

Perturbing coccolithophores: The past and future of Earth's stabilisers

Rosalind E. M. Rickaby

Department of Earth Sciences, University of Oxford, South Parks Road, Oxford OX1 3AN, UK. rosalind.rickaby@earth.ox.ac.uk

Coccolithophores are single-celled photosynthesising algae that precipitate a multitude of intricate calcium carbonate liths inside their cells before expulsion to form an external spherical armour. Although microscopic in stature, coccolithophores have exerted a gigantic influence on Earth's carbon cycle since their emergence in the Triassic. Massive accumulations of calcium carbonate coccoliths (an estimated flux of $\sim 6 \times 10^{25}$ liths/year) contribute to export of organic matter from the mixed layer, and ultimately form sediments on the deep seafloor, a dominant sink of carbon from the atmosphere over geological timescales, playing a role in Earth's thermostat and acting as a buffer for seawater chemistry. Through this carbon sink, the coccolithophores have exerted an influence on the ocean and atmosphere, but similarly this changing carbon cycle has driven genetic and physiological innovation and adaptation within the coccolithophores. In this talk, I will explore, using novel bio(geo)chemical tools, how coccolithophores and the environment are linked in an inescapable feedback, in the geological past and how looking to the past may help to predict their future destiny in a rising carbon world.