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# Seymour Island/Marambio Drilling Project: Drilling 40Ma (Campanian to Eocene) of high latitude Southern Hemisphere climate history.

Lothar Viereck-Gotte (1), Jane E. Francis (2), Alan P.M. Vaughan (3), Barbara A.R. Mohr (4), Sergio A. Marenssi (5), and Stephen F. Pekar (6)

(1) Institut fuer Geowissenschaften, Friedrich-Schiller-Universitaet, Jena, Germany (lothar.viereck-goette@uni-jena.de), (2) School of Earth and Environment, Leeds University, Leeds, UK ( j.francis@see.leeds.ac.uk), (3) British Antarctic Survey, Cambridge, UK (a.vaughan@bas.ac.uk/+44-1223-362616), (4) Museum fuer Naturkunde, Institut für Palaeontologie, Berlin, Germany (barbara.mohr@mfn-berlin.de), (5) Instituto Antártico Argentino, Universidad de Buenos Aires, Buenos Aires, Argentina (smarenssi@dna.gov.ar), (6) School of Earth and Environmental Sciences, Queens College (CUNY), New York, USA (stephen.pekar@qc.cuny.edu)

The aim of this project is to core a key geological section in the Antarctic Peninsula region. The James Ross Basin, east of the Antarctic Peninsula, contains the best high-latitude section in the world that spans more than 40 million years of geological history from the mid-Cretaceous to the mid-Cenozoic (∼80-34Ma). More than 6500m of marine and estuarine sediments were deposited during the filling of the James Ross back-arc basin. The sedimentary succession is extremely fossiliferous, yielding diverse invertebrate, vertebrate and plant fossil assemblages, allowing detailed reconstructions and integration of both terrestrial and marine systems. The sequence also contains a key global reference section for the Cretaceous-Palaeocene extinction event at high latitudes.

The sequence contains key intervals that provide details about past polar climates:
Mid-Late Cretaceous Thermal Maximum (∼80Ma) when tropical floras grew at ∼65°S and greenhouse temperatures reached their peak across the globe; a possible phase of high-latitude glaciation within greenhouse times during the latest Cretaceous; the Cretaceous-Palaeocene extinction event at 65Ma; the Palaeocene-Eocene Thermal Maximum episode of rapid global warming at 55Ma (possibly an unconformity in Seymour Island but this can be better established in a drill core); early Eocene hothouse climates; a cooling phase during the Eocene, and the first signs of global cooling in the latest Eocene.

Although the sedimentary sequence is reasonably well known from surface outcrop and a stratigraphy has been established, the unconsolidated and weathered nature of the outcrop prohibits high resolution studies. Drill cores will provide more consolidated sediments that can be logged and sampled at high resolution and provide an extremely detailed picture of environmental and climate evolution through this transition from greenhouse to icehouse climates. Three drill cores are planned in this time interval using a land-based rig with target depth of up to 1000 m.

The outcomes of drilling and science projects will be a detailed record of climate change at southern high latitudes that can be matched to regional and global events, with a particular focus on the polar regions. These new data will be used to test climate models and evaluate climate simulations. In addition, new information about marine and terrestrial ecosystem extinctions and recovery at major events, such as the Late Cretaceous Thermal Maximum, the Cretaceous-Palaeocene boundary, and Palaeocene-Eocene Thermal Maximum will be obtained to add a high-latitude perspective to these global events.