Geophysical Research Abstracts
Vol. 20, EGU2018-13887, 2018
EGU General Assembly 2018

Ecosystem-scale carbon monoxide exchange and partitioning across major biomes

Albin Hammerle (1), Felix Spielmann (1), Florian Kitz (1), Katharina Gerdel (1), Andreas Ibrom (2), Mirco Migliavacca (3), Steffen Noe (4), Dan Yakir (5), Giorgio Alberti (6), and Georg Wohlfahrt (1)

(1) University of Innsbruck, Ecology, Innsbruck, Austria (albin.hammerle@uibk.ac.at), (2) Technical University of Denmark, Department of Environmental Engineering, Kongens Lyngby, Denmark, (3) Max Planck Institute for Biogeochemistry, Jena, Germany, (4) Estonian University of Life Sciences, Institute of Agricultural and Environmental Sciences, Tartu, Estonia, (5) Department of Earth and Planetary Sciences, Weizmann Institute of Science, Rehovot, Israel, (6) Dipartimento di Scienze Agrarie ed Ambientali, Università di Udine, Udine, Italy

Carbon monoxide (CO) plays a critical role in atmospheric chemistry and has an indirect global warming potential. While sources/sinks of CO on land at least partially cancel out each other and their magnitude is very likely lower compared to other sinks and sources, the magnitude of CO sources and sinks is highly uncertain. Thus it may be premature to neglect any direct contributions of land ecosystems to the CO budget. In addition, changes in global climate and resulting changes in global productivity may require re-evaluating older data and assumptions. One major reason for the large uncertainty is a general scarcity of empirical data.
Here we present data on continuous eddy covariance measurements of CO-fluxes above different biomes in Europe and Asia in combination with soil-chamber flux measurements. Eddy covariance and soil-chamber measurements were conducted during the vegetation periods from 2015 to 2017 at a temperate grassland (AUT), a Mediterranean savanna (ESP), a temperate mixed deciduous (DEN), a soy-bean field (ITA) and a semiarid evergreen forest (ISR). All ecosystems were acting CO neutral or as a slight sink for CO during night times. With increasing light levels the investigated ecosystems were acting as a source for CO. Their source strength for CO was clearly correlated with the amount of light reaching the soil and/or litter layer. Thus the highest CO emissions were found at the managed grassland site (AUT) and the rather open semiarid evergreen forest (ISR).
Soil-chamber measurements mimicked the ecosystem-scale fluxes with CO-emissions during the day and fluxes close to zero or slightly negative ones at night. Applying different treatments to collected soil samples in a lab experiment the influence of radiation and the availability of litter on these fluxes could be shown.