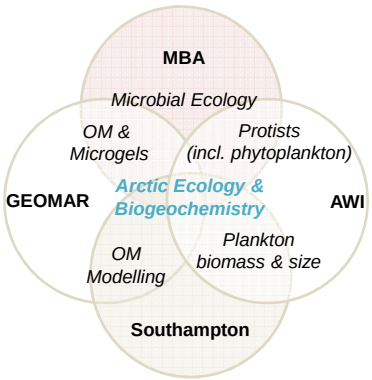
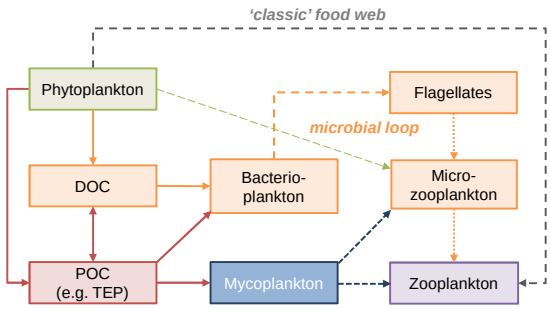
Understanding the links between pelagic microbial ecosystems and organic matter cycling in the changing Arctic (Micro-ARC)

Michael Cunliffe @ Marine Biological Association & University of Plymouth
Angel Engel & Markus Schartau @ GEOMAR
Eva-Maria Nöthig @ AWI
Ben Ward @ University of Southampton

NERC SCIENCE OF THE ENVIRONMENT
Bundesministerium für Bildung und Forschung

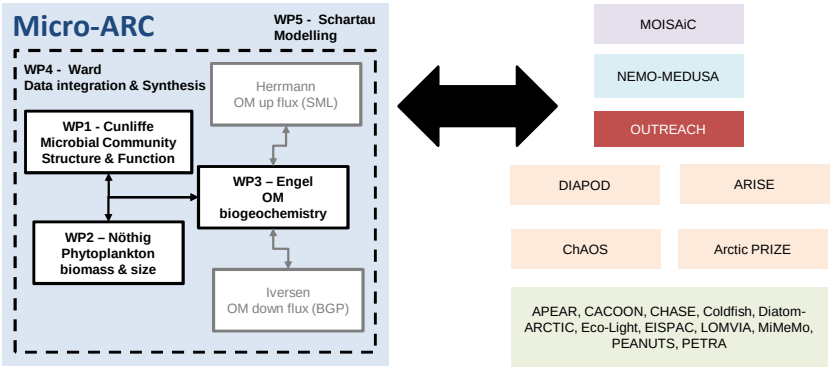
Aims & Objectives | Work packages | Methodologies | Modelling | Cruises





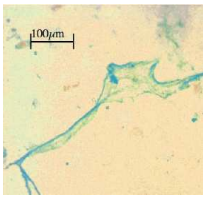
- Micro-ARC has the overarching objective to improve our understanding of how short-term (e.g. seasonal-scale) and long-term (e.g. climate-driven) changes in the physical environment of the Arctic Ocean are impacting **pelagic microbial ecosystems**, and the effects of these impacts on current and future **organic matter (OM) biogeochemistry**

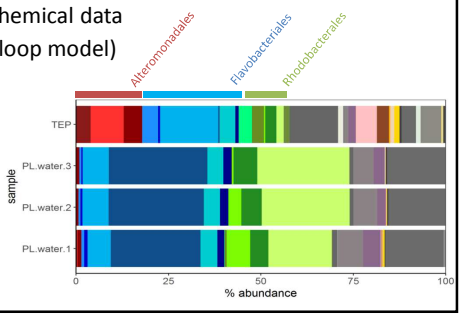
- Our main interest is to better understand how changes in the **lower food-web structure** (diversity, size, biomass, composition) relate to changes in **OM quantity, quality and turn-over rates**. A focus thereby will be on marine gel particles (TEP, CSP) as microbial substrates and as drivers of carbon flux



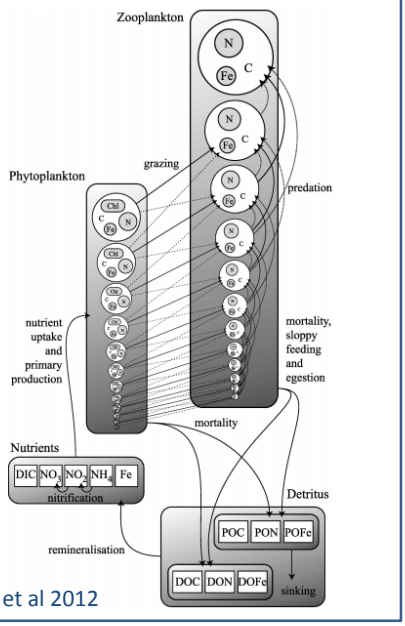
- WP1 Microbial community structure and function — Michael Cunliffe
- WP2 Plankton changes in size/biomass distributions — Eva-Maria Nöthig
- WP3 Organic matter quality and quantity — Anja Engel
- WP4 Model development and data-model synthesis — Ben Ward
- WP5 Modelling organic matter fluxes — Markus Shartau

- Quantifications of TEP, CSP, DOC, dissolved polysaccharides, dissolved amino acids, bacteria/archaea, protists (including phytoplankton) and fungi
- Microbial community structure (bacteria, archaea, protists and fungi; total i.e. DNA-based vs. active i.e. RNA-based), in particular focusing on microbes associated with marine gels and fungi-phytoplankton parasite infection
- Quantify rates of microbial activity (exudation and bacterial secondary production) using radioisotopes
- Assimilation of microbial and organic biogeochemical data into size-based ecosystem models (microbial loop model)



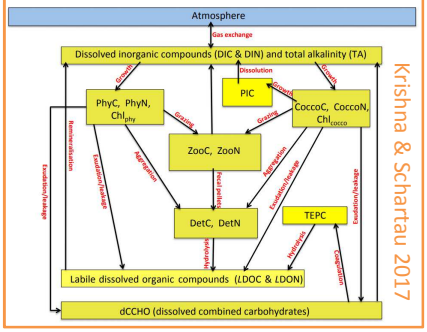


Plankton Size Spectra Allometric Model



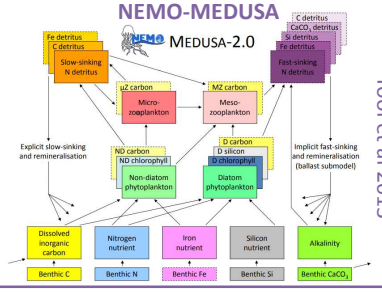
Ward et al 2012

DOM, exudates, gel Model

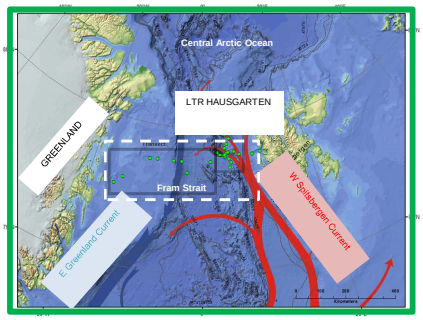


Krishna & Schartau 2017

NEMO-MEDUSA



Yool et al 2013



Cruise 1: June/July 2018 (dates not yet assigned) *RV James Clark Ross* in the FS.

Cruise 2: 13/09/18-13/10/18 *RV Maria S. Merian* (cruise MSM77) in the FS.

Cruise 3: June/July 2019 (dates not yet assigned) *RV Polarstern* in the FS.

Cruise 4: 10/09/19-13/10/19 *RV Polarstern* (PS122) from the FS into the CAO.

Cruise 5: October 2019 – October 2020 (dates not yet assigned) MOSAiC in the CAO.

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→ Photograph from the MBA archive. It shows Edward Nelson, who was a plankton biologist who worked at the MBA, sampling through the ice during Scott's last polar exploration, the Terra Nova expedition (1910-13)