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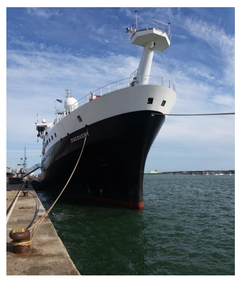

Benthic Macrofauna Communities of the Celtic Sea: a contribution to the Shelf Sea Biogeochemistry (SSB) programme

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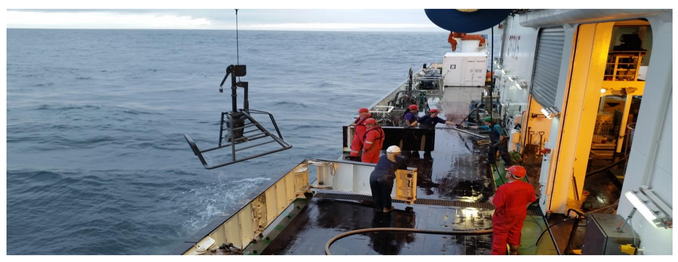
Introduction:

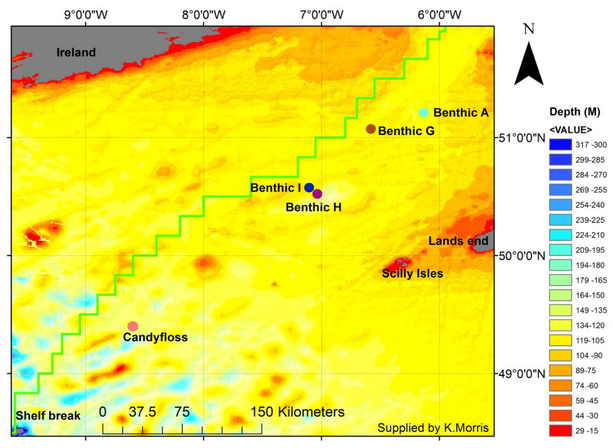
In 2014 and 2015, the NERC funded Shelf Sea Biogeochemistry (SSB) programme ran a series of benthic and pelagic cruises to the Celtic Sea. The focus of the benthic cruises was on investigating the cycling of carbon and nitrogen across a range of sediment types, from soft mud to coarse sand. The cruises were planned to capture the key seasons (winter, spring bloom and summer) and our role at PML was to quantify seasonal changes in the diversity and function of benthic communities (macrofauna, meiofauna, megafauna, epifauna, bacteria, and Archea), as well as key biogeochemical markers and processes (e.g. sediment pigments and N-cycling rates; nitrification, denitrification and anammox).

Methods:

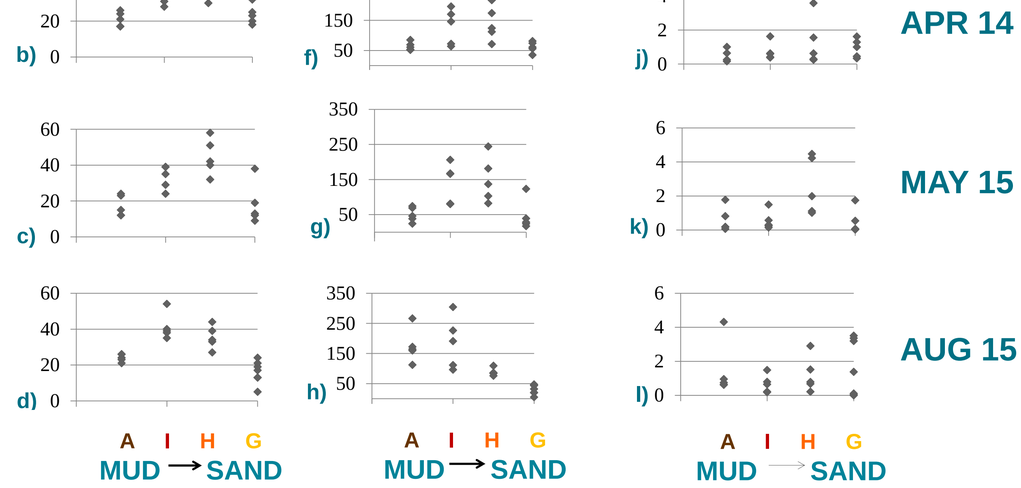
- Four benthic cruises: April 2014, March 2015, May 2015 and August 2015.
- Four main stations: A (mud), I (sandy mud), H (muddy sand), G (coarse sand) - 5 reps per station.
- Macrofauna samples collected using 0.1m^2 NIOZ box corer and sediment sieved over 1mm sieve.

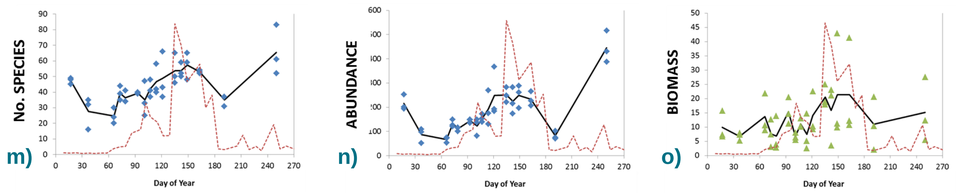


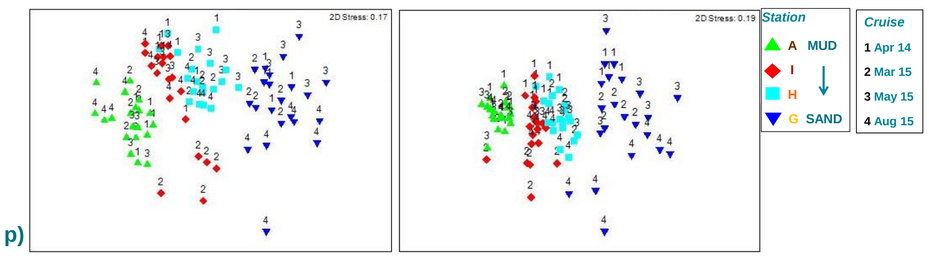
A muddy MUD → I sandy mud → H muddy sand → G sandy SAND



Results:

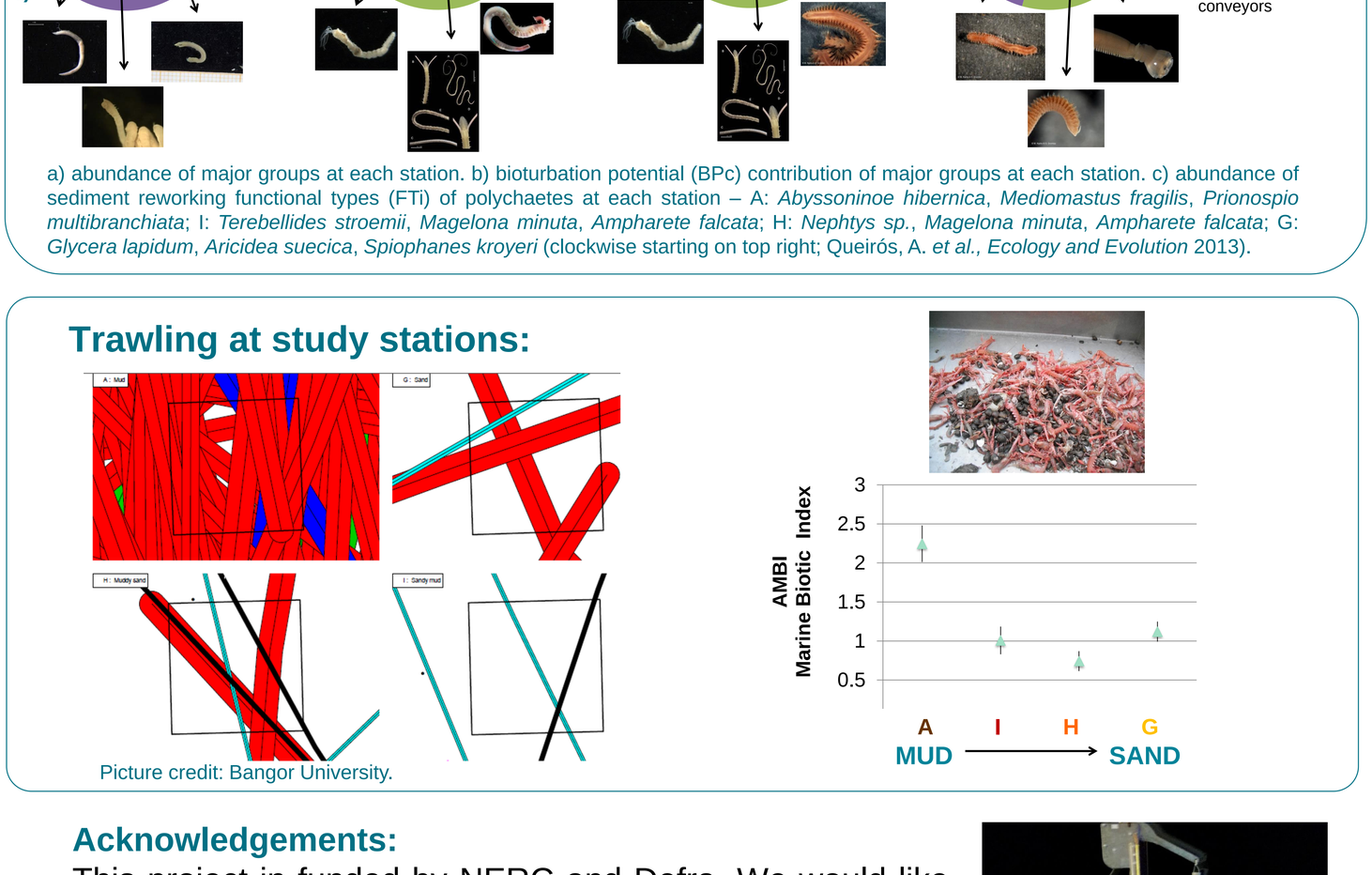






a), b), c) and d) diversity (number of species) per replicate for each cruise and at each station. e), f), g) and h) abundance (number of individuals) per replicate for each cruise and at each station. i), j), k) and l) total biomass (wet weight, g) per replicate for each cruise and at each station. m), n) and o) macrofauna diversity, abundance and biomass at station L4 in 2012 (Zhang, Q. *et al., Progress in Oceanography* 2015); dotted red line is plankton abundance. p) MDS plots for untransformed (left) and 4th root transformed (right) abundance data.

Structure and function of macrofauna communities from the Celtic Sea:



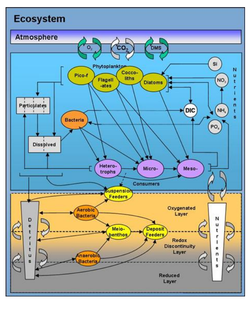
a) abundance of major groups at each station. b) bioturbation potential (BPc) contribution of major groups at each station. c) abundance of sediment reworking functional types (FTi) of polychaetes at each station – A: *Abyssoninoe hibernica*, *Mediomastus fragilis*, *Prionospio multibranchiata*; I: *Terebellides stroemii*, *Magelona minuta*, *Ampharete falcata*; H: *Nephtys sp.*, *Magelona minuta*, *Ampharete falcata*; G: *Glycera lapidum*, *Aricidea suecica*, *Spiophanes kroyeri* (clockwise starting on top right; Queirós, A. *et al., Ecology and Evolution* 2013).

Trawling at study stations:

Picture credit: Bangor University.

Conclusions:

- Mixed sediment sites (I and H) have higher biodiversity.
- Abundance shows seasonality, especially at mixed sediment sites.
- The sandy site G has lowest abundance (very physically driven).
- Biomass reflects seasonality and food availability.
- There is a clear gradation in community driven by sediment type.
- Station A was heavily trawled, yet that did not have a great impact on the community.



Next:

- Update the current ERSEM model.
- Link macrofauna data to data on meiofauna, epifauna, microbial communities, nitrification and denitrification.

Acknowledgements:

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Marine Biodiversity Research at PML

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