Isolating Electromagnetic Induction from the Lunar Interior measured with ARTEMIS

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Geophysical investigations of the lunar interior are central to our understanding of the formation and evolution of the Moon. This project aims to constrain the electrical conductivity of the lunar crust, upper mantle, and lower mantle regions by isolating induced magnetic fields within measurements taken with NASA's twin ARTEMIS (*Acceleration, Reconnection, Turbulence, and Electrodynamics of the Moon's Interaction with the Sun*) satellites, currently in orbit about the Moon. When the Moon is exposed directly to the Solar Wind, spatial and time varying changes in the interplanetary medium interact with conducting regions of the lunar interior inducing telluric currents resisting the passing perturbation. Isolating geophysical magnetic induction from the plasma effects, such as dayside confinement and diamagnetic wake current systems, is the first step to performing Lunar Electromagnetic Sounding. Nightside time domain Electromagnetic sounding was performed during the Apollo missions using the orbiting Explorer 35 magnetometer and the Apollo 12 Lunar Surface Magnetometer. This analysis assumed vacuum symmetry neglecting confinement and diamagnetic effects. We present similar results assuming a symmetric response in vacuum. From analysis of the disturbing effects of the wake structure on the induced field, we conclude the upstream solar wind conditions determine the applicability of the vacuum approximation. This result has implications for Apollo nightside soundings, and informs us of when similar soundings may be conducted using ARTEMIS. In addition, we are analyzing the diamagnetic field within the wake cavity to further characterize background plasma effects and isolate geophysical induction. Under these assumptions we present initial results of inversion methods applied to determine the electrical conductivity structure of the Moon.