AN INTEGRATED STUDY OF THE ALTO PARANAIBA KIMBERLITE PROVINCE, MINAS GERAIS, BRAZIL: A POSSIBLE TOOL FOR DIAMOND EXPLORATION

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Herein are presented the initial results from an integrated study, currently in progress, of the Alto Paranaiba area utilizing remote sensing, geophysical and geological data.

The Alto Paranaiba area is economically important due to the local occurrences of kimberlite and diamonds. Kimberlites in the area are confined to a narrow NW-SE oriented strip of Precambrian metasediments and occur as diatremes and dikes; the former range in size from 50 to 400 meters and are usually weathered, making their detection in the field very difficult.

Visual intepretation of Landsat MSS imagery permits the delineation of the regional geology and structure of the Alto Paranaiba area. The Precambrian metasediments are easily distinguished from each other based on photo-recognition criteria. Structural features demarcated include major fractures trending NW-SE with subsidiary sets trending NE-SW, and folds in the metasediments. Several of the alkaline intrusives in the area are readily identifiable due to their distinct circular expression on Landsat imagery.

Analysis of an X-band SLAR mosaic facilitates a more detailed interpretation of the geology and structure in the vicinities of Coromandel, Monte Carmelo and Patrocinio where most of the known kimberlites appear to be concentrated. Subtle linear and circular features, not seen on Landsat MSS imagery, are expressed clearly on the SLAR mosaic because of the increased resolution, look direction and larger scale.

Initial results of this study indicate that some circular and linear features appear to be related to the known kimberlites in the area. However, several circular features, located near fractures and/or fracture intersections, are not shown on previously published geological maps of the area and need to be investigated in greater detail.

Available regional gravimetric and aeromagnetic data corroborate the interpretations of Landsat and SLAR imagery. It is expected that computer processing and modeling of geophysical data will yield greater information about the geology of the area and the geophysical signature of the kimberlites.

Detailed studies planned for selected areas include: (a) Video-digitizing and subsequent computer processing and interpretation of SLAR imagery; (b) interpretation of "raw" and digitally processed Landsat TM data; (c) air-photo interpretation, and (d) ground-based studies.

The final results of this study, scheduled for completion by June 1987, will lead to a better understanding of the geology of the Alto Paranaiba area and will demonstrate the viability of using an integrated approach, with an emphasis on the use of Landsat TM data, for kimberlite exploration. In addition to its academic importance, this study may have great economic potential if previously undiscovered kimberlites are identified in the area.