PROVENANCE OF SANDSTONES OF THE TRINITY PENINSULA GROUP, ANTARCTIC PENINSULA, ANTARCTICA

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Rocks of the Trinity Peninsula Group cover most of the northern portion of the Antarctic Peninsula. The group is composed of sandstone and shale, with smaller amounts of conglomerate and correspondent low-grade metamorphic rocks. From bottom to top, the Trinity Peninsula Group is formed by the Legoupil, View Point, Hope Bay and Düse Bay formations. Due to lithotype similarities, the Trinity Peninsula Group is correlated to the Miers Bluff and Greywacke-Shale formations and also to parts of the Scotia Metamorphic Complex. The group is described as a turbidite succession, deposited on the Gondwana Pacific Coast during the Late Triassic and Early Jurassic. The aim of the present work is provenance determination of sandstones of the Trinity Peninsula Group and correlated units through petrography and analyses of their heavy minerals content. Samples from the Trinity Peninsula Group, Miers Bluff Formation, and Greywacke-Shale Formation were collected at several points of the Antarctic Peninsula, Livingston, Powell and Laurie islands during Brazilian Expeditions to Antarctica, between 1983 and 2007. Petrography indicates that samples of all units are quartz-feldspathic, with low lithic content, and when present, they are of plutonic, volcanic and metamorphic rocks. The main heavy minerals observed in thin sections are apatite, zircon, titanite, chlorite, muscovite and biotite; epidote is common, but as it occurs mainly as veins and was therefore not considered in the provenance analyses. Samples are classified as arkose, with exceptions of rocks from the View Point Formation that plot in the sub-arkose field, due to higher quartz proportion, and some of the Miers Bluff Formation that plot in the lithic arkose field, as they contain a higher proportion of lithic fragments. The heavy minerals assemblages were characterized using mounts with fine and very fine sand fraction in mounted thin sections. The observed assemblages of the Trinity Peninsula Group and correlated units are the same and composed of zircon, titanite, hornblende, apatite, garnet, rutile, ilmenite and Fe-oxides; in smaller quantities phyllosilicates, chlorite and biotite, are also observed. All grains are sub-rounded to sub-angular and the presence of heavy minerals with different chemical and physical stabilities indicates that the source regions were close to the depositional areas. Provenance of samples from the Hope Bay, Legoupil and Miers Bluff formations indicate a connection to uplifted basement, an interior cratonic setting for the View Point Formation and a recycled orogen for the Greywacke-Shale Formation. From petrography and heavy minerals assemblage, it is possible to establish that the Trinity Peninsula Group and correlated units had the same group of source areas, which must include plutonic, volcanic and metamorphic rocks. These areas were located in the Gondwana mainland, today Patagonia and the central-southern portion of the Antarctic Peninsula. These regions contain igneous and metamorphic rocks formed in an ancient magmatic arc, which acted together with its basement, as source area for the Trinity Peninsula Group and correlated rocks.

Authors acknowledge FAPESP for grant 09/08269-8.