

# The Magnetovariation Sounding with Apollo Data and the Design for Taiwanese Lunar Vector Magnetometer System

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## SUMMARY

In the study, we aimed to recover the deep electrical structures of the moon using data collected during the Apollo 15 and 16 missions through the magnetovariation method. Our goal is to verify the applicability of magnetovariation methods for lunar exploration, obtaining the necessary design parameters and requirements for a future lunar vector magnetometer. The results of data processing tests indicate that both the single station ZH methods and multiple station ZY magnetovariation methods can still be utilized for lunar interior exploration. However, uncertainties may arise due to assumptions made about a simple bipolar magnetic field. Building on the outcomes of testing old lunar measurements, we aim to design new lunar vector magnetometers as payloads for the Taiwanese lunar exploration mission. The Lunar Vector Magnetic field instrument (LVM) comprises two crucial components: the magnetic field sensor and the data recorder. The sensor part of the initial LVM plan consists of three identical three-axis fluxgate magnetic field sensors (FGM1, FGM2, and FGM3), expected to be mounted on top of the lander's retractable mast. The logger is equipped with an ADC unit, power control unit, and processing unit with an FPGA as the core processor. Currently, we are conducting radiation and EM compatibility tests for the LVM, with the hope that the LVM payload can be launched within the next two years.

(The abstract is proofread with ChatGPT)

**Keywords:** magnetovariation, Lunar mission, magnetometer

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