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RECENT CHANGES IN TERRESTRIAL CO2 FLUXES IN SIBERIA INFERRED FROM MULTIPLE BOTTOM-UP ESTIMATIONS

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Siberia is one of the regions where significant warming is proceeding, and the warming might cause changes in terrestrial carbon cycle. We analyzed interannual and decadal changes in terrestrial carbon fluxes in the regions using multiple data sets, such as empirically estimated carbon fluxes based on multiple eddy-covariance sites, satellite-based vegetation index data, and multiple terrestrial carbon cycle models from Asia-MIP (e.g. BEAMS, Biome-BGC, SEIB-DGVM, and VISIT). First, we analyzed the recent changes in climate using the gridded data, and found that significant warming has been occurring in the last 30 years (1982-2011 period). Second, satellite-based vegetation index (NOAA AVHRR dataset), as a proxy of GPP, shows significant increases in most of Siberia region except for north-western Siberia region (e.g. Ichii et al. 2013). Modeled interannual variations in GPP from Asia-MIP closely tracks those in vegetation index observation. Although interannual variations in modeled GPP are consistent with satellite-based NDVI, causes of the modeled GPP increases are different among models; interannual variations in temperature and precipitations and CO_2 fertilization are possible reasons, however contribution of each factor is different among models. Net Ecosystem Exchange (NEE) were evaluated using terrestrial carbon cycle model outputs and empirically estimated carbon fluxes. Estimated carbon fluxes are generally consistent among models and empirical estimations. Possible mechanisms of terrestrial carbon fluxes are analyzed by the model, and updated results will be discussed in the presentation.

Reference:
Ichii et al. (2013) Remote Sensing, 5, 6043-6062.