Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09127, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09127
EGU General Assembly 2008

Carbon dioxide exchange of arctic tundra in the northern part of European Russia

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Northern Russia has been subject to many speculations in relation to climatic change effects and greenhouse gas (GHG) exchange but still little scientific evidence is available for this region. There is low abundance of continuous Arctic GHG exchange measurements deploying eddy covariance technique in a circumpolar perspective and this becomes even more apparent when looking at the Eurasian continent which encloses about 45 % of the global Arctic terrestrial land.

This study, as a part of the European Commission's 6th Framework Program CARBO-North, is conducted in the European part of Northern Russia, in the Pechora basin of the northern Komi Republic. The site is of lowland tundra type (underlain by permafrost) with predominating grasses, low shrubs, lichens and mosses interspersed with thermokarst lakes. The max. active layer thickness ranges from 90 cm till over 160 cm on the mineral slope and from 35 till 70 cm in the hummocky areas. The climate is continental with a mean annual air temperature (1995-2007) of about -9.4°C (Vorkuta).

To determine the greenhouse balance of this area the eddy covariance technique was used in the late period of the growing season of 2007. In this study we focus on the transition period at the end of the growth season, which is a part of the year when predicted changes in temperature is likely to have the most pronounced effects on the exchange of GHGs. The net ecosystem CO_2 exchange reflects two important influences on the opposed fluxes, gross photosynthesis and ecosystem respiration. Our data indicate a functional relationship between net ecosystem CO_2 exchange and soil

temperature and the decrease of photosynthetic active leaf area due to senescence.