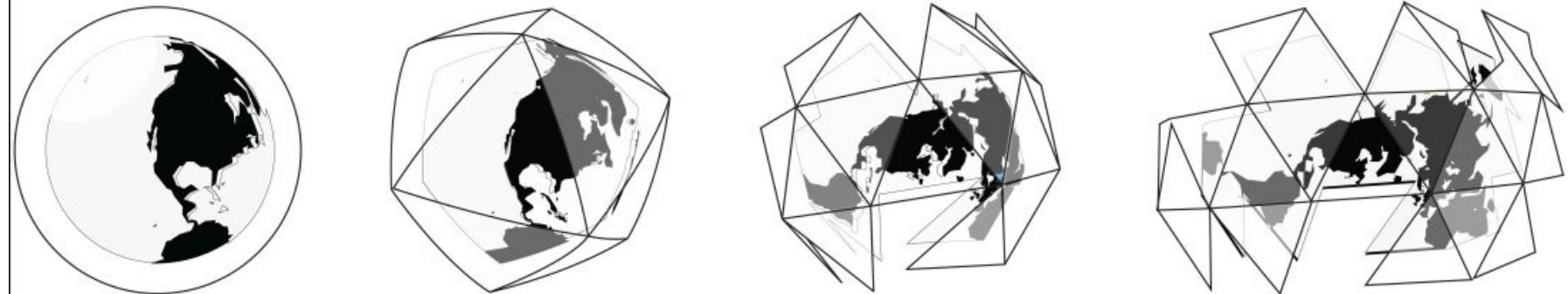


## Virtual Globes and Environmental Storytelling History and Challenges

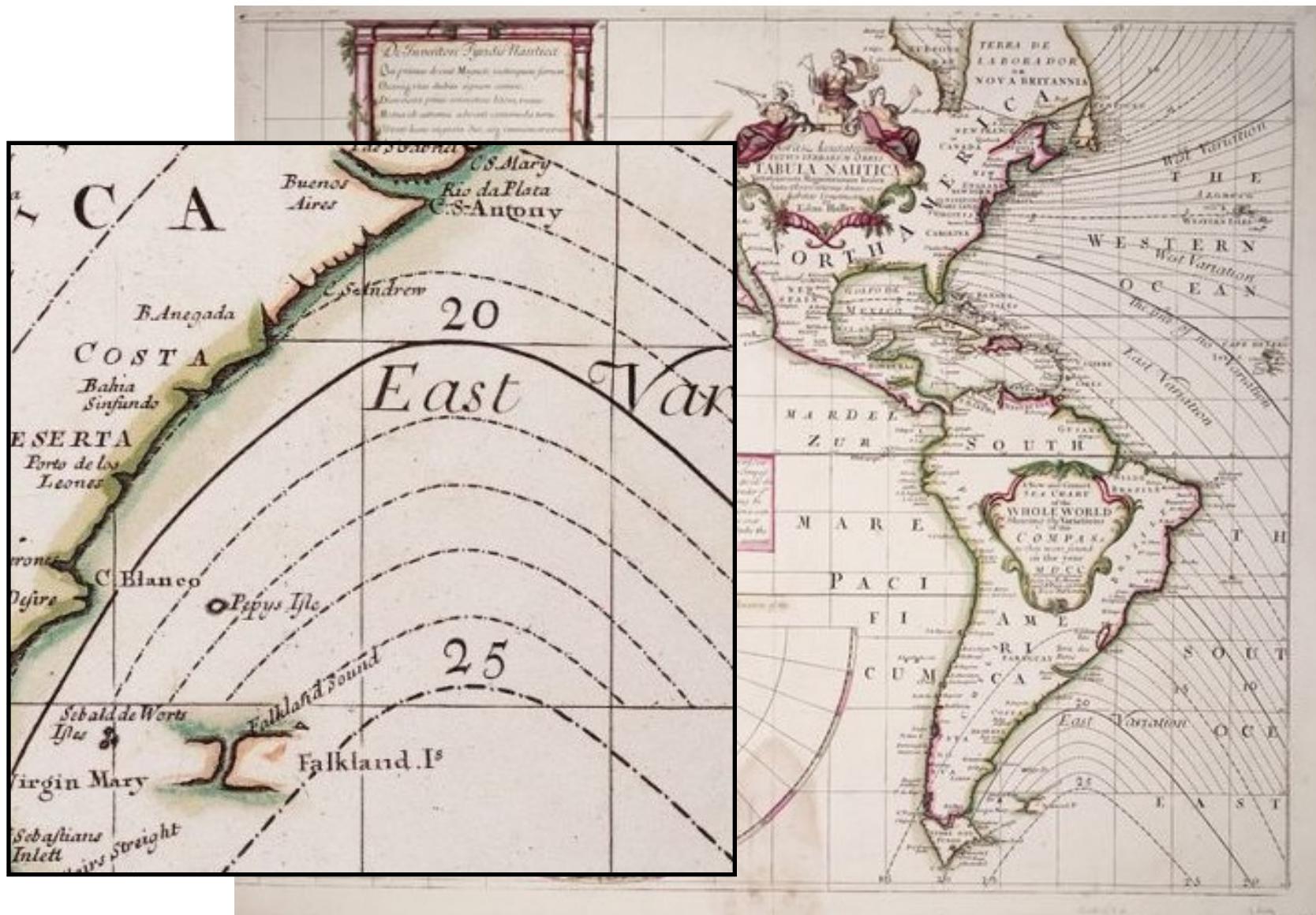
Sebastian Grevsmühl (CNRS), Centre de recherches historiques, EHESS, Paris  
Matthieu Noucher (CNRS), Passages, Bordeaux

**SPHEROGRAPHIA : Des globes virtuels aux blancs des cartes.**  
Une immersion (carto-)graphique dans la mise en récit des changements globaux



Projet ANR-22-CE55-0005-01

## Virtual Globes and Scientific Storytelling: History and Challenges



Edmond Halley, isogonic map of 1701, believed to be the first data-based contour map (Collection of Naval College, Greenwich)

# Virtual Globes and Scientific Storytelling: History and Challenges

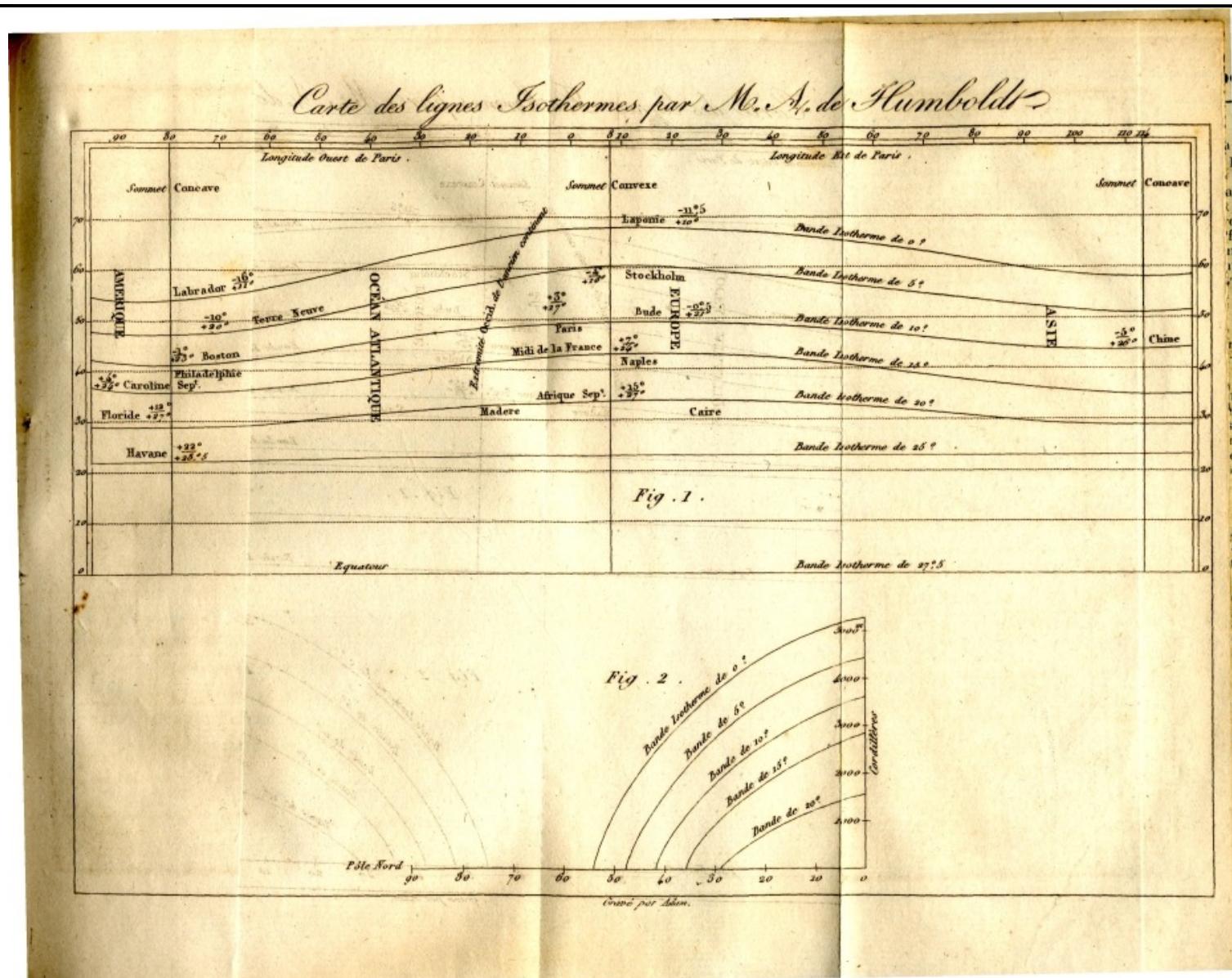


Early use of contour lines in mapping the ocean floor (from Philippe Buache, Géographie physique, 1752)

# Virtual Globes and Scientific Storytelling: History and Challenges



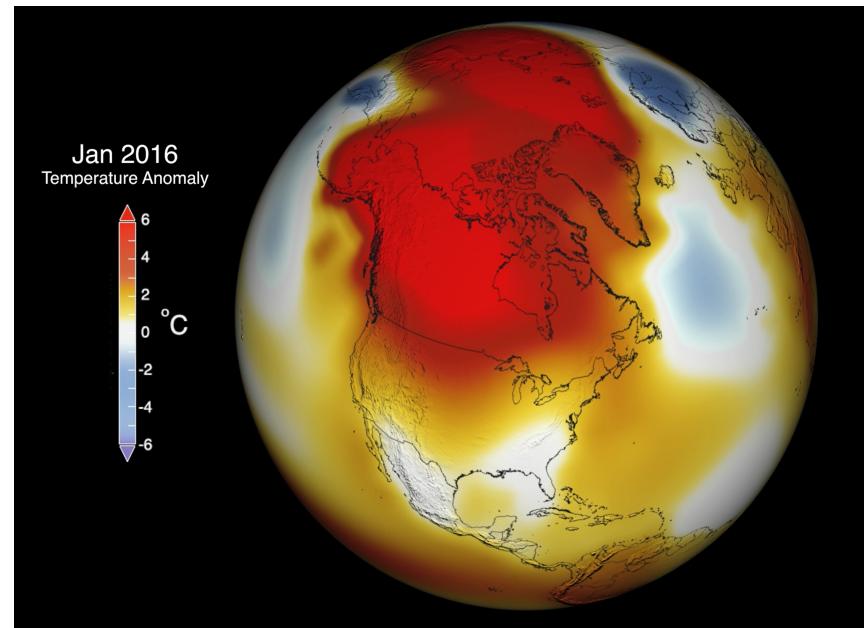
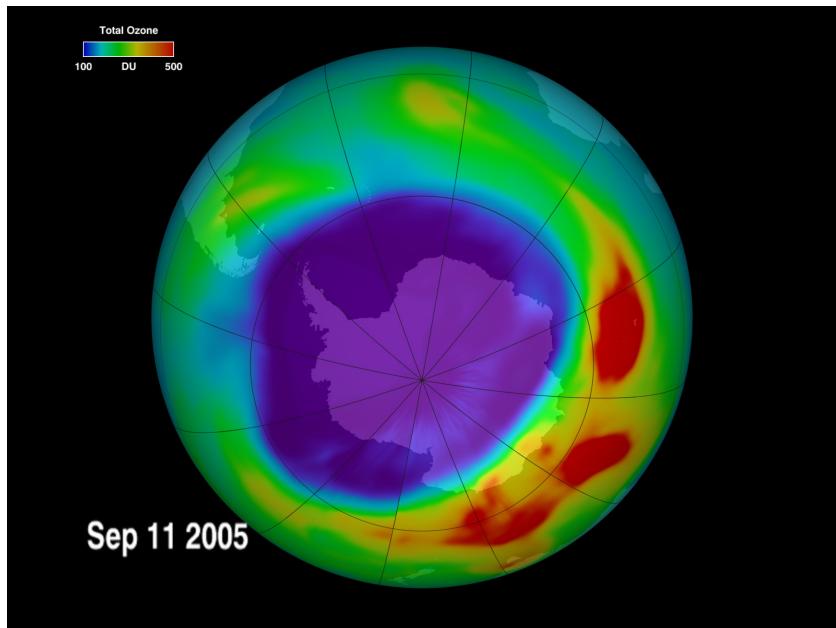
Early topographical map with contour lines (from Marcellin Du Carla-Boniface, Expression des nivelllements, Paris, 1782)



Alexander von Humboldt, „Carte des lignes Isothermes“ (In: Sur les lignes isothermes, Annales de Chimie et de Physique, 1817)

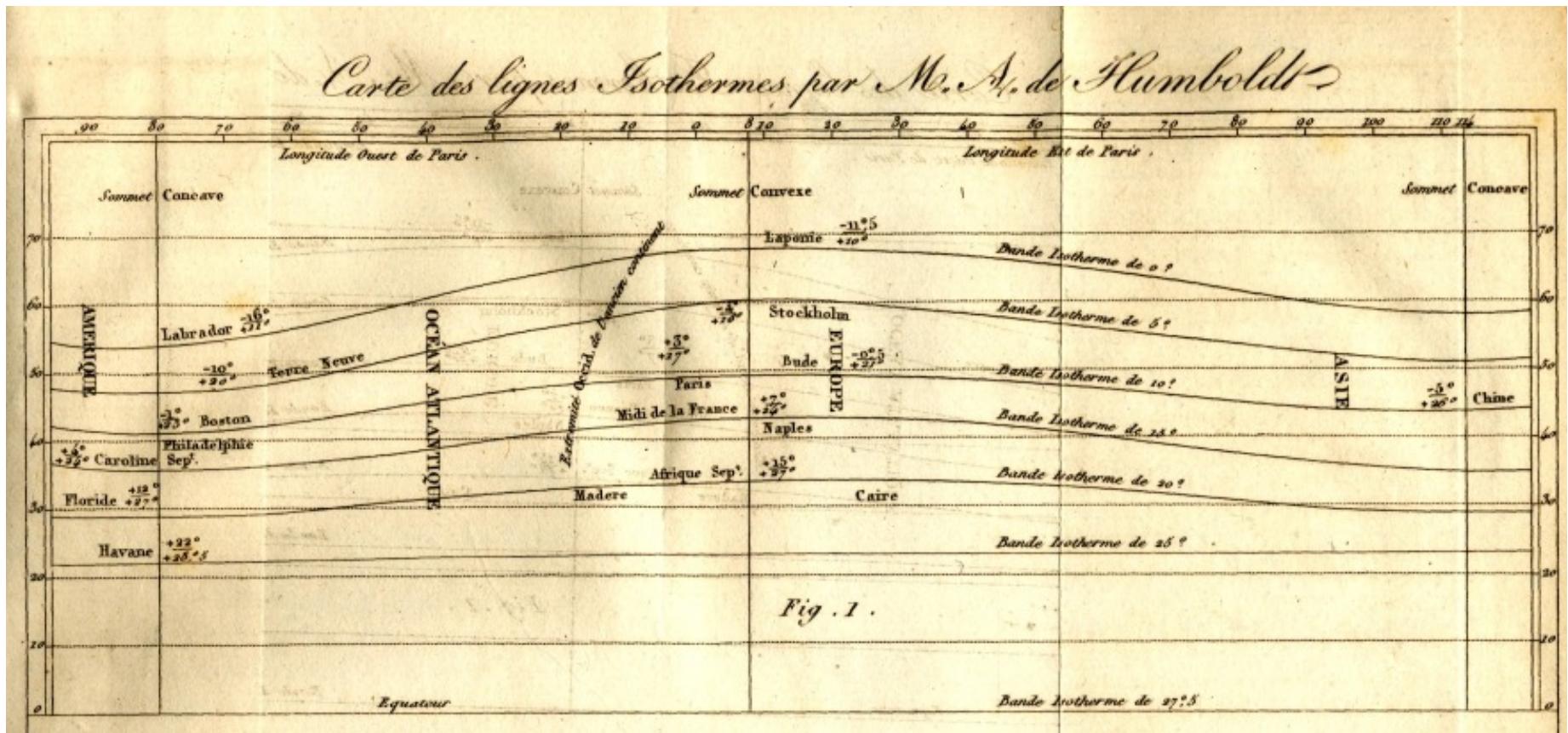
## Virtual Globes and Scientific Storytelling: History and Challenges

---



---

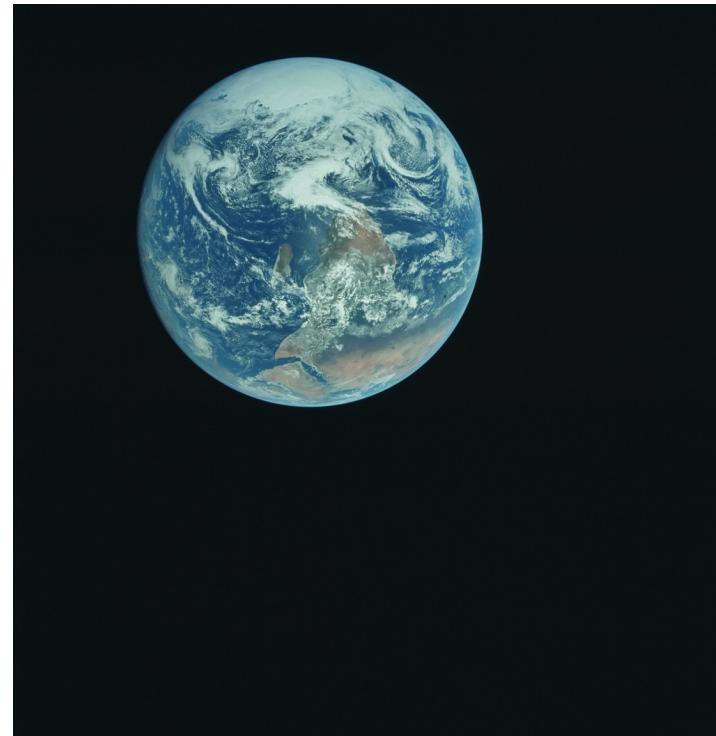
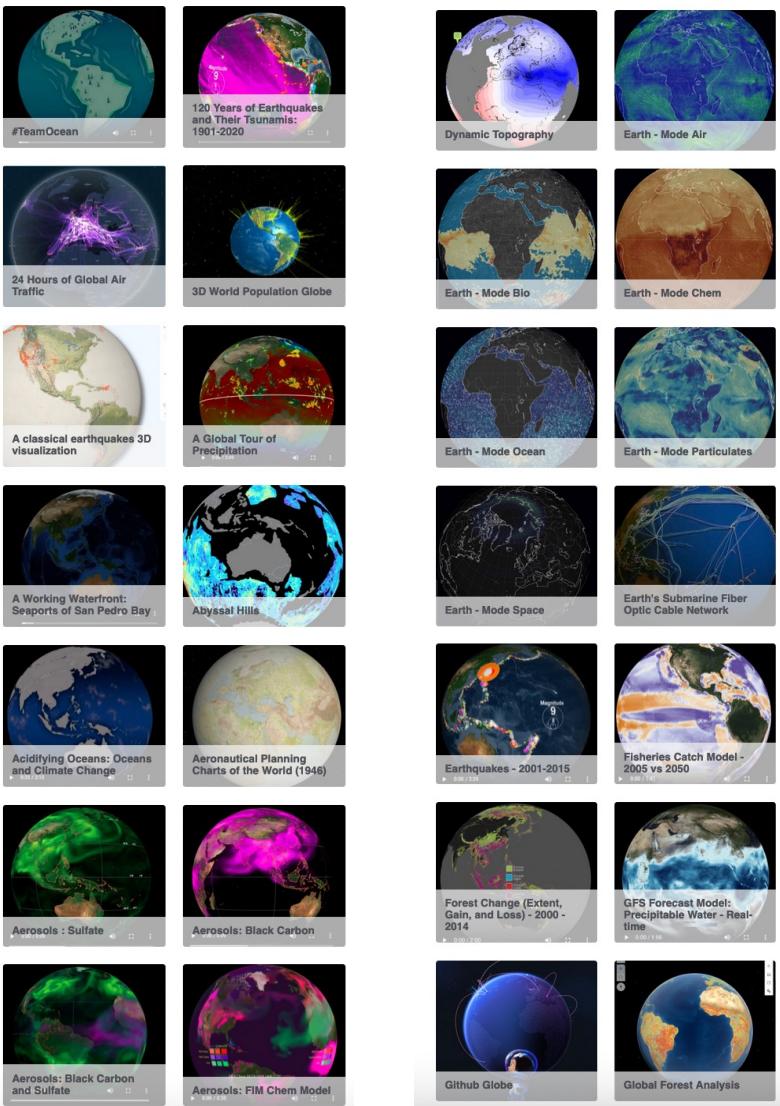
Left: Ozone hole over Antarctica as observed on September 11, 2005; right: Recorded temperature anomalies in January 2016 (both GSFC Scientific Visualization Studio)



Alexander von Humboldt, „Carte des lignes Isothermes“ (In: Sur les lignes isothermes, Annales de Chimie et de Physique, 1817)

# Virtual Globes and Scientific Storytelling: History and Challenges

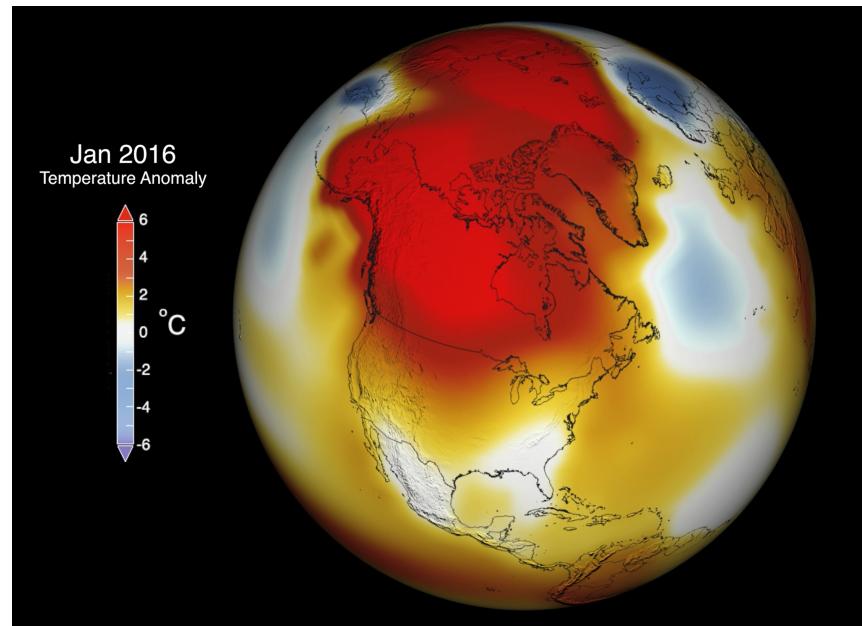
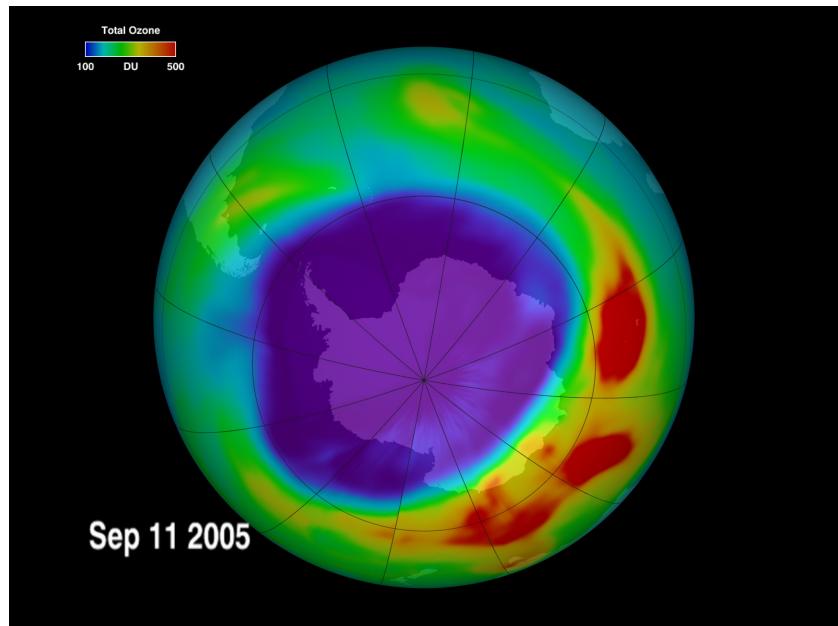
## Catalogue de globes



Virtual globes from the « globothèque » (virtual globe catalogue) of the Spherographia project and the famous « Blue marble » from Apollo 17, 1972 (NASA)

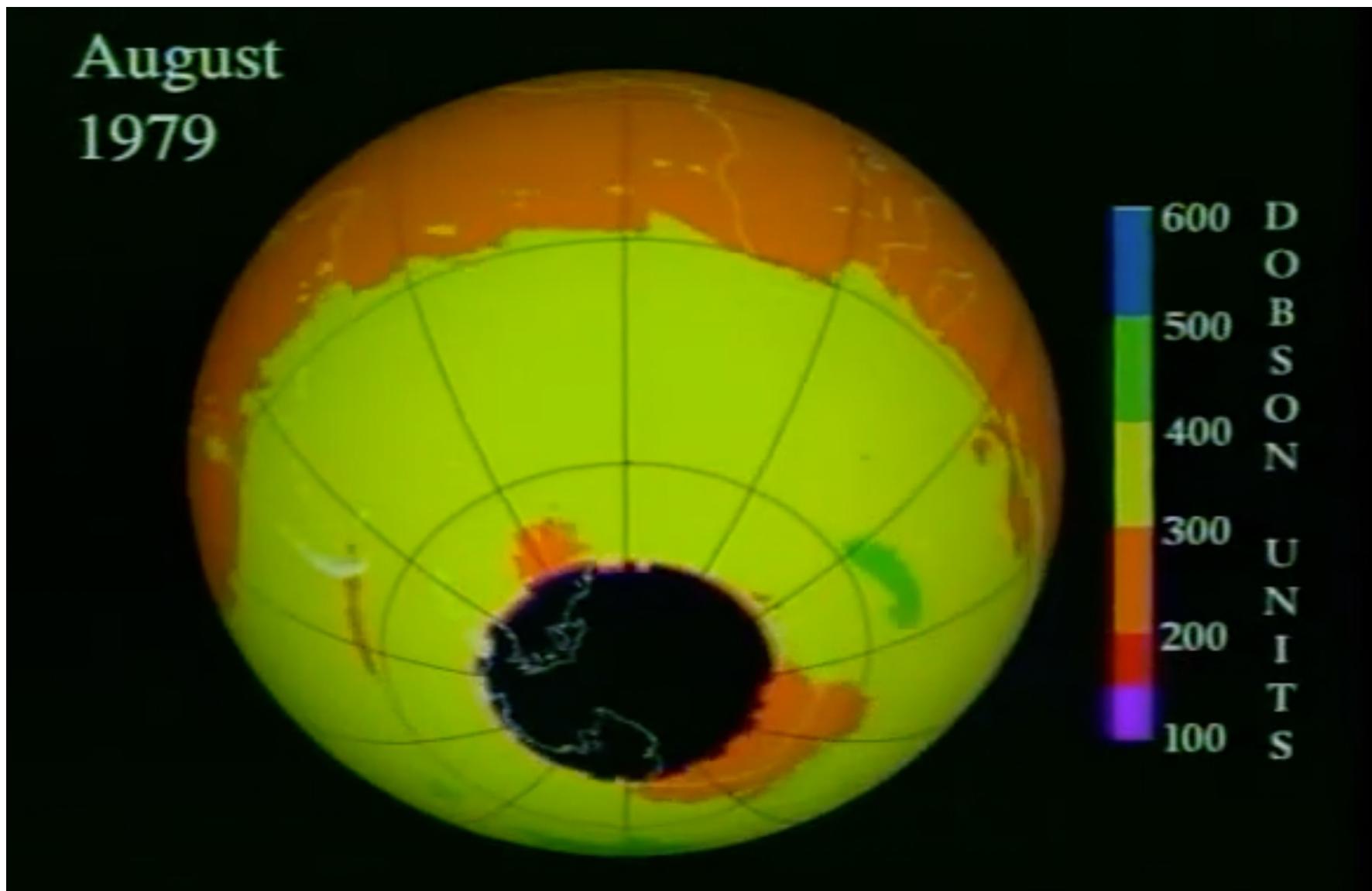
## Virtual Globes and Scientific Storytelling: History and Challenges

---



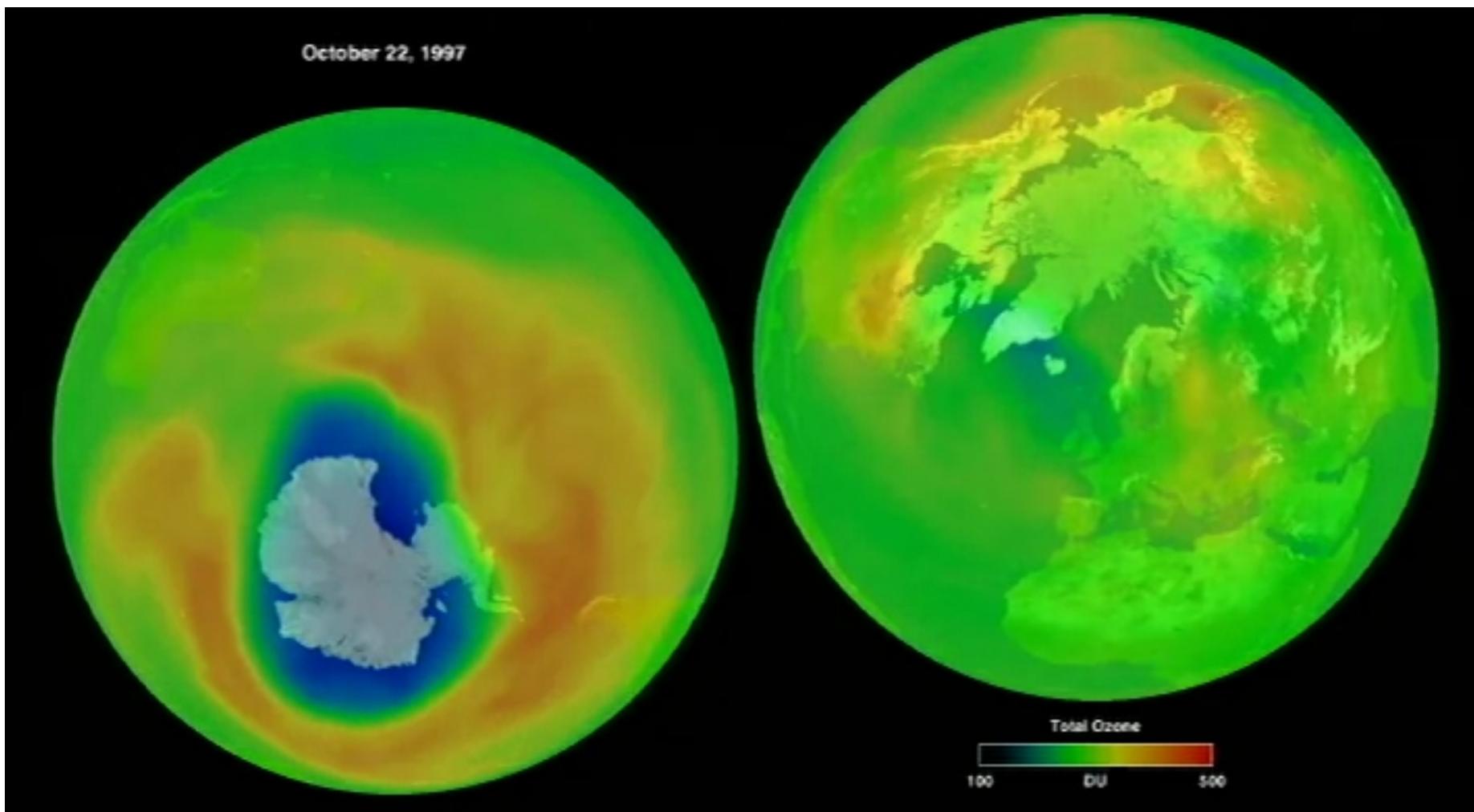
---

Left: Ozone hole over Antarctica as observed on September 11, 2005; Right: Recorded temperature anomalies in January 2016 (both GSFC Scientific Visualization Studio)



---

Early example of total ozone animation for TOMS data produced by NASA's Ozone Processing Team (NASA GSFC)



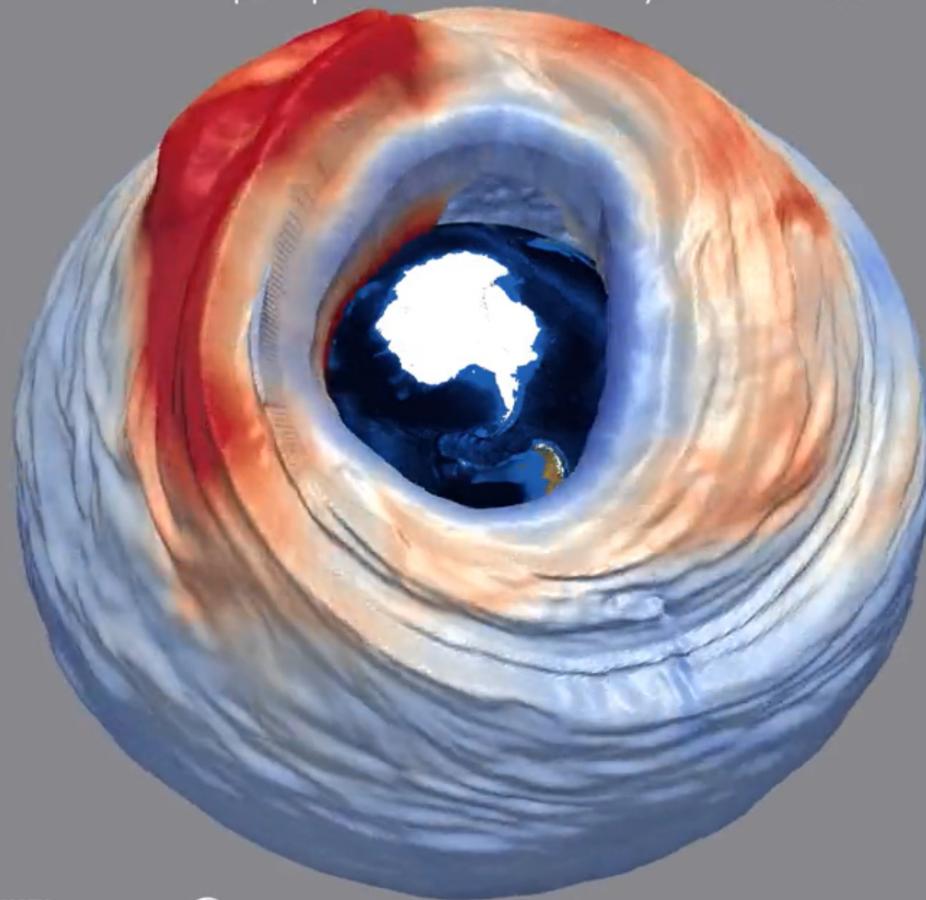
---

Total ozone animations for TOMS data produced by NASA's Scientific Visualization Studio (NASA GSFC SVS) in the late 1990s



## Ozone hole development 2023

12 mPa ozone partial pressure isosurface coloured by total column ozone



PROGRAMME OF THE  
EUROPEAN UNION



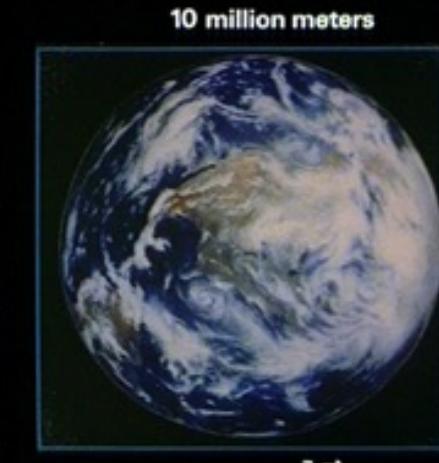
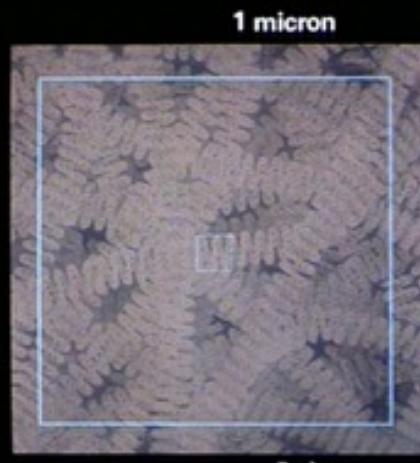
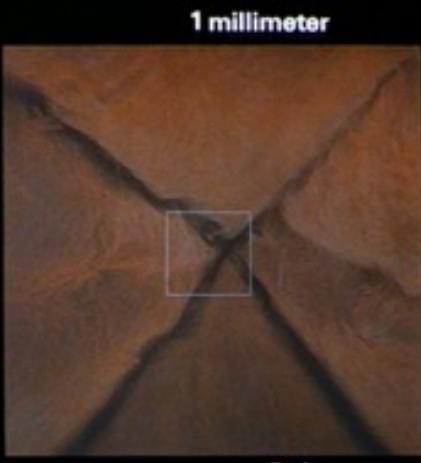
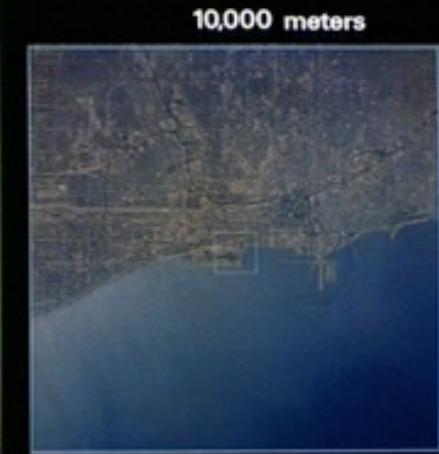
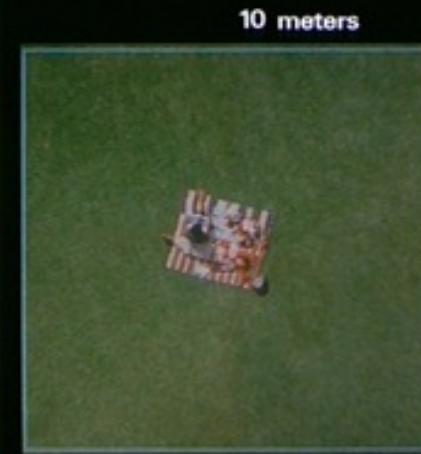
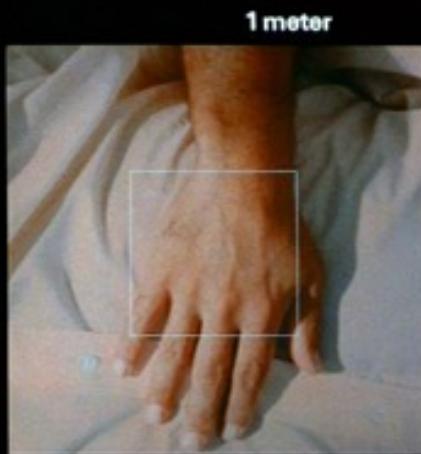
IMPLEMENTED BY  
**ECMWF**



23 Sep 2023 00 UTC

0:19 / 0:22 ▶ ⊞ ✎ \*

## Virtual Globes and Scientific Storytelling: History and Challenges



Some scenes from the film *Powers of Ten*, Ray and Charles Eames, 1977