VENERA-VEGA GEOCHEMICAL ANALYSES: WHAT GEOLOGIC UNITS ARE THE SOURCE OF THE ANALYZED MATERIAL? A. M. Abdrakhimov[1] and A. T. Basilevsky[1], [1]Vernadsky Institute, RAS, Moscow, 119991, Russia, albert@geokhi.ru.

Introduction: Soviet landers Venera 8, 9, 10, 13, 14, and Vega 1 and 2 made geochemical analyses of Venus' surface materials [1] and this is the only direct geochemical information about Venus surface. Geologic analysis of the Magellan images of the landing site showed that the landing ellipses cover predominantly the volcanic plains so it was concluded that the plain-forming lavas had most probably been analyzed although one can not exclude a possibility that at least one of the landers studied some other geologic unit outcropped within the landing ellipse [2-6].

In recent work [7, 8] it was suggested that the fine-layered surface rocks seen on all Venera panoramas may be the partly lithified and partly eroded deposits of debris excavated at impact crater formation events, ejected into the atmosphere and then deposited as dark parabolas seen in the Magellan images around the youngest craters of Venus larger than 11 km in diameter. If so, the source of the layered deposit material could be not only the now observed plain-forming lavas but the rocks from some depth. This paper is devoted to consideration of this possibility.

Observations and analysis: Basilevsky and Head [7, 8] have drawn the model parabolas around each impact crater with D >11 km in the regions where the Venera-Vega geochemical analyses have been done and made the appropriate maps (see e.g. Figure 2 in [7 and 8]). Here we use these maps to find which craters' ejecta could contribute to the surface deposits at each of the sites. These craters are listed in Table 1. Then through the analysis of the Magellan images for the vicinity of each of these craters, the photogeologic maps has been made (see e.g. Fig. 1 and 2 tops). For this mapping, units of the regional and global stratigraphy of Venus [9] have been used. Then, through the analysis of each of these maps the schematic geologic profiles for each of the craters have been done (see e.g. Fig. 1 and 2 bottoms).

In drawing profiles we used estimates of the units' thicknesses made by [9]. Typically the unit thickness estimates were as following: Pl is about a few hundred meters [10], Pwr and Psh together is about 1±1 km; Pfr and Pdf is about 1±2 km [9, 11].

Looking at the crater profile, proportions of the units excavated by this given crater have been estimated. If the unit contribution looked as >40% we designated this as "much", if 20 to 40%, as "not much", and if <20%, as "little" (see Table 1). These estimates for each crater, whose model parabola covers partially or completely the given site, were used to sum up to estimates for each site (Table 2). At this stage a percentage of the site area covered by this given parabola and estimated by [7, 8] was taken into account.

Table 1. Estimates of contribution of materials of different geologic units into ejecta of craters which model parabolas cover the Venera-Vega landing ellipses (M = much, NM = not much, L = little, see text).

Lander	Crater	Tt	Pdf	Pfr	Psh	Pwr
V8	Amalasthuna	M				NM
	Virve					M
	Cynthia				M	L
V9	Patti	M		L	L	
	Wazata	M				L
	West	M				M
	Sanger	M		L	L	
V10	Kaisa		M		NM	L
	Rhys		L	M	L	L
	Centlivre	M	L	L	L	L
V13	Wen Shu				M	M
	Ingrid	L				M
	Bascom	M			L	L
V14	Ingrid	L				M
	Cline	M				L
	Bender		M		L	L
V1	Blackburne		L	M		L
	Surija			M	L	NM
	Fossey					M
V2	Mahina			L		M
	Warren	M		L	L	
	von Schuurman		M			NM

Table 2. Estimates of potential contribution of materials of different geologic units into the crater-related airfall deposits for the Venera-Vega landing ellipses

Lander	Tt	Pdf	Pfr	Psh	Pwr
V8	M			L	M
V9	M		L	L	L
V10	L	L	L	NM	L
V13	NM			L	M
V14	L	L		L	NM
V1		L	L	L	NM
V2	L	L	L	L	L

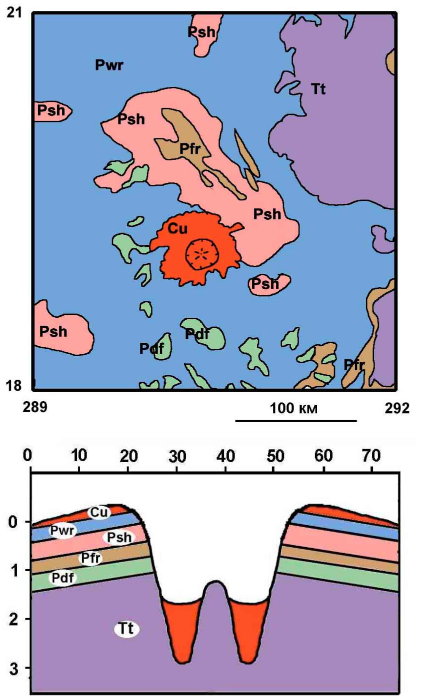

Figure 1. *Geologic map and the schematic cross-section of crater Centlivre.*

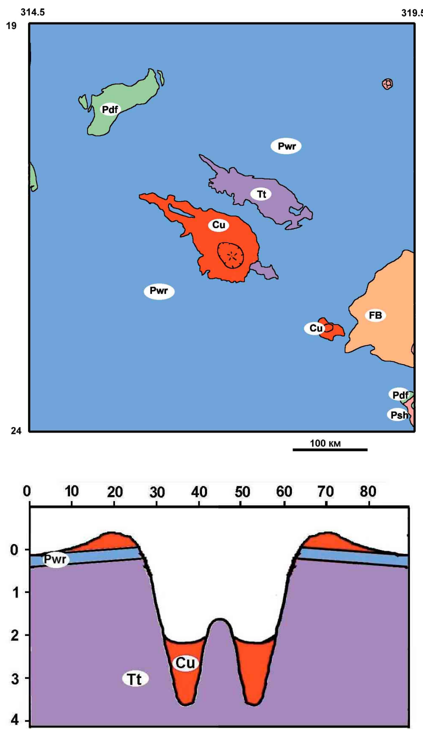

Figure 2. *Geologic map and crater cross-section of crater Cline.*

Concluding remarks: So if the hypothesis that the fine layered rocks seen in the Venera panoramas are the airfall deposits originated from the impact crater debris [7, 8] is correct, the participation of rather deep-seated rocks in the Venera-Vega geochemically analyzed materials can be very significant (Tables 1 and 2). Moreover, it is possible that the geologic unit, which in the Magellan image is seen as the place where the lander sits, may not play a significant role in the analyzed material. In particular, in the case of the Venera 8, which most probably sits within the field of unit Psh, the materials of units Pwr and Tt may play the major role. Tt material could play a major role in the case of Venera 9 while in the case of Venera 10 the contribution of unit Pdf could be dominating. In the Venera 13 and 14 cases contributions of unit Pwr may be most important. In the Vega 1 case, the unit Pfr may be dominating and the case of Vega 2 suggests equally modest participation of several units.

It is necessary to add, however, that Table 2 shows for each of the sites the averaged sum of potential contributions of several craters. But because the X-ray fluorescent analysis (Venera 13, 14, Vega 2) used a sampling core only of a few centimeters long, and that the parabola deposits do not stay intact through the time but certainly are a subject of erosion, the analyzed by any lander material may represent a deposit originated from only one impact event. In this case Table 1 is more appropriate to consider the possible sources. In the case of gamma-ray spectroscopy (Venera 8, 9, 10, Vega 1 and 2) the thickness of the sampled material is larger (0.5-1 m) but even in this case it is quite possible that the analyzed material represents the ejecta of one impact event.

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