



# Mid-Ocean Ridges: scales, geology and stakeholders

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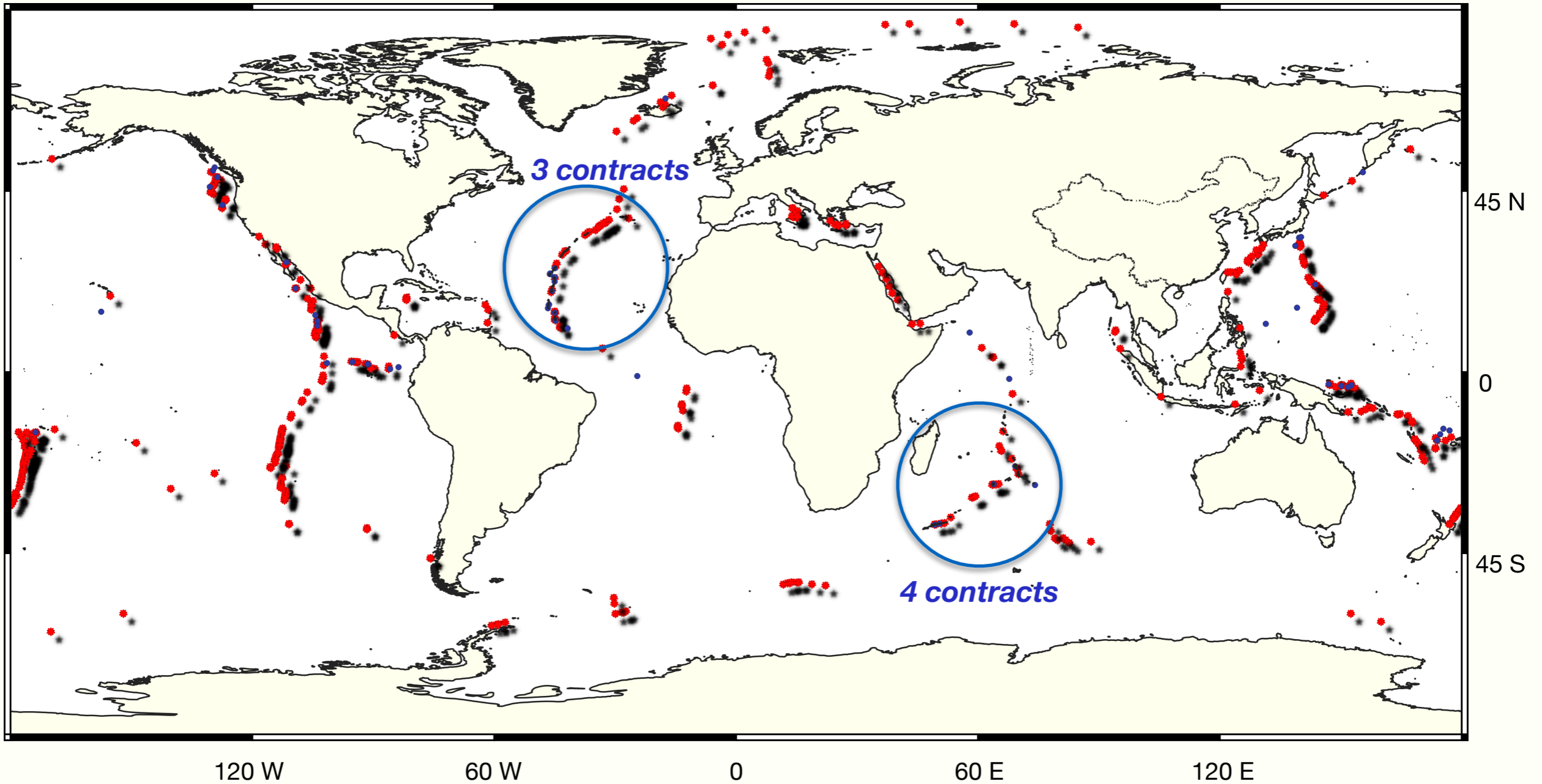
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Active vents: confirmed 257 - inferred 284

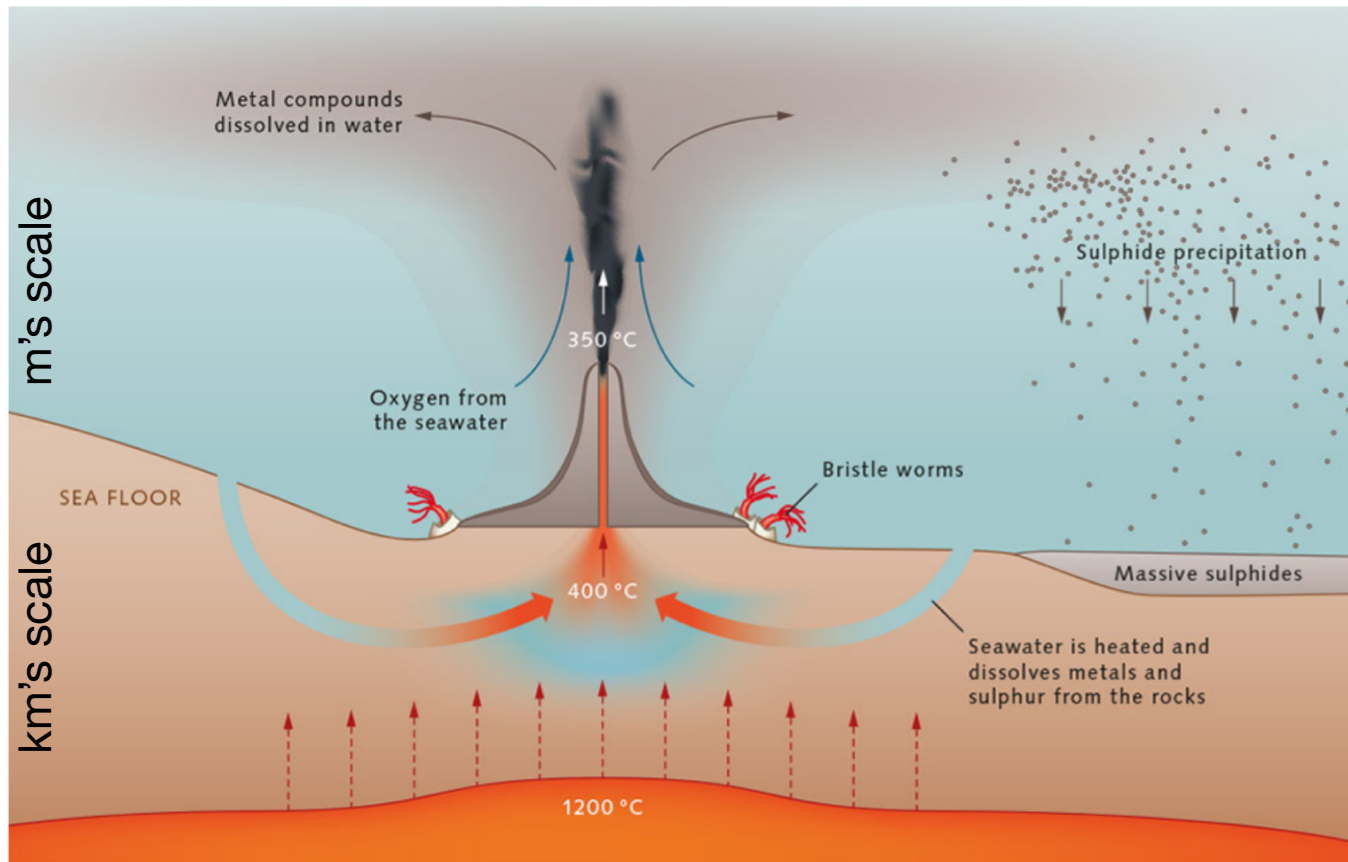
Inactive vents: confirmed 56



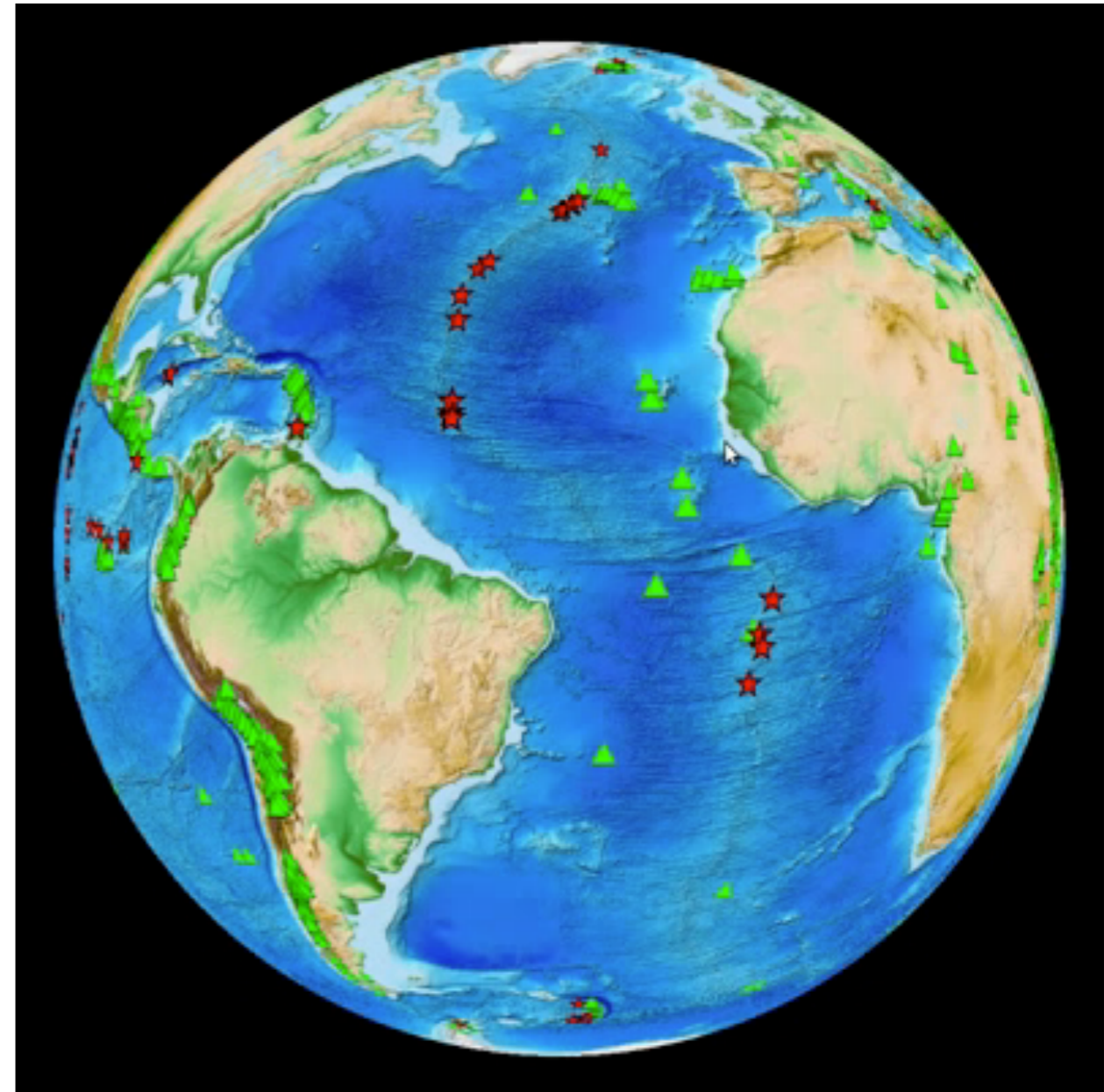
*60% located at MOR*

*50% located at slow and ultraslow spreading*

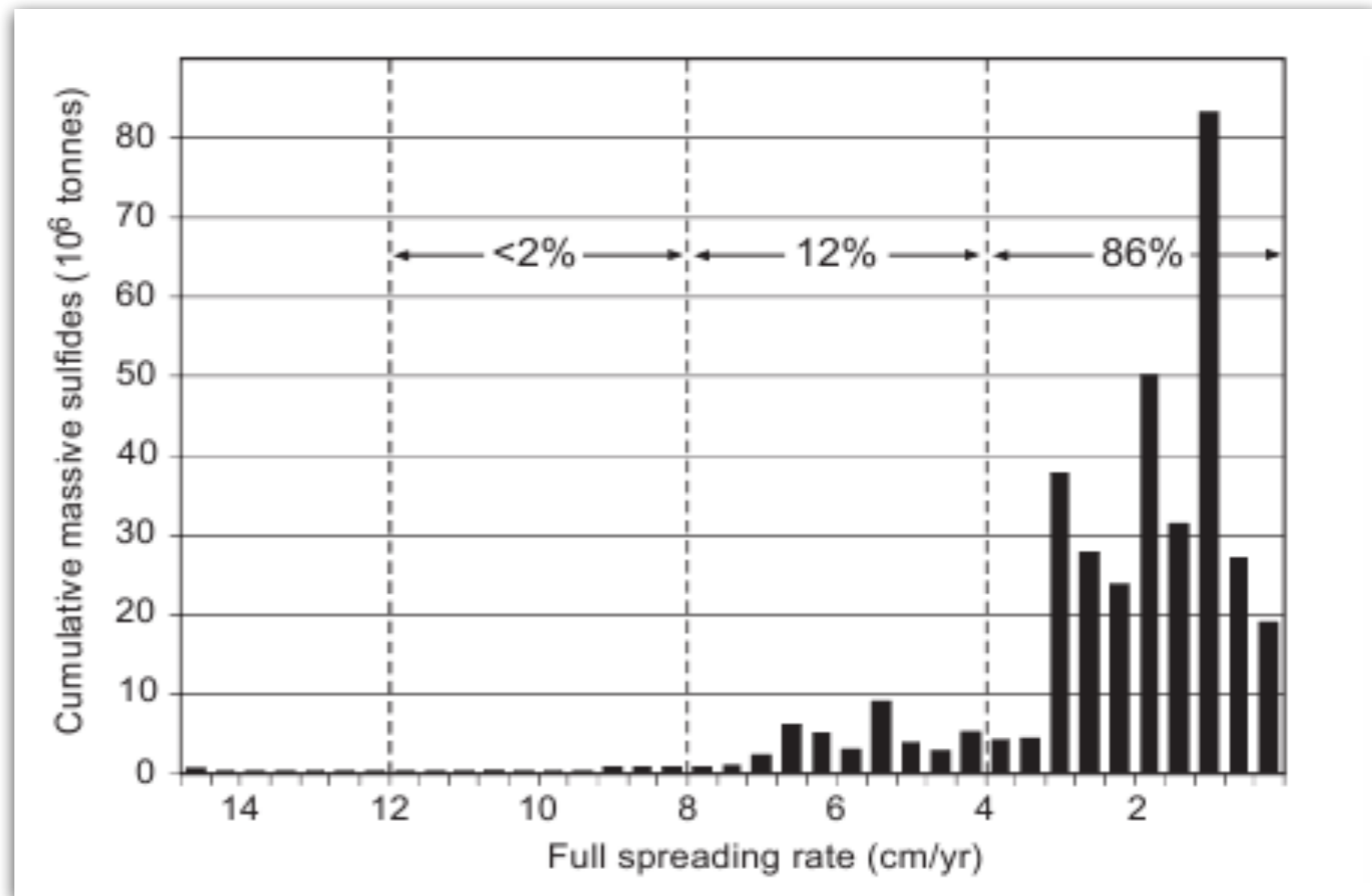
# Polytmetallic massive sulphide's orogeny



*Mulsow, 2015*

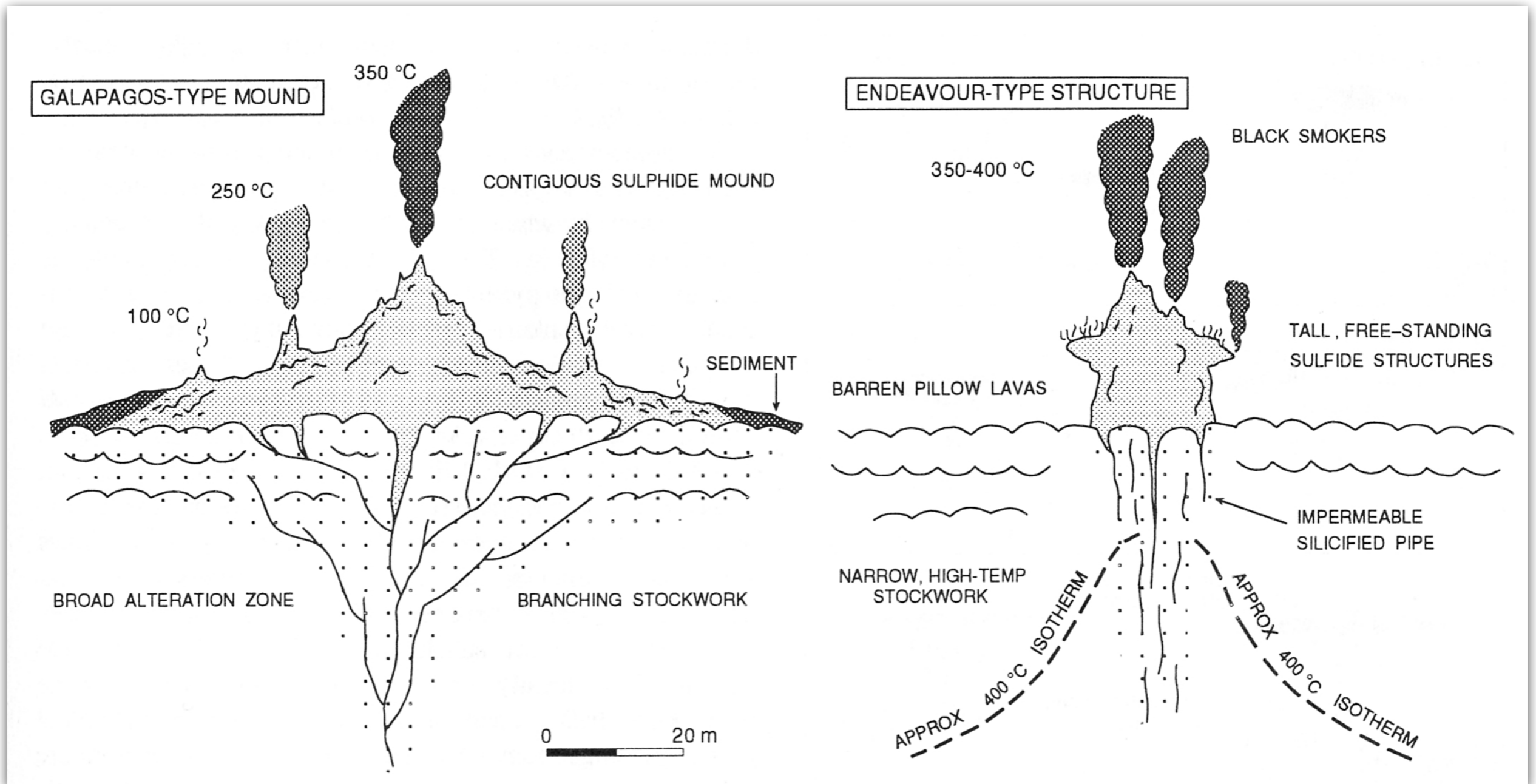


# Slow and ultraslow spreading ridges vents distribution

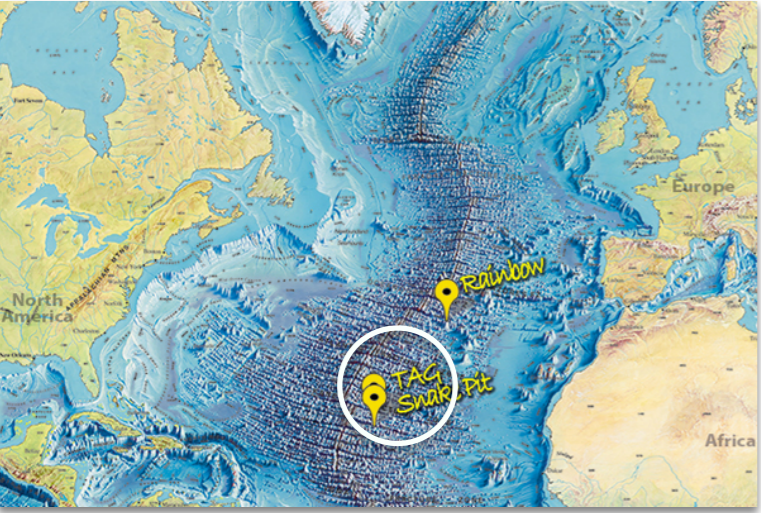


*Hannington et al., 2011*

# Morphology of Seafloor Massive Sulfides

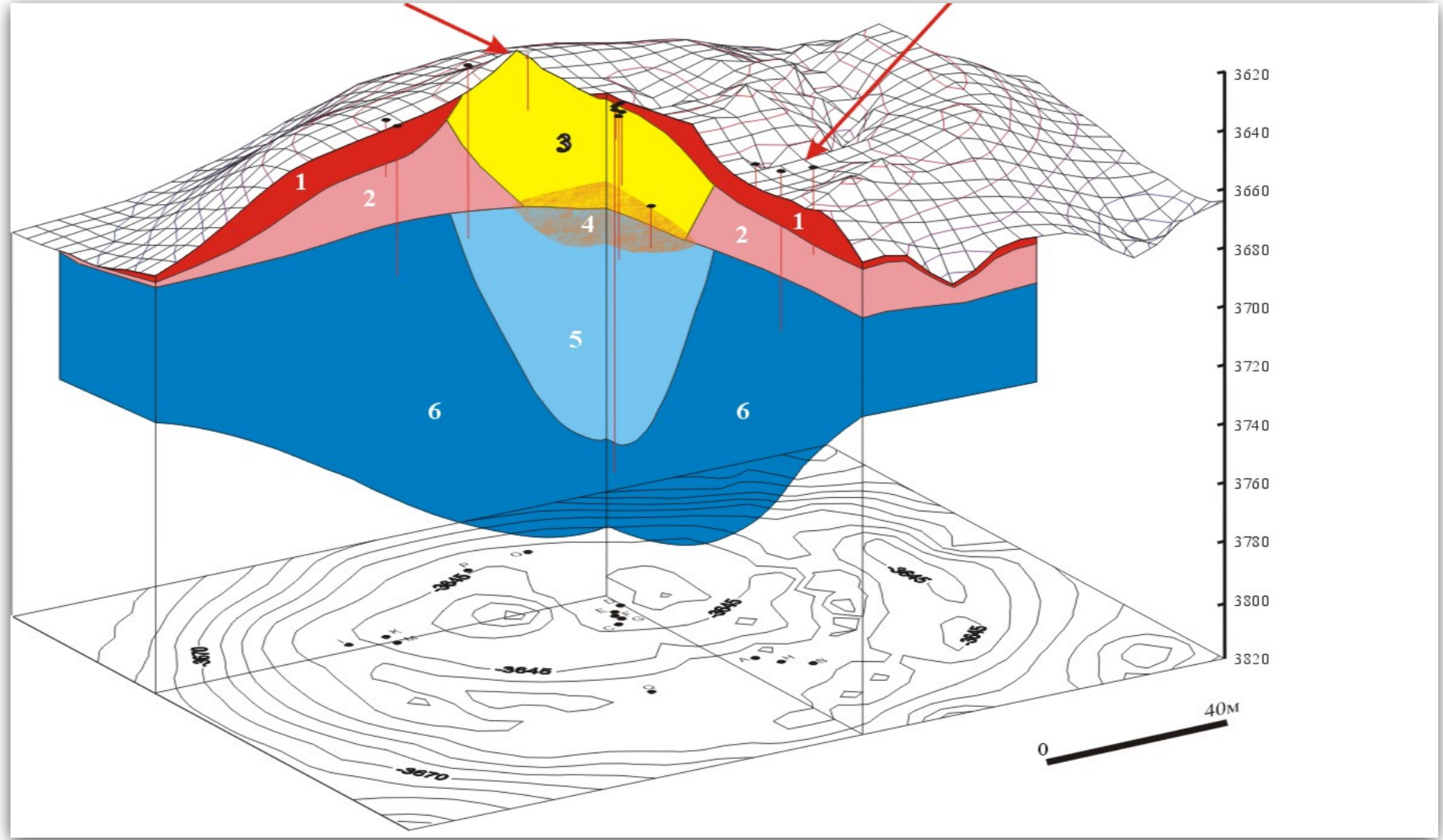


# MOR TransAtlantic Geotraverse (TAG): inner structure of an active mound



High-temperature venting Area  
Black smokers

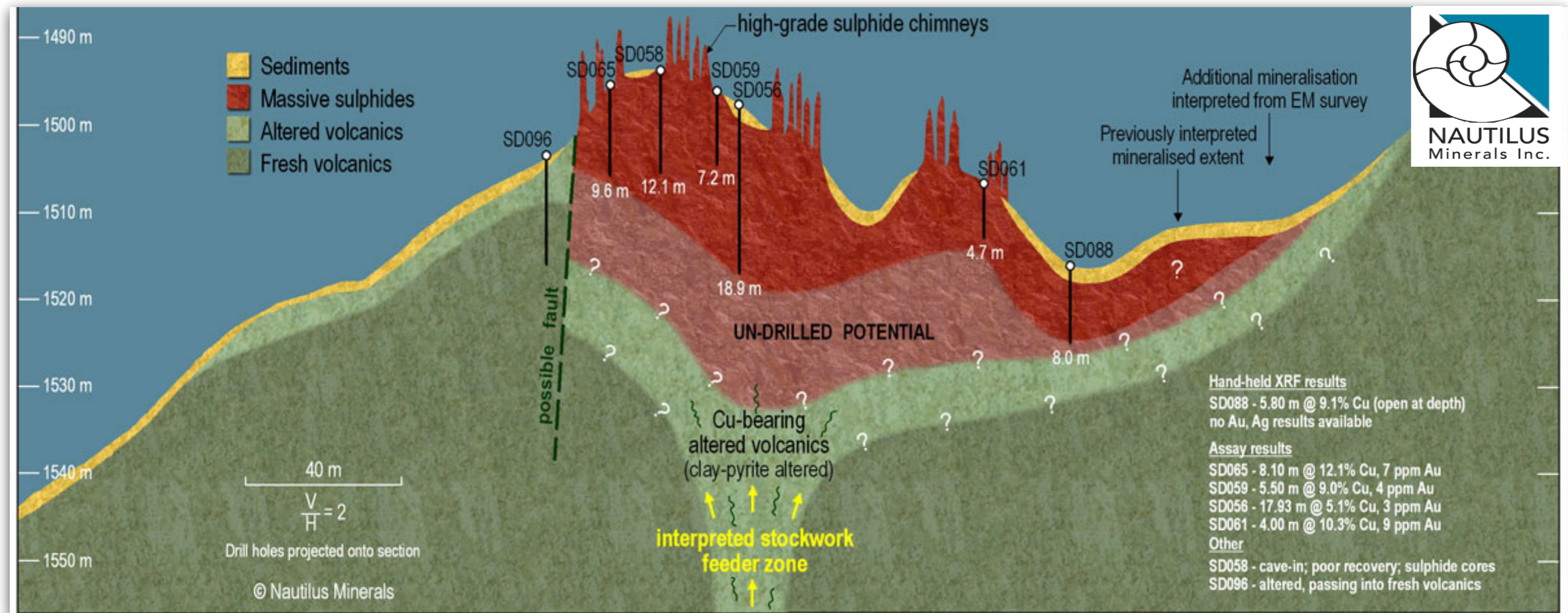
Low-temperature venting Area  
Kremlins



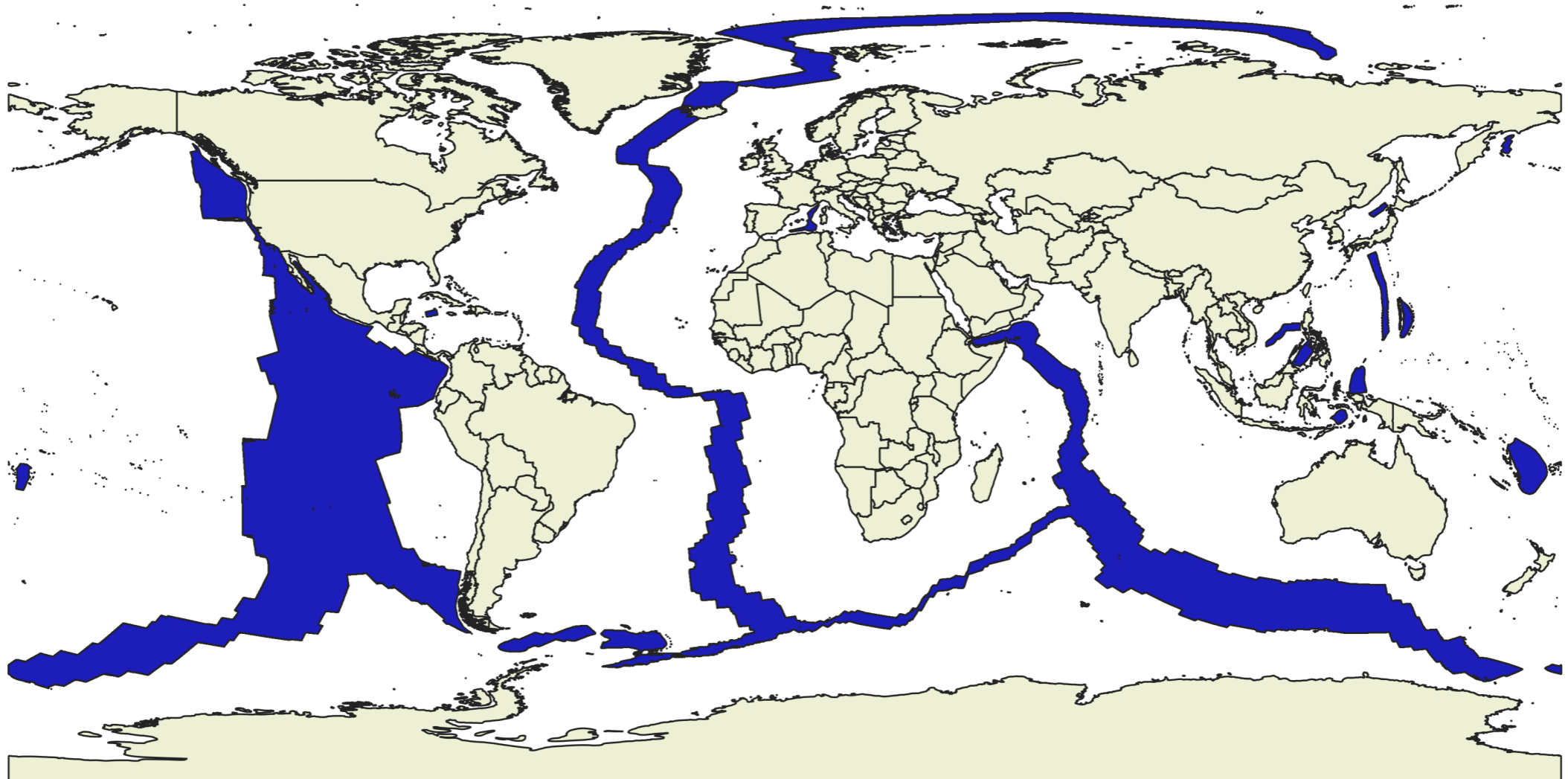
- 1- Cu-Zn sulfides
- 2 - Si-Cu-Zn zone
- 3 - Ca-Cu-Zn zone
- 4 - Ca zone
- 5 - Si-Ca zone
- Red lines – drill holes

# Island arc complex polymetallic massive sulphide: PNG Solwara 1

## Solwara 1 deposit NE-SW cross section (based on drilling results)

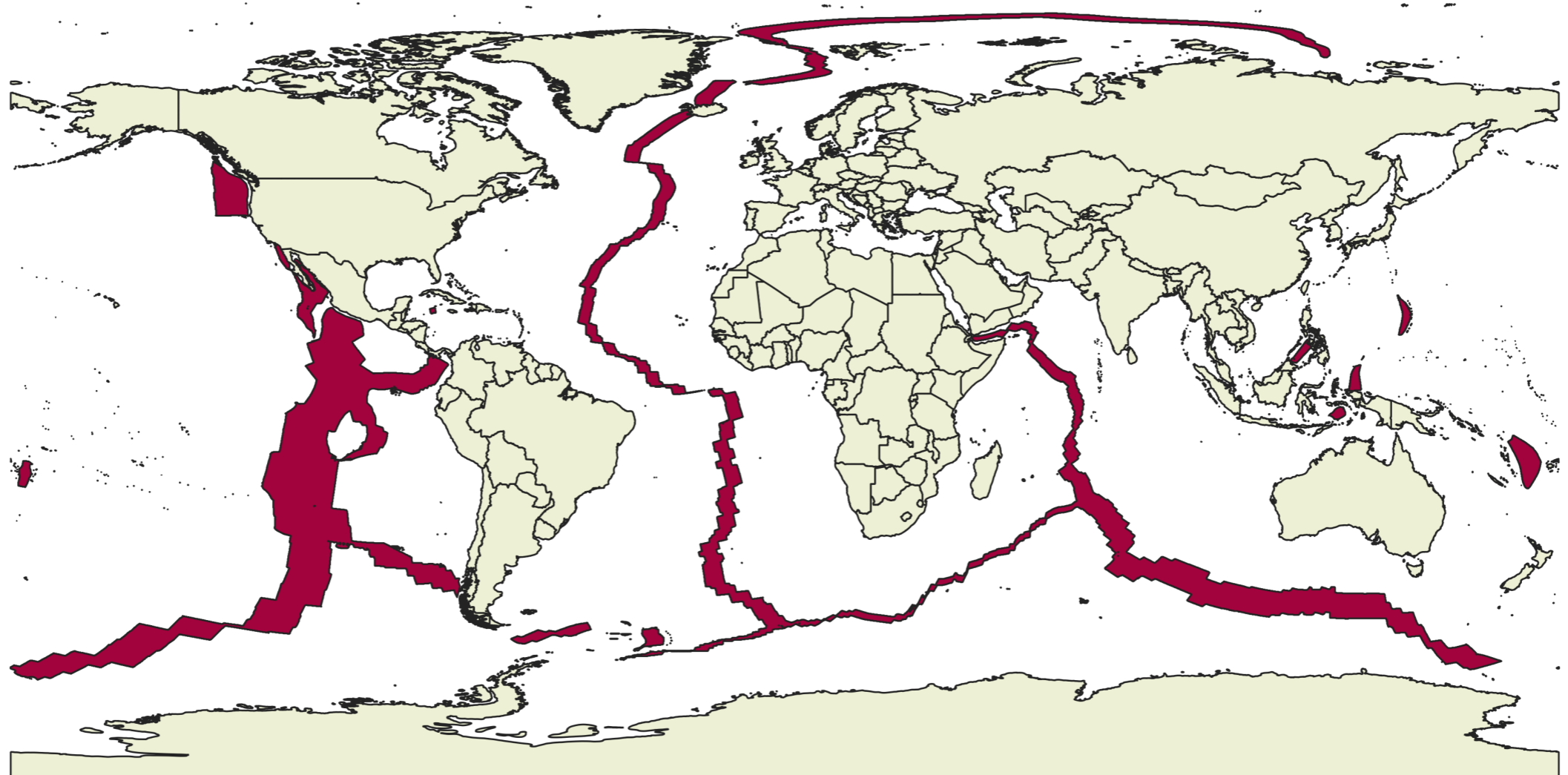


# Fast spreading centers: isocline of 20 million years

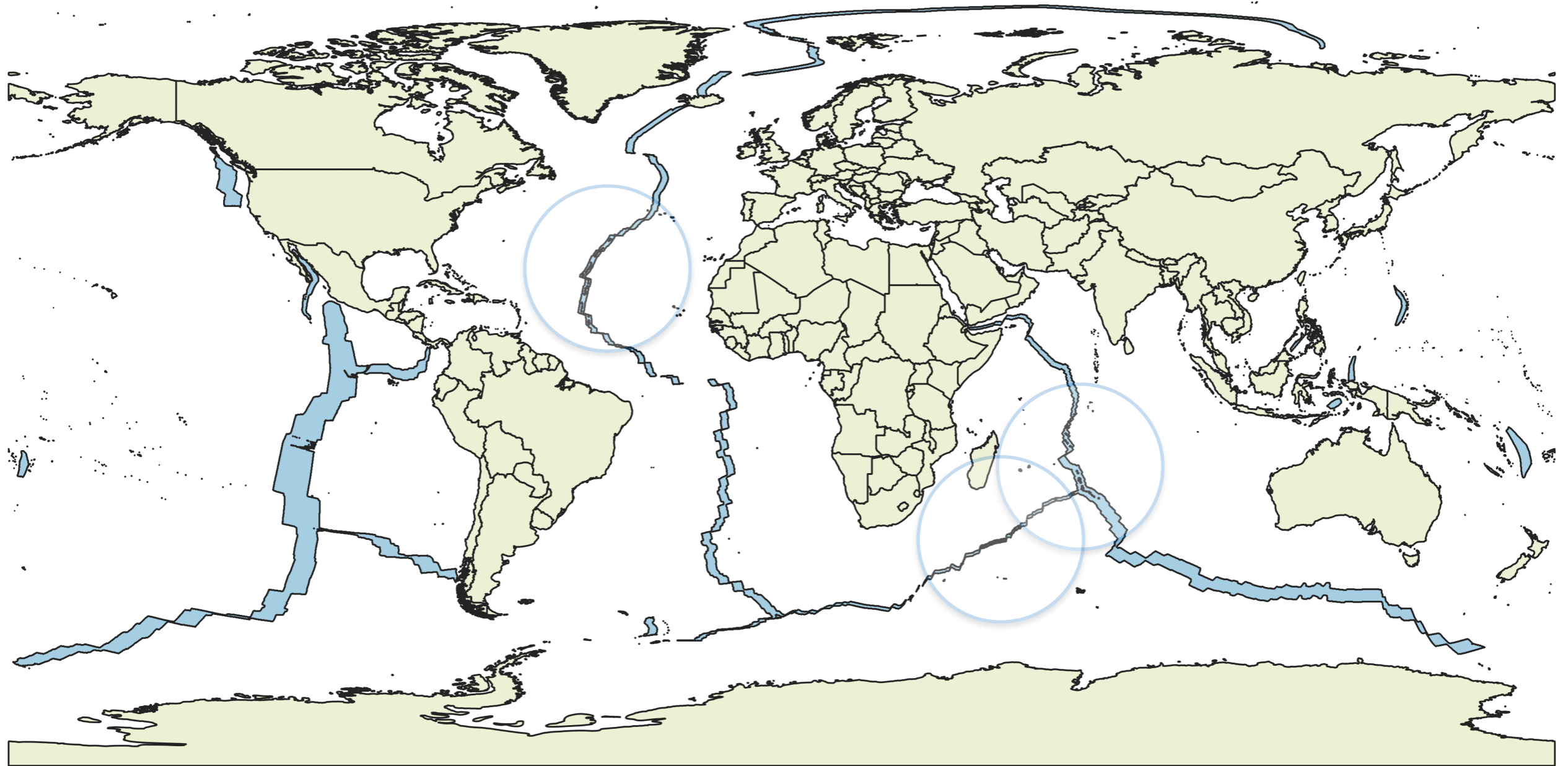




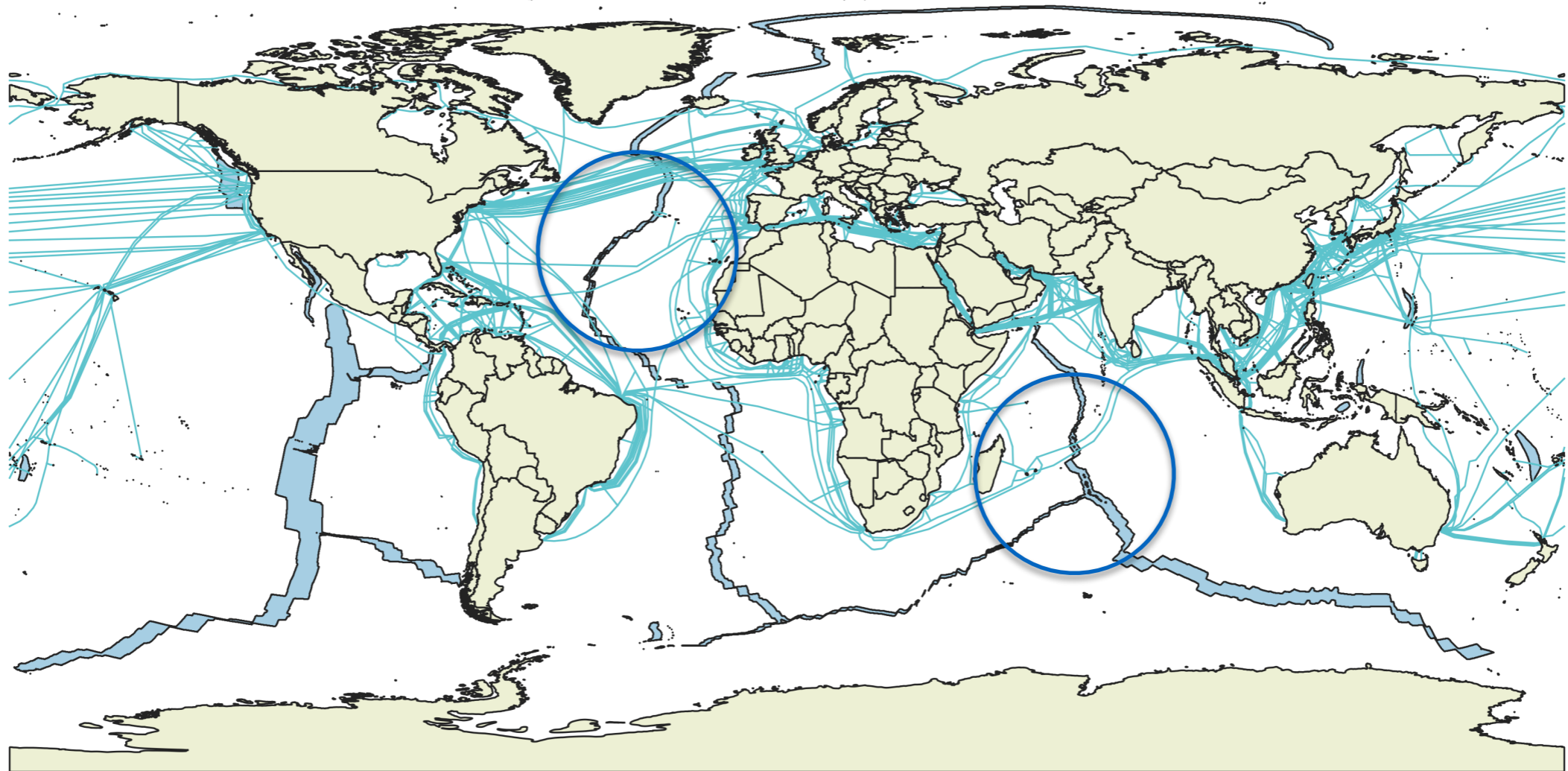
# Fast spreading centers: isocline of 10 million years



# Fast spreading centers: isocline of 5 million years



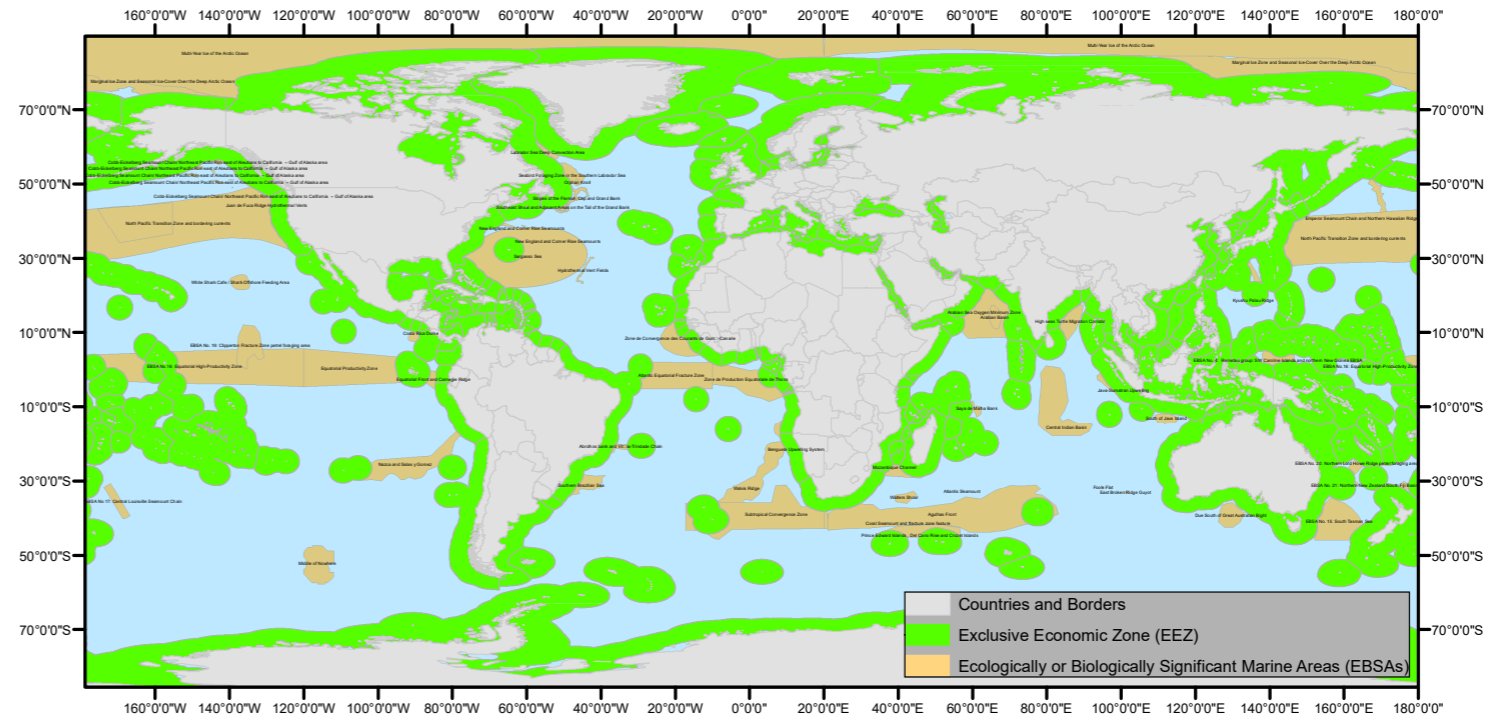
# ICPC comm cables as disclosed by ICPC



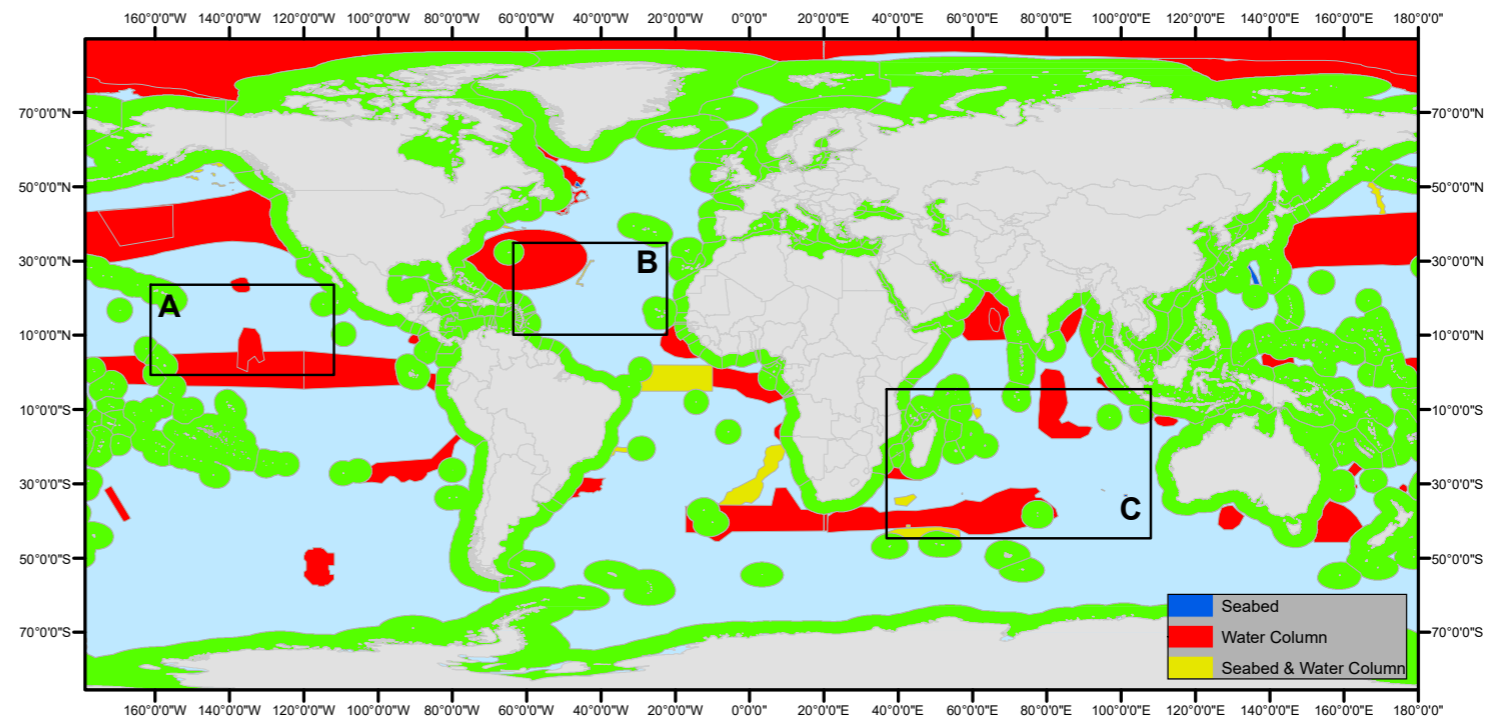
# EBSA only conservation principles: worldwide geographical locations

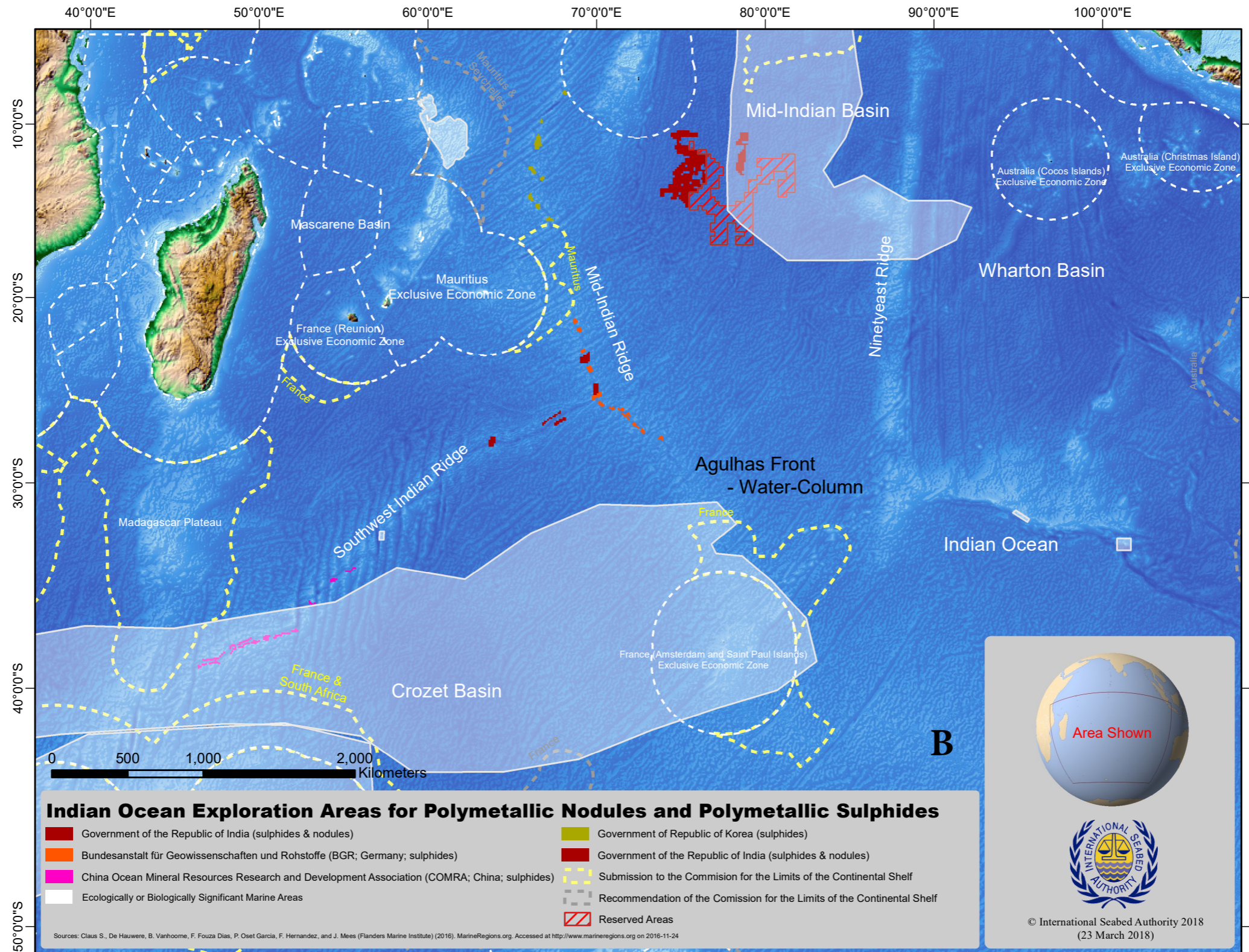


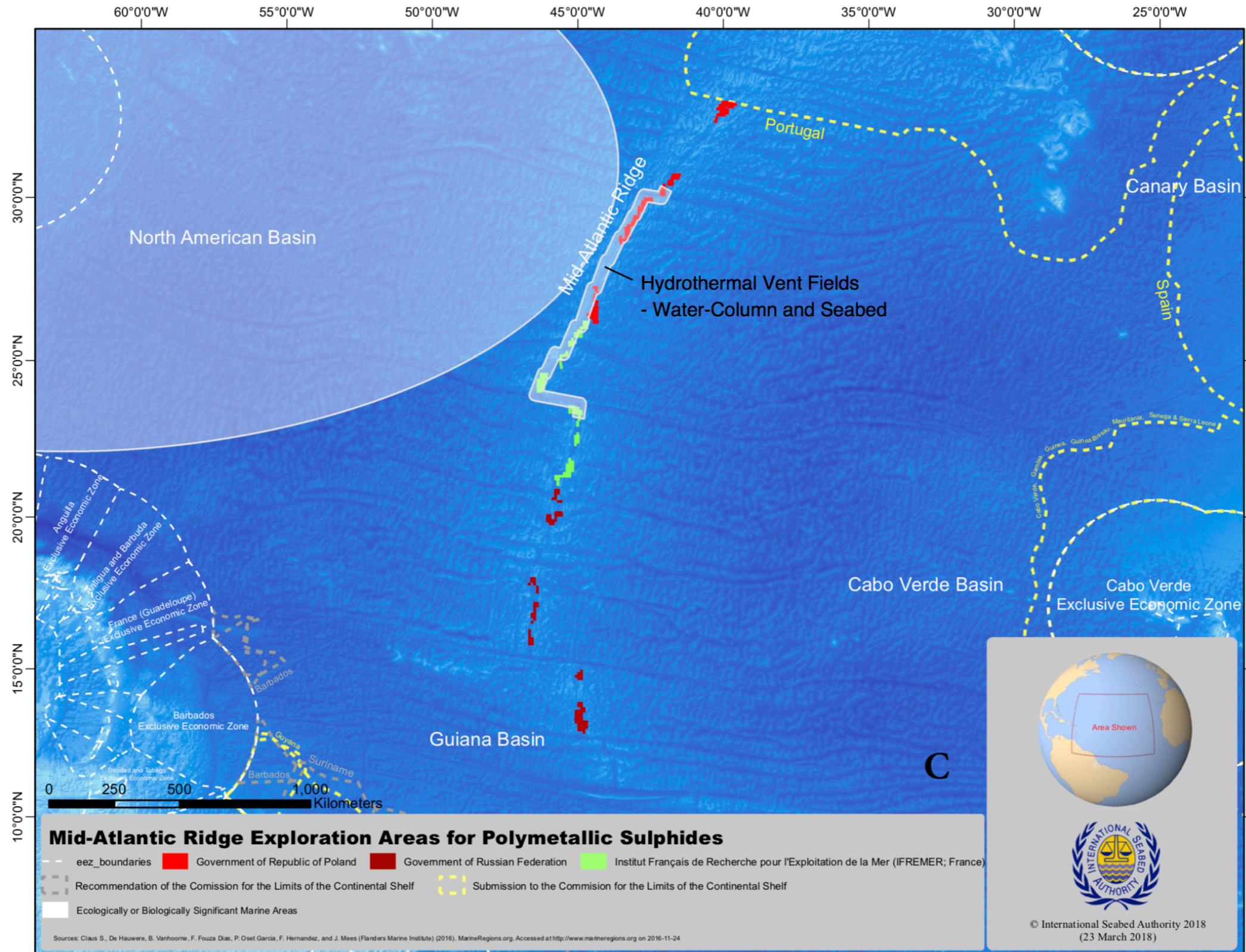
## Ecologically or Biologically Significant Marine Areas (EBSAs) beyond national jurisdiction



## Focused Areas in the EBSAs

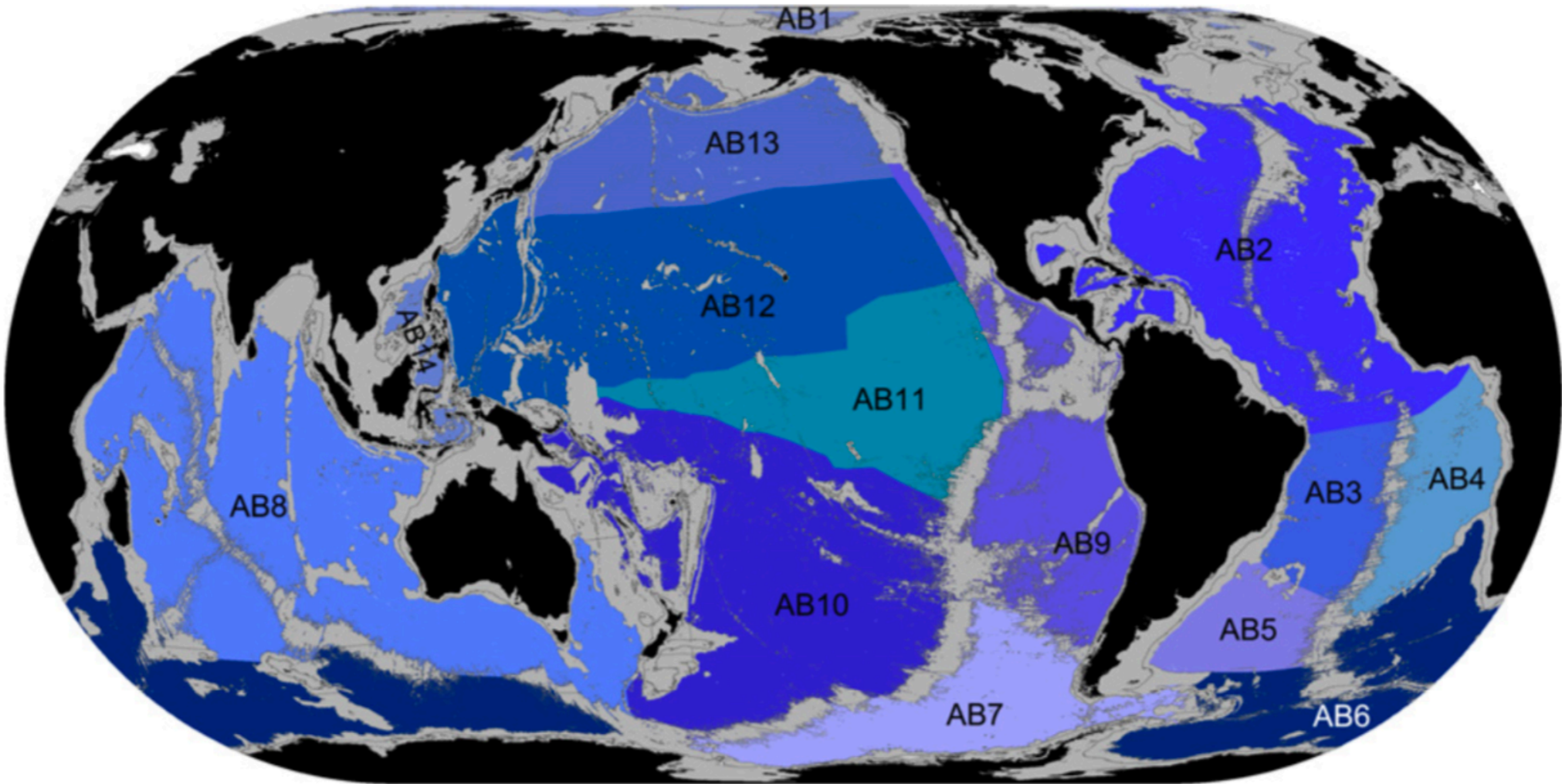






# Abyssal provinces scheme: geographically distinctive structure, discrete unit

*L. Watling et al./Progress in Oceanography 111 (2013) 91–112*



- AB1: Arctic Basin
- AB2: North Atlantic
- AB3: Brazil Basin
- AB4: Angola, Guinea, Sierra Leone Basins
- AB5: Argentine Basin
- AB6: Antarctica East
- AB7: Antarctica West
- AB8: Indian
- AB9: Chile, Peru, Guatemala Basins
- AB10: South Pacific
- AB11: Equatorial Pacific
- AB12: North Central Pacific
- AB13: North Pacific
- AB14: West Pacific Basins

**Fig. 20.** Proposed Abyssal Provinces.

# Concluding remarks



- Seafloor massive sulfides have been only discovered in the late 70's
- Slow- and ultraslow spreading ridges and island arc systems are the most favorable settings with economic potential. Areas for SMS application are still available in the slow spreading ridges.
- Feasibility of cost-effective production of SMS has been elaborated not for the Area, but for the exclusive economic zones (EEZ). The first test mining of SMS in 2017 would have a trigger effect for their development.
- There are several fractionation of the Area, geochemical, age, biogeographic, ecosystems criteria; abyssal provinces
- Spreading center velocities: fast, slow and ultraslow spreading centers
- Other stake holders in the Area: CBD:
  - Both instruments (CBD and the Convention on the law of the sea and the 1994 Agreement) do not have the same Parties;
  - EBSAs criteria are a scientific and technical exercise only;
  - The description of an EBSA has no legal binding yet.