

Arc and slab failure magmatism of the Taconic orogeny, western New England, USA

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Abstract

During the 1970's, geologists considered that the Upper Ordovician Taconic orogeny represented the collision of Laurentia with the Ammonoosuc arc, now largely exposed on the Bronson Hill anticlinorium. Subsequently, several researchers noted that magmatic rocks, which intrude and overlie the Ammonoosuc arc are younger than the ~455-451 Ma Taconic orogeny. This led them to hypothesize that a Middle Ordovician collision was followed by westward-dipping subduction beneath the amalgamated Laurentian-Ammonoosuc zone to produce the younger arc rocks. In this model, the Taconic allochthons and foredeep were produced later in a retro-arc setting above westward-dipping subduction. However, those models prove inadequate due to the lack of ash beds, foredeep sedimentation, and deformation on the Laurentian platform prior to the Upper Ordovician Taconic orogeny.

Here, we resolve the dilemma by recognizing that the magmatic rocks, which post-date the 455-451 Ma Taconic orogeny, are not arc rocks, but instead typical post-collisional slab failure rocks as old as 450 Ma, with $Sr/Y > 10$, $Sm/Yb > 2.5$, $Nb/Y > 0.4$, and $La/Yb > 10$. Thus, in New England and western New York, the Upper Ordovician Taconic orogeny represents the collision of the Ammonoosuc arc with Laurentia followed by slab failure of the descending plate.

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