# NORTHERN BETA: PHOTOGEOLOGIC ANALYSIS OF VENERA 15/16 IMAGES AND MAPS.

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Beta Regio is one of the prominent highlands on Venus surface. Early interpretations considered it as a giant shield volcano /1/. Later on the role of tectonic uplift in the highland formation had been shown /2/. Recent interpretations combine these two approaches and suggest that Beta was formed as a result of doming in response to a thermal anomaly which caused also the volcanic activity including the formation of Rhea and Theia shield volcanoes /3/.

The northern part of Beta Regio was covered by Venera 15/16 radar mapping. The present paper is a short description of Northern Beta and its vicinities based on photogeological analysis of Venera 15/16 radar images and maps (fig. 1).

Within the Venera 15/16 coverage the foot of Beta highland is close to the contour line +1 km (above 6051 km datum). Its highest part, Rhea Mons, has altitudes about +4.5 km.

Two major terrain units are within Northern Beta: 1) hummocky terrain and 2) smooth terrain. H u m m o c k y terrain is mostly localized at altitudes higher than +3 km but in some places it goes down to about +2 km level. The surface of this terrain is complicated by abundant hummocks, each a few km across, aligned in numerous systems forming subparallel, cross-cutting and circular features (fig. 2). These features are mostly faint but evidently real resembling in their pattern some areas of parquet.Probably, like the parquet, they are controlled by tectonic deformations. The spacing of these features is about 3 to 5 km. That may mean that thickness of the deformed surficial layer is no more than a few km. Variegated orientations of these systems and the presence of circular features among them seem to indicate that they were formed at the conditions of omidirectional extention. The areas of the hummocky terrain coincide with zones of high cm- and meter-dekameter roughness mapped by Pioneer-Venus /1/. Hummocky terrain of eastern flank of Northern Beta is a landing site of Venera 9 space probe. Surface TV observations are in good agreement with the hummocky character of the terrain /5/. According to gamma-spectrometric measurements the surface material at Venera 9 landing site correspond to basalts /6/.

S m o o t h terrain is mostly localized within the lower parts of Northern Beta slopes. On Venera 15/16 images their surface is mostly seen as smooth and merging into the smooth plains of the adjacent Guinevere Planitia. Smooth terrain, at least at some places, is younger than the hummocky terrain. Its material overlaps and embays the hummocky terrain. It often associates with the domes which range in diameter of some to 40 km and have the morphology evidencing that they are basaltic lava volcanic constructs. Several broad gentle-sloping ridges about 100-150 km long complicate the smooth terrain within the northeastern sector of Northern Beta (fig. 3). These ridges are approximately parallel to the altitude contour lines. Perhaps, their position and orientation indicate that they may have been formed as a result of folding due to down-slope slumping.

The apical part of Northern Beta is dissected by a fan-like system of g r o o v e s and s c a r p s with fresh sharp-edge morphology. The geometry of this system gives little doubts that they are extentional features, formed as the result of doming of Beta highland. The features in the system are arranged into several bunches with 20 to 30 km average spacing. Evidently, it means that the thickness of the deformed layer in the case of this fan-like system is significantly larger than in the case of the mentioned faint features in the hummocky terrain. The fan-like system cuts the surface both of the hummocky and smooth terrains including the mentioned gentle-sloping ridges.

At the northern part of the smooth terrain apron a system of cross-cutted narrow lineaments arranged into a diagonal pattern can be seen (fig. 4). The geometry of the system and its posititon at the northern foot of Beta uplift indicates that these lineaments may be strike-slip faults formed as a reaction to the extention in east-west direction.

The surface of G u i n e v e r e P l a i n adjacent to the Northern Beta foot is generally smooth but bears in some places several subparallel systems of mostly subdued grooves and scarps. The orientation of these features is concordant with the orientation of the fan-like system in the apical part of Northern Beta. These features abut into the smooth Beta unit bearing the diagonal lineament system (fig. 4) that is an evidnce that the Guinevre surface is structurally older than the Northern Beta uplift. At the north-western part of the area covered by Fig. 1 a segment of Rauni corona can be seen. Its subdued

and evidently reworked by volcanism surface is dissected by grooves belonging to the mentioned features of Guinevre Plain that means that Corona Rauni is geologically older than the Beta uplift too.

C o n c l u s i o n s. The presented characteristics of Northern Beta confirm its origin as being mainly made by tectonic doming which took place after the fromation of the surface of the adjacent part of Guinevere Planitia including Rauni Corona. Volcanism seemed to play here only a secondary role smoothing the uplift flanks by lava flows and decorating the surface by small-scale volcanic constructs.

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