

## Estimating solar-induced chlorophyll fluorescence using process-based ecosystem model VISIT-SIF

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Photosynthesis is a fundamental process of carbon fixation in terrestrial ecosystem and monitoring changes of photosynthetic activity is necessary to probe global carbon cycle. Solar-induced chlorophyll fluorescence (SIF) is known as a good index to monitor photosynthetic activity, and satellite-observed SIF is useful to improve global carbon cycle simulations by terrestrial ecosystem models. The forward model which can calculate SIF based on ecophysiological process is required for utilization of SIF for model parameter adjustment. Moreover model-simulated SIF needs to calculate the satellite observing proportion of total canopy SIF to compare satellite-observed SIF. We developed the process-based ecosystem model to estimate SIF based on VISIT model (VISIT-SIF). We incorporated biochemical process of SIF and geometric effect of observing direction to the model and assessed the reproducibility of SIF by comparing SIF simulated by VISIT-SIF with SIF observed by Greenhouse gases Observing SATellite (GOSAT). The annual mean global SIF by VISIT-SIF showed good agreement with one observed by GOSAT. The seasonal change of SIF in several regions by VISIT-SIF also showed good agreement with one by GOSAT. However, some region showed deference of phenological term. In our presentation, we will explain the model processes and results of comparing SIF by VISIT-SIF and GOSAT.

Keywords: Solar-induced chlorophyll fluorescence, Process based ecosystem model, Global carbon cycle, Satellite observation