Geophysical Research Abstracts
Vol. 16, EGU2014-4626, 2014
EGU General Assembly 2014

Climate change and wildfire influence the methane uptake capacity in Australian eucalypt forest soils

Stefan Arndt (1), Benedikt Fest (1), Nina Hinko-Najera (1), Tim Wardlaw (2), and Stephen Livesley (3)

(1) Department of Forest and Ecosystem Science, The University of Melbourne, Richmond, Australia (sarndt@unimelb.edu.au), (2) Forest Research & Development Branch, Forestry Tasmania, Hobart, Australia, (3) Department of Resource Managment and Geography, The University of Melbourne, Richmond, Australia

Forest ecosystems comprise the largest soil sink for the greenhouse gas methane and climate change and fire can have significant impacts on this important process. We present data from a number of long-term field studies that investigated the impacts of reduced rainfall and fire regimes on soil methane flux in Australian forest systems. Long term soil methane flux measurements with automated chambers indicated that around 90% of soil methane uptake variability in dry- and wet-sclerophyll Eucalyptus obliqua (L. Her.) forests was explained by soil moisture through influencing methane diffusivity. The application of rainfall reduction shelters in the dry-sclerophyll eucalypt forest caused an average reduction of 14.6% in soil volumetric water content but an increase in soil methane uptake of around 38%, again a consequence of increased methane diffusivity. Consequently, the potential reductions in rainfall in large parts of Australia are likely to result in an increase in methane uptake. Wildfire disturbance also altered forest soil methane uptake and here the methane uptake capacity was related to stand age dependent changes in stand structure likely linked to changes in stand water use. Stands that had dryer soils displayed greater methane uptake, indicating that soil methane uptake changes during forest stand development. Wildfire can therefore have significant impacts on landscape level methane uptake.