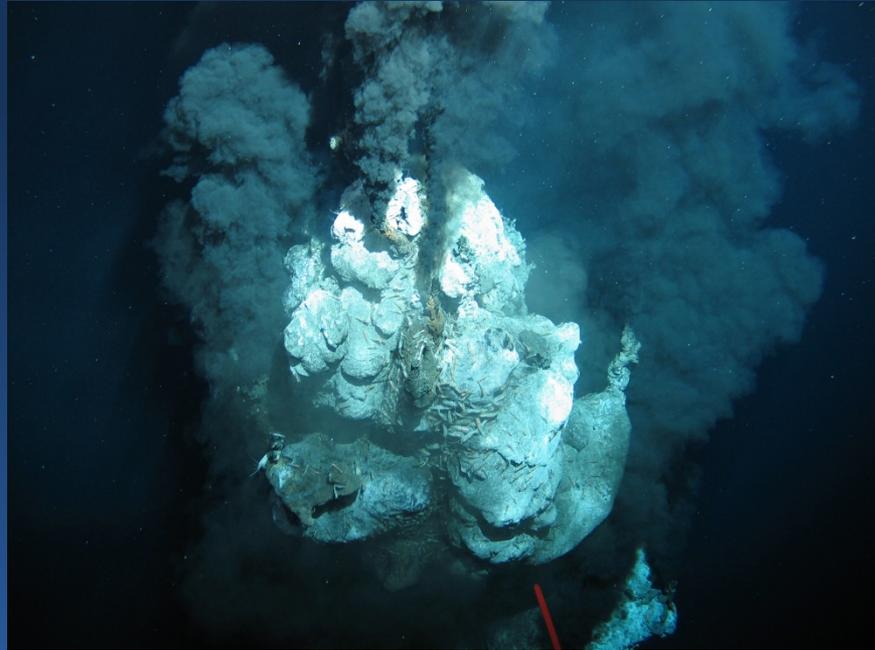


# Data Needs for Deep-Sea Mining



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**KDM**

Konsortium Deutsche Meeresforschung

# German Marine Research Consortium

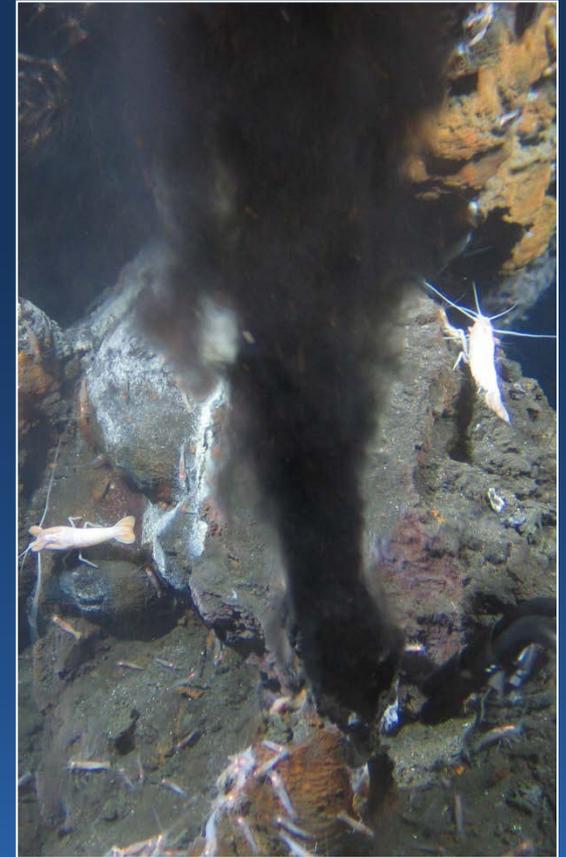


- ☞ KDM is the representative body of Germany's major marine research centres
- ☞ With over 2,200 scientists, KDM provides comprehensive expertise to meet global challenges having to do with the sea and our environment.

# Goal of session

Challenges to ensure the **needs of end users**, especially mining industry and oil/gas companies: which data? Which functionalities, how do web GIS systems contribute to support their activities? **How do these systems contribute to the secure supply of Europe with energy and raw materials?**

Example: massive sulphides.



# What data is out there?

Among the outstanding questions is how many (massive sulphide) deposits might be accessible to deep-sea mining (Hannington *et al*, *Geology*, 2011)

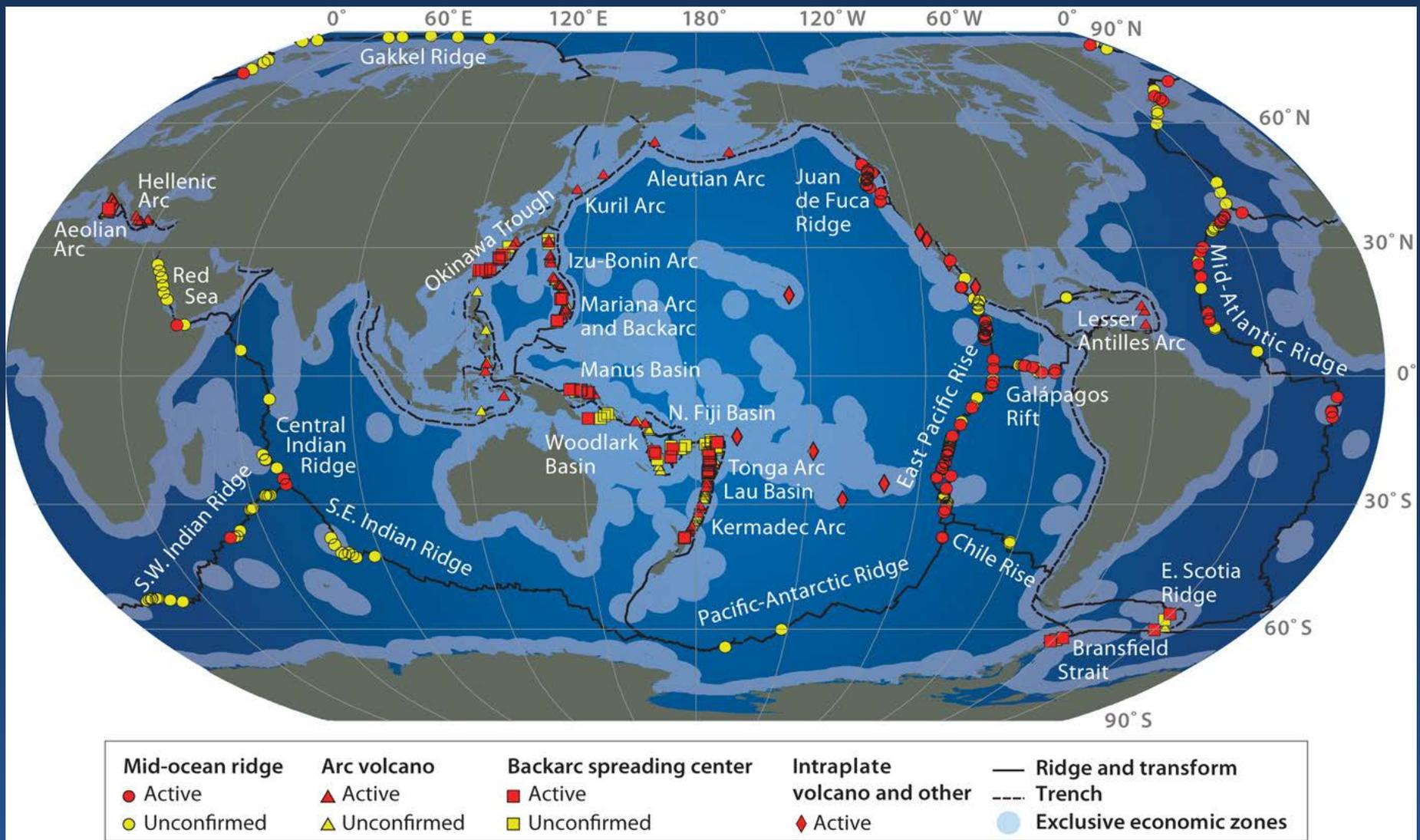
Global distribution of seafloor hydrothermal systems and related mineral deposits:

- ➡ InterRidge Global Database (to be merged with ChEssBase - Biodiversity & biogeography of species from deep-water chemosynthetic ecosystems)
- ➡ International Seabed Authority

Seabed Mapping – much more needs to be done ...

- ➡ European Commission – may invest about 170 million Euro (2014-2020)
- ➡ Google - looks impressive but has a resolution of only a few km for most of the oceans

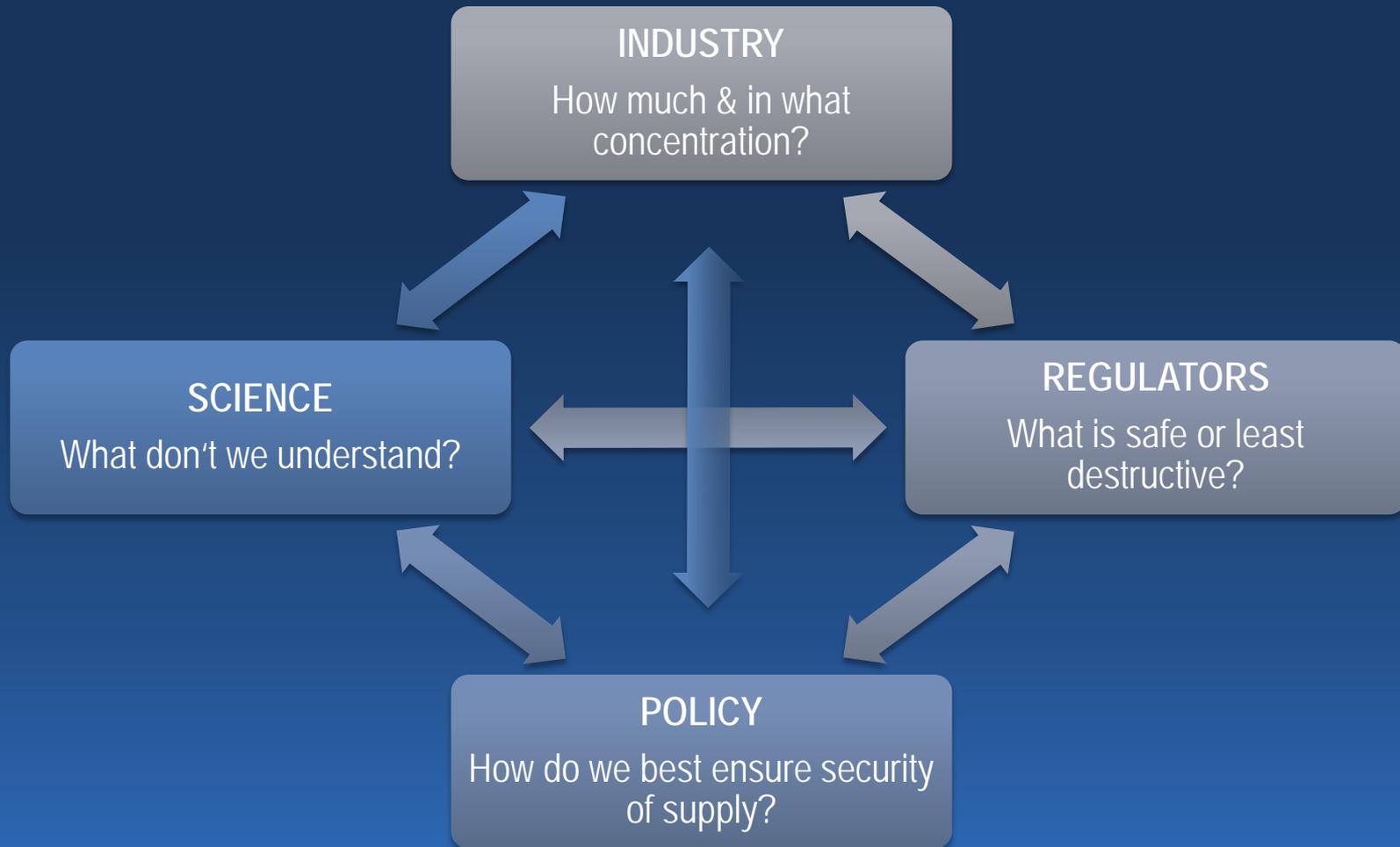




# Global distribution of seafloor hydrothermal systems and related mineral deposits.

Version 2.0 of the InterRidge Global Database

# But the key question is ... Who are end-users?



# The Science Perspective

... key global studies still rely on statistical analysis.

## **Geology**

### **The abundance of seafloor massive sulfide deposits**

Mark Hannington, John Jamieson, Thomas Monecke, Sven Petersen and Stace Beaulieu

*Geology* 2011;39;1155-1158  
doi: 10.1130/G32468.1



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# Data needs for exploitation

- ☞ Massive corporate investment needed to map the oceans at the resolution required for resource exploration. Unfortunately we don't have the equivalent of ocean satellites. The various Navies might have done some of this, but I can imagine that a fleet of "Google Inc" vessels or AUVs would be needed to map the oceans at the necessary resolution. This is essential for the future viability of marine mineral resources, as individual countries or companies do not have the resources to conduct both baseline mapping and more focused resource exploration. One must precede the other, and both are needed to ensure a pipeline of projects to sustain a marine minerals industry.
- ☞ Beyond a global bathymetric map, there is clear need for geophysical mapping of the oceans to reveal the resource potential beneath the sediments.
- ☞ We need to remap the oceans with a resolution of 5 m or less.

Hannington 2013



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# Data Gathering in Europe – COM Plans

Flagship project to prepare a seamless multi-resolution digital seabed map of European waters by 2020. This should be:

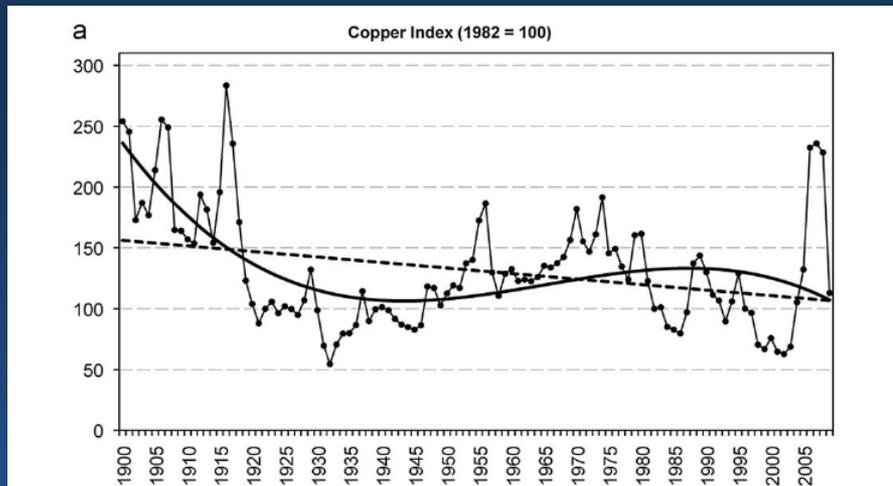
- highest resolution possible, covering topography, geology, habitats and ecosystems.
- accompanied by access to timely observations and information on the present and past physical, chemical and biological state of the overlying water column, by associated data on human activities, by their impact on the sea and by oceanographic forecasts.
- nourished by a sustainable process that progressively improves its fitness for purpose and helps Member States maximise the potential of their marine observation, sampling and surveying programmes.
- All this should be easily accessible, interoperable and free of restrictions on use.

Funding: €170 million for 2014-2020 from DG MARE and coupled to the Marine Service of Copernicus



# Economic Analyses

But even if we have data, its the economic analysis, which will influence industry most. Here there is still much work to be done ...



Hoaglund et al, *Marine Policy* (2009)....

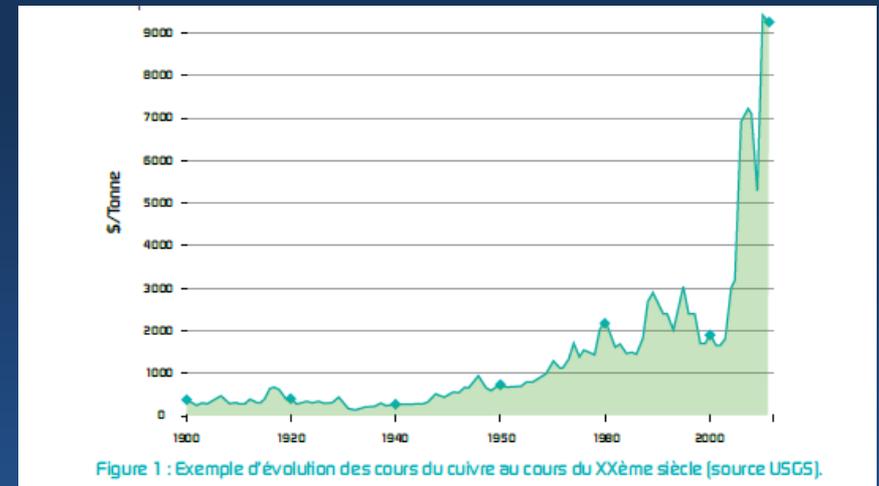


Figure 1 : Exemple d'évolution des cours du cuivre au cours du XXème siècle (source USGS).

Ifremer, *Remima project report*, 2011

USGS data developed and interpreted in different terms

# The Regulatory Needs

- ☞ There are no established global standards by which minerals shall be exploited

Europe ☞ *Marine Strategy Framework Directive*

The Area ☞ The International Seabed Authority

- ☞ The International Marine Minerals Society's Code for Environmental Management of Marine Mining (submitted to ISA 2010)

Territorial Waters around the world

- ☞ There has been little progress toward creation of environmental regulatory systems specific to deep-sea mining by governments with jurisdiction over massive sulfide deposits (Halfar & Fujita, *Science*, 2007)



# Summary

Data is clearly needed, but it should to be coupled with an integrated debate about how we develop deep-sea mineral resources ...



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# Two medium-term proposals ...

JPI Oceans ([www.jpi-oceans.eu](http://www.jpi-oceans.eu))

- ➔ Pilot Action on deep-sea mining
- ➔ Foresight process on needs and the role of science

European Innovation Partnership on Raw Materials Pilot Project

- ➔ Promote an integrated pilot project on deep-sea mining
- ➔ Cooperate in Europe (and with international partners) to develop this new economic sector with the best knowledge and technologies and according to the highest standards



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# Short-term Action

Presentation to the  
Scientific and Technological Options Assessment (STOA) Panel

**Pushing the Frontiers of Technology:  
What role for the EU in supporting science  
& technology for deep-sea resource use?**



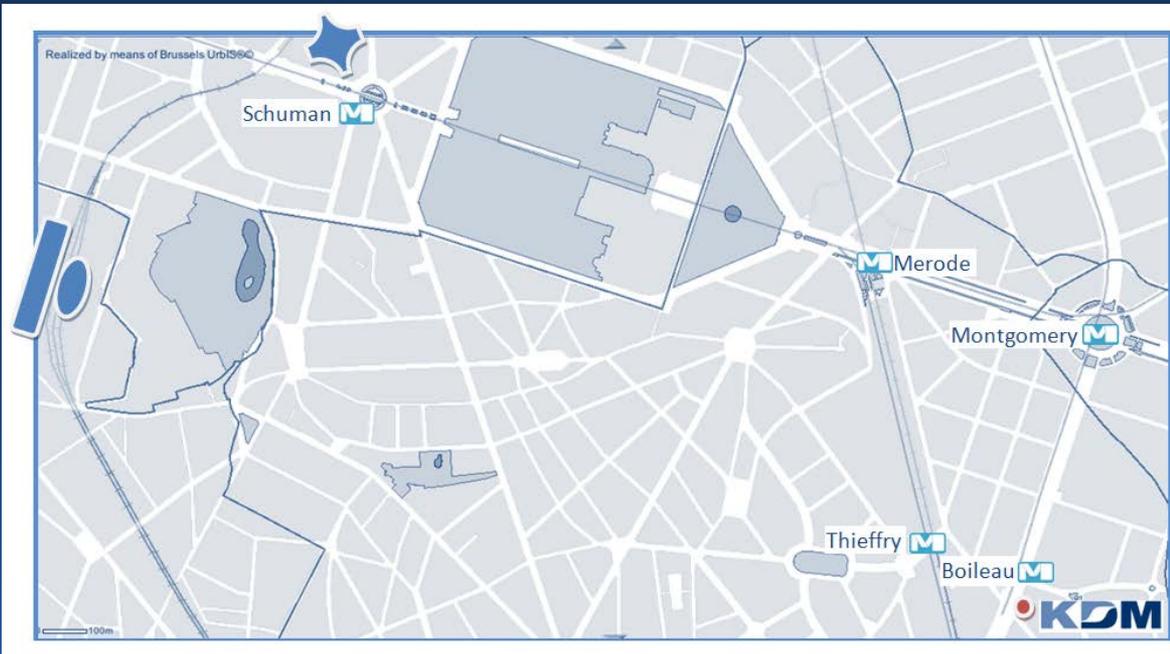
18 April 2013, 9:35 – 10:30, European Parliament Strasbourg

**Professor Antje Boetius**, Professor at the University of Bremen and Head of the Helmholtz-Max Planck Group for Deep-Sea Ecology and Technology, Germany

**Professor Fernando José Arraiano de Sousa Barriga**, Director, Centre for Mineral Resources, Mineralogy and Crystallography, University of Lisbon, Portugal

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