K/Ar Dating of Fine Grained Sediments Near Prydz Bay, Antarctica: East Antarctic Ice Sheet Behavior During the Middle-Miocene Climate Transition

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The Middle Miocene Climate Transition (MMCT) (~14 Ma) represents a time of major East Antarctic Ice-Sheet (EAIS) expansion, with research suggesting major global sea level fall on the order of ~60 meters (John *et al.*, 2011, EPSL). Geochemical studies of the terrigenous fraction found in marine sediment cores can aid in identifying past dynamic EAIS behavior during this time period. The few outcrops available on the continent provide specific rock characterizations and age constraints from which cored sediments can then be matched to using established geochemical and radiometric isotope techniques. However, more proxies are needed in order to continue Antarctic provenance studies. Here we apply the K/Ar dating method as a proxy for identifying respective source areas of fine-grained Antarctic sediments (<63 μm). Using an Ocean Drilling Program (ODP) core from Site 1165B near Prydz Bay, samples chosen for this investigation were deposited ~13.8-13.5 Ma and were of particular interest because of an ice-rafted detritus (IRD) cobble burst found within the core's section. This core also contained an anomalously low abundance of sand, thus we seek to understand the sedimentary processes that led to the deposition of such isolated dropstones. Using the $^{40}Ar/^{39}Ar$ radiometric dating method on hornblende and/or biotite grains, a companion study found that 5 of 6 dated pebbles originated from the Wilkes Land drainage basin, a site located over 1500 kilometers away. Using the K/Ar on fine-grained sediments for our investigation, we find that these finer sediments showed a mixture of local Prydz Bay sourcing (~400 Ma signature) and Wilkes Land provenance (~900 Ma signature). These results indicate that while locally-derived Prydz Bay sediments are likely to have been delivered via meltwater from, both IRD and fine-grained sediments sourced from Wilkes Land required transport via large icebergs during ice-rafting events. We anticipate that the K/Ar radiometric dating system will provide a tool for future Antarctic provenance studies and aid in the study of glacially transported terrigenous materials as a means of providing insight into past EAIS behavior.