[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG40]Material Circulations in Land Ecosystems

convener:Tomomichi Kato(Research Faculty of Agriculture, Hokkaido University), Takashi Hirano(Research Faculty of Agriculture, Hokkaido University), Hisashi Sato(海洋研究開発機構 地球表層物質循環研究分野, 共同), Ryuichi Hirata(National Institute for Environmental Studies)

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Terrestrial ecosystem influences global climate through circulations of water, carbon, and nitrogen between land surface and atmosphere. For better understanding of those behaviors, a great effort has been paid for developing varieties of approaches and techniques such as biometric survey, eddy and chamber methods, near and satellite remote sensing, biosphere modeling and so on.

In particular, the JapanFlux, founded in 2006 as a researchers network of CO2, H2O and other trace gas flux measurement, has promoted the multi-disciplinal studies not only for flux measurement community, but also for remote sensing and biosphere modeling communities. Moreover, the Research-Group-on-Integrated-Land-Processes, which was founded in 2006, also has contributed to build networks between Japanese researchers to better understanding of physical and biological processes on interactions between terrestrial surface and atmosphere.

This session unites those multi-disciplinal activities, and promotes the oral and poster presentations on the role of terrestrial ecosystem in material circulations of water, carbon, nitrogen, energy and other substances by any approaches and technics. This session takes over the former session in last year: A-CG47.

[ACG40-P08]Effect of typhoon intensity and frequency on forest dynamics and material cycle using the Spatially Explicit Individual-Based Dynamics Global Vegetation Model (SEIB-DGVM)

*Wu Lan[1], Tomomichi Kato[2], Hisashi Sato[3], Takashi Hirano[2], Tomotsugu Yazaki[4] (1.Graduate School of Agriculture, Hokkaido University, 2.Research Faculty of Agriculture, Hokkaido University, 3.Department of Environmental Geochemical Cycle Research, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), 4.School of Agriculture, Meiji University)

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Typhoon is a major natural disturbance, which would give a dramatic impact on forest especially in coastal area of the world. For long-term period, the extent of damage that affects the forest structure and subsequent recovery, largely depends on the characteristics of the disturbance, such as intensity and frequency. Given the changing climate, typhoon is expected to become stronger and to come more frequently in the future, especially in the Northwest pacific. (Mei et al. 2016; Lin et al. 2015). However, few studies have focused on the impact of changes in typhoon frequency and intensity on forest dynamics and material cycles. To elucidate them, in this study, we use the spatial explicit individual based dynamic global vegetation model (SEIB-DGVM, Sato et al., 2007) in Tomakomai Flux Research Site from 1901 to 2100. Comparing with other Dynamic global vegetation model, SEIB-DGVM has a great advantage that can represent the three-dimensional forest structure based explicitly on local competition among individual trees on the virtual forest stand (Sato et al. 2009, 2010).

In this study, we run the SEIB-DGVM with the variation of different typhoon characteristics: typhoon intensity and frequency. First, we validate the SEIB-DGVM at Tomakomai site, and then simulate for the future from

2017 to 2100. About the future part, we did a series of scenarios experiment simulation by changing the intensity and frequency of typhoon. We categorize the typhoon frequency into six ranks: 1, 2, 4, 8, 16, and 20 times for 84 years (2017-2100). For each typhoon frequency, we divided typhoon intensity into 10 levels with interval of 10% from 10-100%. The percentage of typhoon intensity represents how much damage the typhoon will cause (= tree mortality). Six levels frequency and ten levels intensity make up 60 groups of simulation scenarios. Each simulation over an 84-year period (2017-2100) was repeated 10 times. We address the following questions in this study: (1) whether SEIB-DGVM can reconstructs the forest in Tomakomai or not in historical period. (2) how do forest ecosystem respond to changes in two key typhoon characteristics in the context of projected climate change.