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Identification of lithological differences and similarities in the East Anatolian Fault Zone by using the remote sensing methods

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Lithology and mineralogy of geological units were featured relative to each other. Based on the lithological classification of geological units located in the northwest and the southeast of the East Anatolian Fault (EAF) it is aimed to estimate the total offset of the EAF.

As data compiled 3 scenes of ASTER SWIR satellite image sets, geological map of the area at a scale of 1:25000 were obtained. An ASD field spectro-radiometer, which has the capability of recording the electromagnetic energy reflected from the objects as reflectance measurement data was also used.

To increase the utility of the satellite images, crosstalk (an effect in ASTER imagery caused by signal leakage from band 4 into adjacent bands 5 and 9) correction, radiance calibration (a process of rescaling the digital values to the observed top of atmosphere radiance values to 8-bit data and is important for reducing information loss) and atmospheric correction (retrieve the surface reflectance from remotely sensed imagery by removing the atmospheric effects) process were applied to remote sensing data respectively. On the atmospheric correction, calculated using spectral irradiance values derived using MODTRAN. And the radiance values of the remote sensing data were converted to reflectance values.

Spectro-radiometer measurement data that are obtained at 2152 wavelength points, in the range of 350-2500 nanometers, were resampled to the 6 bands range of ASTER SWIR sensor. After the resampling process, a spectral library, which contains the new spectral data sets, was created. The library was used for entering the spectral data as end member to the classifications neatly. To collect end member on the ASTER images, and classify the images, the “Spectral Angle Mapper” (SAM) methods was used. The method produces maps of the spectrally predominant mineral for each pixel by comparing the angle between the image spectra and reference spectra in n-dimensional vector space. And smaller angles represent closer matches to the reference spectrum.

As a conclusion of the displacement estimation in the EAFZ, the NTRS of ophiolitic serpentine was detected on the North-east and the South-west of the EAF. By proving the result, geological map and the result of enhancement images were compared with SAM.