Observing the Ocean and Earth with

SMART CABLES

Observing the oceans and Earth with submarine cables, into the future

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Thirty-first Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXXI),
Beijing, China
7-11 April 2025

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

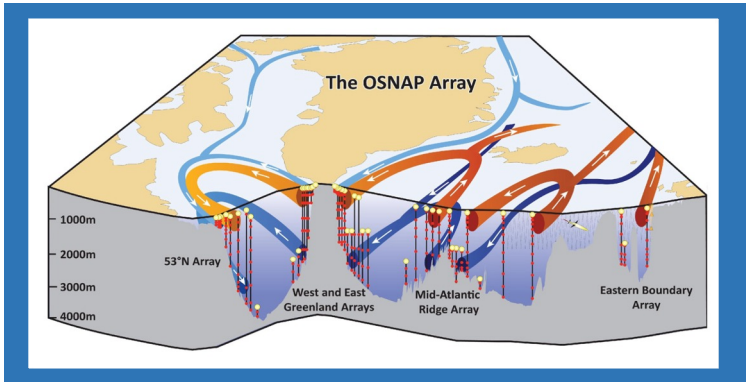
What are SMART Cables and Why do they matter?

SMART Cables integrate sensors into submarine telecommunications cables to measure seafloor temperature, pressure, and seismic motion (SMART modules)

Advancing Climate and Ocean Monitoring

Continuous, long term data for:

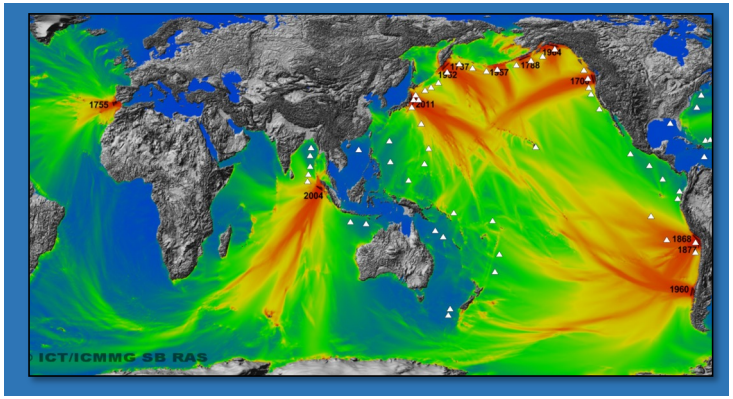
- Ocean heat content
- Sea Level Rise
- General ocean circulation



Improving Disaster Risk Reduction

Real time data for:

- Earthquakes
- Tsunamis

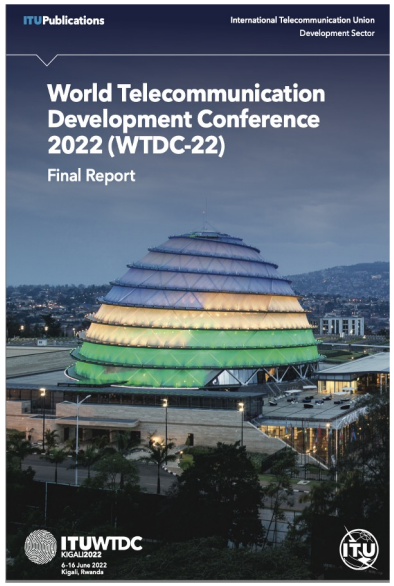


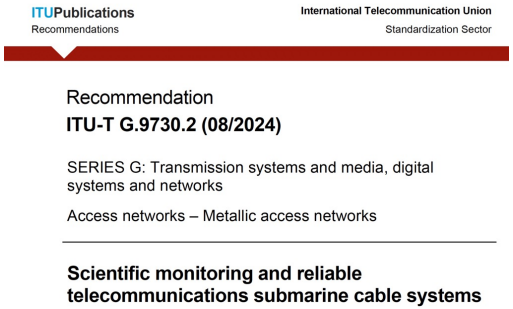
JTF Sponsors

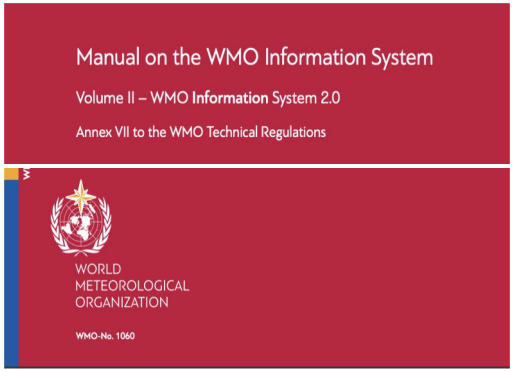
- JTF Secretariat
- Resolutions on climate change Disaster Risk Reduction (DDR) includes SMART
- Recommendations SG15/Q8 G.dsssc/9730.1 and G.SMART/9730.2

- Integrates SMART into WMO Information platform

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







UN World Conference on Disaster Risk Reduction
2015 Sendai Japan

Climate Change and Disaster Risk Reduction

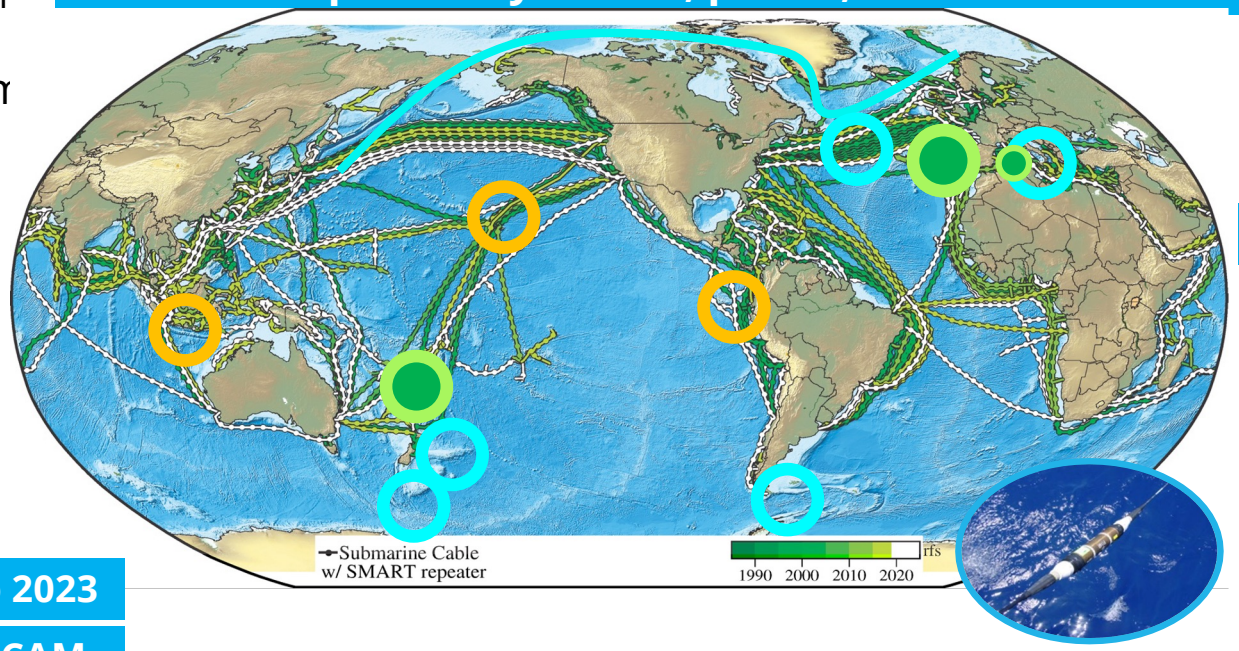
Global Array for Climate, Oceans, Sea Level, Earthquakes, Tsunamis

1st order addition to Ocean-Earth observing system

Emerging Network

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

A sustained planetary sensor, power, Internet network



Share submarine cable infrastructure
Telecom + science
⬇ €$

NO Interference

1.4+ GM
~20,000 repeaters
20 year refresh

Every ~100 km

InSEA Wet Demo 2023

SMART Atlantic CAM and Tamtam V-NC Funded, install 2026

Know the environment protect the network

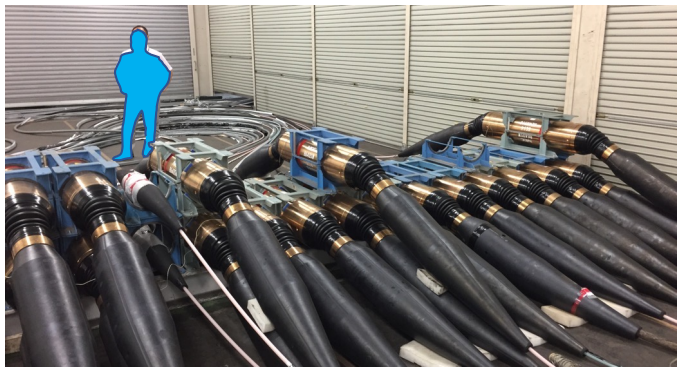
Bottom temperature, pressure, seismic motion

ITU unesco WMO

SMART Technical Solution

Shared Cable Infrastructure: Telecom + Science

S-net



Existing Technology

Sensor module
INGV InSEA SMART Wet Demo

Leverage Existing Technology

Guralp + Global Marine

Sensors:

- Temperature
- Pressure
- Seismic

Key point:

- Essential Ocean Variables

CC Node: Integration of Specific Sensors in Submarine Cables

ASN Telecom Repeater

Leveraging Proven Subsea Telecom Technology for SMART Integration

ASN CC Node

DRY SECTION
Pressure Vessel

WET SECTION
Open Rigid Housing

Armadillo

Accelerometer

Seismometer

Pressure

Temperature

Armadillo

- **Power supply converter**
- **Communication module**

Progress

UN Sponsor Agencies Recommendations – Recognition

- ITU Recommendations G.dsssc /9730.1 and G.SMART/9730.2.
- UNESCO-IOC recognition as and Emerging Network of GOOS.
- WMO is supporting process to incorporate SMART Cable Data into WIS 2.0 for Global Data Sharing.

Technical Advancement

1. InSEA Wet Demo – Data Analysis in Progress

- Setting precedents for the SMART Cable Network

2. Other sensing techniques and SMART Modules

- Progress in combining other sensing techniques with SMART sensors.
- Increasing industry and scientific interest in hybrid monitoring approaches.

Progress

Financial structure

- Aligned Private sector and multilateral Banks ESG goals
- European Commission and Asian Development Bank.

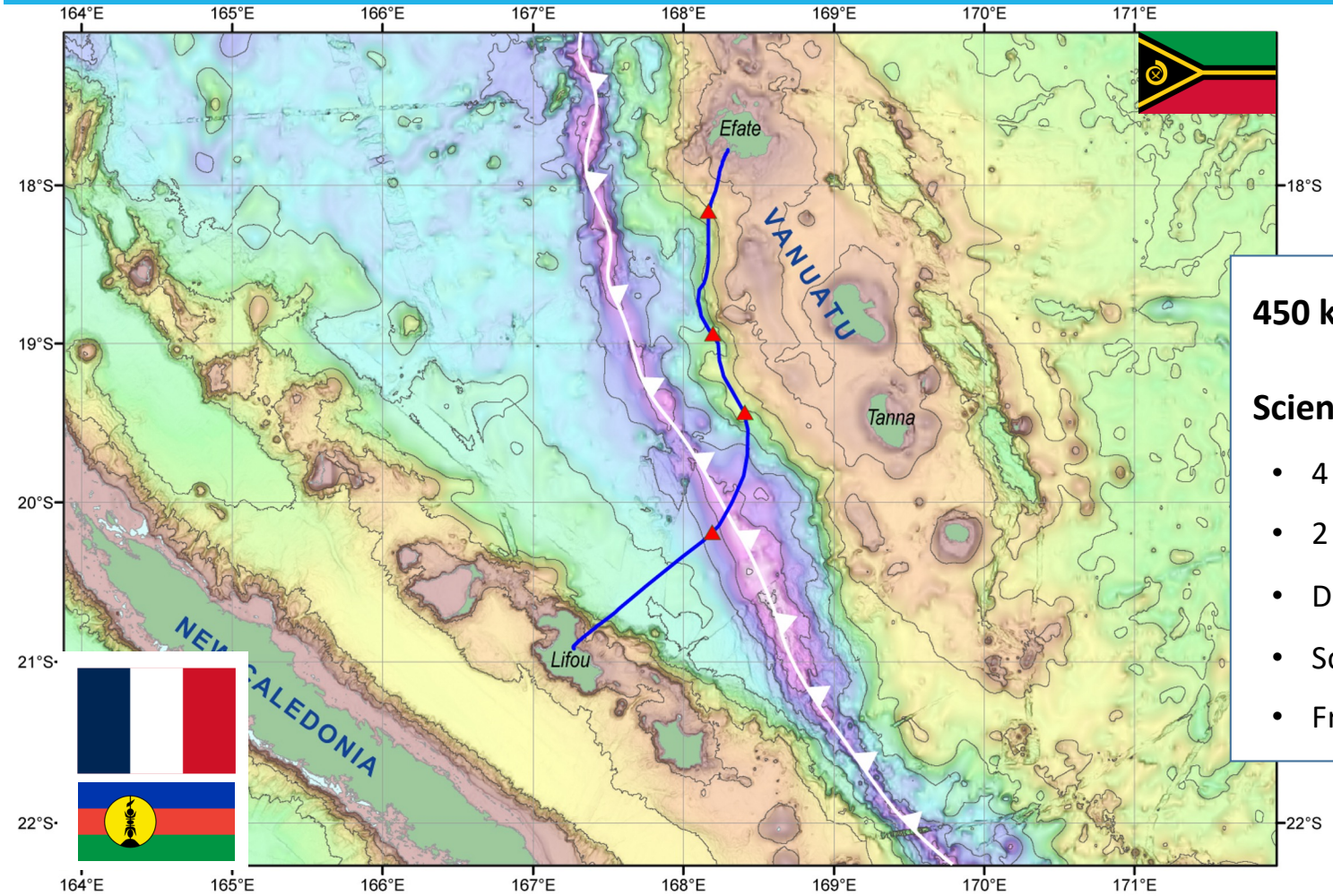
Commercial availability

- Different companies providing the SMART capability.

Engagement & Awareness

- Organized two Workshops and 16 seminars
- Attended meetings/Conferences on Industry- Science- governments- UN communities
- Newsletter
- Engagement videos in collaboration with AGU and WMO

Progress: Tamtam SMART Cable System



450 km Telecom Cable

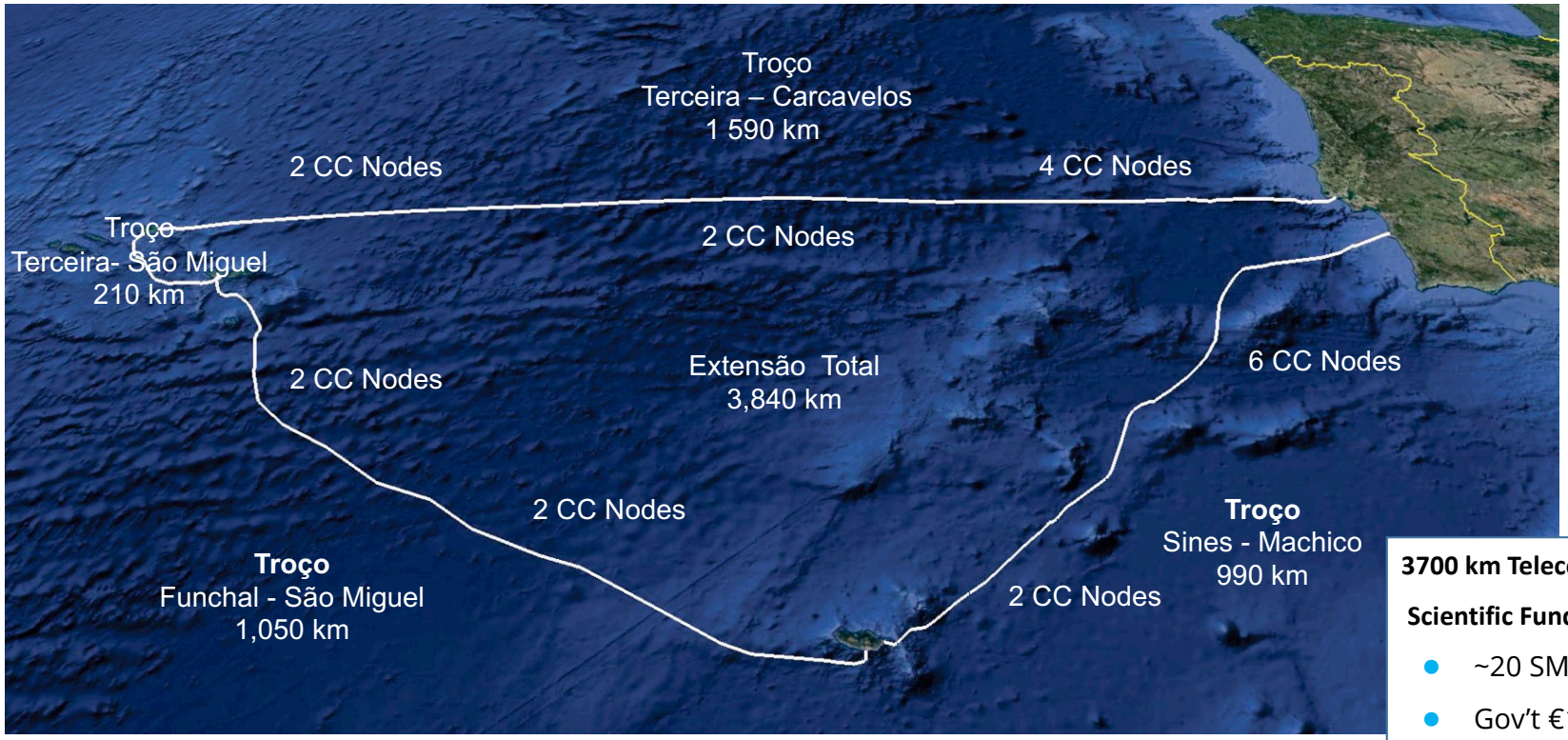
Scientific Funding :

- 4 SMART « CC-nodes »
- 2 Scientific Optic Fibers (DAS)
- Data Center
- Scientific Research
- France + ADB

Funding and deployment Progress:

Infraestruturas de Portugal

Atlantic CAM
Physical Layout



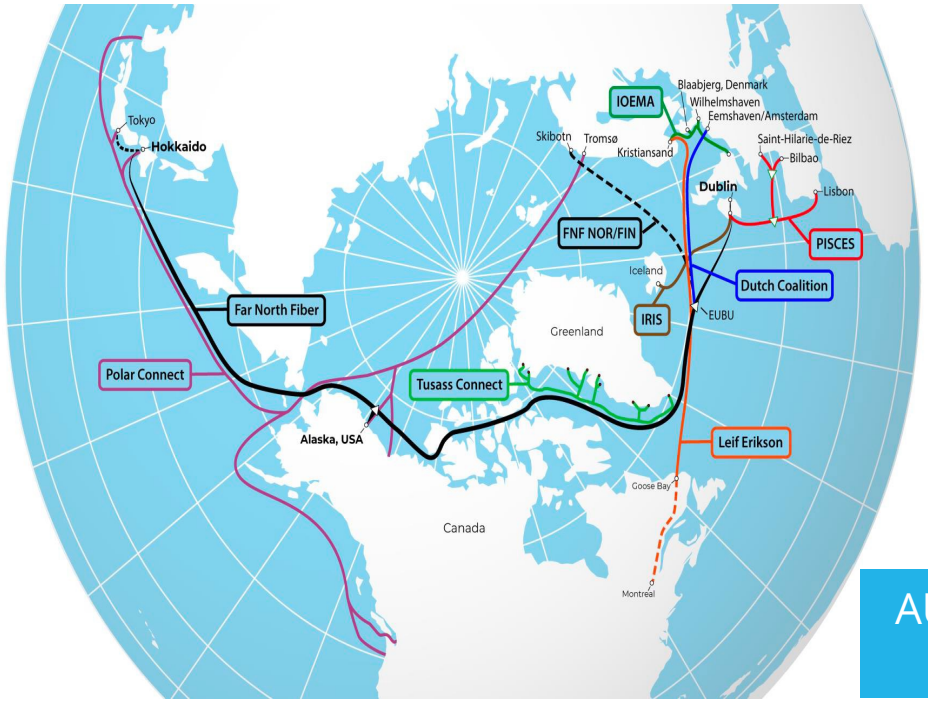
3700 km Telecom Cable

Scientific Funding :

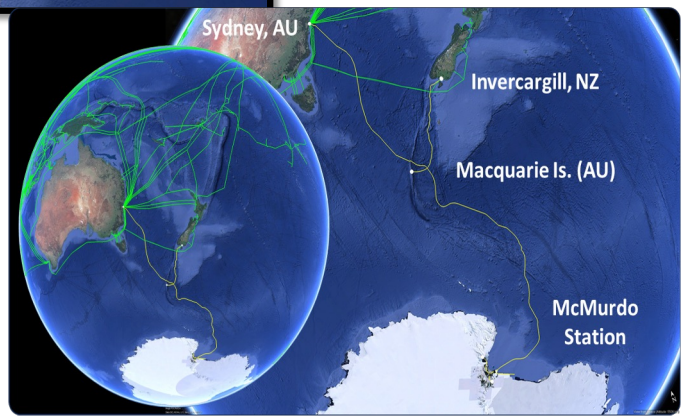
- ~20 SMART modules
- Gov't €154M. EU support €56M
- OFS

Polar and North Atlantic

Polar Connect, Far North Fiber, Tussas, PISCES, IRIS, IOMEA, +



Antarctica Chile
Drake Passage

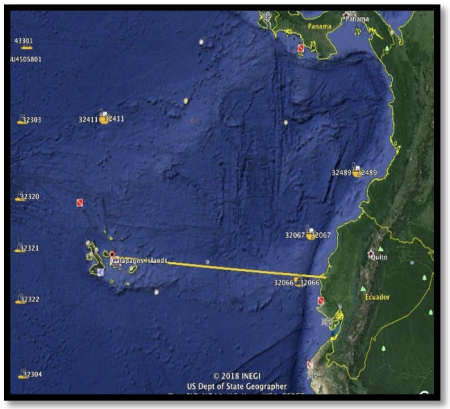


AUS/NZ Antarctica
NSF McMurdo

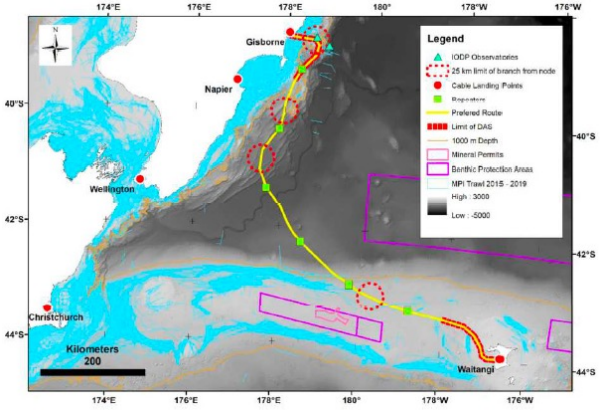
Pacific, Mediterranean, Indian Oceans

SMART CABLES

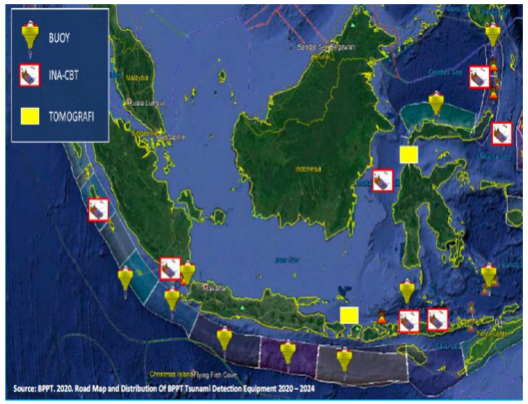
Galapagos



NZ - Chathams



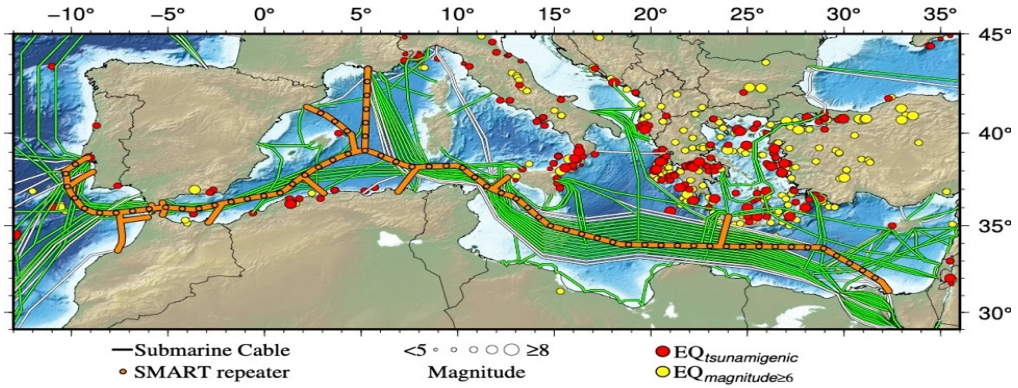
Indonesia



50 km, 2 module test system installed off Labuan Bajo

Medusa

BARRACUDA



MISTS

ITU unesco WMO

ITU/WMO/UNESCO-IOC SMART Cables Roadmap

Phase 1: 2024–2025 | Laying the Foundation

SMART Cables officially recognized in GOOS & UN frameworks.
Atlantic CAM & Tamtam systems funded and moving toward deployment.
Global collaboration expands – engaging governments & industry for next projects.

Phase 2: 2025–2027 | First Large-Scale Deployments

Atlantic CAM (Portugal) & Tamtam (France-Vanuatu) operational – first real-time SMART data streams.
Legal & data-sharing frameworks established under ITU/WMO/UNESCO-IOC.
Industry adoption accelerates, integrating SMART sensors into future subsea cable projects.

ITU/WMO/UNESCO-IOC SMART Cables Roadmap

Phase 3: 2027–2030 | Scaling & Global Integration

SMART data integrated into WMO's WIS 2.0 & global tsunami warning systems.
New deployments planned in high-risk regions (Chile, Indonesia, Caribbean).
Public-private partnerships drive funding & technological advancements.

Phase 4: 2030–2034 | A Global SMART Cable Network

Standardized deployment of SMART-enabled telecom cables worldwide.
Faster, more accurate tsunami warnings, better climate monitoring, and stronger disaster resilience.
A fully integrated global system, providing ocean data for science, policy, and sustainability

SMART – Summary – call to action

Global Array: Climate, Oceans, Sea Level, Earthquakes, Tsunamis

- Integration of SMART Cables into the Pacific Tsunami Warning System (PTWS)
- Establishing UNESCO-IOC SMART Cable Working Group.
- Support Pilot Deployments and Regional Expansion
- Data Sharing and Integration with Tsunami Warning Centers
- Advancing SMART Cables as a UN Ocean Decade Initiative
- Continue Outreach, Capacity Building and Awareness
- Challenges remain – first systems setting positive precedents

SMART CABLES

ITU unesco WMO

GORDON AND BETTY MOORE FOUNDATION

Schmidt Marine TECHNOLOGY PARTNERS

SMARTCables.org

ITU/WMO/UNESCO-IOC Joint Task Force

Scan to Join!

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