A maritime perspective on Maine's Gander Zone, including a few thoughts on tectonic-climate linkages

DOUGLAS N. REUSCH, JASON CHOQUETTE, THOMAS GREGG, WILLIAM O'BRIEN, JESSIE POWERS, AND BRYAN WAY
Department of Natural Sciences, University of Maine at Farmington, Farmington, ME, 04938 USA.

Maine's Gander Zone extends from the foothills of the Boundary Mountains to the coast. Lower Paleozoic quartz-rich strata of the Lunksoos, Liberty-Orrington, and St. Croix inliers share common detrital zircon populations. They represent a passive continental margin that, according to shelf quartzites with bipolar cross beds (St. Croix) and deepwater *Oldhamia* trace fossils (Lunksoos), faced northwest. In Penobscot Bay, the Ellsworth terrane, composed of marine volcanic sequences and minor tectonized harzburgite, sits structurally above Early Ordovician black shales of the St. Croix. It is an obvious candidate for GRUB equivalency. Late in the Ordovician, the attenuated leading fringe of Ganderia accreted to Laurentia along the Red Indian Line, which most likely lies along the northwestern margin of the Hurricane Mountain mélange. In this view, the overlying Dead River Formation to the southeast is a structural lid rather than post-mélange cover. Lower Silurian strata of the Central Maine (CM) and Fredericton troughs (FT) record a forearc through foredeep system. The intervening Liberty-Orrington inlier exposes a southwestward extension of the Brunswick subduction complex (BSC), with the Dog Bay Line juxtaposing the BSC and FT. The BSC was raised when the main

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Gander block (St. Croix) docked, causing proximal turbidite deposition (Vassalboro, southeastern margin of CM) and distal anoxia (Smalls Falls) in the former forearc. Slab break-off triggered minor within-plate volcanism. The Acadian foreland system, prominent in Maine, propagated northwestward following the docking of Avalon.

Two examples from Maine illustrate how Appalachian tectonics may contribute to a general understanding of tectonic-climate linkages. First, Penobscot orogeny and the emergence of the New Caledonian ophiolite share much in common. The latter event coincided with the onset of Antarctic glaciation at 34 Ma. In both cases, the exhumation of soluble basic and ultrabasic rocks caused sequestering of atmospheric carbon dioxide through silicate weathering and organic carbon burial. For the 34 Ma event, a rapid trigger is needed to explain the climatic overshoot, and slab breakoff seems a plausible candidate. Second, near Farmington, a recently discovered slumped horizon rests directly on black shales, suggesting a methane release trigger for the slump. This relationship resembles the mechanism invoked for terminal Paleocene extinction, the best ancient analog for the worst-case future global warming scenario.