# Recovery of plankton cell and coccolith size after the Cretaceous-Paleogene mass extinction (IODP Expedition 342 Sites 1403 and 1407, North Atlantic)

**Hojung Kim**
University College London, Department of Earth Sciences, London WC1E 6BT, UK; hojung.kim.09@ucl.ac.uk

**Paul Bown**
University College London, Department of Earth Sciences, London WC1E 6BT, UK; p.bown@ucl.ac.uk

**Samantha J. Gibbs**
University of Southampton, National Oceanography Centre, Southampton, UK SO14 SO14 3ZH; samantha.Gibbs@noc.soton.ac.uk

The Cretaceous-Paleogene (K/Pg) mass extinction event, the most significant geological event to have affected calcareous nannoplankton, caused the extinction of over 90% of species. Because calcareous nannoplankton are major contributors to both primary and carbonate production, these rapid and devastating extinctions resulted in a major disruption of the marine biogeochemical cycles as evidenced by stable isotope excursions and the carbonate crash. The extinction eliminated the vast majority of open ocean taxa, and recovery initiated in new lineages that were characterized by very small cell size and minute coccoliths (<3$\mu$m). The initial few million years after the extinction saw a rapid diversification in species and increases in cell and coccolith size. In this study, we were able to quantify the speed and method of this recovery from a recently drilled Cretaceous-Paleogene section (IODP Expedition 342 Sites U1403 and U1407) that is located on the J-Anomaly Ridge in the northeast Atlantic Ocean. The succession includes an intact spherule layer and very well preserved microfossils. We focused on a variety of morphometric traits, including coccolith length and width, and cellular traits, including cell geometry (cell size and number of coccoliths per cell) and compared the evolutionary rates among the newly evolved lineages (*Prinsius*, *Coccolithus*, *Cruciplacolithus*, *Chiasmolithus*, and *Toweius*) and survivor taxa (*Cyclagelosphaera*, *Markalius*, and *Zeugrhabdotus*). These new data will provide us with an insight into the post-mass-extinction recovery of the marine ecosystem, including the rate at which pelagic carbonate production by coccolithophores was re-established.