Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

ACG37-P06 Room:Convention Hall Time:May 21 18:15-19:30

Impact of drought due to climate change on dry matter production and ecosystem function in tropical rain forests

Shinjiro Fujii[1*], Hisashi Sato[2], Tomo'omi Kumagai[1]

[1]Hydrospheric Atmospheric Research Center, Nagoya University, [2]Graduate School of Environmental Studies, Nagoya University

Since 1980's, 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.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 cover 7-10% of the land area of the Earth and accumulate 40-50% of land vegetation carbon. 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 significant role in the biological community may influence the structure and ecosystem functions of the tropical forests. Although some model studies have been conducted on the response of vegetation to drought due to climate change, most of the models did not consider the ecophysiological mechanisms on the mortality process, and they could not be applied to the different climatic zones and types of forest vegetation. In this study,we predicted the impact of drought on dry matter production and ecosystem functions 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, the estimated values, such as temperature and precipitation, for the global climate models were used in the vegetation dynamics model, and the dynamics of tropical rain forests for 200 years were described. The predicted result was compared with the meteorological and tree data, including the 1997/98 El Nino, of the tropical rain forests of Sumatra Island in Malaysia that were measured in 1997-2009 and was validated.

Keywords: drought, El Nino, tropical rain forests, ecological function, SEIB-DGVM