Geophysical Research Abstracts
Vol. 18, EGU2016-7989, 2016
EGU General Assembly 2016

Metagabbro associated with the shear zone on Prins Karls Forland (Svalbard, Arctic)

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Prins Karls Forland (PKF) is a N-S elongated island situated west of Spitsbergen in the Svalbard archipelago, High Arctic. The northern part of the island is dominated by siliciclastic metasediments regionally metamorphosed to greenshist facies assemblages during one distinct stage of tectonism. Amphibolite facies garnet-mica schists, mica schists, quartzites and carbonate-silicate rocks exhibiting evidence of at least two distinct, strong deformation episodes (including mylonitization) locally outcrop on the east coast of PKF, termed the Pinkie Unit. A ∼1 km wide shear zone containing ductile to brittle structures and distinct outcrops of greenstones (metagabbros and greenschists), associated with magnetite ore, separates these two contrasting tectonic units. Ten samples of greenstones were collected on the slopes of Lauratzonfjellet and Boureefjellet for petrologic and geochemical analyses. Despite intense localized shearing, the metagabbros are undeformed and preserve coarse crystalline, magmatic texture, which is locally poikilitic. The primary magmatic assemblage consists of brown hornblende, plagioclase, biotite and opaque minerals, with accessory apatite and titanite. No relicts of pyroxenes are preserved. Formation of secondary uralite, sericite and chlorite is observed. Metamorphic assemblage consists of actinolite pseudomorhs after hornblende, epidote, and second generation biotite. Blue amphibole is observed in one sample from Boureefjellet; greenschists from Boureefjellet also contain fibrous blue amphibole, as well as garnets, actinolite, epidote and biotite. Some rocks sampled on Boureefjellet are more strongly deformed and exhibit probably two stages of metamorphism: amphibolite facies metamorphism resulting in blue amphibole-garnet assemblage followed by greenschist facies metamorphism resulting in actinolite-epidote-biotite paragenesis. Parallel and overlapping patterns on chondrite-normalized REE diagrams and spider diagrams indicate that these metagabbros are comagmatic. Enrichment in incompatible lighter elements and position of projections on discrimination diagrams suggest ocean island basalt (OIB) character of primary magmas. The age of these rocks is unknown and is an objective of ongoing investigation. This work is partially funded by AGH research grant no 11.11.140.319.