Numerical study of energy, carbon and iron dynamics between boreal forests and marine ecosystems using a process-based model

Motomu Toda[1]

[1] Pan-Okhotsk, ILTS, Hokkaido Univ.

Terrestrial and marine ecosystems are intimately linked by the discharge of elements from watersheds. Dissolved iron in terrestrial soil surfaces plays an important role on regulating increase/decrease in marine biomass as well as nutrients such as phosphorus, nitrogen. The production in aquatic ecosystem related with terrestrial hydrologic, soil carbon and redox potential dynamics and vegetation types. In order to enhance our understanding on the importance of iron for biogeochemical relevant land-ocean interaction, widely applicable ecosystem models that describe the dynamics of iron are required. A fully coupled multi-layered meteorological surface physics-terrestrial ecosystems model (MINoSGI) has been developed and a below-ground soil carbon dynamics model has been incorporated into MINoSGI. Moreover, we extended MINoSGI to simulate water, carbon and iron dynamics by linking the biogeochemical processes to water level fluctuation with distinct seasonal and annual changes in hydrologic conditions in watersheds. The extended model was applied to boreal watersheds; Amur river watershed with broadleaved-conifer mixed forest and wetland near river mouth and Yukon river watershed with widespread evergreen coniferous forest and wetland scattered throughout the watershed, each of which has different terrestrial vegetation types, hydrologic and soil types over the basin to simulate seasonal and annual changes in dissolved iron flux to marine ecosystem.