Geophysical Research Abstracts
Vol. 16, EGU2014-5324, 2014
EGU General Assembly 2014

Implications for local and global climate of alternative forest management strategies in Norway

Ryan M. Bright (1), Clara Antón-Fernández (2), Rasmus Astrup (2), Francesco Cherubini (1), Maria Kvalevåg (3), and Anders Hammer Strømman (1)

(1) Norwegian University of Science and Technology, Industrial Ecology Programme, Energy and Process Engineering, Trondheim, Norway (ryan.m.bright@ntnu.no), (2) Norwegian Forest and Landscape Institute, (3) Center for International Climate and Environmental Research - Oslo (CICERO)

We applied a mix of observation and empirical models to evaluate both local and global climate effects of three realistic alternative forest management scenarios in the boreal forests of Norway's largest logging region. The alternative management scenarios embraced strategies aimed at increasing harvest intensities and allowing harvested conifer sites to regenerate naturally with broadleaved species.

Stand-level analysis was firstly executed to attribute differences in daily, seasonal, and annual mean surface temperatures to differences in surface intrinsic biophysical properties across coniferous, deciduous, and clear-cut sites. Relative to a coniferous site, we observed a slight local cooling of 0.13 °C at a deciduous site and 0.25 °C at a clear-cut site over a 6-year period which was mostly attributed to a higher albedo throughout the year. When monthly mean albedo trajectories over the entire managed forest landscape were taken into consideration, we found that strategies promoting natural regeneration of coniferous sites with native deciduous species led to substantial global direct climate cooling benefits relative to those maintaining current silviculture regimes – despite predicted long-term regional warming feedbacks and a reduced albedo in spring and autumn months. The magnitude and duration of the cooling benefit depended largely on whether management strategies simultaneously promoted an enhanced material supply over business-as-usual levels.

While additional climate impact linked to changes in life-cycle emissions and to changes in the global supply and demand of timber products ought to be factored into any mitigation-oriented climate policy involving the forestry sector, our analysis demonstrates that - within the boundaries of the managed forest ecosystem - excluding important biogeophysical considerations like surface albedo change may lead to sub-optimal climate policy.