In-situ characterisation of habitats adjoining cold-water coral reefs using a Sediment Profile Imagery (SPI) camera

Silvana N.R. Birchenough, Nigel Lyman, David A. Roberts, Juan Moreno-Navas and J. Murray Roberts
To date, views expressed on the potential impact of ocean acidification range from wholesale degradation of marine ecosystems through to no discernable impact with minimal consequences.

Constraining this range of predictions is necessary to support with scientific evidence for sustainable management and marine policy.
UKOA Programme

- July 2010-2013
- Wide range of scientists (PML, Cefas, SAMS, NOC)
- Experiments, large scale observations, modelling
- Funded by NERC/Defra/DECC
- Aims to characterise different benthic species and habitats to understand changes in function resulting from ocean acidification
Lophelia pertusa habitats

- Cold water corals reefs are long-lived and structurally complex
- They support many species, provide essential fish habitats
- In many areas have been damaged by trawling (Koslow et al. 2001)

Why are these habitats important?
- These are considered vulnerable and have conservation importance
- Scleractinian species producing skeletal frameworks

We need to understand Ocean acidification effects
- There is a need to understand the function
- Long-term experiments
- *Insitu* observations
JC073 Expedition

- Full science crew, 11 institutions (Denmark, Germany, Spain, UK, USA)
- 5 sites visited
- 181 activity stations
- First visual surveys Hebrides Terrace Seamount (JNCC)
Sediment Profile Imagery (SPI) Camera

Images collect vertical section of the seabed and examples of the parameter that are measured can be seen below:

Figure: SPI images illustrating the following features: a) gas void, b) polychaete, c) burrows formation, d) pit mound and different sediment types and e) microalgal mat.

Advantages of this technique:

• Fast return of information
• Effective monitoring tool can cover rapidly large areas of the seabed
• The information can be easily communicated to non-specialists
• Robust technique for seabed systems
• SPI survey can be complemented with grab/corers samples

Methods

• Transects inside and outside the reef areas with video and SPI

• Each transect was 1.5-2 km = 56 hours = ~400 images
• 5 replicates were collected at each dip
• Sites: Mingulay, (200-250m) Banana reef (250-300m) and Logachev mounds (500-1200m)
Image analysis

Surface fauna (*Lanice conchilega*)

sediment water interface

aRPD-apparent
Redox Discontinuity
layer

Deep burrowing
infauna

Burrows
Mingulay reef complex
• Giant carbonate mounds (bioherms) in the Rockall Trough
## Study sites

<table>
<thead>
<tr>
<th>Areas</th>
<th>Depth (m)</th>
<th>Sediment type</th>
<th>surface</th>
<th>Penetration</th>
<th>aRPD (cms)</th>
<th>burrows</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRC</td>
<td>200-250</td>
<td>soft muds also stony areas (closer to the reef)</td>
<td>small polychaete tubes</td>
<td>Good</td>
<td>2-4 cm</td>
<td>distinct areas (~2cm)</td>
<td>Crinoids (Leptometra sp.), sponges (Mycale macilenta) and soft corals</td>
</tr>
<tr>
<td>BR</td>
<td>250-300</td>
<td>soft muds also stony areas (closer to the reef)</td>
<td>Lanice conchilega tubes</td>
<td>Good</td>
<td>4-6 cm</td>
<td>deep burrows (6-8cm)</td>
<td>Nephrops norvegicus ** video, tubes and burrowing polychaetes, actinia and stony corals (Caryoplyllia spp.)</td>
</tr>
<tr>
<td>LM</td>
<td>500-1200</td>
<td>layers of coral rubble, framework/attached fauna</td>
<td>limited (layered deposits)</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>Blue sponge (Hymedesmia paupertas), squat lobsters (Munida sp.), Coral Madrepora oculata, yellow sponge Mycale macilenta, the white sponge Aphrocallistes bocagei, cup sponges Phakellia sp. and some hydrocorals such as Pliobothrus symmetricus</td>
</tr>
</tbody>
</table>
• First time that SPI was deployed at these sites
• This survey has helped to characterise habitats in the vicinity of *Lophelia pertusa* reefs
• Fast coverage over large areas
• This survey will help to scale-up experiments
• Evidence of burrows (bioturbation) and infauna presence (tubes and in sediments)
• aRPD layers varied at the sites
• Data sets will contribute as baseline information
Acknowledgments

• Captain Bill Richardson & crew of RRS James Cook
• V. A. I. Huvenne and C. Alt (NOC)
• ICES
• UKOA for added-value awards
• NERC/DEFRA/DECC
• Seedcorn Changing Oceans Expedition (DP309)

http://changingoceans2012.blogspot.co.uk
Thank you
Questions?