Geological Mechanisms of Resurfacing on Venus (Atalanta and Niobe Planitae, Atropos Tessera, Vesta and Ut Rupes): Gian Gabriele Ori 1)2) and Victor R. Baker 1)3): 1) Lunar and Planetary Laboratory, University of Arizona, Tucson, Arizona, 2) Dipartimento di Scienze Geologiche, Universita' d' Annunzio, Chieti, Italy, 3) Department of Geosciences, University of Arizona, Tucson, Arizona

Resurfacing is a major process affecting the surface of Venus [1]. If resurfacing occurs, it implies the formation of new crust with the consumption of older crust. In contrast to Earth, geological process able to achieve such results on Venus, has to be essentially vertical, since there is no evidence of large-scale horizontal movements on Venus. Moreover, seeking for a geological mechanism of resurfacing, it must be taken into account that resurfacing occurs in different tectonic settings. The addition of new crust could be simply achieved by large-scale flooding of lava flows, leading to the formation of basalt provinces. This mechanism is typically vertical, as on Earth, but, since the crust does not shift horizontally on Venus, the old crust must be consumed at its base. The new, added crust loads the older one, producing subsidence that, in turn, produces the large circular (sag) basins of the Venisian planitiae. Such a mechanism could be responsible for a steady resurfacing, with the continuous production of new crust at the top and consumption at its base. However, the old crust is colder and more rigid than the new one. Thus, with time, the behavior changes and, possibly, the old crust can sink dramatically. On the Venusian surface there is evidence of crust collapse linked to areas where new basalt is extruded. Two sag basins, corresponding to the Atalanta Planitia and to part of the Niobe Planitia and the margins of the Ishtar Terra, show structures that can be related with vertical movements produced by basalt effusions and associated extensional collapsing. Because the subsidence centers do not always correspond to the entire planitiae, we will call them basins or sag basins.

Both the Atalanta and the Niobe basins are partially surrounded by dorsae or tesserae. However, these features are affected by deep fractures and grabens that usually reach depths greater than those of the planitia floors. The fractures and grabens must be produced by extensional tectonics that acted on the borders of the basins, affecting former zones of structural weakness. The grabens could occur singly or as a set of few elongated depression along the planitia borders or they could affect the deep dorsae or Tessera substratum, marketly changing the physiography of the former feature. Extensive lava flows were poured out by these extensional features, which rest on top of the basaltic crust that forms the basin floors. Even the wrinkle ridges and other minor features associated with the basin floors are stratigraphically below the lava flows from the extensional features. This stratigraphic relation shows that the fracturing occurred when the planitia themselves where already formed and deformed. Moreover, due to the extension and the great depth of the grabens, they cannot be mere accessories to basin formation. It is much more probable that these features formed after the rigidity of the old crust reached a point that led to its collapse. This is consistent with the probable heat flow history of Venus. The formation of the sag basins is probably contemporaneous to the major high heat flow events, matched by basin formation and lava effusions. Subsequent cooling would lead to the collapse of the basin and to the graben and fracture formation. This hypothesis is consistent with the relatively small dimensions of the lava flows associated with the late-phase extension.

The Atropos Tessera is a rather well-organized feature: it consists of a set of ridges separated by basins. The swells and ridges are elongated roughly north - south along to the Akna Montes strike. The general aspect of the Atropos Tessera is one of basins and ridges. The ridges consist of tessera-like terrains, and, the basins are filled by lava flows. The extension of the Atropos Tessera is probably controlled by the same structural events or type of events that formed the Vesta and Ut Rupes at the south of Ishtar Terra. In both cases, extension occured at the border of the plateau; Vesta and Ut Rupes must be the product, regardless the previous geological history, of the extension linked to collapsing of the margin of Ishtar Terra. Volcanism associated with this structures, although present, is relatively minor if compared with the magnitude of the tectonic movements.

REFERENCES: Strom R.G. et al (1994) *J. Geophysical Res.*, **98**, 10899-10926