

UC SANTA BARBARA
Department of Earth Science

Speakers Club

WEBB 1100 • THURSDAY March 7th. • 2:00 PM

Venus

An Archean Earth Analog
and guide to rocky planet evolution

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As Earth's twin in size, density, and heat producing elements, Venus 'should' have plate tectonics. Further, it was likely the first habitable planet. What is responsible for the divergent evolution of Venus and Earth? New studies of Venus, Earth, and other solar system bodies call the leading hypothesis - a lack of interior water - into question. Although Venus appears to lack terrestrial style plate tectonics, there is good evidence for subduction – the first step in initiating plate tectonics. Laboratory simulations of plume-induced subduction (Davaille et al., 2017) predict rifting of the lithosphere, followed by volcanic loading that initiates lithospheric foundering that creates a partial arc of roll-back subduction, and radial and concentric extension outboard of the trench as the lithosphere accommodates subduction along an arc. A number of 'coronae' on Venus exhibit these features. Neither plume nor subduction models alone predict all these features. This talk begins with an overview of 'myths' about Venus' geodynamic evolution and past habitability, then discusses evidence for active plume-induced subduction on Venus and the implications for early Earth and rocky planets in general.