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SECURING RESOURCES FOR THE FUTURE

Geopolitical and geoeconomic considerations of mining seabed minerals

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Outline

- Hypothesis and observations
- Role of sea-bed minerals – comparative approaches
- Geopolitical and geoeconomic considerations underlying French and Japanese initiatives

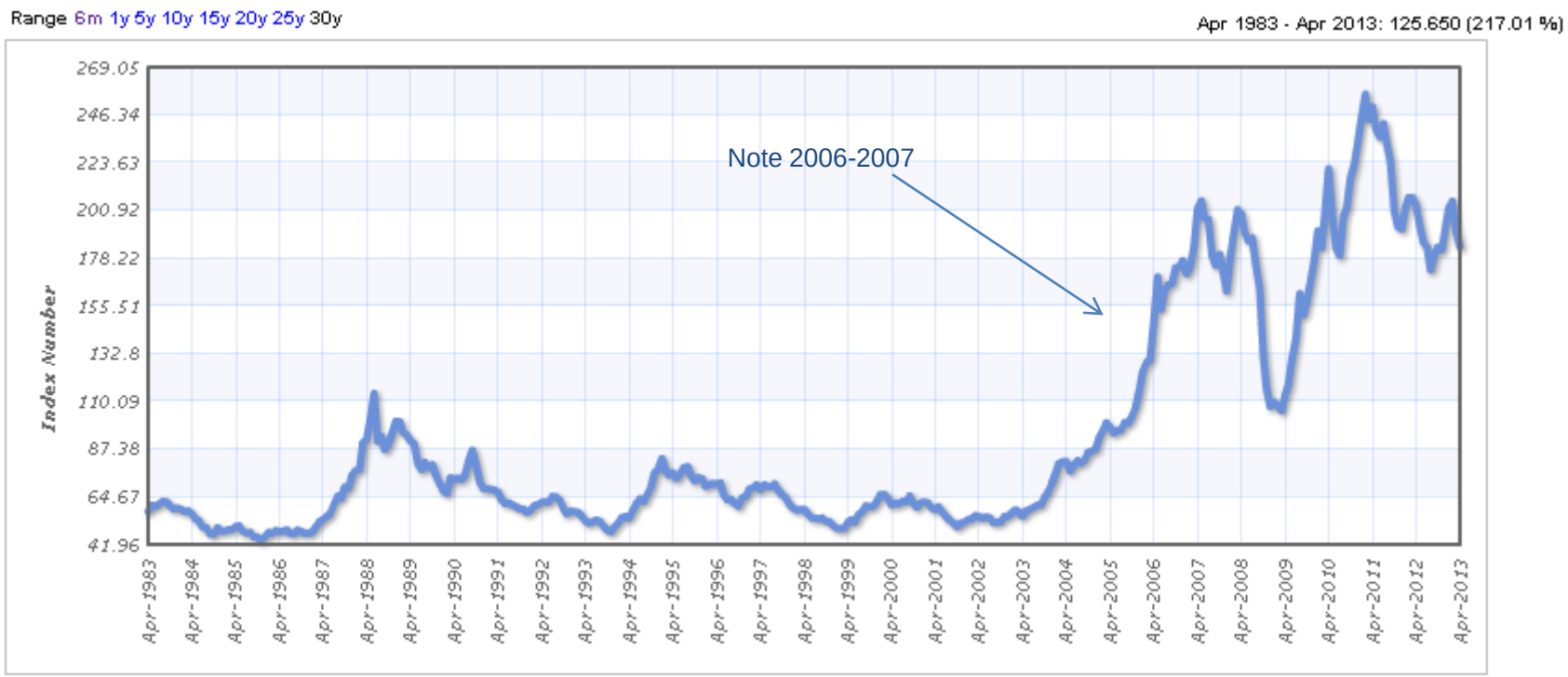
Test hypothesis

- We are headed towards a fundamental shift in the nature of the international market order for raw materials.
- The liberal capitalism model that has underwritten the trade and security of resource supplies in the current era is giving way to a more state / national-interest driven model in which governments take a more pro-active role in securing raw *materials for a country's industrial needs.*
- Impact of hypothesis: This model and the increasing competition for resources lead to an increase in resource-driven, inter-state conflict.
- Parallel in IR theory: liberal VS realist schools (a return to history?)

Observations

- Emerging markets (such as China) are driving new demand, straining supply, and pushing up prices for raw materials – particularly various metals
- *New technologies are increasing demand for "rare" metals and* previously un/underutilized raw materials, sometimes known as *"technology metals"*
- Public policies (such as the promotion of clean energy, or efforts to promote high-tech industry development) are increasing demand for technology metals and increasing their strategic importance for both national economies and political actors
- In areas where countries have a resource advantage, there is an increasing politicization of raw material exports (in particular in the case of China, though not exclusively)

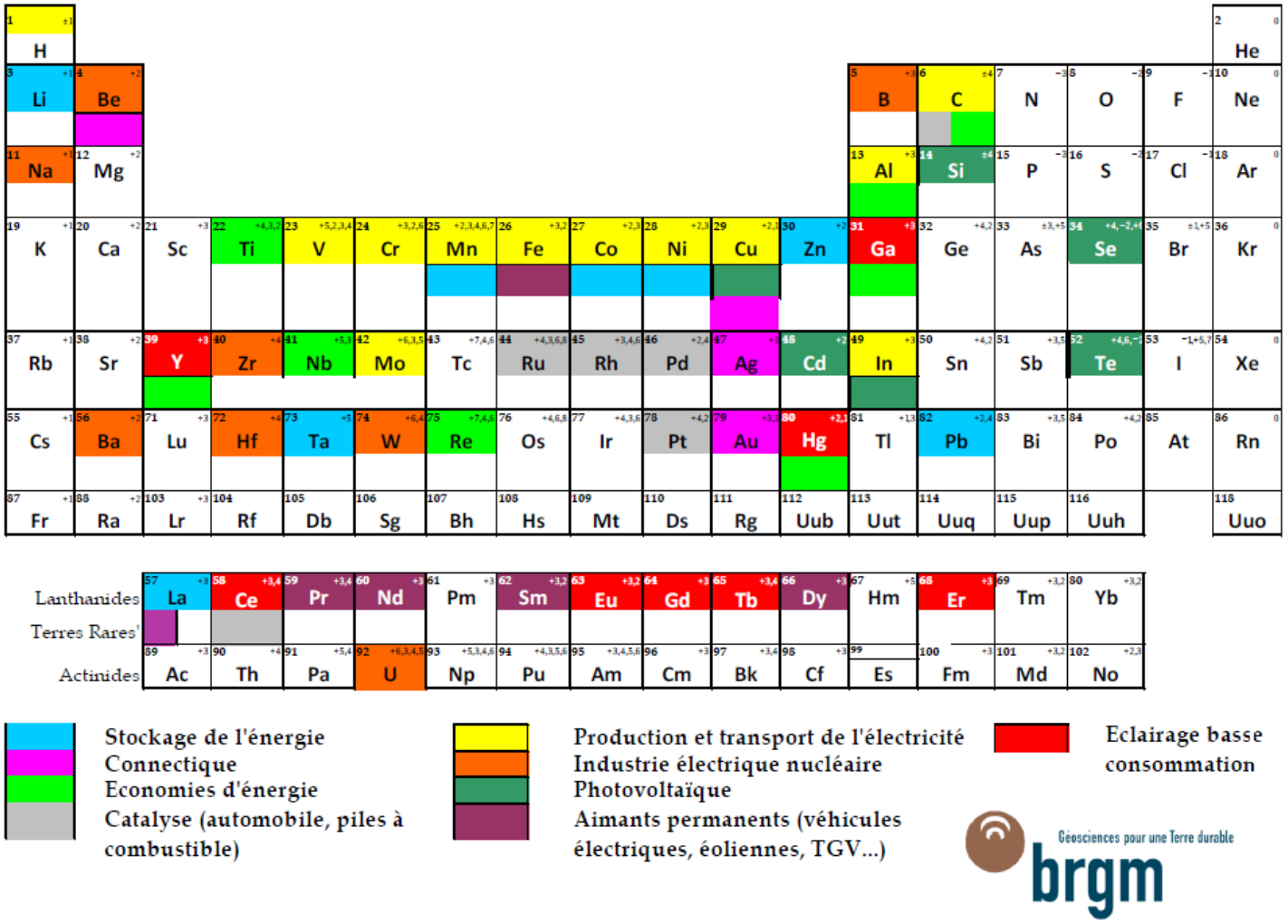
30-Year Commodity Metals Price Index



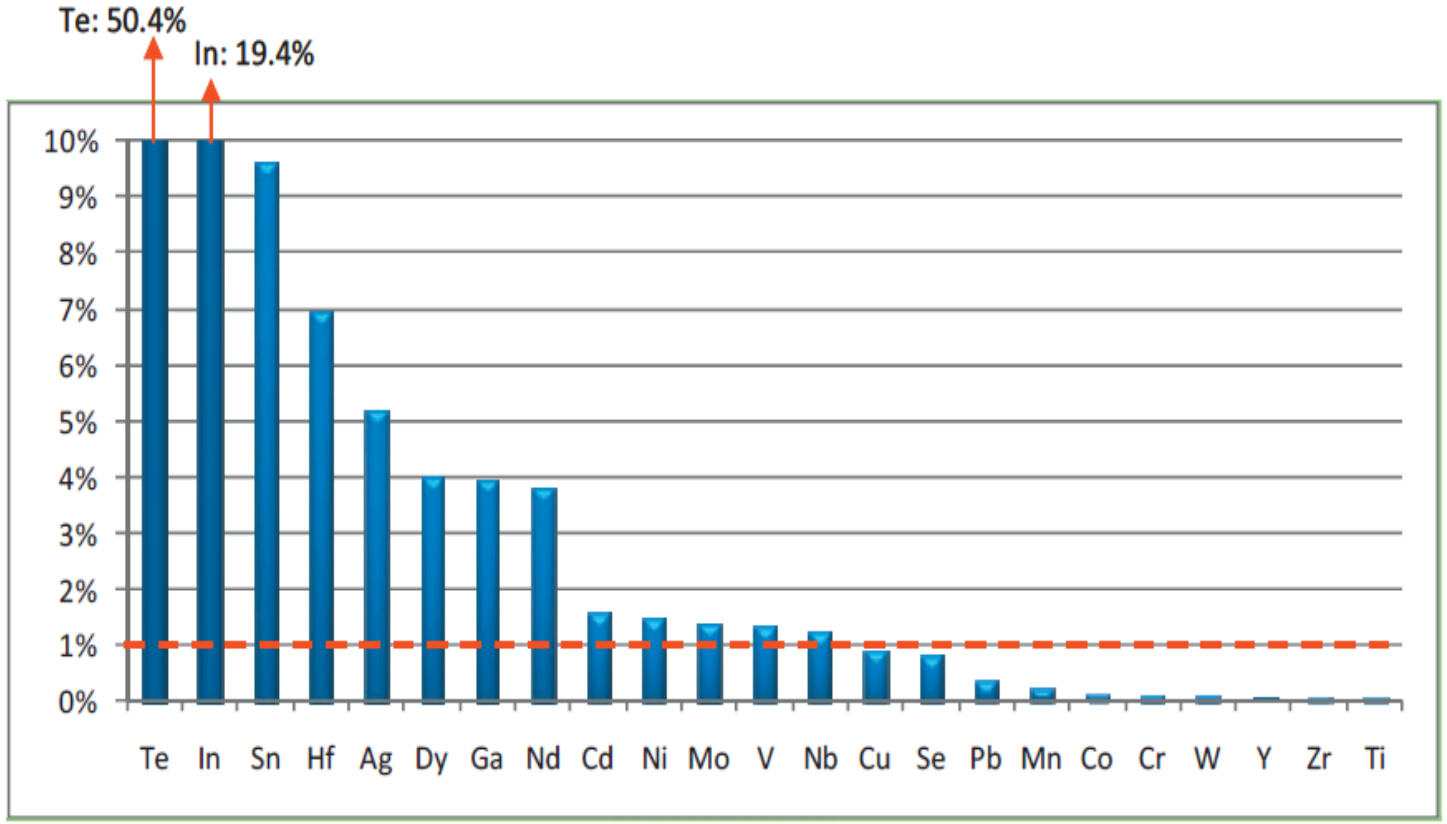
Description: Commodity Metals Price Index, 2005 = 100, includes Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium Price Indices

Source: International Monetary Fund & indexmundi.com

Diversity of elements needed for energy technologies



Metal requirements in 2030 of EU's « Strategic Energy Technologies » plan as a percentage of 2010 global world supply



Key: Te=tellurium, In=indium, Sn=tin, Hf=hafnium, Ag=silver, Dy=dysprosium, Ga=gallium, Nd=neodymium, Cd=cadmium, Ni=nickel, Mo=molybdenum, V=vanadium, Nb=niobium, Cu=copper, Se=selenium, Pb=lead, Mn=manganese, Co=cobalt, Cr=chromium, W=tungsten, Y=yttrium, Zr=zinc and Ti=titanium

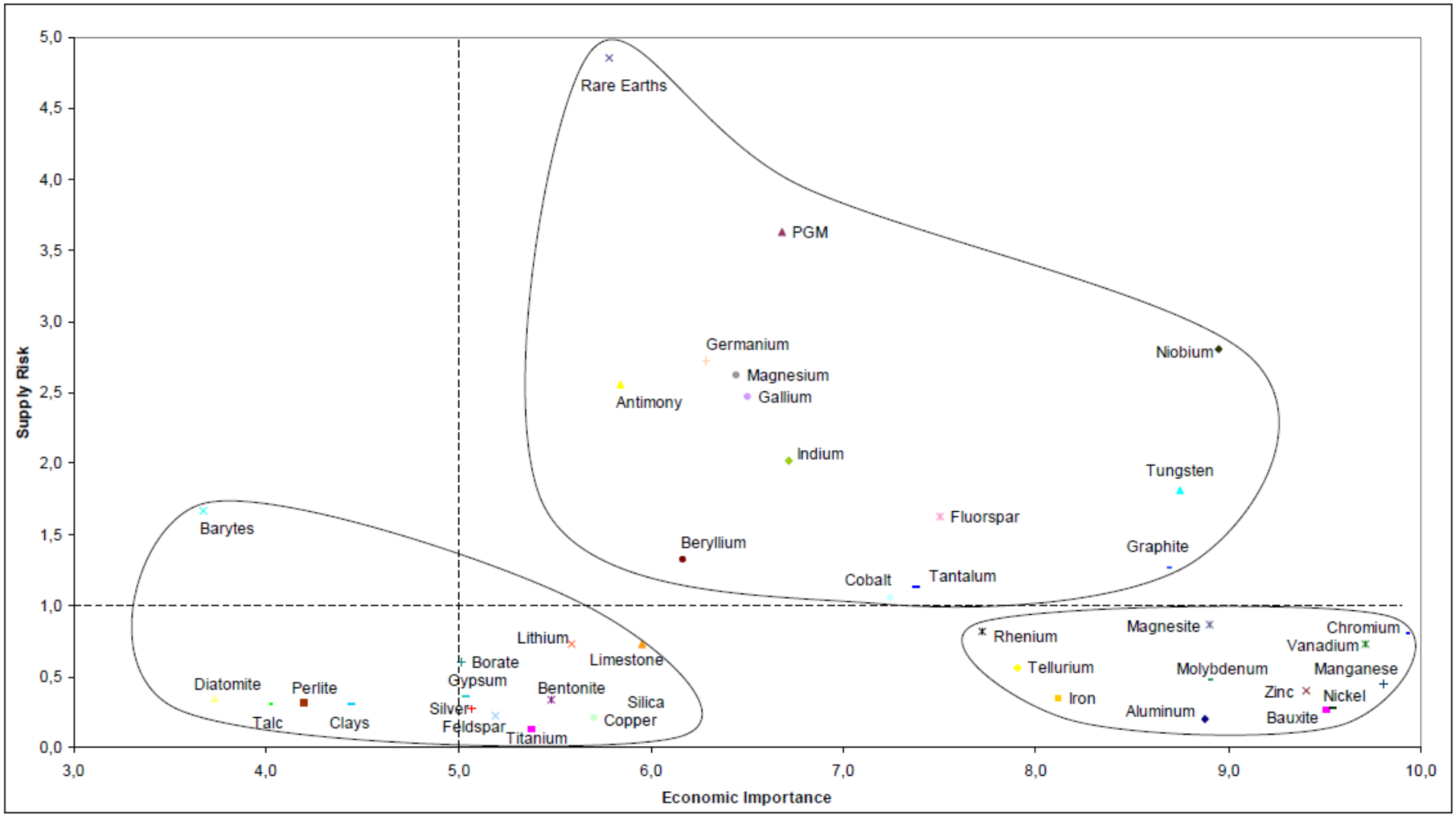
Source: « Critical Metals in Strategic Energy Technologies »,
JRC Scientific and Technical Reports, 2011 – setis.europa.ec.eu

New materials, classic game

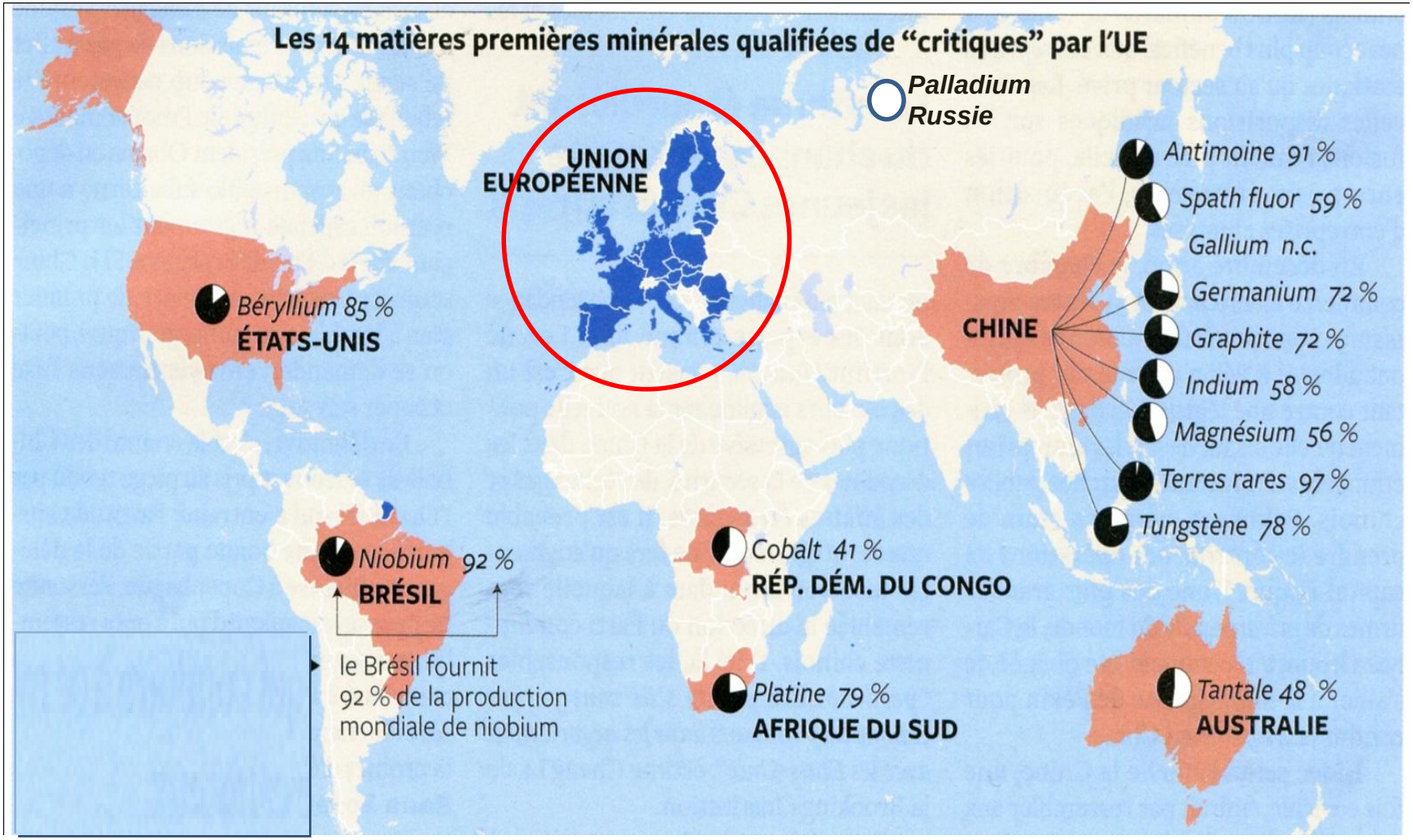
Metal	Market Factors		Political Factors		Overall risk
	Likelihood of rapid demand growth	Limitations to expanding production capacity	Concentration of supply	Political risk	
Dysprosium	High	High	High	High	High
Neodymium	High	Medium	High	High	
Tellurium	High	High	Low	Medium	
Gallium	High	Medium	Medium	Medium	
Indium	Medium	High	Medium	Medium	
Niobium	High	Low	High	Medium	Medium
Vanadium	High	Low	Medium	High	
Tin	Low	Medium	Medium	High	
Selenium	Medium	Medium	Medium	Low	
Silver	Low	Medium	Low	High	Low
Molybdenum	Medium	Low	Medium	Medium	
Hafnium	Low	Medium	Medium	Low	
Nickel	Medium	Low	Low	Medium	
Cadmium	Low	Low	Low	Medium	

Source: « Critical Metals in Strategic Energy Technologies », JRC Scientific and Technical Reports, 2011 – setis.europa.ec.eu

Critical materials for the EU as defined in 2010



Geographical concentration of EU critical materials 2010



C. Hocquard, J.C. Samama, 2011

Result

- Many are calling for a more assertive government role in ensuring raw materials supply, either through reinforcing market mechanisms, or promoting the development of indigenous resources and increasing national stocks of « strategic » raw materials

- BUT, is there a clear trend of skepticism towards the market capitalism model and a turn towards greater state control of natural resources?

Overall approach

Supply side

- Diversification of overseas supplies
- Improve Domestic supplies
  - Sea-bed minerals
  - Recycling
  - Stockpiling

Demand side

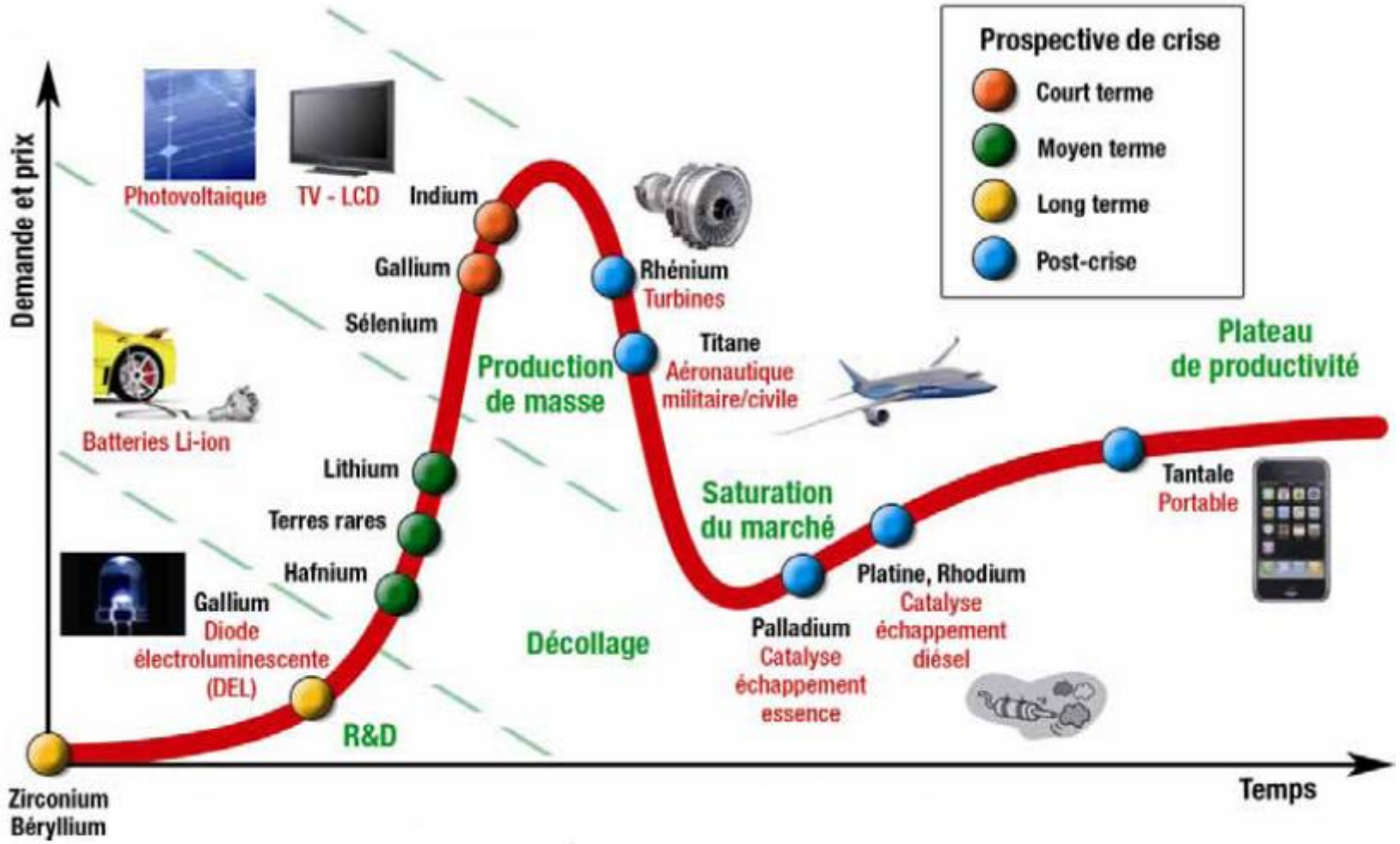
- Improved efficiency of resource use
- Substitution (alternative materials)

Concept of resource scarcity disputed

- Beyond political risk associated with supply concentration, some are concerned about resource scarcity or « peak resources » issues.

- Often, however, concerns over scarcity are alleviated by by market forces that drive new surveying and innovative extraction technologies to improve supply. In other cases, alternative technologies develop to shift demand.

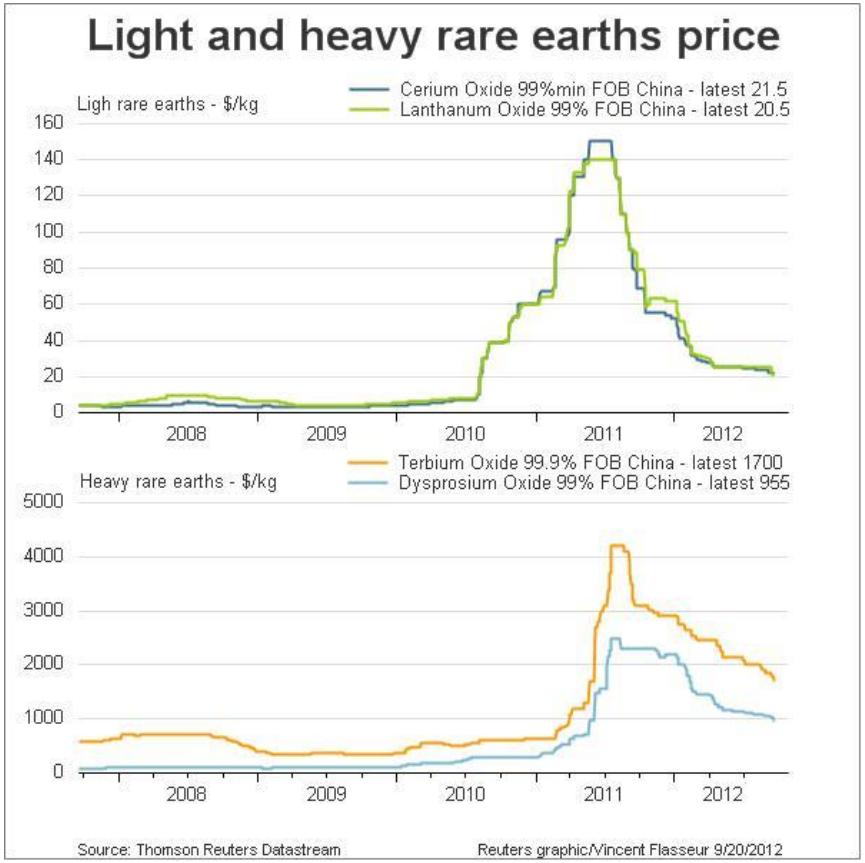
Typical Raw Material Crisis Pattern



C. Hocquard, J.C. Samama, 2011


Copper Price
7,239.98 USD/t
24 May '13
Copper Price (USD/t)
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jan 3 1989
Jan 1 1994
Jan 1 1999
Jan 1 2004
Jan 1 2009
InfoMine.com


Nickel Price
6.69 USD/lb
24 May '13
Nickel Price (USD/lb)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Jan 3 1989
Jan 1 1994
Jan 1 1999
Jan 1 2004
Jan 1 2009
InfoMine.com


Light and heavy rare earths price
Ligh rare earths - $/kg
Cerium Oxide 99%min FOB China - latest 21.5
Lanthanum Oxide 99% FOB China - latest 20.5
160
140
120
100
80
60
40
20
0
2008
2009
2010
2011
2012
Heavy rare earths - $/kg
Terbium Oxide 99.9% FOB China - latest 1700
Dysprosium Oxide 99% FOB China - latest 955
5000
4000
3000
2000
1000
0
2008
2009
2010
2011
2012
Source: Thomson Reuters Datastream
Reuters graphic/Vincent Flasseur 9/20/2012

- Nevertheless, in cases where market size remains small and alternative technologies unavailable, such as in rare earths, creating a diversity of suppliers can be complicated by market structure. This leaves room for political manipulation of resource supplies.

- Skepticism of market forces to ensure raw material supplies remains in policy-making circles and hedging strategies have emerged in a number of countries, including Japan and France, in order to develop options for indigenous supplies of critical raw materials.

- Recent efforts to survey and eventually exploit sea-bed minerals within Japanese and French EEZs are prime examples, and are motivated in part by such skepticism.

Sea-bed minerals

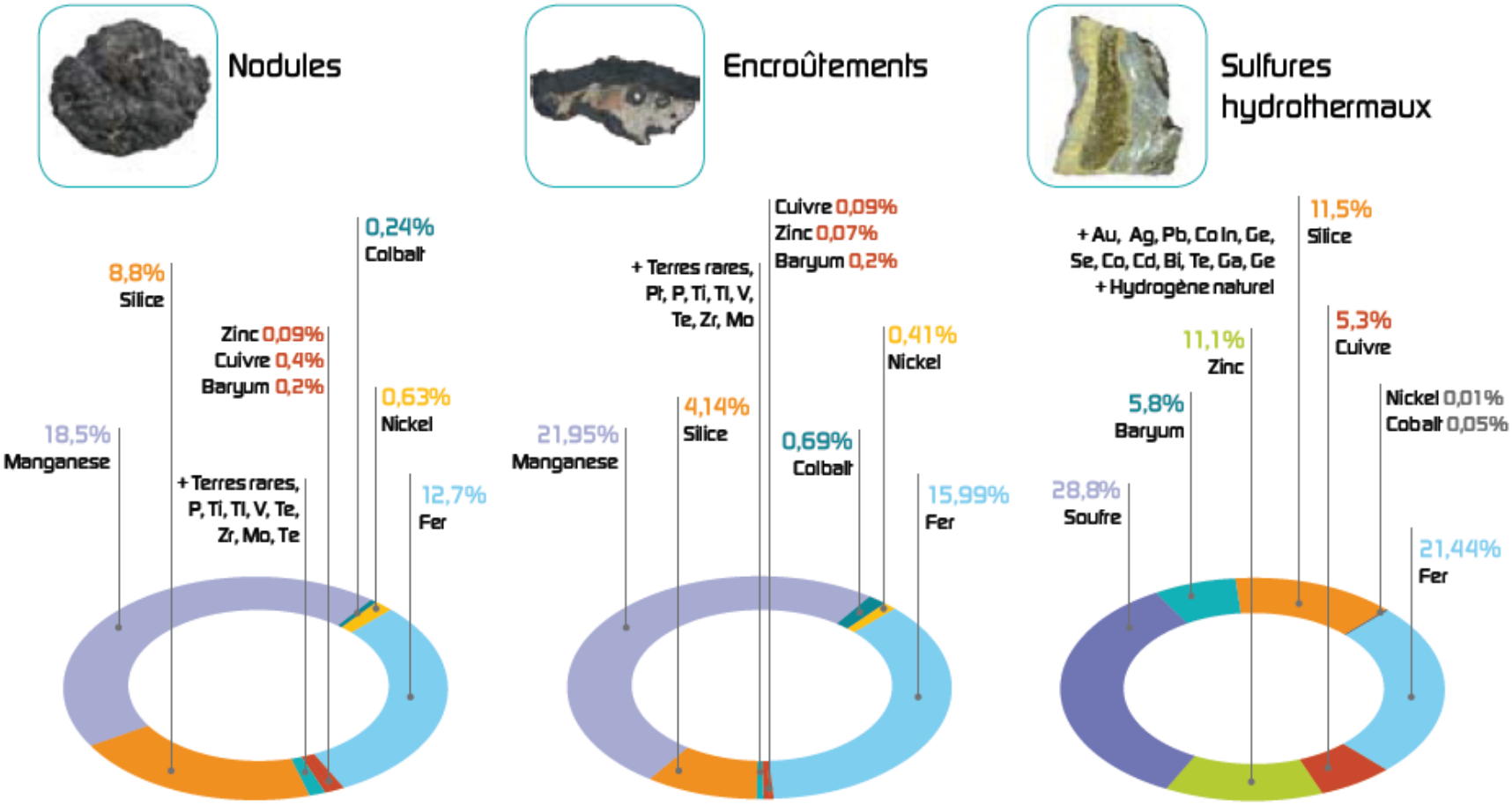
Cobalt-rich crust

Polymetalic Nodules

Seafloor Massive Sulfide

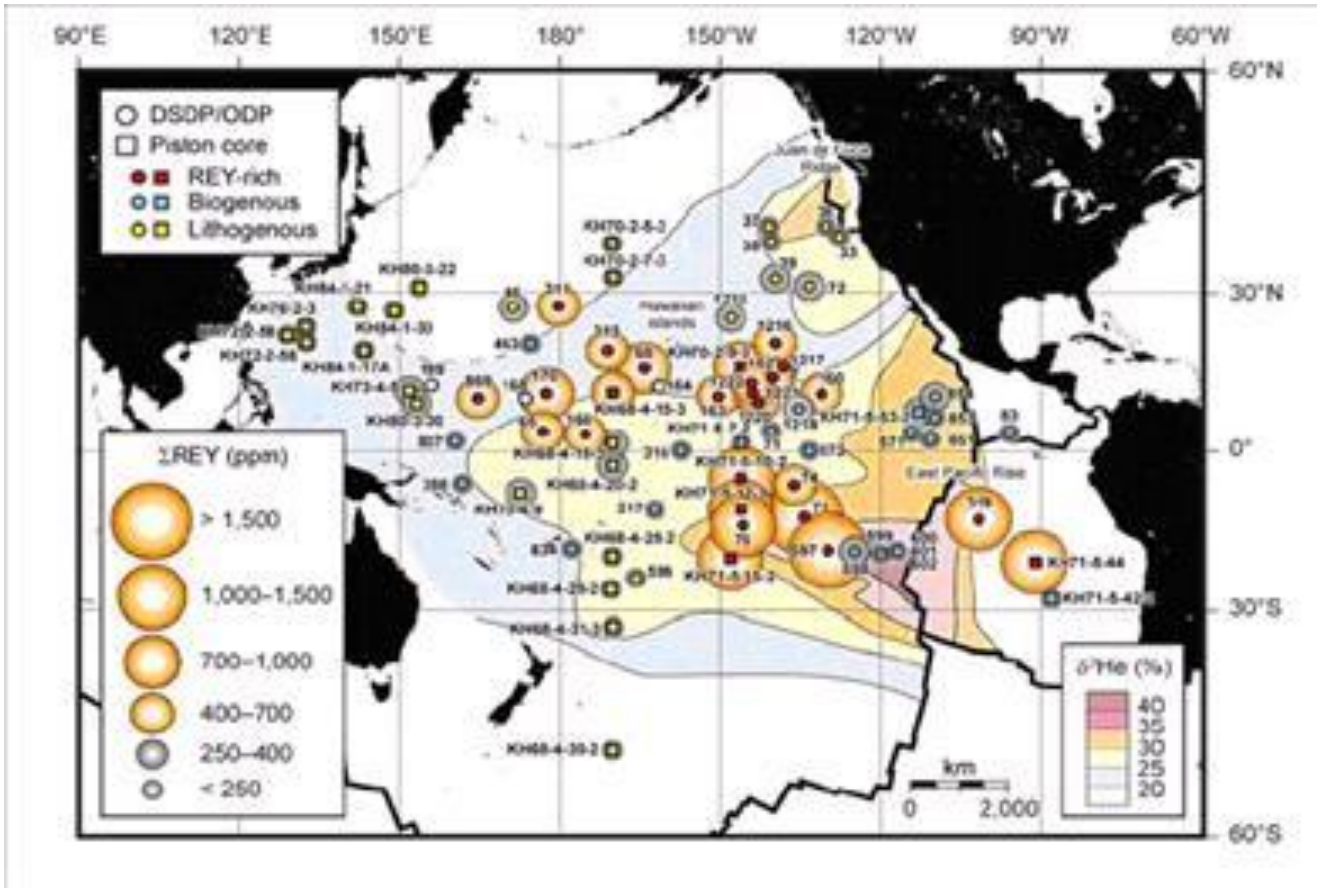
Rare earth mud

The case of sea-bed mineral development

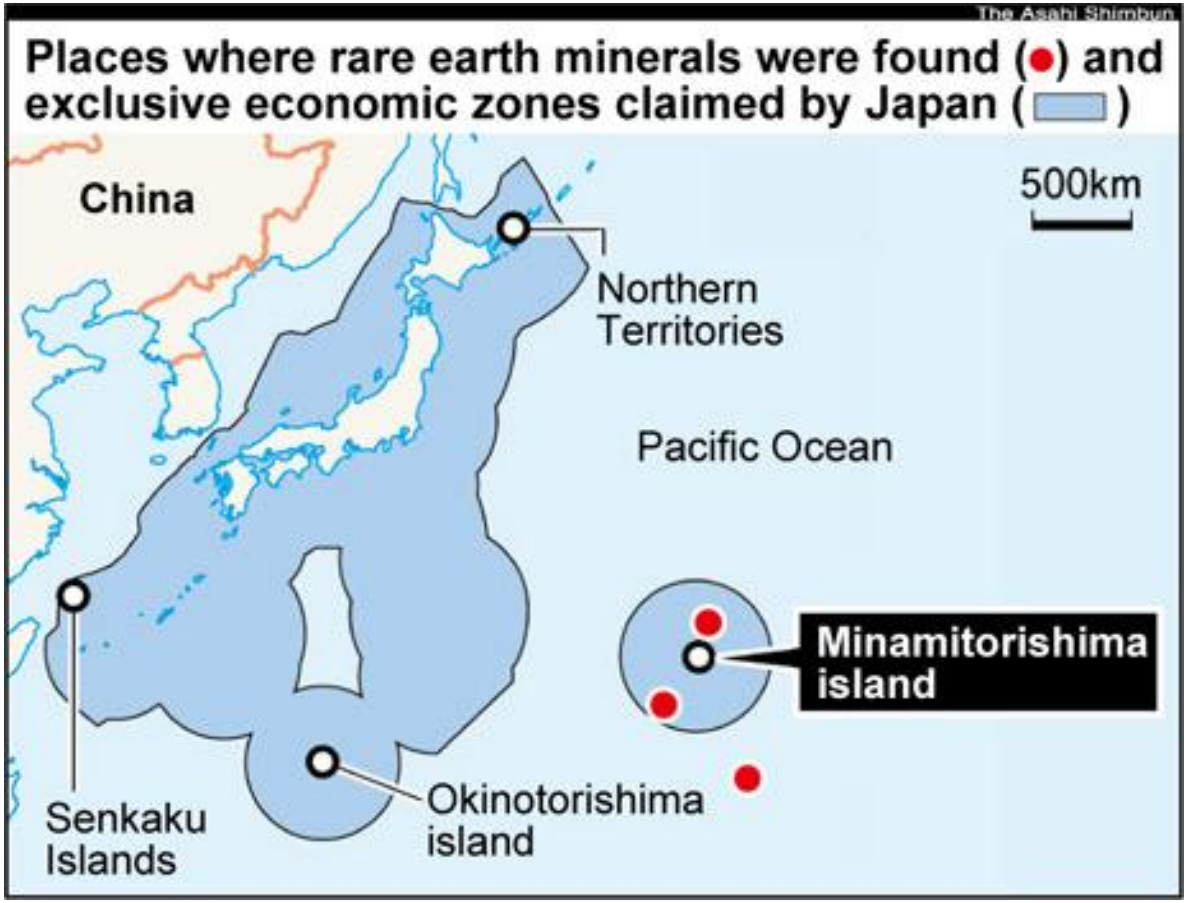


Source: Ifremer 2011

Rare earth mud

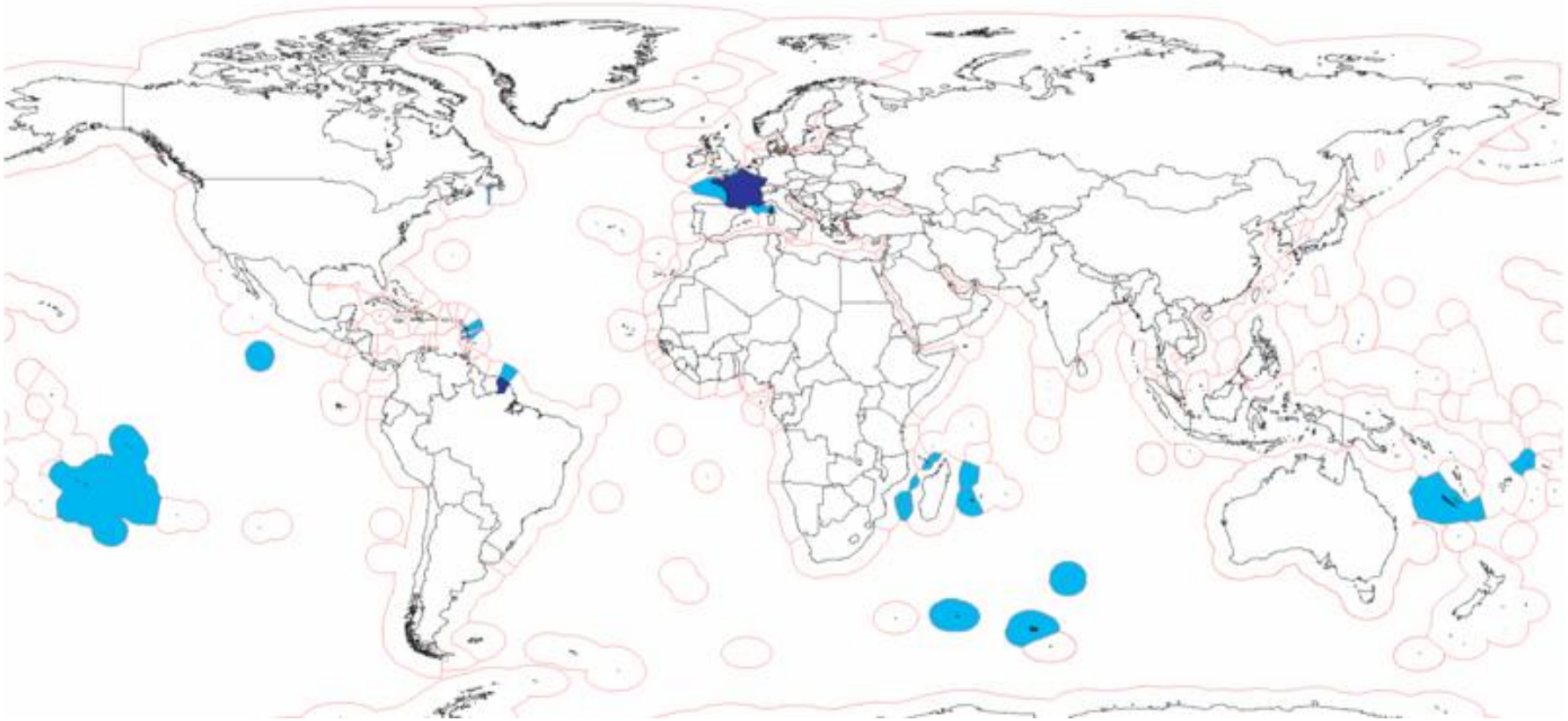


Japan's EEZ



Source: The Asahi Shimbun

France's EEZ



A rush to the seafloor?

- Policies to expand EEZs
- Multiplication of applications to explore international seabed
- Political push in many countries to develop deep-sea tech
- Introduction of private mining operations
- States pressured to act
- Still not an all-out bonanza
- Risks for environment (need for exploitation outstripping efforts to study ecosystems)

Comparing approaches

Japan

- Extension & exploration of EEZ with view towards potential for exploitation
- Exploration in international waters
- Driven by public sector

France

- Extension & exploration of EEZ with view towards exploitation
- Exploration in International waters
- Public-private partnership
  - Wallis & Futuna
- Problem of jurisdiction in overseas collectivities?

Comparing motivations

Japan

- National security
- Resource security
  - Both a negotiating tool and a hedge
- Development of competitive ocean industries
- Environmental preservation

France

- Resource security
- Preserving edge in deep-sea tech & remaining competitive in ocean industry
- Environmental preservation

Observations on test hypothesis

- There is a clear concern about the ability of a market capitalist system to ensure security of resource supplies moving forward
- Nevertheless, drive for maritime resources is more of a hedging strategy and is far from replacing mineral supplies through markets and trade
- For countries such as Japan, who also have a strong national security interest in developing their EEZ, and perceive the need to develop competitive ocean industries of their own, allowing *foreign firms to exploit resources in Japan's EEZ remains out of* the question
- Key goal of competitiveness depends on a healthy system of international trade, but also in the ability of a country to ensure a minimum level of its own autonomous activities

A few preliminary recommendations

- Coordinate on environmental protection
  - Work to create and reinforce international norms
  - Environmental data-sharing
  - Tech-sharing remains difficult because of desire for *competitiveness of country's industries*

- Maintain sea-bed minerals as a hedge, but work to reinforce market mechanisms, trade, economic interdependence as well as international institutions (ISA)
  - Prosperity and progress can be more easily achieved through trade, market forces and intelligent regulation than through nationalization and supply control policies
  - The key will be to convince China and others (including the United States) of such utility

Discussion
Comments?
Questions?
Critiques?