

## Results from the Apollo XII

### Suprathermal Ion Detector

by

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The data from the SIDE have been varied and highly complex. For this reason a substantial portion of the analysis effort during the first year has been spent sifting and establishing the various categories of phenomena that are repetitive from one lunar cycle to the next. These include the following: (1) Ion clouds of low to moderate energy seen during the lunar day and in conjunction with lunar sunrise and sunset; (2) The pre-dawn appearance of solar wind energy ions; (3) Ions of several keV energy seen during the lunar sunset to midnight quadrant; (4) Magnetospheric tail and magnetosheath ion flux enhancements; (5) Baseline background flux levels for both the lunar day and night. The data from Item (1) is highly suggestive of a continuously operative ion acceleration mechanism such as those proposed for the retention of solar wind Argon<sup>40</sup>. Items (2) thru (4) pertain to the physics of the interaction between the moon and higher energy plasmas. The study of Item (2) leads to a belief in a more complex interaction between the moon and the solar wind near the terminators than is generally assumed. Item (3) is attributed to the "evaporation" of energetic protons from the earth's bow shock front. Item (4) indicates

some morphological structure to the distant magnetosheath plasma flow with occasionally at least two characteristic plasmas present simultaneously and sudden temporal changes possible in the flux density of either component.

In addition to these repetitive or diurnal phenomena considerable attention has been given to the singular events such as the Apollo XIII S-IVB impact, the Apollo XII LM impact, the lunar eclipses and solar flare induced events. Of these the S-IVB impact has received the most attention. It is clear from the SIDE data that the S-IVB impact-produced gas cloud resulted in a large burst of suprathermal ions. The mass and energy of these ions suggests that they are not simply deviated solar wind ions but rather that the gas cloud has been partially ionized and the resulting ions accelerated perhaps, by the production of a shock wave in the solar wind. The LM impact data is similar in nature but of much lower flux intensity. The only important eclipse occurred coincidentally with a solar flare that caused a large geomagnetic disturbance. It is therefore impossible at this time to establish whether the very remarkable SIDE data received were the result of the eclipse or were associated with the solar flare. It is hoped that data from subsequent eclipses can resolve this.