STRATIGRAPHIC STUDIES IN THE AREA OF BALTIS VALLIS, VENUS; A. T. Basilevsky[1] and J. W. Head[2]; [1]Vernadsky Institute, 117975, Moscow, Russia; [2]Brown Univ., Providence, R.I. 02912 USA.

Photogeologic mapping of a large area (4,500 x 4,500 km) around Baltis (Hildr) Vallis has led to the identification of six stratigraphic units the relations of which are consistent over the entire mapped region. Most of the mapped area is occupied by wrinkle-ridged plains consisting of two subunits separated by the emplacement of Baltis Vallis. The latter, as other canali-type channels, appears to be formed geologically instantaneously. These relationships support the interpretation that as a stratigraphic unit, plains with wrinkle ridges formed relatively simultaneously over large parts of Venus.

Although the problem of origin of the canali-type channels on Venus (1, 5) is far from resolved, there is a common opinion that they are a result of erosion by some highly-fluid liquid. This style of the formation implies that any given channel was formed geologically instantaneously and makes the channels good stratigraphic markers. Taking this in mind we photogeologically mapped area around the longest on Venus Baltis Vallis (previously named as Hildr Fossa) and studied its stratigraphic relations (Figure 1). The area is large enough (~1/20 of the surface of Venus) that the study results should have more than local significance. Six major stratigraphic units were distinguished and are described in detail elsewhere (2, 3, 4) . From older to younger they are: 1) Tessera terrain, Tt; 2) Densely fractured terrains of plains and coronae, Pdf/COdf; 3) Fractured and ridged plains and Ridge belts, Pfr/RB; 4) Plains with wrinkle ridges, Pwr; 5) Lobate plains, Pl; and 6) Craters with dark parabolas, Cdp. The SE part of the area is cut by the Ganis rift system.

As it was noted by (1) a probable source of Baltis Vallis is a 140 x 180 km volcanic construct at 45 N, 185 E. The channel develops its normal morphology about 200 km north of the construct. Then it makes about a 7,000 km long loop and becomes lost in the plains at 51.7 N, 166.6 E. In the mapped area there are also three 200-400 km fragments of other canali-type channels. Baltis Vallis, which is 2-3 km wide and < 100 m deep (1), is incised in the smooth plains looking moderately dark on the images. In several places the channel is covered by radar-bright lobate plains. Moderately dark plains, Baltis Vallis, the radar-bright plains and the source volcanic construct are deformed by wrinkle ridges. Fragments of other channels are also covered by the radar-bright plains and deformed by wrinkle ridges.

The wrinkle ridges of the mapped area have different trends that appear to be a combination of regional trend(s) and local disturbances of them by the radial-concentric patterns related to coronae and arachnoids. Among the wrinkle ridges deforming Baltis Vallis there are ridges representing both the regional trends and their disturbances. All of them deform the channel and we have found not one case where the ridges predated the channel. The channels were observed in close vicinity of ridge belts (RB) but we have found no case of the channel incising the ridge belt.

The ridge belts in the western part of the area form a chain of elongated remnants embayed by plains with wrinkle ridges (Pwr). In the eastern part the ridge belts merge into fractured and ridges plains (Pfr) also embayed by Pwr. Small patches of dense fracturing are seen within Pfr/RB appearing to be remnants of densely fractured terrains (Pdf/COdf) which are too small to be mapped. Pdf/COdf are present as mappable-size units in the NE and SE parts of the area. Tessera terrain forms rather small islands among Pwr and Pfr. Lobate plains are concentrated in the SE part of the area mostly in association with Ganis rift zone. Four craters with associated radar-dark parabolas are present in the area.

Summarizing, mapping the area around Baltis Vallis led to deducing stratigraphic relations which are consistent all over this large region and with stratigraphic relations found in thirty-six 1,000 x 1,000 km earlier studied sites (2, 3, 4). The most abundant unit in the studied area is plains with wrinkle ridges consisting of two subunits separated by the formation of Baltis Vallis and other channels of this type. The wrinkle ridges deform both subunits of Pwr. A consistency of age relations between the Pwr subunits, wrinkle ridges and Baltis Vallis (which is a geologically instantaneous formation) is evidence that Pwr (at least in the studied area) is a real stratigraphic marker unit and not a mosaic of plains emplaced at significantly different times. This favors the first of two options discussed in Basilevsky and Head (2-4) that the considered stratigraphic units represent globally synchronous geologic events rather than the products of the geologic activity in different areas of the planet at different times.

References: 1) V. Baker et al. (1992) JGR, 97, 13421; 2) A. Basilevsky and J. Head (1994) LPSC XXV, 65-66; 3) A. Basilevsky and J. Head (1994) Brown Univ. Library, 72 p.; 4) A. Basilevsky and J. Head (1994) EMP, in press; 5) G. Komatsu et al. (1992) GRL, 19, 1415.

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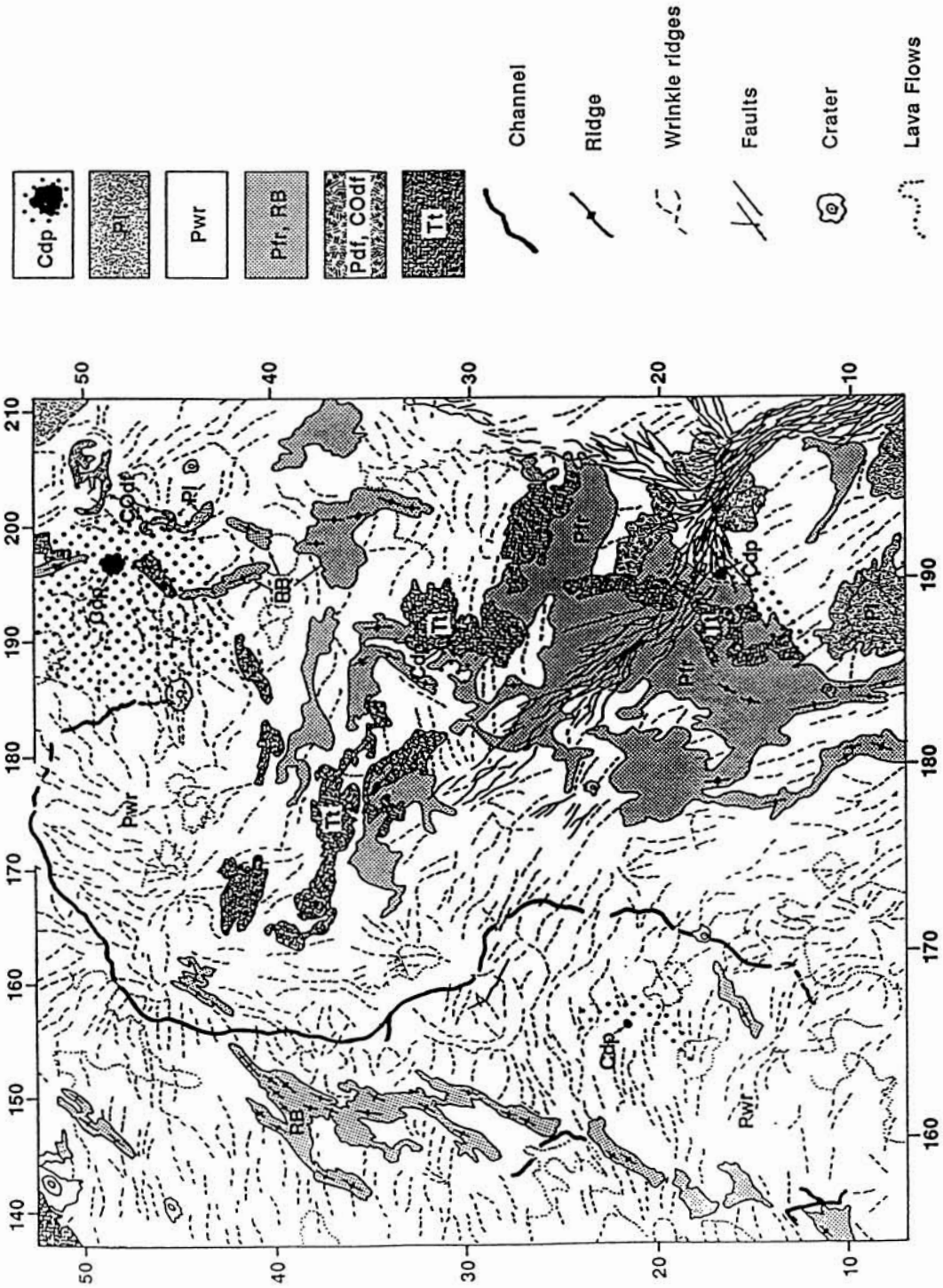

Figure 1. Schematic geologic map of the Baltis Vallis region. Units are Cdp (craters with dark parabolas), Pl (lobate plains), Pwr (plains with wrinkle ridges), Pfr/RB (fractured and ridged plains, ridge belts), Pdf/COdf (densely fractured terrains of plains and coronae), and Tt, (tessera terrain).