



Eddy covariance measurements: Carbon exchange of forest ecosystems after different disturbances (A review)

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Abstract:

Boreal forests cover a huge part of the Earth land and play an important role in global carbon cycle. Forest ecosystems are a key focus for a research because of carbon (C) cycle functioning and C balance. Global change, increasing temperatures and different disturbances including forest management (e.g., fire, storm, insects, clear-cutting) has a big effect on C flux levels of forest ecosystems. For a better understanding of carbon dynamics it is possible to use eddy covariance method (EC). EC provides opportunity to measure C fluxes, water vapor, temperature and many other characteristics (wind speed, wind direction etc.). EC technique measures carbon dioxide (CO₂) exchange between atmosphere and canopy (NEE) and allow include all vegetation, respiration and photosynthesis processes are included. This technique has emerged as one of the most reliable and provide relevant results of C fluxes at the forest stand level. This method and measured data allows us to define forest ecosystem functioning as a C-sink or C-source, even specify C neutral situation. It is important to determine how disturbances affect forest ecosystem and its balance. Also it is very important to pay attention forest recovery period and ecosystem responses to disturbance. In this review of published studies was taking account different disturbances and basing by literature we found that generally forest is a C-source after disturbance and it takes several years to recover and be able to absorb C and become a C-sink. Immediately after stand-replacing disturbances (wildfire, storm, insects and clear-cutting) forests were C-sources. Recovery required approximately 5 years after storm or insects outbreak, clear-cut areas required up to 20 years to become a C-sink again. Recovery after wildfire disturbance was much longer, more than 50 years.

Keywords:

Forest ecosystem, ecosystem recovery, carbon balance, carbon dioxide (CO₂), disturbances, eddy covariance.