Publication type	Year	Suggested citation	Hyperlink
Thesis	**2014**	Bordet, E. (2014) **Eocene volcanic response to the tectonic evolution of the Canadian Cordillera**. PhD thesis, The University of British Columbia, 488 p.	http://hdl.handle.net/2429/46271

Abstract:
The Ootsa Lake Group (OLG) represents a voluminous episode of Eocene volcanism across the Interior plateau of British Columbia (BC), in the Canadian Cordillera. Remarkable aspects of the rocks (lithology, texture, volume, extent, and geochemistry) suggest that even though they formed along an active continental margin, the tectonic setting was different from a classic arc. The OLG was defined by field mapping, U-Pb and $^{40}Ar/^{39}Ar$ geochronology, major and trace elements geochemistry, and three-dimensional modelling of the thickness and structure. A new tectonic model for the evolution of the Canadian Cordillera in the Paleogene is proposed using this comprehensive dataset.

The OLG stratigraphy comprises a thick sequence of rhyolite and dacite lava, locally capped by andesite. Onset, duration and termination of volcanism are equivalent across the Interior plateau, and are constrained between 54.7 and 46.6 Ma by new U-Pb and $^{40}Ar/^{39}Ar$ geochronology.

OLG lavas yield a “volcanic arc” signature (diagnostic high-K calc-alkaline trend, and trace and rare earth elements patterns), suggesting supra-subduction zone contributions from a hydrated mantle wedge. However, a similar signature may be inherited from partial melting of crustal reservoirs composed of older accreted volcanic arc crust. This is supported by Sr isotope data indicating variable crustal contributions to melts across BC. OLG intermediate rocks were likely derived from mantle melting, but dominantly silicic compositions support partial melting of the crust as a dominant magma producing mechanism.

Eocene volcanic rocks cover at least 65,000 km² of BC, but their original extent may have been almost continuous from southwestern Yukon to Idaho. Coeval volcanism and extensional deformation contributed to the accumulation and preservation of volcanic products in extensional basins, up to 4000 m thick in some locations. With such dimensions, the OLG may have attained the status of a Silicic Large Igneous Province prior to erosion.

The cause of OLG volcanism and coeval extension is attributed to the sudden ingress of hot sublithospheric mantle within a previously metasomatized mantle region, following cessation of subduction and a slab break. The resulting thermal anomaly progressed across a “slab gap” beneath BC, leading to mantle and lower crustal melting, crustal anatexis and magmatism.

Publication type	Year	Suggested citation	Hyperlink
Journal article	**2014**	Bordet, E., Mihalynuk, M.G., Hart, C.J.R., Mortensen, J.K., Friedman, R.M. and Gabites, J. (2014) **Chronostratigraphy of Eocene volcanism, central British Columbia**; Canadian Journal of Earth Sciences, vol. 51, no. 1, p. 56-103.	http://www.nrcresearchpress.com/doi/abs/10.1139/cjes-2013-0073#.Ut8jgBBQ0Y0

Abstract:
Onset and termination of Eocene felsic volcanism in the Chilcotin Plateau of central British Columbia is constrained between 54.6 and 46.6 Ma by 33 new U–Pb and 40Ar/39Ar isotopic age determinations. Dates were obtained from representative felsic coherent and fragmental volcanic rocks that comprise the Ootsa Lake Group. The resulting chronostratigraphy shows that magma compositions evolved from felsic to intermediate, with no spatial migration of the volcanic activity. Rhyolitic compositions are oldest; and are overlain by dacitic rocks with varied phenocrysts assemblages. In many parts of the Chilcotin Plateau, the Eocene stratigraphy is capped by distinctive vitreous black dacite lavas, which are contemporaneous with andesitic lavas of the Endako Group in the Nechako Plateau to the north. Crystallization ages from Ootsa Lake Group rocks of the Chilcotin Plateau overlap age determinations from correlative rocks of the Nechako Plateau and southern BC. Collectively, this geochronological dataset supports previous suggestions of a voluminous Early Eocene-aged (55–46 Ma) period of volcanism in the Intermontane Belt. The abrupt initiation of volcanism, as well as the wide extent, thickness, and compositions that characterize Eocene volcanic rocks may be explained by cessation of subduction and formation of a slab gap beneath British Columbia in the Early Eocene.

Geoscience BC Summary of Activity Report	**2014**	Bordet, E., Mihalynuk, M.G., Hart, C.J.R. and Sanchez, M. (2014) **Three-dimensional thickness model for the Eocene volcanic sequence, Chilcotin and Nechako plateaus, central British Columbia** (NTS 92O, 92P, 93A, 93B, 93C, 93G, 93F, 93E, 93K, 93L); in Geoscience BC Summary of Activities 2013, Geoscience BC, Report 2014-1, pp. 43-52.	http://www.geosciencebc.com/i/pdf/SummaryofActivities2013/SoA2013_Bordet.pdf

In order to better define the distribution of Eocene volcanic rocks in this region, a three-dimensional (3-D) thickness model for the OLG in the Chilcotin and Nechako plateaus (Figure 1) is developed and presented in this paper. This model is generated from geological constraints, including field maps, cross-sections and stratigraphic columns, and interpreted geophysical-survey data (Figure 2, Table 1). Objectives of this model are to 1) image regional thickness variations of the OLG where it has been mapped previously; 2) identify areas of eroded or covered Eocene volcanic rocks; 3) investigate the spatial and temporal correlation between Eocene volcanic rock accumulations and fault-bounded basins; 4) generate new surface and volume estimates for the Eocene volcanic event; and 5) correlate and extend OLG intervals containing known mineralization into regions covered by CGB and glacial till, with implications for mineral exploration

Publication type	Year	Suggested citation	Hyperlink
Geoscience BC Summary of Activity Report	**2011**	Bordet E. and Hart, C.J.R. (2011) **Characterization and structural framework of Eocene volcanic sequences in the Nechako region, central British Columbia** (NTS 092N, O, 093B, C, G); in Geoscience BC Summary of Activities 2010, Geoscience BC, Report 2011-1, pp. 239–254.	http://www.geosciencebc.com/i/pdf/SummaryofActivities2010/SoA2010_Bordet&Hart.pdf

In this paper, the authors present the significant outcomes of their 2010 field season, document the nature, structure and extent of the different packages of volcanic sequences currently inferred to be Eocene in age, and discuss the latter's relationships with underlying and overlying rocks.

Geoscience BC Final Report	**2011**	Bordet, E., Hart, C. and Mitchinson, D. (2011) **Preliminary Lithological and Structural Framework of Eocene Volcanic Rocks in the Nechako Region, Central British Columbia**; Geoscience BC, Report 2011-13, 81 p.	http://www.geosciencebc.com/s/Report2011-13.asp

The objectives of this report are to:

• Propose an improved stratigraphic model for the Eocene period in the Nechako region based on field characteristics of Eocene volcanic rocks including: lithologies and facies variations, geochemical signature, age, field relationships and lithologic characteristics. To develop this model, existing geological and geophysical data will be combined with new field observations and data.

• Assess the physical properties of Eocene volcanic rocks in the context of mapped lithologies and textures. Physical properties constitute a direct link between the geology and geophysical models.

• Constrain the variable thicknesses and structural framework of Eocene volcanic rocks in order to quantify the depth of underlying Cretaceous rocks, provide insights into the Jura-Cretaceous basin architecture, and improve understanding of the tectonic evolution of this part of British Columbia.

Characterization of the nature, thickness and structural framework of Eocene volcanic rocks in the Nechako region will provide new insights into the area's Early Cenozoic history, contribute to improved interpretations and add value to existing geophysical, particularly seismic and magnetotelluric, data sets. Such information, integration and interpretations will provide a stronger geological foundation to facilitate future exploration efforts for natural resources, including oil and gas and mineral deposits.