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Geological mapping of Mountain Pass Carbonatite Complex, USA, using the EnGEOMAP (basic mineral mapping and REE mapping)

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The increased demand of rare earth elements for the production of modern technologies lead to an intensification of mineral exploration during the last decade. Today's mineral exploration more and more utilize remote sensing techniques to map ore bearing rock units. In preparation of EnMAP, a future hyperspectral satellite mission [1], new tools for basic mineral mapping and rare earth element (REE) mapping were recently published (EnGeoMAP). This study shows the performance of EnGeoMAP based on an example of Mountain Pass Carbonatite Complex, USA. The mountain pass carbonatites contain the REE bearing minerals of the bastnaesite group, also called fluorocarbonates. The REE concentrations at mountain pass belong to the highest in the world and are 9.2 % in average [2]. In order to map the

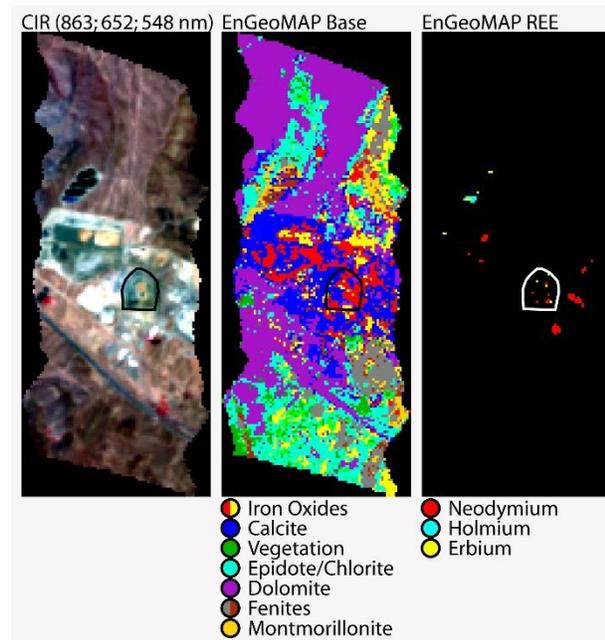


Figure 1: Color infrared visualization in comparison with the EnGeoMAP results (EnGeoMAP Base and EnGeoMAP REE). The black/white outlines mark the open pit mining area of Mountain Pass Mine, USA. Note the East wall of the pit is enriched in REE and hematite (red color).

mineral content in the area of mountain pass, AVIRIS next Generation images were used to simulate EnMAP images. Those images were spectroscopically analyzed in two ways: 1) using the EnGeoMAP Base [3] and 2) the EnGeoMAP REE [4,5] software tool. The result of the presented investigation is a mineral map overlaid by the ore zone identifications. This map indicates REE containing pixel at the open pit mine surface, the material separation areas and the tailings sites. Moreover the map shows the spatial distribution of associated surface minerals of the area. As global mineral exploration is increasing and new satellite missions will meet the spatial and spectral requirements for detailed mineral mapping, the EnGeoMAP proved to successfully map a carbonatite complex and its results can be used in general as an additional tool for classical exploration.

References:

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