

# Early Avalonian arc paleogeography: preliminary paleomagnetism and $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of Neoproterozoic units, Burin Peninsula, Newfoundland, Canada

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We report a reconnaissance paleomagnetic survey of volcanic and associated intrusive rocks of the Burin Group and overlying clastic strata, to compare with Ediacaran results from elsewhere in Avalonia (Avalon zone in Newfoundland) and interpret the paleogeography for the Avalonian arc. Previous work shows the Burin Group to have a juvenile, oceanic arc affinity, with ca. 760–766 Ma U–Pb zircon ages in two locations along the length of the Wandsworth gabbro. Reconnaissance paleomagnetic sampling of the gabbro, along with pillowed basalt and mafic dykes in twelve sites yields stable remanence in nine. At Epworth, moderately SW-dipping mafic dykes of unknown age show a positive backed contact test with respect to the 764 Ma gabbro host, with the simplest tilt correction to dyke vertical making their primary remanence SE and upwards-directed, implying a 27 degree paleolatitude that is similar to the low paleolatitude previously found for the ca. 575 Ma Marystown Group. The host Wandsworth gabbro carries steep down directions that likely predate the dyke emplacement, possibly representing a high paleolatitude for Avalonia in the mid-Neoproterozoic. At Burin, pillow basalts and interbedded SW-dipping marine strata are cut by numerous moderately NW-dipping dykes. The basalts and dykes at Burin record NW steep down in situ directions that are retained at high coercivities and unblocking temperatures, becoming W and moderately down after structural tilt correction. One dyke yielded hornblende single crystal separates that are confirmed to be free of alteration by in situ micro X-ray diffraction. Two hornblende separates provide precise step fusion  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau ages of  $608.1 \pm 1.7$  and  $605.4 \pm 1.2$  Ma, indicating that the Burin dykes are similar in age to the Connecting Point Group and the Bull Arm Formation in the Isthmus of Avalon. If remanence in these ca. 607 Ma Burin dykes is primary, then their tilt-corrected result, which is similar to younger Ediacaran directions on the Burin Peninsula, implies that Avalonia resided at low- to mid-paleolatitudes at ages bracketing the 580 Ma Gaskiers glaciation. Previously published paleomagnetic results from the Bull Arm Formation are now known to be of 592 Ma age at their Bonavista Peninsula locality (Plate Cove volcanic belt), further implying that Avalonia remained at low- to mid-paleolatitudes through the mid Ediacaran. In global paleogeography, these results collectively are consistent with Avalonia having been associated with either the Amazonia portion of West Gondwana, or the Timanian-north Urals margin of Baltica during the early to mid Ediacaran.