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Glauconitization episodes before the onset of Antarctic glaciation

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The environmental changes leading up to the first continent-wide glaciation of Antarctica during the Eocene-Oligocene Transition (EOT) is still not fully understood. Declining atmospheric CO2 concentrations and associated feedbacks have been invoked as underlying mechanisms, but the role of the coeval opening/deepening of Southern Ocean gateways, and subsequent changes in paleoceanography remain poorly understood. Evidence suggests both a temperate late Eocene and cooling before the EOT, both broadly coetaneous with a wide, supra-regional diagenetic event that resulted in green-clay (glaucony) formation in the marine realm around Antarctica. Glaucony is a sensitive marker of sedimentation rates, sea-level and sediment physico-chemical conditions, and thus a powerful tool for marine sedimentological and climatic interpretation. In spite of all, the nature, depositional setting, paleoenvironmental implications and chronology of the late Eocene glaucony reported in diverse shallow-marine settings are loosely constrained. Here, we evaluate the palaeogeographic implications and temporal variations of Antarctic glaucony-bearing sediments deposited before major ice sheet advance during the EOT. In this sense, the morphological, mineralogical and geochemical features of late Eocene glauconitized fecal pellets in both ODP Site 696 and Seymour Island sections denote an autochthonous origin of the evolved glaucony grains, indicating a period of low sedimentation rate associated with rising sea levels related to plate reorganization and opening/deepening of Drake Passage.