LARGE-SCALE EMPLACEMENT OF YOUNG LAVAS IN THE AREA OF THE TANOVA-UPDOMING, MARS.

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The large-scale emplacement of the youngest lavas (i.e. parasitic shields in the general sense and youngest Tharsis lavas including the youngest Syria Planum lavas) in the area of the Tharsis, Noctis Labyrinthus, Valles Marineris (TaNoVa) - Updoming has been widely influenced by the spatial distribution of concentrically arranged escarpments, the relief of the Tharsis ridge, and by the rugged landscape of the aureole around Olympus Mons.

Numerous authors have carried out geologic investigations about volcanism and lava production in the area of the TaNoVa - Updoming, Mars (1-4). A morpho-interpretative investigation of the gross relief of that area and the distribution and shape of the parasitic shields of the Tharsis Montes, Olympus Mons, and Alba Patera leads to the result that the emplacement of the latter lavas has been widely influenced by various morphologic features (see Fig. 1):

1) The emplacement of the lavas of the Tharsis ridge and its huge shield volcanoes happened in such a way that the lavas were dammed up and got ponded by concentrically arranged arcuate escarpments which have been interpreted as remnants of huge progressive chaotic terrains (5), (A - C in Fig. 1).

2) In the cases in which the youngest lavas have been produced at the end of the Tharsis ridge (southern parasitic shield of Arsia Mons and northern parasitic shield of Ascraeus Mons) and in the area of Syria Planum the lavas formed huge fans which show a tendency to build horse tail-like structures, according to the local/regional relief (D in Fig. 1).

3) The southern parasitic shield of Ascraeus Mons has formed two lobes which point northward, hence indicating indirectly the existence of the Tharsis ridge by flowing parallel to its contour lines (E in Fig. 1).

4) A similar situation exists around Olympus Mons. The eastern part of its parasitic shield formed two lobes which had the tendency to flow around that volcano (southern branch) and its aureole (northern branch, resp.). The western part of that parasitic shield was dammed up and got ponded by the ridges of the aureole around Olympus Mons (F in Fig. 1). F2 and F4 indicate the hypothetic shape of that part of the parasitic shield as it might have occurred if the aureole around Olympus Mons would not have existed. In that case a huge lava fan (or even lava lake) would have been formed west of Olympus Mons by lavas which flowed approximately perpendicular to the contour lines of that area.

5) Such a situation has been realized by the youngest Elysium lavas which got not dammed up by an aureole. Hence, those lavas flowed down along proto-Marti Vallis and formed a fan/small lava lake west of Olympus Mons (G in Fig. 1).

6) Only the Alba Patera lavas show an emplacement which has been influenced but very little by the gross relief in the vicinity of that shield volcano-like system. The lavas formed a concentrically arranged unit (the inner shield) and numerous radially arranged individual flows (H in Fig. 1).

Fig. 1
Types of large-scale lava emplacement in the area of the TaNoVa-updoming, MARS; parasitic shields in the general sense.

indicates concentrically arranged escarpments (partly suspected) which have been interpreted as remnants of huge progressive chaotic terrains (5).