Seminar on Exploration, Sustainable Access and Extraction of Raw Materials

Exploration and Extraction of Marine Mineral Resources in Europe

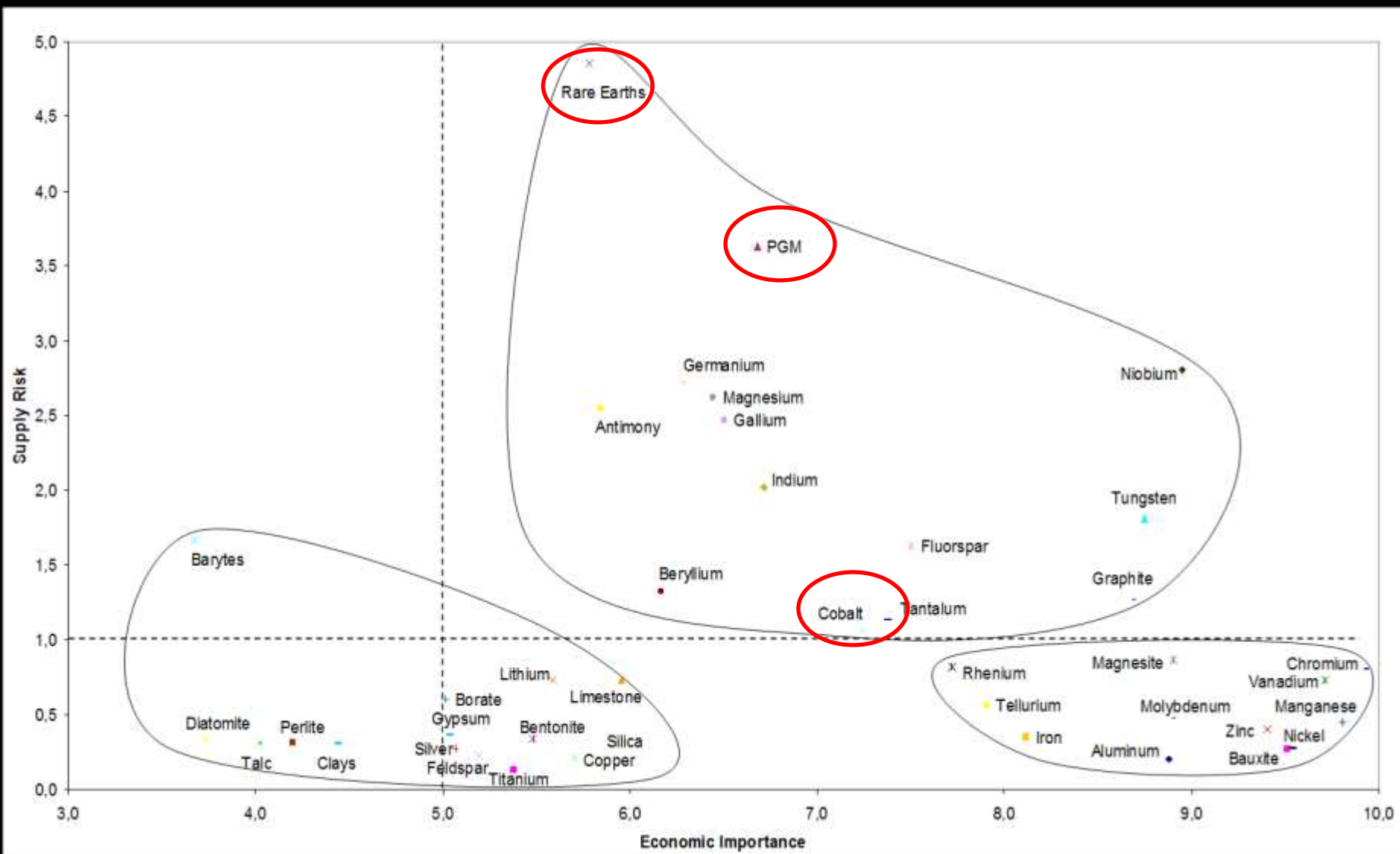Fernando Barriga

Pedro Madureira

Universidade de Lisboa

Estrutura de Missão para Extensão da Plataforma Continental

January 9, 2014
Scotland House Conference Centre

Source: Report of the Ad-hoc Working Group on defining critical raw materials.
DG Enterprise and Industry, EU.

EUROPE 2020

European Commission › Europe 2020 › Europe 2020 in a nutshell › Priorities › Sustainable growth

A A+ A++   Print   Sitemap   RSS   Share

Europe 2020

Europe 2020 in a nutshell

Priorities

Targets

Flagship initiatives

Other tools for growth and jobs

Who does what

European institutions and bodies

EU Member States

Regional and local authorities

Sustainable growth - for a resource efficient, greener and more competitive economy

Sustainable growth means:

- building a **more competitive low-carbon economy** that makes efficient, sustainable use of resources

- **protecting the environment**, reducing emissions and preventing biodiversity loss

- capitalising on Europe's leadership in developing **new green technologies** and production methods

- introducing **efficient smart electricity grids**

- **harnessing EU-scale networks** to give our businesses (especially small manufacturing firms) an additional competitive advantage

- **improving the business environment,** in particular for SMEs

- **helping consumers** make well-informed choices.

Popular links

- Living with climate change in Europe [en]

- Greenhouse gas monitoring and reporting [en]

- Eco-innovation for a sustainable future [de] [en] [es] [fr] [it]

- Sustainable and responsible business [...]

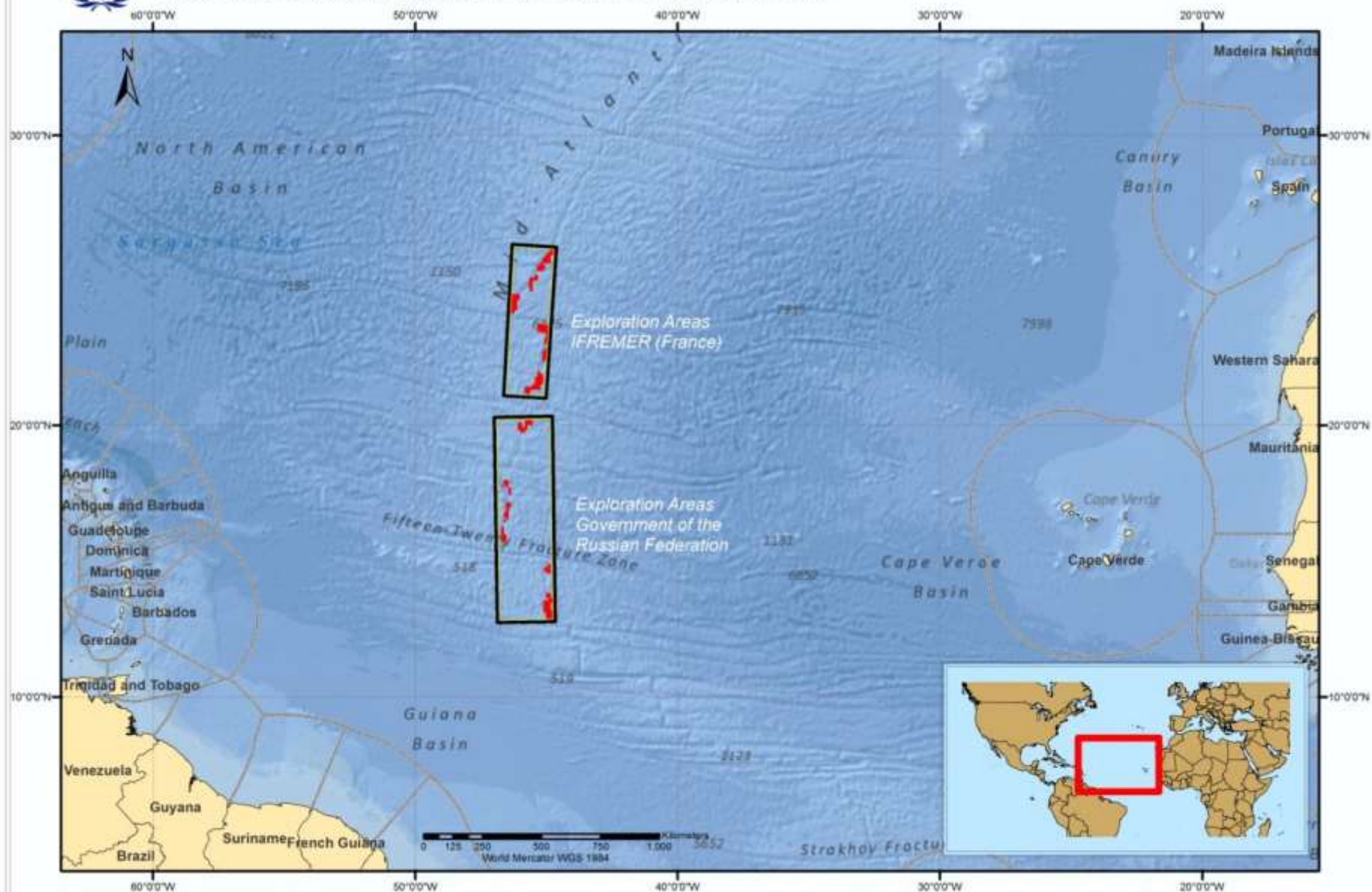- Information and communication technologies for sustainable growth [en]

Useful download

- Energy 2020 - A strategy for competitive, sustainable and secure energy [...]

Polymetallic Sulphides Exploration Areas on the Mid-Atlantic Ridge
Areas under contract or approved by the International Seabed Authority

Exploration Areas
IFREMER (France)

Exploration Areas
Government of the
Russian Federation

Madeira Islands

Portugal

Canary Basin

Spain

Western Sahara

Mauritania

Cape Verde

Cape Verde

Senegal

Gambia

Guinea-Bissau

North American Basin

Sargasso Sea

Plain

Anguilla

Antigua and Barbuda

Guadeloupe

Dominica

Martinique

Saint Lucia

Barbados

Grenada

Trinidad and Tobago

Venezuela

Guyana

Suriname French Guiana

Brazil

Guiana Basin

Cape Verde Basin

Fifteen-Twenty Fracture Zone

Strakhov Fracture

World Mercator WGS 1984

0 125 250 500 750 1,000 Kilometers

© International Seabed Authority, 2013. Background map: ESRI
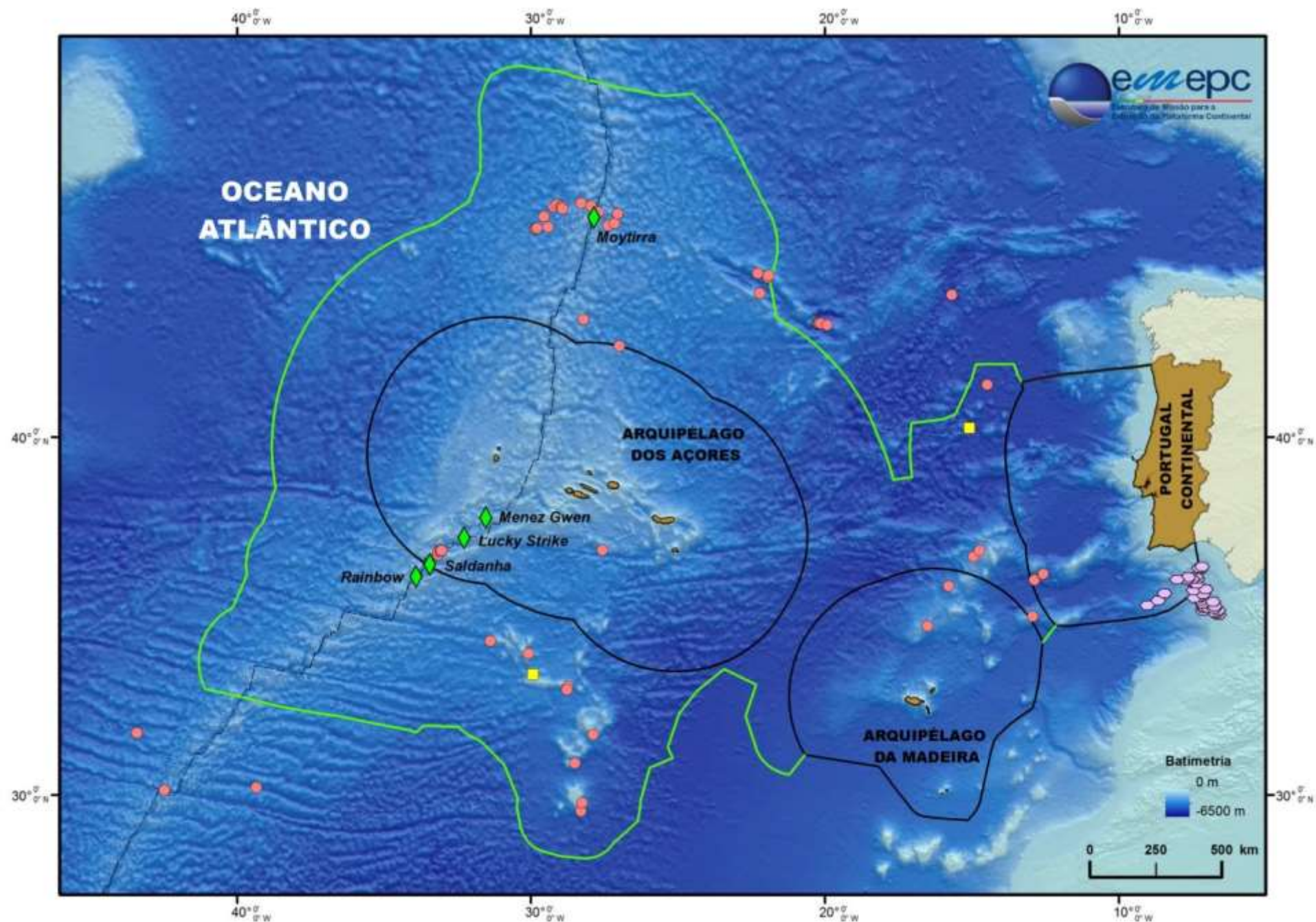

■ Exploration block (approx. 10 x 10 km)

☐ Confinement area containing 100 polymetallic sulphides exploration blocks*

— EEZ Boundaries (VLIZ 2011)

* According to the Regulations on prospecting and exploration for polymetallic sulphides, a maximum of 100 exploration blocks (not exceeding 100 sq. km) must be arranged in clusters with at least five contiguous blocks. Clusters need not to be contiguous, but shall be confined within a rectangular area, where the longest side does not exceed 1,000 km.

RECURSOS MINERAIS DA PLATAFORMA CONTINENTAL PORTUGUESA

OCEANO ATLÂNTICO

Moytirra

ARQUIPÉLAGO DOS AÇORES

PORTUGAL CONTINENTAL

Menez Gwen

Lucky Strike

Rainbow   Saldanha

ARQUIPÉLAGO DA MADEIRA

Batimetria
0 m
-6500 m

0   250   500 km

Portugal and MOMAR vent fields

- 1993: Alvin cruise (USA, 2 Portuguese researchers, PR)
- 1994: Diva 1 and Diva 2 cruises (France, 3 PR)
- 1997: Flores cruise (EU, 5 PR)
- 1998: Saldanha (Portugal and France, 9 PR)
- 2002: Seahma (Portugal, 17 PR)
- Several biology cruises with submersibles
- Many cruises without submersibles

2009 – first expedition to hydrothermal vents with Portuguese-owned equipment, including ship and submersible

ROV
Luso
6.000 m depth

logística de
campanha
*campaign
logistics*

câmara HD e 2 lasers de escala
HD camera and 2 laser scaling device

luzes de alta
intensidade
(7500 watts)
HID lights (7500watts)

transmissor e receptor
acústico de posicionamento
*USBL (Ultra ShortBaseLine
positioning system)*

sensor de
CO$_2$ e CH$_4$
*CO$_2$ and CH$_4$
sensor*

umbilical
umbilical

flutuador
buoyancy

propulsores
(4 horizontais
+ 3 verticais)
*thrusters (4 horizontal
+ 3 vertical)*

LUSO

Bathysaurus XL

amostrador
biológico
biological suction sampler

garrafas
*Niskin
Niskin bottles*

manipulador
de 5 funções
5 function arm

CTD c/ sensores:
* fluorescência
* turbidez
* O$_2$

*CTD with fluorescence,
turbidity and O$_2$ sensors*

manipulador
de 7 funções
7 function arm

girobússola
fluxgate compass

sala de
controlo
control room

caixa de
amostragem
sampling box

suporte para *corers*
corers holder

altímetro
altimeter

DVL
(Doppler Velocity Logger)

garrafa electrónica
electronic bottle
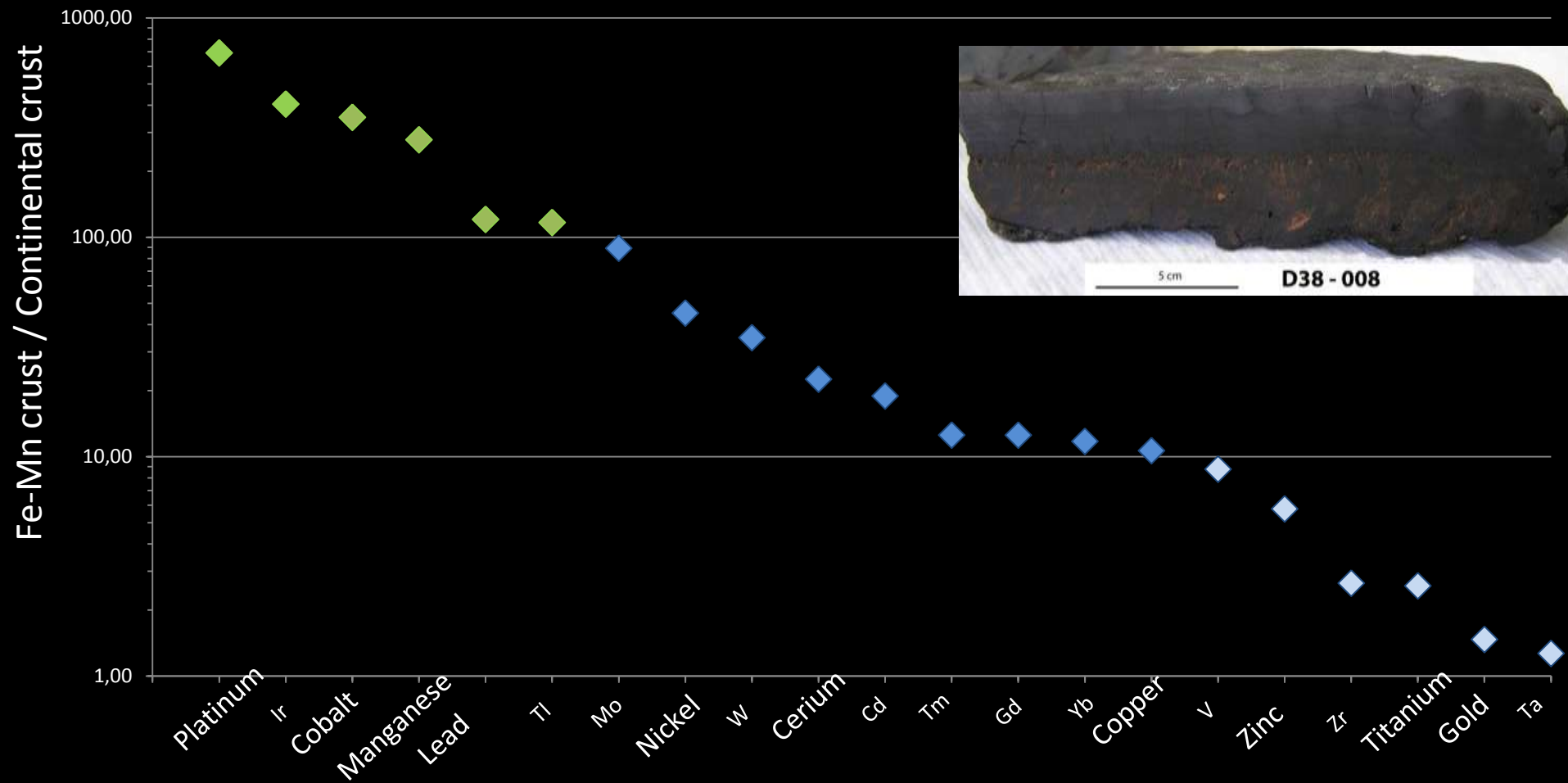
Research in esms and ssms

- Ample knowledge
- VMS + sms deposits
- Huge economic potential
- Blue Mining
  - Exploration for extinct and sub-seafloor ms deposits
  - Turning resources into reserves

blue mining

Since 2007

Metal enrichment in Atlantic Fe-Mn crusts

	Identified resources		Unidentified
	Demonstrated	Inferred	Hypothetical Speculative
Economic	Reserves	Inferred reserves	
Sub-economic	Demonstrated resources	Inferred resources	

Increasing economic viability

Increasing geological knowledge

McKelvey (1972)

Environmental concerns

Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach

Technical Study: No. 9