

# Origin and source geochemistry of Meso-Cenozoic volcanic-plutonic rocks in the South Shetland Islands, Antarctica

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The South Shetland Islands is located in the Pacific coastal area of western Antarctic continent, and outcrop extensive Mesozoic-Cenozoic arc volcanic-plutonic rocks. After petrologic and petrochemical analyses, Tertiary volcanic-plutonic rocks from King George Island, and Late Cretaceous ones from Half Moon Island and Greenwich Island, are selected to determine their Rb-Sr, Sm-Nd, Pb and O isotopic compositions.

Their (<sup>87</sup>Sr/<sup>86</sup>Sr)<sub>i</sub> ratios are 0.70325-0.70390 for Tertiary rocks and 0.70404-0.70469 for Late Cretaceous ones, εNd(t) values are 3.02-6.72 (mostly >4) for Tertiary rocks and 1.14-3.56 (mostly <3) for Late Cretaceous ones, respectively. Tertiary rocks have <sup>206</sup>Pb/<sup>204</sup>Pb of 17.776-18.515, <sup>207</sup>Pb/<sup>204</sup>Pb of 15.506-15.571, <sup>208</sup>Pb/<sup>204</sup>Pb of 37.868-38.308, Δ<sup>208</sup>Pb/<sup>204</sup>Pb of 25.5-75.0; and Late Cretaceous rocks have <sup>206</sup>Pb/<sup>204</sup>Pb of 17.878-18.487, <sup>207</sup>Pb/<sup>204</sup>Pb of 15.505-15.611, <sup>208</sup>Pb/<sup>204</sup>Pb of 37.891-38.426, Δ<sup>208</sup>Pb/<sup>204</sup>Pb of 36.2-69.0. Their δ<sup>18</sup>O values vary greatly from 0.5‰ to 15.2‰, but two quartz samples are obtained δ<sup>18</sup>O values of 5.7‰ and 6.3‰, respectively.

The studied igneous rocks belong to typical arc calc-alkaline high-Al basalt series and derive from upper mantle wedge; the source underwent metasomatism of CO<sub>2</sub>-rich fluids released mainly from subducted pelagic sediments, which resulted directly it to become a mixed source of EMI+DMM and form the Dupal isotope anomaly. The mantle wedge partially melted to form primary olivine tholeiitic magmas, then these magmas evolved to produce high-Al basaltic magmas through fractional crystallization of olivine+pyroxene.