Geophysical Research Abstracts
Vol. 14, EGU2012-583, 2012
EGU General Assembly 2012

Predicting gross primary production with high spatio-temporal resolution remote sensing datasets at regional scale

D. Fu (1) and B. Chen (2)

(1) State Key Laboratory of Resources and Environment Information System, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China (fudongjie@gmail.com), (2) State Key Laboratory of Resources and Environment Information System, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China (baozhang.chen0808@gmail.com)

Remote sensing has great potential for estimating gross primary production (GPP) without resorting to interpolation of many surface observations. Meanwhile, it can be applied to analyzing the variation of GPP at different ecosystems across a wide range of spatial, temporal, and spectral resolutions. However, the availability of input data for remote-sensing-based GPP models is the bottleneck. The input data of remote-sensing-based greenness and radiation (GR) model is more independent on climate or ground-based observations, and the result is promising. Previous work using this modeling approach only used coarse spatial resolution data (e.g. MODerate resolution Imaging Spectroradiometer, MODIS), the estimated spatio-temporal distributions of GPP with higher resolution remains unclear. To overcome this limitation, a modified image fusion method was developed based on Enhanced Spatial and Temporal Adaptive Reflectance Fusion Model (mESTARFM), producing images with high spatial and temporal resolutions based on Landsat Thematic Mapper (TM) / Enhanced TM Plus (ETM+) (high spatial resolution, low temporal resolution) and MODIS (low spatial resolution, high temporal resolution). Meanwhile, the Simple Analytical Footprint model on Eulerian coordinates (SAFE) model to estimate the flux tower's footprint, which will be helpful for GR model's calibration, and improve the accuracy of GPP estimate. In the study, twelve flux sites belonging to Fluxnet-Canada Research Network (FCRN)/Canadian Carbon Program (CCP) were selected, covering grassland, forest, and wetland biomes. The remote sensing dataset acquired in this study for each site include MODIS reflectance product (MOD09A1, 500 m), Landsat TM /ETM+ (30 m), MODIS BRDF/ Albedo model parameter product (MCD43A1, 500 m), MODIS BRDF/ Albedo quality product (MCD43A2, 500 m). The steps are as follows:: (i) Landsat TM /ETM+ and MODIS data were used as mESTARFM inputs to produce reflectance datasets with high spatio-temporal resolution; (ii) the estimated GPP is produced by GR model using available reflectance data with high spatial resolution; (iii) the GR model's calibration process is done combined with SAFE model's pure footprint result and the observations of flux sites; (iv) the spatio-temporal distribution of GPP values at regional scale are predicted with specific parameters correspond to different ecosystem.