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The Oligocene-Miocene transition at the East Antarctic Wilkes Land margin: IODP Site 1356

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IODP drilling in the flank of a levee deposit at continental rise Site U1356 recovered a thick section of Oligocene to upper Miocene sediments indicative of relatively deep water, sea ice—influenced setting. Three main lithological units characterize the sediment record: 1) hemipelagic and bottom current deposition dominated during the late early to late Oligocene; 2) debris flows with interbedded turbidite deposits characterize sedimentation during late Oligocene to early Miocene; and 3) turbidite and hemipelagic sedimentation dominated during the early Miocene. The regional grid of multichannel seismic lines, provide a regional depositional context for the three units. Early to late Oligocene deposits record abyssal plain sedimentation under the influence of bottom currents. The sharp transition from abyssal plain facies to distal debris flows during the late Oligocene coincides with the deposition of large mass transport deposits at the base of the continental slope and erosion of large channels on the continental rise. The distal end of these mass transport deposits is recovered in our cores interbedded with levee turbidites from the nearby channel. The Oligocene to Miocene transition marks the disappearance of debris flows in our cores and the start of turbidite and hemipelagic deposition that characterizes levee sedimentation of the early Miocene environment. The studied section records one of the major climate transitions in the history of Earth's climate and ice sheet evolution during leading to the Mi-1 event. We argue that mass transport processes resulted from East Antarctic Ice Sheet expansion during the climate cooling leading to the Mi-1 glaciation. Following the Mi-1 event, sedimentation is characterized by hemipelagic, turbidity-, and bottom-current deposition. In addition, we present elemental and clay mineralogy data that provide insights into terrigenous fluxes, productivity, and the transition from a poorly oxygenated low-silica system to a ventilated silica-enriched system that is more similar to the modern Southern Ocean.