Refinement of a diagnostic terrestrial ecosystem model using AsiaFlux network data toward GCOM-C SGLI GPP/NPP product

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GCOM-C satellite with SGLI sensor was launched in December 2017. Because of medium resolution(300m) of SGLI sensor, it’ s possible to get more accurate climate change prediction. Furthermore, terrestrial carbon cycle products are significant to create. This presentation will introduce our current work on GCOM-C SGLI terrestrial carbon flux products. We select BESS (Breathing Earth System Simulator) as basic mechanistic terrestrial biosphere model,with some GCOM-C satellite products as inputs and then get estimations of daily gross primary productivity (GPP), net primary productivity (NPP), and net ecosystem exchange (NEE).

For the original BESS model, here are some improvements, including (a) using eddy-covariance observation network data across Asia to optimize model parameters, (b) adding a practical ecosystem respiration module, (c) applying some GCOM-C SGLI land products as inputs. In the beginning, we check the BESS model performance by using existing Asia Flux observation sites (about 50 sites) and select several key parameters by using sensitive analysis. Then, for these parameters, we use a trust-region optimization algorithm to identify their optimized coefficient. Second, a classify method of different land cover is add to improve BESS model accuracy. We think areas with different land covers have their own mechanisms so that optimized coefficients should be different. According to this, we can get a new flux estimation on large scale. Third, we create a semi-empirical respiration model for the BESS model to do more further estimation. So far, we chose Terra and Aqua MODIS data all model inputs. Then, we choose some available input data, such as leaf area index (LAI) and land surface temperature (LST) and switched them from MODIS to SGLI.

In the furture, Our group will still improve the models and calculate GPP, NPP and NEE. Remote sensing data with high spatial resolution (e.g. 300m) and high temporal resolution (e.g. daily) will be helpful to understand terrestrial carbon cycle at global scales. These products will be available as an official SGLI research product soon and updated annually.

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