Petrology and tectonic setting of the late Devonian Fisset Brook Formation, Gillanders Mountain area, Cape Breton Island, Nova Scotia

Alexandra Arnott
Acadia University, Wolfville, Nova Scotia B0P 1X0, Canada

The Fisset Brook Formation is a sequence of interlayered volcanic and sedimentary rocks of late Devonian age in northern and western Cape Breton Island.

In the Gillanders Mountain area, the Fisset Brook Formation forms an anticlinal structure, with a basal, buff-coloured, medium-grained quartz-rich conglomerate overlain by interbedded rhyolite, basalt, sandstone and conglomerate. The basalts are massive to vesicular and amygdaloidal near flow tops. They contain abundant peperitic structures indicating intrusion over mud. The rhyolites are red, and vary from massive and porphyritic to flow banded. Siltstone interlayered with the volcanic rocks ranges from red to green to grey in colour and is micaceous. Associated buff coloured paraconglomerates contain abundant volcanic clasts. Fine to coarse-grained ophitic gabbro intruded three areas in the hinge of the anticline.

The Fisset Brook Formation in the Gillanders Mountain area is overlain by Carboniferous Horton Group, a sequence of red and grey sandstone, red siltstone, shale, conglomerate and limestone. To the north and east, the Fisset Brook Formation is mainly in faulted contact with Silurian and older metamorphic and plutonic rocks. Farther north, the older rocks have been intruded by an equigranular to granophyric syenogranite proposed to be cogenetic with rhyolite of the Fisset Brook Formation.

Basalt and gabbro in the Gillanders Mountain area display tholeiitic characteristics when plotted on immobile element discrimination diagrams, and formed in a within-plate setting. Clinopyroxene compositions, determined by electron microscope, also suggest tholeiitic affinity and non-orogenic setting for the basalts. The rhyolites also have compositions consistent with an intraplate setting. Magmatism in the Gillanders Mountain area appears to have been related to basin development in an extensional tectonic regime, after the Acadian Orogeny.