

Observing the Ocean and Earth with



SMART
CABLES

SMART Cables: Infrastructure support to the ODTP HLO -1



Ceci Rodríguez Cruz
JTF SMART Cables – SMART IPO
University of Hawai‘i at Mānoa



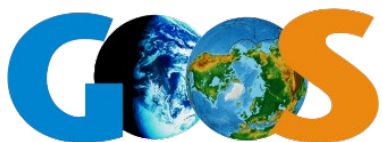
Meeting of the TOWS-WG Inter ICG Task
Team on Tsunami Watch Operations (TT-
TWO)

5 - 6 March 2026

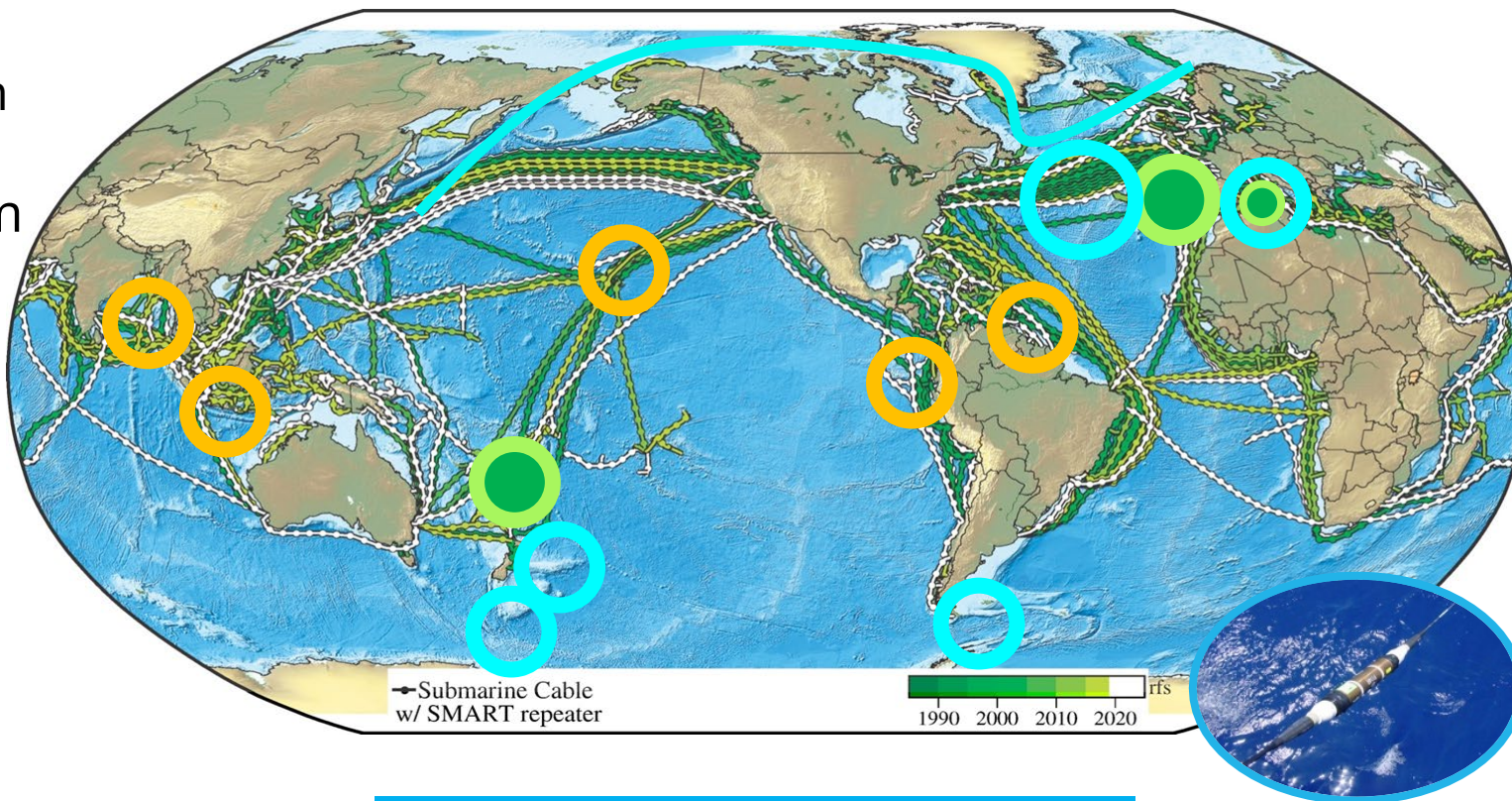
Scientific **M**onitoring **A**nd **R**eliable **T**elecommunications

Global Multi Purpose Infrastructure (connectivity + science) for the benefit of Society

Global array
1st order addition
to Ocean-Earth
observing system



Emerging
Network



**NO
Interference**

Societal Benefit:

- Climate
- Oceans
- Earthquakes
- Tsunamis

**Financed
Systems:**

- Atlantic CAM
- Tamtam

**Know the environment,
protect the network**



2021-2030 United Nations Decade
of Ocean Science
for Sustainable Development

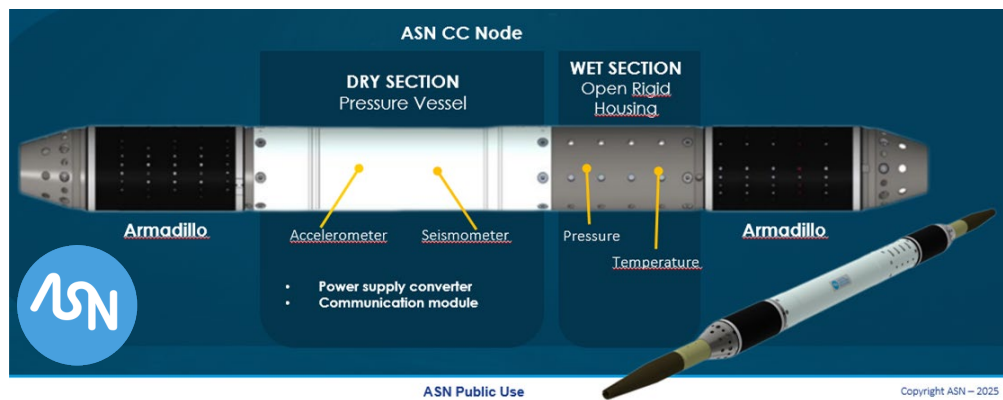


Shared Cable Infrastructure: Telecom + Science

No Interference



Repeater



Sensors:

- Temperature
- Pressure
- Seismic

Key point:

- Essential Ocean Variables, Global Ocean Observing System

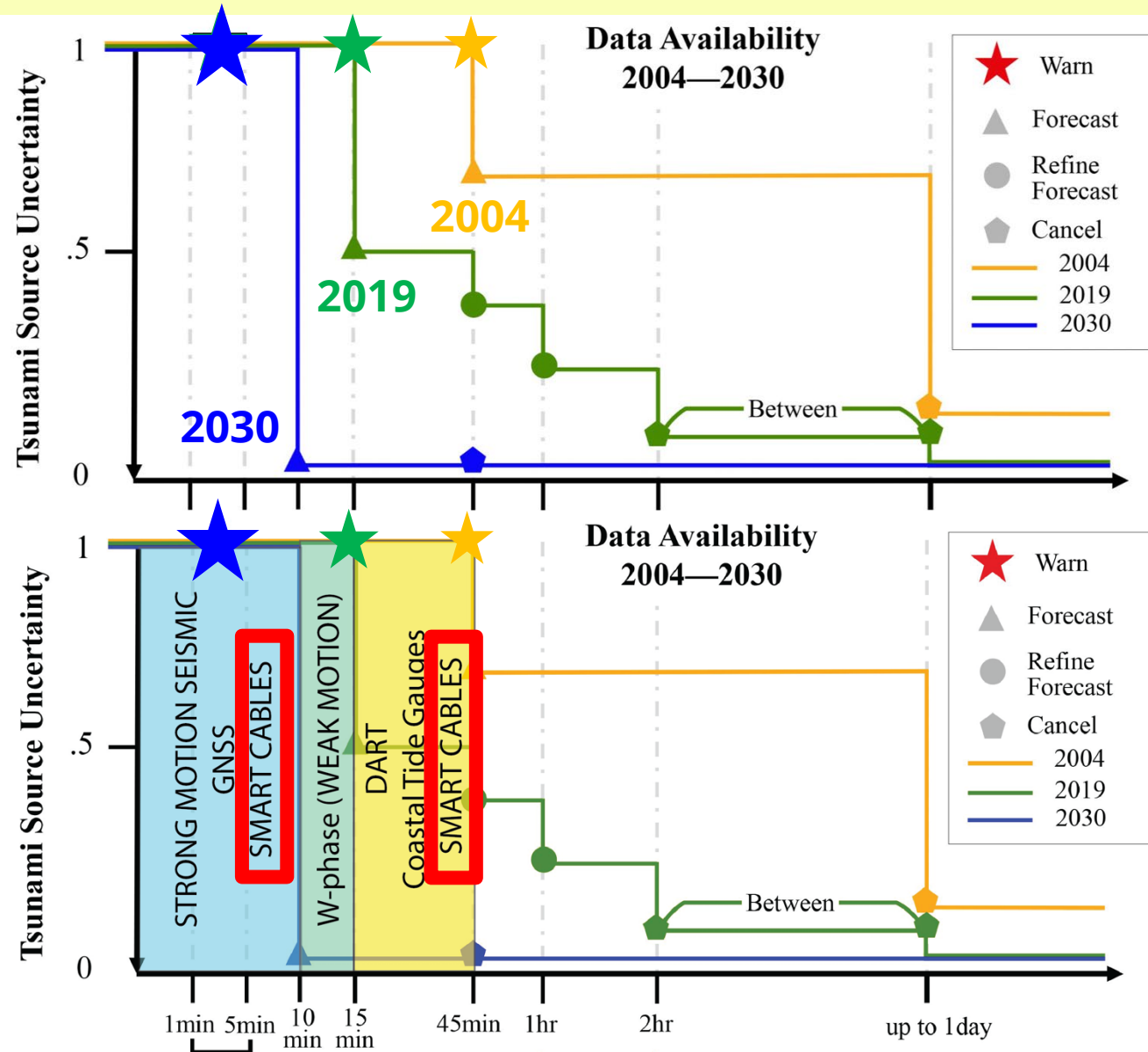
Existing Technology



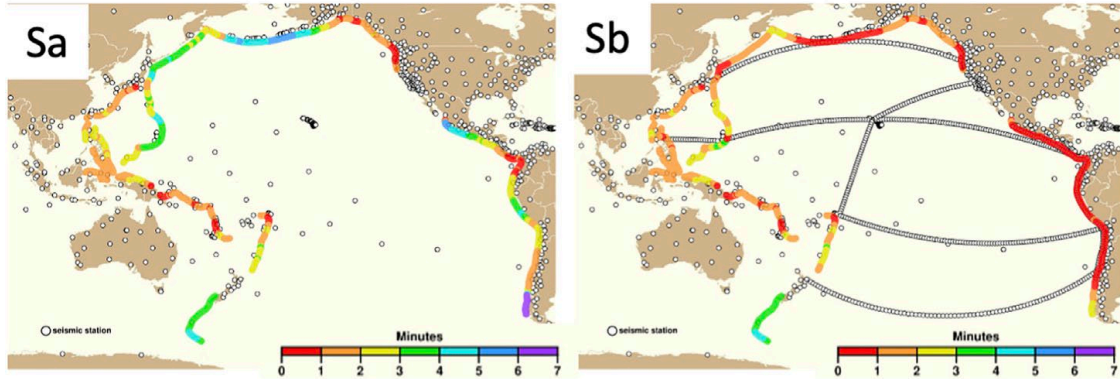
Improving
Early Warning
by integrating
SMART Capability into
early warning systems



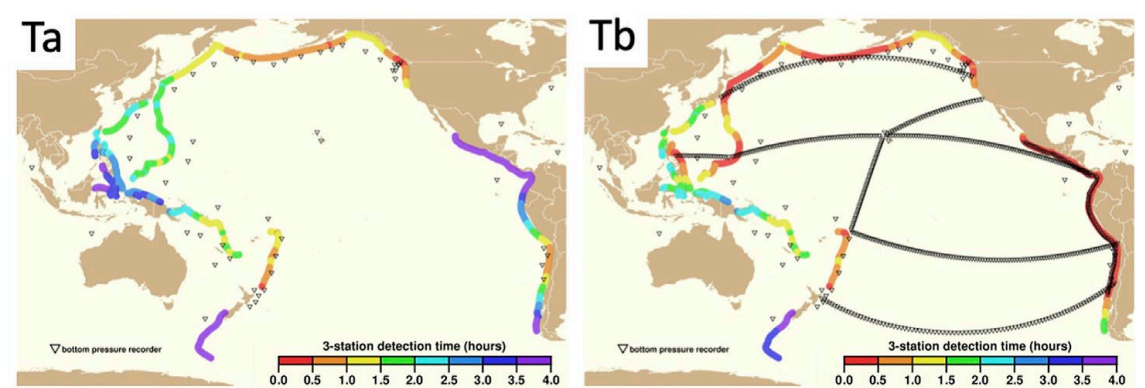
2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development



Seismic

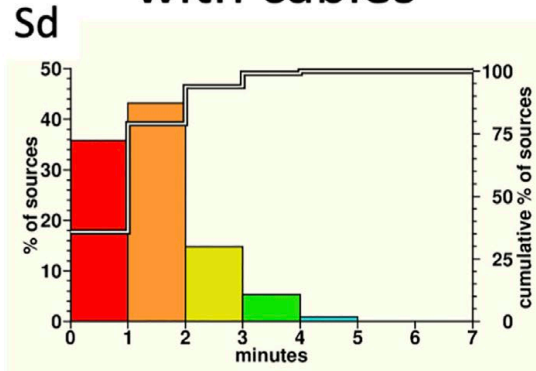
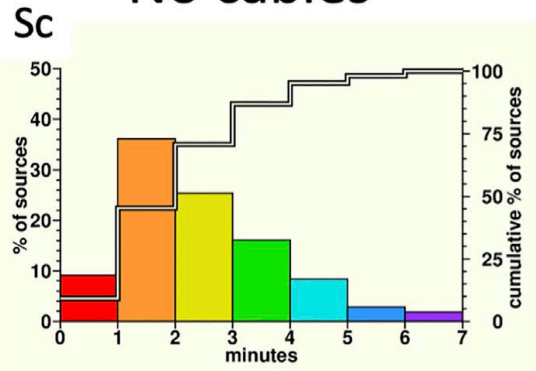


Tsunami



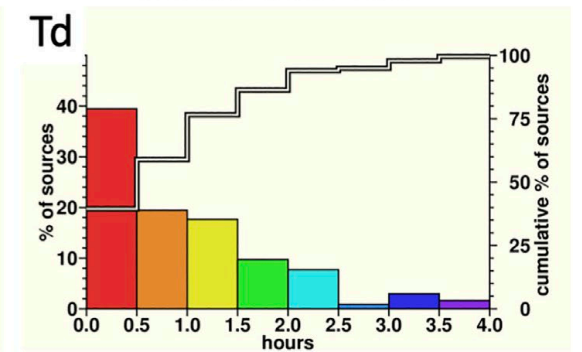
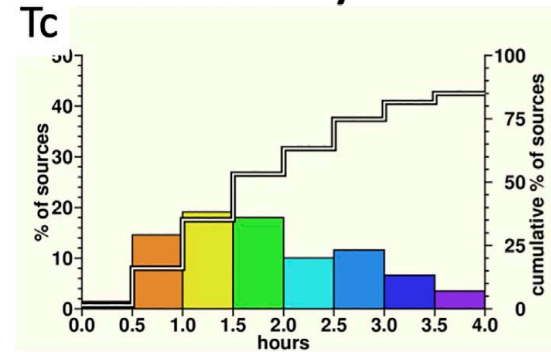
No cables

with cables



BPR only

with cables



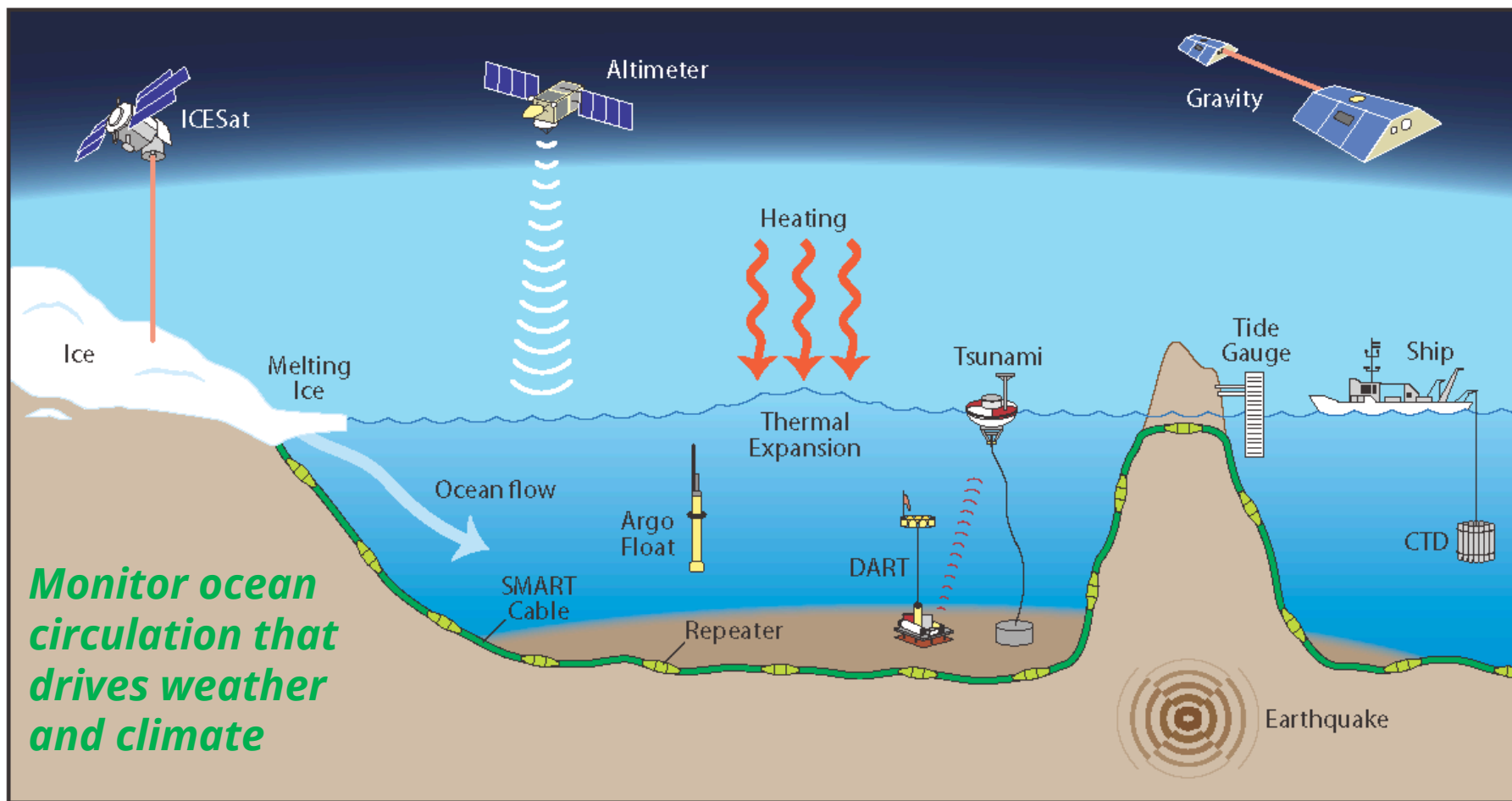
Time scales: 0 - 7 minutes

0 - 4 hours

Earthquake → 0-7 min
SMART seismic + pressure
supports confirmation

Deep-ocean propagation →
minutes to hours
SMART pressure sensors
refine amplitude

SMART Data – International Frameworks



SMART (pressure)

- Embedded
- 25-year life
- No surface buoy

DART (pressure)

- Dedicated system
- Flexible deployment

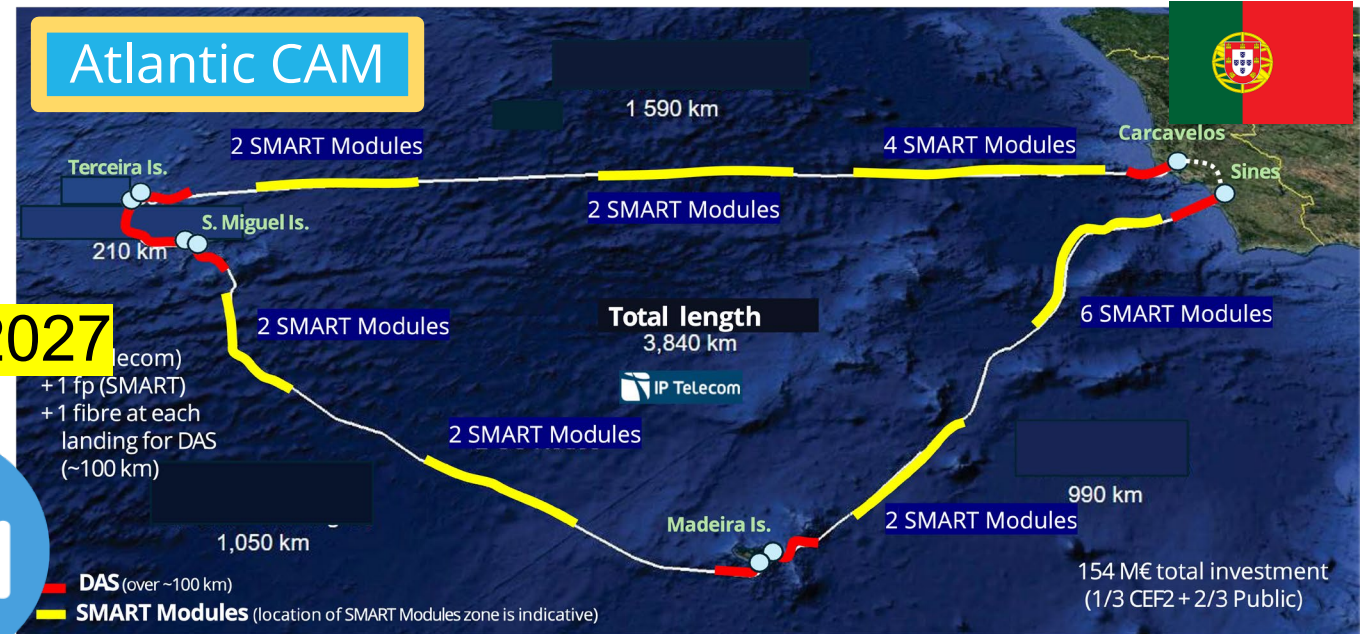
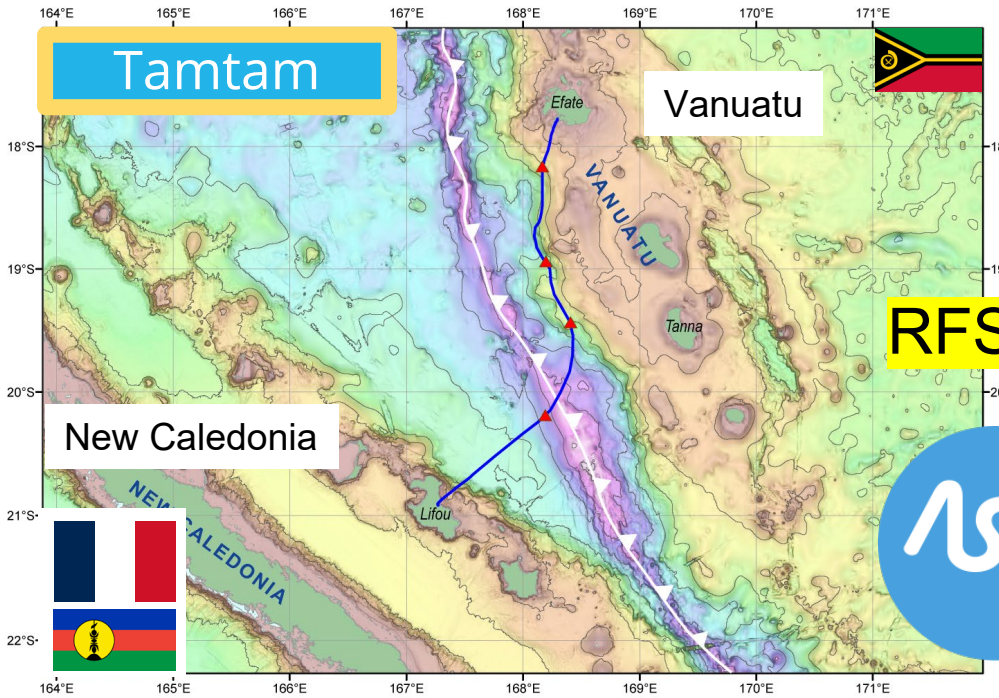
Other Sensing Techniques

SMART Cables measure Essential Ocean Variables: Temperature, Pressure; Seismic motion/Ocean Sound + ...

- Increasing deep-ocean pressure density
- Improving detection confirmation and amplitude
- Supporting resilient long-term infrastructure
- Enabling multi-hazard integration

HOW to make it possible in a global scale?

- SMART Cables – a new way to observe the ocean – real time, reliable, 25-year life, low lifetime cost.
- Early systems underway setting valuable precedents, preparing for more
- SMART will catalyze further tech development, research, and funding
- Funding sources, coming from outside ocean/research – telecom related





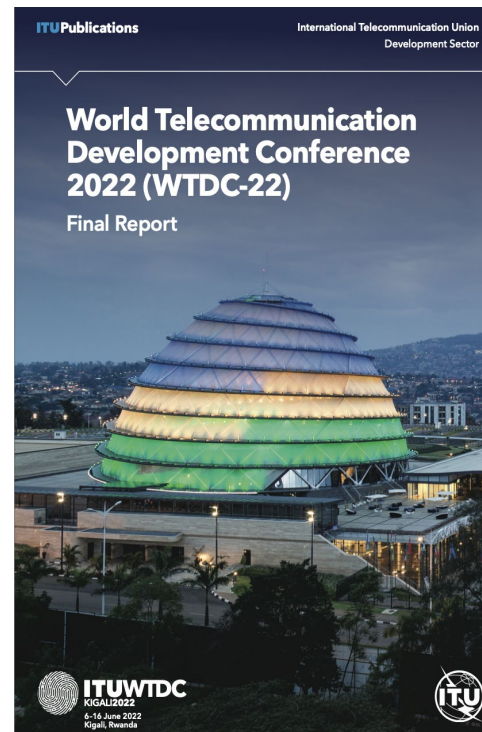
- JTF Secretariat
- Resolutions on climate change Disaster Risk Reduction (DDR) includes SMART
- Recommendations SG15/Q8 G.dsssc/9730.1 and G.SMART/9730.2



- Integrates SMART into WMO Information platform



- Global Ocean Observing System (GOOS)
- Tsunami Programme
- UN Ocean Decade: endorsed Project
- Emerging Observing Network of GOOS



Recommendation
ITU-T G.9730.2 (08/2024)

SERIES G: Transmission systems and media, digital systems and networks

Access networks – Metallic access networks

Scientific monitoring and reliable telecommunications submarine cable systems

Manual on the WMO Information System

Volume II – WMO Information System 2.0

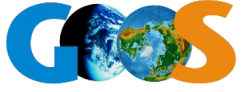
Annex VII to the WMO Technical Regulations



WORLD METEOROLOGICAL ORGANIZATION

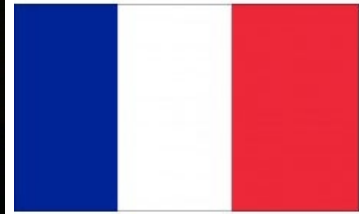
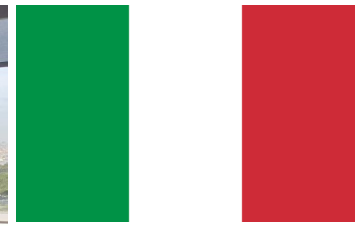
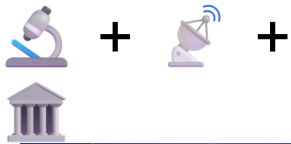
WMO-No. 1060





Emerging Network

2021-2030 United Nations Decade of Ocean Science for Sustainable Development





SMART Cables enable ocean and Earth observing, contributing to cable protection as well.

SMART Cables are a good example of multipurpose critical infrastructure providing Connectivity and Science serving Society

Mahalo!



SMART CABLES



GORDON AND BETTY
MOORE
FOUNDATION



SMARTCables.org

[ITU/WMO/UNESCO-IOC Joint Task Force](#)



Scan to Join!

Danke Gracias ありがとう Thank you Terima kasih Obrigado Arigatō
Dhanyavaad Merci Tankyu tumas Takk Grazie Mālō 'aupito
Kop koon 谢谢 Xièxiè Salamat po S' efharistó