TABLE 4. Values of the Maximum Velocities of Lateral Blast Clouds on Earth and Venus

Magma Water Content, wt %	Maximum Velocity of Blast Cloud, m/s			Acoustic Speed in Blast Cloud, m/s
	Earth (Sea Level)	Venus		
		4-MPa level	10-MPa level	
10	548	155	88	219
5	443	125	70	153
3	374	105	60	118
Atmospheric Acoustic Speed	350	412	442	

Also given are the acoustic wave speeds within the blast material and in the surrounding atmosphere.

Stofan et al., 1985] have confirmed earlier proposals [McGill et al., 1981, etc.] that Beta Regio is the site of a major rift zone and that two centrally located topographic prominences (Rhea and Theia montes) are of volcanic origin. Theia Mons (Figures 1a, 1b, and 1c) appears as an approximately circular radar bright feature averaging 325 km in diameter and rising over 5 km above mean planetary radius and approximately 1.5-2.5 km above the surrounding crest of Beta Regio [McGill et al., 1981; Campbell et al., 1984] (Figure 1c). A smaller, irregular, radar dark feature 60-90 km in diameter is centrally located on the bright spot. This topographically distinct radar feature is located along the major western bounding fault of the central Beta Regio rift system and appears to be superposed on the structure, filling in the deep chasma in this area. The central dark area may be a volcanic caldera containing relatively smooth flows, a situation common in terrestrial volcanoes, although the density of topographic data is insufficient to establish the existence of a summit depression. The dark central region is surrounded by a halo which has a relatively rougher surface or an enhanced dielectric constant (or both). This region could consist of air fall materials or flows of either lava or pyroclastic origin. Farther down the flanks are observed features which extend approximately radially (downslope) away from the summit, particularly to the northwest, and from their shapes they show signs of topographic control (Figures 1a and 1b). The edges are very lobate and are much more suggestive of the margins of lava flows than of ignimbrites. The most distinctively lobate features are 25-75 km in width and extend on the average about 250 km from the edge of the radar diffuse zone to the northwest of Theia, about 375 km from the edge of the bright region and about 550 km from the summit. The geometry of the mapped units suggests that some of the lobate flows may originate in the vicinity of the diffuse zone on the west and northwest flank of Theia.

High-resolution radar images have also been obtained of a region south of Ishtar Terra in northern Sedna Planitia which contains extensive volcanic deposits (Figure 1d) [Head et al., 1985a]. The volcanic plains consist of patches of radar dark, bright, and intermediate terrain often with lobate and flowlike boundaries. In the central western portion of the plains occurs a 200-km-diameter intermediate-brightness patch with a 50-km dark central area that has been interpreted to be a volcanic source area and possibly a low shield area. Approximately 250 km to the north occurs a second low shieldlike structure of intermediate radar brightness and approximately 200-350 km in diameter. In this case, the central area is dark and about 100 km wide and contains an inner, irregularly shaped region about 50 km in diameter, which may be a caldera. This region is characterized by several flowlike features about 10-30 km in width and extending at least 200 km from the apparent source at the center of the structure. These elongate and lobate flowlike features then merge into broad units surrounding the structures (Figure 1d). A third occurrence of elongated flowlike features has been reported by Barsukov et al. [1984a, 1986] for the Lakshmi Planum area as observed on Venera 15/16 images. Here, a system of flows up to 100-300 km in length emanates from the vicinity of Colette, an apparent caldera in central western Lakshmi Planum. Flow lengths in the 100-200 km range are also reported by Barsukov et al. [1984a, 1986] for other parts of the northern hemisphere of Venus, with flow widths in the 10-20 km range.

To summarize, on the flanks of Theia Mons the lava flow features have widths averaging about 50 km and lengths of up to 300 km if they emerge from the middle of the diffuse zone or 550 km if they emerge from the summit. If the bright zone represents a carapace of rough flows, their widths are not known, but lengths should not exceed about 160 km. All of these flows have formed in areas where the regional slope measured from the Pioneer Venus orbiter radar altimetry [Pettengill et al., 1980; Sharpton and Head, 1985] averages 0.007 rad. In the region south of Ishtar Terra, similar features have average widths of 20 km and lengths of at least 200 km on regional slopes of 0.002 rad. The flows described by Barsukov et al. [1984a, 1986] surrounding Colette crater on Lakshmi Planum average 150 km in length and 15 km in width and occur on regional slopes of 0.01 rad.

For these sets of features, therefore, we can regard an average value of each of W_t, X, and α as known. A range of possible rheological properties and effusion rates can be calculated using equations (19) to (27) and some simple assumptions. We choose a series of pairs of values of Y and η from the range specified by the curve in Figure 2c, and for each value of Y we calculate D_b from equation (19), W_b from equation (20), and D_c from equation (23). We obtain a value of W_c for each Y,η pair by subtracting $2W_b$ from W_t and use this