# Multiple organic carbon isotope reversals across the Middle Permian and Upper Triassic of eastern Tasmania: clues to Carbon Cycle Perturbations and Paleoclimate Reconstruction Near the South Pole

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**Abstract**

During the mid-Permian de-glaciation phase, Tasmania was located in a high-latitude Southern Hemisphere setting, wedged between Antarctica and Australia. Significant global carbon cycle disturbances associated with major environmental changes resulting in extinctions occurred globally. Here we present new high-resolution pXRF, organic carbon isotopes, and sedimentological data from Bicheno 5 core, located in Eastern Tasmania. The record here represents _˜300 meters of Middle Permian and early Upper Triassic sediments, with a significant unconformity in the Upper Permian associated with eustatic sea-level fall as an effect of regional uplift in eastern Australia. Three major carbon isotope excursion (CIE) intervals characterized by negative shifts of up to 6‰ were recognized; the Middle Permian, Upper Triassic Carnian, and Norian. The low-resolution palynological analysis shows well-preserved pollen and spore assemblages in the younger part of the core dominated by *Alisporites* spp. and *Aratrisporites* spp. We combine the new carbon isotope and palynological data with the eastern Australian Late Triassic spore-pollen biozones (*A.parvispinosus*, *C.rotundus, and P.crenulatus* Zone) and precise U-Pb dating. These CIEs can further be correlated with global $\delta$13CTOC records from the paleo-Pacific Ocean (Panthalassa), Southwest England, and South China. Sedimentological data coupled with the pXRF data shows the relationship between the major carbon cycle perturbation and the environmental response to these events in the Antarctic region.

**Keywords:** C cycle pertubration, paleoclimate reconstruction, tasmania, middle permian, carnian pluvial event, middle norian event

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