Spatial and temporal variability of soil CO2 efflux from xeric and mesic sites within Black Rock Forest, New York.

Kim J. Brown Ohio University, Athens OH 45701
Kevin Griffin LDEO-Columbia Univ., Palisades NY 10964-8000
William Schuster Black Rock Forest, Cornwall NY 12518
David Tissue Texas Tech.Univ., Lubbock TX 79409-3131
Matthew Turnbull Univ. of Canterbury, Christchurch, New Zealand
David Whitehead Landcare Research, Lincoln, New Zealand 8152

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LIMTS: 230 words, no more than 2000 characters.
(Right now there is room for 300 additional characters if you would like additional text)

Soil surface respiration (Rsoil) is a large component of the net ecosystem exchange of forests, and was an important factor to characterize in our evaluation of carbon flux rates and controls on carbon gain within a forested watershed in New York. Data from this oak-dominated forest provides information from a geographically underrepresented area in the patchwork of carbon flux studies currently ongoing within the large spatial distribution of this forest type. The specific objective of this work was to characterize the factors controlling Rsoil from our research forest located within the Hudson Highlands of New York, which we stratified into two sampling locations: a xeric ridgetop and a mesic valley. Both areas contained similar basal area and overstory species, but differed in stand stature and structure. A 50x50m grid was installed at each site, 8 gridpoints were randomly subsampled from each grid, and at each of the 8 points the following were measured from early March to late November 2000 on a biweekly to weekly basis: midday Rsoil, soil temperature (Tsoil), % soil moisture (SM). Soil cores were sampled for physical, chemical and root content analyses in mid-July. Mean annual Rsoil of 3.67 and 4.07 umol m-2 s-1 were measured in the xeric and mesic sites, respectively. Maximum mean rates of Rsoil of 6.55 and 9.1 umol m-2 s-1 were observed for the xeric and mesic sites in July. Rsoil trends were well characterized by an Arrhenius temperature function at both sites, with greater within-site variability in Rsoil at the mesic site, due to larger fluctuations in & soil moisture. Although rates of Rsoil were generally lower at the xeric site, there was a larger range in Tsoil. After inputs of soil moisture during the growing-season, Rsoil increased at the xeric site (suggesting soil moisture limits to Rsoil) and decreased at the mesic site (suggesting waterlogging). Clearly, soil heterogeneity within a site should be accounted for when sampling forest carbon fluxes with a “bottom-up” approach.

Kim J. Brown
Assistant Professor -- Forest Ecology and Tree Physiology
Department of Environmental and Plant Biology
Ohio University
Athens, OH 45701

P: 740.593.1122
F: 740.593.1130
E: kim.brown@ohio.edu
W: http://oak.cats.ohiou.edu/~brownk4