SIMULATIONS OF THE SURFACE PRESSURE TIDES ON MARS INCORPORATING NEW MOLA TOPOGRAPHY DATA. A. F. C. Bridger[1], R. M. Haberle[2], and J. Schaeffer[2], [1]Department of Meteorology, San Jose State University, San Jose CA 95192, USA (bridger@hellas.arc.nasa.gov), [2]Mail Stop 245-3, NASA Ames Research Center, Moffett Field CA 94035, USA (haberle@humbabe.arc.nasa.gov; jschaef@mintz.arc.nasa.gov).

Introduction: Simulations of surface pressure tides on Mars have been conducted previously with the NASA Ames Mars General Circulation Model (MGCM) [1,2], as well as by Wilson and Hamilton [3]. In the case of the MGCM, annual simulations with realistic (Viking-derived) dust loading have been reasonably successful at reproducing observed tides at the Viking Lander sites (Figs. 1 and 2 of [1]). One obvious discrepancy between observed and simulated tides is the amplification found in the model's diurnal tidal amplitude around L_s 90. The observations show no such amplification.

We report here on recent simulations of the surface pressure tide on Mars conducted with the MGCM and with the newly acquired MOLA topography data [4]. The data is provided at 1° × 1° resolution, and is used by the MGCM at 7.5° × 9° resolution. The vertical domain of the MGCM extends to around 80 km. In the simulations reported in [1], the vertical domain extended to around 50 km, and the Consortium topography dataset was used.

Results: Two annual simulations were conducted in which dust visible opacity was held constant at $\tau = 0.3$. In the first, the Smith-Zuber [5] topography dataset was used, and in the second the new MOLA topography data [4] were used. Figure 1 shows a comparison of diurnal tidal amplitudes in the surface pressure field at the Viking Lander 1 (VL1) site in the two simulations. Focusing on the first half of the year (when observed opacities were less than 1), we see that with the Smith-Zuber topography, there is an amplification of the diurnal tide, peaking just after L_s 90. This amplification does not appear when the MOLA topography data are used. At this same time of year, the semidiurnal tidal amplitude increases when the MOLA data are used. As has been previously reported, there is significant longitudinal variability in both amplitude and phase behavior. Explanations for these changes are offered (Kelvin wave activity is a leading candidate).

Additional annual simulations have been conducted with enhanced dust (τ = 1 and 3), again fixed during the year, and results will be presented. Finally, we report on an annual simulation with the same annually varying Viking dust load as used in [1]. These simulations aid in determining the relative sensitivities of the tides to dust loading and its variability, and to the topography.

References: [1] Bridger A. F. C. and J. R. Murphy (1998) *J. Geophys. Res., 103,* 8587–8601. [2] Haberle R. M. et al. (1998) *J. Geophys. Res.,* submitted. [3] Wilson R. J. and K. Hamilton (1996) *J. Atmos. Sci., 53,* 1290–1326. [4] Smith D. E. et al. (1999) *Science,* submitted. [5] Smith D. E. and M. T. Zuber (1996) *Science, 271,* 184–188.

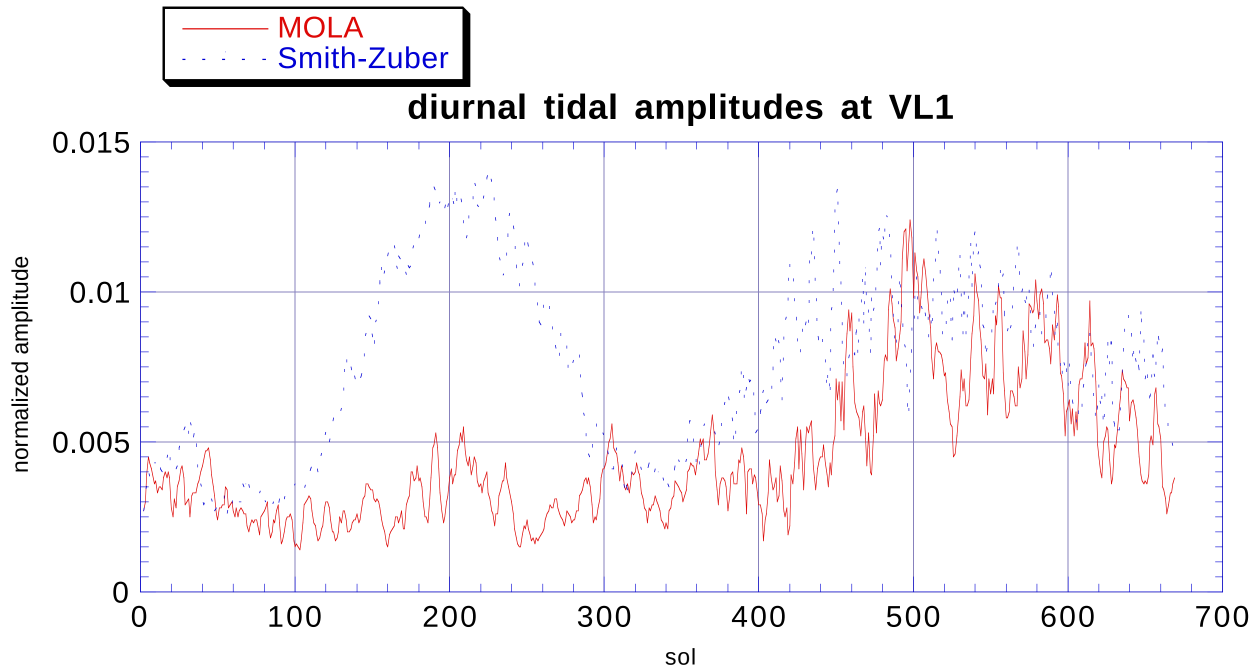

Figure 1. Amplitude of the diurnal tide in the surface pressure field at the MGCM's VL1 grid point. (a) Smith-Zuber topography (dotted), (b) MOLA topography, solid.