Summer 2014

Using paleomagnetism to unravel the mysteries of the Summit Creek Basalts

Glynis Bawden
gbawden@pugetsound.edu

Follow this and additional works at: http://soundideas.pugetsound.edu/summer_research

Part of the Geology Commons, and the Geophysics and Seismology Commons

Recommended Citation

Bawden, Glynis, "Using paleomagnetism to unravel the mysteries of the Summit Creek Basalts" (2014). Summer Research. Paper 212.
http://soundideas.pugetsound.edu/summer_research/212

This Article is brought to you for free and open access by Sound Ideas. It has been accepted for inclusion in Summer Research by an authorized administrator of Sound Ideas. For more information, please contact soundideas@pugetsound.edu.
Using Paleomagnetism to Unravel the Mysteries of the Summit Creek Basalts

Glynis Bawden¹, Mike Valentine

¹Department of Geology, University of Puget Sound, Tacoma, WA
gbawden@pugetsound.edu

Abstract

The Summit Creek Basalts are a group of poorly understood lava flows located near Washington’s Mount Rainier that erupted during the late Eocene. A paleomagnetic survey was conducted to provide evidence for any rotation that has occurred since the flows erupted and determine if the basalts are related to a sequence of flows on the Olympic Peninsula. Additional structural data was mapped to further investigate movement of the unit. Results indicate that the flows have been tilted an average of around 50 degrees and rotated about 45 degrees west of north.

Research Questions

- Are the Summit Creek Basalts related to the Crescent Formation?
- Did they erupt in situ or were they moved westward to their present location?

Fieldwork

Four trips were made into the field to collect cores and orientation data – two along Hwy 12 and two on Carlton Ridge. Fifteen flows were sampled, with eight to ten drill cores collected from each. Structural flow orientations were mapped based on vesicle horizons and visible flow tops at 21 outcrops along both Hwy 12 and Carlton Ridge.

Lab Work and Data

The samples were analyzed with a Molspin magnetometer and demagnetized by intervals using alternating field (AF) and thermal demagnetization to remove any secondary magnetic field overprint. This analysis produces values for the declination and inclination of the magnetic field present when the basalts erupted. Average inclinations and declinations were found for each flow, corrected for core position and flow tilt, and compared to a standard north direction of 0° to determine rotation.

The flow orientations were grouped by location and plotted on stereonet diagrams (below) to help visualize patterns and dominate orientations.

Results and Conclusions

The paleomagnetic results indicate that the flows have rotated counterclockwise to an average of 45 degrees. From these results, we can conclude that the Summit Creek Basalts have been rotated and likely moved in other ways since their eruption. The mapping data confirms that the flows have been deformed by tectonic processes and are no longer in their original, flat-lying state. The variations seen in both strike and dip of the flow orientations also indicates significant deformation. This movement may be related to the extension caused by subduction of the Kula-Farallon slab window beneath the western edge of the North American plate.

References


Acknowledgements

I would like to thank the Summer Research Grants in Science and Mathematics for awarding me the McCormick research grant, my advisor Mike Valentine, and my field hands Greg Bawden and Gordon Bawden for their hard work and help.