

Ganderia: what, where and when

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Ganderia was introduced in the 1990s as a terrane in the northern Appalachians encompassing the former Gander zone and parts of the Dunnage and Avalon zones. It is now widely accepted as an independent Gondwanaderived microcontinent, different and separated from the other Gondwana-derived terranes (Avalonia and Meguma). Ganderia was the first of the Gondwana-derived terranes to arrive at the progressively growing Iapetus margin of Laurentia and hence, was subjected to a complex, polyphase Paleozoic orogenic history that was superimposed on an already existing complicated Proterozoic to Cambrian tectonic imprint acquired during the various tectonic processes responsible for the assembly of Gondwana. The concept of Ganderia as one coherent microcontinent is not straightforward, because it comprises several belts that potentially preserve different geological evolutions. Most of the existing geological differences can be explained by strike-slip shuffling of the various Ganderian belts during its complicated and long-lived tectonic history near plate margins.

Various lines of geological and tectonic evidence link the various constituents of Ganderia together, as well its provenance. Ganderia can be defined by its predominantly Early Paleozoic siliciclastic sedimentary rocks that largely cover the underlying Precambrian basement. However, this sedimentary facies extends into the Cryogenian and represents development of a long-lived passive margin that was interrupted periodically by periods of ensialic supra-subduction magmatism between 630 and 420 Ma. Detrital zircon studies of the various sedimentary rocks are consistent with a common hinterland, although subtle changes in age-peaks suggest that the various belts may have occupied different geographic positions before final juxtaposition during the Middle-Late Paleozoic. A predominance of quartz arenite in the older and more eastern parts of Ganderia versus siltstone and dark shale in the more western segments indicates that the Gander margin was facing an open oceanic basin to the west in present coordinates during the Cambrian to Silurian; the paleogeographic facing of the Gander margin during the Neoproterozoic is poorly known. Rifting of Ganderia from its continental hinterland, commonly assumed to be Amazonia, which transformed it into a microcontinent during the Middle Cambrian, opened the Rheic Ocean along its trailing edge, making the Gander margin two-sided. However, most of the post-Early Ordovician sedimentary cover that should have been deposited along the trailing Rheic margin is not preserved, suggesting the outboard segments of this margin were largely buried and/or removed by tectonic mechanisms associated with closure of the Rheic Ocean and related seaways.