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New tool for CO_2 flux partitioning with soil chamber flux implementation as a solution for site in topographically complex terrain

Ladislav Šigut (1,2), Ivan Mammarella (3), Pasi Kolari (3), Eva Dařenová (2), Kateřina Novosadová (2,4), Justina Pietras (2,4), Radek Pokorný (2,4), Pavel Sedlák (2,5), and Matthias Mauder (6)

(1) Department of Physics, Faculty of Science, University of Ostrava, 30. dubna 22, CZ-70103 Ostrava 1, Czech Republic, (2) CzechGlobe – Global Change Research Centre AS CR, v.v.i., Bělidla 986/4a CZ-60300 Brno, Czech Republic, (3) University of Helsinki, Gustaf Hällströmin Katu 2, FIN-00014 Helsinki, Finland, (4) Department of Silviculture, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, CZ-61300 Brno, Czech Republic, (5) Institute of Atmospheric Physics AS CR, v.v.i., Boční II 1401, CZ-14131 Praha 4, Czech Republic, (6) Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU), Kreuzeckbahnstr. 19, DE-82467, Garmisch-Partenkirchen, Germany

Eddy covariance method (EC) is one of the most accurate and direct approaches for measurements of fluxes of matter and energy on the level of an entire ecosystem. CO_2 flux data acquired using the global network of EC flux towers help us to better understand the impacts of natural and anthropogenic phenomena on the global carbon balance. Comparisons among different sites are usually performed on annual sums of net ecosystem exchange (annual sums of NEE). Nowadays, EC is also used in complex terrain on the edge of its applicability (e.g. hills, cities) such as the mountain forest site at Bílý Kříž, Beskydy Mountains, Czech Republic. This requires revisiting of generally applied algorithms for computation of annual sums of NEE. The first aim of this study is the assessment of the performance and correctness of a newly developed tool for CO_2 flux separation in comparison with standard algorithms. Simple models describing response of NEE to temperature and photosynthetic active radiation will be used for flux partitioning and a new approach to remove seasonality from datasets will be demonstrated. The second aim of this study will be to evaluate whether it is possible to estimate defensible annual sums of NEE for complex terrain site Bílý Kříž with the help of auxiliary biomass inventory and soil chamber measurements. Here the up-scaling of soil respiration to ecosystem respiration will be attempted and the resulting sums of NEE will be compared to independent biomass inventory estimates of net primary productivity. The importance of this research lies in extending the boundaries of EC application, thus contributing to better understanding of carbon balance in mountainous regions ecosystems which are not well represented within networks of EC flux towers.

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