Siletzia's origin along an oceanic spreading center: What's Bremerton got to do with it?

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Fifty million years ago, Bremerton, Washington, may have looked a lot like Iceland: hot new land atop an oceanic spreading center. That land was part of the Siletzia terrane, a thick wedge of basaltic crust that

extends from Oregon to British Columbia.

Siletzia has been recognized and studied for decades (by Ray Wells at the USGS, GSA Annual meeting abstract 321-2, and many others). The wedge of oceanic material that forms this terrane is thick, as much as 32 kilometers, and accreted onto North America 50 million years ago.

Yet big questions remain about Siletzia's magmatic and tectonic history and its role in the tectonic evolution of the Pacific Northwest and the Western Cordillera as a whole. For example, what was the source of all that magma? Was Siletzia a series of oceanic plateaus along a spreading center, or the product of a mantle plume? What was the precise age of basalt and how did it relate to ongoing subduction of the Farallon plate under North America?

On Wednesday, 25 October, at the Geological Society of America's 2017 Annual Meeting, Michael Eddy will present new data that sheds light on these questions. Eddy's work supports the hypothesis that Siletzia was an oceanic plateau or island chain built along a northeast-trending spreading center. His high-precision age dates show that oceanic rocks to the northwest in British Columbia are 51 million years old, while similar rocks near Bremerton are a million years younger. "If my timing for the collision between Siletzia and North America is correct, then the rocks in the Bremerton area represent the location of the spreading center during collision," Eddy says.

In this case, that timing was everything. At the same time that hot new crust was building Siletzia near Bremerton, active subduction worked to pull that new crust beneath North America. Eddy's data adds credence to the model that this young crust was still too hot and buoyant to subduct. Instead, it "jammed" the subduction zone and stuck to North America.

Like a pile-up on a highway, Siletzia's jamming of the subduction zone

and the subsequent collision likely had a tectonic ripple effect. Eddy's work supports the scenario in which that collision coincides with the deformation of the Cascades, caused crunching of central Washington, impacted the direction of subduction, and may help explain why the Farallon plate broke off on its way under North America.

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