Geophysical Research Abstracts
Vol. 16, EGU2014-1538, 2014
EGU General Assembly 2014

Carbon allocation in plants and ecosystems – insights from stable isotope studies

Arthur Gessler (1,2)

(1) Long-term Forest Ecosystem Research (LWF), Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Zürcherstrasse 111, 8903 Birmensdorf, Switzerland., (2) Institute for Landscape Biogeochemistry, Leibniz Centre for Agricultural Landscape Research (ZALF), Eberswalderstr. 84, 15374 Müncheberg, Germany

Trees are large global stores of carbon (C) that will be impacted by increased carbon dioxide levels and climate change. However, at present we cannot properly predict the carbon balance of forests in future as we lack knowledge on how plant physiological processes, the transfer of carbon within the plant, carbon storage, and remobilization in the plant tissues as well as the release of carbon from the roots to the soil interact with environmental drivers and ecosystem-scale processes. This paper will summarise how stable isotope techniques can give new insights in the fate of newly assimilated C in plants and ecosystems on time scales from hours to seasons and it will include studies either characterizing temporal and spatial variation in the natural abundance of carbon and oxygen isotopes or applying isotopically enriched tracers.
It comprises the assessment of the mechanisms of C partitioning among specific metabolic pathways, between plant organs and into various ecosystem C pools with different residence times. Moreover stable isotopes are highly suitable tools to characterise the role of the phloem, which is the central long-distance conveyer distributing C from source to sinks and thus plays a central role in linking sites and structures of storage, growth and other metabolic activities.
A deeper understanding of these processes and their interaction with environmental drivers is critical for predicting how trees and ecosystems will respond to coming global environmental changes, including increased temperature, altered precipitation, and elevated carbon dioxide concentrations.