

**Abstract #357841**

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INVOLVING STUDENTS FROM DAY ONE: TEACHING GEOLOGICAL CONTROVERSY

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It is a common misconception that the Plate Theory for volcanism is too complicated to teach in introductory Earth science classes. This mistaken view deprives new students of one of the most exciting, interesting and challenging subjects in current Earth science work. Plate Theory for volcanism is a simple concept and will be clearly laid out in the forthcoming Elsevier Encyclopedia of Geology 2nd Edition, due to be published in December, 2020. Plate Theory for volcanism proposes that all volcanism on Earth's surface results from lithospheric extension which permits pre-existing melt to escape passively from the crust and mantle to the surface. Extension results from plate-boundary forces, thermal contraction of the lithosphere, and vertical motions. Melt volumes may be supplemented by upwelling decompression melting. The methods most relevant to Plate Theory are those that study lithospheric structure and deformation. The type examples for on-ridge-, continental-intraplate- and oceanic-intraplate volcanic anomalies are Iceland, Yellowstone, and the Hawaii-Emperor volcano chains. Iceland, a uniquely large subaerial of exposure of a spreading plate boundary, owes its high-stand to a substrate of stretched, magma-inflated continental crust blanketed with young basaltic lavas. The Yellowstone-Eastern Snake River Plain volcanic system is part of the extending Basin Range region of the western USA where the crust stretches via diking. Migrating silicic volcanism follows the known migration of a regional axis of strong extension. Plate Theory for the Hawaii-Emperor volcanic chains predicts persistent extension along a line at least 1,000 km long in the center of the Pacific plate. However, it remains to be tested in the uniquely challenging environment of the remote central Pacific Ocean. Plate Theory elevates plate tectonics to a unifying theory that can account for all of Earth's volcanism, dispensing with the need for additional, *ad hoc*, auxiliary hypotheses to account for regions that superficially appear to be exceptions.

Abstract ID#:

357841

Password:

400119

Meeting:

GSA 2020 Connects Online

Session Type:

Discipline Sessions

Primary Selection:

General Pool: Tectonics/Tectonophysics

Final Session Number:

Abstract Title:

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Preferred Presentation Format:

Oral

Discipline Categories:

Geoscience Education Geoscience Information/Communication Tectonics/Tectonophysics

Abstract Submission Fee:

Paid (gsa-2020AM-1265-0162-7222-3944)

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