$TITLE$
Coronae as a Key to Lithospheric Thickness

[*S E Smrekar*] (Jet Propulsion Laboratory, 4800 Oak Grove Dr.,# Pasadena, CA 91 109; ph. 818-354-4192; fax 81 8-393-5059; # Internet: ssmrekar@cythera.jpl.nasa.gov); E R Stofan (Jet # Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA # 91 109; ph. 818-354-2076; fax 818-393-5059; Internet: # ellen.r.stofan@jpl.nasa.gov)

The study of mantle upwellings is one of the primary methods# used to estimate lithospheric thickness on Venus. However, a# unique value of lithospheric thickness can not be derived from fits# of mantle upwelling models to gravity and topography data. One# approach to answering this question is to determine if the# consequences of a thick or thin lithosphere are consistent with all# available data. If Venus has a thick lithosphere, how does it# permit geologic activity? If the lithosphere is thin, how is the heat# being lost given the low resurfacing rate? We argue that thick# lithosphere is inconsistent with the formation of coronae,# volcanotectonic features that are unique to Venus and which are# inferred to be relatively young. We also pursue the second# question above and suggest that coronae may be key to# understanding Venus' geologic history and heat loss# mechanisms. A model of a new process in which upwelling# causes delamination at the edge of the plume head, along with# deformation of a pre-existing depleted mantle layer, can produce# the full range of topographic forms of coronae. If half of the# coronae are active and Venus' heat production is similar to# Earth's, delamination of the lower lithosphere could account for# about 10% of Venus's heat loss, with another 150/0 due to# upwelling. Delamination may occur in other geological environments, such as highland plateaus, and could account for# Venus' heat loss 'deficit.' Thus Venus may be as geologically active as Earth but with a milder surface expression. # Delamination at coronae requires strong coupling between the# lithosphere and upper mantle, and supports the hypothesis that# water is key to the different tectonic styles on Venus and Earth.

$INFO$
1. Geodynamics of Venus Chapman

2. Oral

3. (a) Suzanne Smrekar
Jet Propulsion Laboratory