

ANALYSIS OF THE PYROPHYLLITE DEPOSIT ALTERATION AREA IN NOHWA ISLAND OF KOREAN PENINSULA USING ASTER IMAGES

Moon-Kyung Kang¹, Young-Sun Son², Wang-Jung Yoon³

^{1,2,3} Department of Energy & Resources Engineering, Chonnam National University, Gwangju, Republic of Korea

Abstract:

This study area, the pyrophyllite ores of Wando and Nowha mines in southern part of the Korean Peninsula are composed mainly of high alumina minerals such as pyrohyphyllite, sericite and kaolinite. These mines are located at Haenam pyrophyllite deposit group area which occurred in the rhyolitic tuff of late Cretaceous age and the most of altered rocks show diagnostic characteristics of bleaching effect. An Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), with three visible and near infrared (VNIR) bands, six shortwave infrared (SWIR) bands and five thermal infrared (TIR) bands, was used to characterized the pyrophyllite deposit alteration area. ASTER images prove to be a good tool in the initial steps of ore deposit exploration because they can provide high accuracy data that can be used as a basis for mapping the surface distribution of certain minerals. We focus on that ASTER images could be applied in area with a known geological setting, not only to look for new exploration targets but also to establish its alteration suites and make a preliminary alteration map. The texture of the pyrophyllite deposit and alteration zone in Nohwa island were more clearly observed in the VNIR and SWIR band, in particular, AST5 (2.145-2.185 μm) and AST6 (2.185-2.225 μm) bands. Main spectral analysis of the surface reflectance was processed using band ratio, principal component analysis (PCA), and minimum noise fraction (MNF) transform. PCA and MNF methods were applied to the cases of each VNIR, SWIR, TIR bands, and all bands. Using VNIR and SWIR spectral bands showed more clearly and good result about ore deposit and alteration area characteristics than other cases. The analysis result of ASTER images showed that ASTER can be a powerful and useful tool in the initial steps of ore deposit exploration or mapping of distribution of mineral deposit and alteration area.