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アジア陸域炭素循環の長期・広域評価における地上観測の役割
Role of ground observation networks for long-term and continental scale carbon budget estimations in East Asia

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Recent studies using flux measurement networks in Asia have shown that the year-to-year changes in annual net ecosystem CO2 exchanges are controlled by different key factors in different biomes. In humid temperate forests, the key factors are the temperature and solar radiation during the growing season, which vary year-to-year in response to the timing of the early summer rainy seasons. In tropical forests in Southeast Asia, the keys are the length and strength of the dry season, and the El Nino/Southern Oscillation (ENSO)-related dry weather and smoke from fires.

In order to improve future climate change predictions, more synthetic knowledge of how ecosystem functions on carbon and water cycles respond to large-scale meteorological phenomena, such as year-to-year changes in Asian monsoon circulations would be desirable. This is because ongoing global warming has the potential to increase the frequency and magnitude of many extreme climatic events, including floods, droughts, storms, and anomalous temperatures in the global scale as well as in the Asian monsoon region. Another reason is that any of the recent climate prediction models needs to incorporate the biological feedback of terrestrial ecosystems that may play important roles in the global carbon and water cycles. However, we still do not understand the magnitude of the feedback, and the models have enormous uncertainties in the estimation of that feedback.

Since there is a potential that the frequency of anomalous weather conditions increases in the future affecting productivity in the Asian forests, further studies are necessary to gain a more accurate understanding of the response of Asian ecosystems to the meteorological patterns. As a case study, responses of East Asian forest productivity to large-scale meteorological anomalous pattern will be presented and the role of ground observational network for detecting long-term and continental scale terrestrial ecosystem responses will be discussed. The results lead to an understanding of the spatial distribution of ecosystem responses to large-scale meteorological phenomena and serve as a verification dataset for the development of forest carbon monitoring, accounting and reporting system.

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