D-33 Mapping of iron-hydroxyl alteration zones using Landsat TM image data, Troodos Massif, Cyprus

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Cupriferous volcanogenic massive sulphide ore bodies occur within the pillow lava series rock units of the Troodos Ophiolite Complex in Cyprus. These ore bodies are surrounded by alteration zones which are normally 2 to 3 orders of magnitude greater than the actual mineral deposit. In remote areas where accessibility is limited, identification of such alteration zones is an extremely difficult task with the help of traditional mapping methods.

In order to map alteration zones which are associated with sulphide mineralization in the eastern part of the Troodos massif, Loughlin's (1993) technique was applied in this study. The method uses only 4 of the possible 6 Landsat TM bands for mapping iron (bands 1,3,4, & 5) and hydroxyl (bands 1,4,5 & 7) alteration zones readily apparent in TM imagery. Careful examination of the Eigen vector loadings allow the identification of the correct principal component needed to map these alteration types.

In the resultant colour composite image, areas with anomalous concentrations of hydroxyl minerals appear as deep brown colour whereas those with more influence of iron oxides are highlighted as orange to yellow in colour. The heavily iron stained areas are shown as blue. Theoretically, areas that have both types of alterations should appear white.

Field verification studies revealed that in addition to alteration zones, areas with highly reflective non-altered soils and rocks like pure whitish limestones also appear in white colour. Furthermore, the above mentioned resultant image also shows a linear arrangement of white zones which coincides with the major lineaments observed in the area. By considering these linear patterns, it is possible to confirm that the areas covered by these zones have been subjected to both types of alterations. Therefore these zones can be considered as prospective zones for future exploration activities.