COMPARATIVE VOLCANOLOGY OF THE SILURIAN PASSAMAQUODDY BAY SUBBELT, MAINE AND NEW BRUNSWICK: IMPLICATIONS FOR CORRELATION AND VOLCANIC SETTING

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The Coastal Volcanic Belt of southwestern New Brunswick and coastal Maine comprises five volcanic and sedimentary subbelts ranging in age from Late Ordovician to Silurian. The volcanology and geochronology of each of these subbelts is important to unraveling the tectonic history of this portion of the Appalachians, and to understanding similar modern volcanic settings. The Silurian Passamaquoddy Bay subbelt (PBSB) is exposed in southwestern New Brunswick and eastern Maine, and comprises rocks deposited in an extensional tectonic setting. This study compares the volcanology of the Eastport Formation of the PBSB on either side of the Oak Bay Fault, which separates the New Brunswick and Maine sections of the formation and elaborates on implications for correlation and volcanic setting. The New Brunswick portion of the PBSB is a 4 km thick sequence of the Eastport Formation and comprises four cycles of subalkaline basaltic and rhyolitic volcanism. The basaltic rocks are interpreted to be mantle melts modified by crustal contamination and mantle metasomatism from a previous subduction event. The rhyolitic rocks are crustal melts, modified by crystal fractionation. Analysis of 7 facies associations and 19 facies indicates that the sequence remained mostly at or near sea level, although alluvial facies dominate in parts of the middle and upper cycles. Effusive volcanism dominates over explosive volcanism, and rhyolitic volcanism dominates over mafic in all but the final cycle that records the waning stages of volcanism. Most of the explosive volcanism was driven by magmatic volatiles. There are three periods of relative volcanic quiescence and each is associated with a relative rise in sea level, possibly as a combined response to deflation, crustal relaxation, and a decrease in the sedimentation rate. Exposures of the Eastport Formation in the Eastport area of Maine differ from the New Brunswick section in that the rocks are more alkalic in composition, and are predominately basalts and basaltic andesites. Phreatic and phreatomagmatic mafic deposits are common and may be related to maar-type volcanism. Mafic flows are thick, commonly aa flows, and show evidence for interaction with external water and wet sediment. Although the Maine and New Brunswick sections are similar in isotopic age and depositional environment (shallow water to subaerial), they differ in style and chemistry of volcanism possibly due to such factors as crustal variations, and variations in magma supply and chemistry, relationship to arc volcanism, effusive rate, and access to external water.