HIGH SPATIAL RESOLUTION Mg/Al MAPS OF LARGE AREAS OF THE MOON.

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INTRODUCTION

Orbital geochemical experiments have determined Al/Si and Mg/Si ratios of parts of the lunar surface by x-ray fluorescence (1,2,3). The purpose of this work is to present high spatial resolution maps of Mg/Al for several large areas of the Moon and briefly discuss the results. The maps were produced by applying the Laplacian subtraction method (4,5) to the data from Adler's x-ray fluorescence experiment (1,2) as modified by Bielefeld et al. (3).

In this work the computer program was modified to handle large areas of the Moon and maps with improved spatial resolution were prepared for the following areas: a) Smythii - includes Smythii and areas W, E, and S of Smythii; b) Crisium - includes Crisium and areas W, E, and S of Crisium; c) Central Highlands - includes Apollo 16 site and Nectaris basin; d) Highlands between Imbrium and Serenitatis basins.

SMYTHII AND AREAS WEST, EAST, AND SOUTH OF SMYTHII

The enhanced, or higher resolution, Mg/Al map is shown in Figure 1. The darkest gray level corresponds to a Mg/Al ratio of 0.62 or larger, and the lightest gray level to an Mg/Al ratio of 0.25 or smaller. Each picture element or pixel has a size of 0.25x0.25 degrees or approximately 7.5x7.5 km. The gray scale combines both intensity level and texture thereby allowing the human eye to distinguish differences more effectively than by using only intensity levels.

The geology of this area has been described previously (6). The Mg/Al map includes parts of the Smythii and Al-Khwarizmi-King basins. It also includes several smooth areas (6) and several large craters such as: Schubert, Gilbert, Banachiewicz, Pasteur, Langemak, Kastner, Saenser, and Babcock. Because the resolution of the x-ray experiment is about 15 km it is possible to measure the Mg/Al ratio inside and outside these large craters.

Two general observations can be made. Around the first ring of the Smythii basin (6) there is a decrease in the Mg/Al ratio over a width of approximately 30-60 km. Further out the Mg/Al ratio increases again. This could mean that the Smythii ejecta did not go very far or that part of the ejecta were covered later by more mafic units with higher Mg/Al ratios.

The other general observation is that the highlands are quite heterogenous in Mg/Al ratios and, as shown before (7), the higher Mg/Al ratios tend to be located in relatively low and topographically smooth areas, suggesting the possibility of volcanism in the highlands.

REFERENCES: (1) Adler, I., et al. (1972), PLSC 3rd, p. 2157; (2) Adler, I., et al. (1973), PLSC 4th, p. 2783; (3) Bielefeld, M. J. (1977), PLSC 8th, p. 901; (5) Schonfeld, E. (1981), PLPSC 12th, p. 809; (6) Wilhelms, D. .E. and Faruk El-Baz (1977), USGS Map I-948; (7) Schonfeld, E. (1982), LPS XIII, p. 689.

HIGH RESOLUTION Mg/Al MAPS

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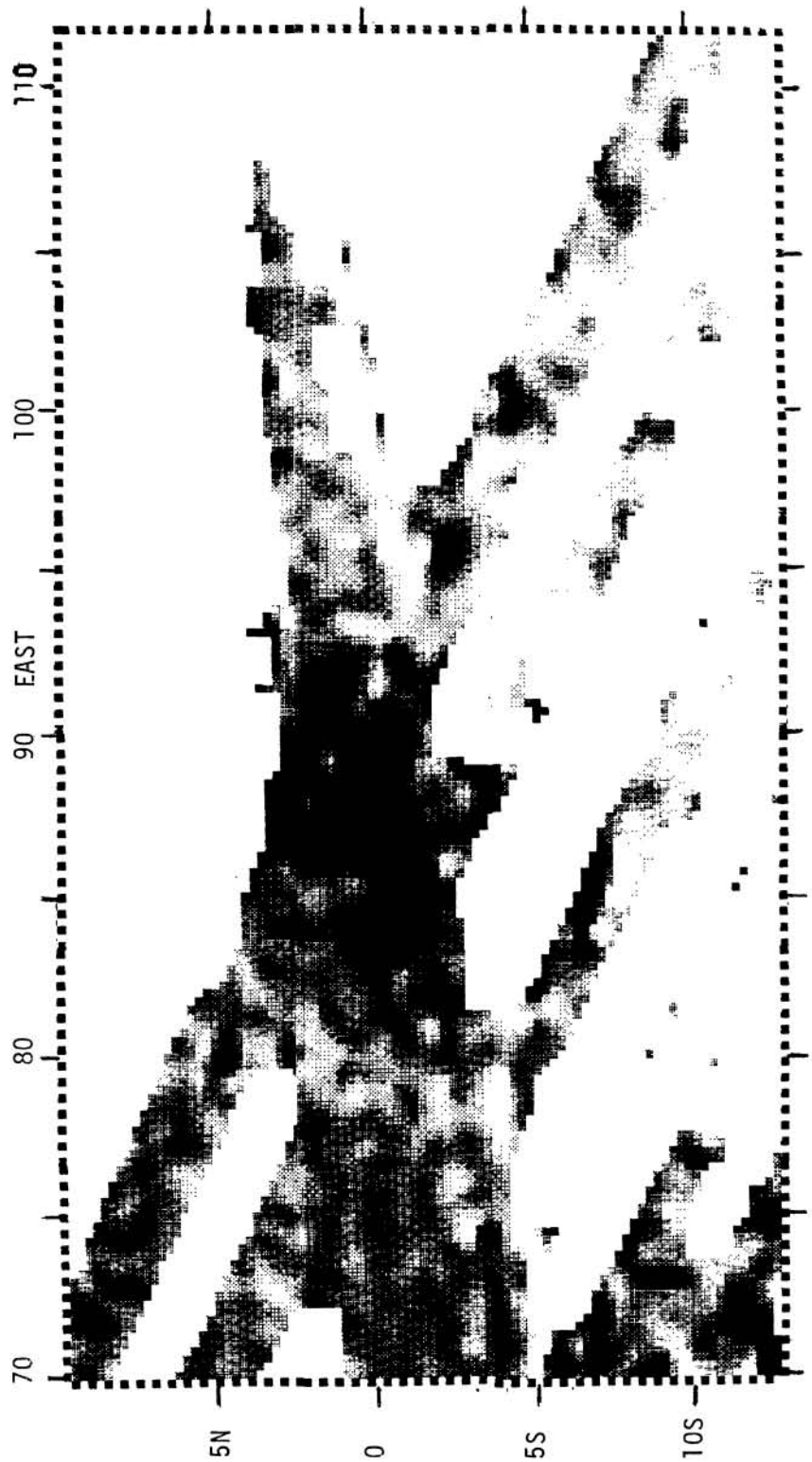

Figure 1. Mg/Al ratio map of the East side of the Moon. It includes the Smythii basin and areas West, East, and South of Smythii. The darkest gray level corresponds to a Mg/Al ratio of 0.62 or larger and the lightest gray level to a Mg/Al ratio of 0.25 or smaller.