Assessing the role of viruses on carbon export in a warming ocean.

Focardi, Amaranta*¹, Martin Ostrowski¹, Deepa Varkey¹, Kirianne Goossen³ Mark Brown², and Ian Paulsen¹

¹. MQMarine and Department of Molecular Sciences, Macquarie University, North Ryde, NSW, Australia
². School of Environmental and Life Sciences, University of Newcastle, Newcastle, NSW 2052, Australia.
³. CSIRO Oceans and Atmosphere, Castray Esplanade, Hobart

Martin.ostrowski@mq.edu.au

The flow of carbon and energy from the base of the food web is influenced by physical, chemical and biological factors. While nutrients and temperature are recognised as important drivers, almost nothing is known about the impact of viruses and grazers on the structure and productivity of Australian marine ecosystems. To gain quantitative insights into the biological factors influencing regional productivity we compared phytoplankton (prokaryotic and eukaryotic) communities in the East Australian Current (EAC) and adjacent Tasman Sea during Voyage IN16_v04 in September 2016. A combination of cytometry, dilution incubations and genomics was used to characterise the standing stocks (number, identity and biomass) and the rates of viral lysis and grazing on three phytoplankton groups, Prochlorococcus, Synechococcus and picoeukaryotes. We observed that picocyanobacteria make a significant contribution to the Carbon (C) standing stocks in the EAC. Distinct differences were observed for C flux through viral and grazing pathways in the EAC water compared to the Tasman sea. Viral lysis of all three groups was identified as a major factor, with up to 80% of the population being removed each day in the EAC. C uptake to higher trophic levels via grazing was observed in all samples, however, C “recycling” due to viral lysis was significantly higher in the EAC in comparison to the Tasman sea. These results highlight the rapid turnover of microbial populations on a daily basis by grazers and viruses, and that biological interactions play major roles in structuring the phytoplankton communities and modulating the flow of C and energy through marine ecosystems. We will present estimates of the group-specific C standing stocks and flux through different routes, calibrated by elemental composition analyses and discuss the implications of viral activity in the context of a warming ocean.