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Greenhouse gases measurements at Zotino Tall Tower Observatory (ZOTTO) in central Siberia

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Boreal ecosystems play a crucial role in atmospheric carbon budget calculations as they represent about one third of the Earth's forested land surface area and are typically a net sink of carbon dioxide and a net source of methane. However, direct measurements of carbon dioxide, water vapor, and methane in large areas of the boreal zone, such as Central Siberia, are sparse and unevenly distributed in space. In order to improve the spatial coverage and representativeness of flux estimates and reduce their uncertainty, our group has begun eddy covariance measurements to complement our tall tower measurements in Central Siberia. The Zotino Tall Tower Observatory (ZOTTO, www.zottoproject.org) measurement site is located in pristine taiga near the Yenisei river (60°48'N, 89°21'E). The ZOTTO tall tower is equipped with continuous, low-maintenance CO_2/CH4 concentration measurements by cavity ring down spectroscopy (CRDS) from six heights up to 301 m since May 2009. Additionally, we have set up two eddy covariance flux measurement systems in the forest and in the bog, located 1 and 3 km from the tall tower, respectively. Both towers are equipped with an enclosed CO_2/H_2O gas analyzer and ultrasonic anemometers. The bog tower includes a CH4 eddy covariance gas analyzer. Here, we report atmospheric CO_2 and CH4 concentrations, focusing on growing season of 2012. The net ecosystem exchange (NEE) and evapotranspiration in boreal forest eddy site, and carbon fluxes in the wetland area (60°49'N, 89°23'E) are examined in terms of their relationship with major controlling factors such as temperature, photosynthetically active radiation, vapor pressure deficits, soil moisture, and friction velocity.