The Time Dependence of Resurfacing on Venus: Constraints Provided by the Impact Cratering Record

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Although a consensus is emerging on the average surface age of Venus (300 - 800 My), many questions regarding the resurfacing history of the planet remain. For example, if Venus did experience a massive global resurfacing event approximately 500 Mya, how did the obliteration of existing surface features proceed, and over what timescales? What can the surface record that exists today tell us about the magnitude and timescales of the resurfacing event and subsequent volcanism? Several estimates of the current volcanic flux on Venus have been proposed recently [1][2][3][4], based on analyses of the impact cratering record revealed in Magellan radar images. These range from 0.1 to 2 km$^3$/yr for constant rate resurfacing. Monte Carlo methods are used [2] to model the competing processes of impact cratering and volcanic resurfacing. The observations that the spatial distribution of impact craters cannot be distinguished from a random one, and that only a small number of impact craters are partially embayed by lava are used as constraints in the model. However, as has been pointed out [5], the ‘dark splotches’ seen in Magellan images represent an important category of surface feature that can further constrain our knowledge of the resurfacing history of Venus. We have included the non-random spatial distribution of the dark splotches, as well as time-dependent volcanic fluxes in our 3-D Monte Carlo resurfacing model, in order to investigate likely scenarios for global and subsequent regional resurfacing. We will discuss the implications of considering time-dependent resurfacing and the dark splotches in unraveling the history of resurfacing on Venus.