PROTEROZOIC CRUSTAL & METALLOGENIC EVOLUTION

ABSTRACTS

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CORRELATION OF PAN AFRICAN AND BRAZILIAN OROGENS ACROSS THE SOUTHERN ATLANTIC

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We used Landsat Multispectral Scanner scenes to correlate Proterozoic structures and rock units of south-western Africa (Angola, Namibia, South Africa) and eastern South America (Uruguay, southern Brazil). Digital mosaics covering - 10^6 km of the African and South American continents were generated from 48 Landsat 4 & 5) MSS scenes (Africa: 22; South America: 26). Mosaics were generated from singe MSS bands and from band ratio images. Landsat MSS scenes cover 185 by 185 km, with four broad spectral bands that derect reflected visible and infrared radiation (0.5 to 1.1 um) and have image element widths of 79 by 79 m.

Processing involved two stages; (1) processing to emphasize lithologic variations, and (2) processing to correct for the spatial displacement resulting from the opening of the Atlantic Ocean. To emphasize lithologic variations we converted data for each scene to brightness values in proportion to bidirectional reflectance, using nominal gain and offset parameters. Then we normalized reflectance values to the scene with the least amount of atmospheric scattering and absorption to correct for observed differences in reflectance values between adjacent scenes where they overlapped. These differences are due to a combination of variations in extent of atmospheric scattering and absorption. Finally we generated reflectance band ratio images to suppress spectral variations due to topography and grain size variations.

To correct for displacement associated with the opening of the Atlantic, we rotated the South American side to match the continental outline at shelf-break using the Cretaceous basalts of the Torres syncline (Brazil) and the Etendeka plateau (Namibia) to provide controls for juxtaposition of the two mosaic stripes. Rotations were done in spherical coordinates. Because the spectral reflectance signature of rock units can be largely modified by vegetation, we explored the use of gravity data (terrestrial free air and global free air anomalies) to conduct geologic correlations in areas that are heavily vegetated (e.g., southern part of the South American mosaic).

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