Volcanology of subaqueous felsic volcanic rocks, Mount Carleton area, north-western New Brunswick

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Two main lithologic associations of Lower Devonian felsic volcanic rocks are recognized in the Mount Carleton area: a glassy lava facies and a pyroclastic/epiclastic facies. The glassy-lava facies includes massive to flow-banded, typically porphyritic and often auto-brecciated rhyolites frequently displaying spherulitic and perlitic textures, and interpreted as subaqueous lava domes. A striking feature of many glassy lavas is the development of apparent pyroclastic textures. In thin section, this phenomenon is seen to be due to the effects of perlitic fracture, autoclastic or hyaloclastic brecciation, nodular devitrification, and/or inhomogeneous hydrothermal alteration. The non-fragmental nature of these rocks is evident in porphyritic varieties, in which size and abundance of feldspar phenocrysts is clearly independent of apparent "fragment" and "groundmass" domains. Pyroclastic/epiclastic facies rocks interfinger and intercalate with the glassy-lava facies, as well as with marine sedimentary rocks. Pyroclastic rocks include lithic lapilli tuffs and pumice-lapilli tuffs which are interbedded with submarine lavas and volcaniclastic rocks. A subaqueous depositional environment is supported by petrographic evidence such as random orientation of lapilli, absence of welding, and the presence of lithic fragments of perlitic rhyolite from previous eruptions of glassy lava. Epiclastic volcanic rocks include debris flows and volcaniclastic sediments; like the lithic and pumiceous tuffs, they are products of explosive volcanism. However, epiclastic rocks display prominent flow features and are interpreted as redeposited pyroclastic ejecta which settled from the eruption column, accumulated on the flanks of the vent, and sloughed laterally into deeper water. Epiclastic deposits of this type vary from relatively proximal coarse-grained deposits containing blocks up to 15-20 cm, to distal fine-grained tuffaceous sediments. The spatial and temporal association of pyroclastic rocks and glassy, viscous or "dry" lavas implies a significant variation in the volatile content of the magma sources of these eruptions. Lithic tuffs containing abundant angular rock fragments may be the result of shattering during phreatic explosions following introduction of sea water. Pyroclastic rocks rich in pumice and glass shards, however, resulted from eruptions of rapidly vesiculating magma, perhaps reflecting locally elevated volatile content in a zoned magma chamber.