UNVEILING THE INTERIOR OF VENUS: USING TECTONIC DEFORMATIONS ALONG CANALI TO CONSTRAIN LITHOSPHERIC STRUCTURE & MANTLE CONVECTION. A. S. Jindal¹ and A. G. Hayes², ¹Department of Astronomy, Cornell University (asj59@cornell.edu), ²Department of Astronomy, Cornell University (hayes@astro.cornell.edu).

Introduction: Venus is Earth's "sister planet", they both have nearly identical sizes and densities. However, analysis of its surface and atmosphere reveals that it took a very diverse evolutionary path from Earth. Studying the interior of Venus can help us understand when the evolutionary paths of Earth & Venus diverged and what caused this divergence. With the massive interest in the search for life beyond Earth, understanding the evolution of Venus could also significantly contribute towards answering the timely and provocative question of what makes a planet habitable.

Deformational features of various varieties and styles are ubiquitous on the surface of Venus, and many of these display characteristic scales (widths or spacings) of deformation that fall into distinct size classes. We will study the mantle convection and lithospheric structure of Venus by analyzing tectonic deformation features along canali. Canali-type channels are long lava channels with almost constant widths found in the Venusian plains. Stratigraphic evidence points towards the canali being old features on the plains that formed with the last phases of extensive plains volcanism possibly induced by the hypothesized global resurfacing event 300 Myr ago [1,2]. When these channels were emplaced, they must have had downhill gradients, but post-depositional tectonic deformations in the Venusian lithosphere have caused them to be interspersed with nearly periodic topographic relief [3]. The dominant length scales associated with these nearly periodic deformation features can inform us on the lithospheric structure and mantle convection of Venus.

We will map all major (longer than 300 km) canali on Venus, and generate their topographic profiles. Since the canali are sinuous and may not always flow perpendicular to the deformation features, the characteristic length scales of tectonic deformations we obtain by studying the canali undulation profiles may have a path dependent error in them. We will apply statistical modeling methods to eliminate this sinuosity-induced error and attempt to accurately determine the deformation length scales. Once we successfully obtain the deformation length scales, we will build on crustal-thickness models [4] and plume models [5], to link the observed length scales to the lithospheric structure and mantle convection of Venus.