

Lineament mapping of vertical fractures of rock outcrops by remote sensing images

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The monitoring of hydrological processes within the vadose zone is usually difficult, especially in the presence of compact rock subsoil. The possibility of recognizing the trend of the structural lineaments in fractured systems has important fallout in the understanding water infiltration processes, especially when the groundwater flow is strongly affected by the presence of faults and fractures that constitute the preferred ways of water fluxes.

This study aims to detect fracture lineaments on fractured rock formations from CASI hyperspectral airborne VNIR images, with a size of 60 cm of the spatial resolution, and collected during November 2014. Lineaments detected with such high resolution have been compared with the fracture lineaments detected by a Landsat 8 image acquired at the same time of the CASI acquisition.

The method has processed several remote sensed images at different spatial resolution, and it has produced the visualization of numerous lineament maps, as result of the vertical and sub-vertical fractures of the investigated area. The study has been applied to the fractured limestone outcrop of the Murgia region (Southern Italy). Here the rock formation hosts a deep groundwater, which supplies freshwater for drinking and irrigation purposes. The number of the fractures allowed a rough estimation of the vertical average hydraulic conductivity of the rock outcrop. This value was compared with field saturated rock hydraulic conductivity measurements derived from large ring infiltrometer tests carried out on the same rock outcrop.