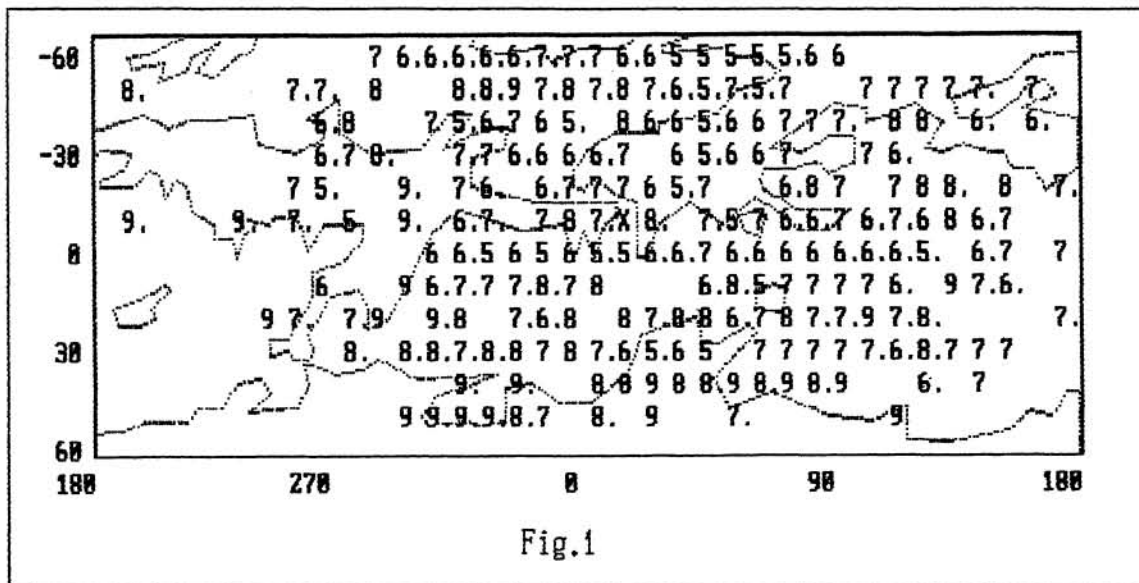


THE EXPERIENCE OF THE MARS NORMAL ALBEDO AND LIMB DARKENING COEFFICIENTS MAPPING FROM THE OBSERVATIONS DURING 1990 OPPOSITION: U.G.Teifel, N.U.Sinyaeva, A.N.Aksenov, and G.A.Kharitonova (Astrophysical Institute of Kazakhstan Academy of Sciences, Alma-Ata)

Among the various studies of the Mars surface optical properties there are few estimates of the diffuse reflection function which may be described at definite wavelength by known Minnaert's expression using only two parameters - the normal albedo or reflectivity R_0 and the limb darkening coefficient k . During 1990 Mars opposition we have obtained a number of photographs of Mars using 1-m telescope at the image scale 2.125 arcsec per mm. 36 pictures in red light obtained from 21 November to 4 December 1990 were used for detailed photometric reduction and computer analysis to compile the maps of the normal albedo and the limb darkening coefficients distribution on most part of martian surface. Each image of Mars was divided on 10x10 square regions containing 8x8 pixels within each region. From the intensity data for these pixels plotted in terms of the Minnaert's graph the values of the limb darkening coefficients and normal albedo were derived by the mean square root technique. If the standard error for the value of k exceeds 0.02 (as a result of the albedo differences within this area) these estimates of k were excluded from the subsequent consideration. The map of obtained by this manner 315 values of k averaged for approximately 10x10 square degrees regions is presented on figure 1.



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The most of k values lies between 0.6 and 0.9 (the effective wavelength is 0.65 μm) with maxima of the distribution at $k=0.75$. The mean value of the limb darkening coefficient $k=0.76$ is very similar with the global mean value 0.79 which was derived from the computer reduction of images for the limb darkening at different values of k and choice of the optimal k value when the dispersion of the relative intensities on reduced images is minimal. There is very clear correlation between the limb darkening coefficients and normal albedo as it may be seen from figure 2, where the light squares fall into the measurements for north hemisphere and filled squares fall into south hemisphere of Mars. The difference between mean values of k for maria and continental regions was found statistically insignificant at mean dispersion for each region about 0.1 - it may be the consequence of the significant albedo and the surface roughness differences inside both regions.

