Watch Out! DIFFERENT ROOM

UC SANTA BARBARA

Department of Earth Science

Relax! SAME TIME SLOT

Speakers Club

BROIDA 1640 • THURSDAY NOV 15th.• 2:00 PM

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Part I: Eruption Triggering Mechanisms at the Lassen Volcanic Center

Recent work at the Lassen Volcanic Center (Chaos Crags; Scruggs and Putirka 2018), indicates that mafic “recharge” magmas undergo >200°C of cooling prior to eruption. Cooling occurs as the high-T basaltic magmas interact with dacite or rhyolite that is held in “cold storage”, (Cooper and Kent 2014), which is warmed over time. A remaining question is what is the time frame for recharge, cooling and then eruption? We suspect that cooling on the scale of hundreds of degrees requires more than a few minutes or hours of pre-eruption storage. As a test, we present new analyses of compositionally zoned olivine grains, which are often interpreted as time-sensitive diffusion profiles, but might not be.

Part II: Exoplanets: Are They Earth-like in Mineralogy, Composition, or Plate Tectonics?

The Kepler mission has led to the discovery of nearly 4,000 exoplanets, most of which are very large, or very close to the star they orbit, due to detection bias. But Earth-like planets (with respect to size and orbit) are inferred to be common. Could such planets have plate tectonics or have continental-crust? As a first cut at the problem, we examine the compositions of stars in the Hypatia Catalog (Hinkel et al. 2014) to estimate a range of possible exoplanet mantle compositions. We find that most exoplanets have silicate upper mantles that range from dunite to orthopyroxenite in lithology. Such contrasts might have no effect on mantle convection, but may lead to contrasts in lithosphere strength or production of crust. High orthopyroxene (Opx) contents may yield a stronger lithosphere that is more resistant to tectonic rupture. But a high Opx mantle might also distill into thicker Si-rich crustal domains, perhaps enhancing density contrasts and tectonic activity. New experiments might help us differentiate these possibly competing effects.