Geophysical Research Abstracts
Vol. 15, EGU2013-2653, 2013
EGU General Assembly 2013

Pastures to forests: a regional assessment of soil carbon sequestration, and carbon cycling processes

Timothy Cavagnano (1), Shaun Cunningham (2), and Marianne Hoogmoed (3)

(1) School of Biological Sciences, Monash University, Australia (timothy.cavagnaro@monash.edu), (2) School of Biological Sciences, Monash University, Australia (Shaun.cunningham@monash.edu), (3) School of Biological Sciences, Monash University, Australia (marianne.hoogmoed@monash.edu)

Afforestation of agricultural land is increasingly recognized as a viable means of mitigating against climate change. However, the effects of afforestation on soil carbon stocks, and the time scales over which they change, remain unclear. Here we present results of a detailed investigation of how soil carbon stocks and cycling change following afforestation of pastures.
1. We conducted a global meta–analysis of published data on the effects of afforestation of pastures on soil carbon and nitrogen stocks in a Mediterranean climate. Results indicate that more than 30 years will be needed for soil carbon stocks to reach those of remnant forests.
2. We surveyed soil carbon and nitrogen at 40 sites across southeastern Australia, spanning a chronosequence (5-45 years old) of existing plantings, and their adjacent pastures to account for differences in soil type and land-use history among sites. Whereas changes in total soil carbon were not yet evident, a shift in the C:N ratio of the soils, and an increase in the density of plant litter, was observed.
3. We undertook a detailed analysis of soil carbon stocks at a sub-set of our field sites to determine the optimum number of soil samples needed to provide an accurate estimate of soil carbon in mixed species plantings.
4. We studied carbon and nutrient cycling in afforested pastures to gain new process level knowledge.

Together the results presented here will be discussed in the context of the role of revegetation activities to sequester carbon in the soil on the regional scale.