Decoding coccolithophores – calcification at the base of marine food webs

At the base of nearly all marine food webs are microscopic unicellular algae, fixing carbon dioxide (CO_2) like plants on land via photosynthesis. Among those is a special group called coccolithophores (Fig. 1), which also fix inorganic carbon into calcium carbonate ($CaCO_3$) to form an intricate exoskeleton like hard corals. Similar to these, coccolithophores struggle to calcify when seawater pH levels decrease, a phenomenon termed ocean acidification and a direct result of ever growing anthropogenic CO_2 emissions.

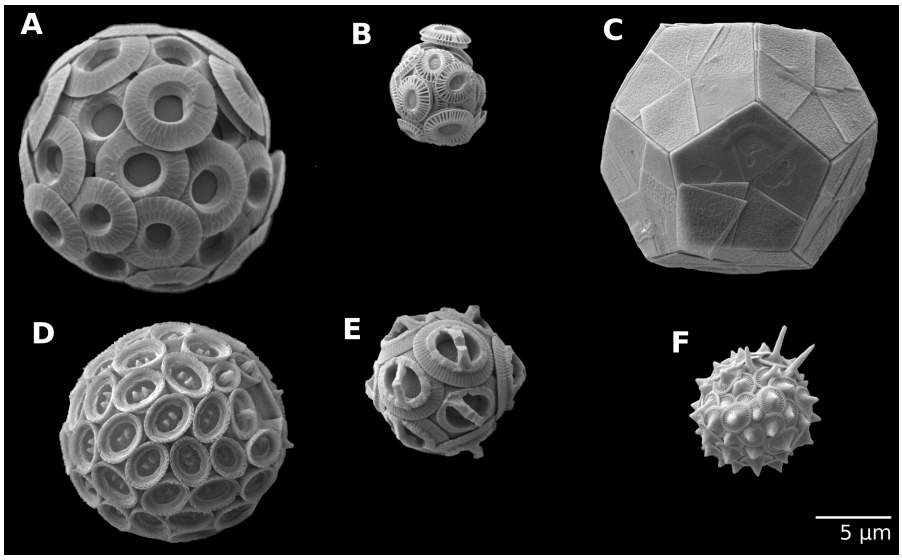

Figure 1: Calcifying phytoplankton divsersity in the modern ocean, exemplified by **(A)** *Umbilicosphaera sibogae*, **(B)** *Emiliania huxleyi*, **(C)** *Braarudosphaera bigelowii*, **(D)** *Coronosphaera binodata*, **(E)** *Gephyrocapsa oceanica* und **(F)** *Acanthoica quattrospina*. SEM images taken by Maxine Dawes (SCU, Australia).

Here we are looking for a highly motivated Honours student to unravel a remaining mystery of coccolithophorid calcification, that would help in understanding and better projecting their potential success in a future ocean. It will involve deciphering the inorganic carbon source(s) used for producing $CaCO_3$, i.e. CO_2 and/or bicarbonate or carbonate ions. This can be achieved by clever experiments making use of new developments in isotope geochemistry.

The successful candidate has ideally a marine background, but most importantly is eager to learn new techniques in an exciting and interdisciplinary project ranging from phytoplankton culturing, scanning electron microscopy, mass spectrometry to numerical modeling and data visualisation.

If you are interested please contact Kai Schulz (kai.schulz@scu.edu.au) or Renaud Joannes-Boyau (renaud.joannes-boyau@scu.edu.au) for details. Looking forward to a chat!