UC **SANTA BARBARA**

Department of Earth Science

Speakers Club

Watch Out! DIFFERENT ROOM

Relax! SAME TIME SLOT

BROIDA 1640 • THURSDAY OCT 18th.• 2:00 PM

Entrainment and storage of silicates and volatiles by descending iron diapirs during core formation.

Dayanthie Weeraratne
Department of Geological Sciences
California State University, Northridge

Segregation of the iron core from rocky silicates is a significant evolutionary event in planetary accretion, yet the process of metal segregation remains obscure due to obstacles in simulating the extreme physical properties of liquid iron and silicates at finite length scales. We present experimental results studying the settling of liquid metal drops and gravitational instability of an emulsified liquid metal layer using liquid gallium and glucose solutions. We find that metal drops settling through viscous fluids form a metal pond of drops which are coated with a film of low density viscous material. The emulsified metal pond is observed to descend as a coherent Rayleigh–Taylor instability with a trailing fluid-filled conduit. Scaling to planetary interiors and high pressure mineral experiments indicates that molten silicates and volatiles are entrained by emulsified metal diapirs to the iron core. The light elements entrained in the core are inherently buoyant and migrate out of the core initiating buoyant thermochemical plumes over time that rise and may later oxidize and hydrate the upper mantle. Surface volcanism from initially large thermochemical plumes may carry and release oxygen and volatiles linking atmospheric growth to the Earth’s mantle and core processes.