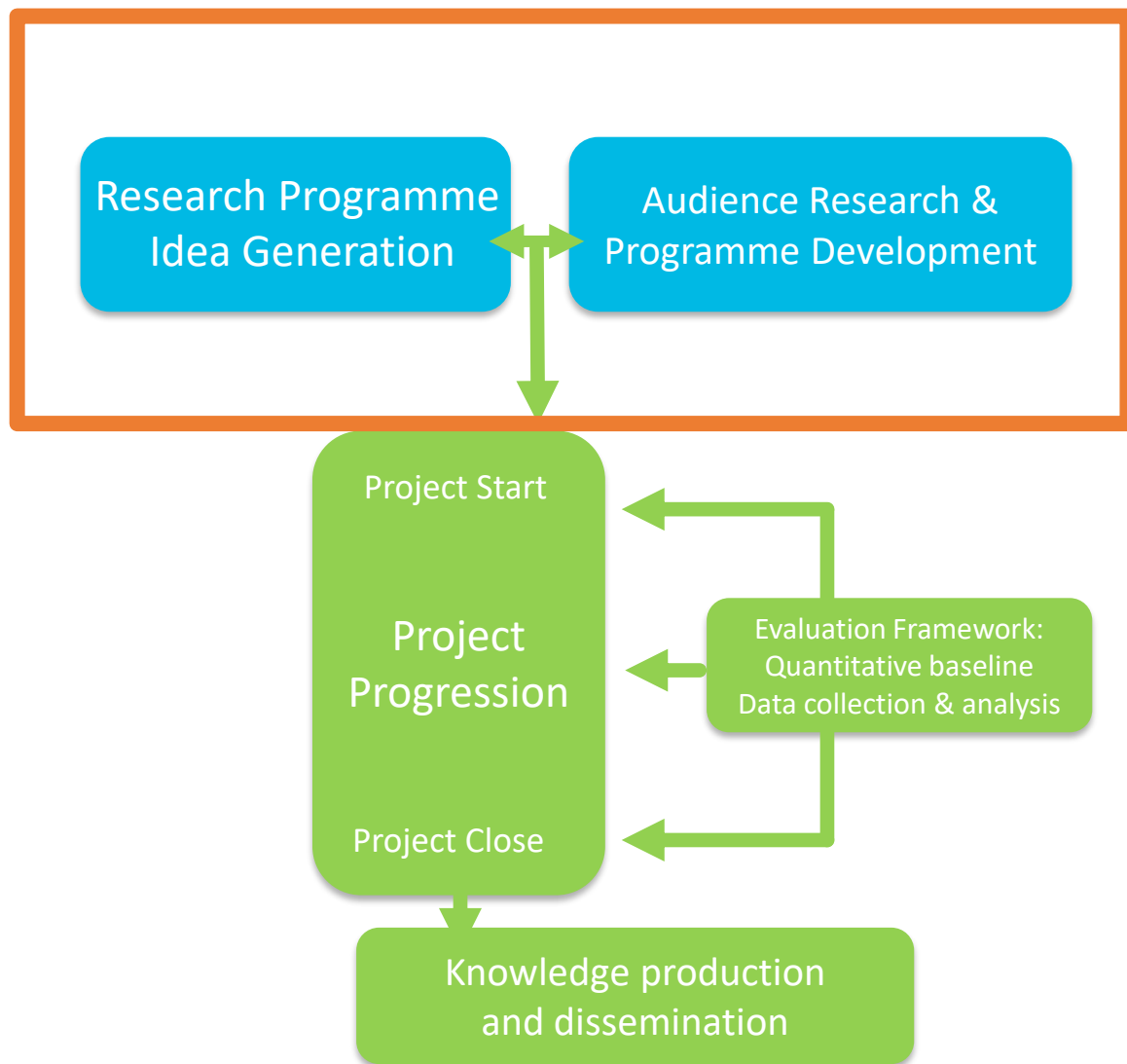
Reach and Culture



(Jan 2021-present)

iCRAG's EPE programming: stepwise approach





Challenge:
Create a funding pitch for Public Engagement
exhibit/event/project

Constraints:

- A specific topic
- A specific audience
- An exhibit/event/project
- Max budget available = €10,000
- Deliver in Autumn 2024
- 3 minutes to pitch to a national science funder

Design Thinking



Empathize



Define



Ideate



Prototype



Test

Break 20 min

Demonstrating PE activities using logic model with KPIs - Part II

Fergus McAuliffe

In breakout rooms and on worksheets:

- Empathise (10 mins)
- Define (10 mins)
- Ideate (15 mins)
- Pitch (15 mins)

Step 1



Empathize



Profiling



Who is your target audience?

Fergus' aunt, works in corporate PR

Age group?

60s, coming towards end of career

Location?

Mainly at home (works from home), occasionally hiking, cinema, farmers markets, sunny holidays

Hobbies? Interests?

Watching TV, planning holidays, home improvement, Harry Potter, conspiracy theory shows, true crime, TV shows about paranormal activity, detective novels, loves the outdoors but worried about climate change

Family and Living?

Lives with husband. In Dublin. Has four sons but all have left home. Husband is often travelling for work.

Needs and priorities:

- Can be lonely as WFH
- Wants to spend more time with family
- Wants to be healthier and feel younger
- Wants to destress and relax from high profile job
- Nature and climate change

Who is your target audience?

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- Nature and climate change



Breakout rooms and groups

Group 1 - Andi, Cynthie, Emma, Elizabeth
Audience: members of a farming organisation

Group 2 - Sonia, Camila, Nicolette, Dee-Ann
Audience: a choir for retired people

Group 3 - Wiebke, Briony, Claire
Audience: a friends group of hipsters

Google Slides links in the zoom chat
(copy link for your group before you go to the breakout room)

Google Slides worksheets

Profiling

Who is your target audience?

Age group?

Location?

Hobbies? Interests?

Family and Living?

Needs and Priorities:

-
-
-
-
-

10 minutes

Your turn:

- **Spit the group (audience & PE developers)**
- **Role play**
- **Ask questions**

Design Thinking



Empathize



Define



Ideate



Prototype



Test

Step 2



Define

Define a SMART objective

Problem

There are not enough female-identifying people in physics

Aim

Encourage participation of more female-identifying people in physics

SMART Objective

Increase by 10% the number of female-identifying school students choosing physics in their final years at 3 underperforming schools in 1 year

Specific
Measurable
Achievable
Relevant
Time-bound

Breakout rooms and groups

Define a SMART Objective

Problem

Aim

SMART Objective

Specific
Measurable
Achievable
Relevant
Time-bound

Your turn:

- Use the Needs and Wants to help define the problem

10 minutes

Design Thinking



Empathize



Define



Ideate



Prototype



Test

Step 3



Ideate

What is your idea?

How will this address the problem?

Inputs

- Materials
- Costs
- Training
- Travel
- Venue



Activity

- What will take place/happen?
- For whom?
- When?
- Where?



Outputs

- What will be made?
- Physical objects/lessons plans/art/kit



Outcome

- What will change?
- How will the audience feel?
- What might they do afterwards?

Writing the Earth: a collaboration between geoscientists and writers

Provide space for debate and dialogue on climate change for creative writers to reach new audiences

Inputs

- Marketing campaign x 1
- €9,360
- Training
- Staff and writer travel costs
- Irish Writers Centre, Pearse St Library



Activity

- 6 sessions over 4 months
- 6 writers, 10 scientists
- March – August 2023
- Online x 3, in person x 3



Outputs

- 6 new pieces of creative work:
- 4 essays
- 2 new plays
- 3 stage performances
- 1 feature article
- 1 conference presentation



Outcome

- Writers' understanding of iCRAG earth system change increases/change in practice
- Female + older audiences receive increased exposure to iCRAG research topics (via writing)
- Researchers gain new ways of thinking about and communicating their research

Logic model

What is your idea?

How will this address the problem?

Inputs

- ...
- ...
- ...
- ...

Activity

- ...
- ...
- ...
- ...

Outputs

- ...
- ...
- ...
- ...

Outcome

- ...
- ...
- ...
- ...

Your turn:

- Fill in the logic model
- Move between inputs -> Outcomes

Constraints: €10,000; Autumn 2024

15 minutes

The pitch

3 minutes:

Who is it for?

Why are you doing it?

What is it?

When and where will it take place?

How much will it cost & How will you know if you've succeeded?

Your turn:

Content, Clarity, Charisma

10 minutes

A stage with red curtains and a wooden floor. The curtains are a vibrant red with vertical pleats and a decorative valance at the top. The floor is made of light-colored wooden planks. The text "Your turn" is centered on the curtains.

Your turn

icrag-centre.org

[@fergusmcauliffe](https://twitter.com/fergusmcauliffe)

Break 20 min

Ethical & Inclusive Approaches in PE: Tuam Oral History Project

Sarah-Anne Buckley

AESIS: Public Engagement and Societal Impact of Science

“Ethical & Inclusive Approaches in Public Engagement: The Tuam Oral History Project”

Dr Sarah-Anne Buckley
University of Galway Ireland

Sarah-anne.buckley@universityofgalway.ie



Galway University
FOUNDATION



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Welcome!

Who am I?

Thanks for joining today – please interrupt me at any point.

If you prefer to ask a question ‘in-person’ or add it to the chat both work.

I will be having 1-2 breakout rooms today, time and tech permitting.



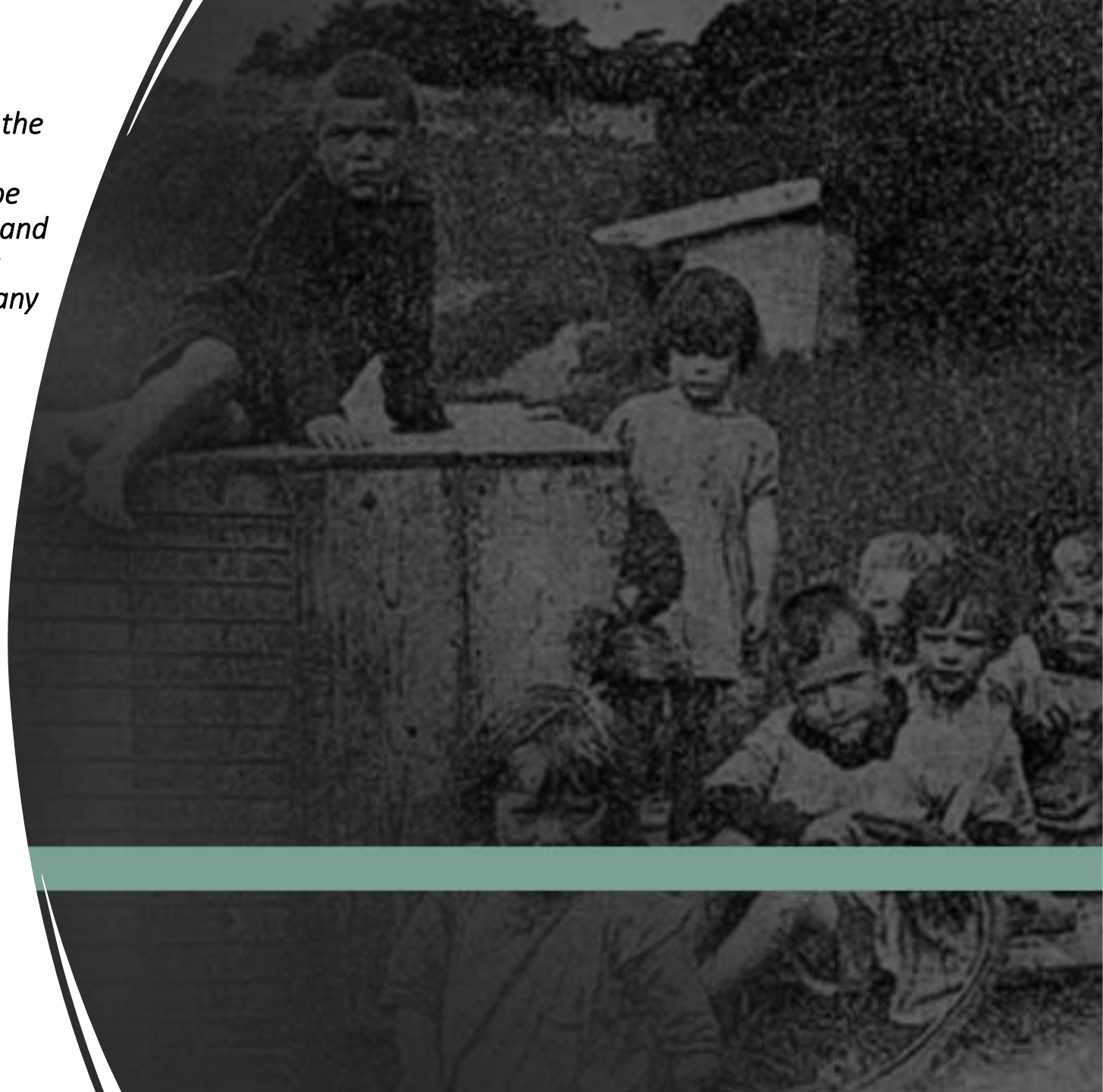
Overview

1. What is the TOHP?
 2. The context and institutional support.
 3. Outputs and Impact.
 4. Co-creation and activist research – *Discuss in breakout rooms.*
 5. Trauma-informed research. Ethical considerations.
- Time permitting, group discussion and learnings.



The key aim of the Tuam Oral History Project is to enable the survivors of the Tuam institution and their families to tell their own life stories, in the way that they want them to be told. In that regard, members of the project team record and archive the histories and life stories of survivors and their families, as well as the memories of others connected in any way with the institution or with those who spent time there.

- **Lead Researchers/Co-PIs:** Dr Sarah-Anne Buckley and Dr John Cunningham.
- **Interviewers:** Mary Cunningham, Dr Sarah-Anne Buckley and Dr John Cunningham.
- **Creative Writing:** Elaine Feeney
- **Director/Producer of Tuam Oral History Theatre Production:** Dr Miriam Haughton
- **Archivist:** Dr Barry Houlihan
- **Marketing:** Lorna Farren

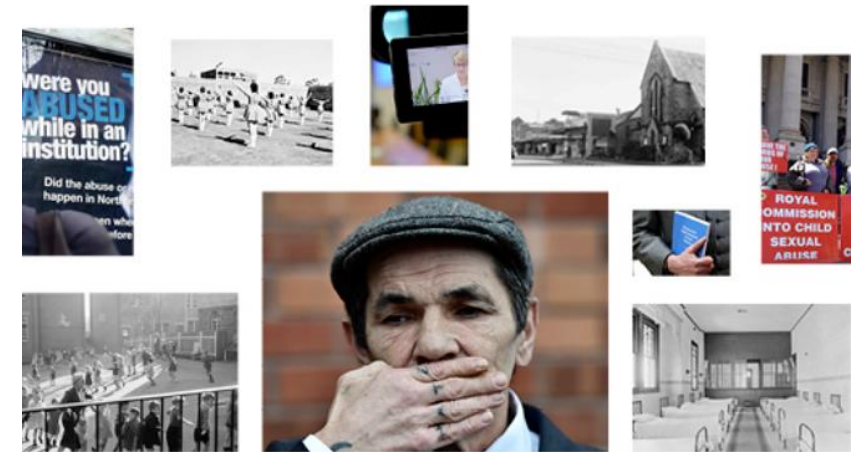


2. Context and Institutional Support

- Past three decades globally - over 12 countries have been addressing historic cases of child abuse and gender-based violence in institutions. During this 'age of inquiry', different countries have taken different approaches to justice.
- Since 2014, the mother and baby institutions in Ireland have become a topic of national and international discourse after the discovery of 798 infants who were buried in a septic tank in Tuam, a town in Galway. Over 200,000 women and infants were placed in the institutions in the twentieth century.

2015...MBHCOI

Feb 2019, 1-day event in the National University of Ireland Galway.
Limited funding but institutional support and co-creation from the beginning.



Ireland wanted to Forget. But the Dead
Don't Always Stay Buried.



The Tuam Mother and Baby 'Home' and the MBHCOI





-
- “The Report is the Record....”

Judge Sean Ryan, 2019, RTÉ Radio

The Commission Report, 3,000 pages – the print Copy weighs 9kg



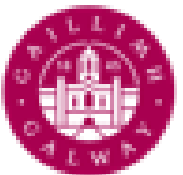
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UNIVERSITY OF GALWAY



Oral History and enabling the past to speak out today.

Catherine Connolly T.D. – “The powerful against the powerless”.

“This assigns no blame for the source of the shame. Women didn’t shame themselves. They *were* shamed, they *experienced* shame, the shame was inflicted upon them. . . .Society did this, a society composed of the powerful against the powerless”



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Why An Oral History Project?

"**lived childhood** must be narrated through memory". . . and, more importantly, the memories of those in institutions & the archival records of the institutions "**seldom tell the same story**"

"Beyond telling one's story, recognition is about being believed..."

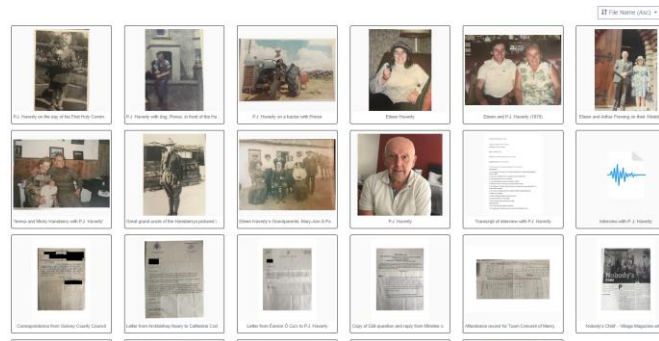
Johanna Skold (2015), *Journal of Education*



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“Nothing about us without us”

- The project *is grassroots, interdisciplinary and grounded in the principles of transitional and historical justice*, and in the ethical digitization of life stories.
- **Co-creative, Creative Learning.**
- Small Scale (60,000 euro) but has built genuine and sustained relationships with those directly affected.
- Merged research and advocacy, demonstrating the need for ethically driven trauma-informed research in this space.
- There have been over 100 articles including an article in CNN on the project. In his 2020 article ‘The Children of Tuam’ Dan Barry cited work from the team – it remains one of the most read articles published by the *New York Times*.
- Our podcast series ‘*Other*’ was narrated by the actor Cillian Murphy.
- The project has demonstrated that Impactful research can be ethical and co-creative, and that a local project like ours can have a global reach and relevance to some of the biggest issues of our time.



P.J. Haverty on the day of his First Holy Communion.



Tuam Oral History – Digital Open Access

Date: 16 September 2019

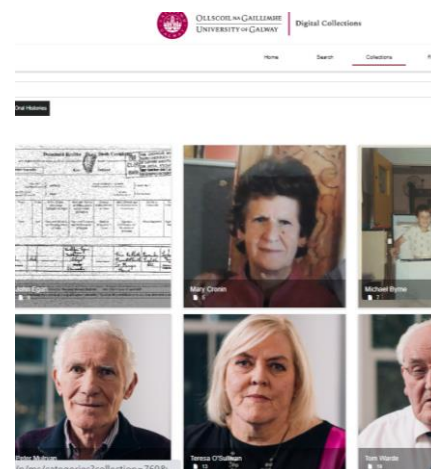
Location: The Correllea Court Hotel, Tuam, Co Galway

Length of Interview: 1 hour 23 minutes.

The following items were copied and submitted by P.J. for the archive:

DOCUMENTS

- 1: Correspondence from Galway Co. Council to the Hansberrys relating to their application to foster a child.
- 2: Letter from Archbishop Neary to Catherine Corless, 3 October 2016.
- 3: Letter from Éamon Ó Cuív to P.J. Haverty
- 4: Copy of Dáil question and reply from Minister of Justice.



Citation

(24/9/2020), Interview with Carmel Larkin, Publisher = "NUI Galway Digital Collections", Asset Id 17060, Archival Record Id TOHP

Copy to clipboard

Reference Manager Download

Cite this document Download

Collection Carmel Larkin

Title Interview with Carmel Larkin

3. Some key outputs and Impacts

- A Living Archive. Impact on 'Stakeholders' and continuing relationship.
- Media – [Select Media](#)
- Education and Creative Learning a key request (JC Module)
- Policy impact – National Survivor Centre, Retention of Records Bill
- Podcast Series
- Exhibition/s - [Survivors' Stories](#)
- Creative Writing Workshops
- Related Projects - [Art Therapy Project](#) ; Language Project
- Broader knowledge - *Stolen* [Trailer](#)
- Students – Nochtaithe...



OTHER

Stories from the Tuam Mother & Baby Home [Link](#)

Narrated by Cillian Murphy



Nochtaithe (Unveiled)

- [Link to Nochtaithe](#) (1.54; 24.34)



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Language, Terminology and Representation – Issues with Co- Creation

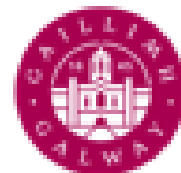
Language, Terminology and
Representation - [Final Report](#)

Language, Terminology and Representation

considering Ireland's
Institutions historically
known as '*Mother and Baby
Homes*', '*County Homes*'
and related Institutions

Professor Caroline McGregor,
Dr Carmel Devaney and
Dr Sarah-Anne Buckley

UNESCO Child and Family



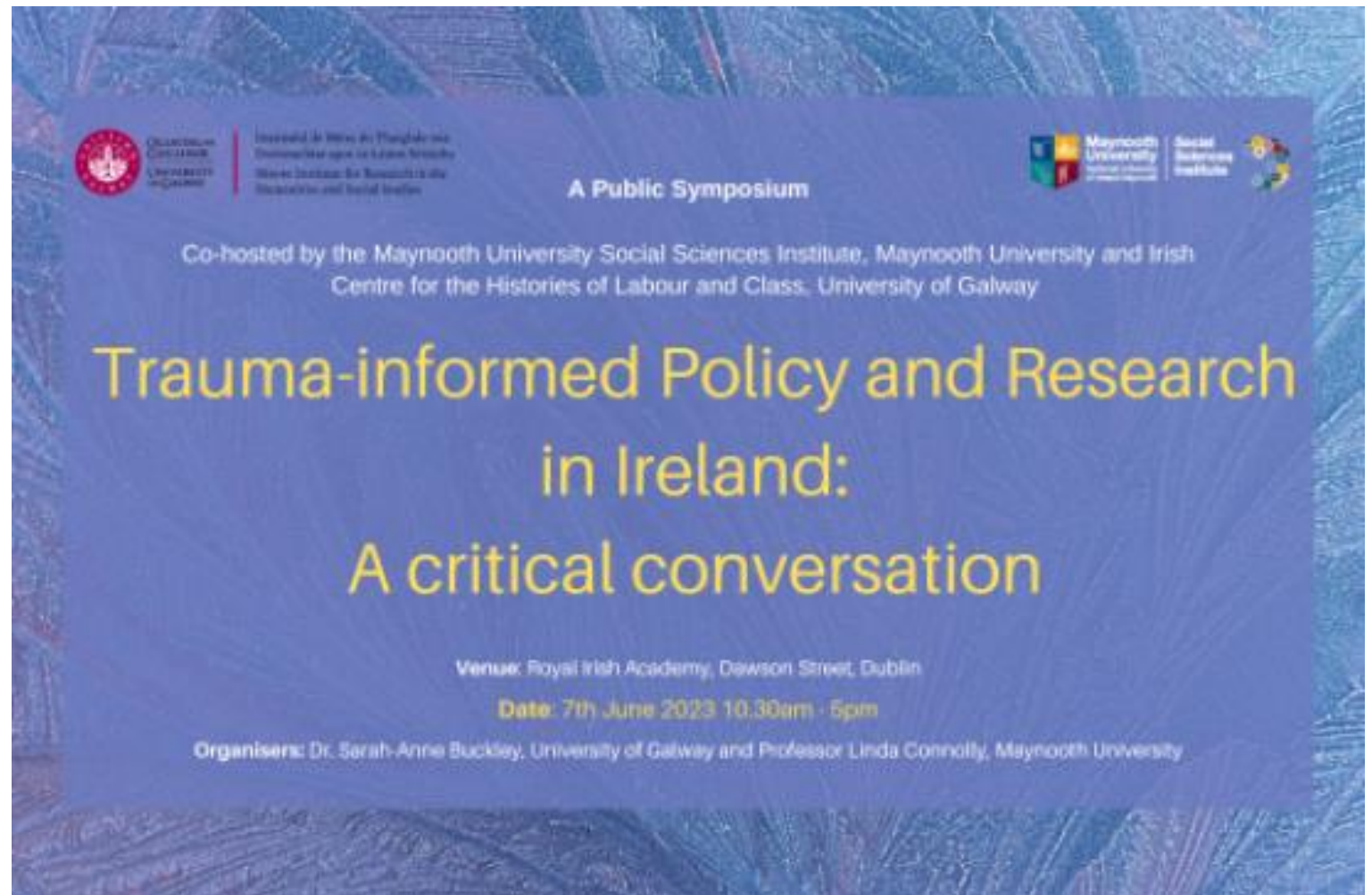
OLLSCG
UNIVER



~~HOME~~ RESPECT
CHILD ~~BAS~~
RESIDENT ADULT
TUTION H

- Co-creation and activist research – *Discuss in breakout rooms* for 5 mins

Trauma- informed research



Break 50 min

Data Visualisation in Public Engagement

Kalina Borkiewicz



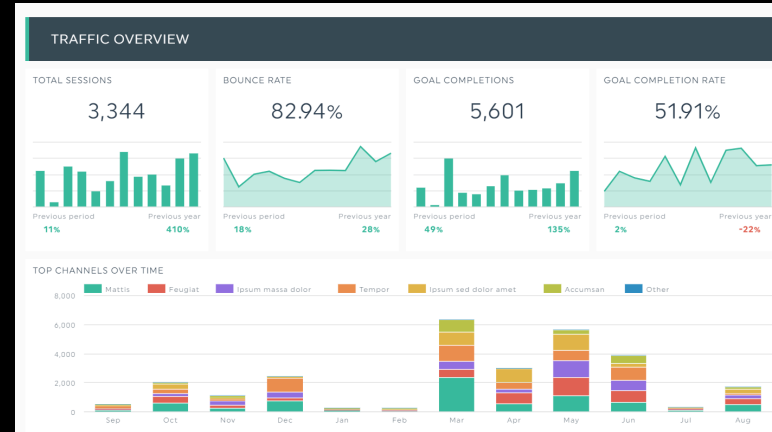
Data Visualization in Public Engagement

Kalina Borkiewicz

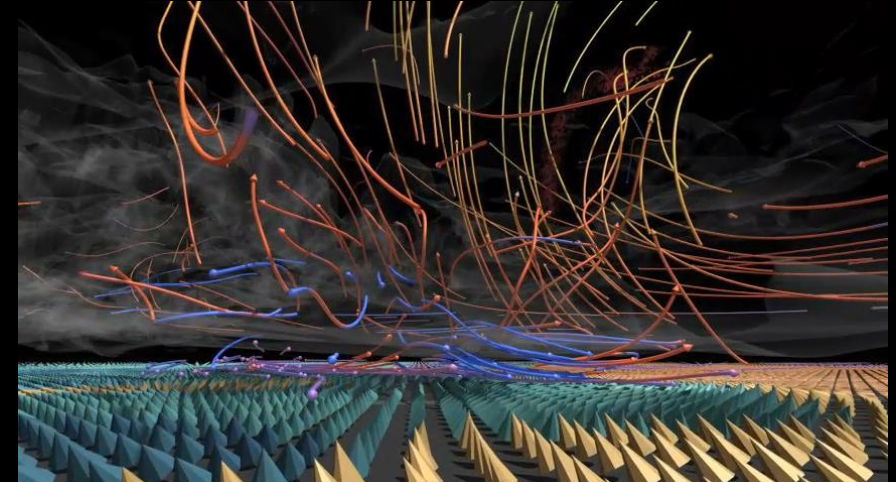
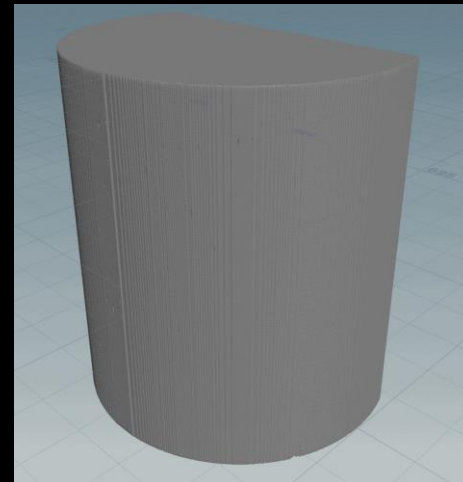
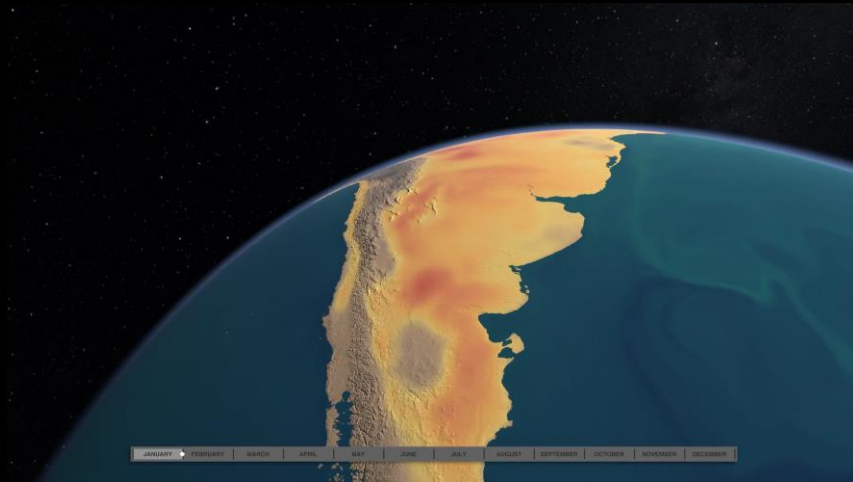
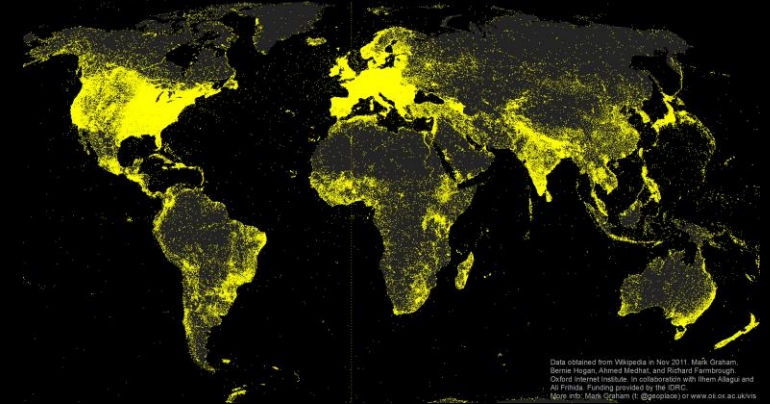
Scientific Computing and Imaging Institute
University of Utah

Affiliate, Former Director of Visualization Program Office
National Center for Supercomputing Applications
University of Illinois at Urbana-Champaign

Visualization



Geotagged Articles in English Wikipedia

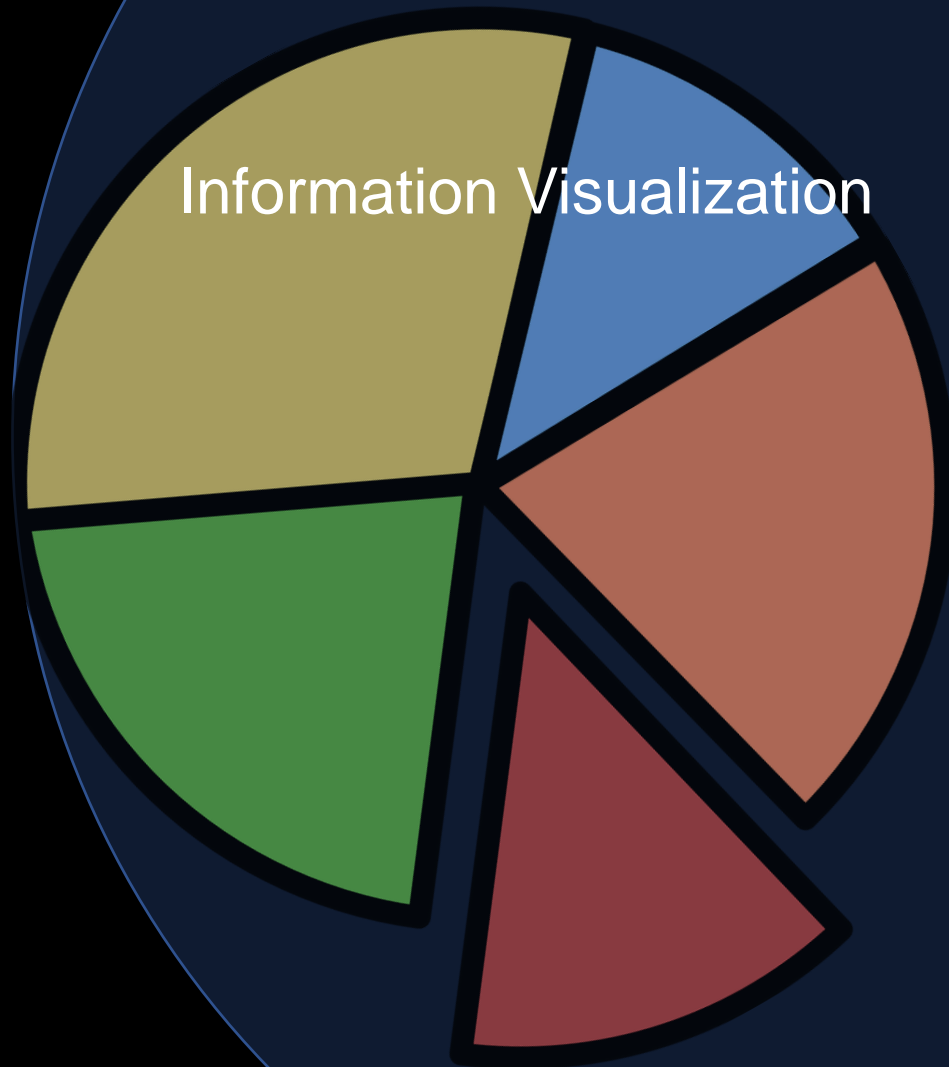


Visualization

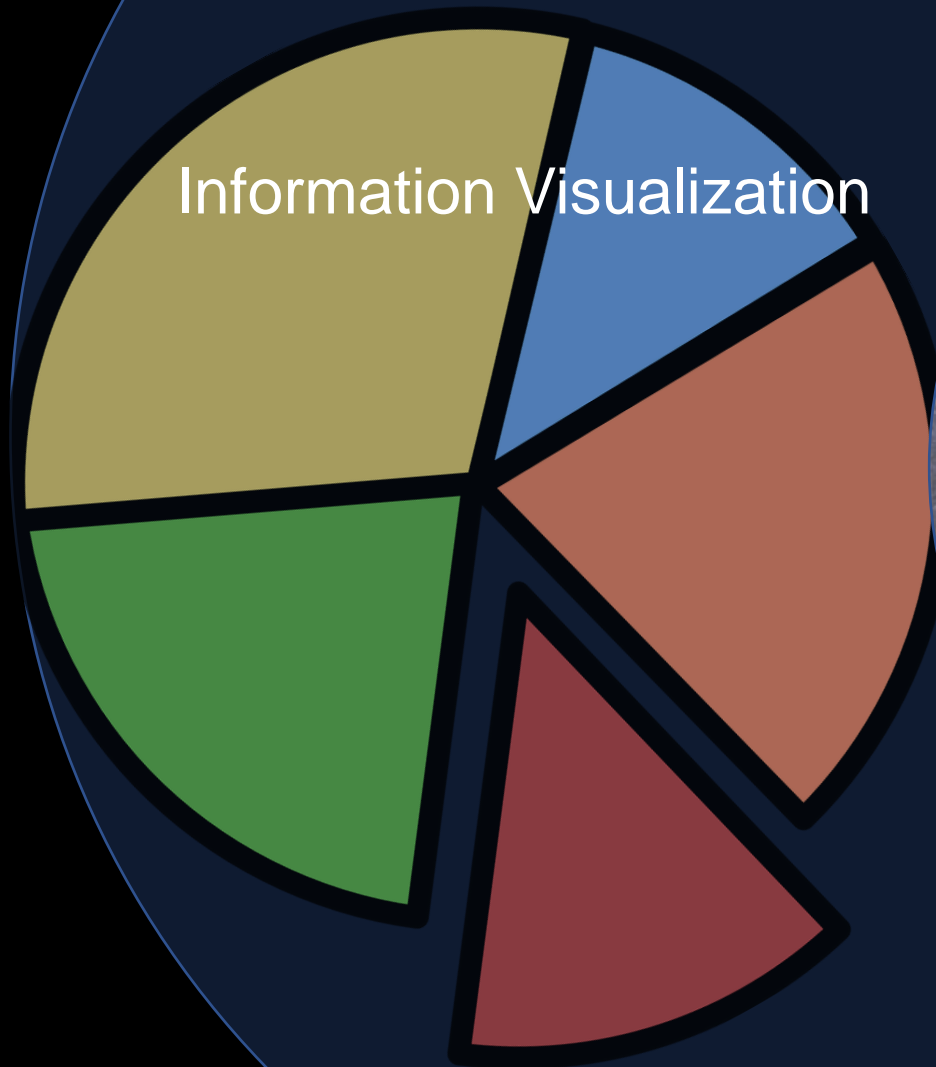
The image features a circular graphic on a black background. Inside the circle, there is a complex visualization of a neural network. It consists of multiple layers of nodes, represented by blue circles of varying sizes, connected by lines. The nodes are arranged in a way that suggests a flow from left to right. The background within the circle is filled with a dense pattern of binary code (0s and 1s) in a light blue color, which is slightly blurred and has a perspective effect, making it look like it's receding into the distance. The overall aesthetic is high-tech and digital.

Visualization

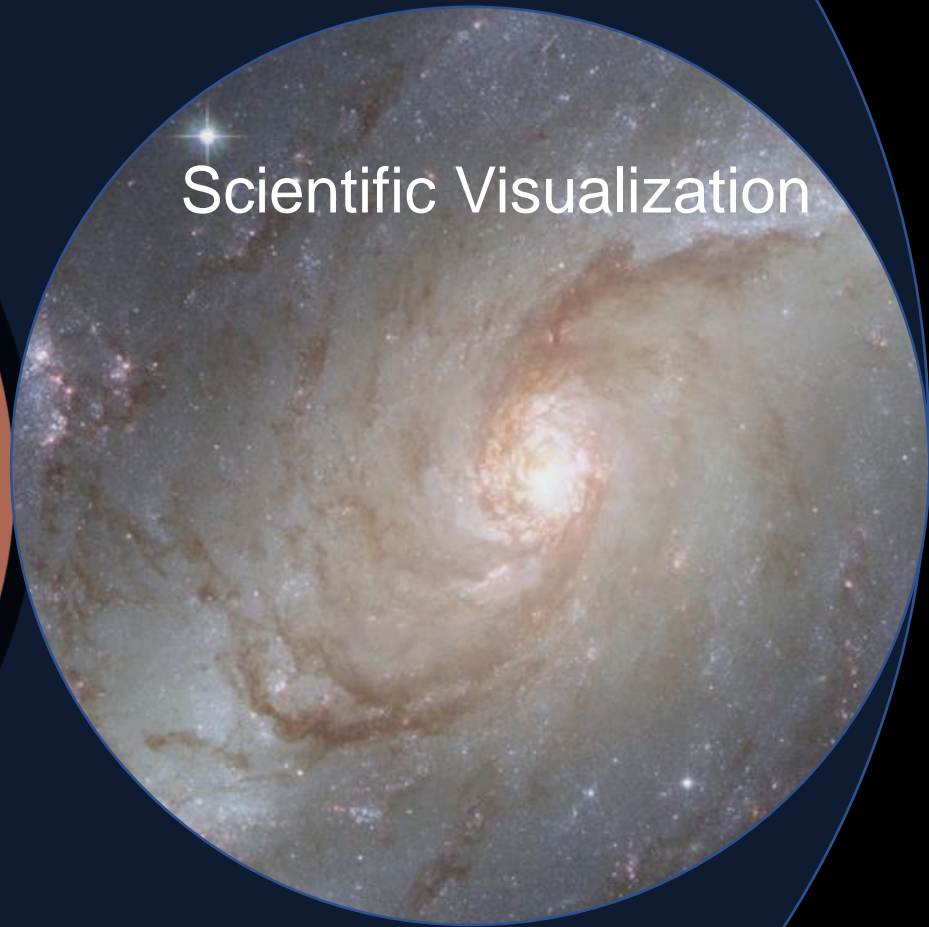
Visualization



Visualization



Information Visualization



Scientific Visualization

Visualization

Scientific
Visualization

Information Visualization



Visualization

Scientific
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Information Visualization

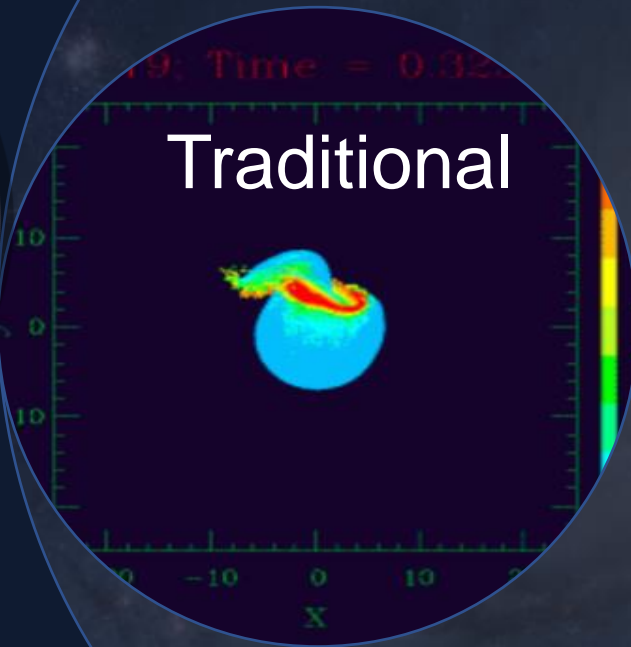


Visualization

Scientific Visualization

Information Visualization

Traditional

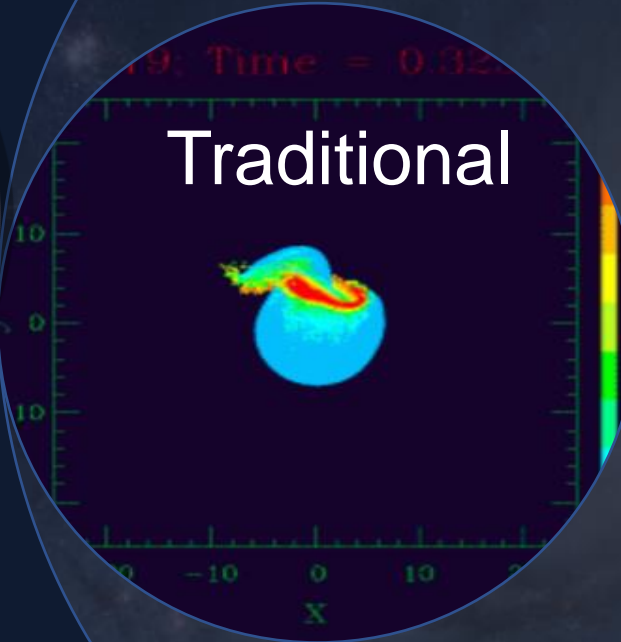


Visualization

Scientific Visualization

Information Visualization

Traditional



Cinematic



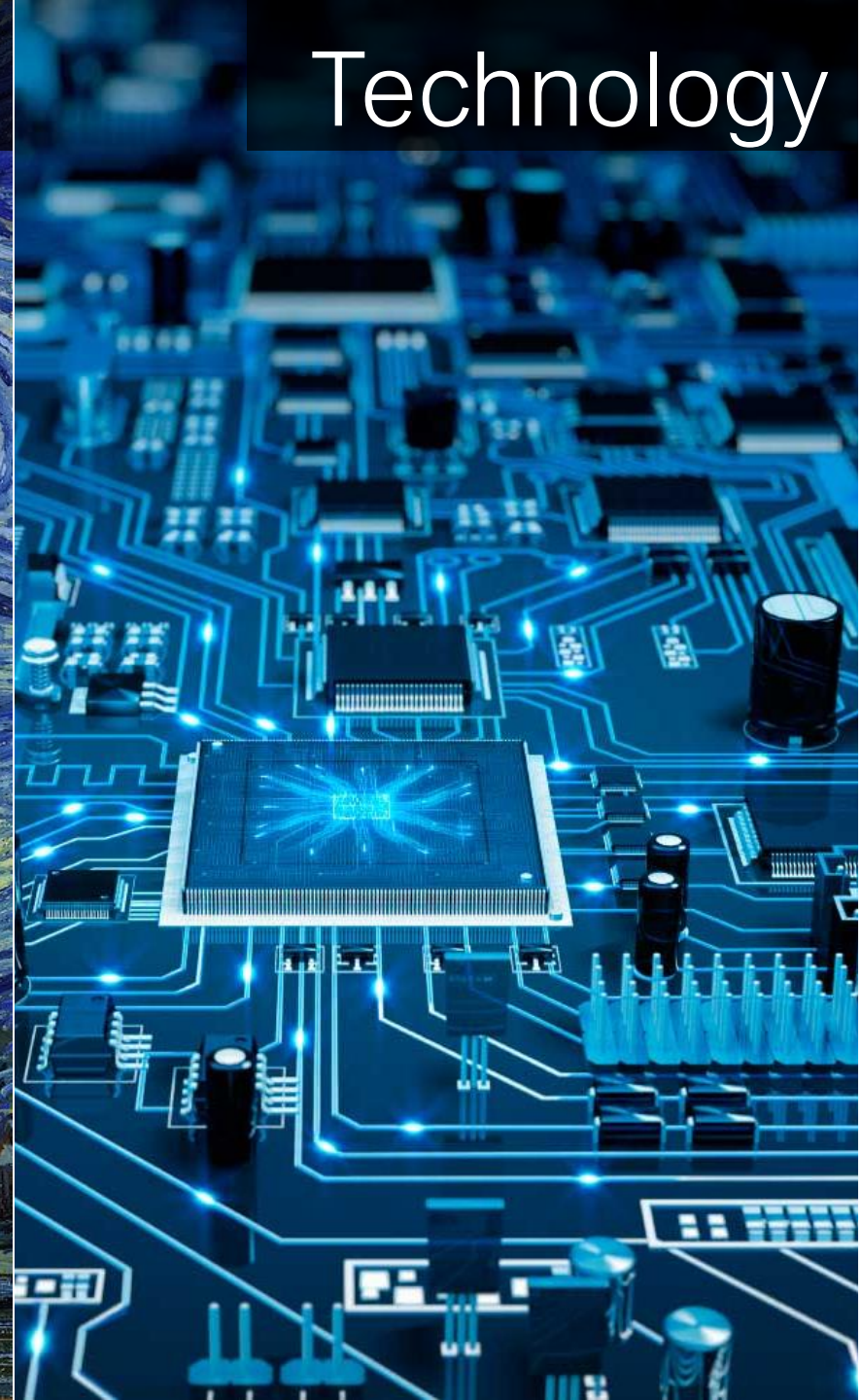
Science

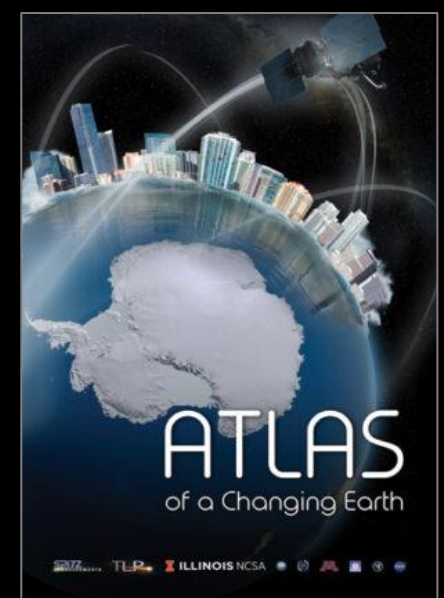
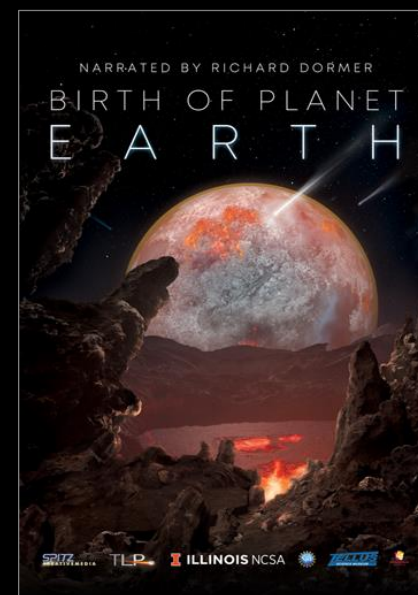
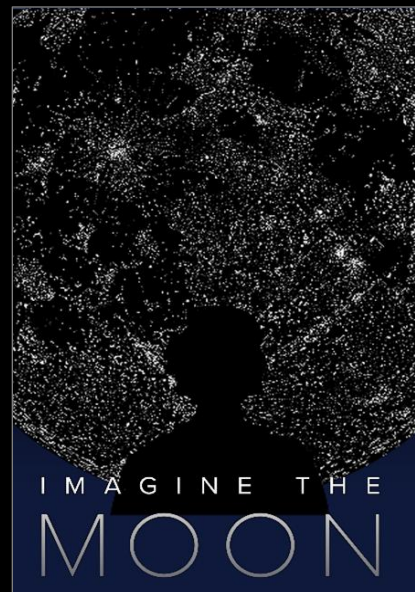
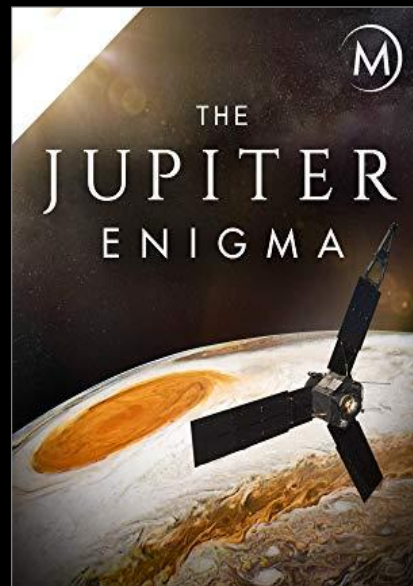
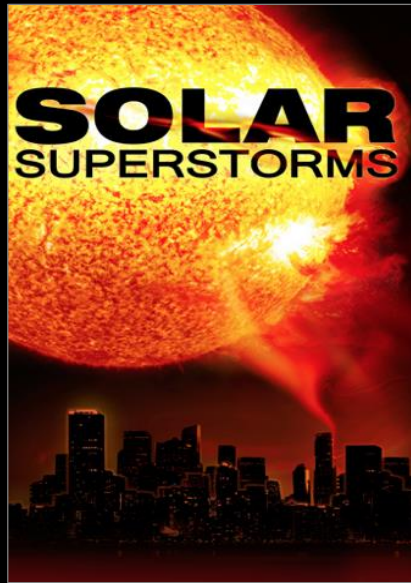


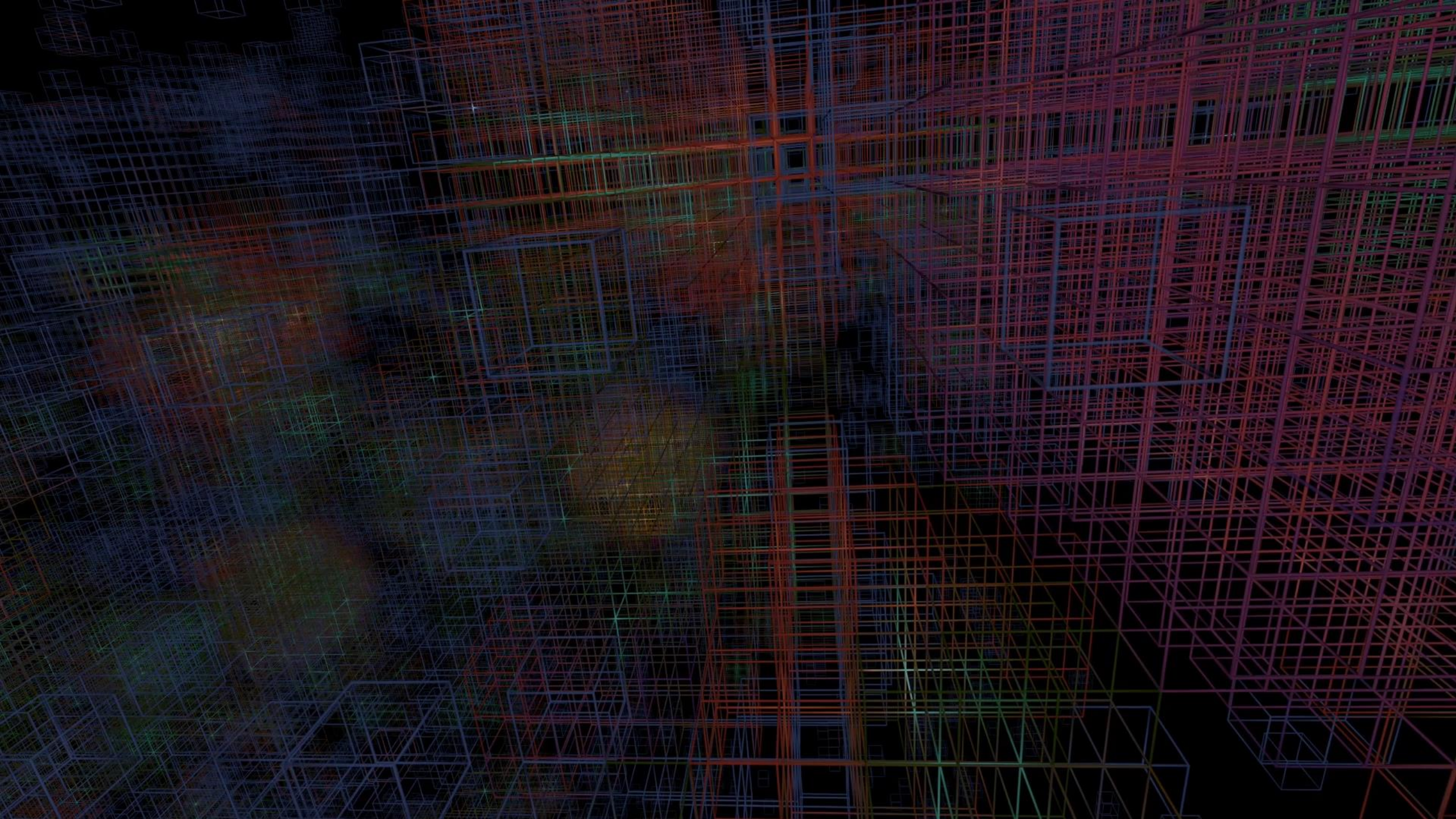
Art



Technology







Data Management

Simulation Model Data
3D, stretched, nested grids,
particles, probabilistic surfaces



Observed Data
Sensor data, satellite, DEM



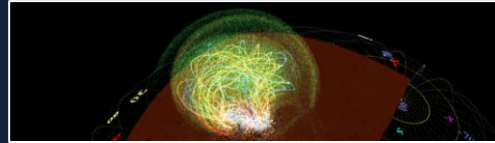
Data Analysis
Statistical survey, histograms

Data Transformation
Registration, interpolation, fusion

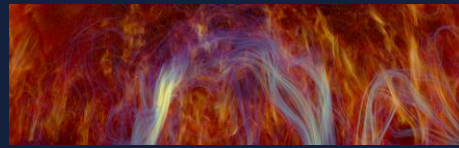
Data Readers
Software plugins, converters

Visualization Processing

Software Development
Partview, Virtual Director,
Star Renderer, Ytini



Data Mapping
Data attribute mapping to
Volumes, geometry and points



Procedural Geometry
Isosurfaces, glyphs, sprites,
Tracing streamlines, instancing

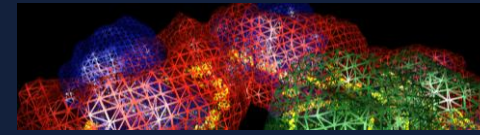


Visualization Design

Pre-visualization
Rough first look, pipeline test

Procedural Asset Design
Integrating multiple datasets
and designed elements

Virtual Cinematography
Camera choreography



Look Design
Color transfer functions,
lighting, shading

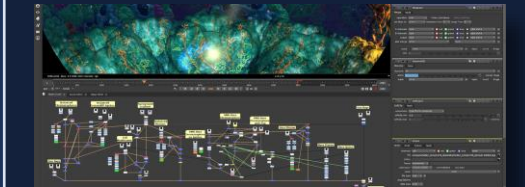


Rendering and Viewing

Raytracing, Volume
Rendering
Mantra, Star Renderer, Hourend,
Dome, 4K, 3D

High Performance
Computing
Blurend rendering, file
management

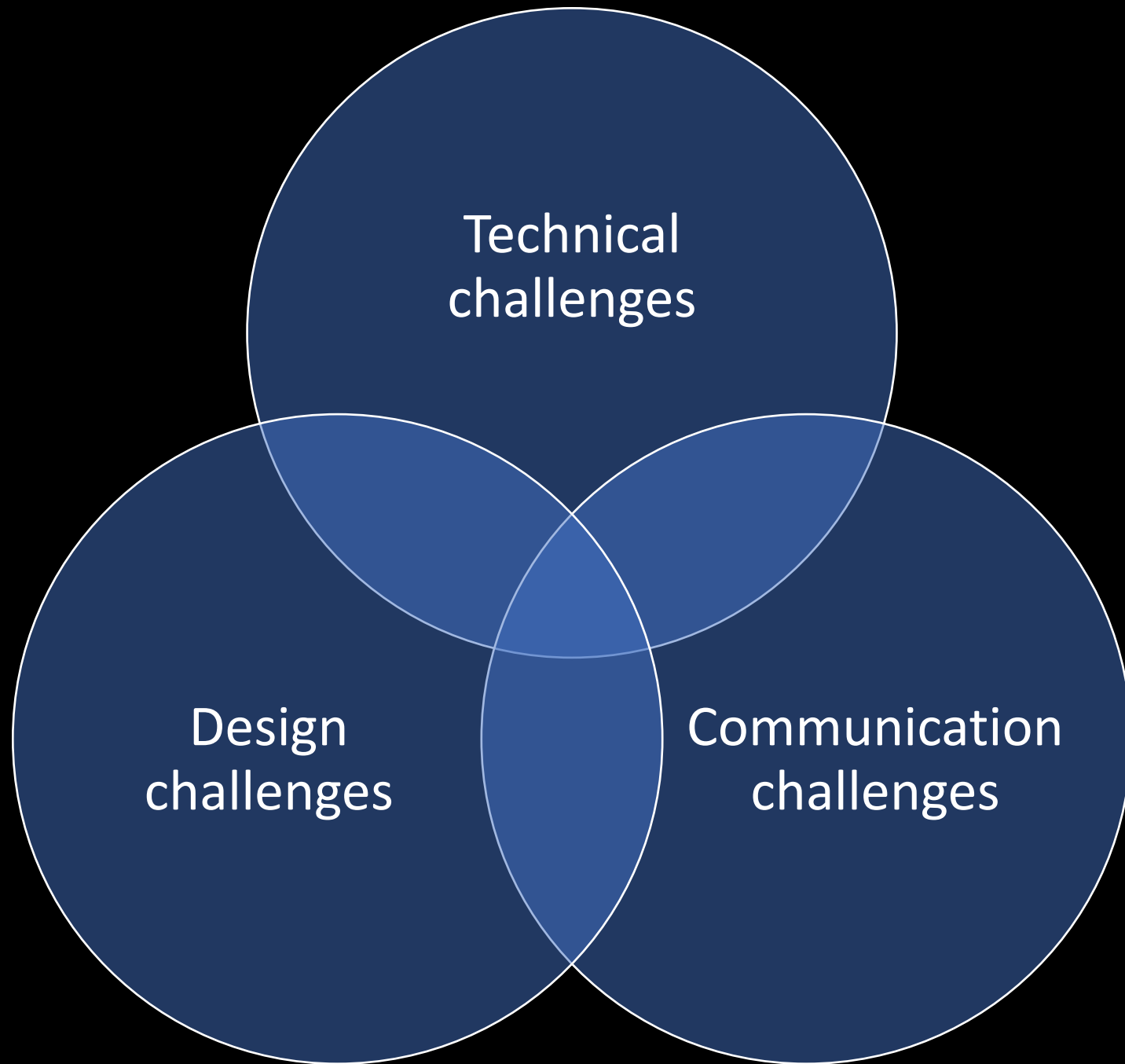
Compositing
Layering and combining multiple
render passes, post-processing

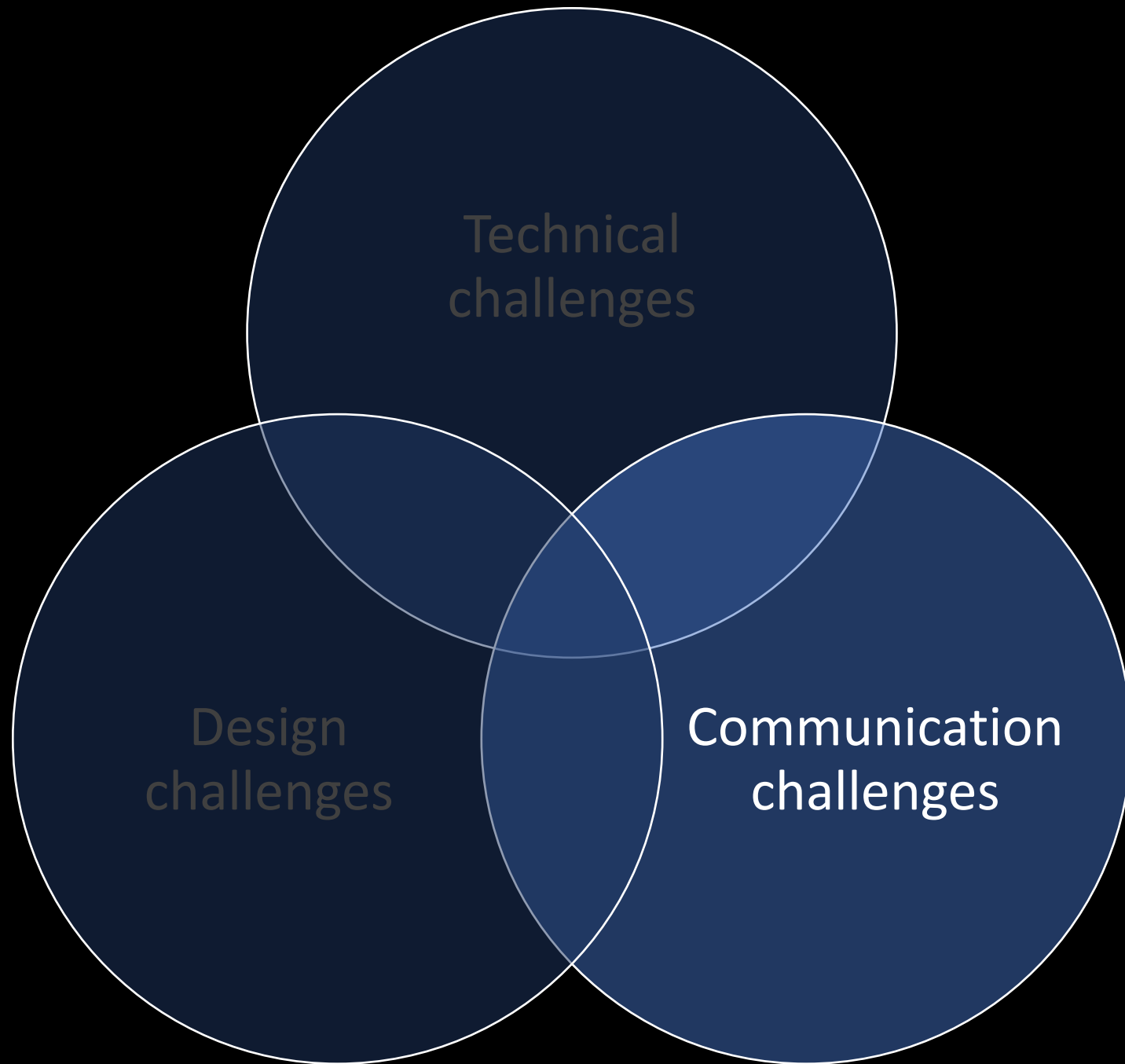


Packaging Output
Movie file generation,
streaming, network file transfer

Review and refine visualization, working with science teams

Researching emerging fields: VR, AR, displays, interactivity, machine learning, MOOC online teaching.

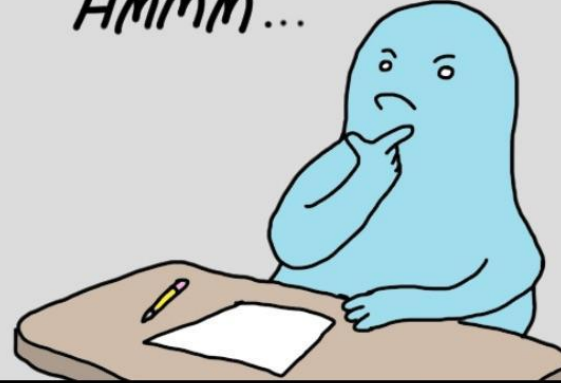




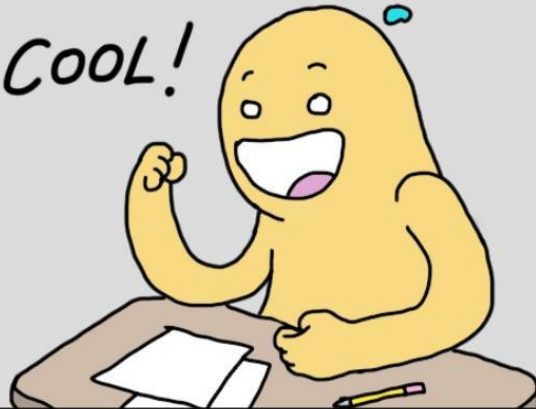
THERE IS AN EYE
AT THE CENTER OF
A HURRICANE



HMMM...

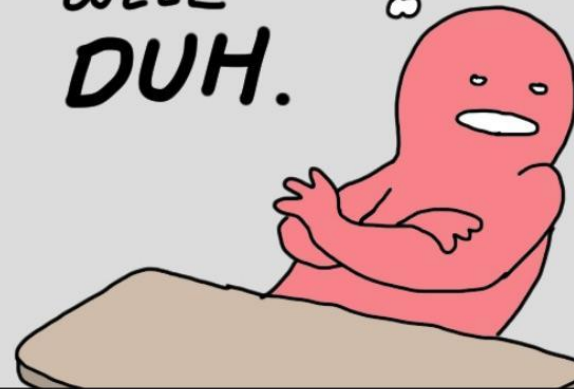


COOL!



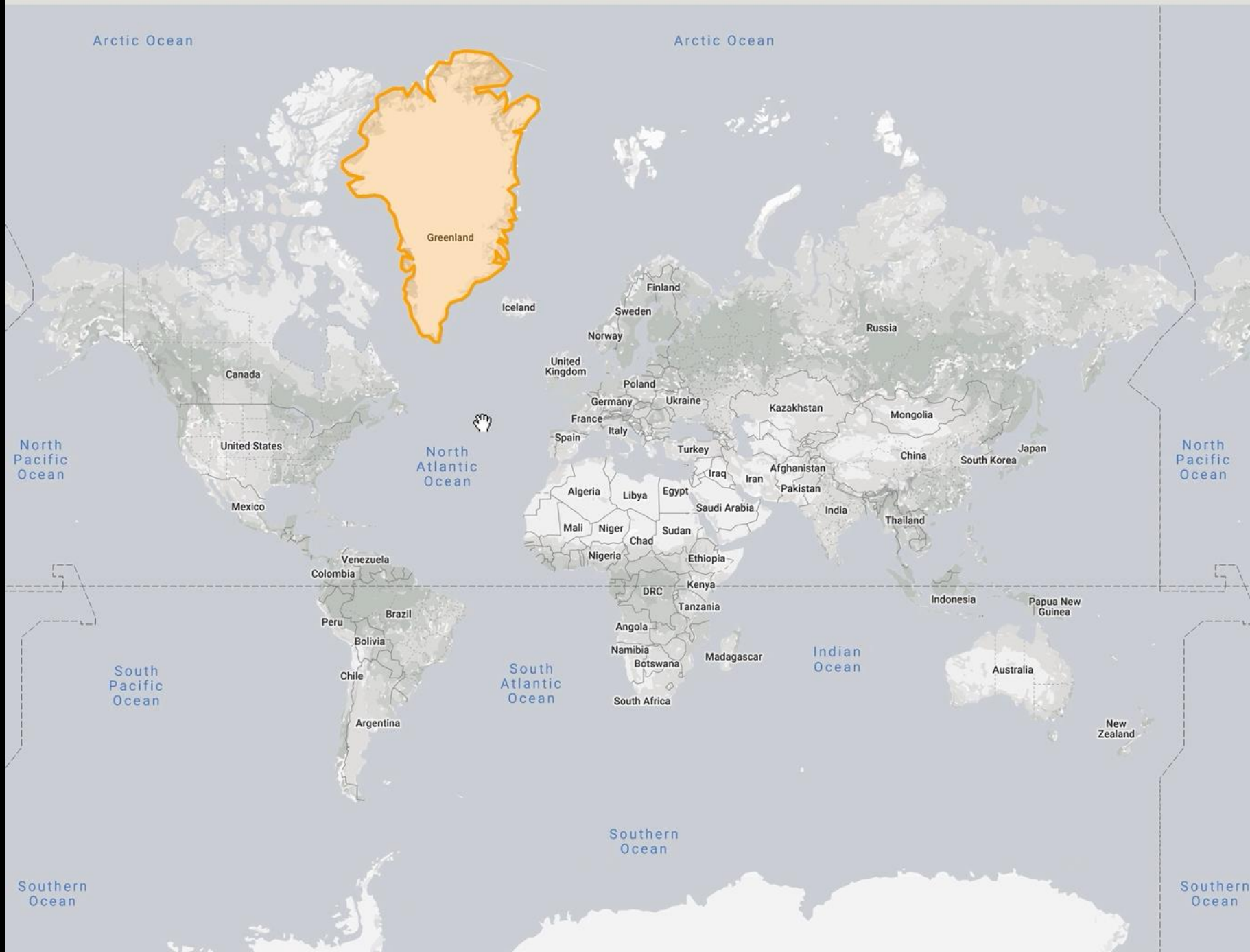
HURR I CANE

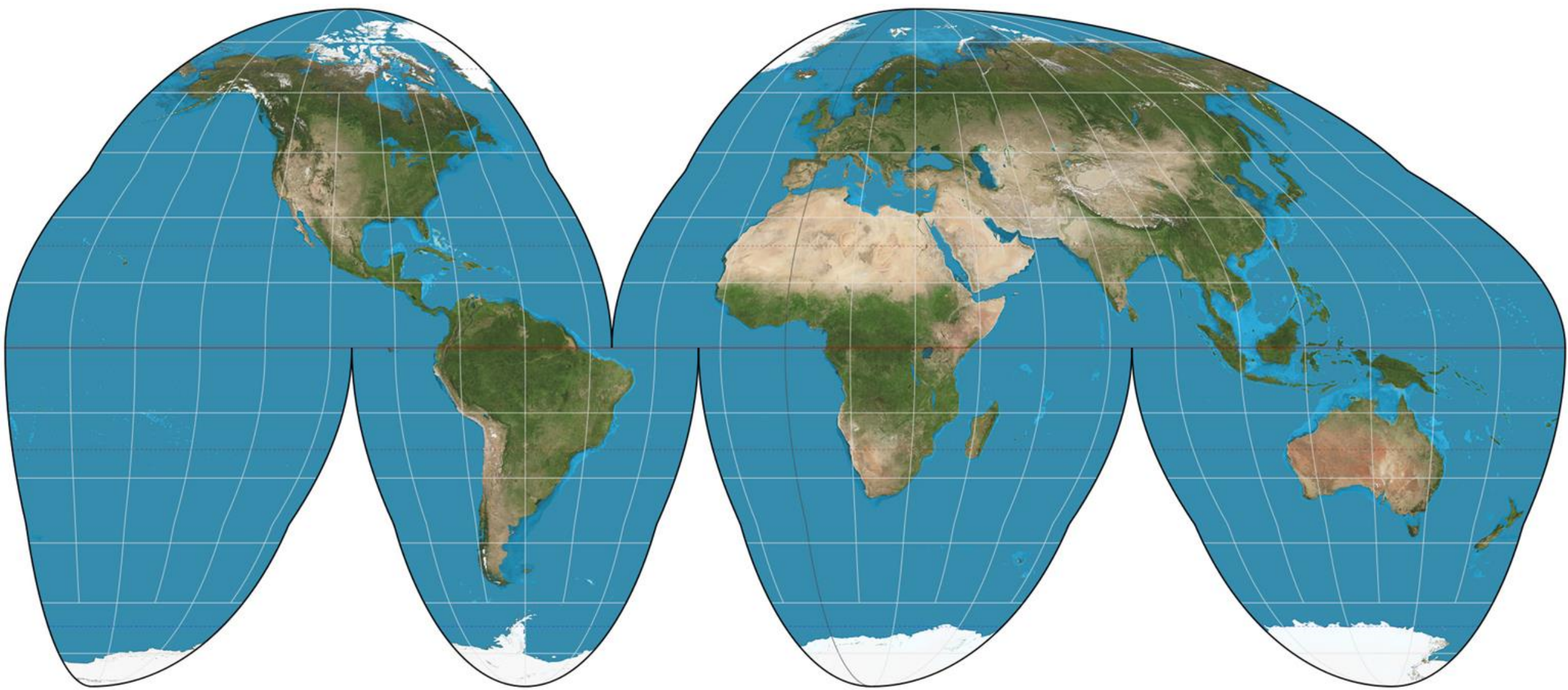
WELL
DUH.

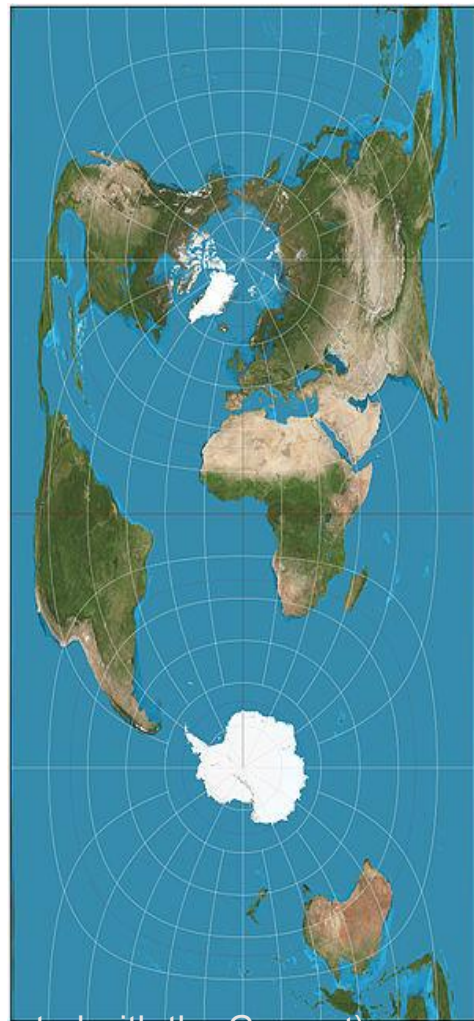
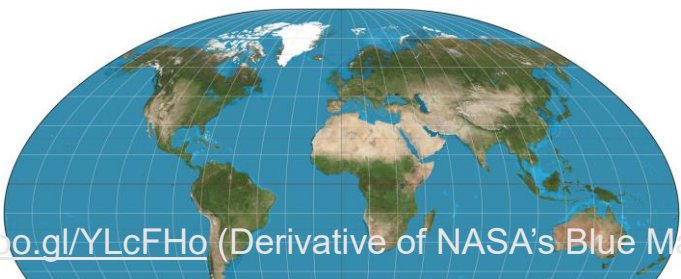
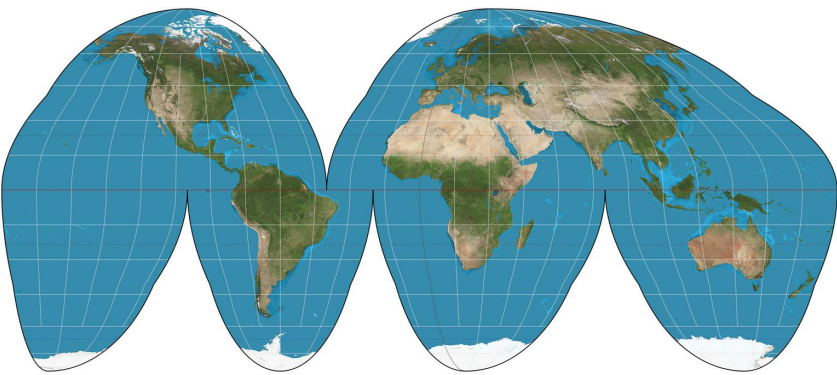
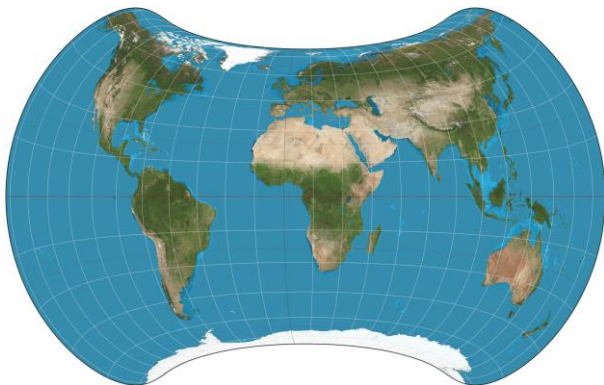
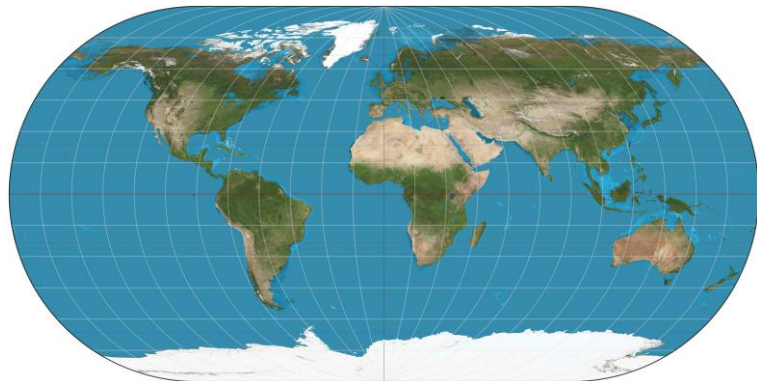
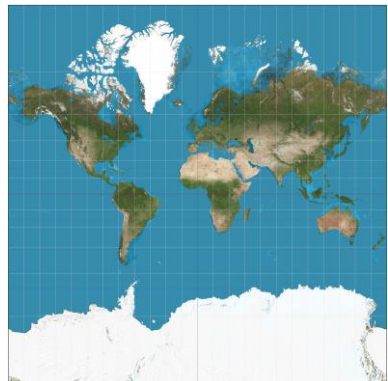
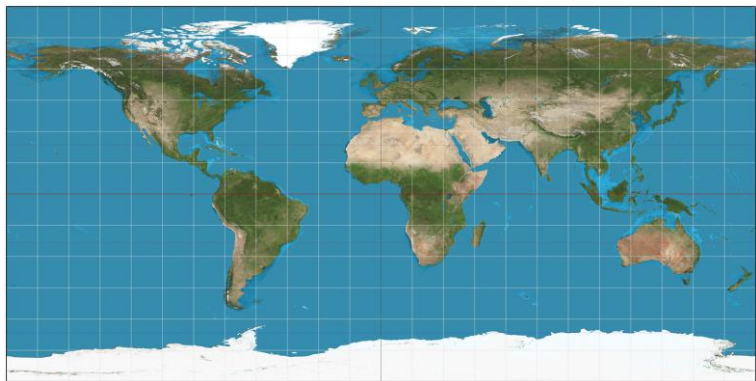
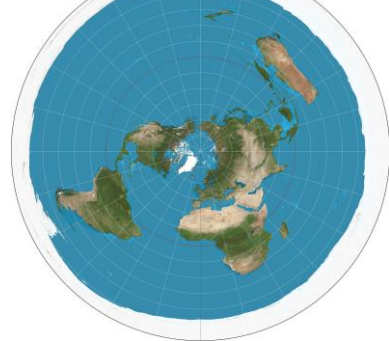
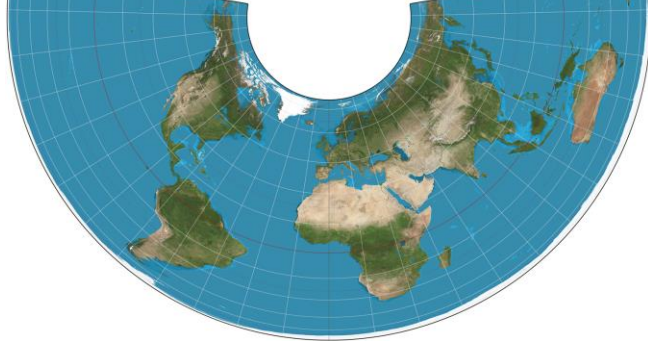
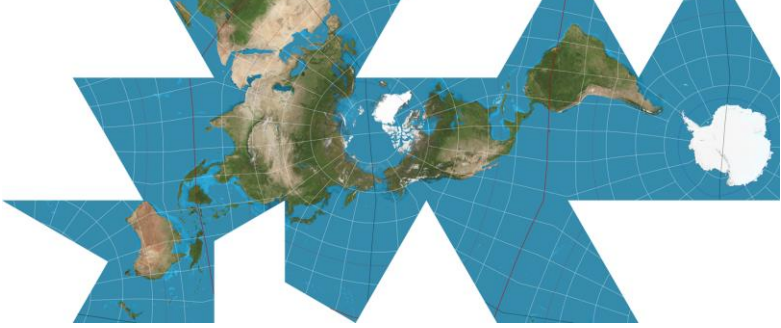


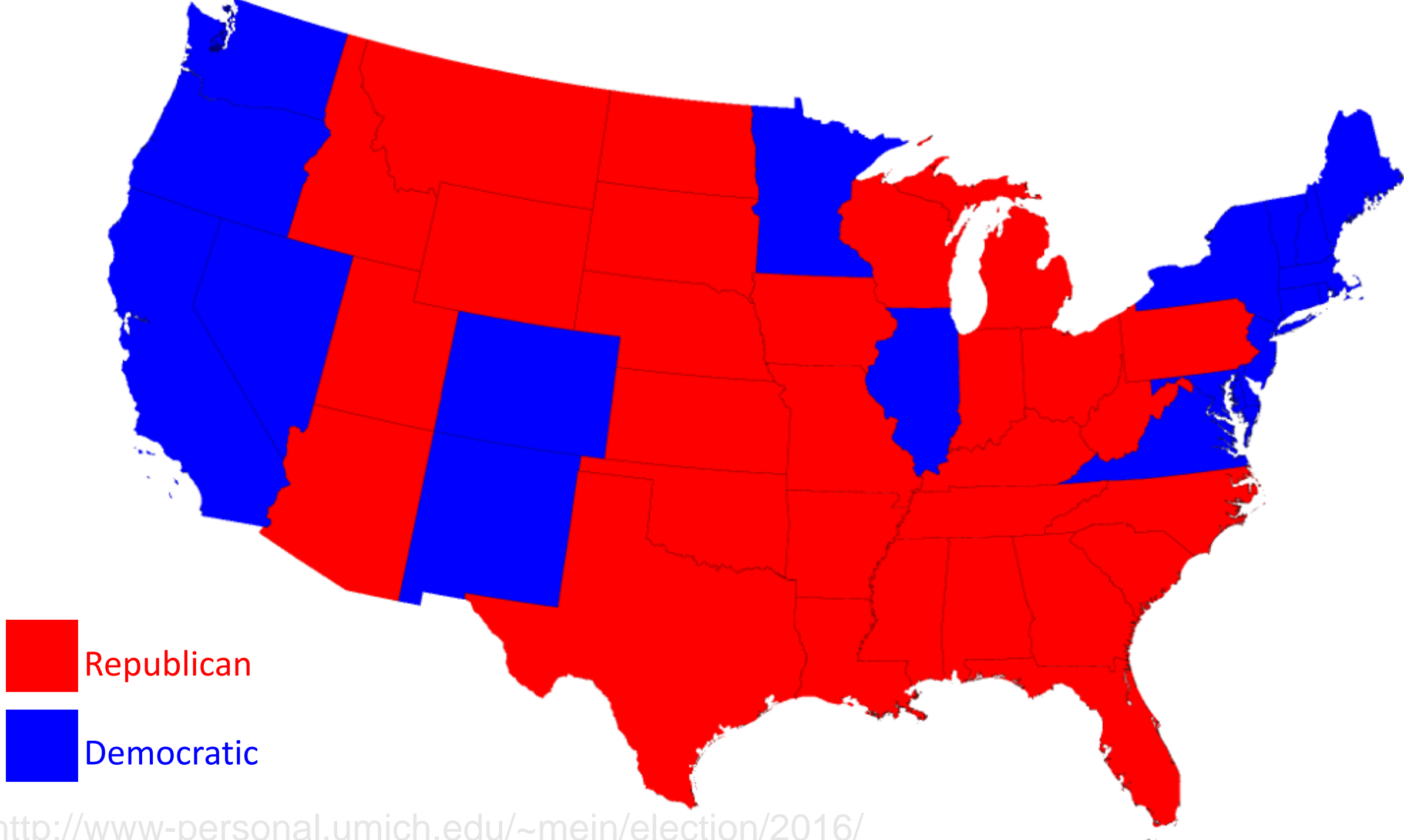
@D03m0D03

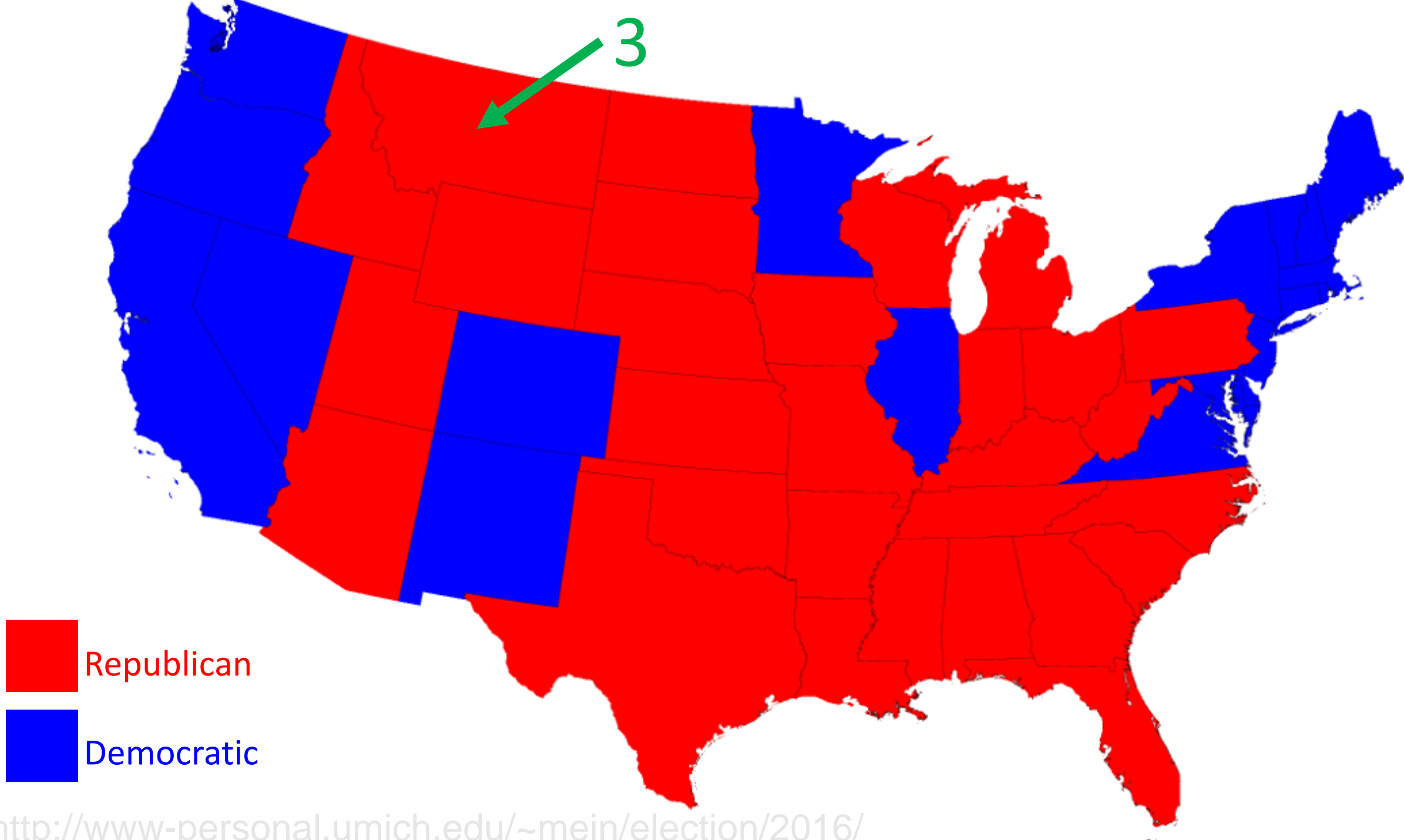


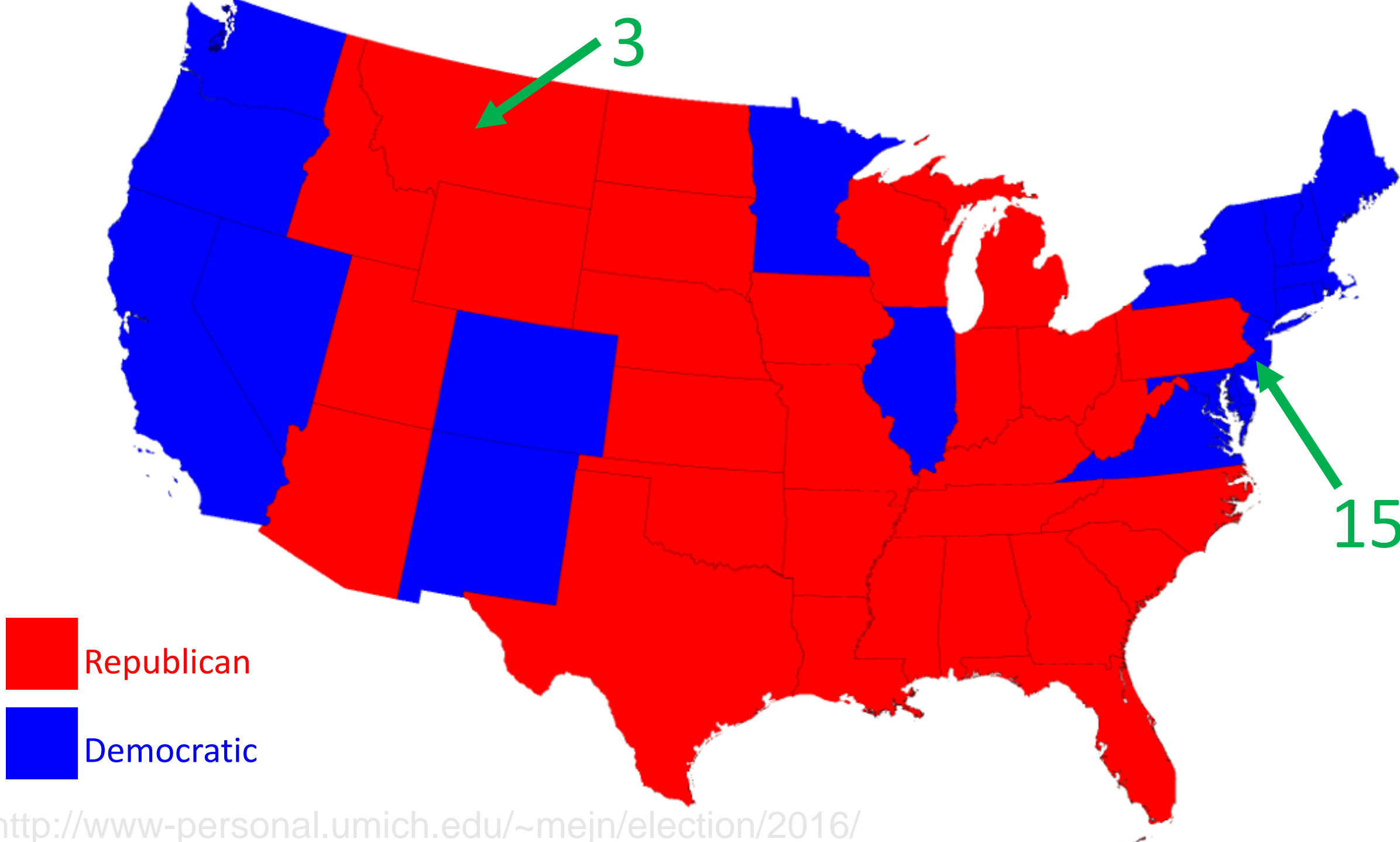


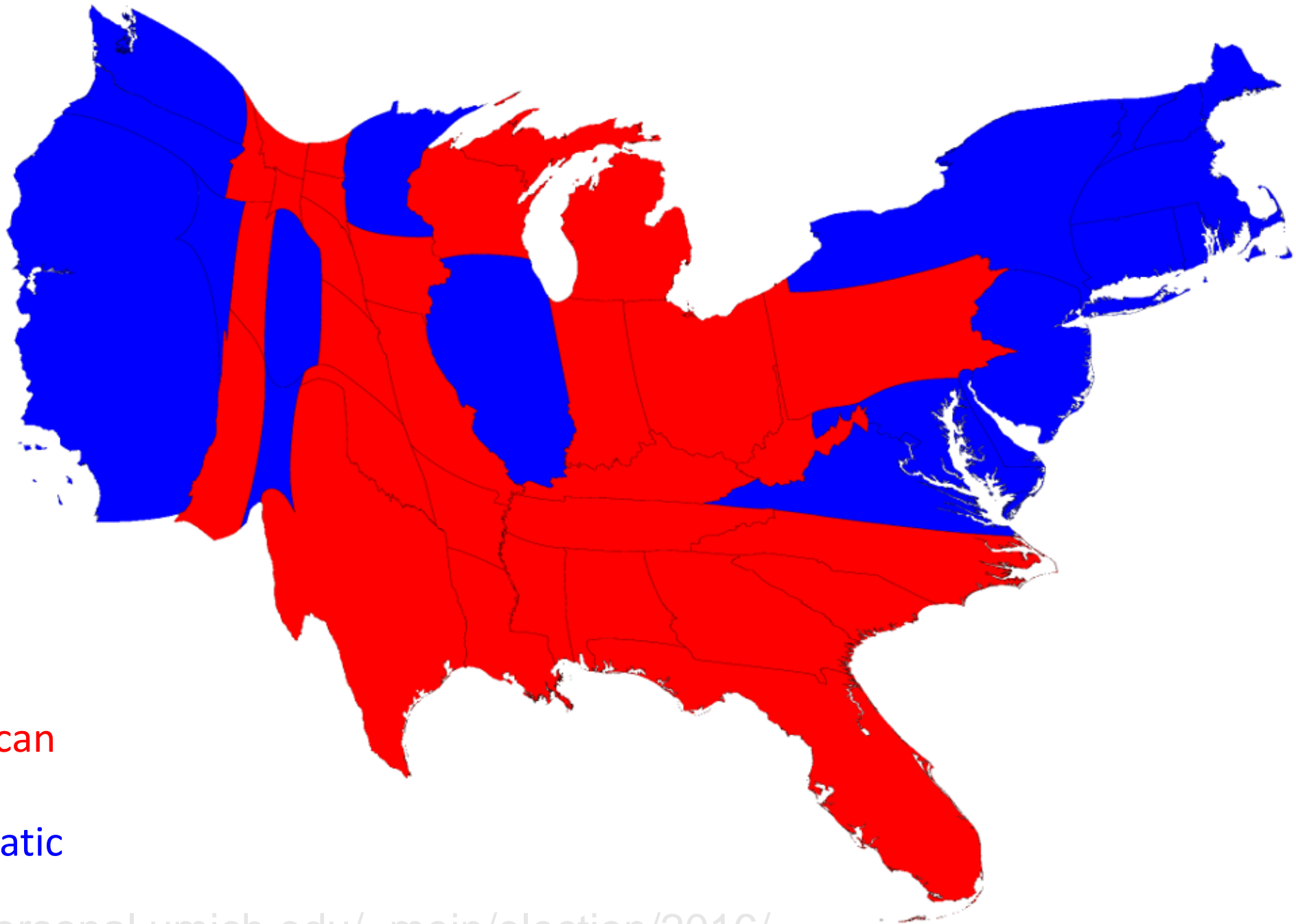






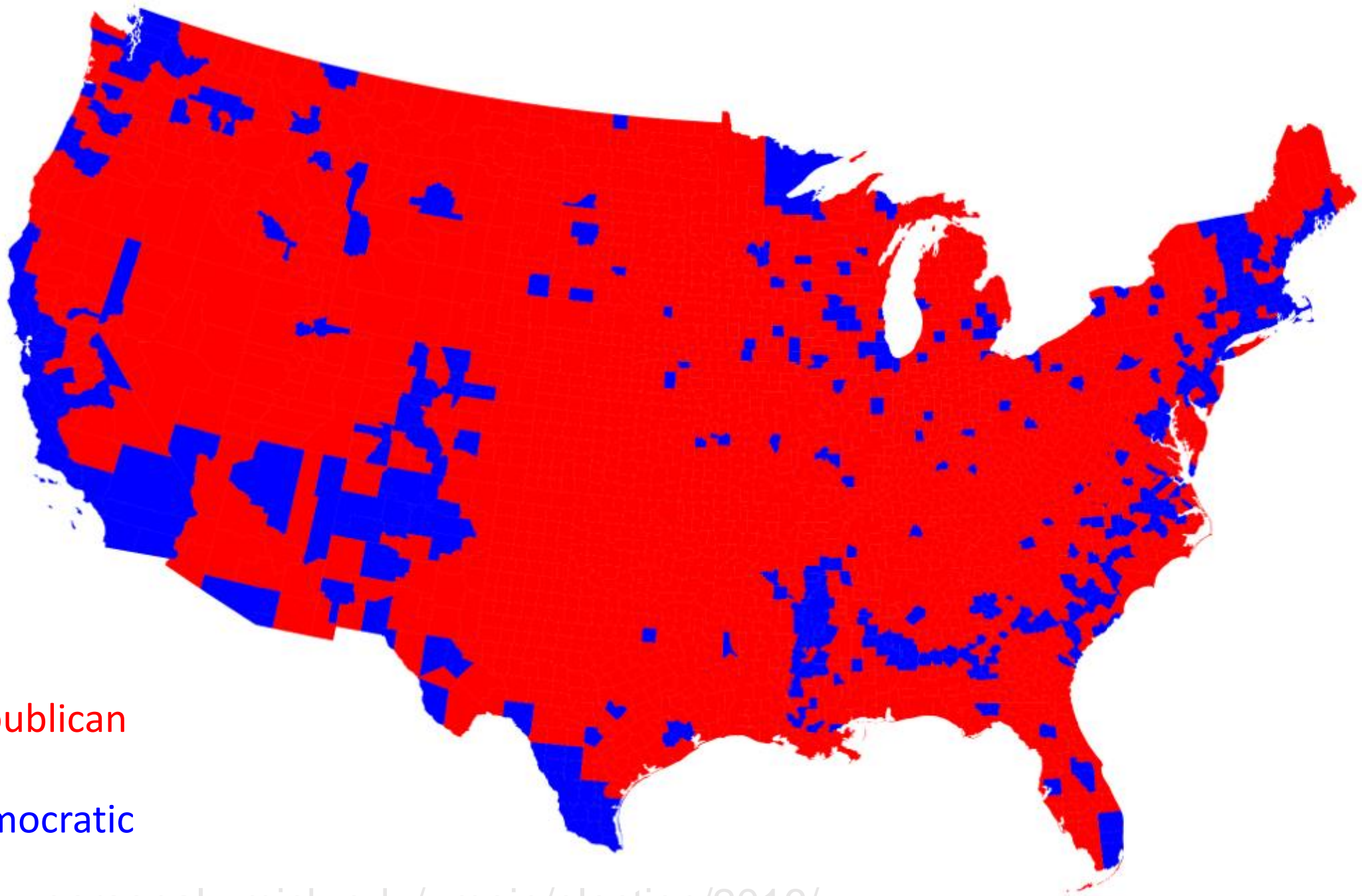






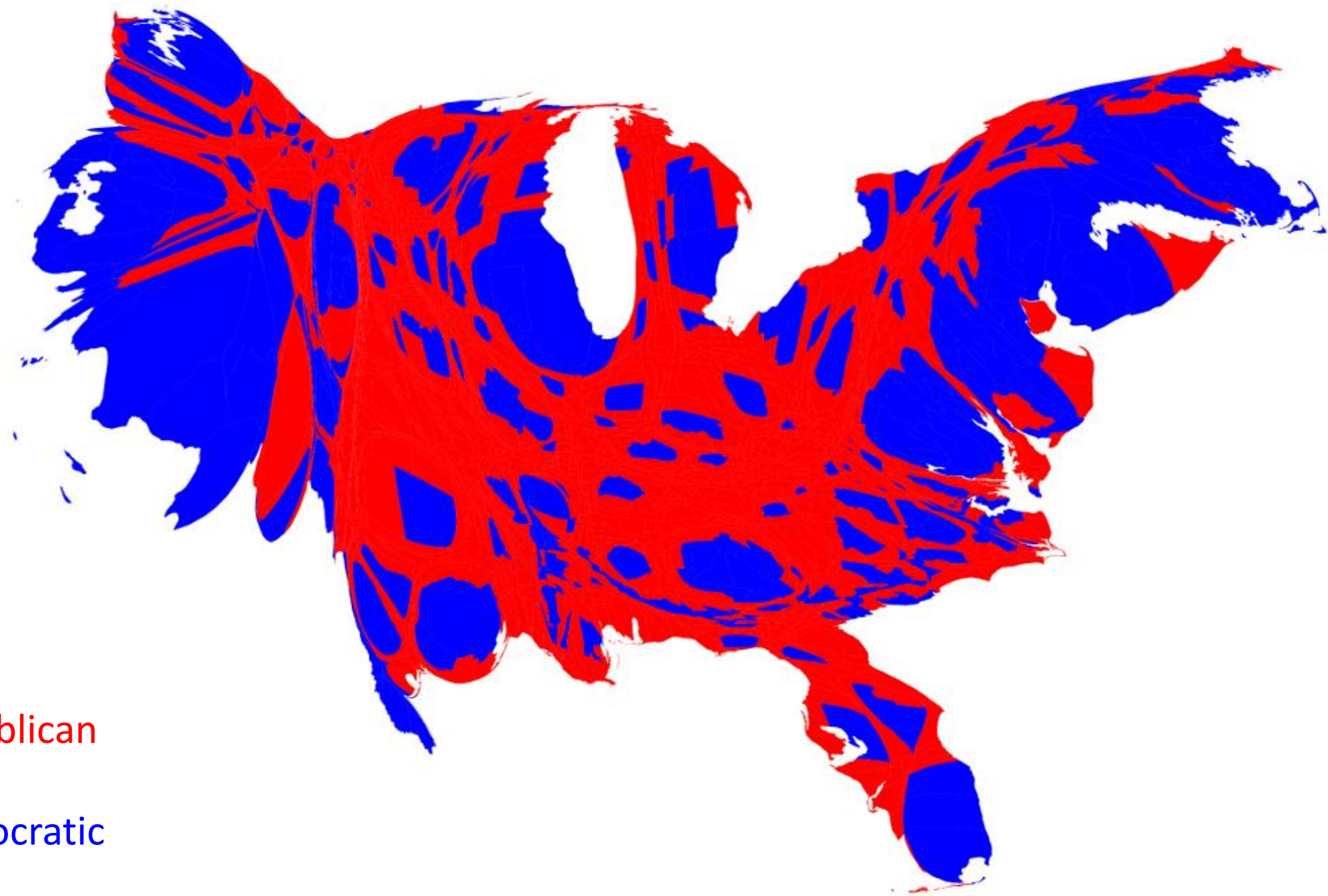
Republican

Democratic



Republican

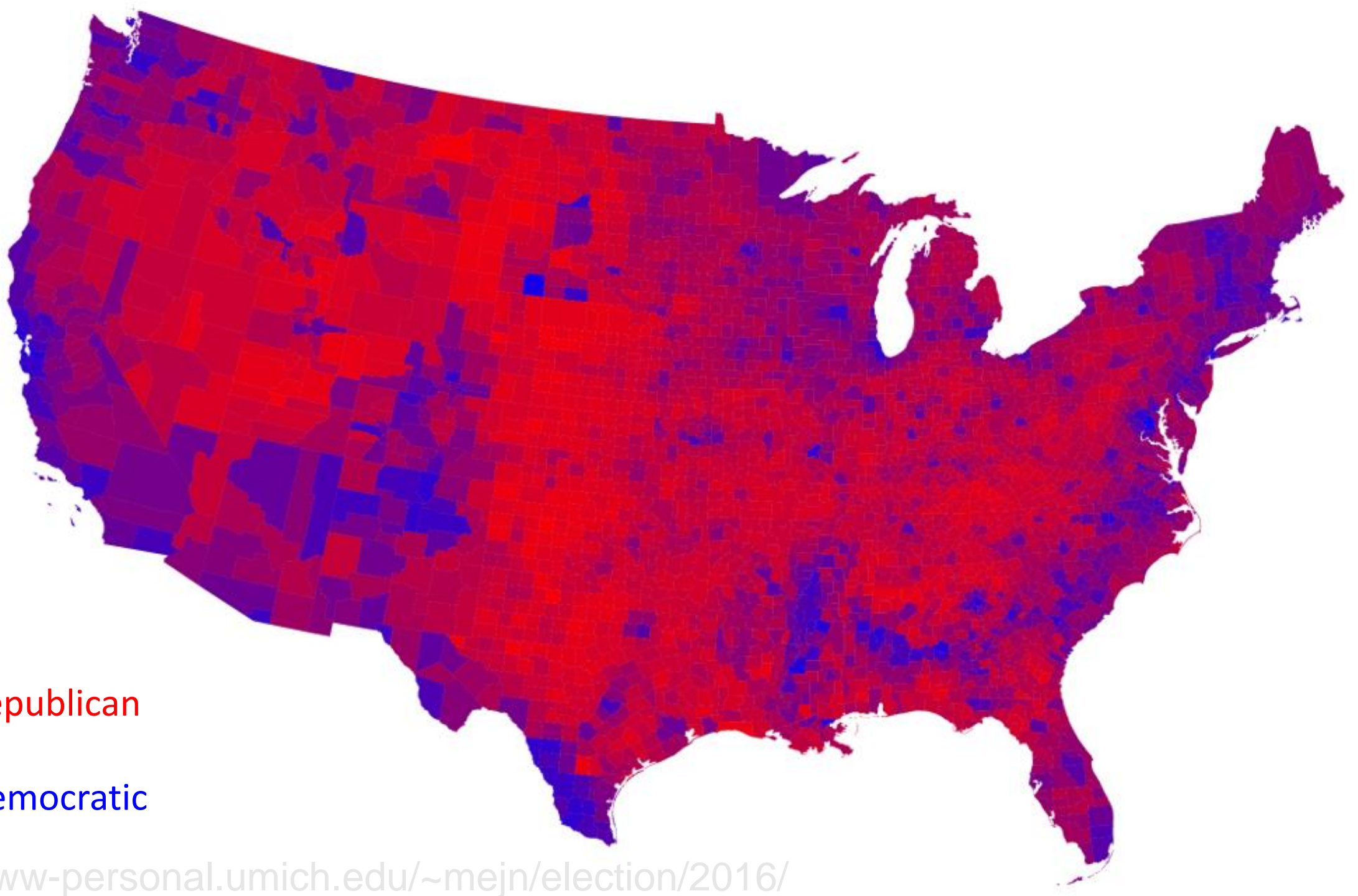
Democratic



Republican



Democratic



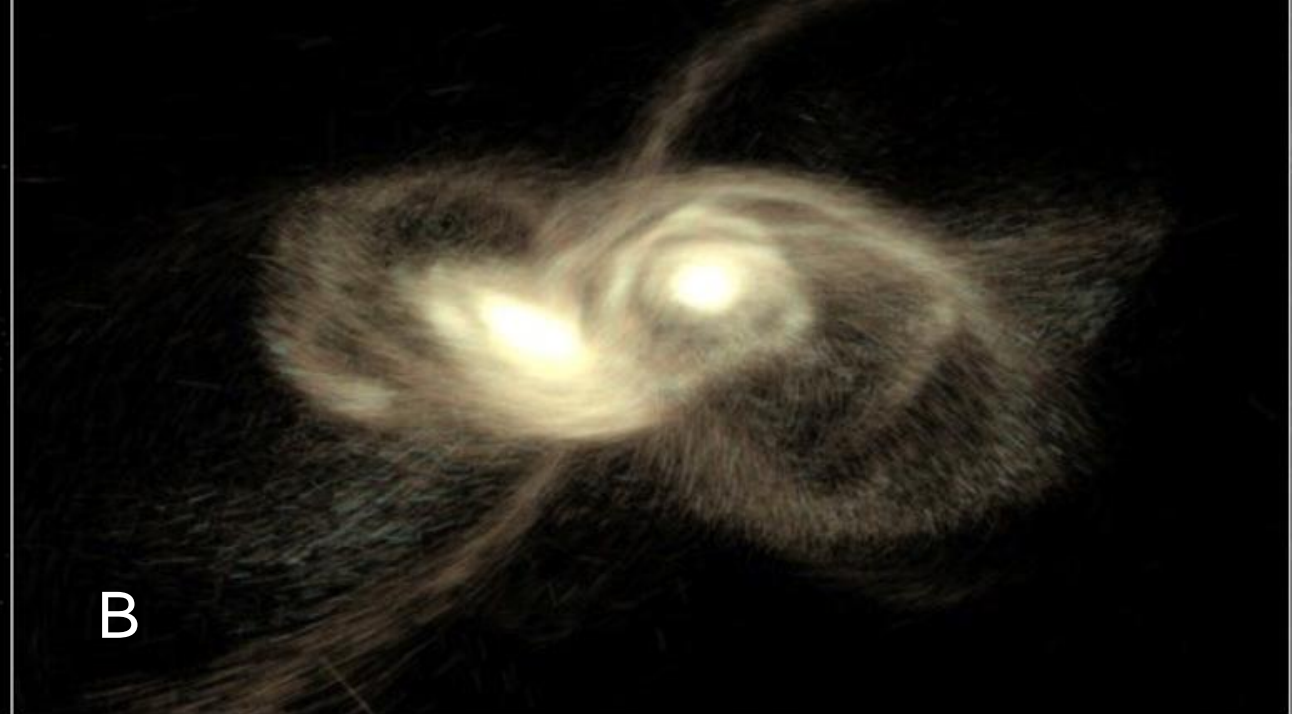
Republican

Democratic

Visualization is subjective.

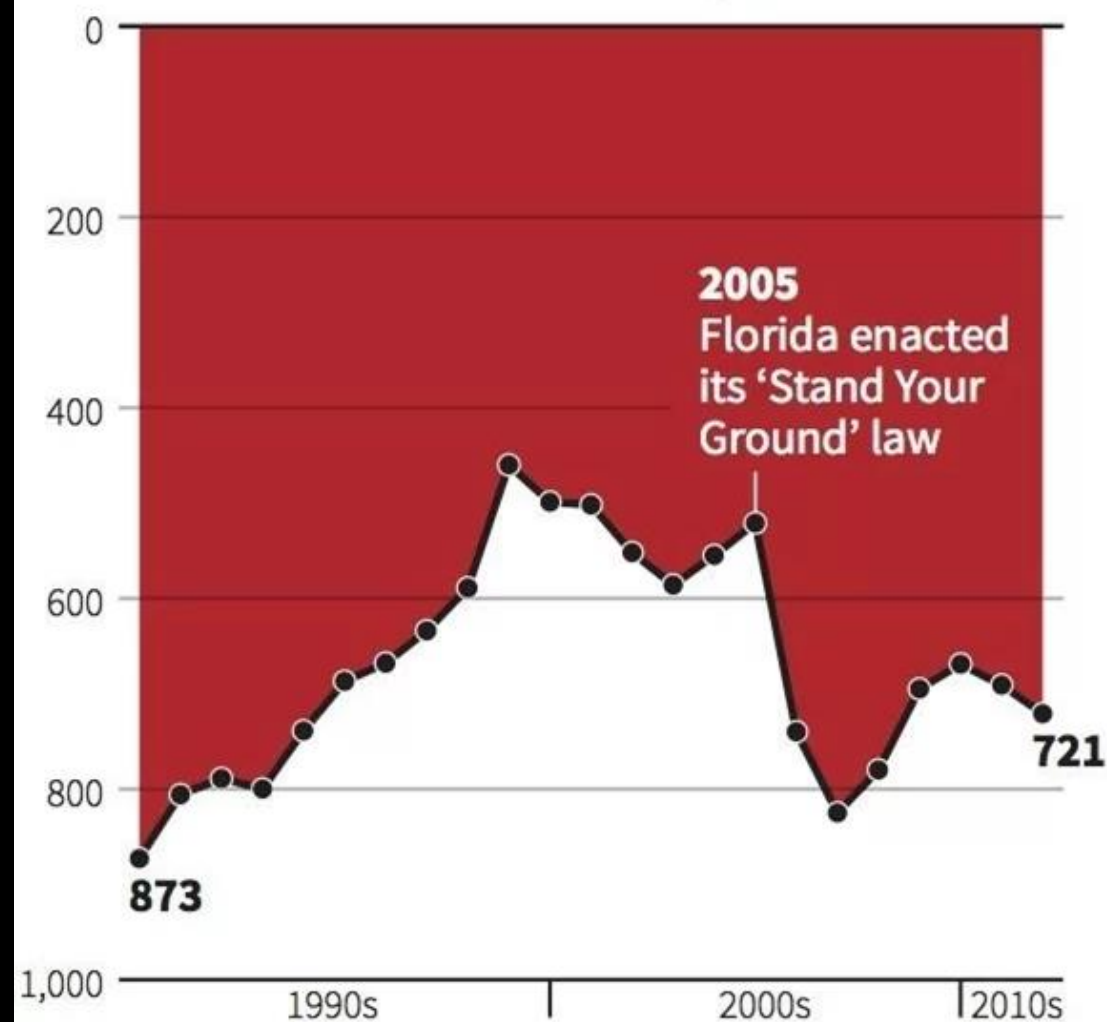
Visualization can be unintentionally biased.

Visualization can be maliciously incorrect.



Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement



AMY MARSHALL-COLÓN
Department of Plant Biology



Working with Scientists

Felipe Menanteau
NCSA, University of Illinois at Urbana-Champaign



STEPHEN P. LONG
Departments of Crop Science and Plant Biology



Dara Norman
National Optical Astronomy Observatory

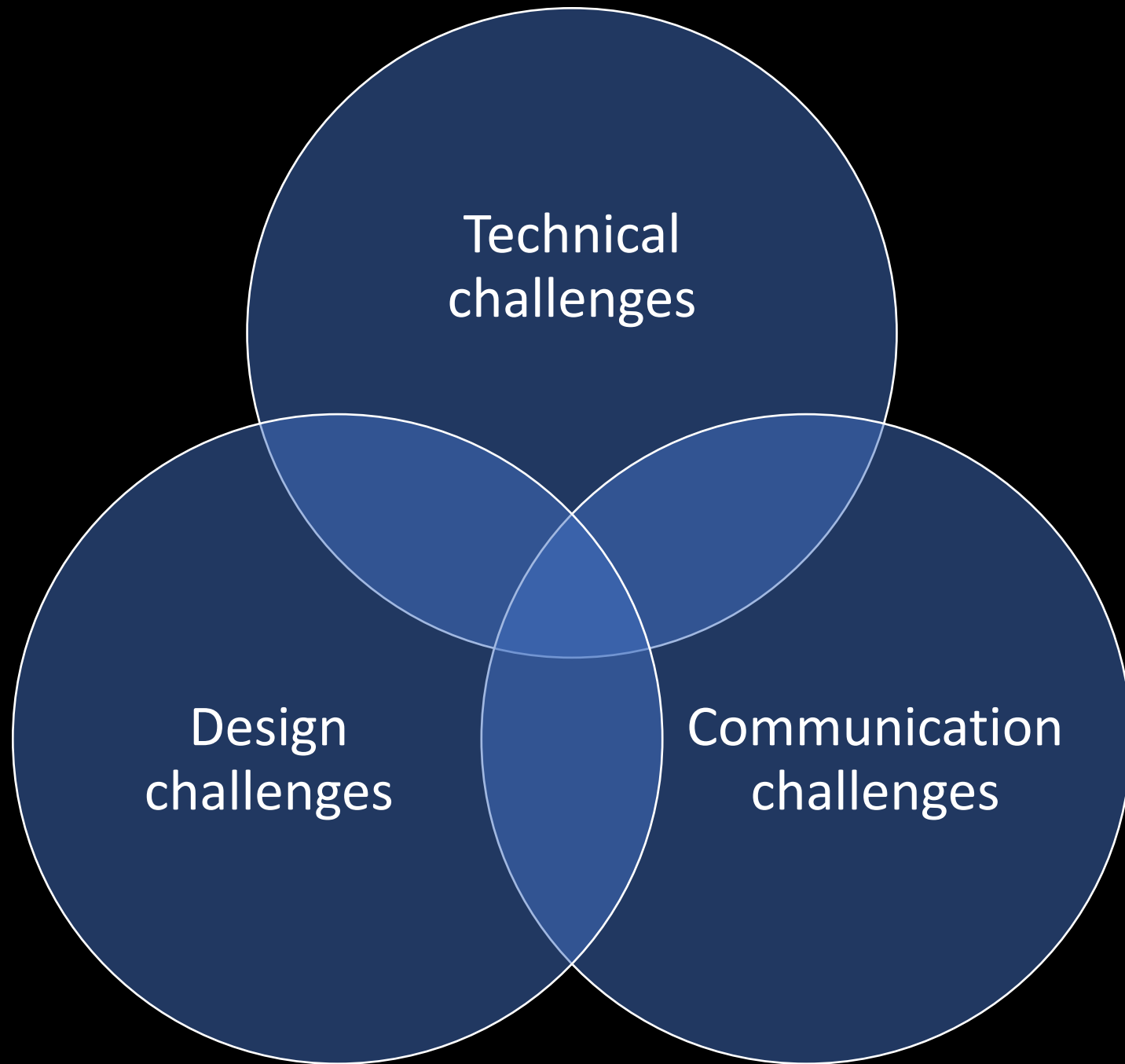
Audience Testing

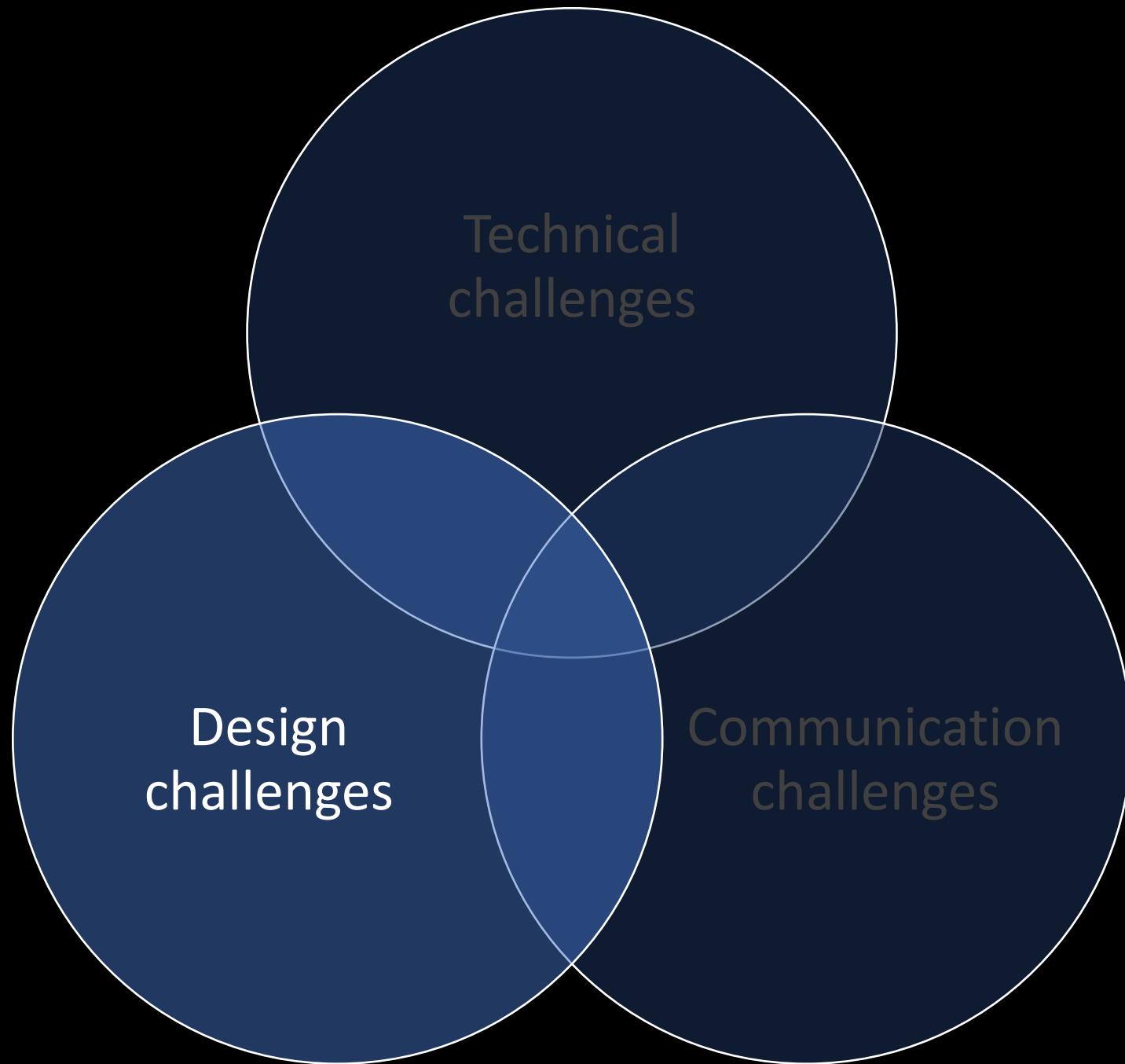
Example Question


Where do these images come from?

- A. This is real video, observed through a telescope
- B. This is a visualization, based on a scientific computer simulation
- C. This is an artistic drawing of what we think it looks like










What makes
a data visualization
“cinematic”?




What makes a data visualization “cinematic”?

All visualization design:

- How will you represent the data?
- What aspects of the data do you choose to highlight?
- What colors will you use?
- ...

Cinematic visualization design:

-



What makes a data visualization “cinematic”?

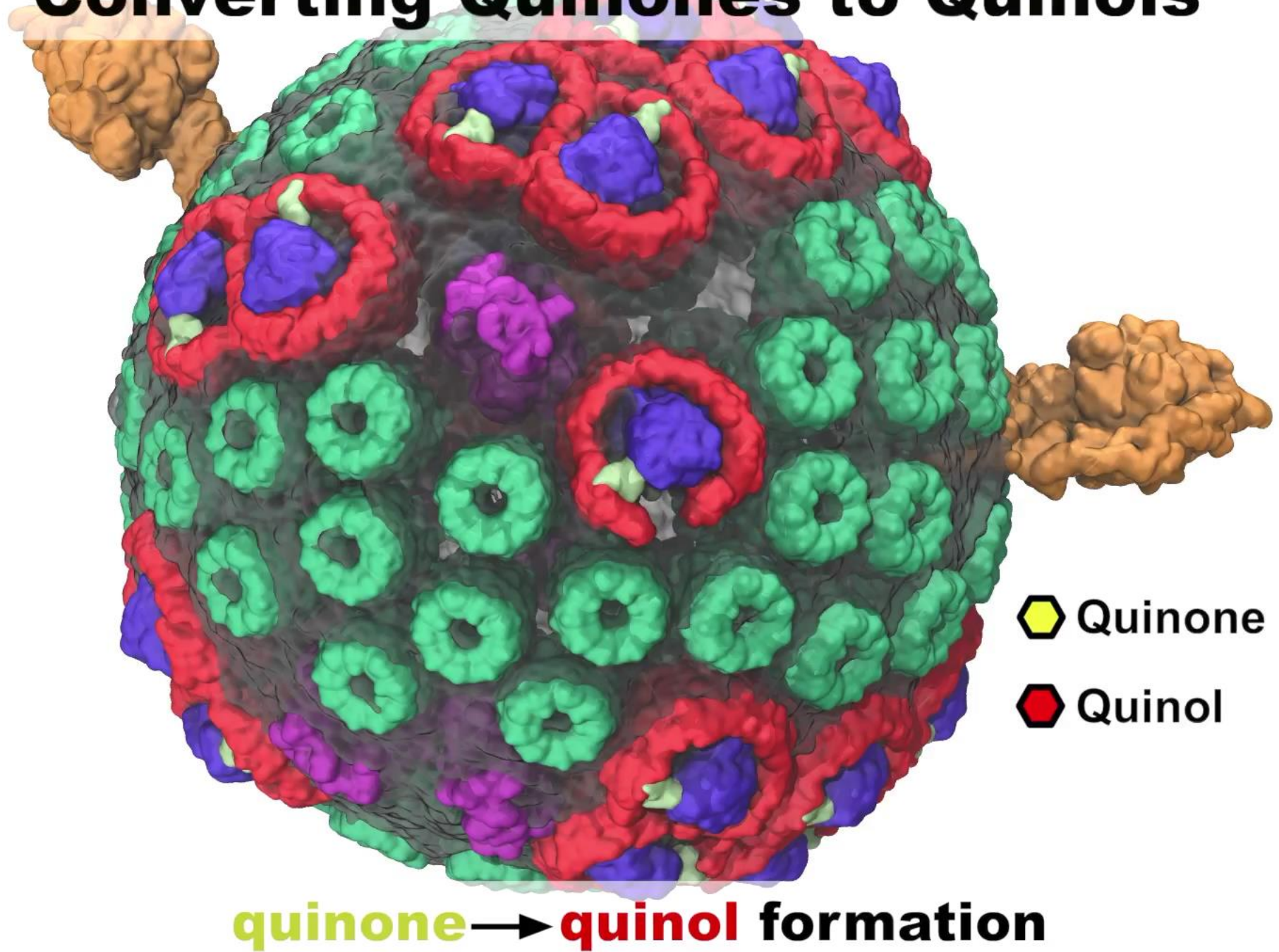
All visualization design:

- How will you represent the data?
- What aspects of the data do you choose to highlight?
- What colors will you use?
- ...

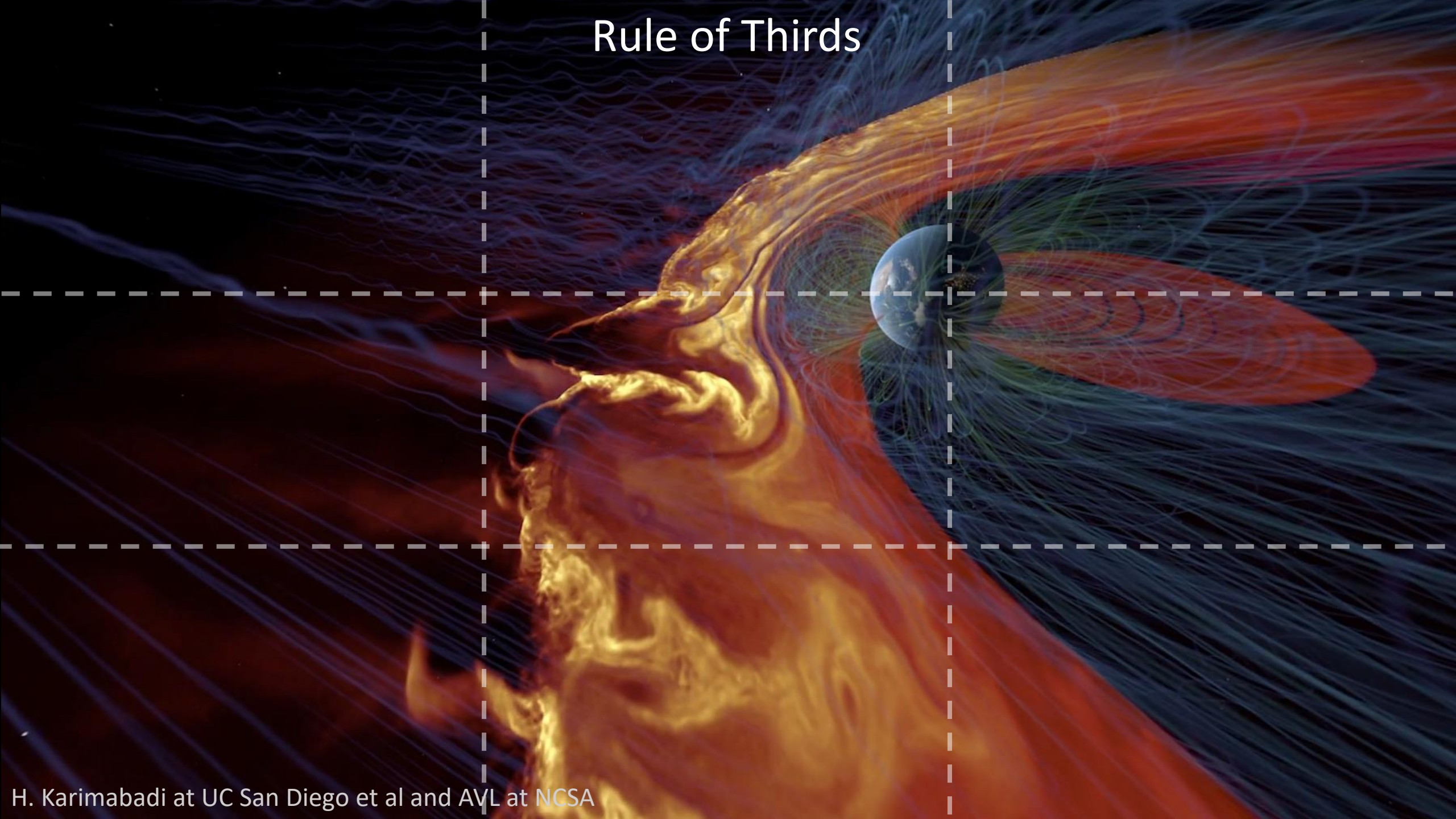
Cinematic visualization design:

- Scene design
- Camera choreography
- Composition in the frame
- ...

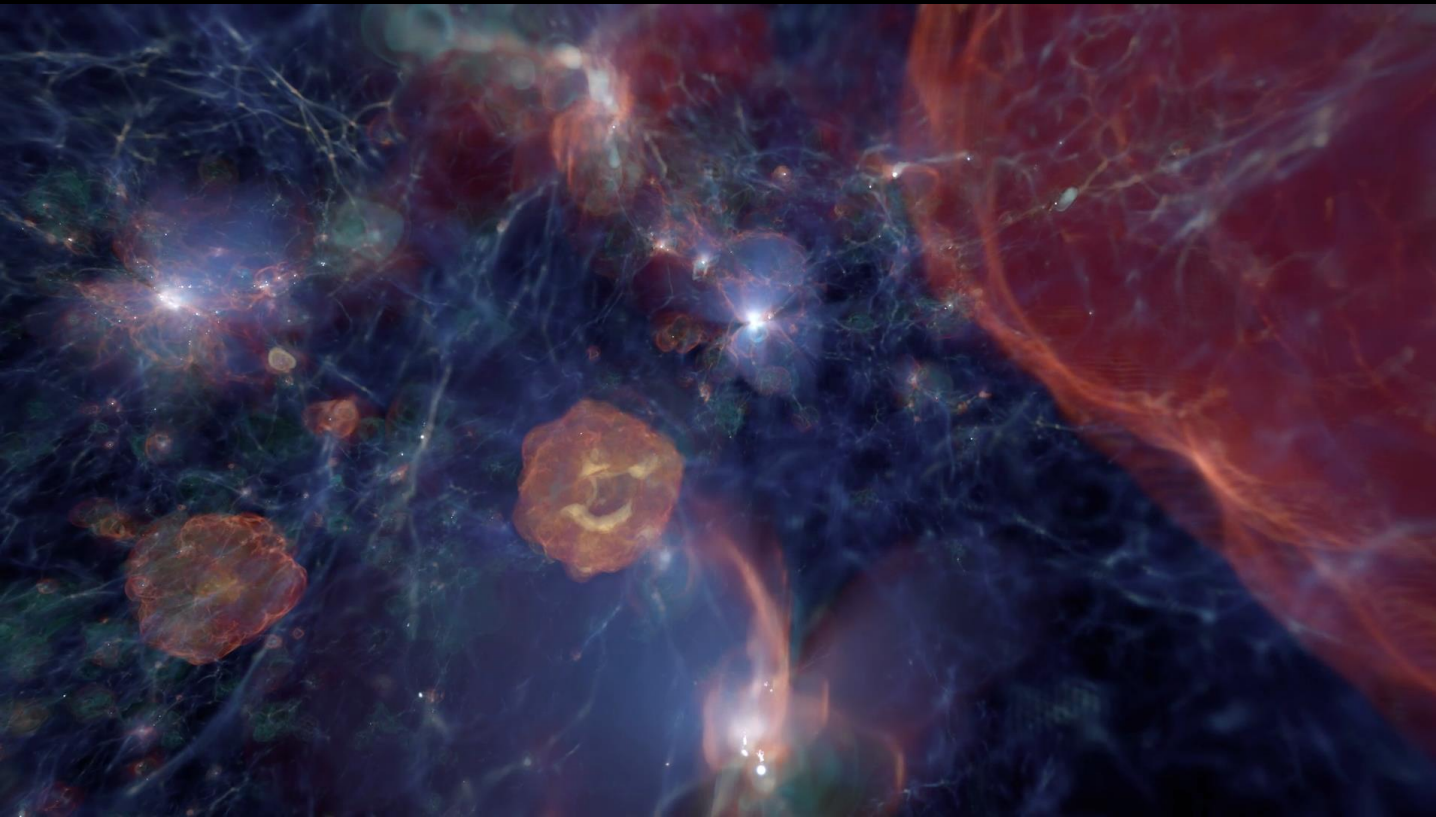
Converting Quinones to Quinols



Rule of Thirds

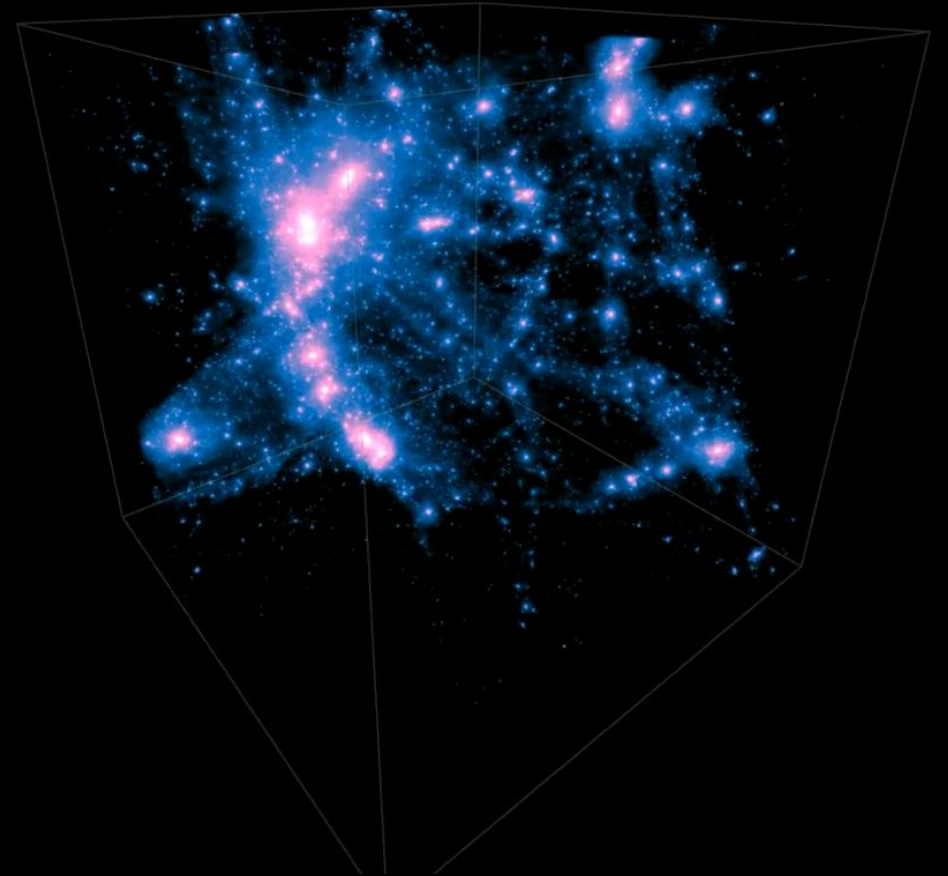


Camera inside the data box



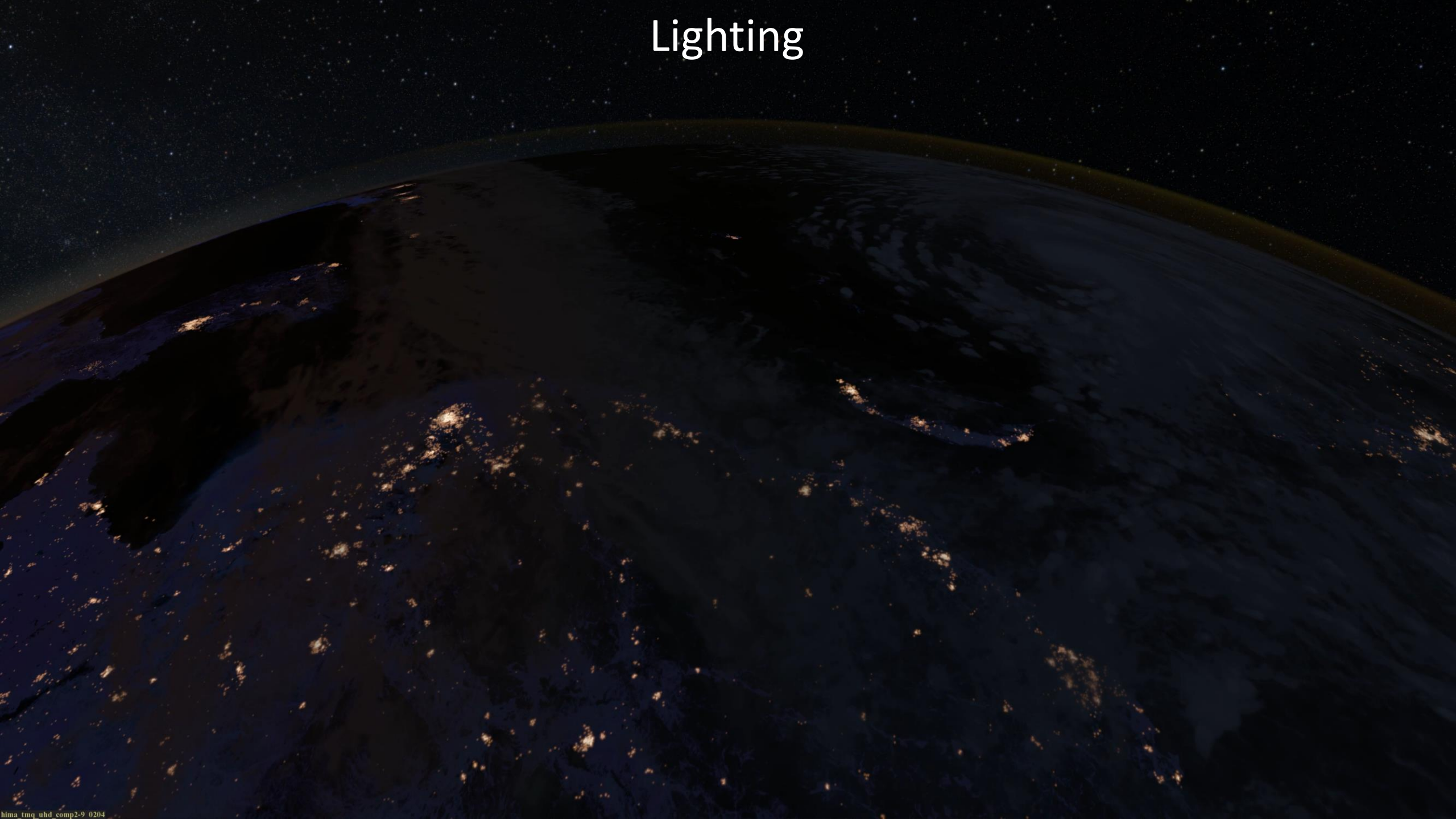
B. O'Shea et al and AVL at NCSA

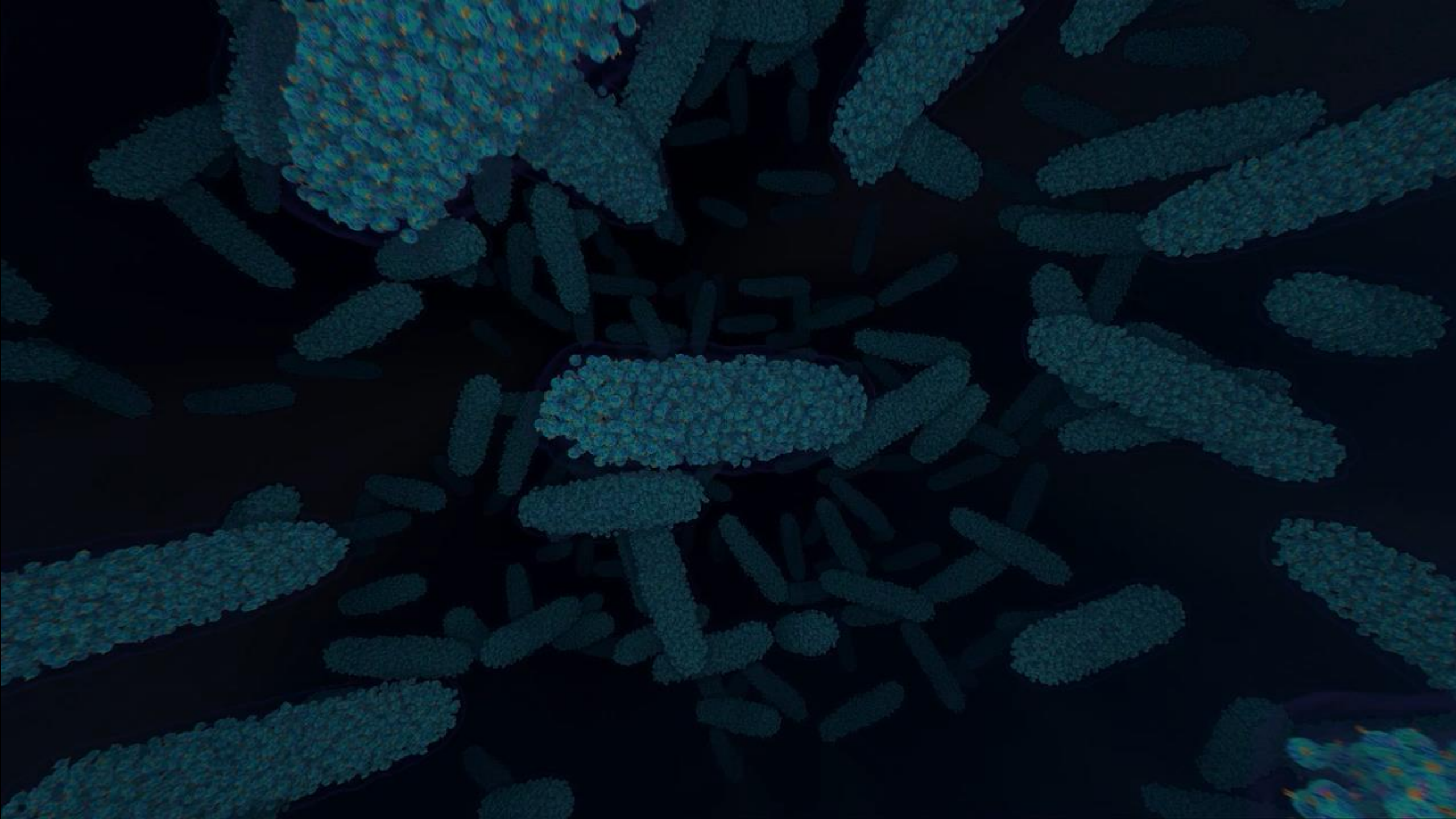
Camera outside the data box



Illustris Collaboration

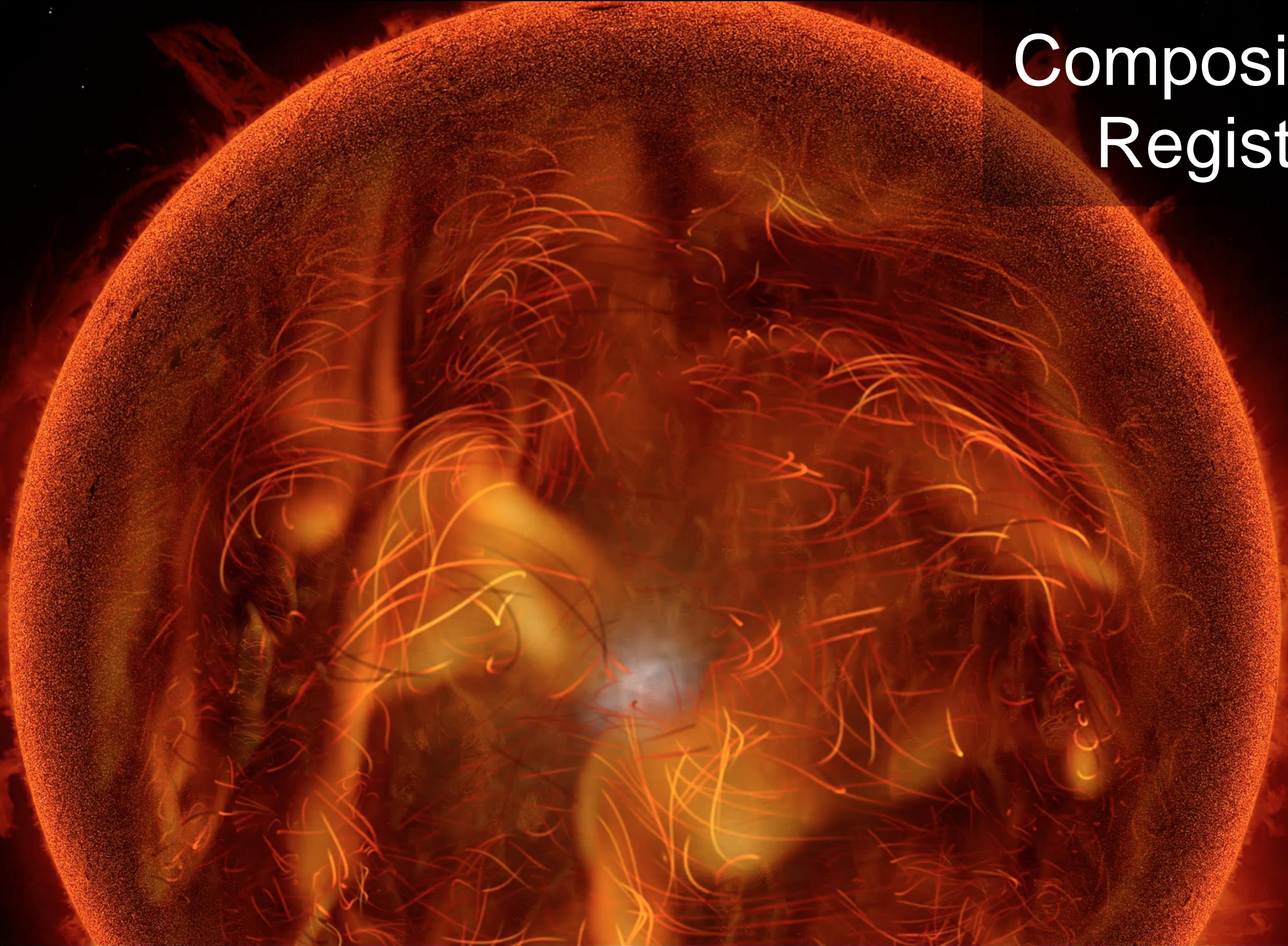
Lighting

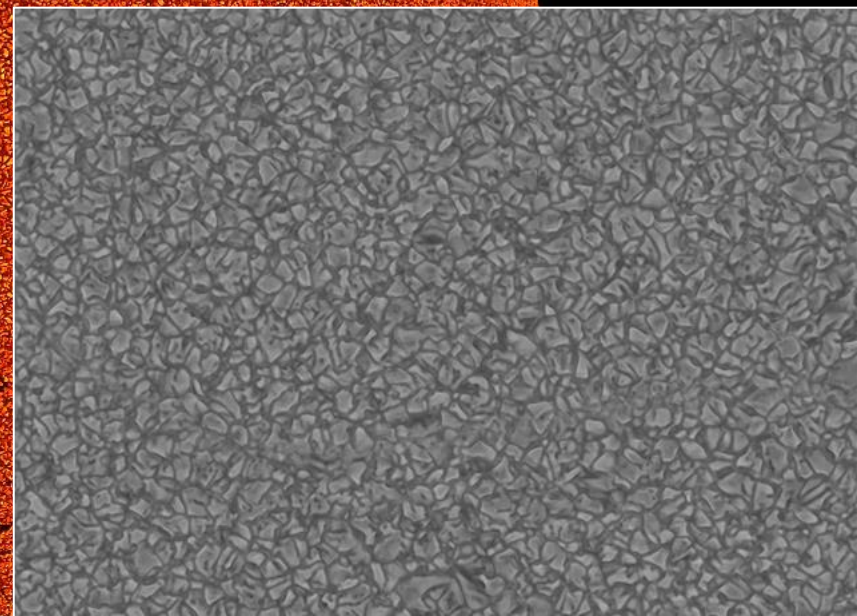
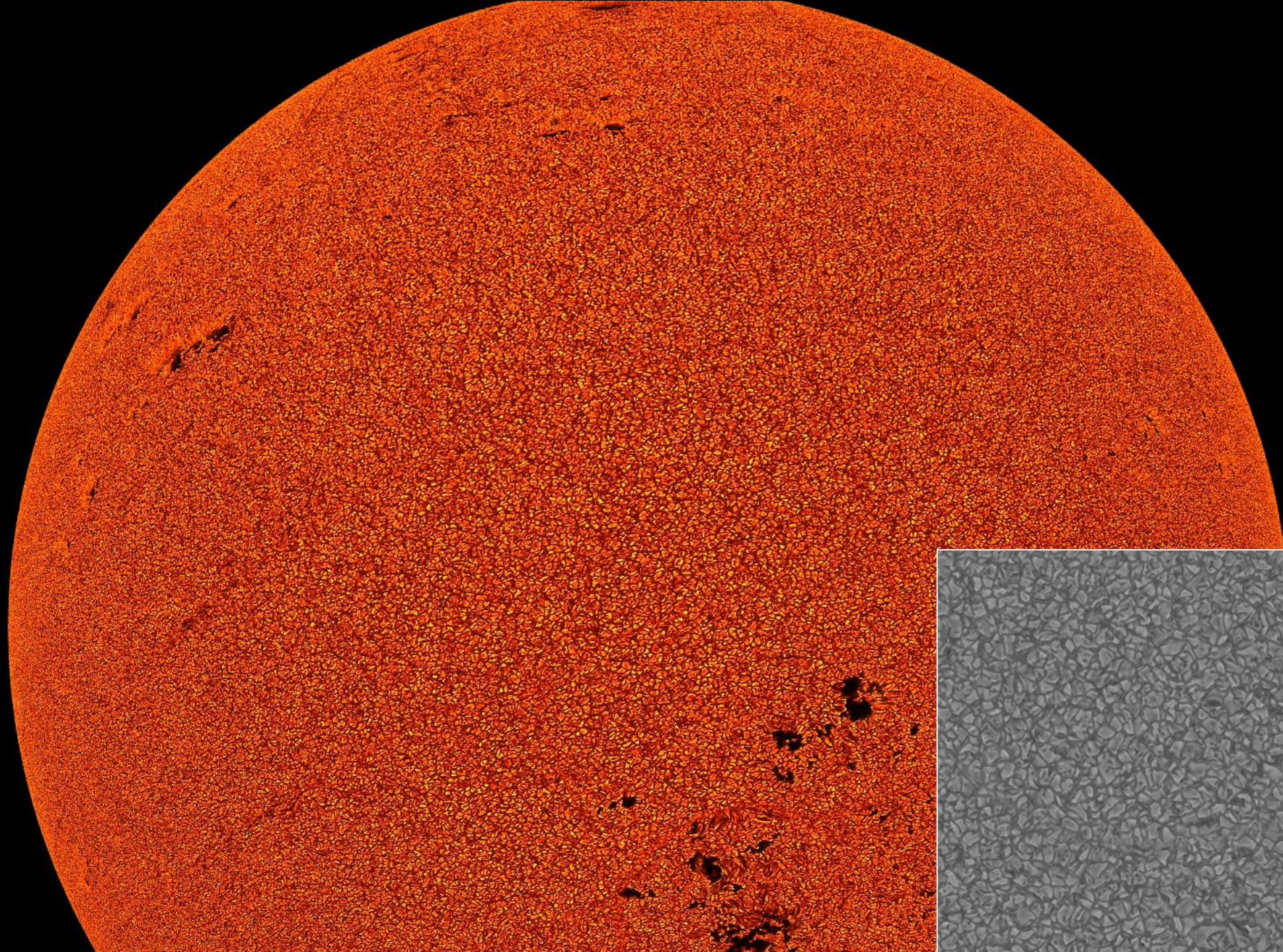


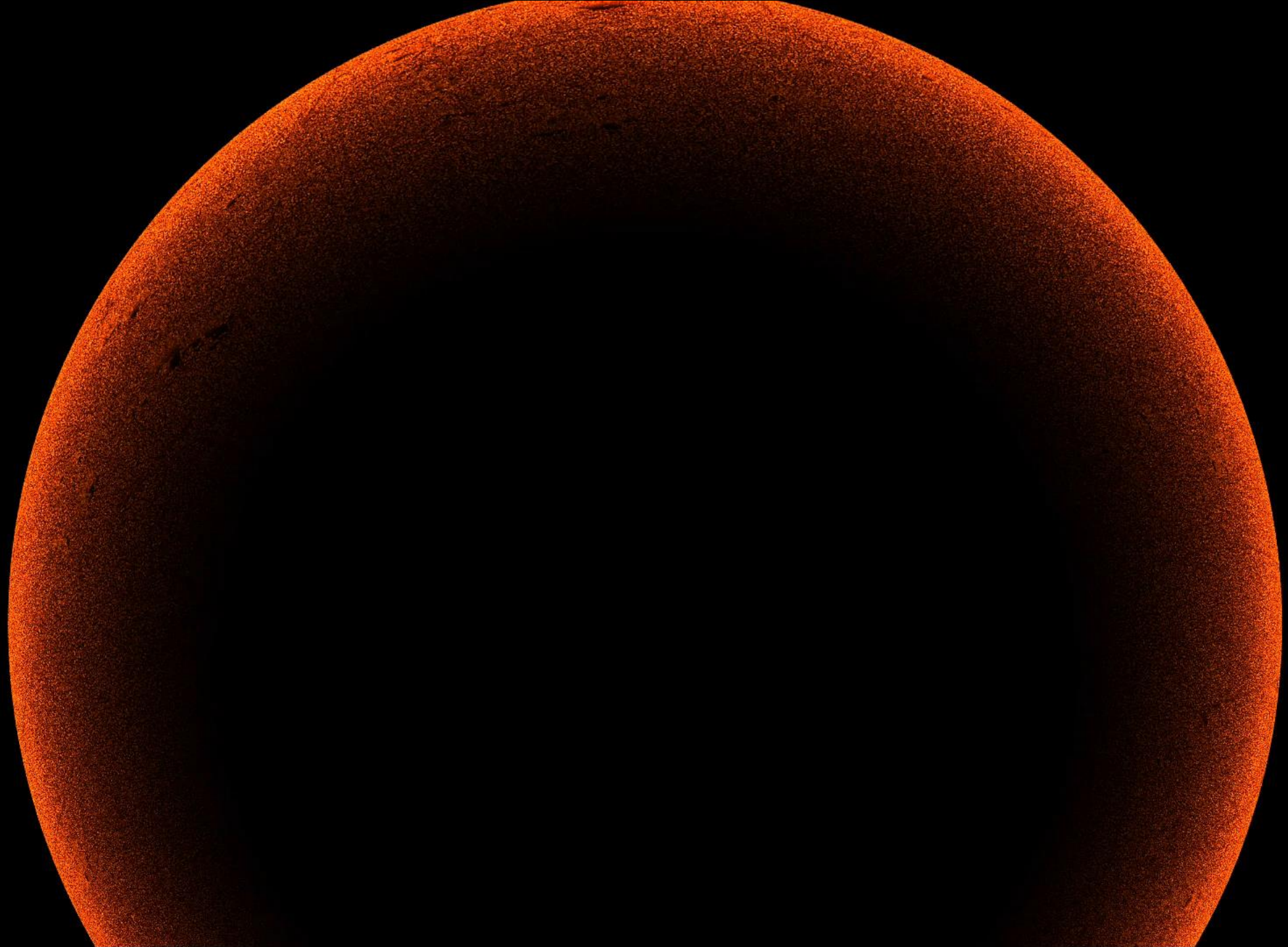


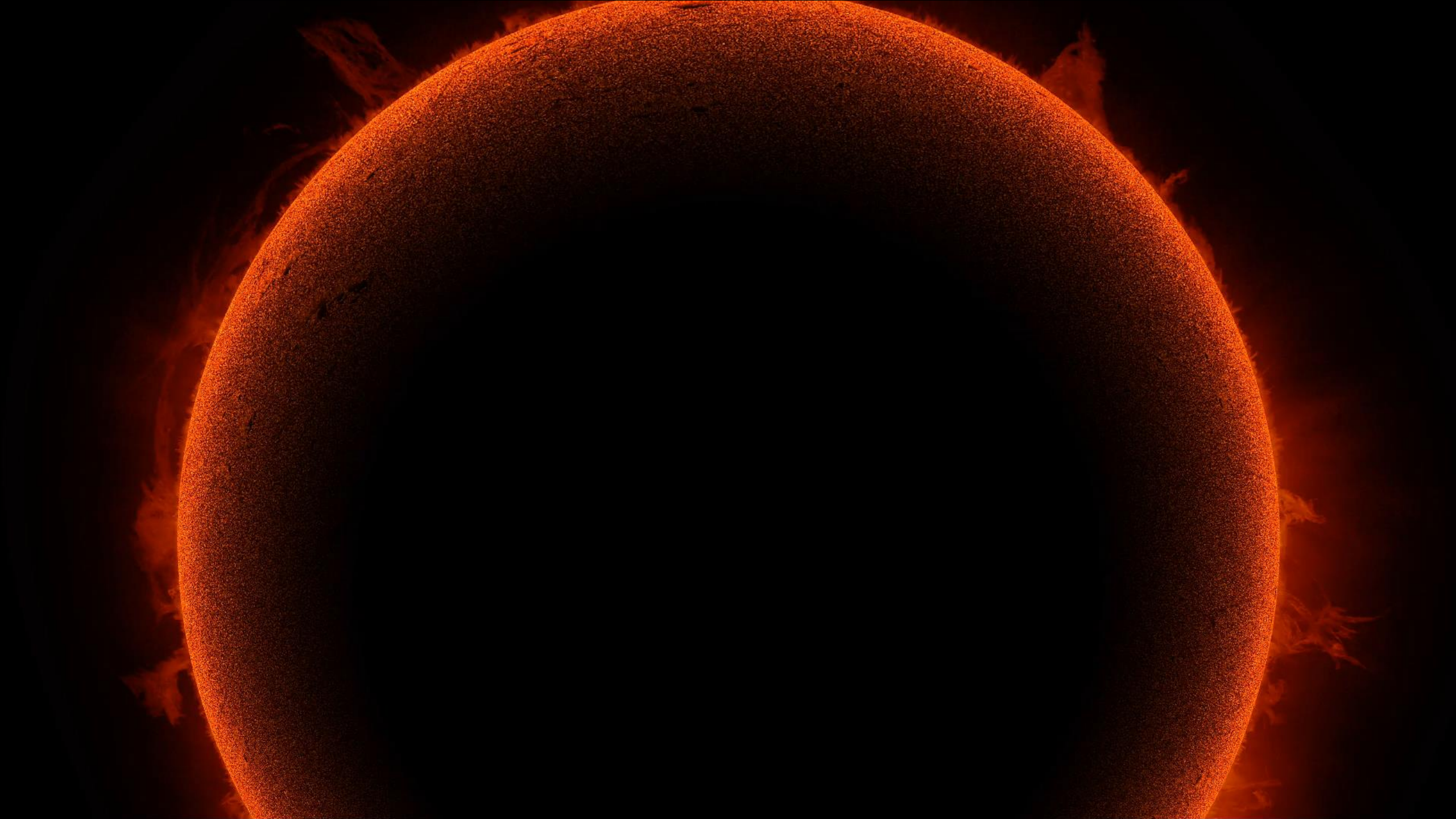


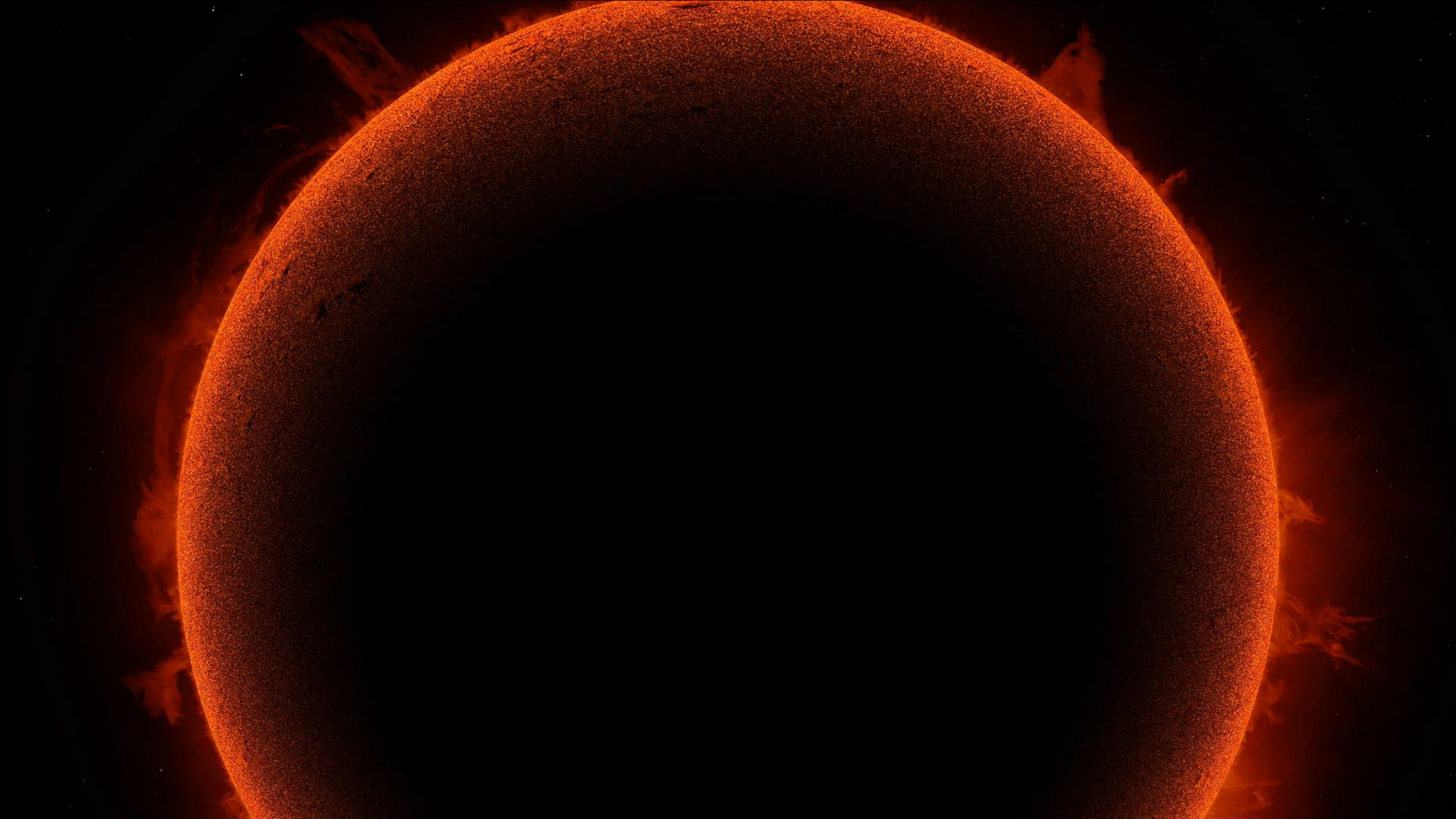
Compositing & Registration

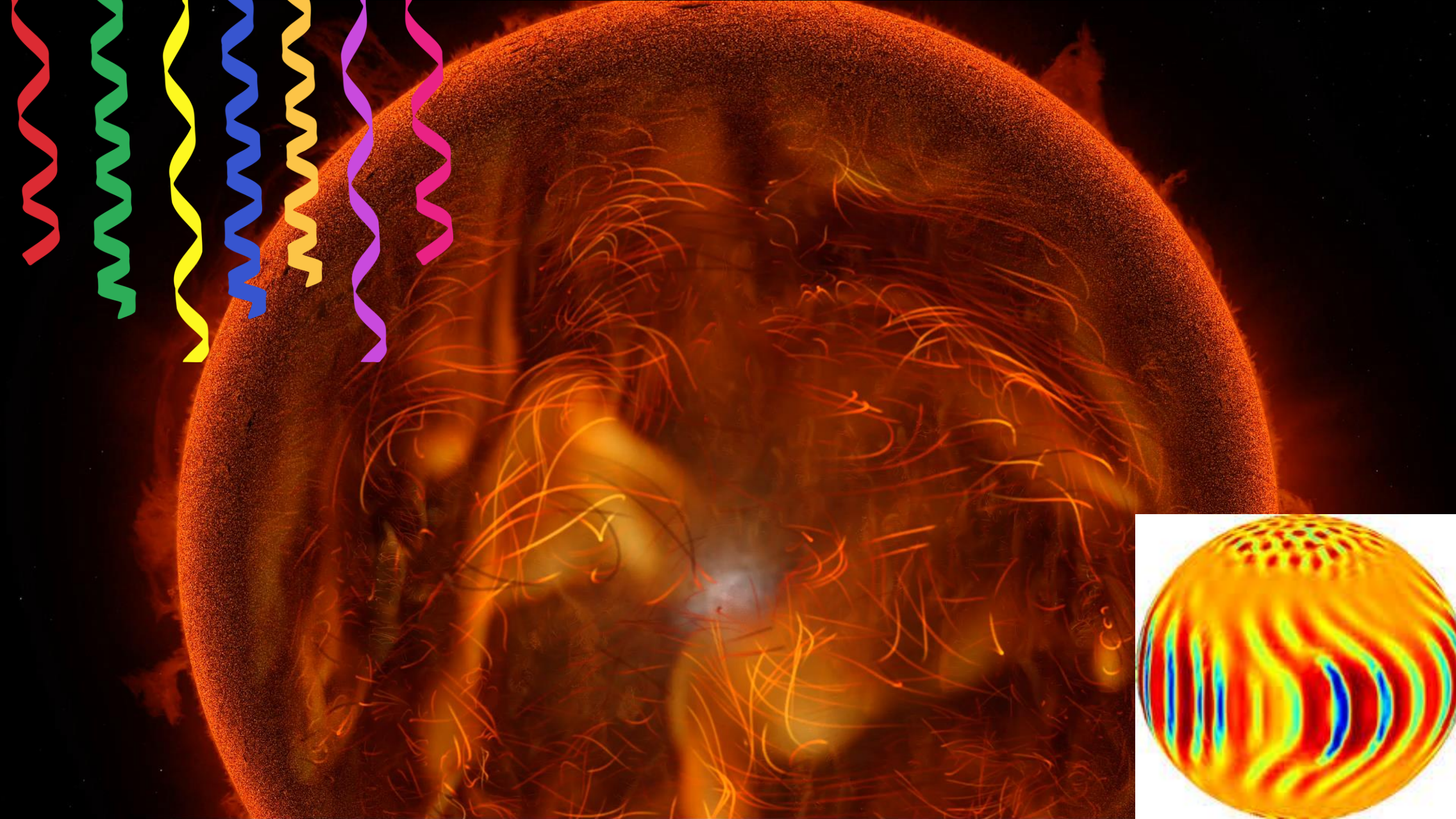


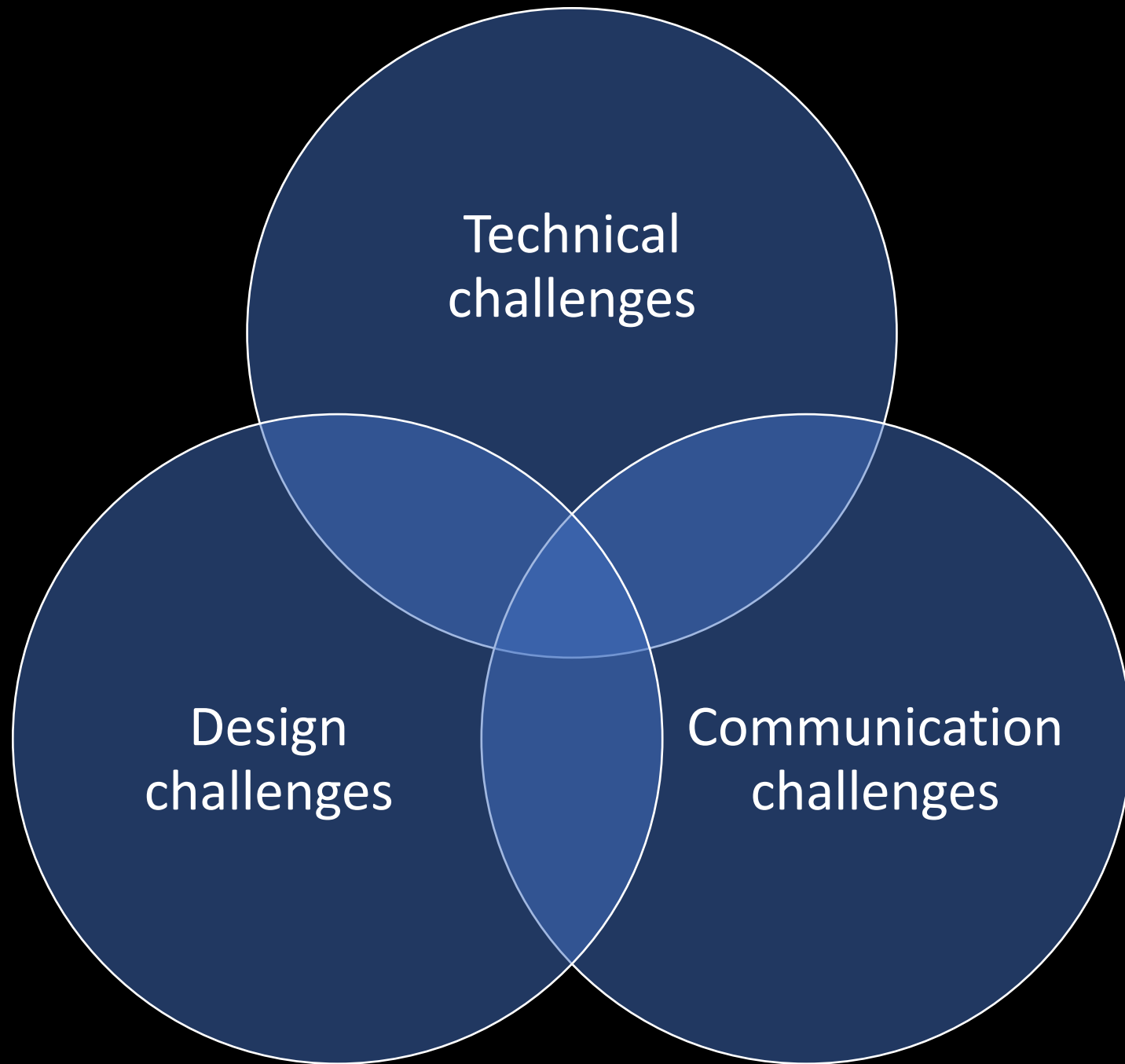


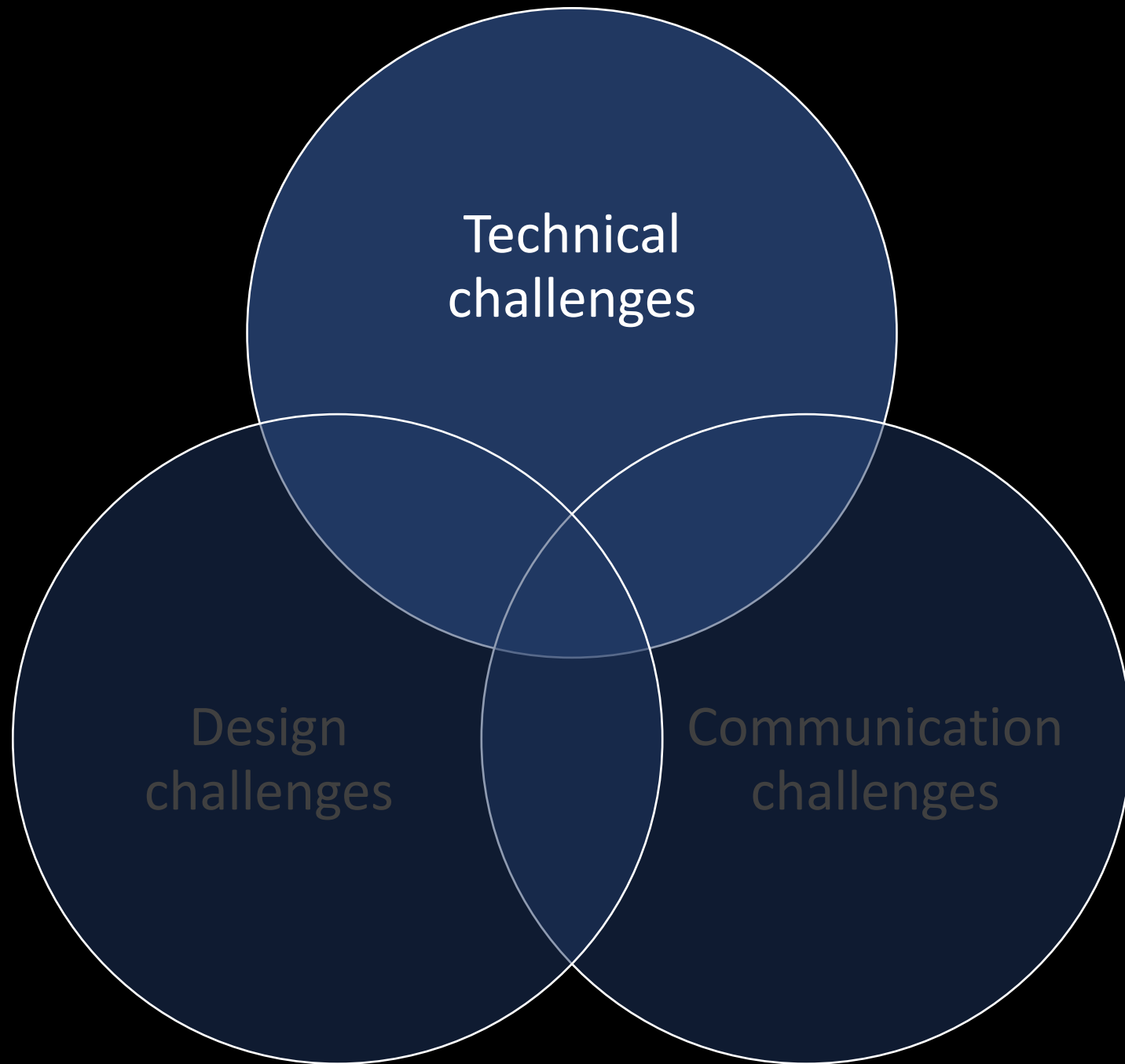




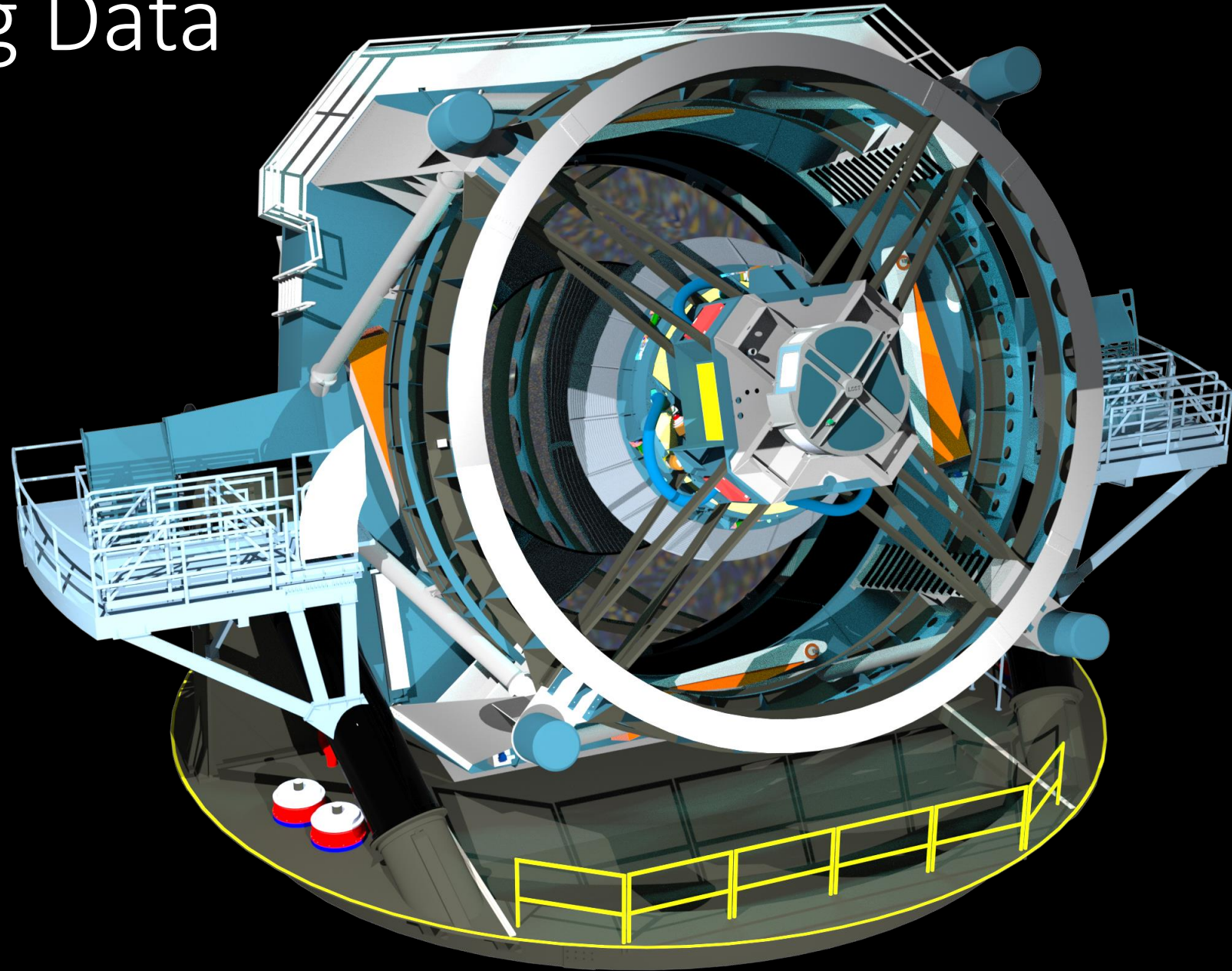








Challenge: Big Data



BIG DATA

Arctic Digital Elevation Model

Blue Waters supercomputer

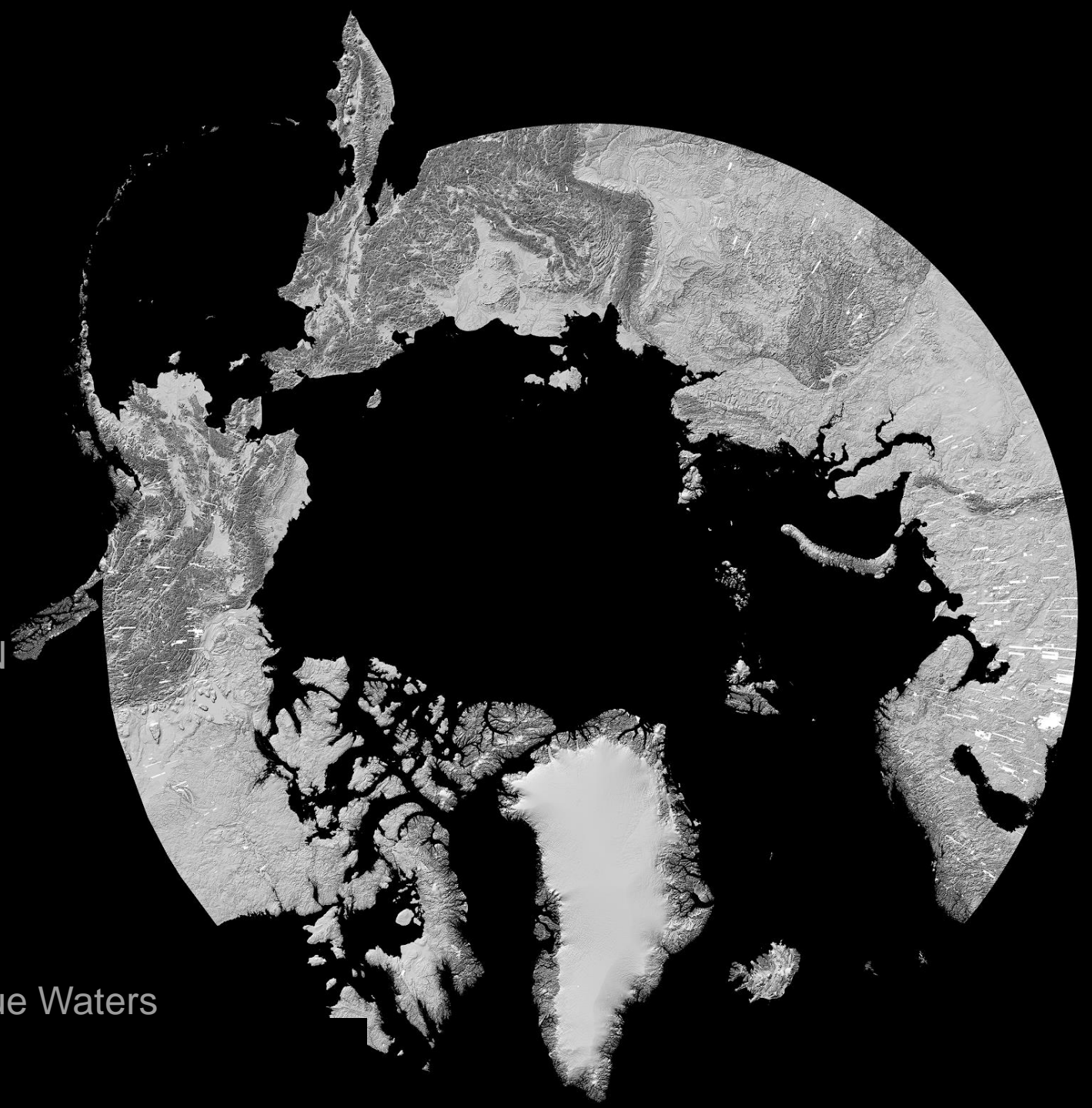
DATA STATS

DATA SIZE	200 TB
PROCESSING TIME	1.5 billion hours
SPATIAL SCALE	All land north of 60°N
RESOLUTION	1 pixel = 2 meters

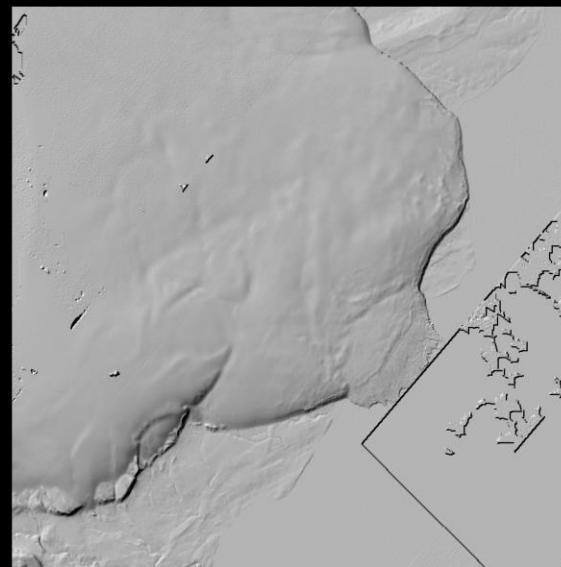
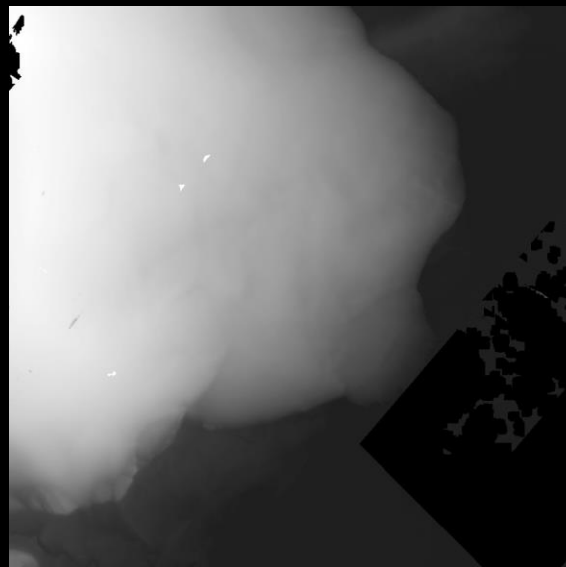
VISUALIZATION STATS

DATA SIZE	45 TB
RENDER TIME	110,000 hours on Blue Waters

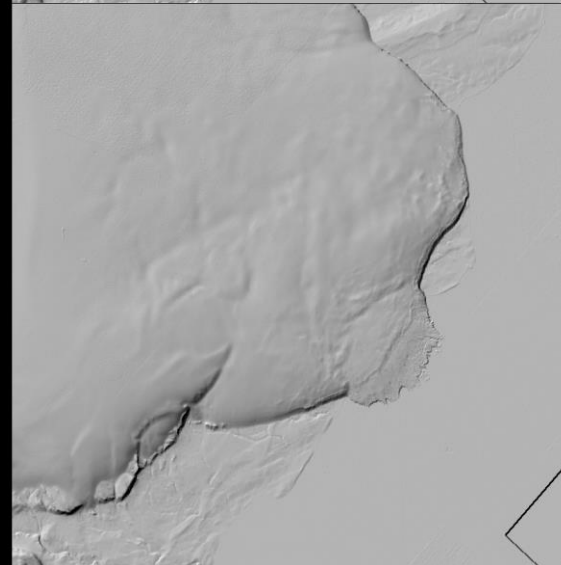
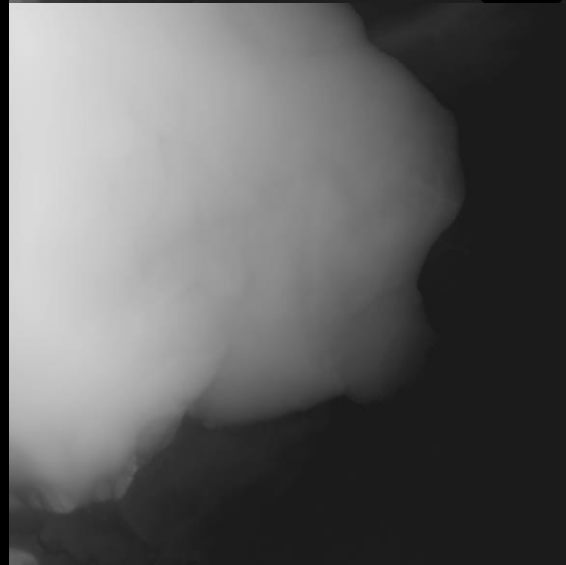
for documentary
“Atlas of a
Changing Earth”



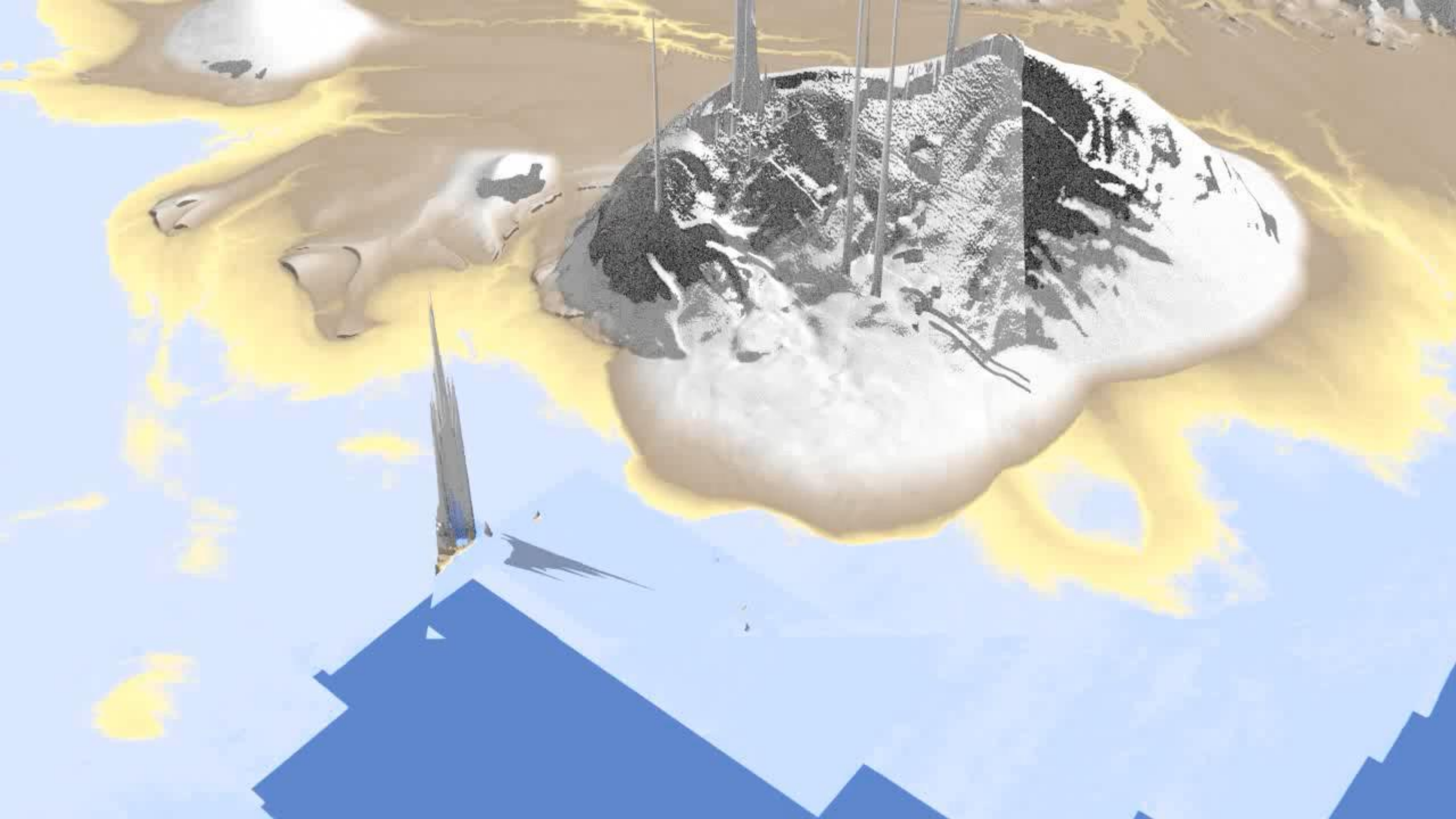
Challenge: Data is messy



Original with
cloud artifacts



After
cloud masking

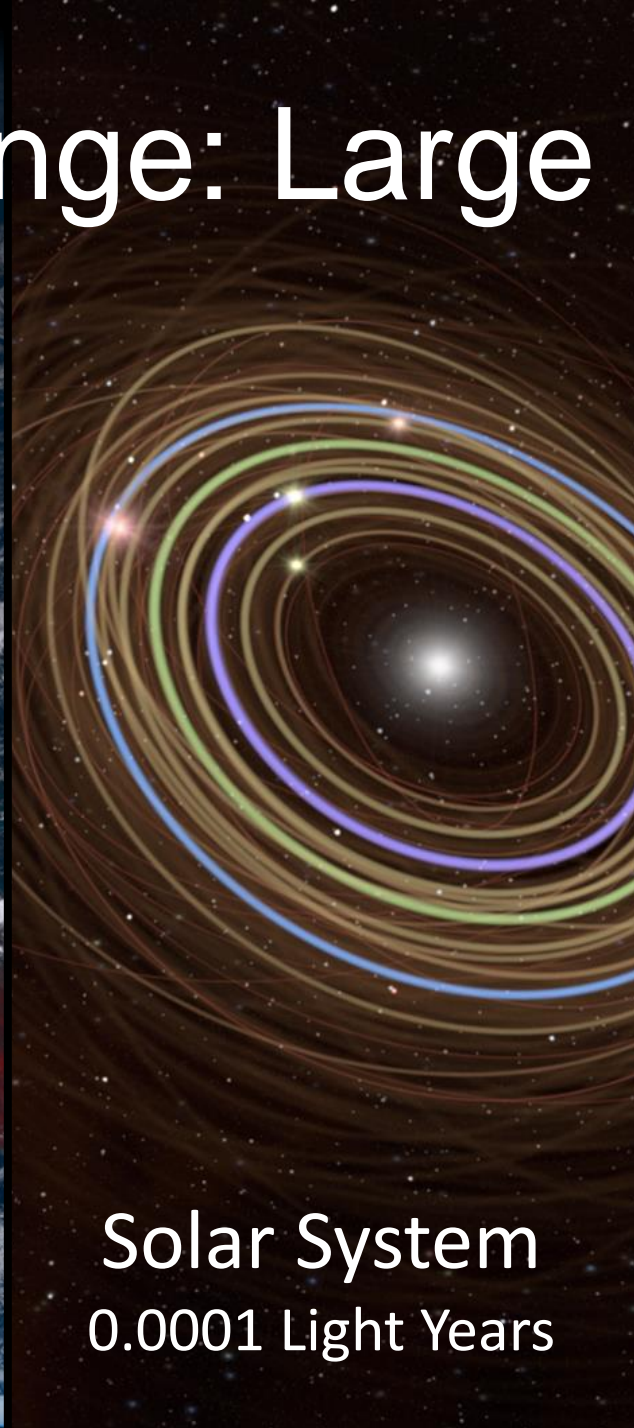




Challenge: Large Changes in Scale



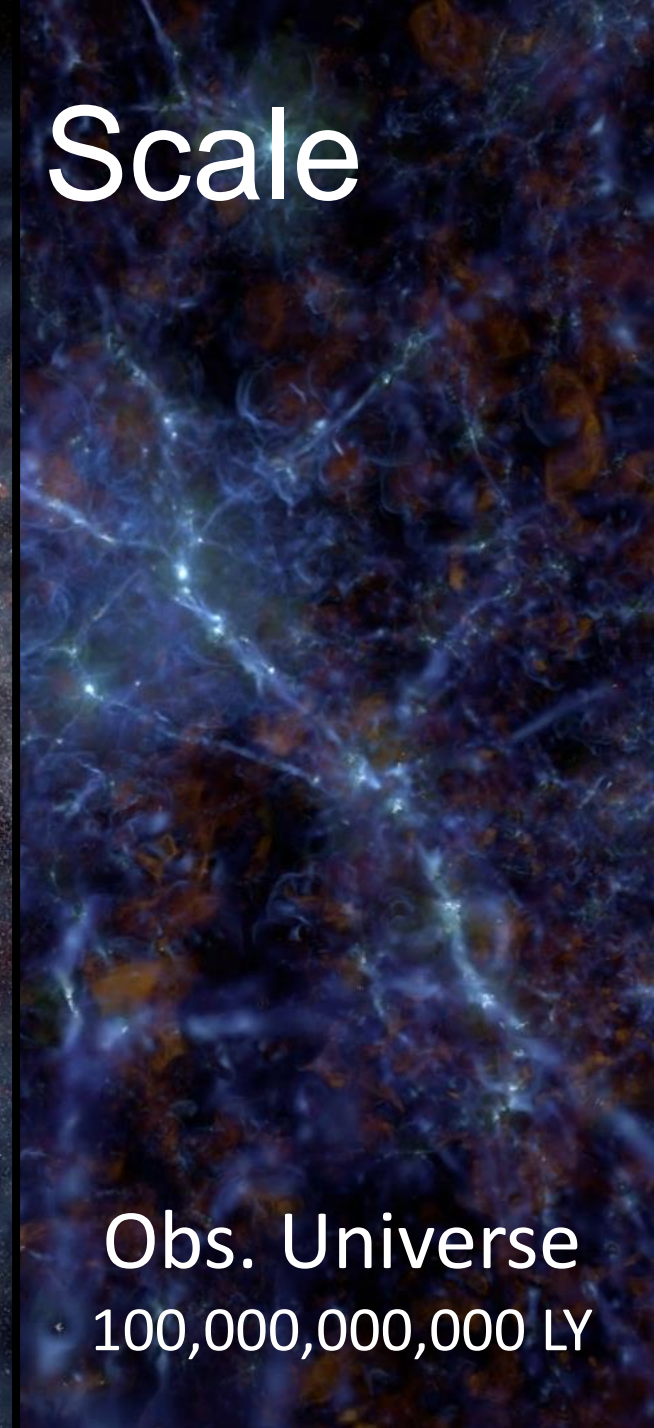
Earth
0.0000000001 LY



Solar System
0.0001 Light Years



Milky Way
100,000 Light Years

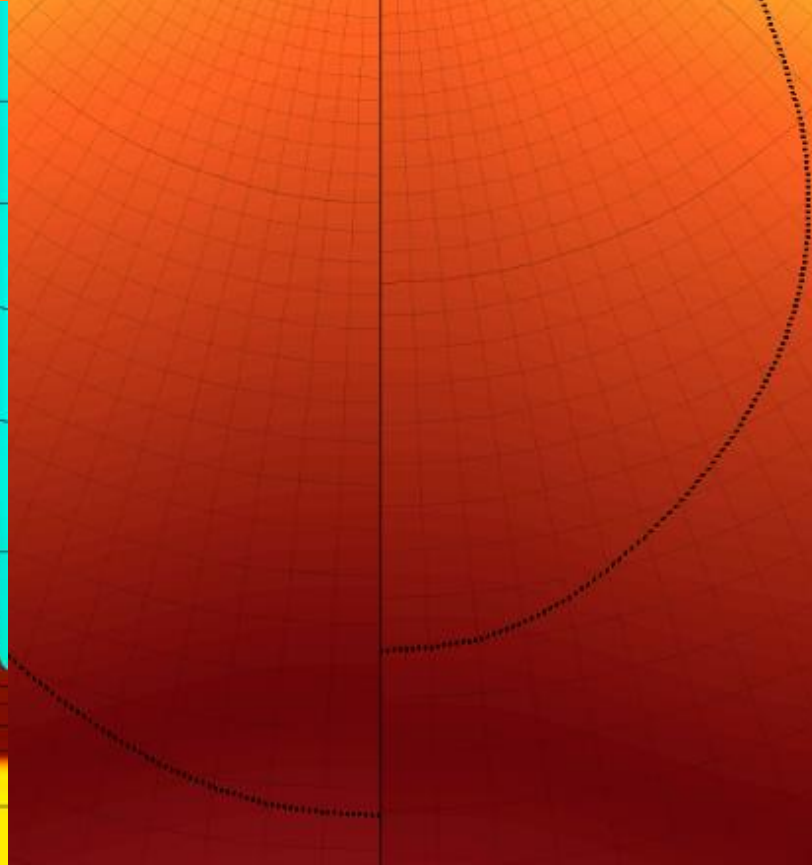
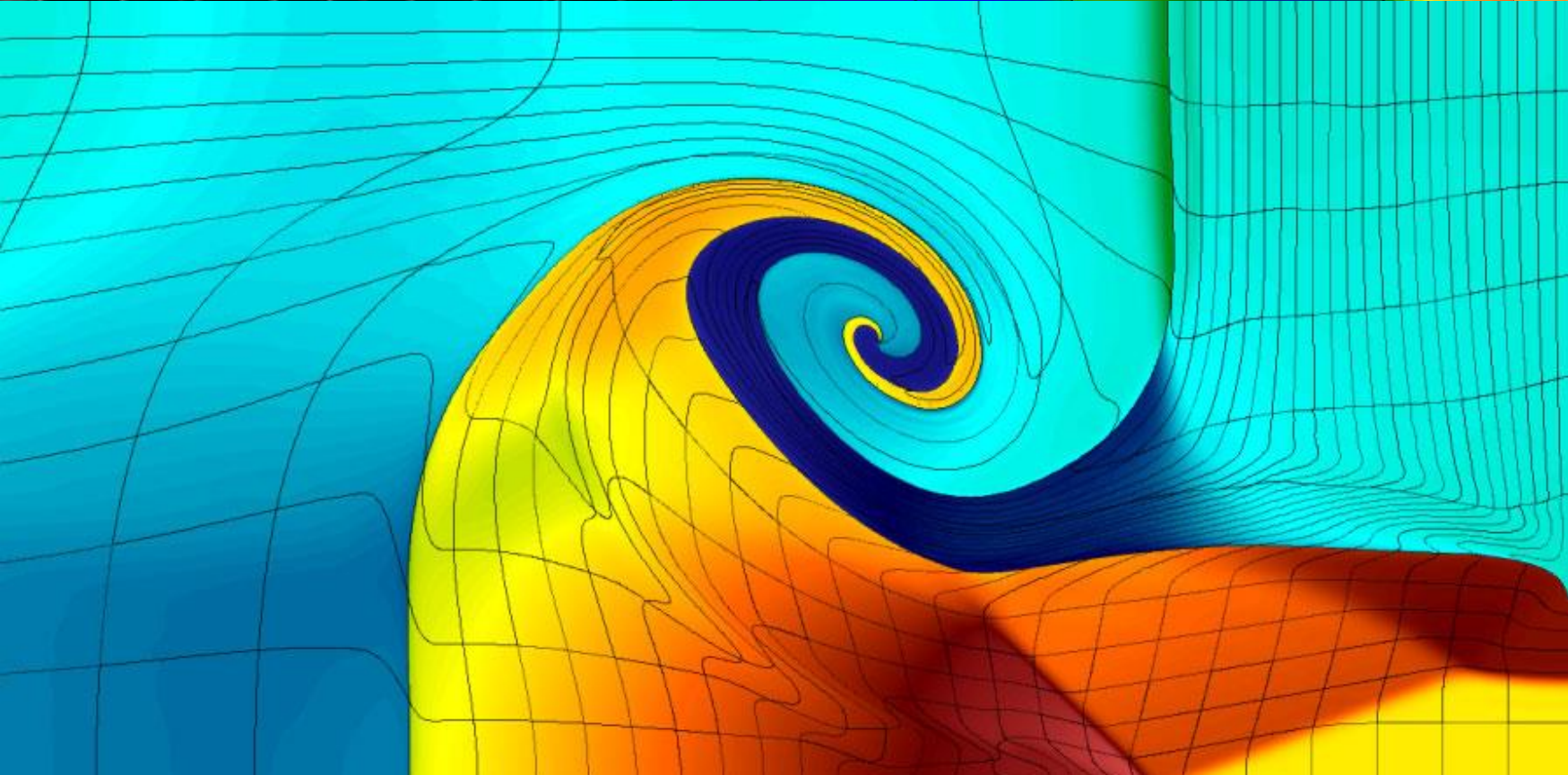
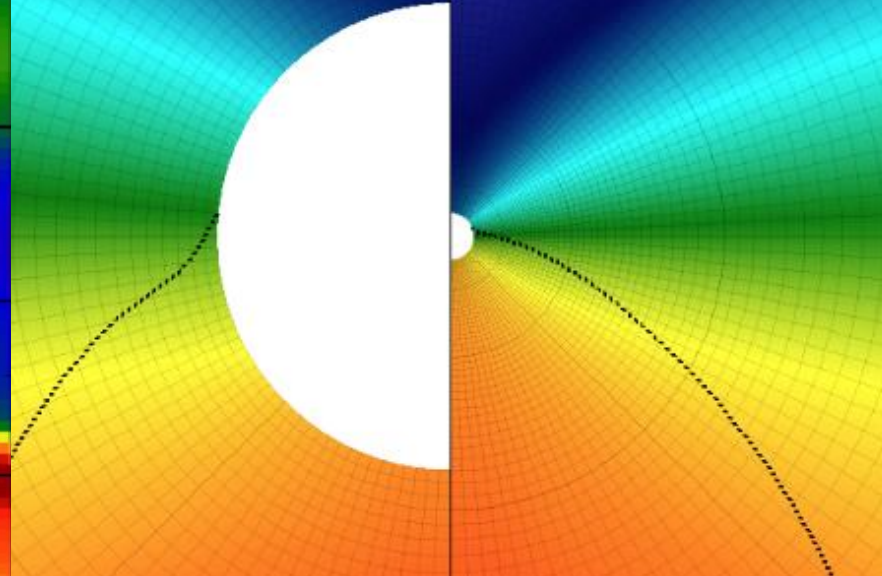
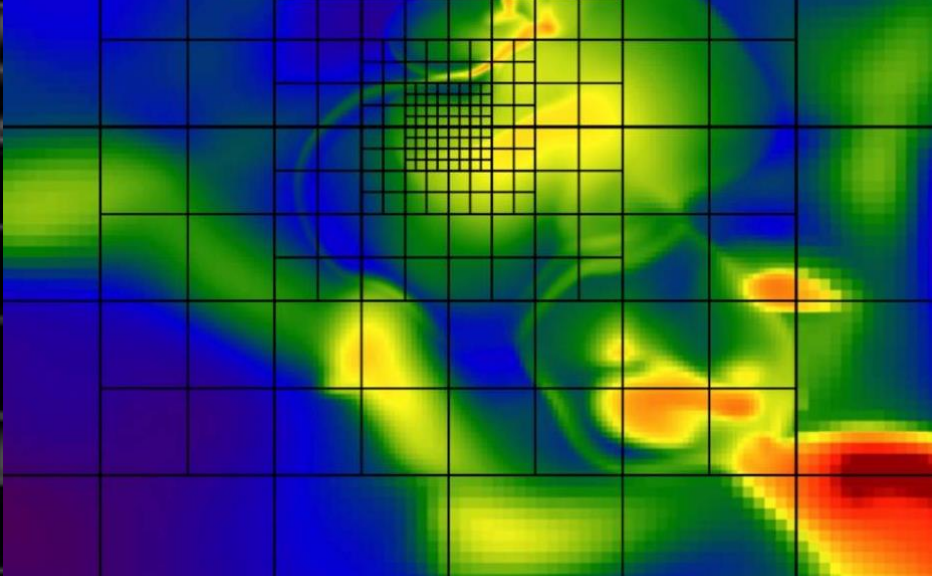


Obs. Universe
100,000,000,000 LY



Challenge: Complex Coordinate Systems

https://en.wikipedia.org/wiki/List_of_map_projections



Challenge: No Single Software Does It All

Visual Effects Software



Scientific Software



Custom Software

- Partiview
- Ytini
- Plugins
- OSL shaders
- MEL scripts
- IDL code
- ...

Challenge: No Single Software Does It All

Visual Effects Software






Scientific Software



Custom Software

- Partiview
- **Ytini**
- Plugins
- OSL shaders
- MEL scripts
- IDL code
- ...

	yt	Houdini
Data analysis	X	
Runs on supercomputers	X	
Can read complex scientific data	X	
Open source	X	
Artist-friendly		X
Can render geometry		X
Can render multiple objects in a scene		X
Lighting		X

		Houdini 	ytini 
Data analysis	X		
Runs on supercomputers	X		
Can read complex scientific data	X		X
Open source	X		X
Artist-friendly		X	X
Can render geometry		X	X
Can render multiple objects in a scene		X	X
Lighting		X	X

Custom middleware

Is this really worth doing?

A picture is worth a thousand words

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Interdum et malesuada fames ac ante ipsum primis in faucibus. Phasellus ullamcorper congue dui. Curabitur feugiat lacus imperdiet ante laoreet molestie. Nam id risus nibh. Proin sapien odio, consequat quis magna sit amet, viverra maximus erat. Phasellus elementum, erat quis feugiat feugiat, tellus sem auctor arcu, vitae interdum nunc risus convallis nisl. Vestibulum lobortis ultrices leo, eget molestie neque tempus quis. Nunc nec quam in nisl cursus commodo. Suspendisse finibus odio quis quam imperdiet cursus. Sed blandit in diam sodales commodo. Etiam eleifend dapibus faucibus. Etiam vel mollis metus. Aliquam erat volutpat. Maecenas dapibus congue egestas. Nullam risus lorem, euismod nec orci quis, congue consequat nisi. Quisque sed ornare enim, laoreet imperdiet ex. Nullam imperdiet tellus eu justo imperdiet sagittis. Suspendisse eu turpis commodo, luctus velit rutrum, tempus dui. Fusce nec turpis nec diam aliquam tincidunt. Integer venenatis nec massa nec dignissim. Etiam ac accumsan dolor, sed dignissim lectus. Maecenas vehicula ultrices nulla ut ornare. Proin tristique ante arcu, a ultricies lectus sollicitudin in. Fusce venenatis euismod pretium. Etiam arcu neque, tristique sit amet sodales in, tempor quis est. Donec non ligula diam. Sed.

Impact of academic publications

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"Citation metric" redirects here. Not to be confused with Citation index.

Citation impact is a measure of how many times an academic journal article or book or author is **cited** by other articles, books or authors.^{[1][2][3][4][5]} Citation counts are interpreted as measures of the impact or influence of academic work and have given rise to the field of **bibliometrics** or **scientometrics**,^{[6][7]} specializing in the study of patterns of academic impact through **citation analysis**. The journal **impact factor**, the two-year average ratio of citations to articles published, is a measure of the importance of journals. It is used by **academic institutions** in decisions about **academic tenure**, promotion and hiring, and hence also used by authors in deciding which journal to publish in. Citation-like measures are also used in other fields that do ranking, such as Google's PageRank algorithm, software metrics, college and university rankings, and business performance indicators.

Contents [hide]

- Article-level
 - Most-cited papers
- Journal-level
- Author-level
- Alternatives
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Article-level [edit]

Main article: Article-level metrics

One of the most basic citation metrics is how often an article was cited in other articles, books, or other sources (such as theses). Citation rates are heavily dependent on the discipline and the number of people working in that area. For instance, many more scientists work in neuroscience than in mathematics, and neuroscientists publish more papers than mathematicians, hence neuroscience papers are much more often cited than papers in mathematics.^{[8][9]} Similarly, **review papers** are more often cited than regular research papers because they summarize results from many papers. This may also be the reason why papers with shorter titles get more citations, given that they are usually covering a broader area.^[10]

Most-cited papers [edit]

The most-cited paper in history is a paper by Oliver Lowry describing an **essay to measure the concentration of proteins**.^[11] By 2014 it had accumulated more than 305,000 citations. The 10 most cited papers all had more than 40,000 citations.^[12] To reach the top-100 papers required 12,119 citations by 2014.^[12] Of Thomson Reuter's Web of Science database with more than 58 million items, only 14,499 papers (~0.026%) had more than 1,000 citations in 2014.^[12]

Journal-level [edit]

Main article: Journal-level metrics
Further information: Journal impact factor

The simplest journal-level metric is the **journal impact factor** (JIF), the average number of citations that articles published by a journal in the previous two years have received in the current year, as calculated by **Clarivate**. Other companies report similar metrics, such as the **CiteScore** (CS), based on **Scopus**.

However, very high JIF or CS are often based on a small number of very highly cited papers. For instance, most papers in *Nature* (impact factor 38.1, 2016) were only cited 10 or 20 times during the reference year (see figure). Journals with a lower impact (e.g. *PLOS ONE*, impact factor 3.1) publish many papers that are cited 0 to 5 times but few highly cited articles.^[13]

Journal-level metrics are often misinterpreted as a measure for journal quality or article quality. They are not an article-level metric, hence its use to determine the impact of a single article is statistically invalid. Citation distribution is **skewed** for journals because a very small number of articles is

Part of a series on
Citation metrics

Altmetrics • Article-level (Eigenfactor • G-index • H-index) • Bibliographic coupling • Citation (Analysis • Dynamics • Index • Graph) • Co-citation (Proximity Analysis) • Coercive citation • I4OC • Journal-level (CiteScore • Impact factor • SCImago) • Kardashian Index

V · T · E

only 14,499 papers (~0.026%) had more than 1,000 citations in 2014.^[12]

Impact of outreach through museums

Wikipedia article for the **Museum of Science and Industry (Chicago)**.

Visitors 1.5 million (2016)^[1]

The **Museum of Science and Industry (MSI)** is a science museum located in Chicago, Illinois, in Jackson Park, in the Hyde Park neighborhood between Lake Michigan and The University of Chicago. It is housed in the former *Palace of Fine Arts* from the 1893 World's Columbian Exposition. Initially endowed by Julius Rosenwald, the Sears, Roebuck and Company president and philanthropist, it was supported by the Commercial Club of Chicago and opened in 1933 during the Century of Progress Exposition.

Among the museum's exhibits are a full-size replica coal mine, German submarine *U-505* captured during World War II, a 3,500-square-foot (330 m²) model railroad, the command module of *Apollo 8*, and the first diesel-powered streamlined stainless-steel passenger train (*Pioneer Zephyr*).

Chevy Humphrey became president and CEO of the private, non-profit^[2] museum in January 2021.^[3]

History [edit]

The **Palace of Fine Arts** (also known as the Fine Arts Building) at the 1893 World's Columbian Exposition was designed by Charles B. Atwood for D. H. Burnham & Co. During the fair, the palace displayed paintings, prints, drawing, sculpture, and metal work from around the world.^[4]

Unlike the other "White City" buildings, it was constructed with a brick substructure under its plaster facade.

After the World's Fair, the palace initially housed the Columbian Museum, largely displaying collections left from the fair, which evolved into the **Field Museum of Natural History**. When the Field Museum moved to a new building near downtown Chicago in 1920, the palace was left vacant.

School of the Art Institute of Chicago professor **Lorado Taft** led a public campaign to restore the building and turn it into another art museum, one devoted to sculpture. The South Park Commissioners (now part of the **Chicago Park District**) won approval in a referendum to sell \$5 million in bonds to pay for restoration costs, hoping to turn the building into a sculpture museum, a technical trade school, and other things. However, after a few years, the building was selected as the site for a new science museum.

At this time, the **Commercial Club of Chicago** was interested in establishing a science museum in Chicago. **Julius Rosenwald**, the **Sears, Roebuck and Company** president and philanthropist, energized his fellow club members by pledging to pay \$3 million towards the cost of converting the Palace of Fine Arts (Rosenwald eventually contributed more than \$5 million to the project). During its conversion into the MSI, the building's exterior was re-cast in limestone to retain its 1893 Beaux Arts look. The interior was replaced with a new one in **Art Moderne** style designed by **Alfred P. Shaw**.

Rosenwald established the museum organization in 1926 but declined to have his name on the building. For the first few years, the museum was often called the **Rosenwald Industrial Museum**. In 1928, the name of the museum was officially

Museum of Science and Industry, Chicago

The south facade of the Museum of Science and Industry overlooks a reflecting lagoon in Jackson Park

Chicago

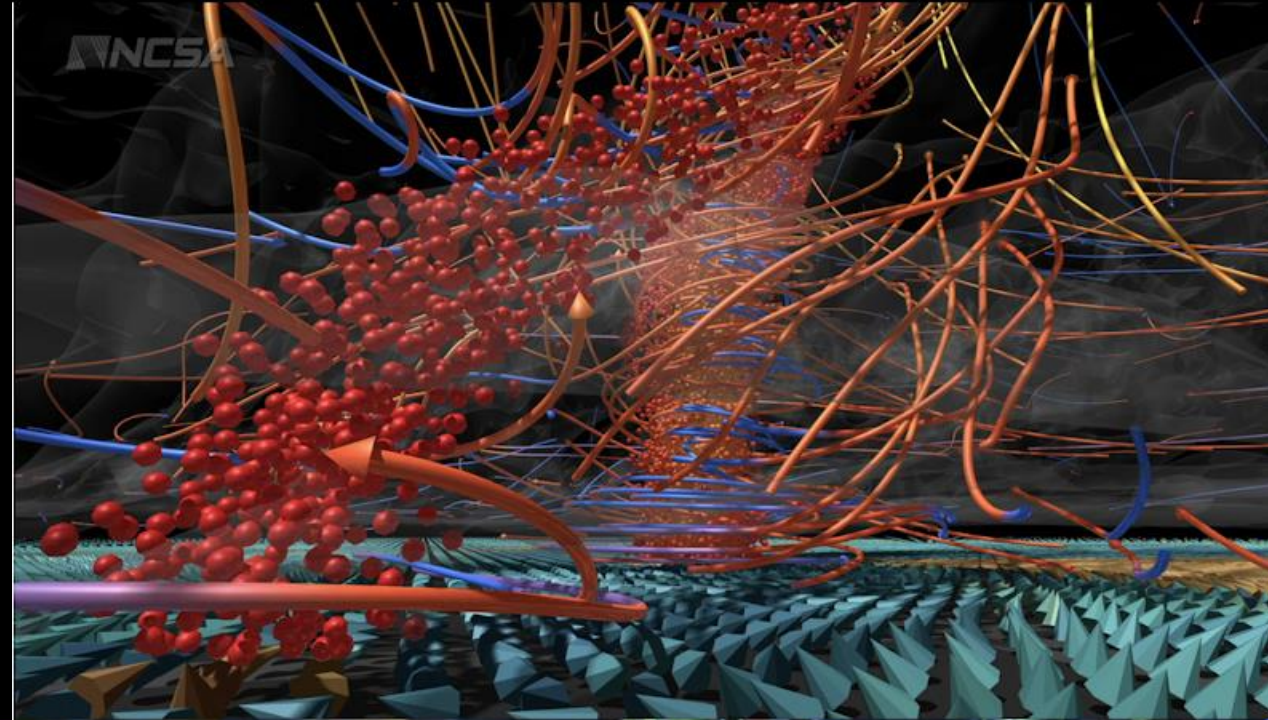
Established 1933

Location 5700 South Lake Shore Drive (at East 57th Street), Chicago, Illinois U.S., 60637

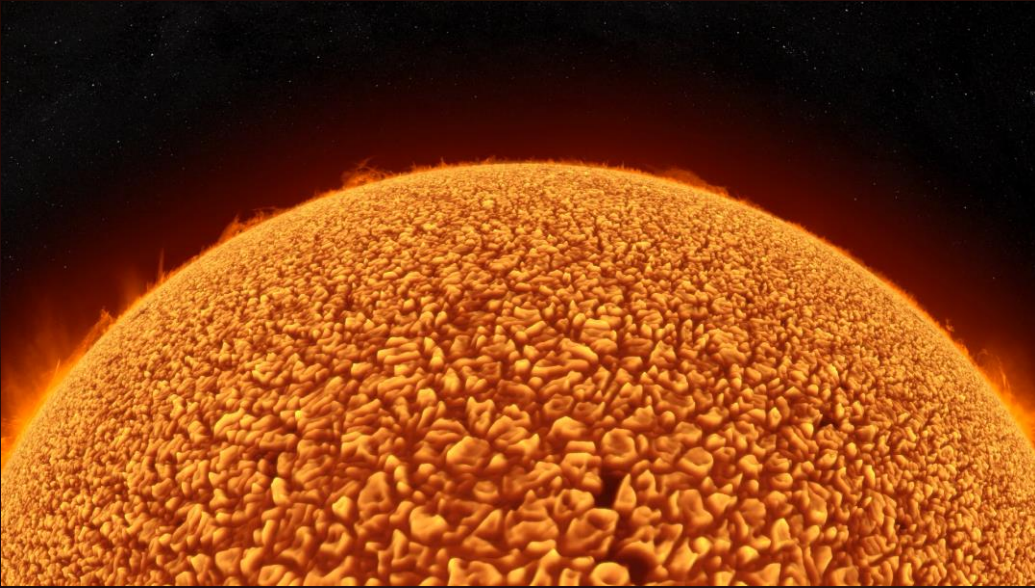
Type Science and technology museum

Visitors 1.5 million (2016)^[1]

Public transit access **CTA Bus routes:** Routes 6 and 28 (to 56th Street and Hyde Park Boulevard) Route 10 (to Museum of Science and Industry) Route 55 (to Museum of Science and



Impact of visualization on social media



Seeing Inside the Sun

SpaceRip ✓
909K subscribers

39K likes

3.3M views · 5 years ago

Dr. Robert Stein, professor of Physics and Astronomy at Michigan State University has long envisioned a day when he could use supercomputer programs to "see" through the roiling surface of the sun and glimpse its dynamic interior. He describes his quest and offers ideas about what drives the violent outbursts kn

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TRIP TO BLACK HOLE
What Would a Journey to the Black Hole Be Like?
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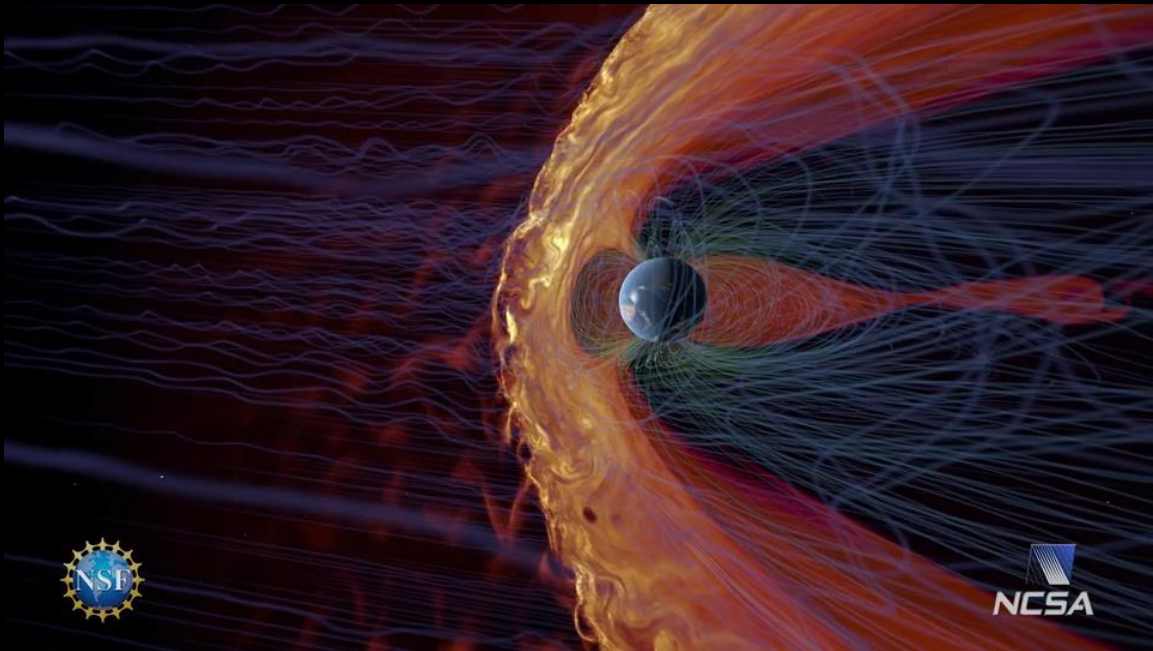
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Ashbury Studios
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3.3M views

Impact of visualization on policy



115TH CONGRESS
1ST SESSION

S. 141

IN THE HOUSE OF REPRESENTATIVES

MAY 3, 2017

Referred to the Committee on Science, Space, and Technology, and in addition to the Committees on Armed Services, Transportation and Infrastructure, Foreign Affairs, and the Permanent Select Committee on Intelligence, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

AN ACT

To improve understanding and forecasting of space weather events, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,
SECTION 1. SHORT TITLE.

This Act may be cited as the “Space Weather Research and Forecasting Act”.

SEC. 2. SPACE WEATHER.

(a) IN GENERAL.—Subtitle VI of title 51, United States Code, is amended by adding after chapter 605 the following:

“CHAPTER 607—SPACE WEATHER

“60701. Space weather.

“60702. Observations and forecasting.

“60703. Research and technology.

“60704. Space weather data.

“§ 60701. Space weather

“(a) FINDINGS.—Congress makes the following findings:

“(1) Space weather events pose a significant threat to humans working in the space environment and to modern technological systems.

Viewing as Staff

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3D Data Visualization for Science Communication

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About this Course

11,466 recent views

This course is an introduction to 3D scientific data visualization, with an emphasis on science communication and cinematic design for appealing to broad audiences. You will develop visualization literacy, through being able to interpret/analyze (read) visualizations and create (write) your own visualizations.

By the end of this course, you will:

- Develop visualization literacy.
- Learn the practicality of working with spatial data.
- Understand what makes a scientific visualization meaningful.
- Learn how to create educational visualizations that maintain scientific accuracy.
- Understand what makes a scientific visualization cinematic.
- Learn how to create visualizations that appeal to broad audiences.



100% online

Start instantly and learn at your own schedule.



Flexible deadlines

Reset deadlines in accordance to your schedule.



Beginner Level



Approx. 32 hours to complete

Thank you

Break 20 min

Co-creation and Public Engagement

Rajesh Tandon

Workshop on 'Public Engagement and Societal Impact of Science'

Organized by:

Network for Advancing & Evaluating the Societal Impact of Science (AESIS)

February 08, 2024

Facilitator:

Dr. Rajesh Tandon

Founder-President, Participatory Research in Asia (PRIA)

Co-Chair, UNESCO Chair in Community-Based Research and Social Responsibility in Higher Education

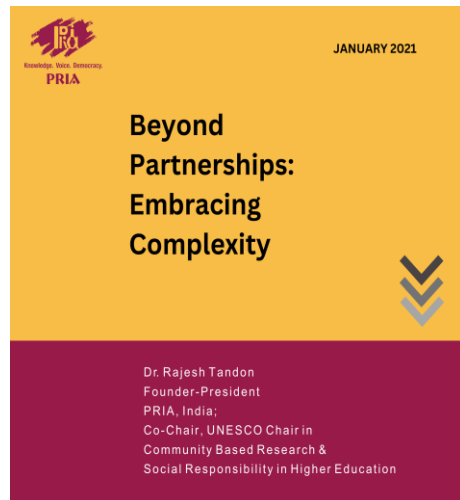


Knowledge. Voice. Democracy.

PRIA

PARTNERSHIPS

- What do you seek from partner(s) that you do not have?
- Hence, very different from you
- What is in it for partner(s)?
- How do you build & nurture trust with partner(s)?



Jude Fransman, Budd Hall, Rachel Hayman, Pradeep Narayanan, Rajesh Tandon & Kate Newman(2021). **Beyond Partnerships: Embracing Complexity to Understand and Improve Research Collaboration for Global Development.** *Canadian Journal of Development Studies*, Vol. 42, No.03, 2021, pp.326-346.

Click here to download: <http://tinyurl.com/msvhb7fc>

Rajesh Tandon & Kaustuv Chakrabarti (2018). **Partnering with HEIs for SDG 17: The Role of HEIs in Multi-Stakeholder Partnerships.** Participatory Research in Asia, New Delhi.

Click here to download this paper: <http://tinyurl.com/pe28yjea>

POWER

- All relationships are relationships of power
- Sources of power vary
- Knowledge is power, power of knowledge
- Rebalancing power to co-create

Tandon, R. (1986). 'Knowledge as Power: Participatory Research as Alternative',
in Walter Fernandes (ed.), *Inequality its Bases and Search for Solutions (Dr. Alfred de Souza Memorial Essays)*,
Indian Social Institute, New Delhi.

Click here to download: https://pria.org/knowledge_resource/Knowledge_as_power_participatory_research.pdf

ETHICS

- How do I secure formal approval from my university?
- How do I secure consent/approval of those we want to partner with?
- Integrity in everyday practice...in relation with partners
- Ownership & control over findings/data

Seminar on '*Reflections on Community-Based Research*', organized by NCCPE, Bristol, UK, on August 15, 2023.

Dr. Rajesh Tandon shared some of the lessons he has learnt about supporting ethical practices in participatory research, drawing on over 50 years of experience and insight.

Click here for access recording of this seminar: <https://www.youtube.com/watch?v=n6lUutuZbzw>

RECENT PUBLICATIONS & CONTACT DETAILS

Recent Publications:

[Bridging Knowledge Cultures: Rebalancing Power in the Co-Construction of Knowledge](#)

[GUNi World Report on Higher Education 8 \(Special Issue\): New Visions for Higher Education towards 2030](#)

[Socially Responsible Higher Education: International Perspectives on Knowledge Democracy](#)

[Unlearning for Change: Empowering Journey of Women Domestic Workers in India](#)

[Small Acts Can Make a Big Impact Too](#)

[Young Adults Learn Collectively to end Violence against Women and Girls: Experiences from India](#)

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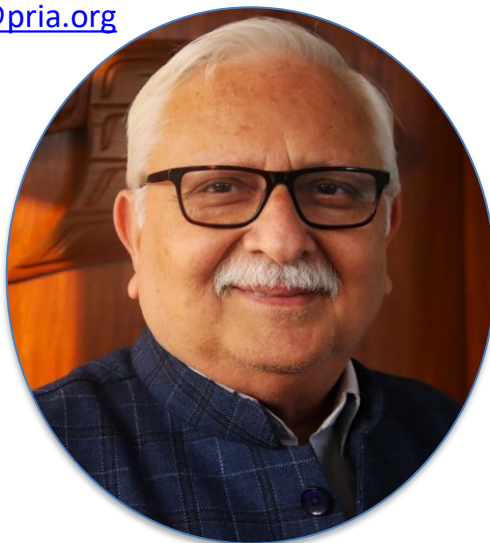
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<https://www.linkedin.com/company/pria-india/> (PRIA)

Instagram:

<https://www.instagram.com/unescochaircbrsr/> (UNESCO Chair in CBRSR)

<https://www.instagram.com/pria.india/> (PRIA)

End of Day 3

17:00 – 17:30 CET

*You may choose to stay in the zoom
meeting for your assignment preparation*

Overview of Day 4



Bridging knowledge culture

Rajesh Tandon, *Founder-President, Participatory Research in Asia (PRIA), Co-Chair, UNESCO*

Chair on Community Based Research and Social Responsibility in Higher Education, India

Remaining questions, debates and assignment preparation

Anika Duut van Goor & Paul Manners

Participants' Presentations

Final words, Q&A, Closing reception