SESSION: Ecosystems, Biodiversity and Biodiscovery

MARS Themes:

Understanding scales of biodiversity from molecular to ecosystem

Title:

Bacteria and archaea regulate particulate organic matter export in suspended and sinking marine particle fractions

Author(s)

Chaoro Dithigoe [1]

Thulani P Makhalanyane [1,2]

Affiliation:

1. University of Pretoria
2. University of Stellenbosch

Abstract:

The biological carbon pump (BCP) in the Southern Ocean is driven by phytoplankton productivity and is a significant organic matter sink. However, the role of particle-attached (PA) and free-living (FL) prokaryotes (bacteria and archaea) and their diversity in influencing the efficiency of the BCP is still unclear. To investigate this, we analyzed the metagenomes linked to suspended and sinking marine particles from the Sub-Antarctic Southern Ocean Time Series (SOTS) by deploying a Marine Snow Catcher (MSC), obtaining suspended and sinking particulate material, determining organic carbon and nitrogen flux, and constructing metagenome-assembled genomes (MAGs). The suspended and sinking particle-pools were dominated by bacteria with the potential to degrade organic carbon. Bacterial communities associated with the sinking fraction had more genes related to the degradation of complex organic carbon than those in the suspended fraction. Archaea had the potential to drive nitrogen metabolism via nitrite and ammonia oxidation, altering organic nitrogen concentration. The data revealed several pathways for chemoautotrophy and the secretion of recalcitrant dissolved organic carbon (RDOC) from CO_2, with bacteria and archaea potentially sequestering particulate organic matter (POM) via the production of RDOC. These findings provide insights into the diversity and function of prokaryotes in suspended and sinking particles and their role in organic carbon/nitrogen export in the Southern Ocean.

Format:

10-min oral

Keywords:

Southern ocean; Biological Cabron Pump; Microbial diversity; Marine snow