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## Geochemical characteristics and the provenance of sediments in the Bransfield Strait, West Antarctica

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### Abstract

The Bransfield Basin is a Quaternary marginal basin separating the South Shetland Islands from the Antarctic Peninsula. We analyzed major, trace, and rare earth element chemistries, and the Nd, Sr, and Pb isotopic compositions for six piston core sediments from the western and eastern Bransfield basins to determine the sediment provenance and factors controlling the composition of the sediments.

The Bransfield sediments have chemical characteristics similar to sediments deposited in a tectonically active setting where the source rocks are predominated by igneous rocks of intermediate to mafic composition: low K and high CN in the A–CN–K diagram, low La/Sc, low Th/Sc, and lower LREE/HREE than average shale. The low chemical alteration index of the sediments, about 45 on average, suggests the effect of weathering on the sediment composition was minimal. The source rocks of the Bransfield sediments are mostly composed of Mesozoic to Tertiary arc volcanic and plutonic rocks in the Antarctic Peninsula and the South Shetland Islands. Meanwhile, contributions from other rock types in the northern Antarctic Peninsula region, such as the Trinity Peninsula Group or Scotia Metamorphic Complex, seem to be negligible.

The Bransfield sediments can be divided into three distinct compositional groups. Group I sediments have a lower La/Yb and a less prominent negative Eu anomaly than Group II sediments. They are also characterized by negative Ce anomalies. Group I sediments have been derived mainly from the South Shetland Islands, whereas Group II sediments, which are more widespread than Group I sediments in the Bransfield Strait, have been derived mainly from the Antarctic Peninsula. Group III sediments, which are very low in La/Yb with the lowest <sup>87</sup>Sr/<sup>86</sup>Sr and the highest <sup>143</sup>Nd/<sup>144</sup>Nd values, have been derived from Deception Island. The composition of the Bransfield sediments is largely controlled by the composition of nearby source rocks; the distribution of sediments is further modified by the current and topography of the basin.

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