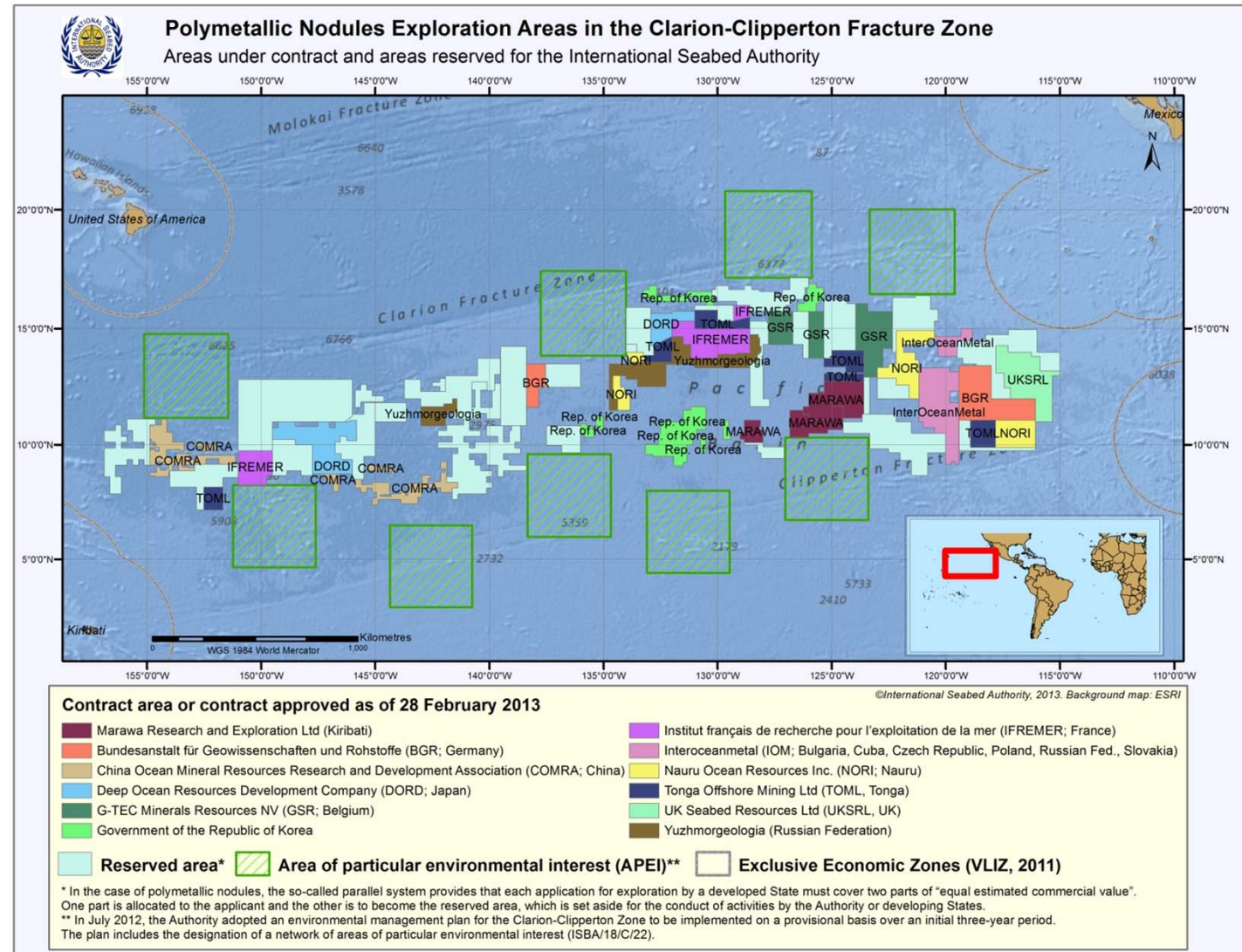


Lead-up of the project and context

- GSR applied in July 2012 for the former OMA zone (about 150,000km²).
- The OMA consortium included the Belgian Union Minière.
- Contract signature with ISA took place in January 2013



- New relevant Belgian legislation was voted in Parliament and officially published in October 2013.



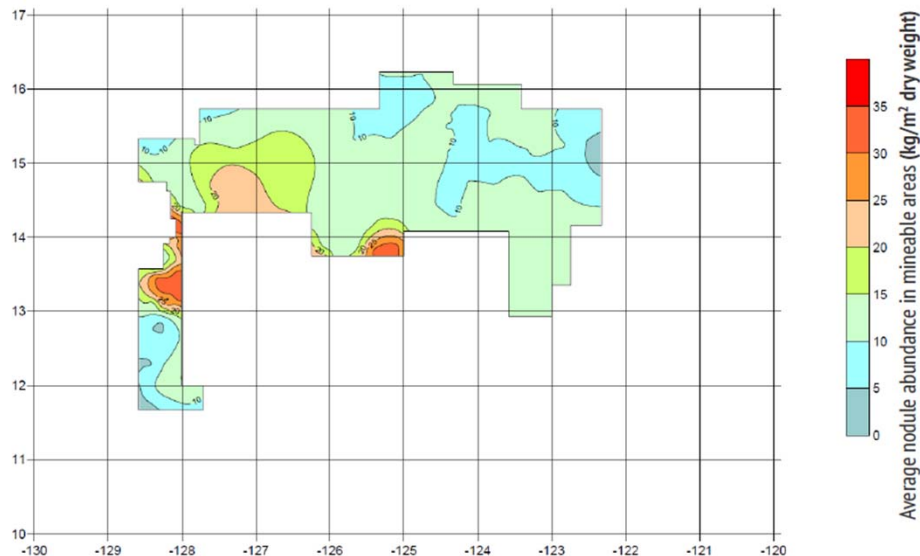
Estimation of the Economical Value of the GSR Concession

Economically “recoverable” metals: Nickel – Copper – Cobalt

Other potentially recoverable metals: Mn – Rare Earth Elements

A “mineable” areas has a favourable morphology and sufficient abundance of nodules (> 8 kg/m² (dry weight)).

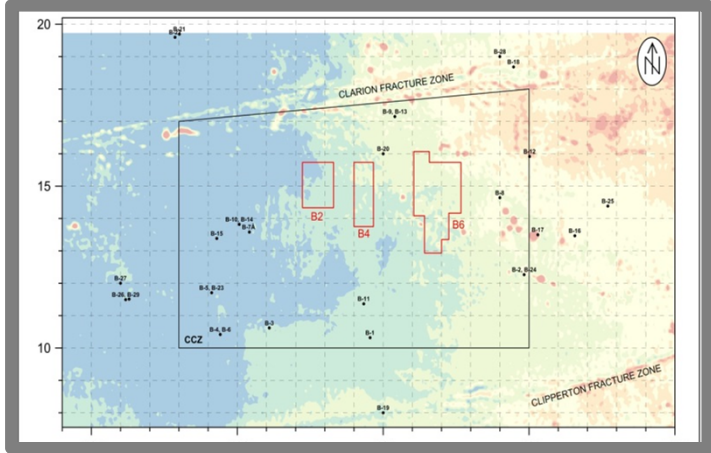
The available studies in and around the GSR concession area: approx. 60% = “mineable”.



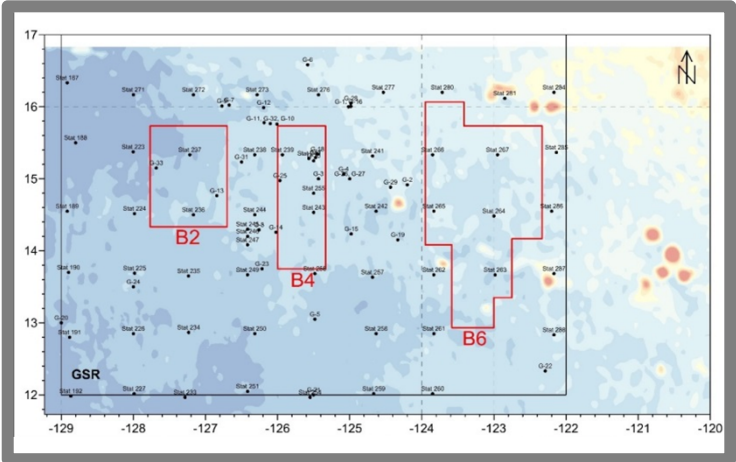
Nodule Abundance (based on Charles MORGAN, 2000 / ISA Data)

GSR Concession Commercial estimated value		
	Surface (km ²)	Est. Commercial value in million USD (Ni + Cu + Co)
B2	17.596	71.949
B4	15.660	49.326
B6	43.470	105.985
TOTAL	76.728	227.261

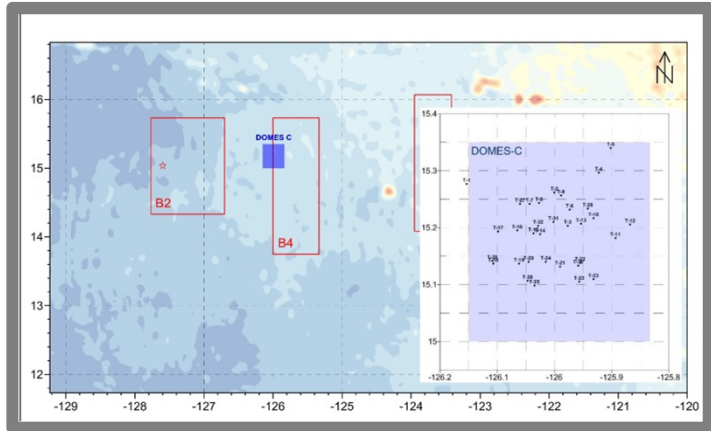
Public data available in the GSR Concession



Data available in the Clario-Clipperton Zone (CCZ)



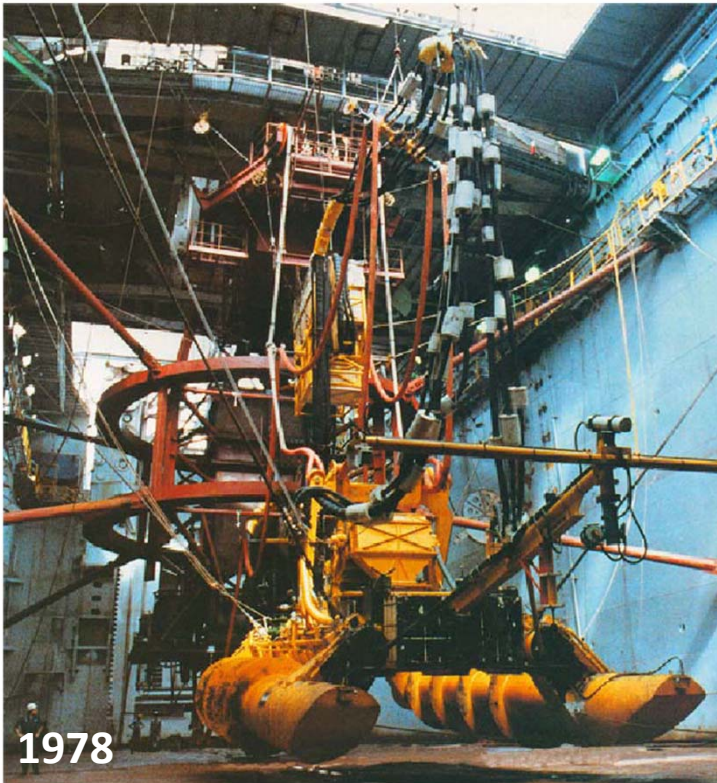
Data available in the GSR-Area (ex-OMA Area)



Data available in the DOMES-C area

- Data mainly acquired during the 70's & 80's
 - 3 scales have been considered into our 2014 bibliographical report to investigate different parameters influencing the presence (or not) of nodules.
- Type of data:
- Soil description: geochemistry, mineralogy...
 - Nodule composition/abundance
 - Water chemistry
 - Biology (groups...)
 - General & punctual detailed bathymetry
 - Metocean/Oceanographic data
- No much information about the deep-sea mining technology (due to evident confidentiality reasons)
- No much data available about in-situ tests / measurement

Previous conceptual attempts and tests of deep-sea mining technology



100 tons Lockheed Martin Trial Miner on the Glomar Explorer in 1978 (Spickerman, 2012) tested at 5,000 m WD.

Mining test executed with the R/V DEEPSEA MINER II in 1978 by the OMA Consortium (Actual GSR concession)



28 tons deep-sea mining robot Minero during its successful test at 1,370 m WD elaborated for future mining of deep-sea manganese nodules in the CCZ (KIOST, 2013).

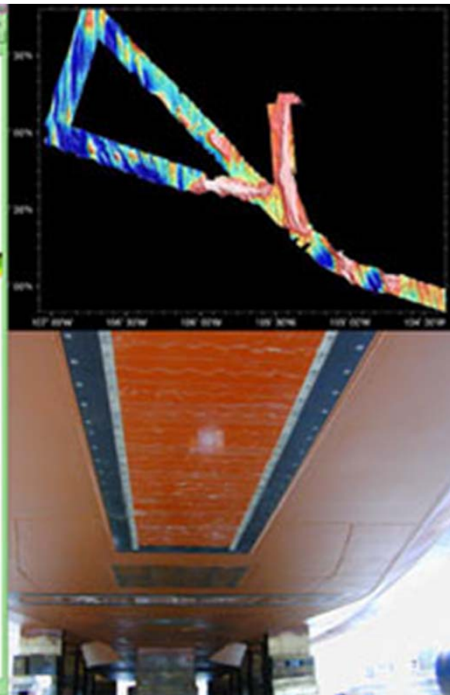
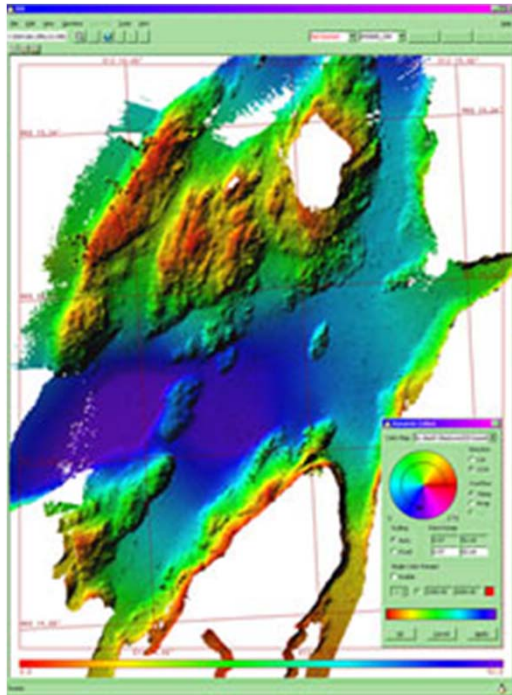
BASELINE STUDY - 2014 GSR Cruise

Multidisciplinary Approach



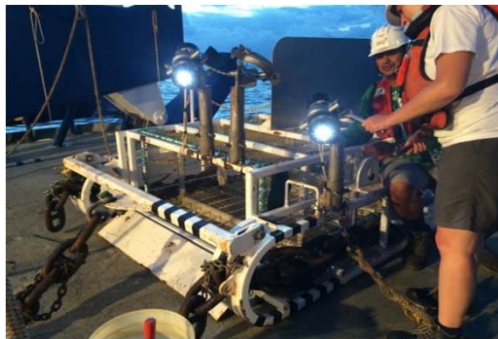
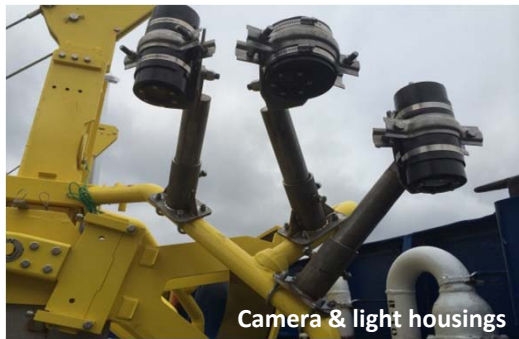
Equipment mobilized for 2014 Cruise (focused on global mapping):

- Vessel: RV MT Mitchell (Global Seas)
- Multibeam Kongsberg EM 120 (bathy/backscatter)
- Soil sampling (box-core)
- Nodule sampling (dredge)
- Seabed Imagery (Camera mounted on sampling equipment)

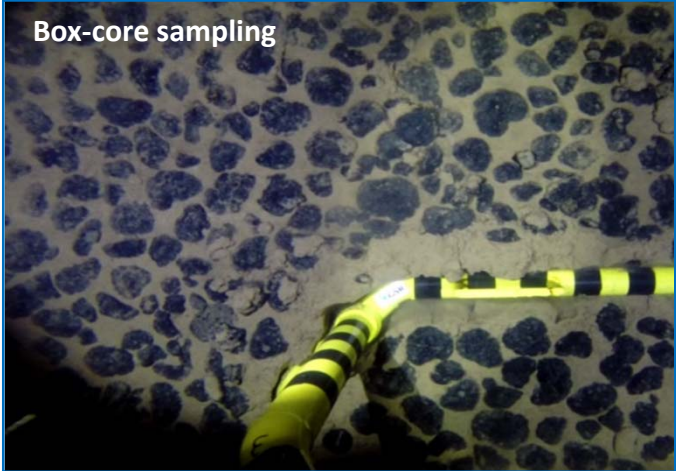
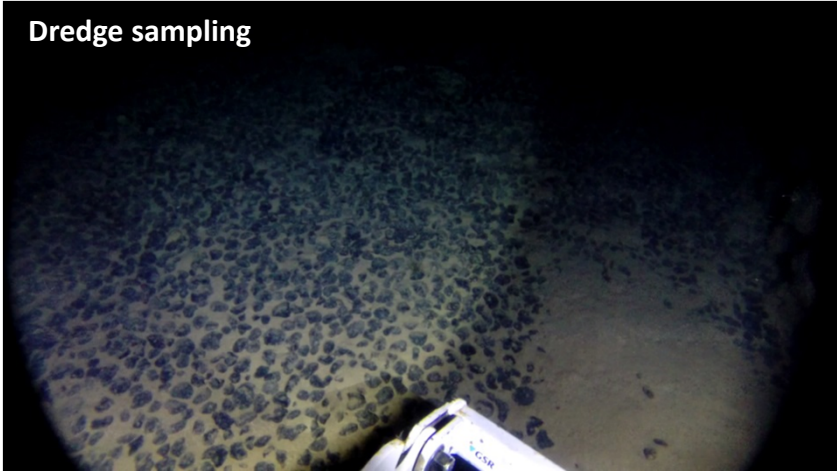


→ Main Target: determination of potential nodule fields

Equipment & Operations



Dredge & box-core Sampling



THANK YOU FOR YOUR ATTENTION

