

LUNAR IRON ABUNDANCE FROM MAGNETOMETER MEASUREMENTS, C.W. Parkin*,
W.D. Daily**, and P. Dyal***,

*University of Santa Clara, Santa Clara, CA 95053

**Brigham Young Univ., Provo, Utah 84601

***NASA-Ames Research Center, Moffett Field, CA 94035

Simultaneous measurements by magnetometers on the lunar surface and in orbit around the moon are used to construct a whole-moon hysteresis curve, from which the global lunar magnetic permeability is determined to be $\mu = 1.012 \pm 0.006$. The corresponding global induced dipole moment is 2×10^{18} gauss-cm³ for typical inducing fields of 10^{-4} Oe in the lunar environment. Lunar free iron abundance corresponding to the global permeability is determined to be 2.5 ± 2.0 wt %; the value within this range is dependent upon location of the Curie isotherm in the lunar interior. Total iron abundance (sum of iron in the ferromagnetic and paramagnetic states) is calculated for two assumed compositional models of the lunar interior. For a free iron/ortho pyroxene lunar composition the total iron content is 12.8 ± 1.0 wt %; for a free iron/olivine composition, total iron content is 5.5 ± 1.2 wt %. Other lunar models with an iron core and with a shallow iron-rich layer are also discussed in light of the measured global lunar permeability.