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Correlation of structural patterns and hydrothermal alteration areas in mineralization zones in San Luis Potosí, México, using GIS and remote sensing techniques.

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A good correlation between the location of main geological structures and areas characterized by hydrothermal alteration in the state of San Luis Potosi, Mexico. Landsat-TM images were processed to define the zones that contained hydrothermally altered rocks. Image processing included image ratios, standard and selective Principal Components Analysis (Crosta technique - also known as Feature Oriented Principal Components Selection) and color enhancement. The geological structures were also identified using multispectral images. Spatial enhancement with directional filters yielded good results in the identification of the main structures in the study area. Field verification was performed in both cases including checking previously reported geological data on structures and altered rock outcrops. Integration of the results was undertaking with the use of a GIS model in order to define the areas where both, structures and altered rock, were present. Evaluation of the accuracy in determination of mineralized areas was done by correlation with the known mineral deposits in the San Luis Potosi state. Thus, an error matrix was obtained which indicated that the accuracy in identifying mineralized areas was of less than 20%.