

## **Provenance analysis of eastern and central Ross Sea LGM till sediments (Antarctica): petrography, geochronology and thermochronology detrital data**

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### **Abstract**

In order to reveal provenance of detrital sediments supplied by West Antarctic Ice Sheet (WAIS), 33 glaciomarine cores of Last Glacial Maximum age were analyzed from eastern Ross Sea, Sulzberger Bay and central Ross Sea. Analytical techniques included petrographic analysis of gravel-sized clasts, geochronology (zircon U-Pb: Zrn-UPb) and thermochronology (apatite fission track: AFT) of sand-sized fractions. Clast assemblages in eastern Ross Sea closely match the lithological spectrum in the main outcrops exposed in western Marie Byrd Land (MBL), with major source contributions from low grade metamorphic rocks and granitoids. In these cores Zrn-UPb and AFT data constrain the ages of formation and cooling of the sedimentary source area, which results to be formed by a Cambrian-Precambrian basement (i.e. Swanson Formation in western MBL) which underwent at least two episodes of magma intrusion, migmatization and cooling during Devonian-Carboniferous and Cretaceous-Paleocene times. Scarcity of volcanic clasts in the region of Eastern Ross Sea along the front of West Antarctica Ice Streams in association with the occurrence of AFT Oligocene-Pliocene dates suggests a localized tectonic exhumation of portions of MBL, as already documented in the opposite side of West Antarctic Rift System in the Transantarctic Mountains. Furthermore, a Zrn-UPb and AFT population of Late Triassic-Jurassic age indicates the presence of unexposed rocks that formed or metamorphosed at that time in the sedimentary source area, which could be identified in McAyeal Ice Stream and Bindshadler Ice Stream catchment areas. Compared to Eastern Ross Sea clast assemblages, those occurring on Central Ross Sea region have similar clast compositions with dominant low-grade metasediments and similar granitoids. However, other rock types such as syenites, limestones and marbles provide evidence of the contributions of additional sources. In the transect west of 180° East, clast assemblages include also volcanic clasts (mafic and minor felsic varieties) and intraclasts (mainly tillite pellets), which are increasingly more abundant approaching the western Ross Sea. Integration of the new data with published data sets can provide a more detailed provenance scenario and updated basis to discuss LGM ice dynamic models, particularly the time-space resolution of variable contribution of West and East Antarctica sources to the LGM and post LGM sedimentary records. Moreover the new data have the potential to provide new geological information on West Antarctic subglacial bedrocks in the Ross Embayment.

**Keywords:** Provenance Analysis, Last Glacial Maximum, Central and eastern Ross Sea

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