A SYSTEM OF CONJUGATE STRIKE–SLIP FAULTS IN THE RIDGE BELTS ON VENUS; V. P. Kryuchkov, Vernadsky Inst., USSR Academy of Sciences, Moscow 117975 U.S.S.R.

The ridge belts on Venus revealed with Venera 15 and 16 radar images are considered to be linear zones of tectonic dislocations [2,5]. There are two views on the origin of the ridge belts. One assumes a situation of extension [5,6], the other implies compression [1,2,4] during the ridge belts' formation period. Both views are based mainly on morphological studies.

Cross–strike lineaments observed in the ridge belts were interpreted as strike–slip faults [3,4] or as analogs of transform faults [6]. The analysis of the spatial interrelation between the revealed faults may indicate the tectonic situation during formation of the ridge belts. The results of such an analysis are discussed in this report. The initial description of the cross–strike lineaments in the ridge belts [3,4] allowed one to discover a great number of these structures. They are to be recognized by: 1) aligned sharp alterations of ridges inside the belts; 2) the linear chains of domes (volcanoes) crossing the belts; and 3) regular displacements of the ridges (Fig. 1,2). The evidenct displacements of the ridges are observed rather seldom. However, these displacements are just those to identify the more probable strike–slip faults from all the supposed faults. The amplitudes of the displacements are of the order of some kilometers. In many cases systematic deviations of the ridges along the cross–strike lineaments can be seen. The evident displacements are not observed here probably owing to insufficient resolution of the radar images (1.5–2 km/pixel). Also, the supposed shear zones may be covered by plains–forming material. Sometimes the strike of the supposed faults are cut by other faults or ridges (see Fig. 1,2). Usually, there are no strike–slip faults in the plains surrounding the ridge belts. Only sometimes they may be found as "shadow" continuations of the linear structures. As a rule the supposed faults are oblique to the ridges. The systems of these faults do not look like the systems of transform faults in spreading zones (see Fig. 1,2). Taking into account the intersection of the cross–strike lineaments and cases of their cutting by other faults or ridges, it can be assumed that these supposed faults are conjugate and have been formed in one and the same tectonic stress field. Unfortunately it is not possible confidently to trace the displacements along the strike of many faults so that it does not allow one to determine a more reliable criterion of the conjugation of these faults.

From the definition of the principal axes of stresses it is known that in many cases the bisector of acute angle indicates relative compression and one of obtuse angle indicates stress axis of relative extension. However, this rule is not always true. For example the strike of faults can turn and change its initial position due to the continuing deformation or by influence of an unhomogeneous environment. Also, it is impossible to exclude the probability that the observed faults can be secondary.

If we accept that the observed strike–slip faults correspond to tangential stress in the ridge belts (see Fig. 1,2), the bisectors of acute angles of the supposed conjugate faults show the compression was in East–West direction. In this case the ridges of North–South direction in the belts could have been formed by tectonic compression. This conclusion could not be considered as the only possibility taking into account those uncertainties mentioned above. The higher resolution images by the future Magellan mission may provide necessary data to resolve this problem.

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Figure 1. (a) a radar image of Pandrosos Dorsa region; (b) deciphering scheme.

Figure 2. (a) a radar image of Ahsonnutli Dorsa region; (b) deciphering scheme.

~~ ridges, - - - - observed faults, • small domes, ⊙ big volcanic structures.

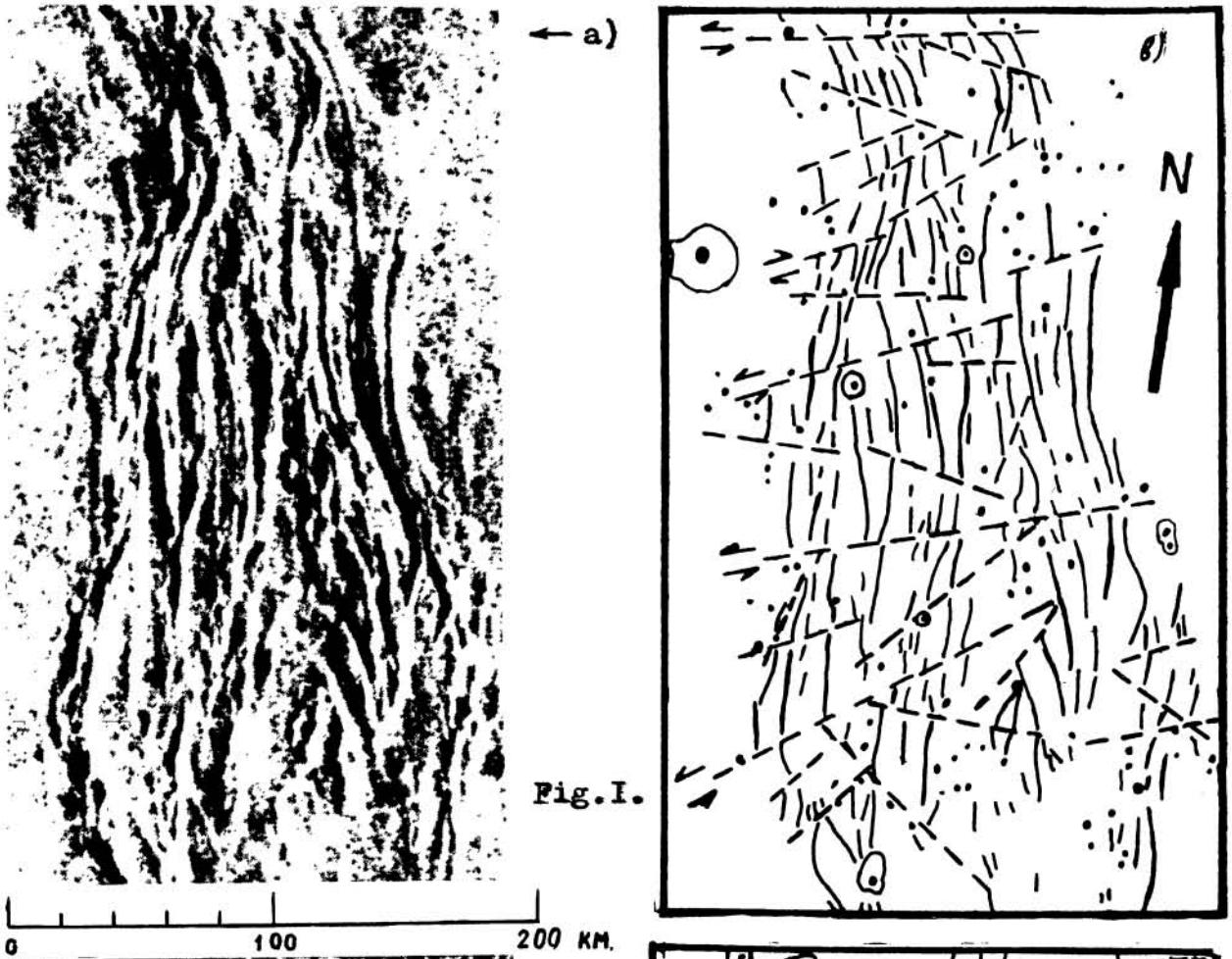

Fig.I.

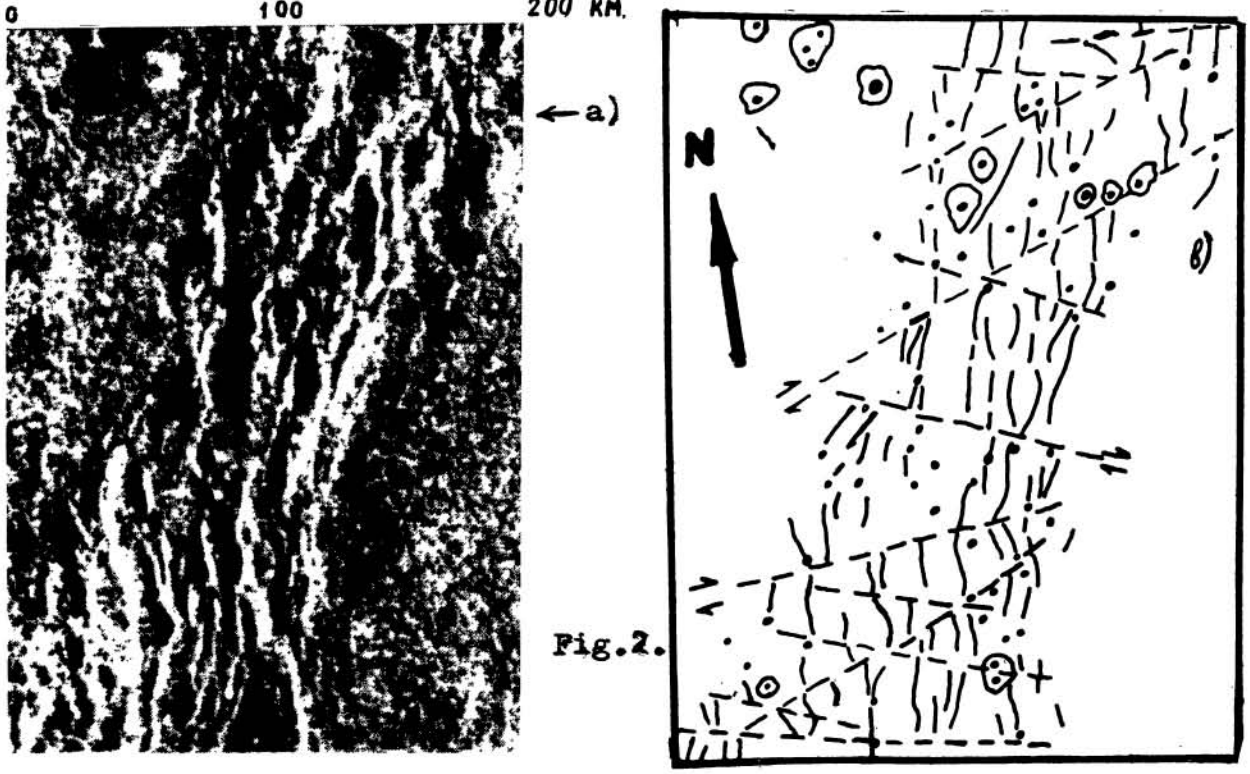

Fig.2.