

Progress report on bedrock mapping in Munsungun inlier, northern Maine, USA in 2017: new insights into its tectonostratigraphy and basement-cover relation

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The Munsungun inlier, or “Munsungun Anticlinorium”, is made of slightly metamorphosed pre-Devonian subaqueous volcanic/sedimentary strata. It is considered an extension of the Ordovician Victoria-Popelogan arc of the northern Appalachians. Bedrock mapping since 2016 has made significant progress towards understanding its tectonostratigraphy and basement-cover relation. Newly obtained geochemical data provide constraints on composition and petrogenesis of the volcanic rocks. (1) The “Anticlinorium” might not be an anticlinorium but a tectonic collage between two accreted terranes – here referred as Chase Brook terrane in the southeast and Blind Brook terrane in the northwest. Both are separated and fault-bounded by a younger, Upper Ordovician black shale-conglomerate formation - the Rowe Lake Formation. Detritus of the Rowe Lake were sourced northwest from the Blind Brook terrane. The black shale might correlate with Popelogan Formation black shale in the Popelogan inlier in New Brunswick, Badger Group black shale in the Victoria arc in Newfoundland, and Partridge Formation black shale in the Bronson Hill arc in New Hampshire. Volcanic rocks within the Chase Brook terrane include Jack Mountain arc calc-alkaline suite of andesite-dacite and Round Mountain-Bartlett Mountain-Norway Bluff non-arc, E-MORB-like tholeiitic suite. The non-arc tholeiitic suite likely formed in an extensional setting as indicated by the Round Mountain half-graben. Volcanic rocks within the Blind Brook terrane include Mule Brook Mountains and Horseshoe Pond tholeiitic basalt and calc-alkaline rhyolite. While their spider and REE patterns indicate arc signatures, they do show differences from the arc suite of the Chase Brook, suggesting both terranes might be associated with two isolated arcs. If the latter is the Ganderian Popelogan arc, could the Blind Brook be a Laurentia arc? Does a suture (the Red Indian Line?) exist between these terranes? (2) Several pieces of basalt and vitric tuff within the Chase Brook terrane might be Penobscotian arc products. For example, the vitric tuff shows remarkable arc signature but distinct spider and REE patterns from other volcanics. (3) An angular unconformity exists between the “Anticlinorium” and its Devonian Seboomook cover, as evidenced by newly-discovered basal conglomerate of the Seboomook Formation on both sides of the “Anticlinorium”. This discovery suggests that the “Anticlinorium” remained to be erosional prior to initial northwestward transgressive deposition of the Seboomook in the early Devonian and after the last Taconic stage. The last Taconic stage likely saw accretion of both arcs/terranes. The accretion likely caused large-scale thrusting but weak metamorphism and foliation because the prevailing regional foliation and lower-greenschist metamorphism in the Munsungun inlier were Acadian.

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