Oral | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-CG Complex & General

[A-CG34_1PM2]Integrated studies for Interactions between Land-Ecological, Hydrological, and Atmospheric processes

Convener:*Hisashi Sato(Nagoya University), Takeshi Ise(Graduate School of Simulation Studies, University of Hyogo), Tomo'omi Kumagai(Hydrospheric Atmospheric Research Center, Nagoya University), Chair:Hisashi Sato(Nagoya University)

Thu. May 1, 2014 4:15 PM - 5:00 PM 213 (2F)

Global environmental changes, such as global warming, are being substantial, and its effects on the vegetation, including biome-distribution changes, are also becoming apparent. Such changes are forecasted to be continuing and, in many cases, accelerating during next few centuries. However, current modeling studies vary in their predictions, partly due to that this issue is a result of wide range of processes including plant ecology, climatology, hydrology, and land use. The aim of this session is to stimulate such integrated studies for interactions between land-ecological, hydrological, and atmospheric processes.

4:45 PM - 5:00 PM

[ACG34-P02_PG]Effects of water stresses due to climate change on production and dynamics of tree community in tropical rain forests

3-min talk in an oral session

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Keywords:drought, water stress, El Nino, tropical rain forests, matter production, SEIB-DGVM

Recently, climate changes caused by the El Nino-Southern Oscillation have been reported to result in the widespread death of trees due to droughts in many parts of the world. Strong reductions in tree growth and litterfall production occurred during the record-hot 1997/98 El Nino. Tropical regions receive strong solar radiation, and tropical vegetation shows a strong feedback effect to carbon sequestration, water circulation, and climate formation. In addition, tropical forests are important ecosystems, and they act as a huge carbon sink because they accumulate 40-50% of land vegetation carbon of the Earth. In a biological community such as a tropical forest that consists of various species, response to changes in the physical environment depends on the operating functional group. A dynamic change in a particular functional group that plays a signi?cant role in the biological community may in?uence the structure and ecosystem functions of the tropical forests. The aim of this study is to predict the impact of drought on matter production and tree community dynamics in tropical rain forests by using a spatially explicit individual-based biogeochemical model developed for predicting vegetation dynamics in response to climate change at the global level, such as global warming (SEIB-DGVM). In the model simulation, applying stochastic rainfall model with the meteorological data, including the 1997/98 El Nino, of the tropical rain forests of Sumatra Island in Malaysia that were measured in 1997-2009, the rainfall experiments were performed by operating some parameters related to daily precipitation and frequency of rainfall events. Based on the experiment results, the turn of production with the amount of tree growth and death, and tree mortality dynamics in the tropical rain forests for 200 years were verified.