MAGNETIZED REGIONS ON THE LUNAR FARSIDE DETECTED BY ELECTRON REFLECTION TECHNIQUES, K.A. Anderson, R.I. Bush, and R.P. Lin, Space Sci. Lab, Univ. of Calif., Berkeley, Calif. 94720

We have made extensive and quantitative measurements of lunar surface magnetic fields by observing the fraction of incident electrons reflected by these fields.[1,2] The principle is that of a plasma magnetic mirror machine: Measurement of the loss cone pitch angle, α_ℓ, and the local field magnitude, B_o, allows the mirror field, B_m, at the lunar surface to be determined:

$$B_m = \frac{B_o}{\sin^2 \alpha_\ell}$$

We have found magnetic fields of $\geq$ 100 nT (100γ) occurring along the northern 250 km of the structural rille, Rima Sirsalis, that we have surveyed.[3] Further analysis of the electron reflection data from the Apollo 16 Particle and Fields Subsatellite reveals a series of strongly magnetized areas on the lunar farside in typical highland terrain. The magnetization centered at S2° W147° (Figure 1) consists of a single feature located on a Nectarian age crater. The size of the magnetization is roughly the size of the crater but nonetheless the association may be entirely coincidental. Between 161E and 170E longitude and from 4° N to 10° N there is a group of strongly magnetized ($\sim$ 50 nT) features lying in Nectarian age materials (Figure 2). The Apollo 16 flux-gate magnetometer[4] has measured magnetic fields in this same region of up to 0.5 nT at an altitude of about 50 kilometers. These two sets of magnetic field measurements put the characteristic size of the magnetized regions in the range 10 to 20 km assuming they lie near the surface. Another group of magnetic features lie just to the East of the Crater Mendeleev (Figure 2). These features again exhibit surface fields of about 50 nT and are only 10 to 30 km in spatial extent. All of the individual magnetized regions are much smaller than the large craters in this area of the lunar farside and the correlation with smaller craters is not high. However, it may be significant that these clusters of small features do occur quite close to large craters.

FARSIDE MAGNETIC FIELDS

Anderson, K. A. et al.

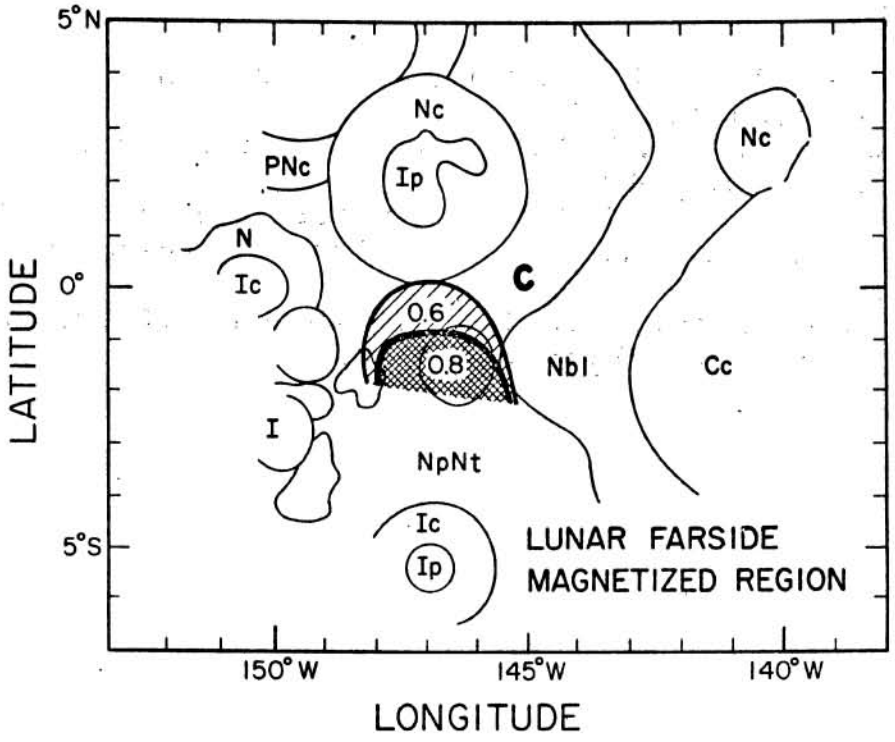

Figure 1

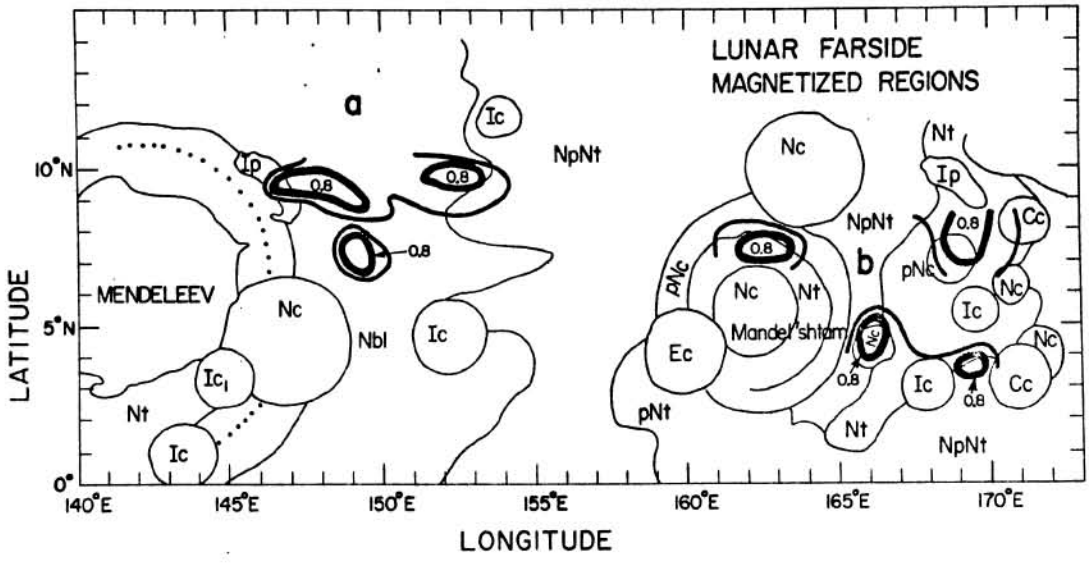

Figure 2

FARSIDE MAGNETIC FIELDS

Anderson, K.A. et al.

References

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3. Anderson, K.A., Lin, R.P., McGuire, R.E., McCoy, J.E., Russell, C.T., and Coleman, Jr., P.J. (1977) Earth and Planet. Sci. Lett., in press.
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