ELEVATION DISTRIBUTION OF MARS TOPOGRAPHY, Sherman S. C. Wu, Annie E. Howington-Kraus, and Karyn Ablin, U.S. Geological Survey, Flagstaff, AZ 86001

A new global topographic map of Mars has been published at a scale of 1:15 million with a contour interval of 1 km [1]. Elevations on the map are referred to the Mars topographic datum that is defined by a gravity field, a 6.1-millibar pressure surface with respect to the center of mass of Mars [2]. From the map, a Digital Terrain Model (DTM) has been derived at a resolution of 1/59.226° (exactly 1 km) per pixel [3]. By using the DTM, the volumetric distribution of Mars topography above and below the datum has been previously calculated [4]. From the same DTM, the elevation distribution of Mars topography has now been calculated, in three different categories: (1) the frequency distribution of elevations at the pixel resolution (Figure 1); (2) average elevations in increments of 6° in both longitude and latitude (Figure 2); and (3) average elevations in 36 separate blocks, each covering 30° of latitude and 60° of longitude (Table 1). For the second and the third categories, average elevations were calculated by averaging pixel elevations of the DTM.

In Figure 1, the positive and negative elevation distributions are shown to be 67% and 33%, respectively. Only 0.5% of elevations are above 9 km. In Table 1, the average elevations of each of the six longitudinal belts are listed on the bottom row, and the average elevations of each of the six latitudinal bands are listed in the last column. In elevation, the western hemisphere (0°-180°) is about 0.993 km higher than the eastern (180°-360°). Also, the southern hemisphere is about 3.191 km higher than the northern (due to a shifting of Mars' center of mass by approximately 3.4 km to the north of its center of figure). The mean elevation above the datum is 1,876 m.

Mars elevation distribution correlates with its volume distribution previously calculated [4].

References: [1] U.S. Geological Survey, 1989, Misc. Inv. Ser. Map I-2030, 3 sheets, scale 1:15,000,000. [2] Wu, S. S. C., 1981, Annales de Geophysique, Centre National de la Recherche Scientifique, Numero 1, Tome 37, p. 147-160. [3] Wu, S. S. C., and Howington-Kraus, A. E., 1987, LPS XVIII, p. 1108-1109. [4] Wu, S. S. C., and Howington-Kraus, A. E., 1990, LPS XXI, p. 1355-1357.

Table 1. Elevation Distributions of Mars Topography (in meters).

| Longitude(w) Latitude	180°-120°	120°-60°	60°-0°	360°-300°	300°-240°	240°-180°	Average
N90°-60°	-1,940	-1,463	-2,313	-1,461	-1,258	-2,581	-1,836
N60°-30°	-1,030	2,343	-1,370	612	-899	-1,038	-230
N30°-0°	768	4,257	-445	1,569	399	-330	1,037
S0°-30°	3,803	6,980	1,519	3,336	3,045	2,232	3,264
S30°-60°	5,016	5,441	3,218	3,023	461	4,247	3,568
S60°-90°	4,232	3,832	3,698	3,252	3,591	4,470	3,846
Average	2,026	4,392	699	2,011	937	1,190	1,876

MARS ELEVATION; Wu, Sherman S. C. et al.
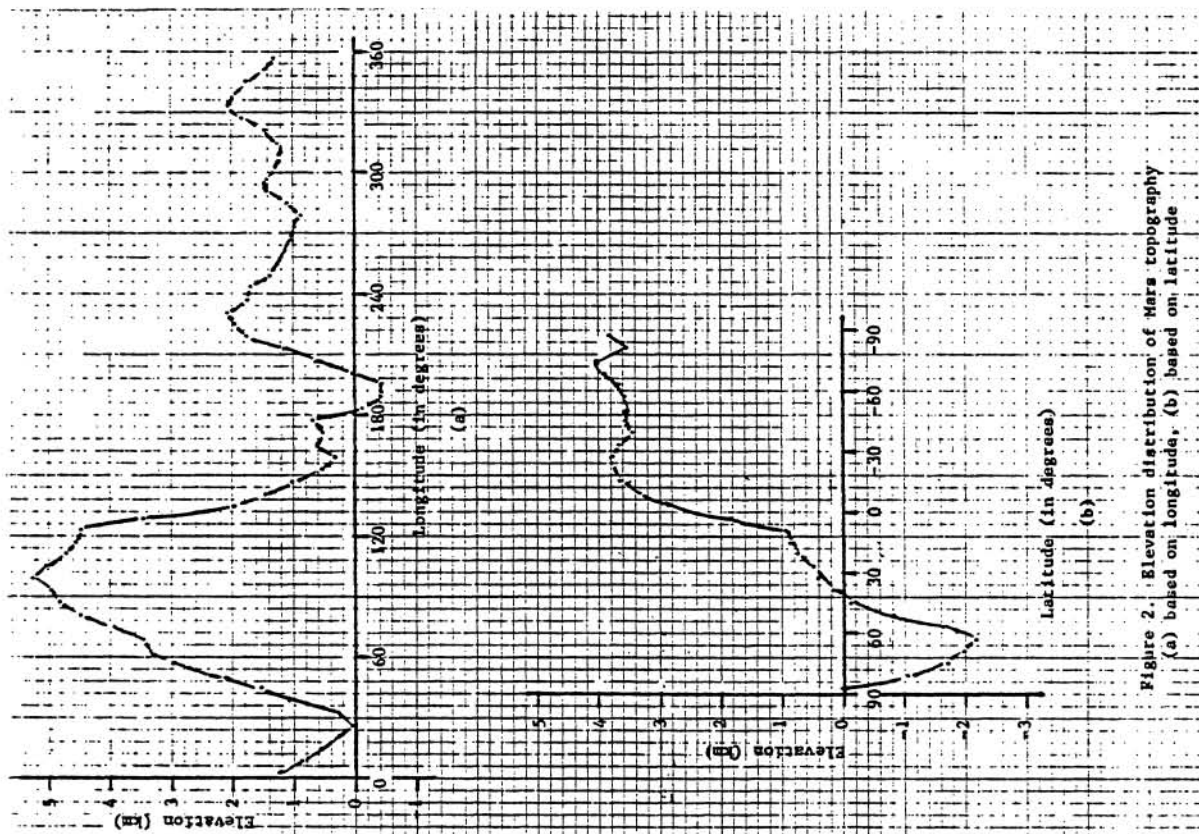
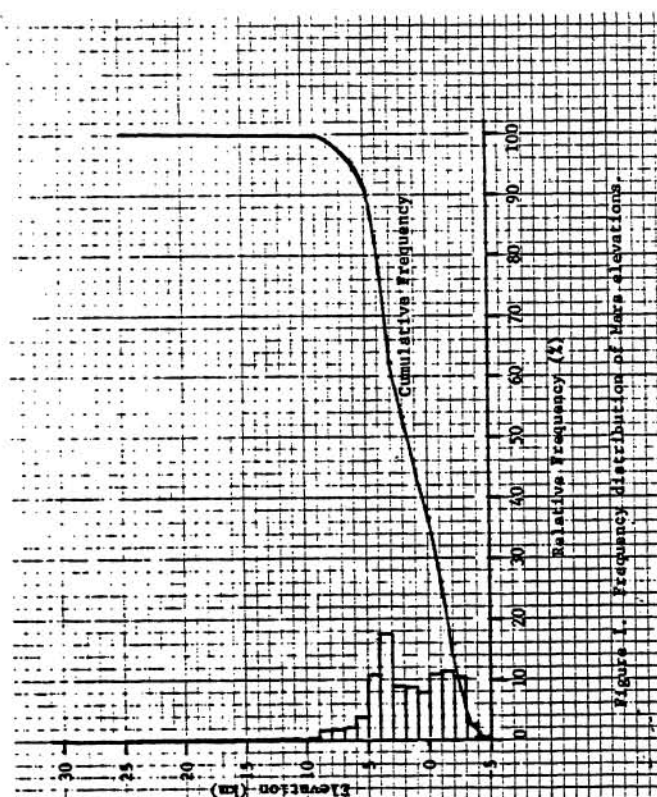Figure 2. Elevation distribution of Mars topography. (a) based on longitude. (b) based on latitude

Figure 1. Frequency distribution of Mars elevations.