

# New constraints on the crustal structure of the South Orkney microcontinental block from detrital zircon U-Pb geochronology

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The South Orkney Islands are the only emergent part of the South Orkney microcontinental block, which measures 350 km east-west and 250 km north-south. The South Orkney Islands consist of a basement complex consisting of deformed schists and low grade metasedimentary rocks unconformably overlain by a generally coarse grained fluviatile and shallow marine clastic sequence (e.g. Matthews & Mayling 1967). The basement complex of the South Orkney Islands is interpreted as part of a subduction complex that was accreted to the Pacific margin of Gondwana probably during the period from Late Triassic to Early Jurassic. The accreted basement complex is similar to, and probably formed along strike in relation to, other accreted complexes in the Antarctic Peninsula region, including the Scotia Metamorphic Complex, and the Trinity Peninsula Group. The South Orkneys are now situated on a crustal block that separated from the Antarctic Peninsula during rifting to form the Powell Basin at 30-22 Ma (King & Barker 1988).

We conducted 13 dredge surveys during the R/V Hakuohmaru KH-19-6-Leg 4 cruise to understand the submarine crustal structures of the South Orkney microcontinent including those of the surrounding Bruce and Discovery Banks (Fig. 1). As part of the dredging, we also attached a video camera to the chain above the dredge to capture images of undersea outcrops.

Among the dredges conducted in the South Orkney Bank (D01 to D06, and D09), the predominant rock type which we considered as being collected in situ was metasedimentary rocks experiencing various degrees of low grade metamorphism and deformation. Volcanic rocks (basalt-andesite) were collected at the eastern part of the bank (D09). We conducted two dredges in the southern scarp of the Bruce Bank (D07 and D08). Various rock types were collected in D07, predominantly metasedimentary rocks and suites of basaltic rocks with one peridotite sample. Two dredges were conducted at the northern wall of the eastern Bruce Deep (D10 and D11). Gabbroic rocks were recovered at both sites. We were unable to survey the main structure of the Discovery Bank due to the presence of icebergs in the area. Instead, we dredged a small topographic high located south of the bank (D13) and recovered metasedimentary rocks and several clasts of basalts.

We report detrital zircon U-Pb ages of the sedimentary and metasedimentary rocks recovered from the South Orkney, Bruce, and Discovery Banks. Our preliminary results indicate strong correlation between the South Orkney and Bruce Banks, both showing prominent Permian and Pan-African peaks, similar to those reported from Scotia Metamorphic Complex exposed in the South Shetland Islands (e.g. Castillo et al. 2016). On the contrary, a sandstone collected from southern Discovery Bank (D13) exhibit prominent Early Cretaceous peak along with Pan-African and older grains, indicating different sources.

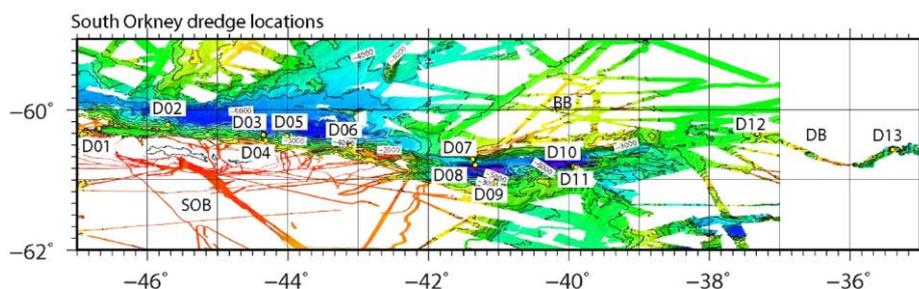


Figure 1. Bathymetry map in the vicinity of the South Orkney Islands. Bathymetric data is a combination of compiled data from British Antarctic Survey merged with newly acquired SEABEAM data during the KH-19-6-Leg 4 cruise. Yellow circles indicate the dredge stations conducted during the KH-19-6-Leg 4 cruise. SOB: South Orkney Bank, BB: Bruce Bank, DB: Discovery Bank.

## References

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