Keynote speaker Topic 1

Professor Gyo-Cheol Jeong

Profile
Dept. of Earth and Environmental Sciences,
Andong National University, Andong 760-749, Korea
E-mail: jeong@anu.ac.kr
Date of Birth: 18January, 1958
Nationality: Korean
Titles
2013-present: President of KSEG(Korean Society of Engineering Geology)
1996-present:Professor, Dept. of Earth and Environmental Sciences, Andong National University
Position Held
2014-2015: Director, Industry-Academic Cooperation Foundation, Andong National University
1994-1996: Senior Researcher, KIGAM(Korea Institute of Geoscience and Mineral Resources)
Research Interests
Engineering Geology and Engineering in Rock Masses
Landslide and Debris Flow
Groundwater Engineering and Environmental Geology
Stability Analysis of DiscontinuousRock Slopes and Tunnel
Education
Dr. Eng., Civil Engineering, Nagoya University, Japan, 1994
Dr. Sc., Hydrogeology and Engineering Geology, Kyungpook National University, Korea,2010
M.S., Engineering Geology, Kyungpook National University, Korea,1987
B.S., Geology, ,Kyungpook National University, Korea,1982

Abstract

Evaluation of Slope Hazards and Landslide-Triggering Factors in Korea

There are many slope disasters nationwide in Korea during the rainy season hit by severe rain storm and typhoon from June to September every year. The Korean peninsula was indirectly affected by typhoons 12thNakri and 11thHalong taken place in August, 2014. The rainfall in August was 369 mm, reaching 138% of an average rainfall of August, while the rainy days were 18.2 that are about 5 days longer than its average. It is acknowledged that diverse factors such as topography, geological features, forest types, and forest fire are combined to induce slope disasters in Korea, even though the rain is one of the main causes. Therefore, it is hard to predict the causes of slope disasters only based on the rain parameter. In this study, landslide vulnerability as a function of swelling clay minerals was evaluated using ASTER satellite imageries. We examined spectral characteristics changes based on the field survey, XRD, XRF analysis, and spectroscopic analyses using GER 3700 portable spectrometer on soil samples obtained from landslide sites, together with ASTER satellite imageries. According to the results analyzed, most landslide areas are made up of illite-rich clay minerals and their spectral properties show differences in the SWIR. The particle size and mineral composition were analyzed through the six bands of SWIR on the basis of spectral characteristics. Illite, one of representative swelling clay minerals, shows characteristic absorption features: Fe^{2+} and Fe^{3+} at 0.9 and 1.0 μm, broad water absorption features near 1.4 and 1.9 μm, and additional Al-hydroxyl features at 2.2, 2.3 and 2.4 μm, respectively. These absorption properties correspond to the band 5, band 6 and band 7 in the ASTER imageries. This study showed the spectral characteristics of the soils and ASTER imageries by applying $SWIR_{illite}$ model for the multiplication ratio between wavelength bands, leading to a conclusion that the applicability of ASTER satellite imageries, combined with analyses of swelling clay minerals, has potential to evaluate and predict the landslide hazards.

Keywords: landslide, spectral reflectance, clay mineral, ASTER, band math