and dolomite, followed by dry quartzite, marble, and wet quartzite. Equivalent viscosities (η) range from 10^{18} to 10^{22} Pa•s (10^{19} to 10^{23} P). At intermediate depths (at T = 300-500°C), σ in dolomite is slightly greater than dry quartzite; both are much stronger than marble. In the shallow crust, secondary creep is expected only in marble (T > 250°C) and in halite (T > 25°C). The η of halite at 25 to 250°C, range from 10^{21} to 10^{17} Pa•s. At the surface and at $\dot{\varepsilon}$ of 10^{-7} to 10^{-10} s^{-1} (glacier flow), η of ice would be 10^{15} to 10^{12} Pa•s between -30 and 0°C. Values of η for all rocks examined appear insensitive to T, except wet quartzite and all dunite.

HEARD, H. C., Duba, A., Piwinskii, A. J., and Schock, R. N., Electrical conductivity studies: refinement of the selenotherm, Sixth Lunar Sci. Conf., Houston, March 17-21, 1975. [UCRL-76406, Abstract]

The electrical conductivity (σ) of single crystals of olivine has been measured to 1660°C under controlled oxygen fugacity. At temperatures between 1200°C and 1660°C, the activation energy for conduction increases; thus the σ extrapolated from low temperature data is the minimum σ possible at higher temperatures. If the σ data measured for olivine below 1200°C were extrapolated to obtain the temperature of the lunar interior, a temperature of 1575 ± 225°C is obtained at a lunar radius of 1000 km. However, the data measured at higher temperatures indicate that the lunar temperature at 1000 km is 1450 ± 60°C.

If we assume that pyroxene is the major phase at depth in the moon and that there are no unusual effects associated with grain boundaries and/or distribution of mineral species, the σ of the lunar mantle will be controlled by the σ of pyroxene. We report here σ data to 1025°C for orthoenstatite from Bamle, Norway ($Mg_{0.86}Fe_{0.14}SiO_3$) under controlled oxygen fugacity near that expected for the lunar interior (10^{-12} at 1200°C). At temperatures much in excess of 1025°C, orthopyroxene inverts to protoenstatite at atmospheric pressure. This transition will probably not occur in the moon because of the strong pressure dependence - 800°C/GPa of this transition.

However, the σ results below 1025°C have been extrapolated to obtain a selenotherm. In doing so, we obtain a temperature of 1360 ± 180°C at a lunar radius of 1000 km. We would expect the lunar temperature calculated from σ measured at higher temperatures to be less than 1360°C with a smaller uncertainty.