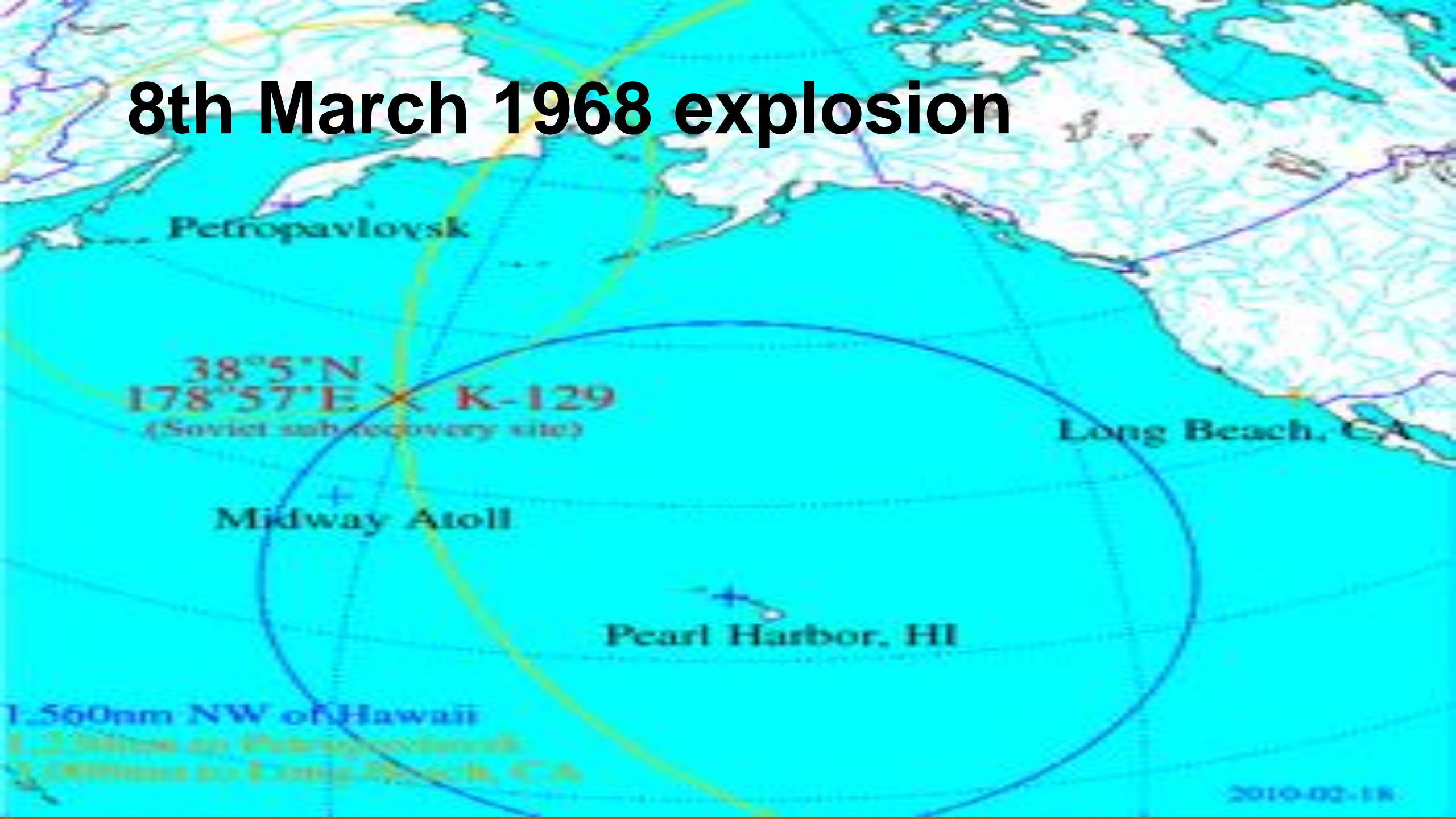


Soviet submarine K 19



8th March 1968 explosion





Glomar explorer

Is marine mining a commercial viability for developing countries?

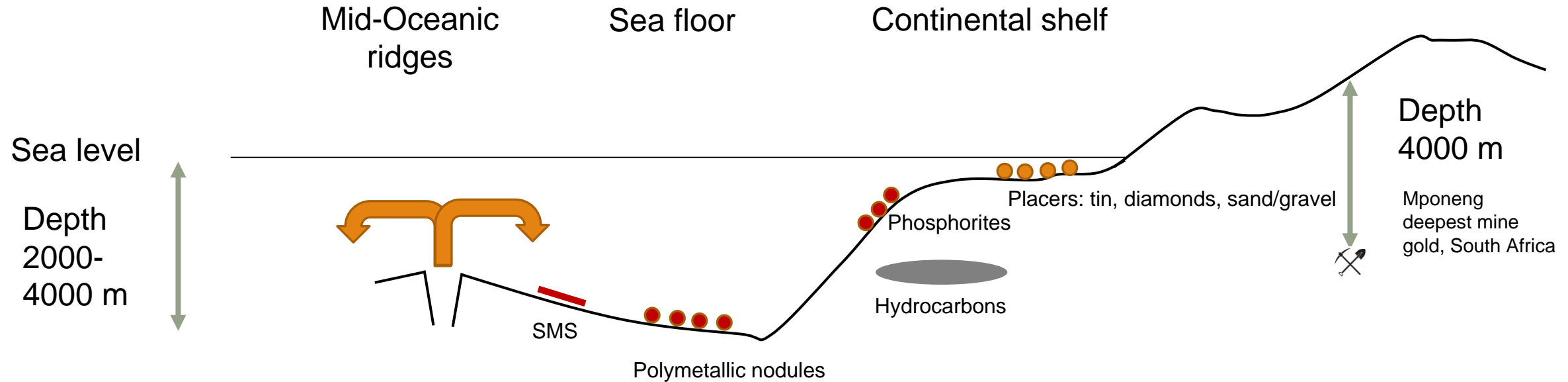
Anton Löf, Magnus Ericsson, Olof Löf

A solid orange horizontal bar at the bottom of the slide.

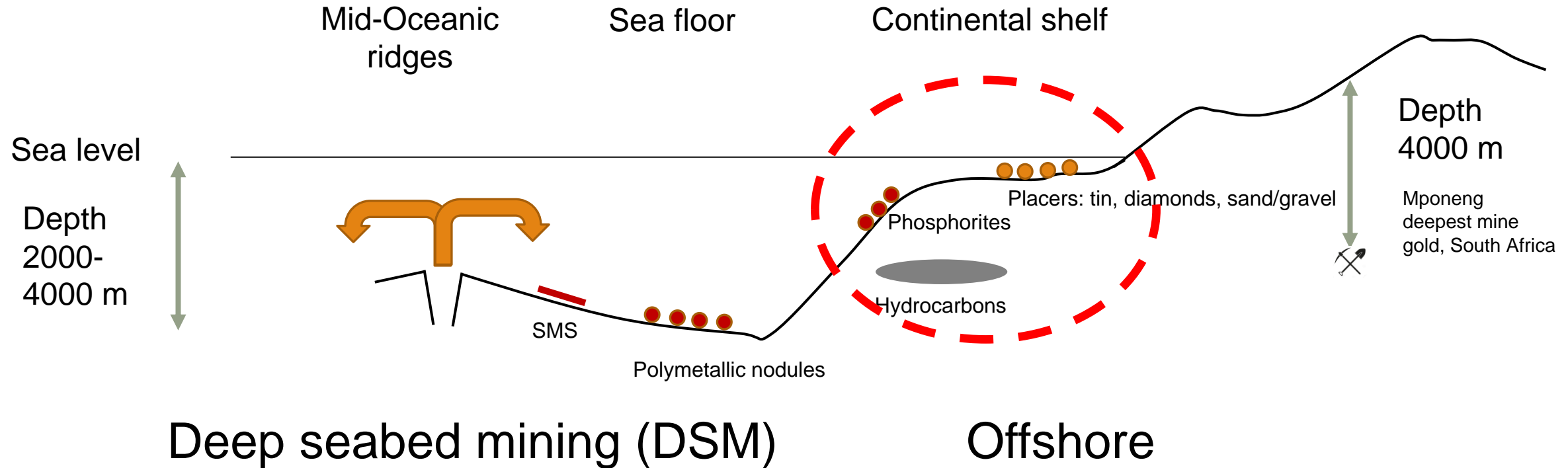
Agenda

- What is marine mining ?
- Deep Seabed Mining (DSM)
- Observations

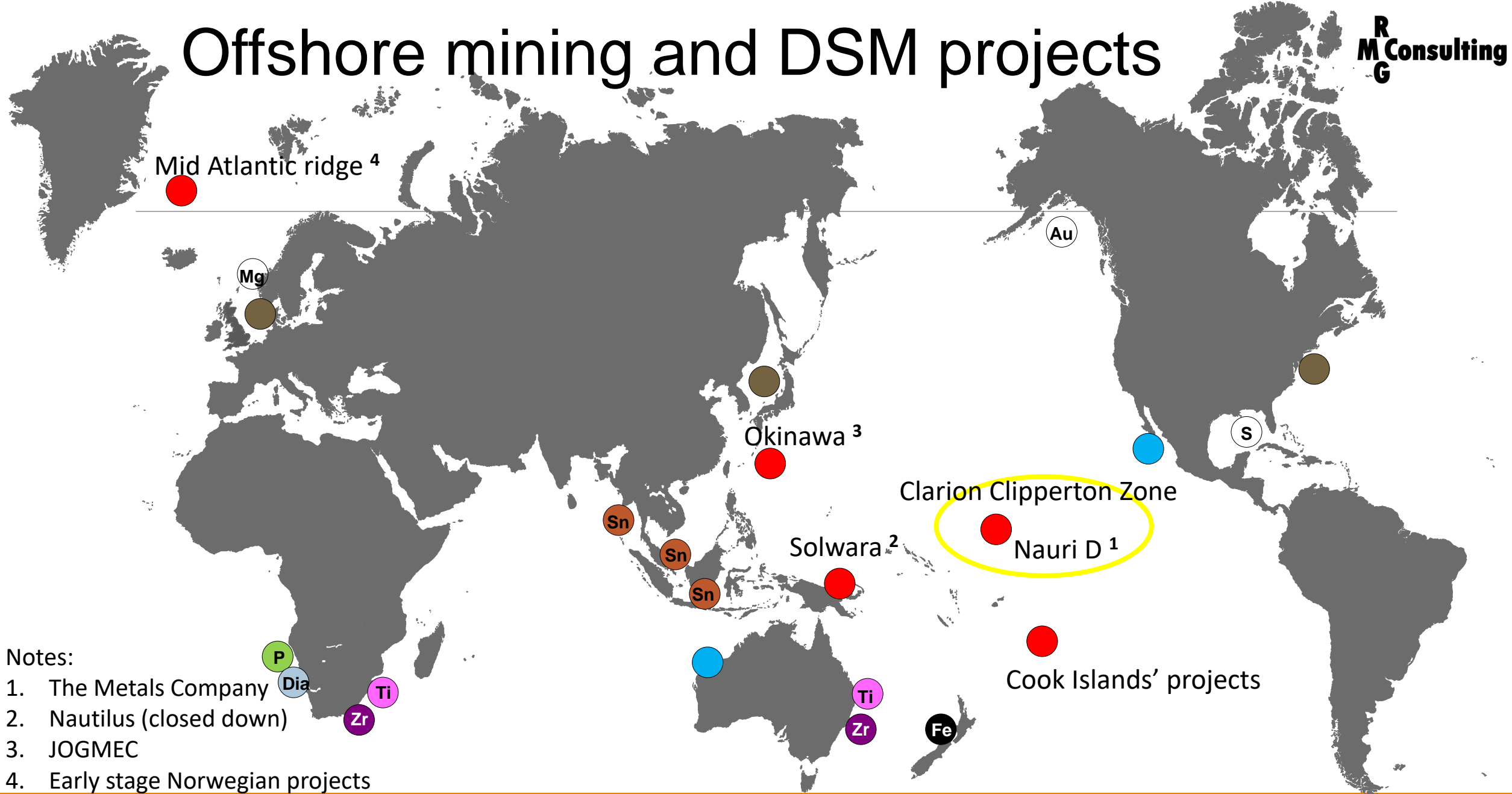
Marine mineral deposits



Marine mineral deposits



Offshore mining and DSM projects



- Notes:
- 1. The Metals Company
 - 2. Nautilus (closed down)
 - 3. JOGMEC
 - 4. Early stage Norwegian projects

Value of offshore extraction 1972/2018

Commodity	1972			2018			Tendency
	Volume	Value (USD M)	% of total production of each raw material	Volume	Value (USD M)	% of total production of each raw material	Volume
Oil & gas		10,300	18		600,000	30	Increase, flattening
Sulphur (Frasch) ¹		25	33	Low	Low	0	Decrease
Sand & gravel (Mt)	na	100	<1	4,500	20,000	10-15	Increase
Tin (kt)	14	53	7	56	1,300	22	Increase
Titanium sands		76	20				
Iron ore (Mt)	3	10	<1	3	200	0.13	Flat
Diamonds (Mct) ²		0	0	1.2	230	1.6	Increase
Salt (Mt)	42	173	29	100	12,000	34	Increase
Magnesium (kt) ³	143	75	61	Low	Low	0	Decrease
SUM⁴		512			33,730		

Area covered by DSM exploration

Total area of the seas			362,000,000	100
#	Contracted exploration areas (ISA)	km ²	Total km ²	%
19	Poly Metallic Nodules (PMN)	75,000	1,425,000	0.4
7	Poly Metallic Sulphides/Seafloor Massive Sulphides (PMS/SMS)	3,000	21,000	negligible
5	Cobalt Rich Crusts (CRC)	10,000	50,000	negligible
	Sum		1,496,000	0.4
	Reserved area (ISA)		1,165,000	0.3
	Total seabed under exploration contract with the ISA		2,661,000	0.7

Marine mining conclusions

DSM

- Technologically difficult and unproven after 50 optimistic years
- No mineral reserves
- ISA unique global, ex ante mineral regime

Offshore

- Offshore mining for LICs and MICs

Marine

- Serious environmental issues, continued studies necessary
- Lowest cost producer, land based or marine, will supply
- Blue economy perspective

Thank you

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Full study:

Löf, Anton, Magnus Ericsson, and Olof Löf. "Marine Mining and Its Potential Implications for Low- and Middle-Income Countries", WIDER Working Paper 2022/170 Helsinki: UNU-WIDER, 2022. <https://doi.org/10.35188/UNU-WIDER/2022/303-1>.

<https://www.wider.unu.edu/publication/marine-mining-and-its-potential-implications-low-and-middle-income-countries>