MINERAL SPECTRAL FEATURES OF THE PUYEHUE VOLCANO ASHES WITH THERMAL SPECTROSCOPY

Rolim, S. B. A.
Universidade Federal do Rio Grande do Sul

RESUMO: Remotely sensed infrared radiance emitted by a surface is a function both of its kinetic temperature and spectral emissivity. Simultaneously, the emissivity is an essential property for determining the temperature of ground targets, which in turn shows spectral features related to electronic processes due to its physico-chemical properties. For the geological mapping and mineral exploration of volcanic rocks, the thermal infrared region shows emissivity features well defined, around 10 µm, associated mainly to bond vibration Si-O-Si in silicates. On June 4, 2011 the Volcanic Complex Puyehue - Cordón Caulle erupted in southern Chile, about 900 km south of Santiago, causing the evacuation of thousands of people in the surrounding areas. The steam and ash column reached more than 10 km high and moved to Argentina. The regions most affected by the cloud of ash and rocks were the cities of Bariloche and Villa La Angostura, and northern of Chubut Province. On the border, near Bariloche, a layer of ash of at least 30 centimeters thick covered the landscape of the region. The plume of contaminants was transported by the wind towards the Atlantic Ocean, suffering at the same time, a dispersion caused by the action of turbulent motions. In October 2011 it was collected ash samples of Puyehue volcano (Chile), in the city of Bariloche, Argentina, in order to measure its emissivity and identify the spectral features belonging to the SiO_2 bond. According to the chemical analysis carried out by the National Atomic Energy Commission (CNEA) of Argentina, SiO2 represents around 70% of the total composition of volcanic ash. The emissivity curves were obtained using the spectroradiometer µFTIR Model 102. Finally, the spectral signature of the ash was compared with those available in the spectral library of the Jet Propulsion Laboratory (JPL) of NASA. The reflectance/emissivity spectra behaviors belonging to the group of silicates showed a good correspondence with minerals presented in rhyolitic magmas with SiO_2. This demonstrated that the thermal infrared spectroscopy can be used as a qualitative, low cost, non-destructive and effective analysis tool for rapid demands of preliminary studies such as characterization of piroclastic material in the environment.

PALAVRAS-CHAVE: THERMAL INFRARED SPECTROSCOPY, PUYEHUE VOLCANO, REMOTE SENSING