

TM-LANDSAT IMAGERY FOR FLUORITE EXPLORATION,
SANTA CATARINA STATE - BRAZIL

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SUMMARY

The use of TM-LANDSAT imagery supported by infrared aerial photographs has permitted the systematic identification of regional lineaments associated with fluorite mineralizations in the State of Santa Catarina, Brazil. More than one dozen fluorite and/or barite occurrences were discovered in structures identified in this manner, from which one large deposit was tested by diamond drill holes. The genetic conceptual model of fluorite mineralization in this region, as defined by previous geological works, clearly pointed out the close relationship of the mineralization with the mesozoic regional brittle shear zones. These zones represent the end product of proterozoic ductile shear zones reactivated during the Mesozoic times. Based on the information provided by the fluorite ore deposits it became possible to successfully test the application of TM imagery to identify the already known structures. Afterwards, the same method was used to prospect unknown areas. In spite of these structures being of a great longitudinal dimension (up to 30 kilometers), they are of difficult identification even in the field, as well as in the available aerial photographs for the region: 1:25,000 panchromatic black and white and 1:50,000 infrared coloured. The choice of the TM sensor and the manner of identification of lineaments by their topographic and spectral characteristics are discussed. This identification is made with help of the synoptic vision that the imagery can provide. The greater reflectance of the lineaments, where they are positive topographic is caused mainly by the presence of siliceous fragments and other hydrothermal minerals and the poorer vegetation. Where the topographic expression was negative, the spectral response is not clear: only the minor reflectance caused by the vegetation with excess of moisture, particularly in the 5 and 7 channels, was detected. The products of the sensor TM-LANDSAT (channels 3, 4, 5, and 7) were used and treated by the image processor image-100 (INPE-MCT), which make use of contrast stretch and directional filtering. The photointerpreted lineaments were transferred to infrared aerial photographs to make their correct localization easier. Field work not only proved the existence of many of the structures suggested by the photointerpreted lineaments but also permitted the discovery of the cited mineral occurrences.