UNDERSTANDING THE OCEAN BELOW THE SEAFLOOR

Scientific ocean drilling: a global infrastructure linking the past and future of Planet Earth

Scientific ocean drilling observing the ocean past to inform the future of our Planet. An overview

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June 3rd, Institut de la Mer de Villefranche (IMEV)

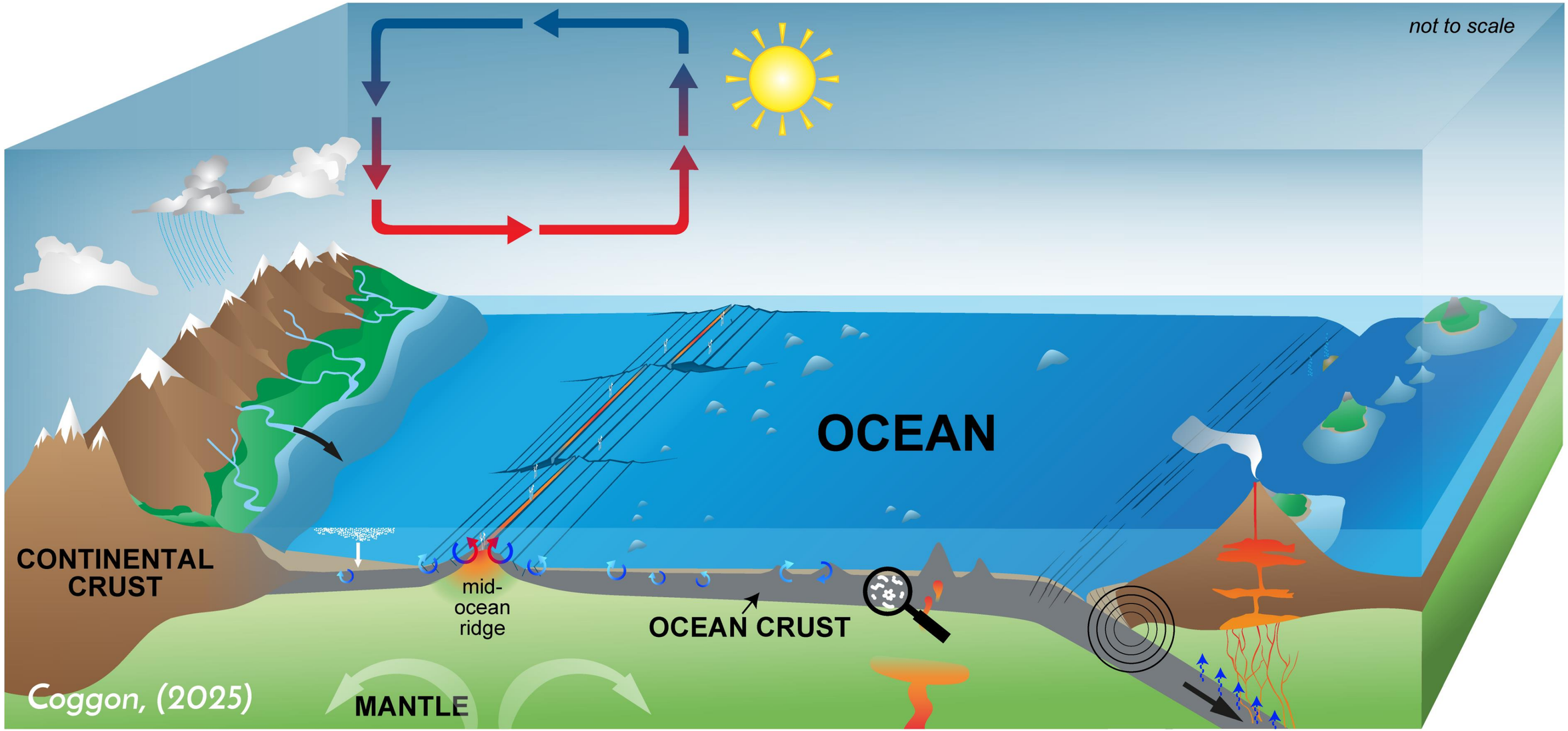
UN OCEAN CONFERENCE NICE 2025 FRANCE

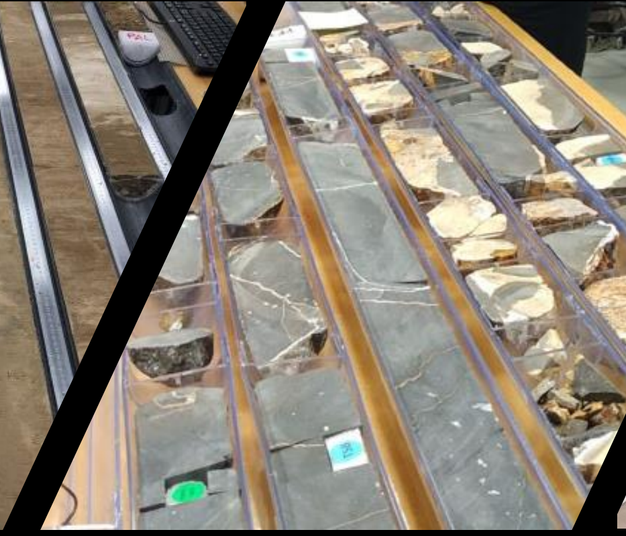
ECORD European Consortium for Ocean Research Drilling

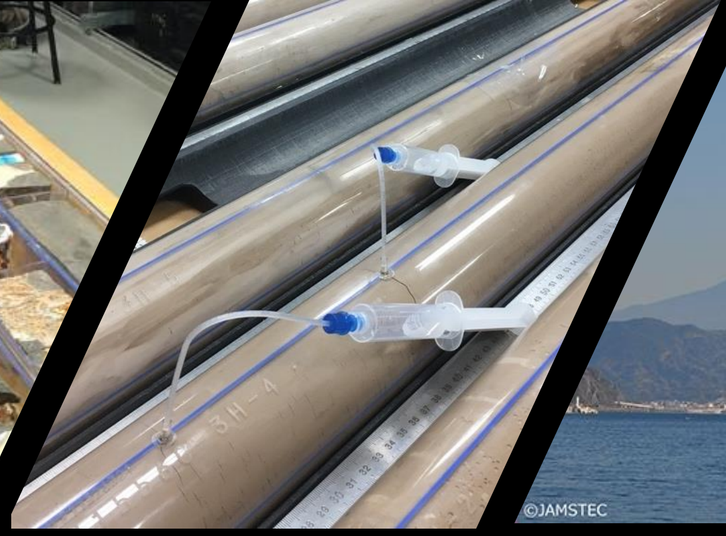
IODP3 INTERNATIONAL OCEAN DRILLING PROGRAMME

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

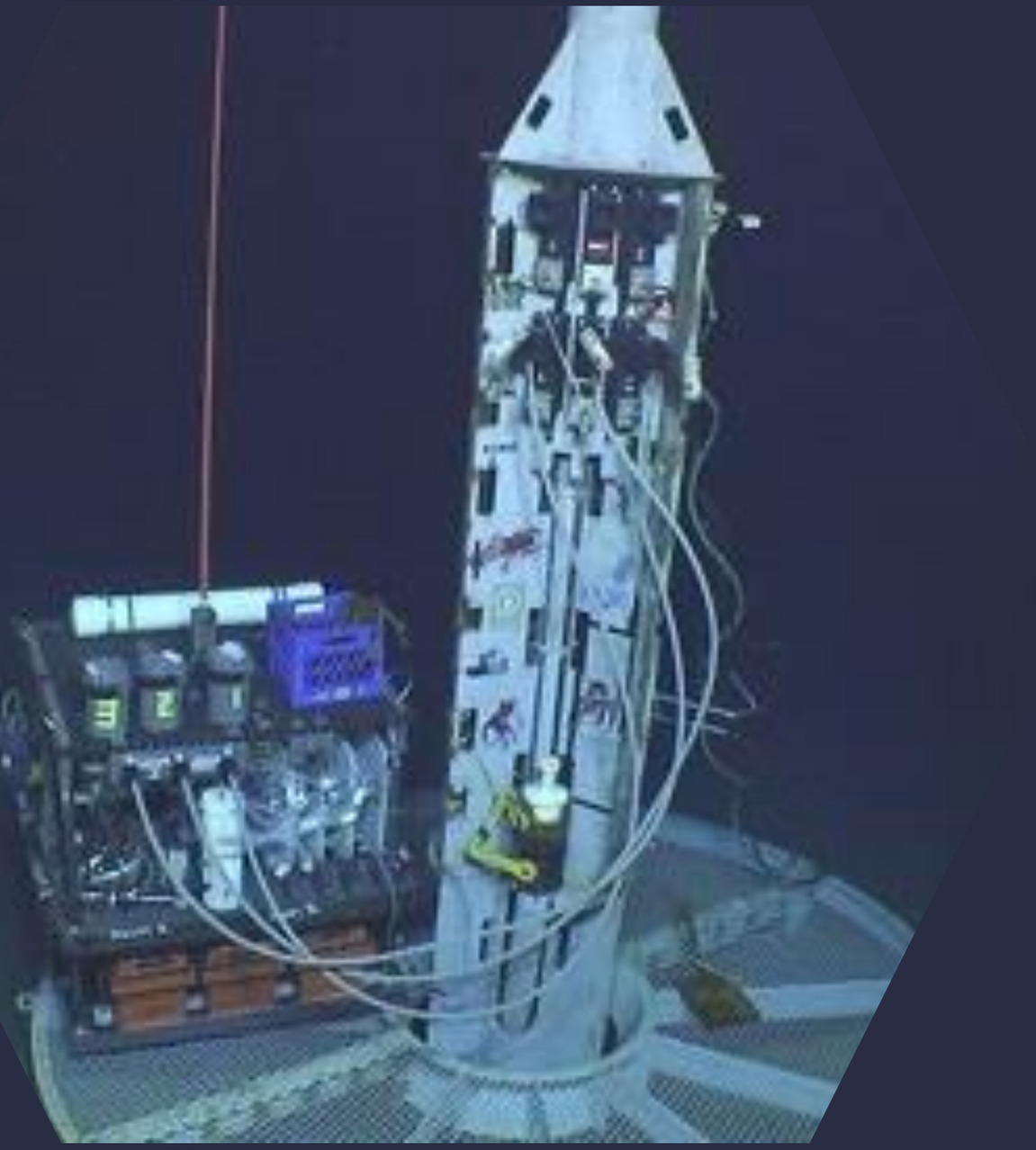
Over time sediments accumulate on the seafloor preserving crucial records of Earth history that inform our future



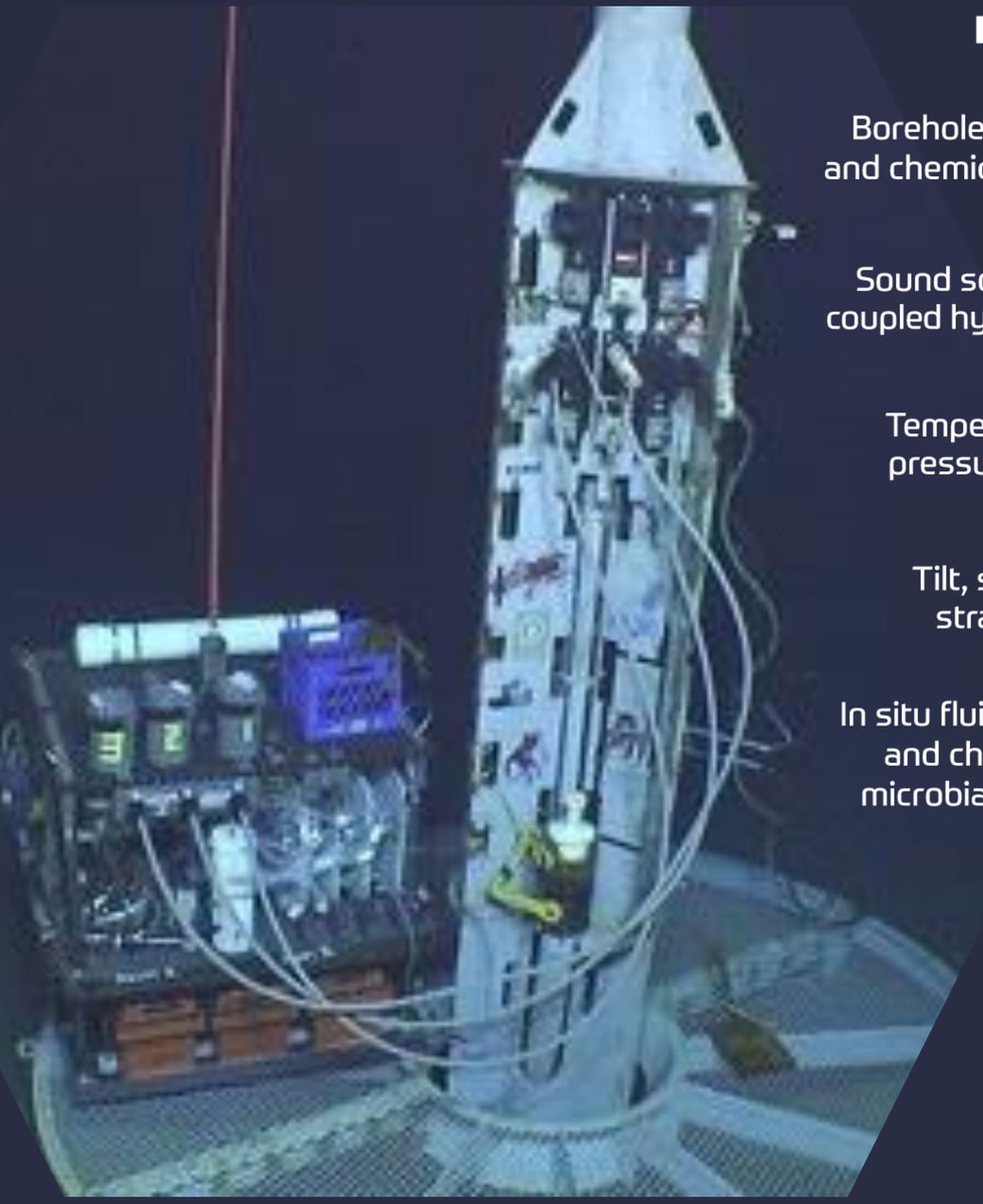




We collect sediment, rock, microbes and fluids from beneath the seafloor…

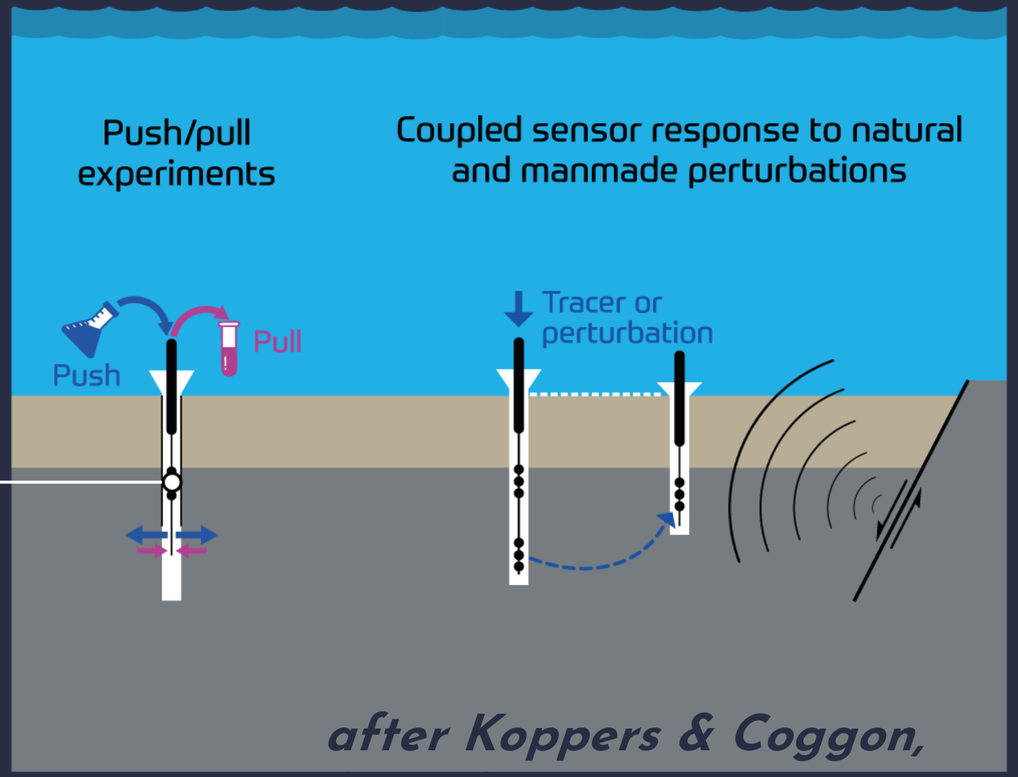


… and we can deploy
state-of-the-art instruments
beneath the seafloor

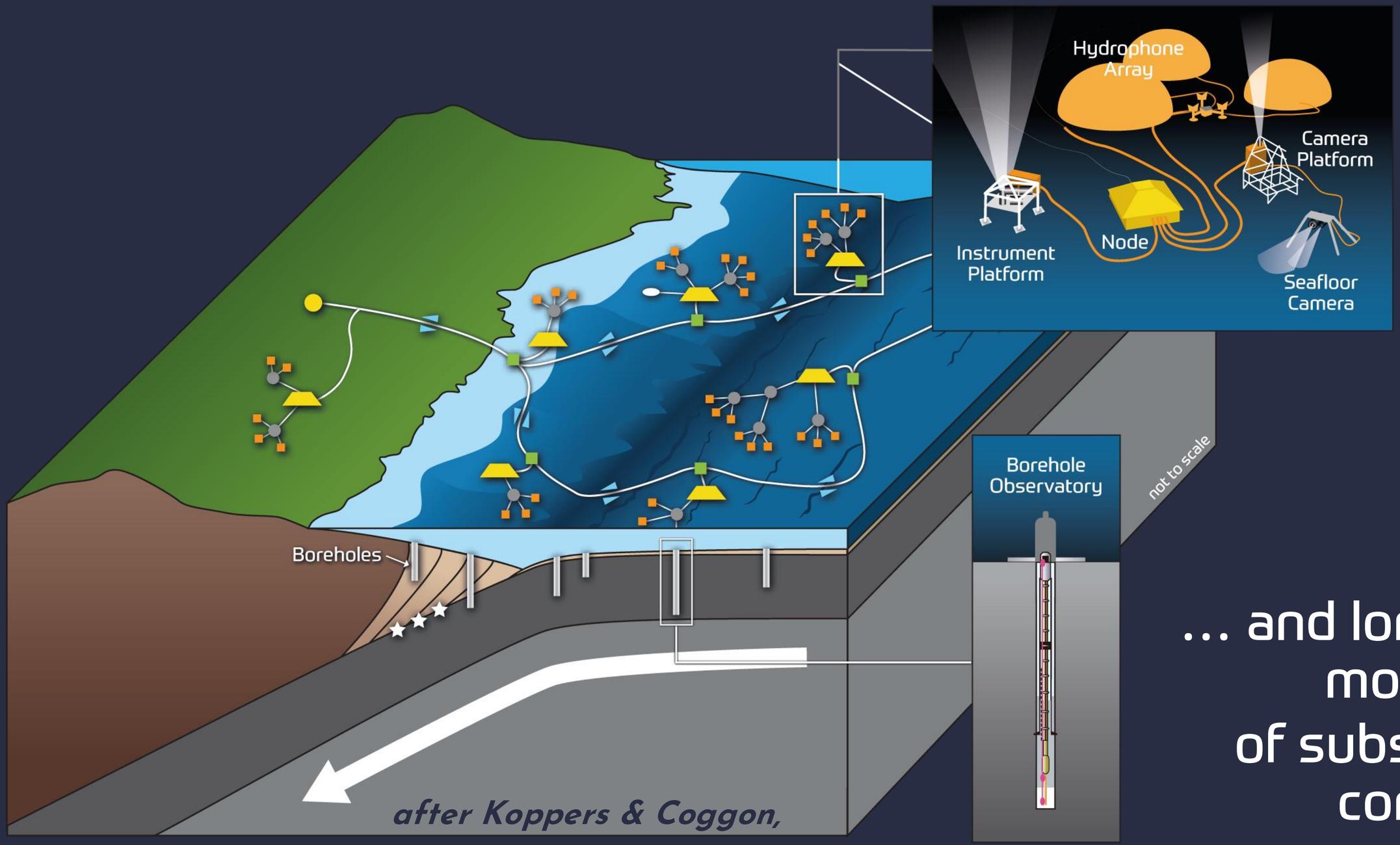


INSTRUMENTS

- Borehole hydrologic and chemical profilers
- Sound sources and coupled hydrophones
- Temperature and pressure sensors
- Tilt, stress, and strain sensors
- In situ fluid samplers and chemical and microbial analyzers



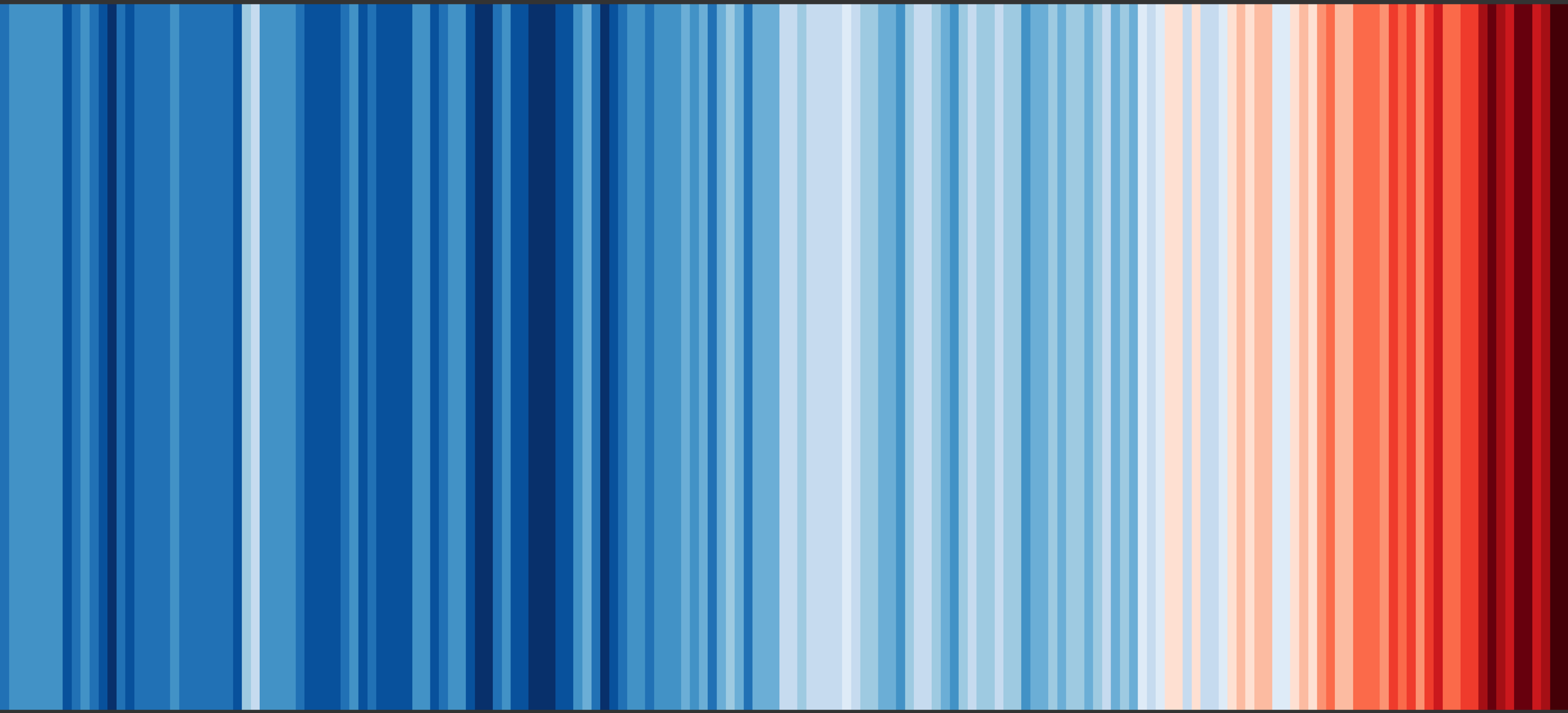
We can conduct subseafloor experiments



... and long-term monitoring of subseafloor conditions

Global temperature change (1850-2024)

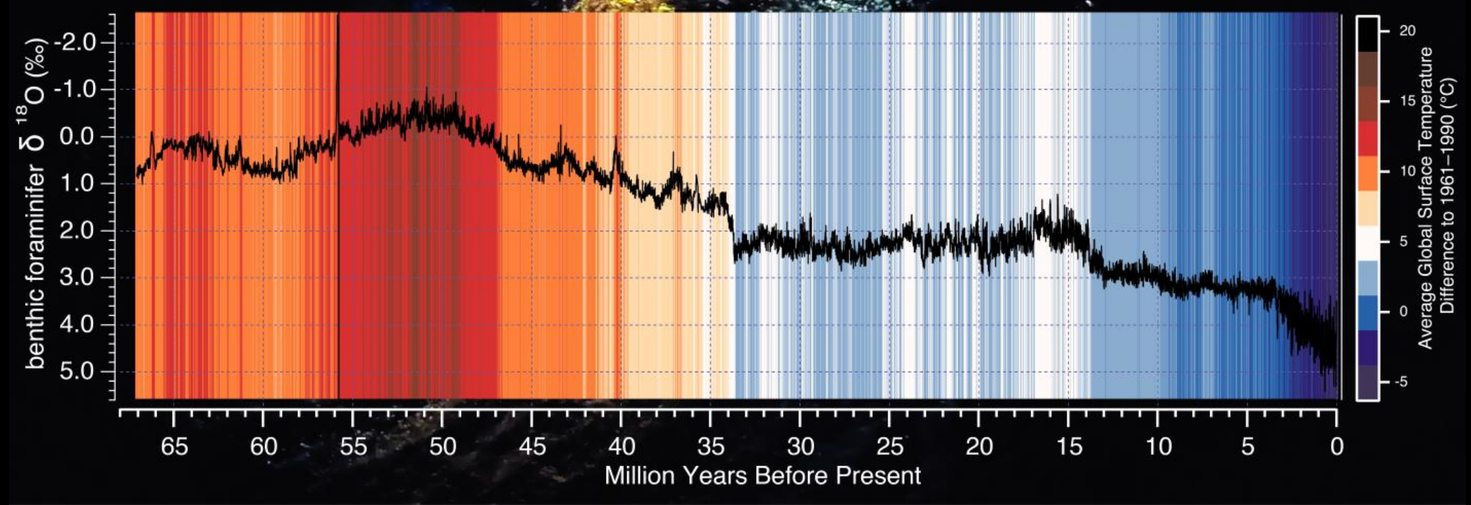
Ed Hawkins: https://showyourstripes.info/

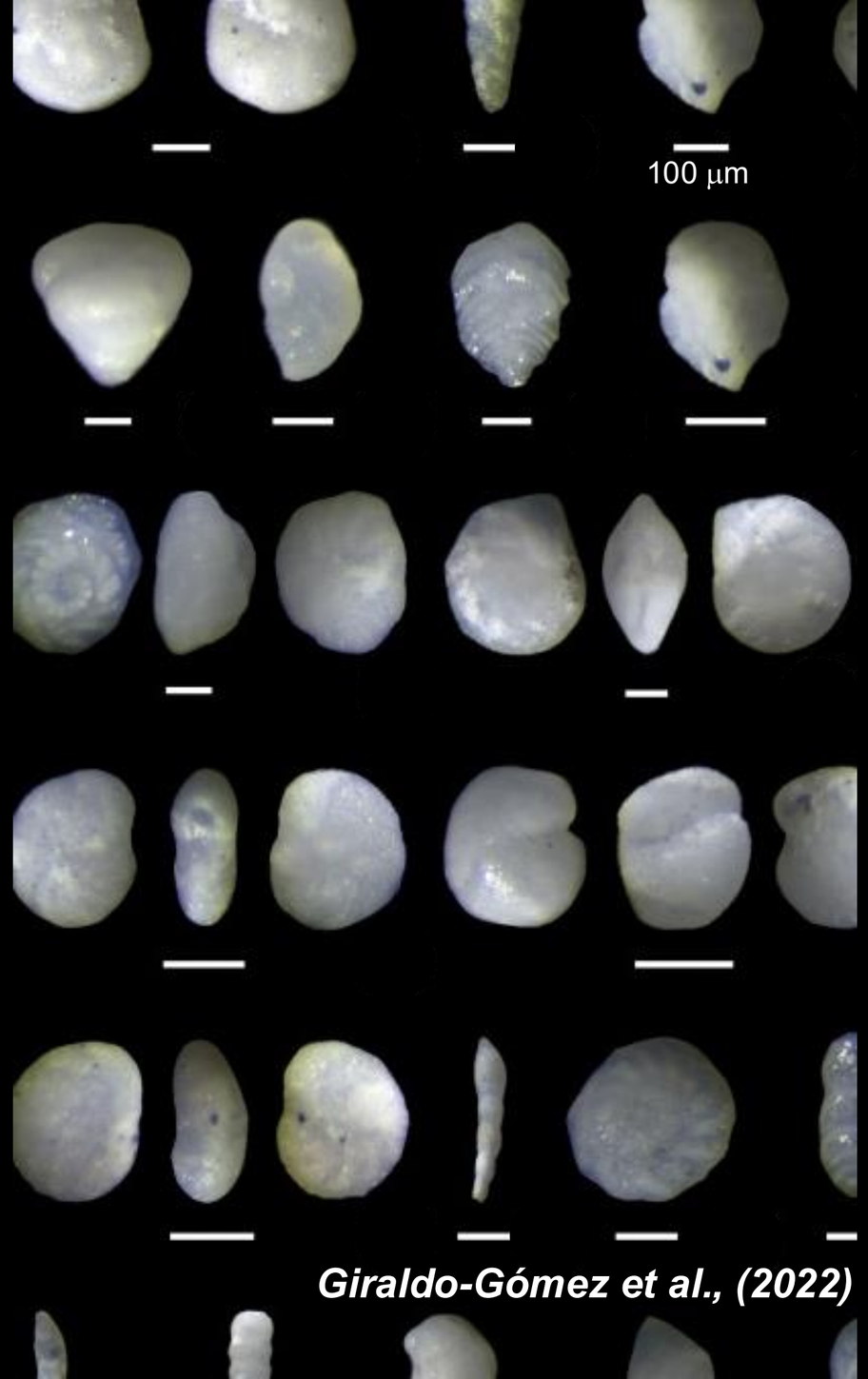


CENOGRID

Cenozoic Global Reference benthic foraminifer carbon and oxygen Isotope Dataset

Westerhold et al., Science (2020)





Giraldo-Gómez et al., (2022)

EXPLORING EARTH
BY SCIENTIFIC OCEAN DRILLING

Mission

The *2050 Science Framework for Scientific Ocean Drilling* guides multidisciplinary subseafloor research into the interconnected processes that characterize the complex Earth system and shape our planet's future.

Vision

To be globally recognized as the authoritative source of information about ocean and Earth system history and its links to society.

Anthony Koppers & Rosalind Coggon
Co-lead Editors
and the Science Framework Authors and Reviewers
representing the international scientific ocean drilling community

The Framework structure combines broad interconnected science topics and aspirational goals

STRATEGIC OBJECTIVES

Broad areas of scientific inquiry that focus on understanding the interconnected Earth system.

FLAGSHIP INITIATIVES

Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Objectives.

ENABLING ELEMENTS

Key facets of scientific ocean drilling that facilitate our research activities, enhance our scientific outputs, and maximize their impact.

ENDURING PRINCIPLES

- Open Access to Samples and Data
- Standard Measurements
- Bottom-Up Proposal Submissions and Peer-Review
- Transparent Regional Planning
- Promoting Safety and Success Through Site Characterization
- Regular Framework Assessments
- Collaborative and Inclusive International Program
- Enhancing Diversity

The 2050 Science Framework Structure

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Broad areas of scientific inquiry that focus on understanding the interconnected Earth System.

The 2050 Science Framework Structure

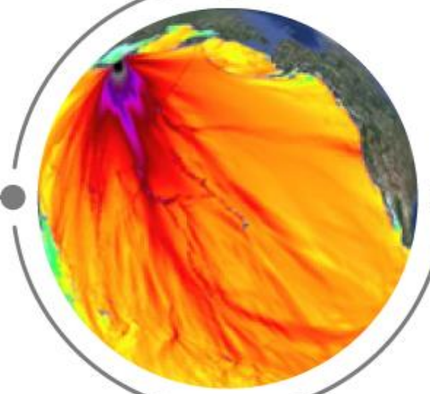
FLAGSHIP INITIATIVES

Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Objectives.

1
Ground Truthing Future Climate Change

2
Probing the Deep Earth

3
Assessing Earthquake and Tsunami Hazards



4
Diagnosing Ocean Health

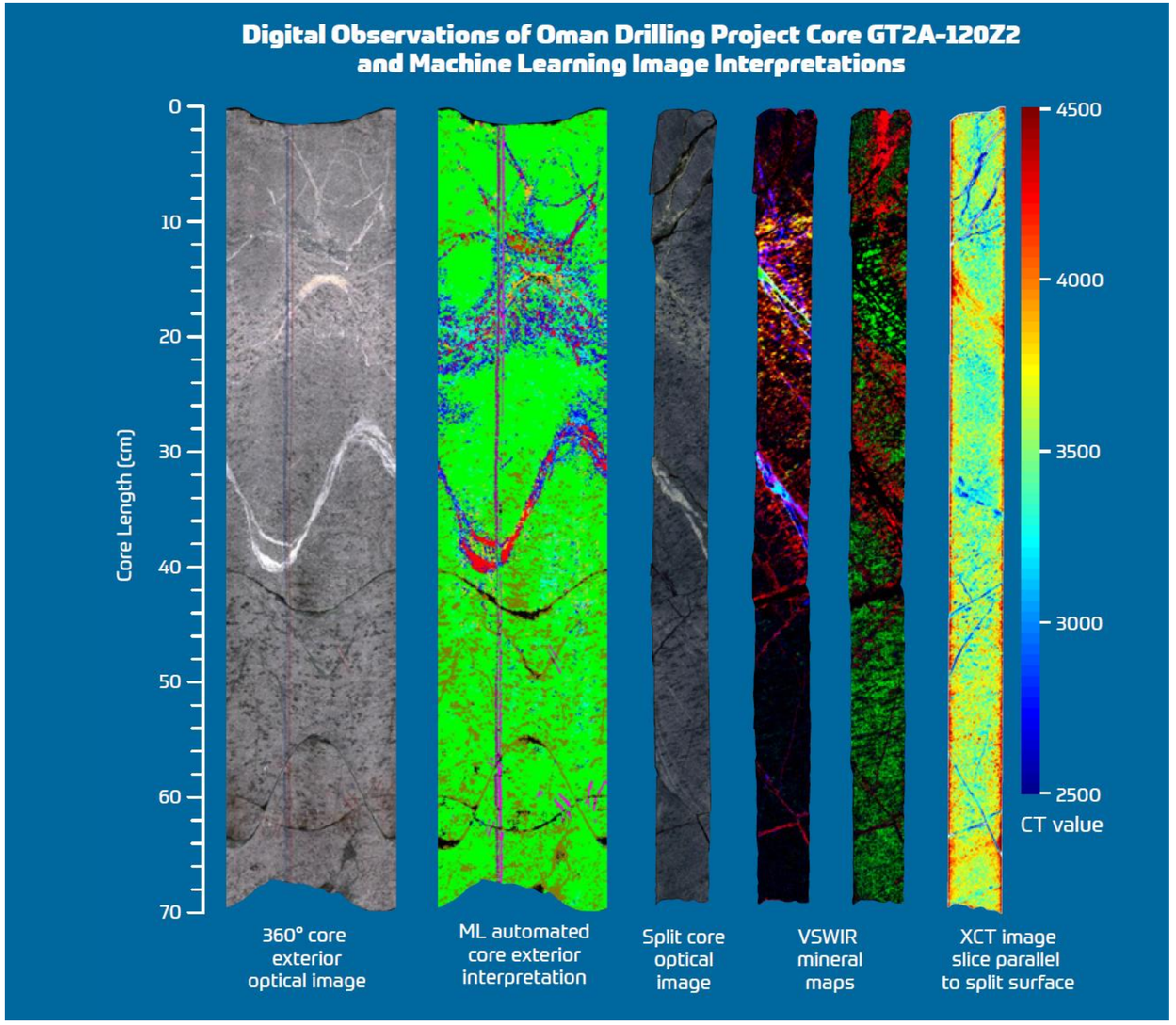
5
Exploring Life and Its Origins

The 2050 Science Framework Structure

ENABLING ELEMENTS

Key facets of scientific ocean drilling that facilitate our research activities, enhance our scientific outputs, and maximize their impact

1. Broader Impacts and Outreach
2. Land to Sea
3. Terrestrial to Extraterrestrial
4. Technology Development and Big Data Analytics



We are an international scientific community pioneering global-scale interdisciplinary research below the seafloor of the world ocean.

WE RESEARCH

the processes that connect the solid Earth, ocean, life, climate, and society.

WE EXPLORE

the interconnected Earth in places that can only be accessed and understood through scientific ocean drilling.

WE TRAVERSE TIME

to reveal the many interactions that shaped Earth's geologic past to illuminate our future.

WE COMMUNICATE

knowledge gained through scientific ocean drilling to the global community.