PERMANENTLY SHADOWED AREAS AT THE LUNAR POLES. V. V. Shevchenko[1], E. A. Kozlova[1], G. G. Michael[1]. 1.Sternberg State Astronomical Institute, 119899, Moscow, Russia. shev@sai.msu.ru.

The orbital plane of the Moon is inclined to the plane of the ecliptic at an angle which varies from 4,98° to 5,28° over a period of 18,6 years. Taking account of these movements, the maximum altitude of the Sun above the celestial equator at midday is 1,7°. So, the limb of the Sun rises a maximum of 1,95° above the horizon at the lunar poles. Therefore topographic depressions near the lunar poles may contain water ice deposits.

We have used the Morphological catalogue of the craters of the Moon [1] for our work. We researched the regions with latitude higher than 60° for both hemispheres of the Moon. 944 craters and 1119 craters with diameters larger than 10 km was considered for North and South polar regions respectively. The depth of a crater was estimated as:

$H=0{,}196*D^{1{,}01}$,

for the interval of diameter from 10 km to 15 km (2), and as

$H=1{,}044*D^{0{,}301}$,

for craters with diameter larger than 10 km [2], where H is the depth of the crater, and D the diameter.

We calculated the areas of permanently shadowed regions for each crater. The total number of craters with a wholly shadowed floor is 44 for the North polar region and 43 for the South polar region. 111 and 122 craters have a floor permanently shadowed less than 10% at the North and South poles consequently. The areas of these terrains make up 0,07% and 0,09% of the total lunar surface respectively. 393 craters at the North pole and 472 craters at the South pole have a floor permanently shadowed more than 10 % and less than 30%. The areas of these terrains make up 0,14% of the total lunar surface for the North polar region and 0,17% for the South polar region. The 251 craters at the North pole and 304 craters at the South pole have a floor permanently shadowed more than 30% and less than 50%. The areas of these terrains are 0,1% of total lunar surface for North polar region and 0,09% for the South polar region. The number of craters with floors permanently shadowed more than 50% and less than 80% is 107 for the North polar region and 120 craters for the South polar region. The areas of these terrains are 0,06% of total lunar surface for North pole and 0,05% for South pole. The number of craters is 88 in the North polar region and 101 in the South polar region. The areas these terrains are 0,05% of the total lunar surface for both polar regions, respectively.

Watson et al. [3] and Arnold [4] examined the illumination conditions near the lunar poles in different latitude zones. Their estimates of the percentage of permanently shadowed areas of the total lunar surface are listed in Table 1:

Table 1.

Latitude zone	This study	Arnold (1979)	Watson et al. (1961)
60 ° - 70 °	0,26	0,08	0
70 ° - 80 °	0,35	0,19	0,23
80 ° - 90 °	0,28	0,21	0,21

Our estimates of the total area of permanently shadowed regions is 0,42% of the total lunar surface or 160109,4 km ^{2} at the North pole and 0,47% of total lunar surface or 180099,4 km ^{2} at the South pole.

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References [1] Rodionova J.F. et al.,(1987*) Morfologicheskiy katalog kraterov Luny, ed Moscow University, 177p.* [2] (1983) *Ударные кратеры на Луне и планетах., АН СССР, Москва, «Наука»*. [3] Watson K et al. (1961) *JGR,* 66, 3033. [4] Arnold J.R. (1979) *JGR,* 84, 5659.

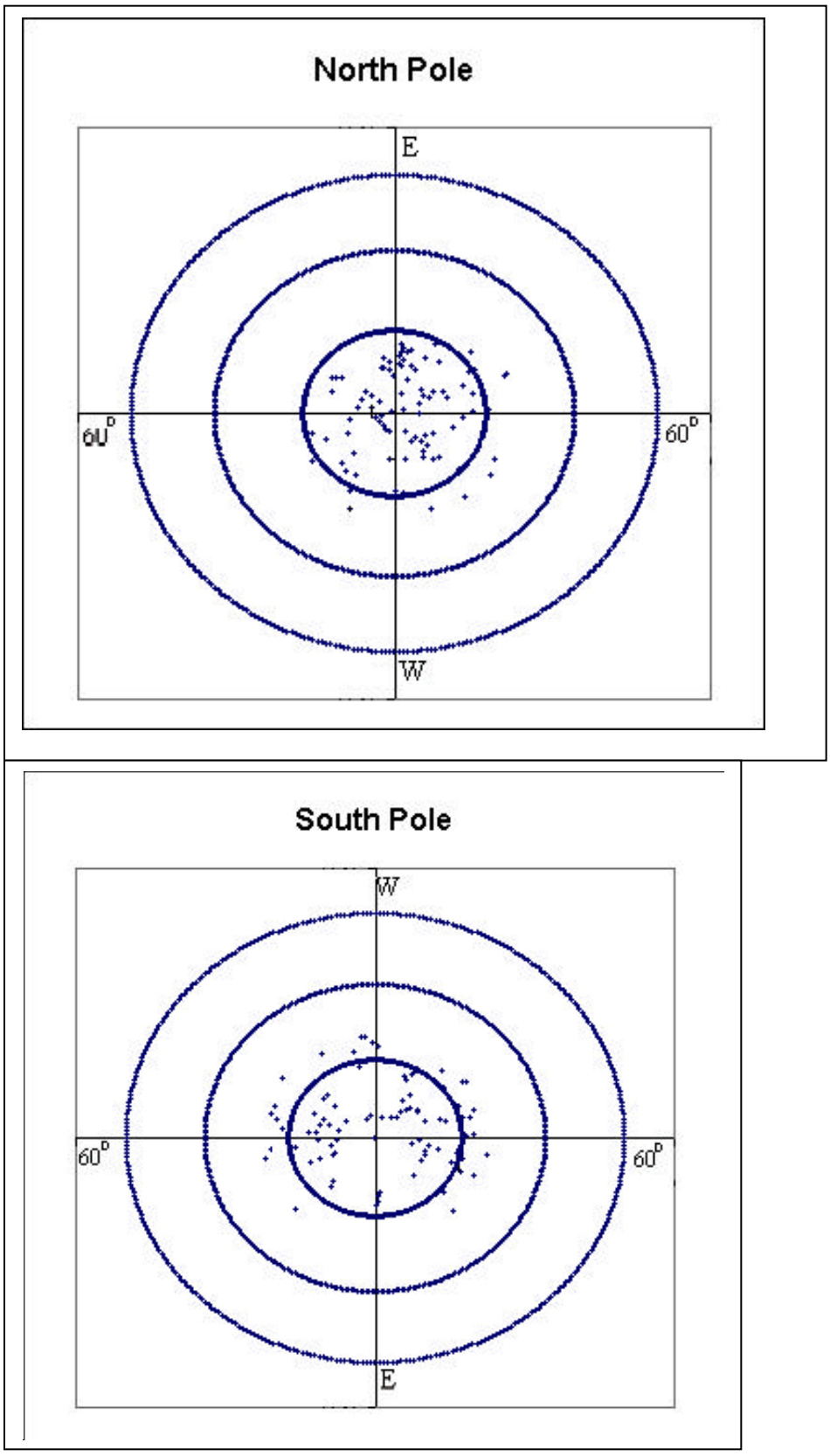

Fig.1. The distribution of the craters with floors permanently shadowed more than 80% for both polar regions.