Table D11. Palynological methodology and data relevant to this study for section DS251, Seymour Island, Antarctica.

This table includes both the raw count data and the cyst/pollen counts calculated per gram of dried sediment (equation used stated below). Rewecked palynomorphs were rare, so not included here. Note, only data for the López de Bertodano Formation is plotted in Figure 2.

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<table>
<thead>
<tr>
<th>Sub-section</th>
<th>Sample No. traverses counted on each slide</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5.1</td>
<td>180</td>
</tr>
<tr>
<td>D5.20</td>
<td>120</td>
</tr>
<tr>
<td>D5.21</td>
<td>180</td>
</tr>
<tr>
<td>D5.22</td>
<td>120</td>
</tr>
</tbody>
</table>

Laboratory processing methodology:

- The sediment was sieved at 180 μm, treated with hydrochloric acid and hydrofluoric acid then oxidized briefly with nitric acid. The organic residue was then treated with hydrofluoric acid and dried. The carbonate fraction was removed via treatment with 10 M hydrochloric acid. The residue was then re-dried and mounted on slides.
- The calculation of palynomorphs per gram (g) of dry sediment is based on the following equation:

\[ \text{Palynomorphs per gram} = \frac{\text{count} \times 1000}{\text{weight of sample}} \]

where count is the total number of palynomorphs counted, and weight of sample is the mass of the sample in grams (g).

- The data for the López de Bertodano Formation is plotted in Figure 2.
Table DR2. Biostratigraphical references to support the age model of the López de Bertodano Formation, Seymour Island, Antarctic Peninsula.

Dating by other authors of measured sections through the López de Bertodano Formation on Seymour Island has allowed the construction of a robust age model for section D5.251 (this study) using the K/Pg boundary as a datum. Magnetic polarity zonal boundaries (Tobin et al., 2012) and strontium isotope ratios (McArthur et al., 1998) have been correlated to D5.251 using stratigraphic height (in metres) relative to the K/Pg boundary identified in each study. We have had to assume planar bedding and continuous sedimentation for these correlations. Due to these assumptions, direct comparison of individual data points between Tobin et al.’s (2012) dataset and our own (for example, on Fig. 2) at any specific stratigraphic horizon is not valid due to these assumptions made. However, we consider any error in stratigraphic position of the correlated data is likely to be minimal based on field knowledge of the outcrop along strike from our measured section and comparisons between our own dinoflagellate cyst biostratigraphy (Bowman et al., 2012) and Tobin et al.’s (2012) magnetic polarity zonal boundaries.

The timescale has been added by linear interpolation between the known ages of reversal boundaries after Gradstein et al. (2012). Strontium isotope ratios measured by McArthur et al. (1998) compare favorably with our age model by comparison with the updated strontium stratigraphy for the Maastrichtian Stage (Vonhof et al., 2011). No discrete ashes have been recorded from the López de Bertodano Formation. Biostratigraphical studies in support of this age model include those listed below.

<table>
<thead>
<tr>
<th>Fossil group</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dinoflagellate cysts</td>
<td>Askin, 1988</td>
</tr>
<tr>
<td></td>
<td>Askin and Jacobson, 1996</td>
</tr>
<tr>
<td></td>
<td>Bowman et al., 2012</td>
</tr>
<tr>
<td></td>
<td>Thorn et al., 2007, 2009</td>
</tr>
<tr>
<td>Other microfossils (foraminifera, diatoms, sillicoflagellates, calcareous nannoplankton)</td>
<td>Harwood, 1988</td>
</tr>
<tr>
<td></td>
<td>Huber, 1985</td>
</tr>
<tr>
<td></td>
<td>Huber, 1988</td>
</tr>
<tr>
<td></td>
<td>Huber et al., 1983</td>
</tr>
<tr>
<td>Macrofossils</td>
<td>Crame et al., 1999, 2004</td>
</tr>
<tr>
<td></td>
<td>Macellari, 1987</td>
</tr>
<tr>
<td></td>
<td>Marshall, 1995</td>
</tr>
<tr>
<td></td>
<td>Olivero and Medina, 2000</td>
</tr>
<tr>
<td></td>
<td>Tobin et al., 2012</td>
</tr>
<tr>
<td></td>
<td>Zinsmeister, 1998</td>
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<td></td>
<td>Zinsmeister et al., 1989</td>
</tr>
</tbody>
</table>
Table DR3. Modern analogue interpretation of key terrestrial palynomorphs.

The terrestrial palynomorph assemblage from the López de Bertodano Formation, Seymour Island, Antarctic Peninsula, was found to have close similarity to that of the New Zealand Late Cretaceous palynoflora, many detailed within an online database: “New Zealand fossil spores and pollen: an illustrated catalogue” (Raine et al., 2011). These taxa are illustrated in Figure DR1.

<table>
<thead>
<tr>
<th>Terrestrial palynomorph taxa</th>
<th>Nearest modern relatives</th>
<th>Modern climatic/habitat preference</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Tricolpites reticulatus</em></td>
<td>Gunneraceae. Specimens of <em>Tricolpites reticulatus</em> previously found on Vega Island (Dettmann and Thomson, 1987) have been compared to the pollen of <em>Gunnera macrophylla</em>, a modern species from Papua New Guinea. This particular <em>Gunnera</em> pollen morphotype was also found in all the New Zealand and Tasmanian <em>Milligania</em> species (a primitive sub-genus of <em>Gunnera</em>), but is absent in South America today (Wanntorp et al., 2004).</td>
<td>Tropical and south temperate super-humid environments, commonly with moderate to heavy rainfall and at moderate to high elevation.</td>
<td>Jarzen, 1980 (and references therein).</td>
</tr>
</tbody>
</table>
Table DR4. List of fossil and modern species.

This table lists all formally defined botanical and zoological species mentioned in this paper, both fossil and modern, together with full author citations. The species are listed alphabetically and grouped by type.

Dinoflagellate cysts:


*Islandinium minutum* (Harland and Reid in Harland et al. 1980) Head et al. 2001

Bryophyte spores:

*Stereisporites antiquasporites* (Wilson & Webster 1946) Dettmann 1963

Pteridophyte spores:

*Laevigatosporites ovatus* Wilson & Webster 1946

Gymnospermous pollen:

*Phyllocladidites mawsonii* Cookson 1947 ex Couper 1953

Angiospermous pollen:

*Clavamonocolpites polygonalis* Askin 1994

*Ericipites scabratus* Harris 1965

*Peninsulapollis gillii* (Cookson 1957) Dettmann & Jarzen 1988

*Tricolpites reticulatus* Cookson 1947 ex Couper 1953

Plantae:

*Gunnera macrophylla* Blume 1826

Belemnite:

*Dimitobelus (Dimitocamax) seymouriensis* Doyle & Zinsmeister 1988
Bivalves:

*Pycnodonte* cf. *P. vesiculosa* Sowerby 1823

*Linotrigonia pygoscelium* Wilckens 1910
REFERENCES FOR DATA REPOSITORY:


Cookson, I.C., 1947, Plant microfossils from the lignites of the Kerguelen Archipelago: British and New Zealand Antarctic Research Expedition, 1929-1931, Reports (Series A), v. 2(8), p. 129-142.


Doyle, P., and Zinsmeister, W.J., 1988, The new dimitobelid belemnite from the Upper Cretaceous
of Seymour Island, Antarctic Peninsula, in Feldmann, R.M., and Woodburne, M.O., eds., The
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Harland, R., Reid, P.C., Dobell, P., and Norris, G., 1980, Recent and sub-Recent dinoflagellate
cysts from the Beaufort Sea, Canadian Arctic: Grana, v. 19, p. 211-225.

Harris, W.K., 1965, Basal Tertiary microfloras from the Princetown area, Victoria, Australia:

Harwood, D.M., 1988, Upper Cretaceous and lower Paleocene diatom and silicoflagellate
biostratigraphy from Seymour Island, eastern Antarctic Peninsula, in Feldmann, R.M., and
Woodburne, M.O., eds., The Geology and Paleontology of Seymour Island: Geological Society
of America Memoir, v. 169, p. 55-130.

Head, M.J., Harland, R., and Matthiessen, J., 2001, Cold marine indicators of the late Quaternary:
the new dinoflagellate cyst genus Islandinium and related morphotypes: Journal of Quaternary

Huber, B.T., 1985, The location of the Cretaceous/Tertiary contact on Seymour Island, Antarctic

Huber, B.T., 1988, Upper Campanian–Paleocene foraminifera from the James Ross Island region,
Antarctic Peninsula, in Feldmann, R.M., and Woodburne, M.O., eds., The Geology and


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