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# Study on the carbon dioxide flux variation of the terrestrial biosphere under precipitation variability in the Asian region

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Asian region consists of a variety of terrestrial biosphere ecosystems and has been estimated as carbon sink patterns at mid-to-high latitudes in the northern hemisphere over the last two decades. However, there are uncertainties in the sink magnitude and spatial distribution of terrestrial carbon fluxes due to changes in climate factors such as regional precipitation, temperature and etc. Therefore in order to accurately understand the changes in terrestrial ecosystem with climate change, it is need to understand the spatio-temporal variations and controlling mechanisms of carbon exchange fluxes between the different carbon pools on global and regional scales. This study analyzed temporal and spatial variations of terrestrial biosphere carbon fluxes due to precipitation changes in the region over the last 12 years (2001-2012) and clarified their relationships.
In this study, we used the terrestrial carbon flux data that are simulated through a Carbon Tracker-Asia, which performs data assimilation based on an ensemble Kalman filter. We demonstrated significant interactions between carbon flux and ERA-Interim precipitation on the same period by using the EOF and linear regression analyses. During the last 12 years, terrestrial biosphere carbon dioxide fluxes showed similar spatial distribution of the summer sink patterns in this period. These biosphere carbon dioxide fluxes showed a positive correlation with precipitation resulting from the comparison between the dry and wet years. From the results of EOF analysis for biosphere carbon flux during 12 years, the first mode represented seasonal variation and the second showed the variability of the biosphere carbon fluxes after monsoon. Additionally the relation between the PC time series of biosphere carbon fluxes and the time series of precipitation suggested 2-month lag correlation in the second mode, and it is thought that these biosphere carbon fluxes after monsoon were associated with precipitation variability in the region.