

100-2 - UPPER PLATE RESPONSE TO RIDGE-TRENCH INTERACTION AND OCEANIC PLATEAU ACCRETION, WASHINGTON CASCADES AND SURROUNDING REGION: IMPLICATIONS FOR PALEOGENE PLATE TECTONIC EVOLUTION OF THE PACIFIC NORTHWEST



Monday, October 11, 2021



1:55 PM - 2:10 PM



A106 (Oregon Convention Center)

Abstract

The interaction of oceanic spreading ridges and oceanic plateaus with convergent margins is widely recognized, but our understanding of how their interaction is manifested in the geologic record is limited to a few well-constrained modern and ancient examples. From ~60 – 40 Ma, at least one oceanic spreading center interacted with the northwestern margin of North America. Several lines of evidence place this triple junction near NW Washington and southern British Columbia in the early-middle Eocene and we summarize new datasets that permit us to track the plate tectonic setting of this region from 60 to 40 Ma. The North Cascades segment of the Coast Mountains magmatic arc experienced a magmatic lull between ~60-50 Ma that we attribute to low-angle subduction. During this period of time the Swauk basin began to subside near the paleo-trench in Washington, and the Siletzia oceanic plateau began to develop along the Farallon-Kula or Farallon-Resurrection spreading center. Accretion of Siletzia and ridge-trench interaction between 53-49 Ma are indicated by: near-trench magmatism on Vancouver Island and western Washington; disruption and inversion of the Swauk basin; voluminous magmatism in the Kamloops – Challis belt accompanied by major E-W extension east of the Cascades; and southwestward migration of magmatism across NE Washington. These events suggest that flat slab subduction from ~60–53 Ma was followed by slab rollback and breakoff in response to the accretion of Siletzia. A magmatic flare-up resulted from rollback and breakoff between ~49.4 Ma and ~45 Ma. The flare-up included bimodal volcanism near the eastern edge of Siletzia and intrusion of granodioritic to granitic plutons and extensive basaltic to rhyolitic dike swarms in the North Cascades. Transtension during and shortly before the flare-up led to >300 km total offset on dextral strike-slip faults, formation of the Chumstick strike-slip basin, and rapid exhumation of 8-10 kb metamorphic rocks in the Cascades crystalline core. By ~45 Ma, the Farallon – Kula – North American triple junction was located south of our study area, the trench had jumped outboard of Siletzia, and strike-slip faulting localized on the N-S-striking Straight Creek – Fraser River fault. These events culminated in the establishment of the modern Cascadia convergent margin.

Geological Society of America Abstracts with Programs. Vol 53, No. 6, 2021
doi: 10.1130/abs/2021AM-366942

© Copyright 2021 The Geological Society of America (GSA), all rights reserved.

Author



Robert Miller

M

San Jose State University

Authors

U

Paul Umhoefer
Northern Arizona University

E

Michael Eddy
Purdue University

T

Jeffrey Tepper
University of Puget Sound

View Related
