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Obliquity paced contourite cyclicity in Antarctic sediments from the Wilkes Land (Site U1356) during Late Oligocene

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Our study on sediment cores from IODP Expedition 318 Site U1356 off the east Antarctic Wilkes Land margin comprises the interval from 641 meters below seafloor (mbsf) to 688 mbsf. Based on the age model, this section spans approximately 1 myr (between 26.2 and 25.2 Ma) during the Late Oligocene. Sediment cores were studied using a detailed facies analyses, X-Ray computed tomography (CT-scans), Scanning electron microscope (SEM) images, X-Ray Fluorescence (XRF) core-scanner data at 2cm resolution, and geochemical mapping.

Sedimentary facies during the Late Oligocene are characterized by an alternation between scarcely bioturbated green claystones with variable silty laminations and highly bioturbated pale-brown silty-claystones with carbonate. In agreement, Magnetic Susceptibility (MS) and XRF analyses show a cyclical variation. Low magnetic susceptibility and high Barium (Ba) content characterizes the laminated facies. In contrast, highly bioturbated facies show high MS and high content in Zr/Ti. SEM images reveal that both facies present evidences of current reworking features.

We interpret sedimentation during the Late Oligocene in the Wilkes Land margin to be dominated by bottom-currents of varying intensities during glacial and interglacial cycles. Spectral analyses of the XRF Ba and Zr/Ti scans, point to the observed cyclicity (i.e. laminated vs. bioturbated facies) to be paced by obliquity. In addition, the lack of Ice Rafted Debris (IRD) within the studied interval points to a reduced continental East Antarctic Ice Sheet (EAIS).