• 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.
GSR Concession - Location

POLYMETALLIC NODULES EXPLORATION AREAS IN THE PACIFIC OCEAN

AREA UNDER CONTRACT WITH THE INTERNATIONAL SEABED AUTHORITY AND AREAS RESERVED FOR THE AUTHORITY

3500 km (7 sailing days)

2500 km (5 sailing days)
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”.

GSR Concession
Commercial estimated value

<table>
<thead>
<tr>
<th>Surface (km²)</th>
<th>Est. Commercial value in million USD (Ni + Cu + Co)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2</td>
<td>17.596</td>
</tr>
<tr>
<td>B4</td>
<td>15.660</td>
</tr>
<tr>
<td>B6</td>
<td>43.470</td>
</tr>
<tr>
<td>TOTAL</td>
<td>76.728</td>
</tr>
</tbody>
</table>

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

- Winch & 9500m Plasma Cable
- Camera & light housings
- Multibeam EM120
- RV Mount Mitchell
- Shippican – Sound Velocity profiler
- 2 box-core units
- 2 Dredge Units
- ... A VESSEL OF OPPORTUNITY
Dredge & box-core Sampling
THANK YOU FOR YOUR ATTENTION