

Dr Eric Raes

Biological Oceanographer

Alfred Wegener Institute for Polar and Marine Research,
Germany



Dr. Eric Raes finished his PhD in Biological Oceanography at the University of Western Australia. His previous research focused on micro algal biofuel production and recently he worked as a postdoctoral fellow at the Alfred Wegener Institute for polar and marine science in Germany. Currently he is employed as a postdoctoral fellow at CSIRO. His research interests are focused on the questions which relate to how the microbial diversity, especially in relation to the nitrogen cycle, can be linked to changes in biogeochemical processes, both now and under future climate driven changes. During his work and research, he fostered a multidisciplinary approach that allowed him to synthesize and bridge links between the fields of microbiology, biogeochemistry, and marine ecology in coastal and open oceanic environments ranging from tropical to temperate and arctic environments.

Professor Anya Waite

Head, Biological Oceanography

Alfred Wegener Institute for Polar and Marine Research, Germany



Anya Waite has been Section Head of Polar Biological Oceanography at the Alfred Wegener Institute in Bremerhaven and Professor of Oceanography in the Department of Biology at the University of Bremen since June 2014, and has chaired AWI's Scientific Council since 2016. After completing a BSc in biology in 1985 in Halifax, Canada, she obtained her PhD in 1992 in biological oceanography at the University of British Columbia in Vancouver, publishing papers on diatom sedimentation and buoyancy, and marine nutrient dynamics. She then held postdoctoral positions at WHOI (USA) and the Victoria University (New Zealand). In 1997 she took a professorship at University of Western Australia in Perth, and was there for 17 years as a biological oceanographer. She was a research group leader in the Oceans Institute as well as teaching students in the Environmental Engineering program. Her early work included participation in the first Southern Ocean iron fertilization experiment, SOIREE. After this, her work in the East Indian Ocean explored the dynamics of mesoscale eddies, the nitrogen cycle in oligotrophic systems and the biology of the spiny lobster larvae in Australian waters. Her current interests include nitrogen fluxes in polar oceans and particle dynamics in mesoscale eddies, and she is on the Project Board for the 2019-20 Arctic ice-drift program MOSAiC. Anya Waite was Board Member of the American Association for Limnology and Oceanography (ASLO) from 2011 to 2014, and she currently serves on the Editorial Board of Limnology and Oceanography and as Proxy Editor-in-Chief. She is international advisor to the Board of Directors of the Antarctic Climate & Ecosystems Cooperative Research Centre ACE

CRC in Hobart, Australia, a member of the Norwegian Research Council Advisory Board, and a member of the Programme Advisory Group for the NERC Changing Arctic Ocean Research Programme. She is Co-Chair of the SCOR Working Group on biological observation systems, "P-OBS". She has been on the Steering Committee of the Southern Ocean Observation System (SOOS) since 2017 and on the SOOS Executive Committee since 2018.

State of play (state of the art) on long-term observing of biota in the Southern Ocean

Eric Raes, Anya Waite

High resolution data covering marine microbes and micro eukaryotes are sparse, despite the fact that these organisms control global biogeochemical cycles and ecosystem services. Here we present insights into the ecosystem dynamics along latitudinal gradients from the tropics to the Southern Ocean, in the Indian and Pacific sectors. Our data were collected on repeated transects (GO-SHIP and OISO; Océan Indien Service d'Observation) which aim to create long term and global coordinated networks of sustained hydrographic sections.

In this presentation I aim to show how our zonal comparisons of prokaryotic and photoautotrophic, eukaryotic communities along with in situ rate measurements of carbon (C) and nitrogen (N) can be used to describe current, and potential shifting, energy pathways in the Southern Ocean. Key findings from our voyages were that a) temperature is not a primary driver of pro- and eukaryotic richness gradients in early winter in the South Pacific Ocean b) archaeal and bacterial richness increased with productivity, and c) that oceanographic features can structure pro- and eukaryotic richness. Our data from both the Indian and Pacific sectors also showed that the geographical range of N₂ fixation extends further than previously thought, and that N₂ fixation can occur in the cold and nutrient rich waters of the Southern Ocean. In addition, our data revealed that nitrification in the surface waters of the Southern Ocean is an important N-cycling pathway connecting the sources and sinks of fixed nitrogen.

We advocate the integration and long term monitoring of biological data on national and international repeated hydrographic transects. The combination of high resolution physical and chemical data with biological components such as rate measurements and genomic data will aid to tease apart the base of the pelagic food web, along with the ecosystem functions, now and potentially under future climate driven changes.



Australian Government
Department of the Environment and Energy
Australian Antarctic Division



ANTARCTIC CLIMATE & ECOSYSTEMS
COOPERATIVE RESEARCH CENTRE