Survival in a feast-famine environment: Resource utilization, storage and recycling in cold-water coral reefs

Maier Sandra[1], Kutti Tina[2], Bannister Raymond[2], Van Rijswijk Pieter[1], Van Breugel Peter[1], De Froe Evert[1] and Van Oevelen Dick[1]

[1] Royal Netherlands Institute for Sea Research (NIOZ), Korringaweg 7, 4401 NT Yerseke, The Netherlands
E-mail: sandra.maier@nioz.nl

2 Norwegian Institute of Marine Research, Nordnesgaten 50, 5005 Bergen, Norway

Cold-water coral reefs play a major role in carbon cycling in the deep-sea, but their high productivity and diversity stands in sharp contrast to infrequently available resources. Organic matter is exported from surface ocean to deep sea in short peaks creating feast feeding conditions intermitted by long famine periods. This natural environmental gradient might be enforced due to global change, likely resulting in lower export production. Further, climate change and ocean acidification potentially increase corals' energetic demands.

In different stable isotope tracer experiments we have investigated the resource cycling within and between key CWC reef organisms: the most abundant framework-forming cold-water coral *Lophelia pertusa*, reef-associated sponges *Geodia baretti* and *Mycale lingua* and bivalve *Acesta excavata*. On the one hand, we have focused on their potential to utilize different resources such as algal detritus, bacteria and dissolved organic matter (DOM), and contrasted their storage capacities (e.g. in fatty acids) with the metabolization of assimilated resources. On the other hand, we have quantified the amount of dissolved and particulate organic matter that those organisms release, which in turn can serve as substrates in recycling pathways of the reef community.

The interconnection between those key reef species, their potential to assimilate DOM and bacteria, i.e. alternative food sources in times of low organic matter export, and their recycling capacity will be discussed as key factors to study resilience towards global climate change.

Keywords: stable isotope tracer experiments; dissolved organic matter (DOM); bacteria; carbon storage; fatty acids