Validation of ASTER Enhanced vegetation index (EVI) using predicted ASTER blue band

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The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) onboard the Terra satellite was developed by the Ministry of Economy, Trade and Industry of Japan. The ASTER sensor has 14 observation band from visible and near infrared (VNIR) to thermal infrared (TIR). The spatial resolution of the VNIR bands are 15 m, the short wavelength infrared (SWIR) bands are 30 m, and the TIR bands are 90 m. Since the ASTER sensor does not have a blue band, normal visualization was difficult to generate pseudo true color imageries. The authors have already developed a database, which can generate true color images using ground surface reflectance. The Terra satellite has 5 instruments including ASTER sensor, and the Moderate-Resolution Imaging Spectroradiometer (MODIS) is one of other instruments, which has a coarser spatial resolution of 500 [m] to 1 [km], and has a blue band (500 [m]). The algorithm for estimating the ground surface reflectance in the blue band using the Artificial Neural Network (ANN) and atmospheric correction has been developed. Currently, this algorithm is applied to ASTER orthorectified browse images and KML products in the satellite search system MADAS (https://gbank.gsj.jp/madas/). On the other hand, there have been many researches on vegetation monitoring observed by satellite optical sensors, and vegetation indices are often used, which can be calculated by two-band or three-band surface reflectance combinations. The Normalized Difference Vegetation Index (NDVI) is most popular index, and the advantage of this index is to have long-term data record as represented by 30 years data set, Global Inventory Monitoring and Modeling System (GIMMS). The Enhanced Vegetation Index (EVI) is also commonly used as vegetation index, and this index is resistant to the background soil brightness and atmospheric effects. Moreover, this index performs better than NDVI over high biomass areas. The EVI is calculated by blue, red, and near infrared surface reflectances, therefore calculation of ASTER EVI is normally impossible. The Operational Land Imager (OLI) instruments onboard the Landsat 8 satellite has 9 bands, which include coastal, blue, green, red, NIR, SWIR-1, SWIR-2 and cirrus bands, and Landsat-8 OLI EVI can be calculated. This research evaluates the results of inter-comparison analysis between ASTER EVI calculated by the blue reflectance prediction algorithm and Landsat-8 OLI EVI (pre WRS2 Data Products).

Keywords: Terra ASTER, Atmospheric Correction, Artificial Neural Network (ANN), Enhanced vegetation index (EVI), Landsat-8 pre WRS2 Data Products

