Geophysical Research Abstracts,
Vol. 11, EGU2009-7981, 2009
EGU General Assembly 2009

World's tallest angiosperm acts as a carbon sink

M. Kilinc (1), J. Beringer (1), L. Hutley (2), K. Kurioka (1), S. Wood (1), N. D'Argent (1), D. Martin (3), I. McHugh (1), N. Tapper (1), and D. McGuire (4)

(1) School of Geography and Environmental Science, Monash University, Clayton, Australia (musa.kilinc@arts.monash.edu.au), (2) Faculty of Education, Health and Science, Charles Darwin University, Darwin, Australia, (3) RMIT, Melbourne, Australia, (4) Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, USA

Natural forests store vast amounts of carbon in the terrestrial biosphere, and play an important role in the global carbon cycle. Given the significance of natural forests, there is a lack of carbon accounting of primary forests that are undisturbed by human activities. One reason for this lack of interest stems from ecological orthodoxy that suggests that primary forests should be close to dynamic equilibrium, in that Net Ecosystem Production (NEP) approaches zero. However, recent results from the northern hemisphere and tropics, using eddy covariance flux towers, indicate that primary forests are a greater sink than first thought. The role of evergreen primary forests in Australian carbon balance studies remain uncertain and hence may function differently to their deciduous counterparts in the Northern Hemisphere. In order to address the lack of baseline carbon accounts, an undisturbed, 300 year old Mountain Ash (*Eucalyptus regnans*) ecosystem, located in the Central Highlands of Victoria (Australia) was selected as a permanent study site to investigate carbon and water budgets over diurnal, seasonal and annual cycles. Mountain Ash trees are the world's tallest angiosperms (flowering plants), and one of the largest carbon reservoirs in the biosphere, with an estimated 1900 tC ha^{-1}. A 110 m tall micrometeorological tower that includes eddy covariance instrumentation was installed in August 2005. An independent biometric approach quantifying the annual net gain or loss of carbon was also made within close proximity to the flux tower. Analysis of NEP in 2006 suggests that the ecosystem acted as a carbon sink of 2.5 tC ha^{-1} yr^{-1}. Woody and soil biomass increment for the same year was estimated to be 2.8 tC $ha^{-1}yr^{-1}$, in which nearly half of the biomass production was partitioned into the aboveground woody tissue. These results indicate that temperate primary forests act as carbon sinks, and are able to maintain their carbon sink status due to their uneven stand structure. Such baseline carbon accounts are essential if we are to accurately value and predict the carbon stored in natural forests. Clearly more emphasis should be placed on the sustainable management of natural forests as they may represent a long term sink of carbon.