GLOBAL LUNAR PROPERTIES FROM MAGNETOMETER MEASUREMENTS, P. Dyal*, C.W. Parkin**, and W.D. Daily***.

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Magnetometers have been deployed at four Apollo sites on the moon to measure remanent and induced lunar magnetic fields. Measurements from this network of instruments have been used to calculate the electrical conductivity, temperature, magnetic permeability, and iron abundance of the lunar interior. Global lunar fields due to eddy currents, induced in the lunar interior by magnetic transients, have been analyzed to calculate an electrical conductivity profile for the moon. From nightside magnetometer data in the solar wind it has been found that deeper than 170 km into the moon the conductivity rises from 3×10^{-4} mhos/m to 10^{-2} mhos/m at 1000 km depth. Recent analysis of data obtained in the geomagnetic tail, in regions free of complicating plasma effects, yields results which are slightly lower than nightside values. Conductivity profiles calculated from data obtained in the geotail region will be presented. The conductivity profile is used to calculate the temperature for an assumed lunar material of olivine. In an outer layer (~ 170 km thick) the temperature rises to 1100 °C, after which it gradually increases to 1500 °C at a depth of ~ 1000 km. Whole-moon hysteresis curves are plotted using Apollo 12 lunar surface magnetometer data with simultaneous lunar orbiting Explorer 35 data. From these curves a new global relative permeability $\mu/\mu_o = 1.012 \pm 0.006$ is calculated. From the magnetic data the free iron abundance is calculated to be 2.5 wt %. The remanent fields range from 3γ as minimum at the Apollo 15 site to 327γ maximum at Apollo 16. Simultaneous magnetic field and solar plasma pressure measurements show that the remanent fields at the Apollo 12 and 16 sites interact with, and are compressed by, the solar wind. Remanent fields at Apollo 12 and 16 sites are increased 16γ and 32γ, respectively, by a solar plasma bulk pressure increase of 1.5×10^{-7} dynes/cm^2.