

Estimation of the thermal conductivity of the lunar regolith: re-analysis of in-situ measurement on Apollo Missions

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Lunar surface heat flow value was measured directly by Apollo 15 and 17 missions. Because the heat flow value is proportional to the product of the thermal conductivity and temperature gradient in depth direction, each value need to be decide in high accuracy.

In-situ measurement of thermal conductivity of the lunar regolith was carried out. Langseth et al. (1972, 1973) initially estimated that the thermal conductivity of the lunar regolith is 0.0168-0.0200 W/m/K. Langseth et al. (1976) later revised the thermal conductivity to 0.009-0.013 W/m/K for two Apollo sites.

However Saito et al. (2006) found out the un-analyzed data. They re-analyzed the long-term data obtained by Apollo heat flow measurement, and concluded that the temperature gradient in depth direction values are about 1/4 as much as the result of the Langseth et al. (1976). This implies that the lunar surface heat-flow value has to be revised to 1/4 of the previous value, too.

We describe understanding of the current state of thermal conductivity of the lunar regolith.