# A DÉCADA DAS NAÇÕES UNIDAS DAS CIÊNCIAS DO OCEANO PARA O DESENVOLVIMENTO SUSTENTÁVEL


COMITÉ PORTUGUÊS PARA A COI
PORTUGUESE COMMITTEE FOR THE IOC
COMITÉ PORTUGAIS POUR LA COI

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*Comité Português para a COI; Comissão de Ciência para o Mediterrâneo*

universidade de aveiro
theoria poiesis praxis


2021 2030 United Nations Decade of Ocean Science for Sustainable Development

United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission

**The Ocean We Need for the Future We Want**

*IPMA, 13/12/2019*

UN World Conference on Disaster Risk Reduction

ISLAND VOICES GLOBAL CHOICES · Small Island Developing States · SAMOA PATHWAY

THE LAW

MARRAKECH COP22|CMP12 UN CLIMATE CHANGE CONFERENCE 2016 مؤتمر الأمم المتحدة لتغير المناخ

14 LIFE BELOW WATER · SUSTAINABLE DEVELOPMENT GOALS · 17 GOALS TO TRANSFORM OUR WORLD

# Um Planeta, Um Oceano

70% superfície terrestre - Profundidade media: 3700m

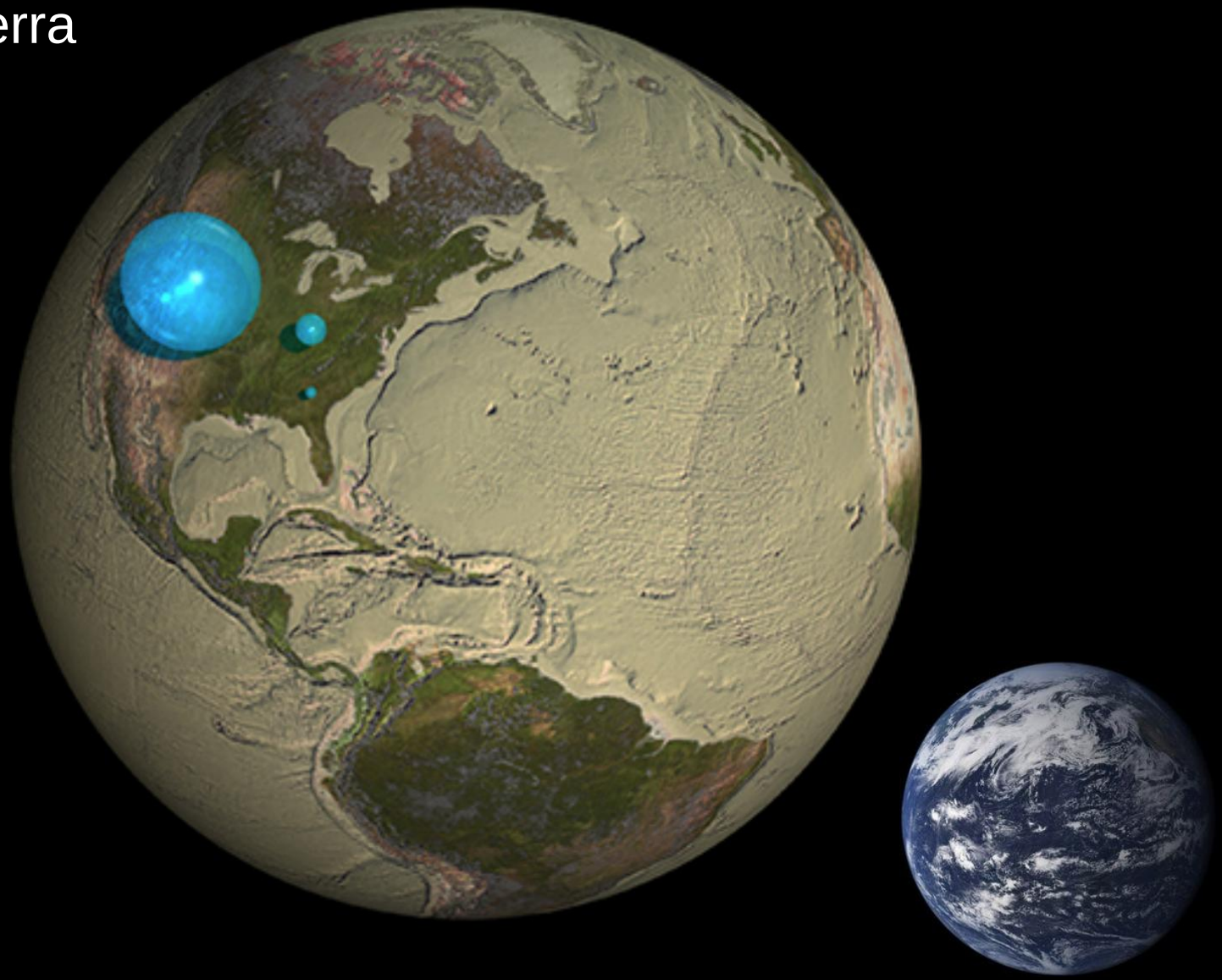
- Oxigénio (50%)
- Regulação do clima
- Biodiversidade
- …

- Recursos
- Alimentação
- Água
- Energia
- …
- Economia
- Saúde
- Emprego
- Transporte marítimo
- …

*Ask not what your ocean can do for you…*
*…ask what you can do for your ocean !*

Riscos naturais

# Água na Terra



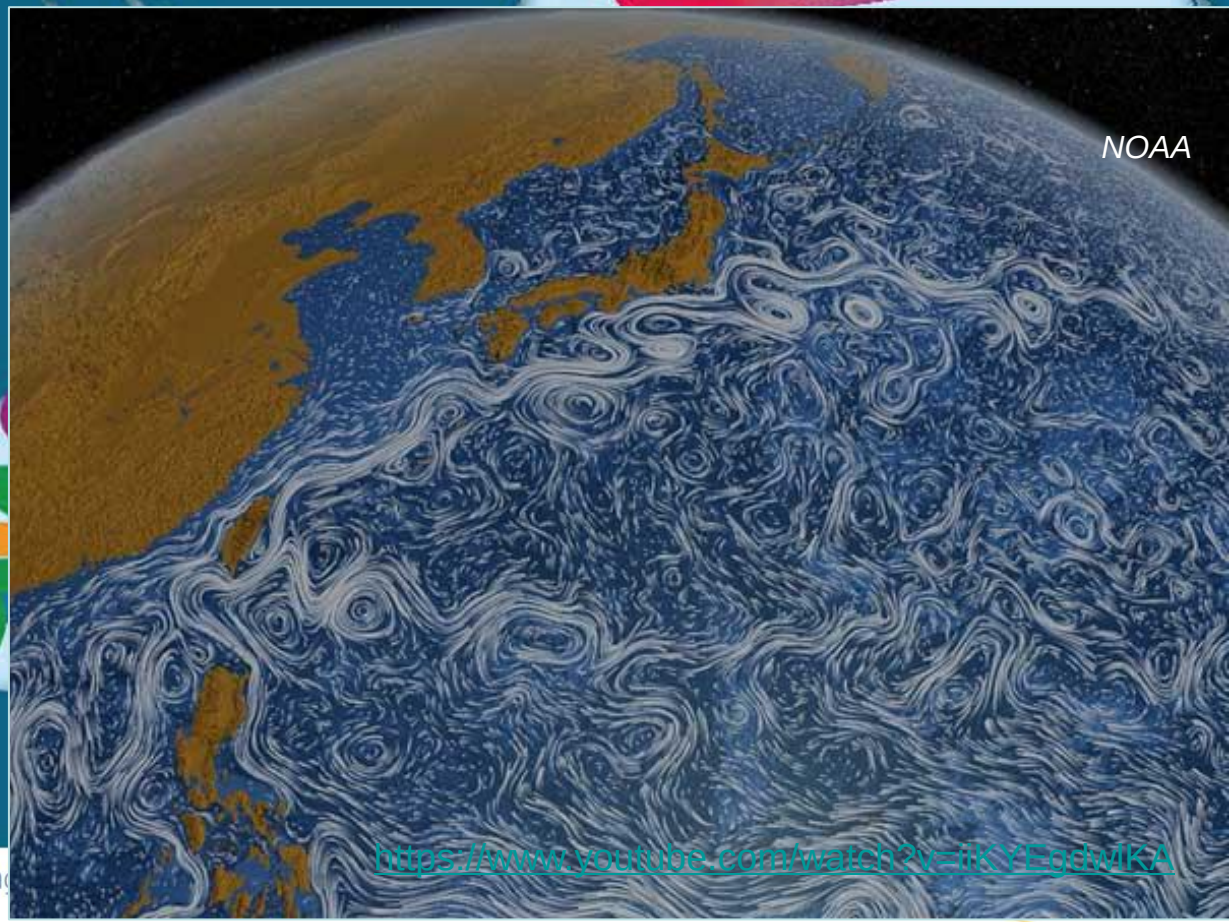
*The Earth stripped of its water. All of the Earth's ocean water (large sphere), fresh water (mid-sized sphere) and freshwater accessible to humans (small sphere). (Credit: Jack Cook/WHOI).*

# Um Planeta, Um Oceano


Upper ocean water
Intermediate and Mode Water
Indian and Pacific Deep Waters
North Atlantic Deep Water
Antarctic Bottom Water
Bering Strait throughflow

Atlantic Ocean

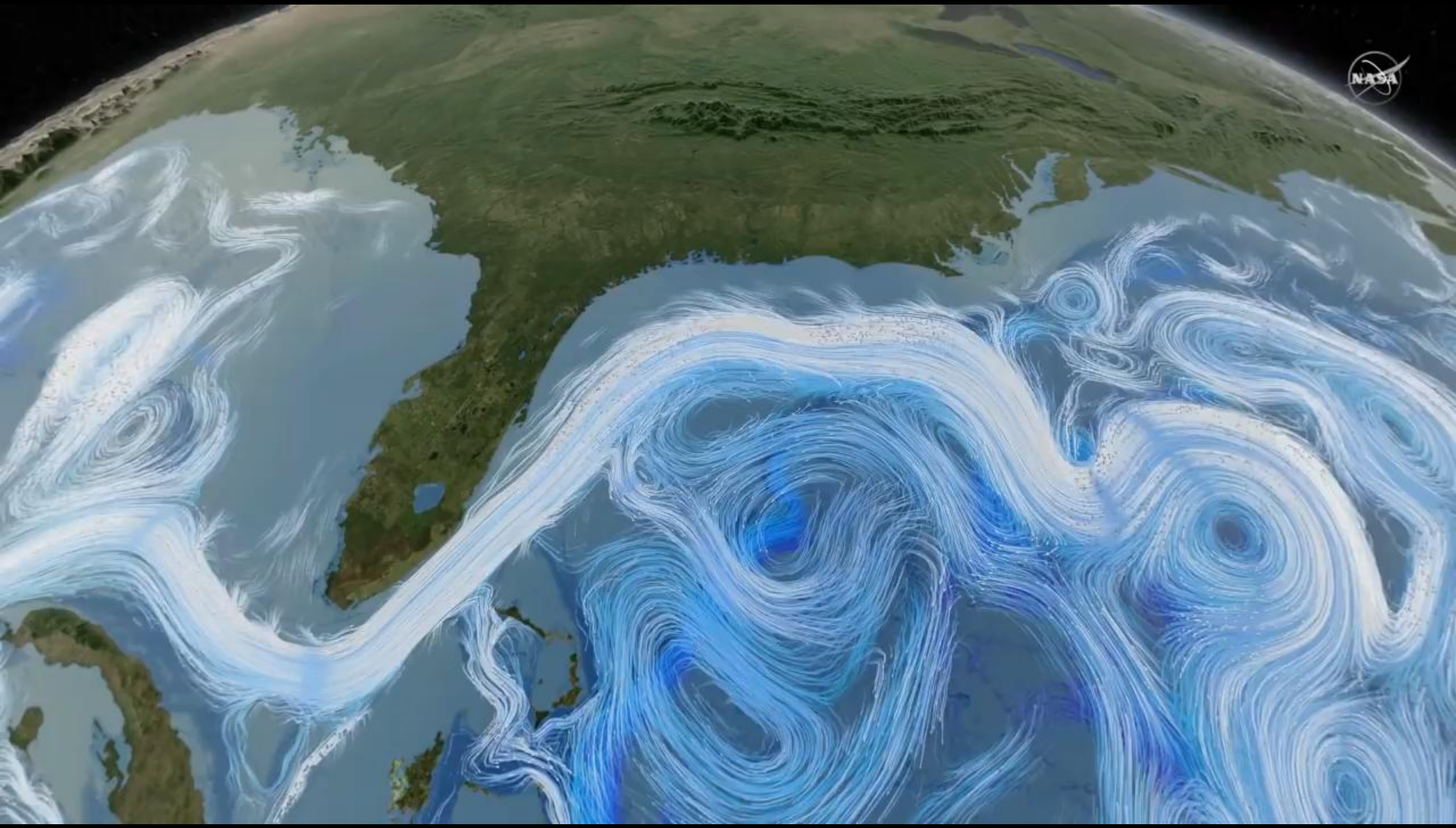
Figure 2.1 Global overturning circulation, driven by chang



NOAA

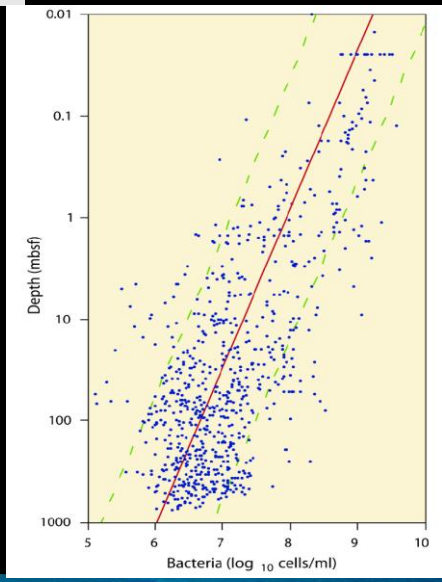
https://www.youtube.com/watch?v=iKYEgdwlKA

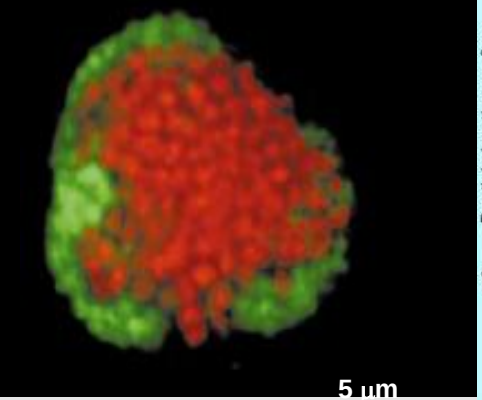
# Um Planeta, Um Oceano

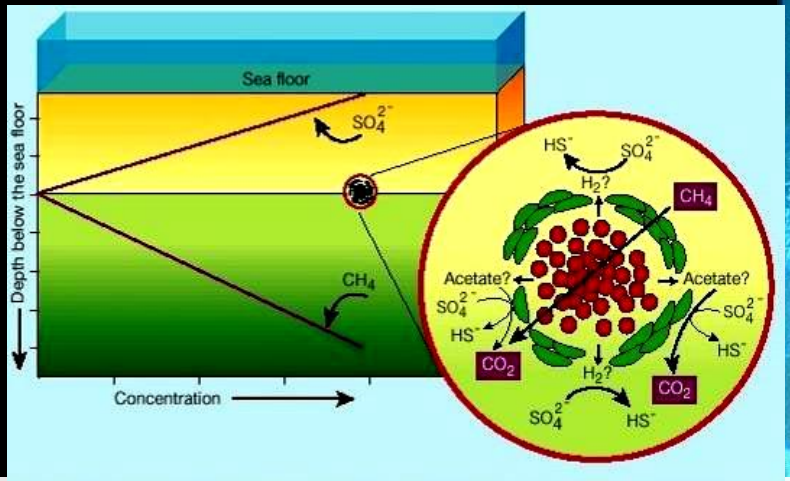


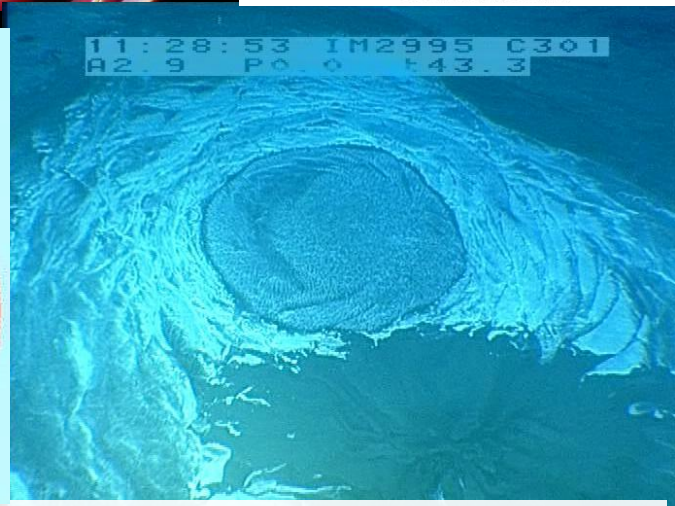
https://www.youtube.com/watch?v=iiKYEgdwlKA

# Origem e limites da Vida




Processos geológicos, Ecosistemas Extremos.
Quimiosíntese. Biosfera profunda

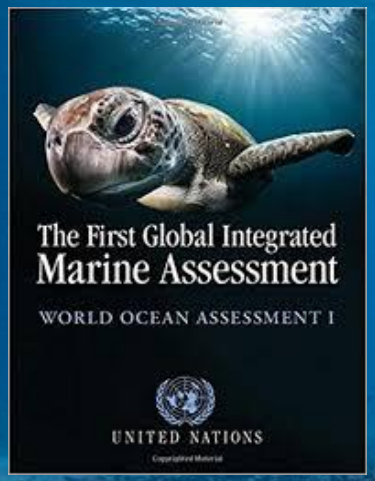
# Oceano saudável e ecosistemas saudáveis

> **Saúde humana**

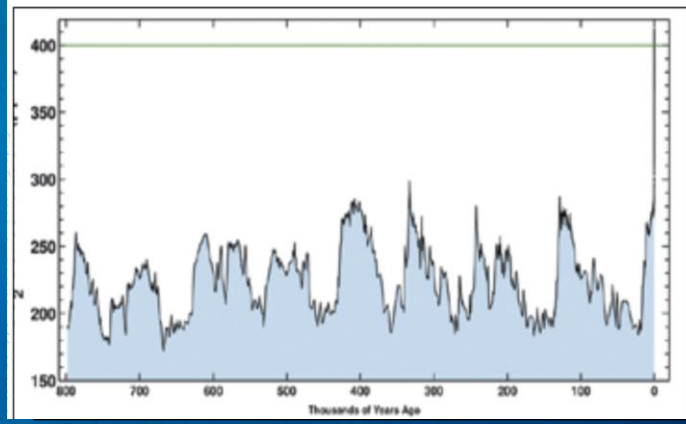
> Regulação do Clima  > Desenvolvimento Sustentável

Photo: B Christensen / Azote

# Poluição e Lixo Marinho: Fontes em terra e no mar




Impacto antropogénico: Poluição, acidificação, aquecimento global, desoxigenação, eutrofização, sobrepesca, destruição de habitats





**Main finding of 1st World Ocean Assessment :**
**due to multitude and complex nature of stressors world is running out of time to save and sustainably manage its ocean!**

Necessário actuar **agora!**

Photo: B Christensen / Azote

# A Comissão Oceanográfica Intergovernamental

United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission

Estabelecida em 1960, com Autonomia Funcional, no seio da UNESCO, como a organização competente em Ciências do Mar dentro do Sistema das Nações Unidas.

150 Estados Membros.

Portugal é Membro desde 1971, e Membro do Conselho Executivo desde 1989.

# A Comissão Oceanográfica Intergovernamental

A COI é o organismo das Nações Unidas responsável pela promoção da cooperação internacional e coordenação de grandes programas de investigação, serviços, transferência de tecnologia e capacitação internacionais em Ciências Oceanográficas.

# A Comissão Oceanográfica Intergovernamental

*Promove e coordena*:

- grandes redes de observação oceânica, no âmbito do GOOS (Global Ocean Observing System)

- o acesso aos dados oceanográficos (IODE) e a cartografa geral dos oceanos (GEBCO).

- Mantém o Ocean Biogeographic Information system (OBIS), base de dados global da biodiversidade marinha, passada e presente, da sua abundaância e distribuição no Oceano.

# A Comissão Oceanográfica Intergovernamental

Tem ainda por funções aplicar o conhecimento científico à protecção e uso sustentável dos oceanos e assistir aos processos de decisão dos Estados Membros.

# IOC – VISÃO PARA O FUTURO

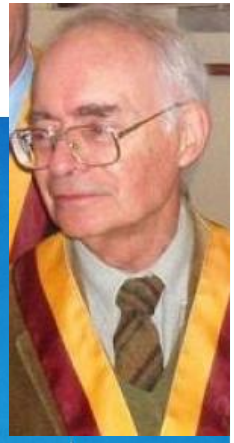
United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission

## Cooperação intergovernamental em Ciência Oceanográfica

- Garantir ecossistemas oceânicos saudáveis e serviços de ecossistemas sustentáveis
- Assegurar avisos precoces eficazes de riscos oceânicos, incluindo tsunamis
- Aumentar a resiliência e adaptabilidade às mudanças climáticas e variabilidade
- Melhorar o Conhecimento e a Literacia sobre o Oceano
- Desenvolvimento de Capacidade (SIDS, LDCs)




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



## The Science We Need for the Ocean We Want

50 Yrs after the 1st Decade of Ocean Exploration

IOC 2015-2017
UNGA – Dez / 2017

AGENDA 2030

The United Nations has proclaimed a **Decade of Ocean Science for Sustainable Development (2021-2030** to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean.

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

14

SUSTAINABLE DEVELOPMENT GOALS

# Conserve and Sustainably Use Oceans, Seas and Marine Resources for Sustainable Development

- Observations
- Research
- Policy
- Legal basis
- Industry
- Education
- Investment
- Capacity development
- Technology transfer

1. Reduce marine pollution of all kinds
2. Manage and protect marine and coastal ecosystems
3. Minimize and address impacts of ocean acidification
4. Eliminate overfishing, science based management to restore fish stocks
5. Conserve > 10% of coastal and marine areas
6. Prohibit some fisheries subsidies
7. Economic benefits to SIDS & LDCs from sustainable use of marine resources (e.g. fisheries, aquaculture, tourism)

a. Build science capacity through *IOC Criteria and Guidelines on the Transfer of Marine Technology*

b. Provide access for small-scale artisanal fishers to marine resources and markets

c. Use UNCLOS for conservation and sustainable use of ocean and its resources

Custodian Agency

**IOC responsible for the Implementation Plan for the Decade!**

# REVISED ROADMAP FOR THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT (2018/19)

## CONTRIBUTION OF THE DECADE TO SOCIETAL OUTCOMES

- *A **clean ocean** whereby sources of pollution are identified, quantified and reduced and pollutants removed from the ocean*

- *A **healthy and resilient ocean** whereby marine ecosystems are mapped and protected, multiple impacts, including climate change, are measured and reduced, and provision of ocean ecosystem services is maintained*

- *A **predicted ocean** whereby society has the capacity to understand current and future ocean conditions, forecast their change and impact on human wellbeing and livelihoods*

# REVISED ROADMAP FOR THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT (2018)

## CONTRIBUTION OF THE DECADE TO SOCIETAL OUTCOMES

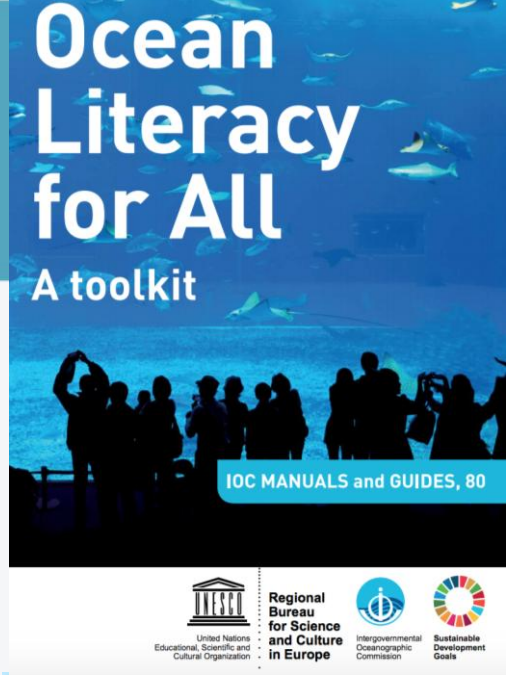
- *A **safe ocean** whereby human communities are protected from ocean hazards and where the safety of operations at sea and on the coast is ensured*

- *A **sustainably harvested and productive ocean** ensuring the provision of food supply and alternative livelihoods*

- *A **transparent and accessible ocean** whereby all nations, stakeholders and citizens have access to ocean data and information, technologies and have the capacities to inform their decisions*

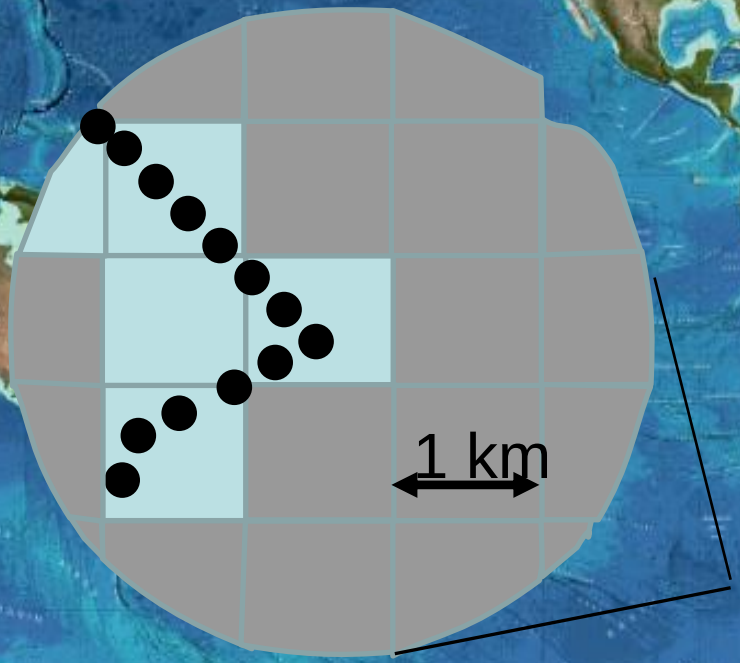
# The seven Research & Development (R&D) Priority Areas

1. *Comprehensive map (digital atlas) of the oceans*
2. *A comprehensive ocean observing system*
3. *A quantitative understanding of ocean ecosystems and their functioning as the basis for their management and adaptation*
4. *Data and information portal*
5. *Ocean dimension in an integrated multihazard warning system*
6. *Ocean in earth-system observation, research and prediction, with engagement of social and human sciences and economic valuation*
7. *Capacity building and accelerated technology transfer, training and education, ocean literacy.*




# 1. Comprehensive map of the Ocean
## Cartografia dos fundos marinhos

If the World Ocean is divided into 1x1 km blocks (grid cells), about 82 % of them do not have depth values.




2019

**Oceano Profundo** (>200m)

**(6%) ➡ 15%** cobertura adequada

**Profundidades < 200m**

**> 50%** não cartografados com cobertura adequada

*Martin Jacobsen; Courtesy Shin Tani*

# 1. Comprehensive map of the Ocean
## Cartografia dos fundos marinhos

Forum for Future Ocean Floor Mapping

June 2016

## Seabed 2030

Mr Sasakawa, Chairman of the Nippon Foundation proposed '…to map 100% of the topography of the World Ocean by 2030'

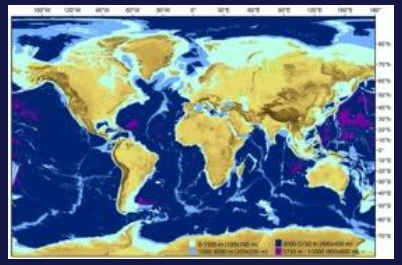
THE OCEAN CONFERENCE
UNITED NATIONS, NEW YORK, 5-9 JUNE 2017

June 2017

**Nippon Foundation - GEBCO Seabed 2030 Project** announced

*Mr Sasakawa – 1 of 8 IOC-UNESCO "Champions of Global Ocean Science"*

Project Operational



1st February 2018

**2030**

**100%** of ocean mapped

# 1. Comprehensive map of the Ocean
## Cartografia dos fundos marinhos

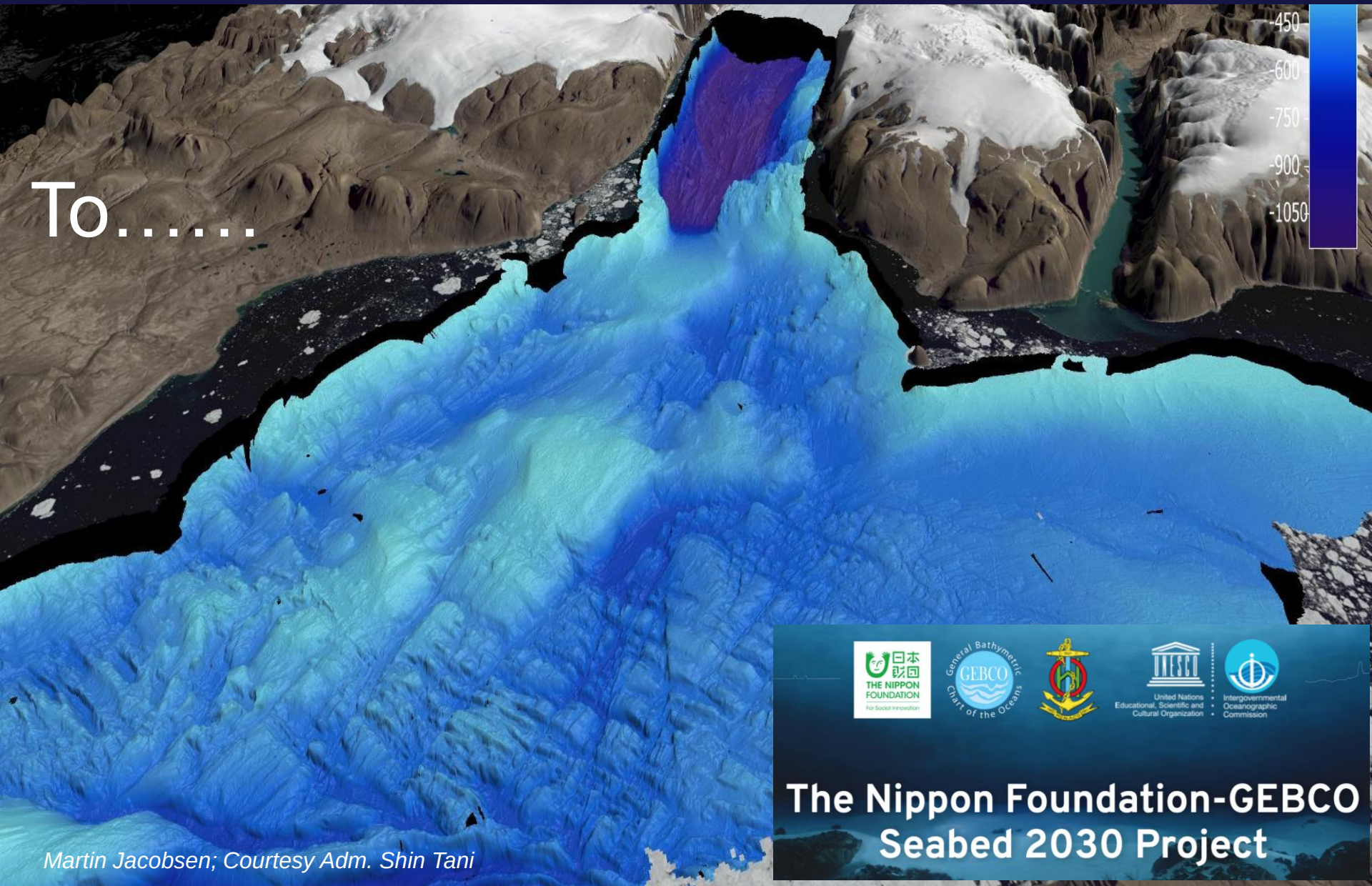
Seabed 2030 vision
From……

-450
-600
-750
-900
-1050

The Nippon Foundation-GEBCO
Seabed 2030 Project

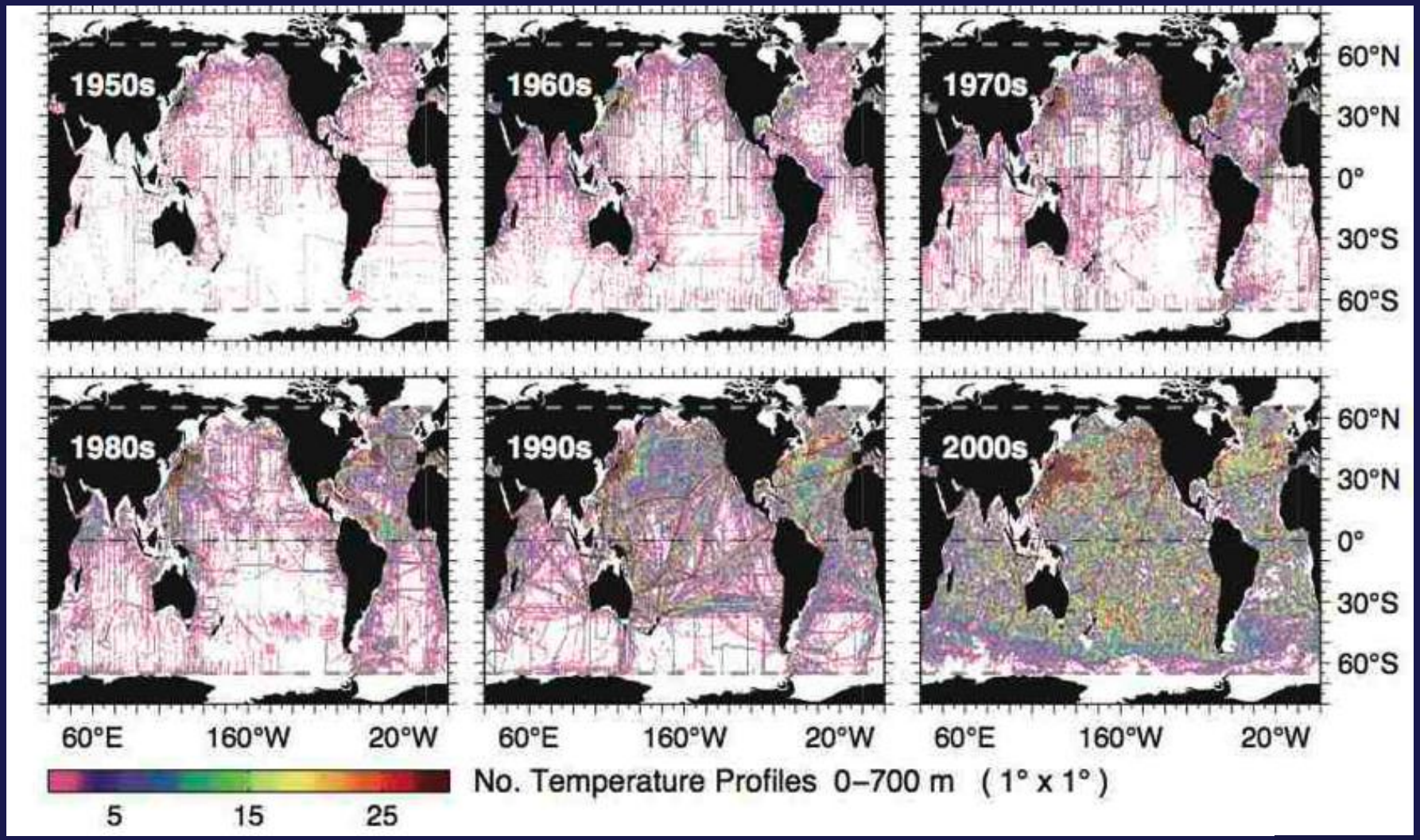

*Martin Jacobsen; Courtesy Adm. Shin Tani*

# 1. Comprehensive map of the Ocean
## Cartografia dos fundos marinhos



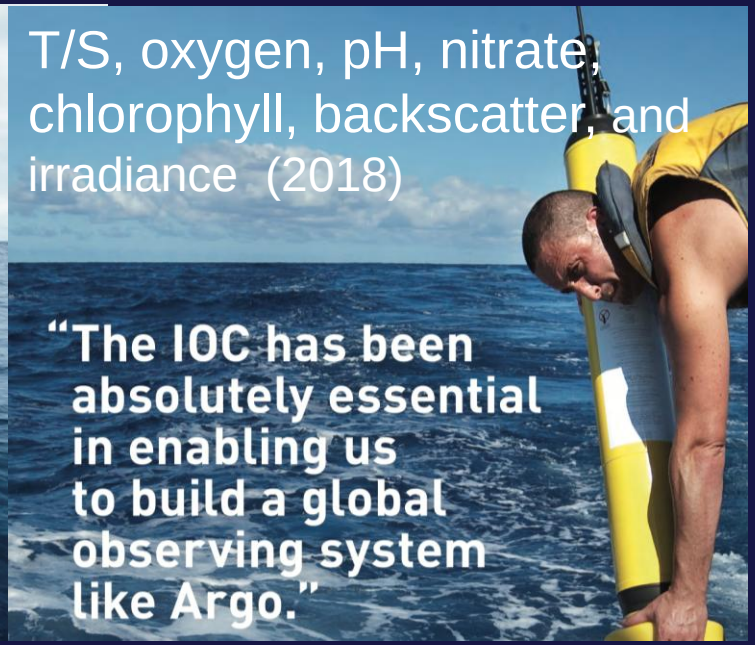

*Martin Jacobsen; Courtesy Adm. Shin Tani*

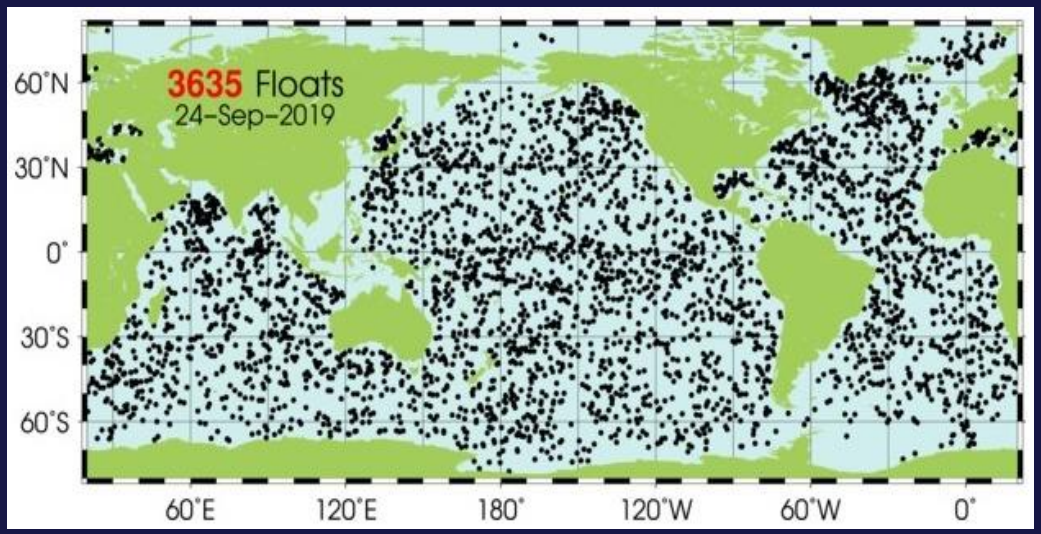
# 2. Comprehensive Ocean Observing System
## ARGO – Essencial para previsão do tempo e clima

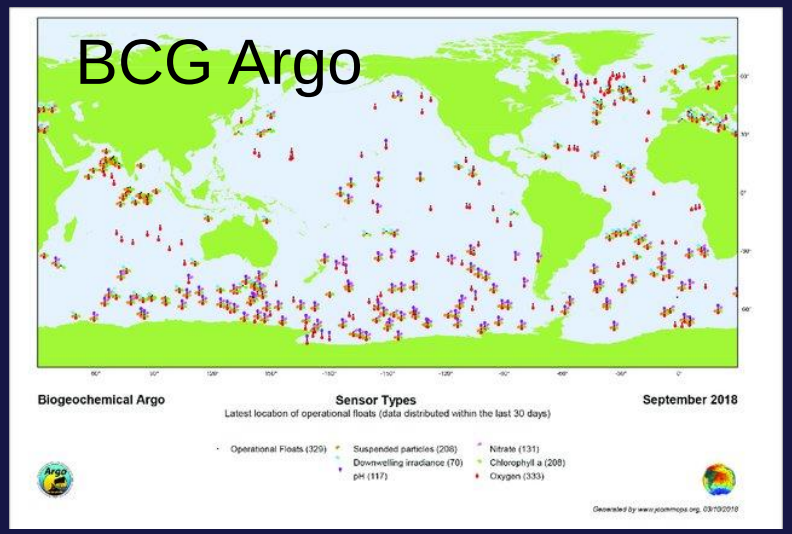



United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission

# IOC - UN Lead on Global Ocean Observing System - GOOS

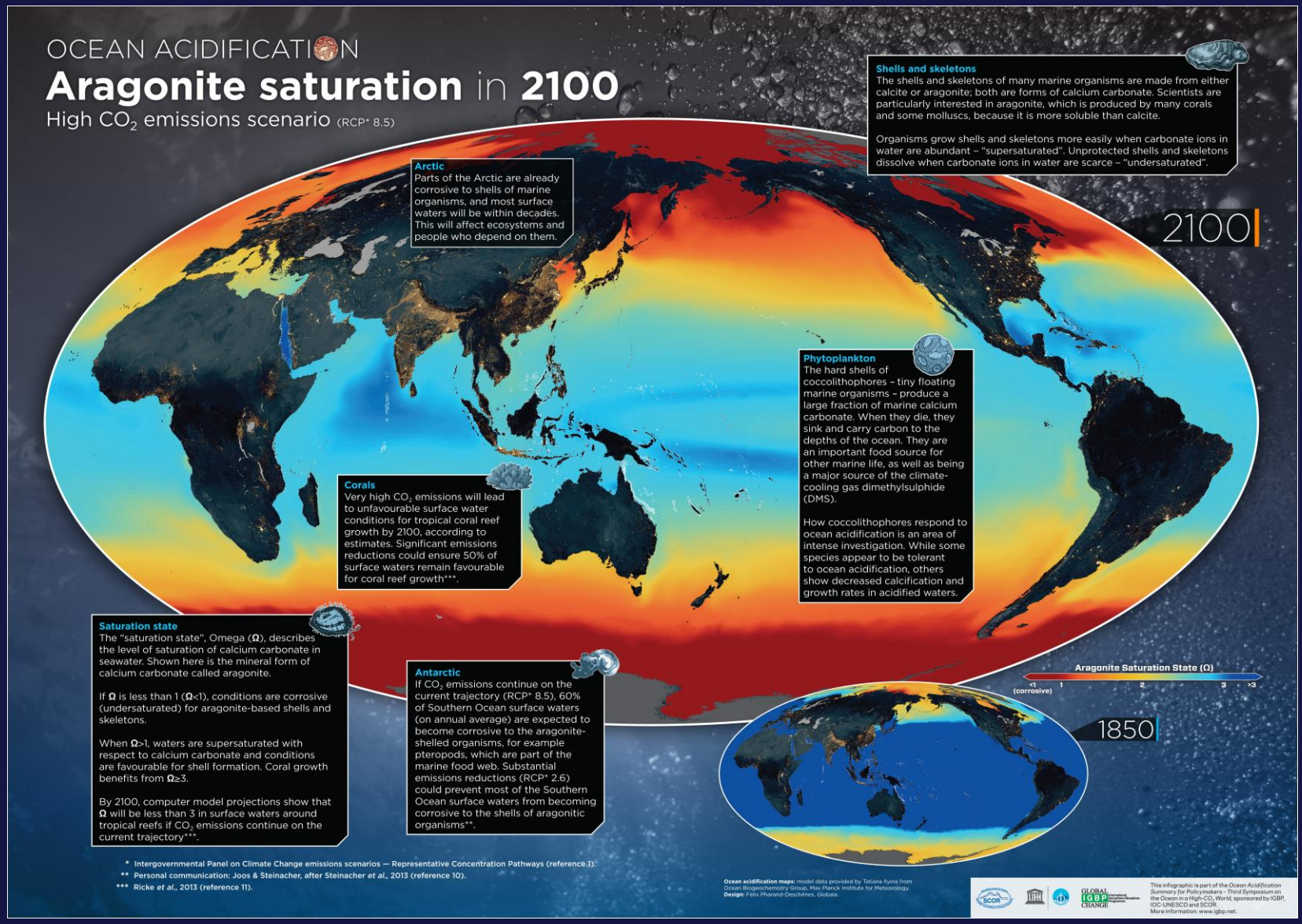



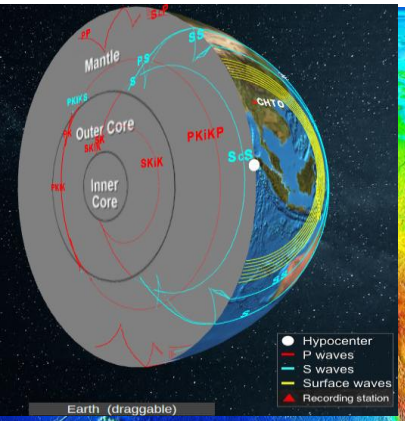



# Acidificação Oceânica

## Observação, modelação, mitigação - redução de emissões de carbono

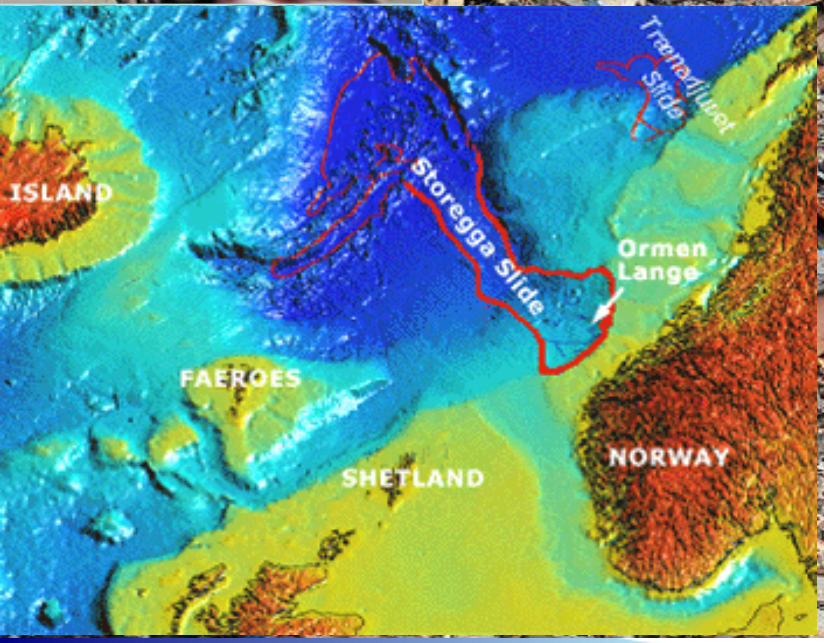


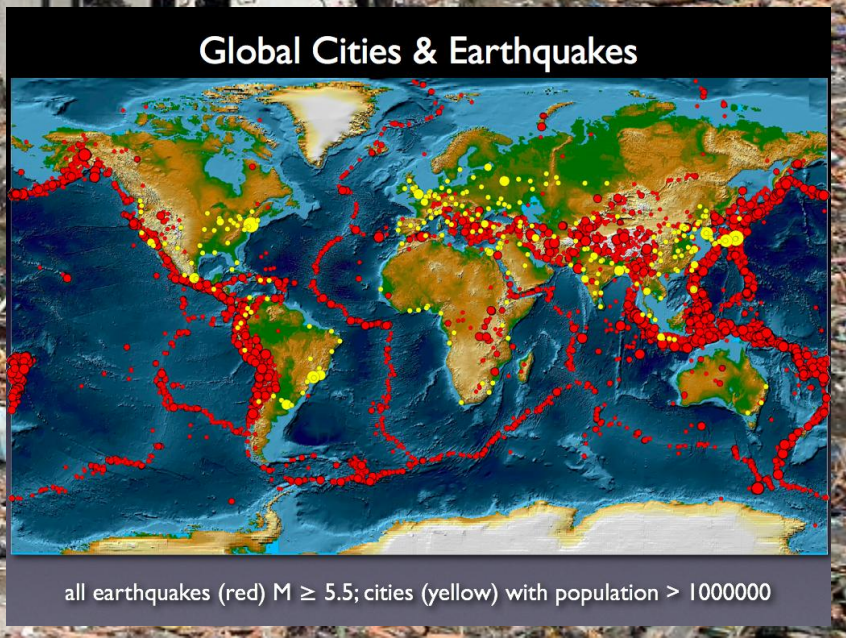
# Riscos Marinhos. Planeta Dinâmico – Tectónica de placas, sismicidade e vulcanismo



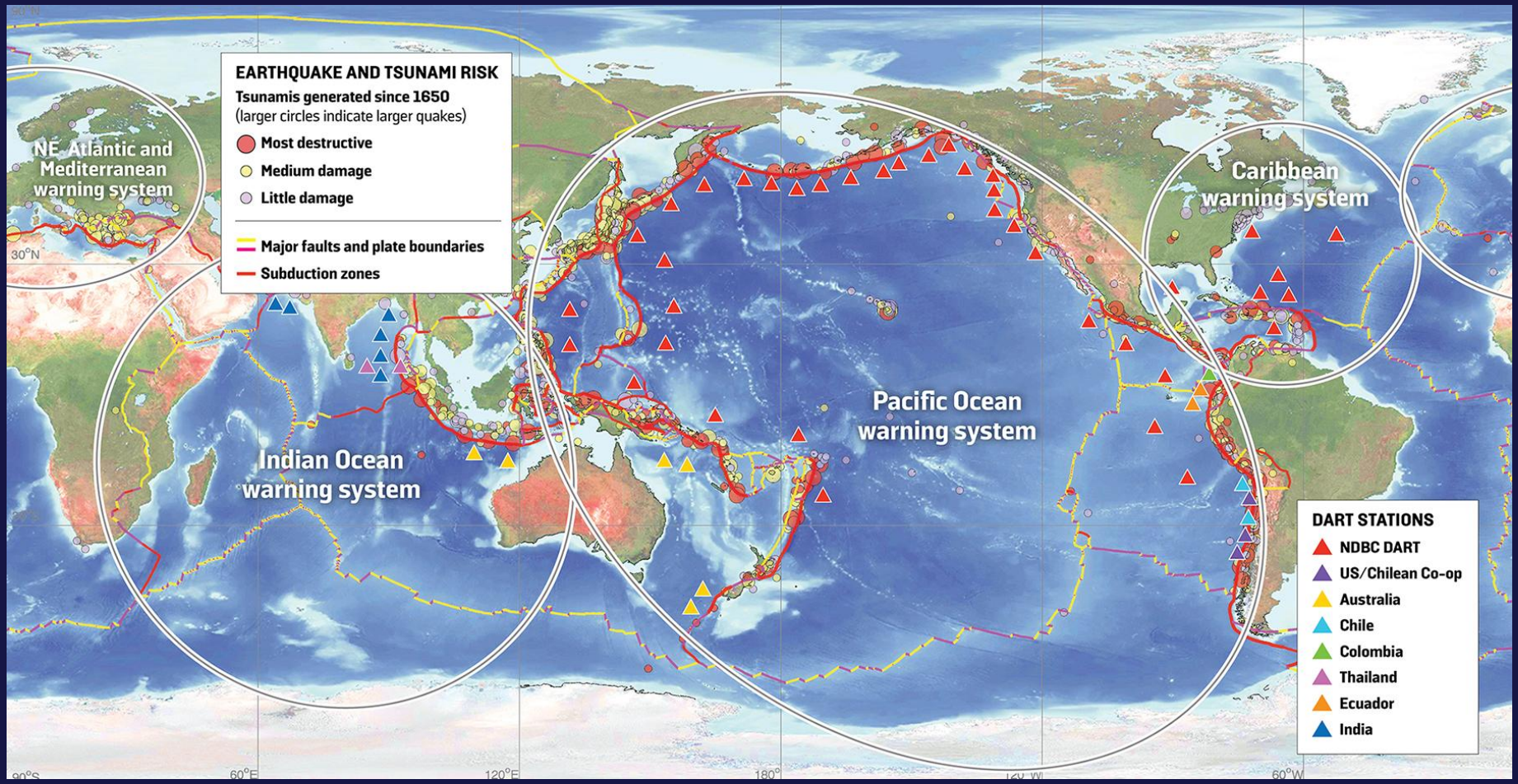



# Sismos, tsunamis e deslizamentos submarinos



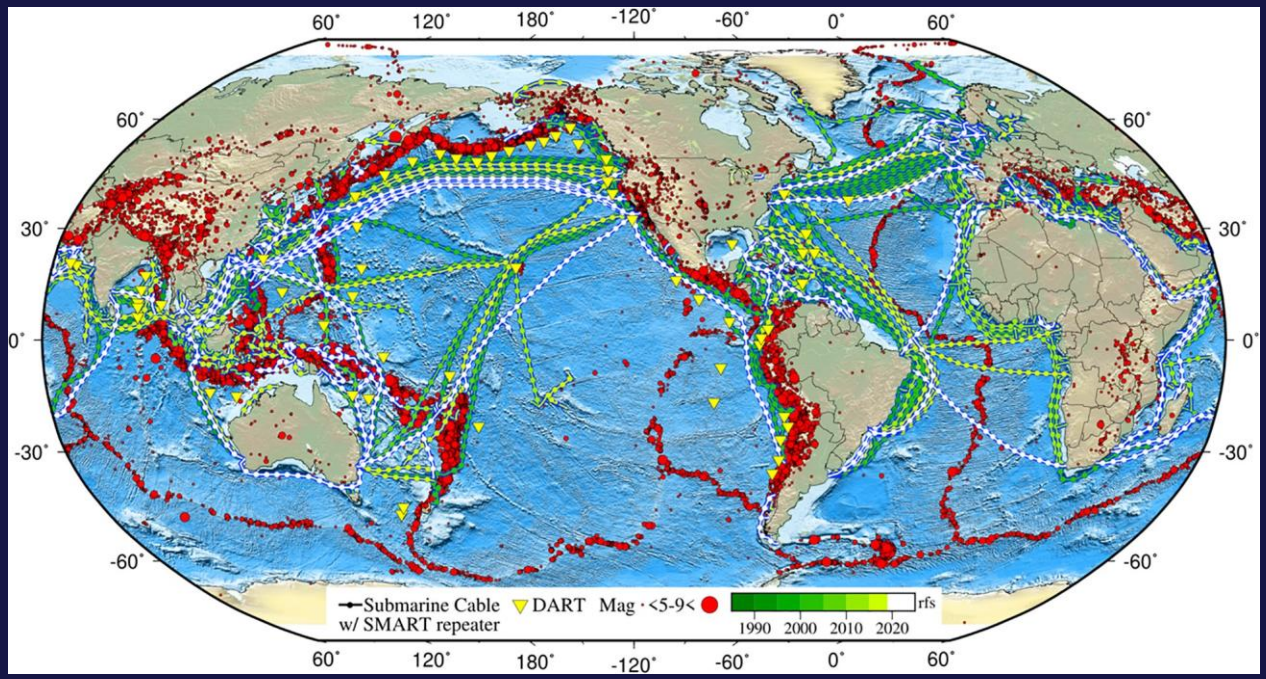



# Sistemas Regionais de Alerta de Tsunamis

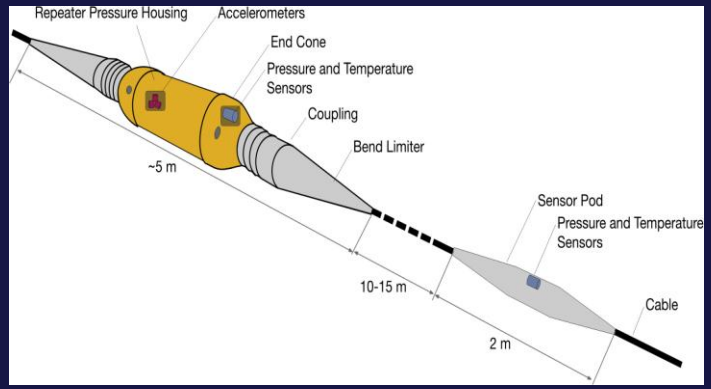


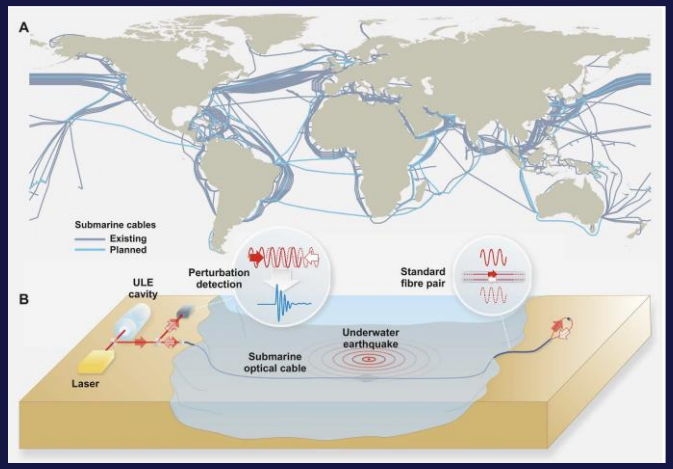

Certified Tsunami Warning Service Providers para o Atlântico NE:
França, Grécia, Itália e Turquia – **Dez/2019) Portugal (IPMA) -** *Candidatura*

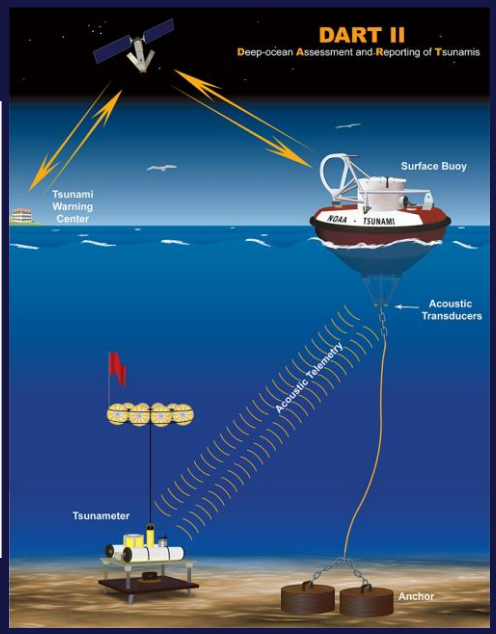
# Smart Cables e interferometria laser




Global map of ~**1 million km of operational submarine telecommunications cables** (green present, white in progress/planned; SMART repeaters shown every 300 km; rfs – year ready for service), historical earthquakes (red), and DART tsunami buoys (yellow triangles).




*Howe et al, Frontiers, 2019; Marra et al., Science 2018*

# EXEMPLOS DE ACÇÕES (REVISED ROADMAP 2018/19)

- *Action Ia: Further develop and accelerate a coordinated program of research on ocean acidification.*
- *Action Ib: Complete a comprehensive eDNA sequencing of ocean life.*
- *Action Id: Document the potential impacts from environmental and climate changes on the established and emerging maritime industries, especially for LDCs and SIDS.*
- *Action Ig: Complete mapping of the seabed, subduction zones and hot vents.*
- *Action Ivb: Complete the initial deployment of a Deep Ocean Observing System, including support for the conservation and sustainable use of marine biological systems beyond*

# EXEMPLOS DE ACÇÕES (REVISED ROADMAP 2018/19)

- *Action Iva: Complete the implementation of a global biogeochemical profiling float array, with all data freely exchanged within the ocean community.*

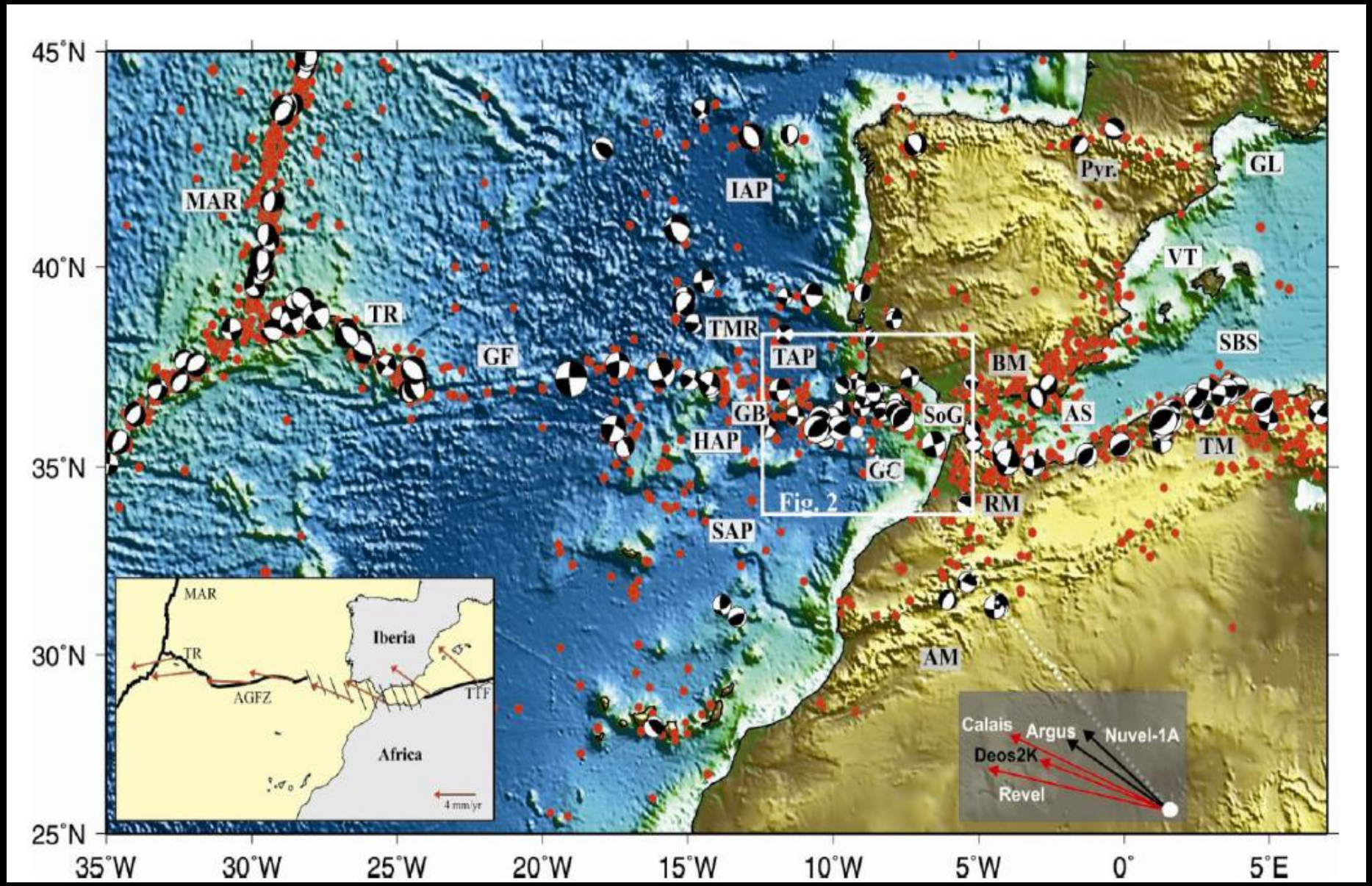
- *Action Ivb: Complete the initial deployment of a Deep Ocean Observing System, including support for the conservation and sustainable use of marine biological systems beyond*

- *Objective (IV): Cooperation in observation, data and other infrastructure*

- *mapping of bathymetry and benthic communities, including around subduction zones and hot vents.*


Um país a caminho dos
4.000.000 km²
North Atlantic Ocean
Madrid
Portugal
(Lisbon) Lisboa
Gibraltar
Rabat
Morocco
emepc
Estrutura de Missão para a
Extensão da Plataforma Continental
Imagem Google Earth

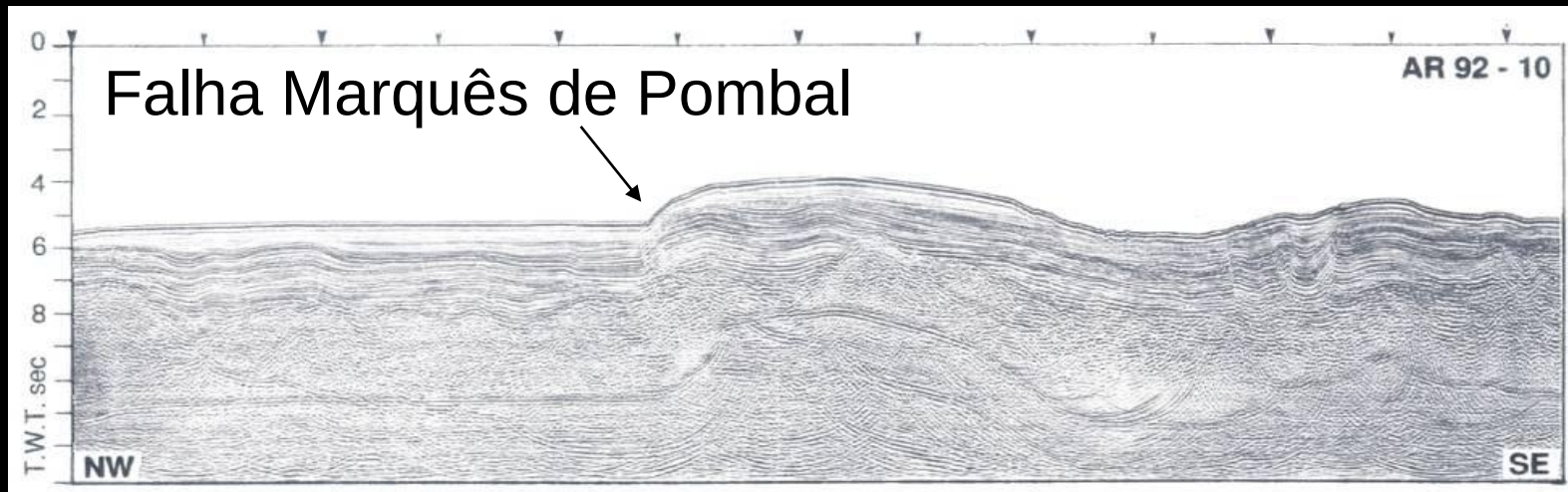
# A Margem W Ibérica e a Fronteira de Placa Açores-Gibraltar

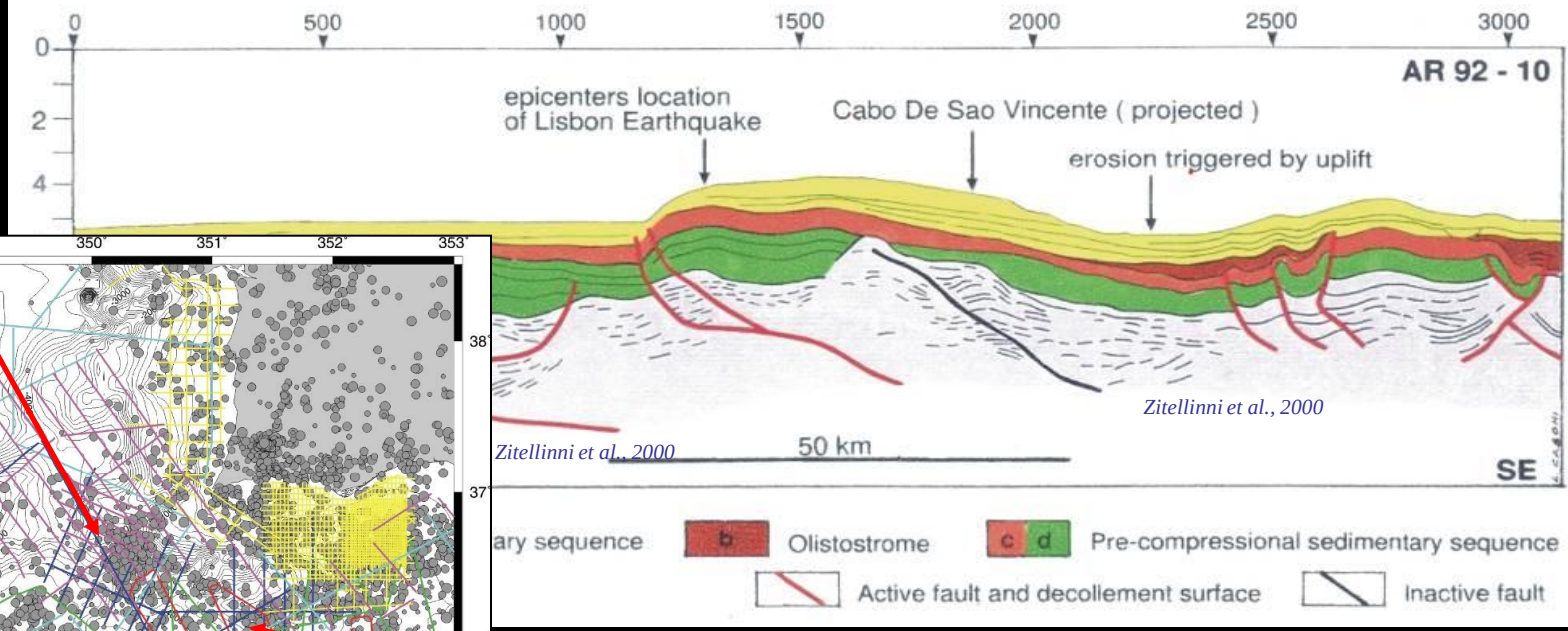


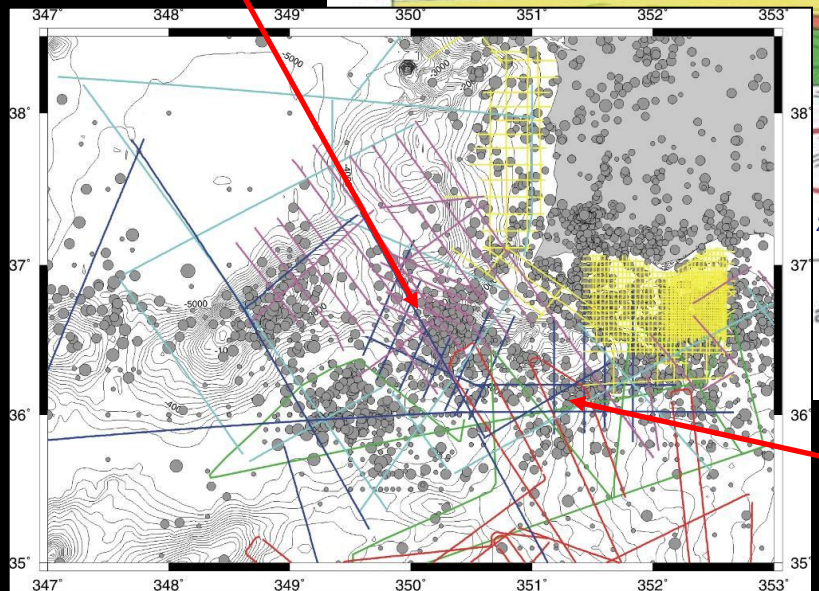

*Cunha et al., GJI (2012)*

# Risco sísmico – Falha Marquês de Pombal

Falha Marquês de Pombal

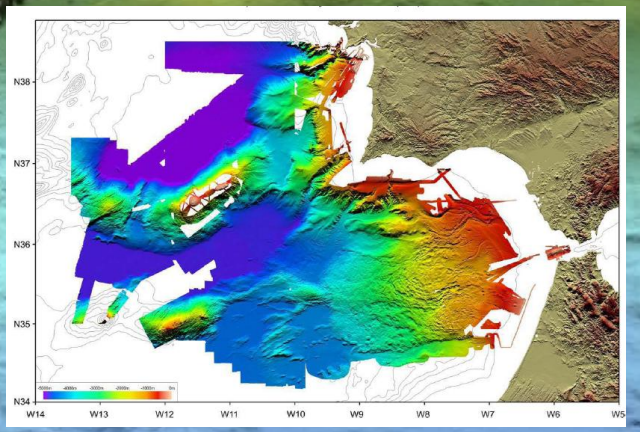


Falha da Ferradura

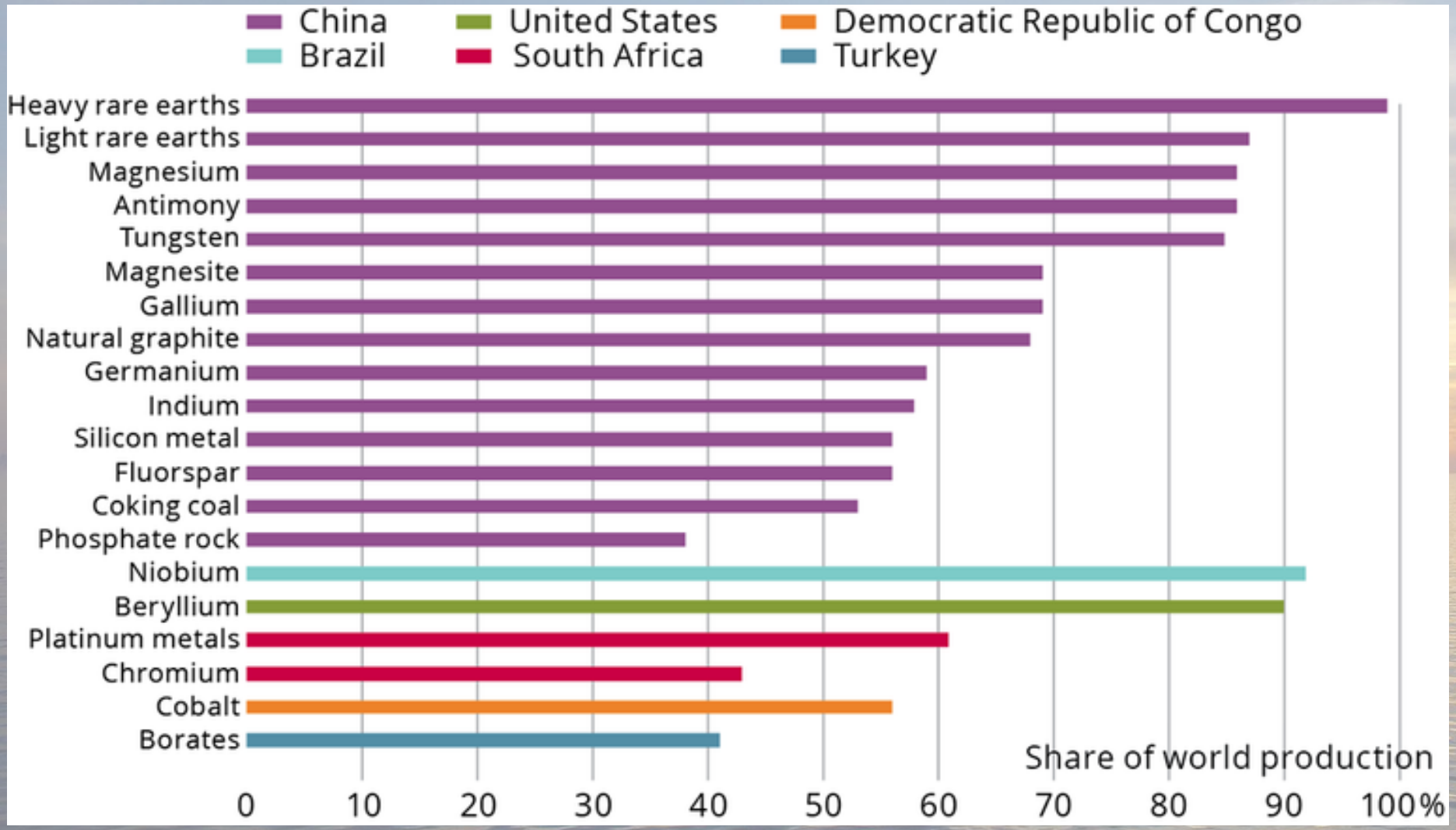
# Batimetria de alta resolução multifeixe. Margem Sul-Portuguesa – Projecto MATESPRO




Falha da Ferradura

# Sismo de Samatra, Dezembro de 2004

# European Commission – Critical Raw Materials



# ELEMENTS OF A SMARTPHONE

ELEMENTS COLOUR KEY: ALKALI METAL | ALKALINE EARTH METAL | TRANSITION METAL | GROUP 13 | GROUP 14 | GROUP 15 | GROUP 16 | HALOGEN | LANTHANIDE

## SCREEN

49 In Indium
50 Sn Tin
8 O Oxygen

Indium tin oxide is a mixture of indium oxide and tin oxide, used in a transparent film in the screen that conducts electricity. This allows the screen to function as a touch screen.

13 Al Aluminium
14 Si Silicon
8 O Oxygen
19 K Potassium

The glass used on the majority of smartphones is an aluminosilicate glass, composed of a mix of alumina ($Al_2O_3$) and silica ($SiO_2$). This glass also contains potassium ions, which help to strengthen it.

39 Y Yttrium
57 La Lanthanum
65 Tb Terbium
59 Pr Praseodymium
63 Eu Europium
66 Dy Dysprosium
64 Gd Gadolinium

A variety of Rare Earth Element compounds are used in small quantities to produce the colours in the smartphone's screen. Some compounds are also used to reduce UV light penetration into the phone.

## ELECTRONICS

Copper is used for wiring in the phone, whilst copper, gold and silver are the major metals from which microelectrical components are fashioned. Tantalum is the major component of micro-capacitors.

29 Cu Copper
47 Ag Silver
79 Au Gold
73 Ta Tantalum

Nickel is used in the microphone as well as for other electrical connections. Alloys including the elements praseodymium, gadolinium and neodymium are used in the magnets in the speaker and microphone. Neodymium, terbium and dysprosium are used in the vibration unit.

28 Ni Nickel
66 Dy Dysprosium
59 Pr Praseodymium
65 Tb Terbium
60 Nd Neodymium
64 Gd Gadolinium

Pure silicon is used to manufacture the chip in the phone. It is oxidised to produce non-conducting regions, then other elements are added in order to allow the chip to conduct electricity.

14 Si Silicon
8 O Oxygen
51 Sb Antimony
33 As Arsenic
15 P Phosphorus
31 Ga Gallium

Tin & lead are used to solder electronics in the phone. Newer lead-free solders use a mix of tin, copper and silver.

50 Sn Tin
82 Pb Lead

## BATTERY

3 Li Lithium
27 Co Cobalt
8 O Oxygen
6 C Carbon
13 Al Aluminium

The majority of phones use lithium ion batteries, which are composed of lithium cobalt oxide as a positive electrode and graphite (carbon) as the negative electrode. Some batteries use other metals, such as manganese, in place of cobalt. The battery's casing is made of aluminium.

## CASING

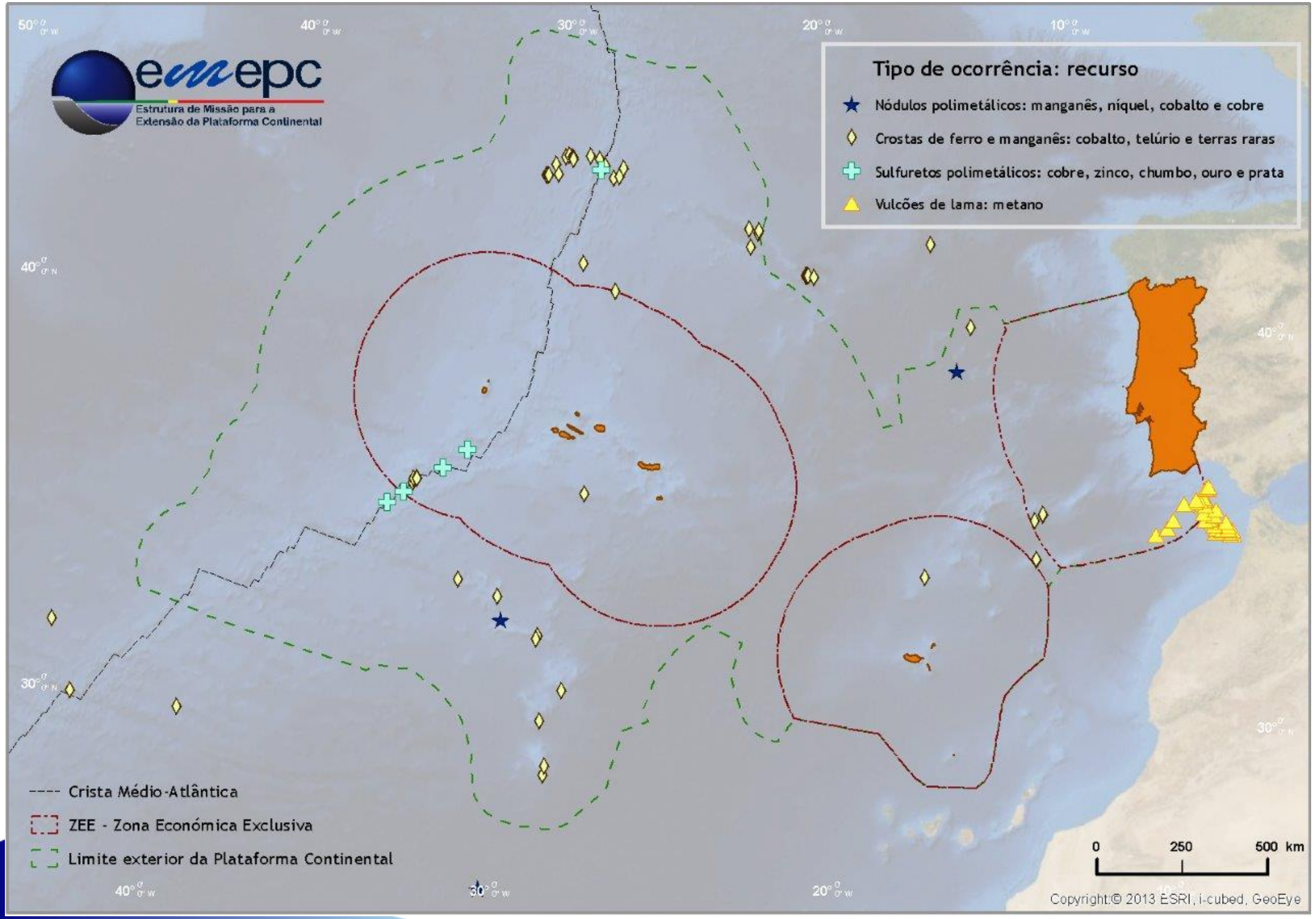
Magnesium compounds are alloyed to make some phone cases, whilst many are made of plastics. Plastics will also include flame retardant compounds, some of which contain bromine, whilst nickel can be included to reduce electromagnetic interference.

6 C Carbon
12 Mg Magnesium
35 Br Bromine
28 Ni Nickel

# European Commission – Critical Raw Materials

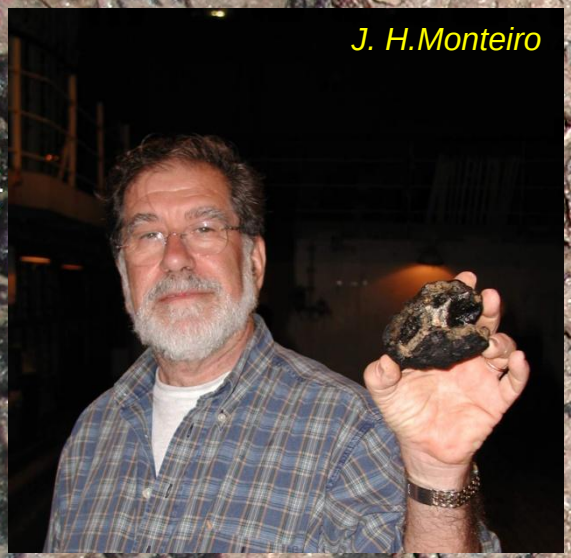

Source: Ree applications in a hybrid electric vehicle. Molycorp Inc. 2010

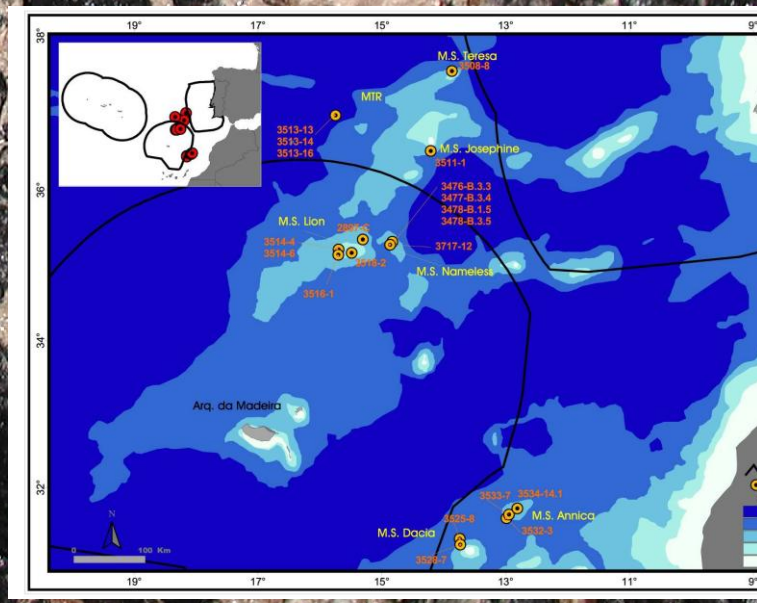
1. Cerium: UV cut glass, Glass and mirrors, polishing powder, LCD screen, catalytic converter, hybrid NiMH battery, Diesel fuel additive
2. Dysprosium: Hybrid electric motor and generator
3. Europium: LCD screen
4. Lanthanum: Catalytic Converter, Hybrid NiMH battery, diesel fuel additive
5. Neodymium: magnets in 25+ electric motors throughout vehicle, Headlight Glass, Hybrid electric motor and generator
6. Praseodymium: Hybrid electric motor and generator
7. Terbium: Hybrid electric motor and generator
8. Yttrium: LCD screen, component sensors


emepc
Estrutura de Missão para a Extensão da Plataforma Continental
Tipo de ocorrência: recurso
Nódulos polimetálicos: manganês, níquel, cobalto e cobre
Crostas de ferro e manganês: cobalto, telúrio e terras raras
Sulfuretos polimetálicos: cobre, zinco, chumbo, ouro e prata
Vulcões de lama: metano
Crista Médio-Atlântica
ZEE - Zona Económica Exclusiva
Limite exterior da Plataforma Continental
0
250
500 km
Copyright:© 2013 ESRI, i-cubed, GeoEye

# Crostas de Fe/Mn ricas em Cobalto

# ZEE da Madeira Cruzeiro TTR11 - 2001



# Nódulos e Crostas Polimetálicas ricas em Cobalto

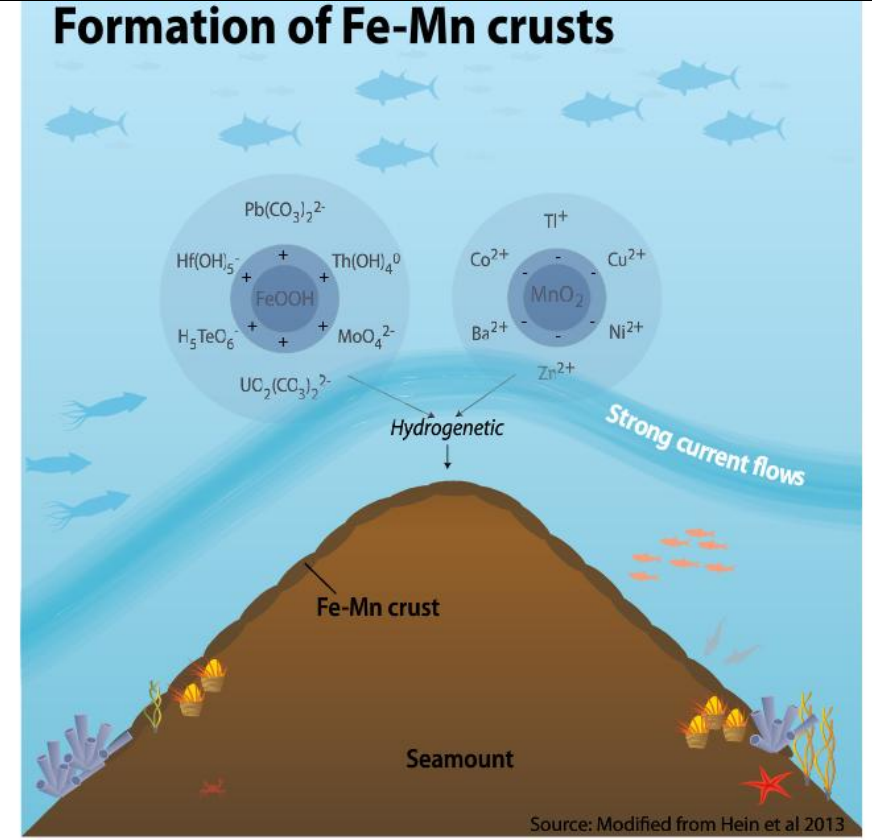



***Figure 3. Formation of cobalt-rich ferromanganese crusts.*** *Adapted from Hein 2004.*

Nódulos conhecidos desde a Expedição do HMS Challenger (1872-76).

20-30% Manganês, 10-20% Óxidos de Ferro, 1.5% Niquel e menos de 1% de **cobalto**, cobre, zinco e chumbo.

**Metais**: Co, Ni, Cu

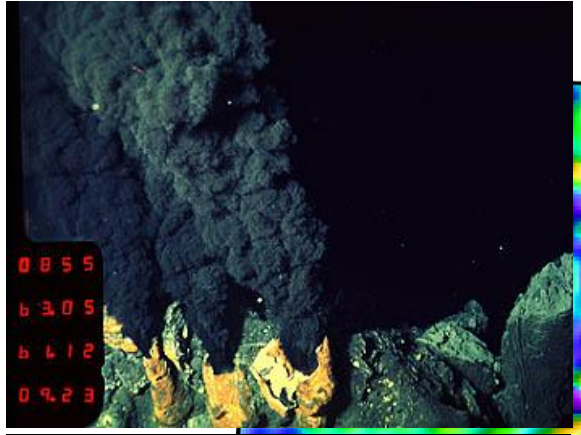
**Metais raros:** telúrio, platina, zircónio, nióbio, tungsténio e bismuto

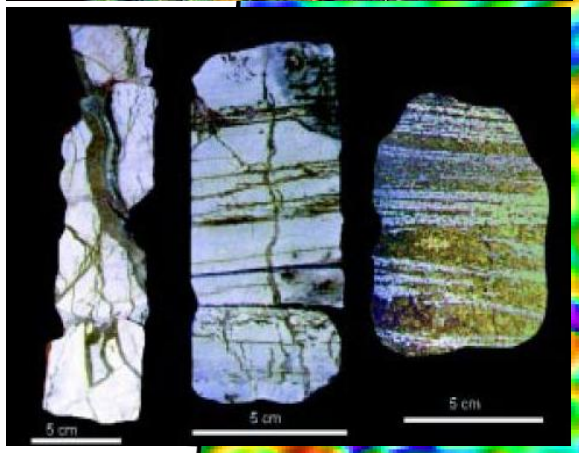
**Terras-raras:** lantânio, cério, noedímio,európio e térbio

As crostas são portanto um fonte potencial de muitos dos metais usados nas tecnologias emergentes.


ZEE da Madeira, Cruzeiro TTR11, 2001

# AÇORES






Azores I

Menez Gwenn

Lucky Strike

Saldanha

Rainbow

Hayes FZ

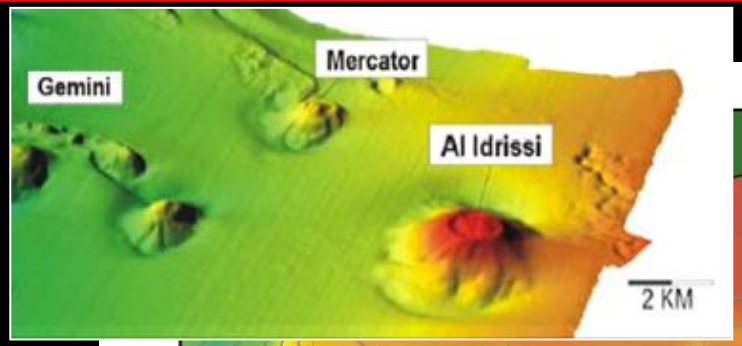
33°N

39°W 36°W 33°W 30°W 27°W

-75 -4 6 15 20 28 34 40 45 70 100 205

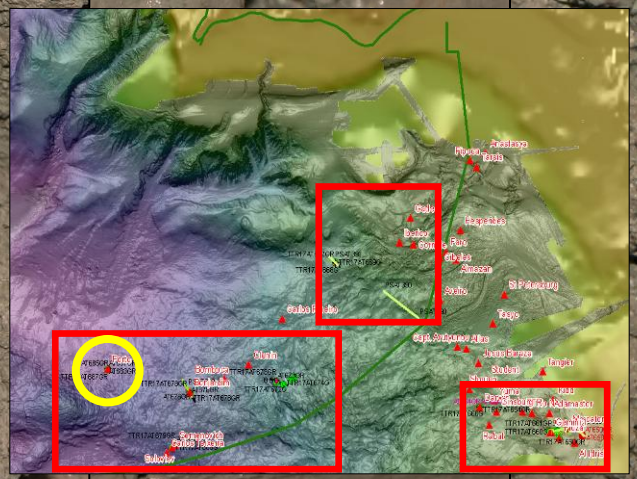
FAA (mGal)

# Mais de 50 Vulcões de Lama descobertos no Golfo de Cádiz, desde 1999



# TTR-17 LEG 2: Hidratos de gás do vulcão de lama Porto

MvSeis



# Mud volcanoes, mud cones and MDAC occurrences in the Gulf of Cadiz

Inferred gas hydrates

Collected gas hydrates

Mud cone

Mud volcano

**Hidratos de gás.**
**Sólidos cristalinos. 1 $cm^3$ HG 160 $cm^3$ gás.**

**Vulcões de lama Bonjardim, Ct. Arutjunov e Ginsburg.**

**Gás Termogénico 81%-88% metano; 12-19% $C_2$-$C_5$.**


9°W 8°W 7°W 6°W 36°N 35°N

Cibeles
St P
Carlos Ribeiro
Aveiro
Tasyo
Cap. Arutyun
Atlas
Jesus Baraza
Tangier
Porto
Olenin
Bomboca
Bonjardim
Shouen
Darwin
Kidd
Adamastor
Mercator
Rabat
Gemini
Al Idrisi
Fiuza
Semenovich
Soloviev
Carlos Teixeira
Meknes

*(Magalhaes, V. 2007)*

# Um Planeta, um Oceano

Muito obrigado pela vossa atenção!

THE DECADE WILL PROVIDE A 'ONCE IN A LIFETIME' OPPORTUNITY FOR NATIONS TO WORK TOGETHER TO GENERATE THE GLOBAL OCEAN SCIENCE NEEDED TO SUPPORT THE SUSTAINABLE DEVELOPMENT OF OUR SHARED OCEAN.

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

COMITÉ PORTUGUÊS PARA A COI
PORTUGUESE COMMITTEE FOR THE IOC
COMITÉ PORTUGAIS POUR LA COI