

## Appendix A

### Global Forest Ecosystem Structure and Function Data for Carbon Balance Research

#### Database Sources and Contributors

##### I. Published Database Sources

- Ameriflux (2006) Ameriflux database <http://public.ornl.gov/ameriflux/>.
- Andrews JA, Harrison KG, Matamala R, Schlesinger WH (1999) Separation of root respiration from total soil respiration using carbon-13 labeling during Free-Air Carbon Dioxide Enrichment (FACE). *Soil Science Society Of America Journal*, **63**, 1429-1435.
- Araujo AC, Nobre AD, Kruijt B *et al.* (2002) Comparative measurements of carbon dioxide fluxes from two nearby towers in a central Amazonian rainforest: The Manaus LBA site. *Journal of Geophysical Research-Atmospheres*, **107**, 8090-9019.
- Arneth A, Kelliher FM, McSeveny TM, Byers JN (1998) Net ecosystem productivity, net primary productivity and ecosystem carbon sequestration in a *Pinus radiata* plantation subject to soil water deficit. *Tree Physiology*, **18**, 785-793.
- Arneth A, Kelliher FM, McSeveny TM, Byers JN (1999) Assessment of annual carbon exchange in a water-stressed *Pinus radiata* plantation: an analysis based on eddy covariance measurements and an integrated biophysical model. *Global Change Biology*, **5**, 531-545.
- Asensio D, Penuelas J, Ogaya R, Llusia J (2007) Seasonal soil and leaf CO<sub>2</sub> exchange rates in a Mediterranean holm oak forest and their responses to drought conditions. *Atmospheric Environment*, **41**, 2447-2455.
- Aubinet M, Grelle A, Ibrom A *et al.* (2000) Estimates of the annual net carbon and water exchange of forests: The EUROFLUX methodology. *Advances in Ecological Research*, **30**, 113-175.
- Barr AG, Black TA, Hogg EH, Griffis TJ, Morgenstern K, Kljun N, Theede A, Nesic Z (2007) Climatic controls on the carbon and water balances of a boreal aspen forest, 1994-2003. *Global Change Biology*, **13**, 561-576.
- Barr AG, Griffis TJ, Black TA, Lee X, Staebler RM, Fuentes JD, Chen Z, Morgenstern K (2002) Comparing the carbon budgets of boreal and temperate deciduous forest stands. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **32**, 813-822.
- Bascietto M, Hajny MT, Linder S, Masci A, Matteucci G, Montagnani L, Moors E, Mund M (2003) Database of tree stands (Structure, age, biomass, LAI and NPP) of the FORCAST project.
- Behera N, Joshi SK, Pati DP (1990) Root Contribution To Total Soil Metabolism In A Tropical Forest Soil From Orissa, India. *Forest Ecology and Management*, **36**, 125-134.

- Berbigier P, Bonnefond JM, Mellmann P (2001) CO<sub>2</sub> and water vapour fluxes for 2 years above Euroflux forest site. *Agricultural and Forest Meteorology*, **108**, 183-197.
- Bergeron O, Margolis HA, Black TA, Coursolle C, Dunn AL, Barr AG, Wofsy SC (2007) Comparison of carbon dioxide fluxes over three boreal black spruce forests in Canada. *Global Change Biology*, **13**, 89-107.
- Bergh J, Linder S (1999) Effects of soil warming during spring on photosynthetic recovery in boreal Norway spruce stands. *Global Change Biology*, **5**, 245-253.
- Bhupinderpal S, Nordgren A, Lofvenius MO, Hogberg MN, Mellander PE, Hogberg P (2003) Tree root and soil heterotrophic respiration as revealed by girdling of boreal Scots pine forest: extending observations beyond the first year. *Plant Cell and Environment*, **26**, 1287-1296.
- Black K, Bolger T, Davis P, Nieuwenhuis M, Reidy B, Saiz G, Tobin B, Osborne B (2007) Inventory and eddy covariance-based estimates of annual carbon sequestration in a Sitka spruce (*Picea sitchensis* (Bong.) Carr.) forest ecosystem. *European Journal of Forest Research*, **126**, 167-178.
- Black K, Tobin B, Saiz G, Byrne KA, Osborne B (2004) Improved estimates of biomass expansion factors for Sitka spruce. *Irish Forestry*, **61**, 50-65.
- Black TA, DenHartog G, Neumann HH *et al.* (1996) Annual cycles of water vapour and carbon dioxide fluxes in and above a boreal aspen forest. *Global Change Biology*, **2**, 219-229.
- Bolstad PV, Davis KJ, Martin J, Cook BD, Wang W (2004) Component and whole-system respiration fluxes in northern deciduous forests. *Tree Physiology*, **24**, 493-504.
- Bond-Lamberty B, Wang C, Gower ST, Norman J (2002) Leaf area dynamics of a boreal black spruce fire chronosequence. *Tree Physiology*, **22**, 993-1001.
- Bond-Lamberty B, Wang CK, Gower ST (2004) Contribution of root respiration to soil surface CO<sub>2</sub> flux in a boreal black spruce chronosequence. *Tree Physiology*, **24**, 1387-1395.
- Bowden RD, Nadelhoffer KJ, Boone RD, Melillo JM, Garrison JB (1993) Contributions Of Aboveground Litter, Belowground Litter, And Root Respiration To Total Soil Respiration In A Temperature Mixed Hardwood Forest. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **23**, 1402-1407.
- Buchmann N (2000) Biotic and abiotic factors controlling soil respiration rates in *Picea abies* stands. *Soil Biology & Biochemistry*, **32**, 1625-1635.
- Burton AJ, Pregitzer KS, Crawford JN, Zogg GP, Zak DR (2004) Simulated chronic NO<sub>3</sub>- deposition reduces soil respiration in northern hardwood forests. *Global Change Biology*, **10**, 1080-1091.
- Calfapietra C, Gielen B, Sabatti M, De Angelis P, Miglietta F, Scarascia-Mugnozza G, Ceulemans R (2003) Do above-ground growth dynamics of poplar change with time under CO<sub>2</sub> enrichment? *New Phytologist*, **160**, 305-318.
- Campbell JL, Sun OJ, Law BE (2004) Disturbance and net ecosystem production across three climatically distinct forest landscapes. *Global Biogeochemical Cycles*, **18**, GB4017.

- CarboEurope-IP (2006) CarboEurope-IP database.  
<http://gaia.agraria.unitus.it/cpz/login.asp>.
- Carrara A, Kowalski AS, Neiryneck J, Janssens IA, Yuste JC, Ceulemans R (2003) Net ecosystem CO<sub>2</sub> exchange of mixed forest in Belgium over 5 years. *Agricultural and Forest Meteorology*, **119**, 209-227.
- Carswell FE, Costa AL, Palheta M *et al.* (2002) Seasonality in CO<sub>2</sub> and H<sub>2</sub>O flux at an eastern Amazonian rain forest. *Journal of Geophysical Research-Atmospheres*, **107**, 8076.
- Chambers JQ, Tribuzy ES, Toledo LC *et al.* (2004) Respiration from a tropical forest ecosystem: Partitioning of sources and low carbon use efficiency. *Ecological Applications*, **14**, S72-S88.
- Clark DA (1998) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.,  
<http://www.daac.ornl.gov>.
- Clark DA, Brown S, Kicklighter DW, Chambers JQ, Thomlinson JR, Ni J, Holland EA (2001) Net primary production in tropical forests: An evaluation and synthesis of existing field data. *Ecological Applications*, **11**, 371-384.
- Clark KL, Gholz HL, Castro MS (2004) Carbon dynamics along a chronosequence of slash pine plantations in north Florida. *Ecological Applications*, **14**, 1154-1171.
- Clark KL, Gholz HL, Moncrieff JB, Cropley F, Loescher HW (1999) Environmental controls over net exchanges of carbon dioxide from contrasting Florida ecosystems. *Ecological Applications*, **9**, 936-948.
- Cleveland CC, Townsend AR (2006) Nutrient additions to a tropical rain forest drive substantial soil carbon dioxide losses to the atmosphere. *Proceedings Of The National Academy Of Sciences Of The United States Of America*, **103**, 10316-10321.
- Coles JRP, Yavitt JB (2004) Linking belowground carbon allocation to anaerobic CH<sub>4</sub> and CO<sub>2</sub> production in a forested peatland, New York state. *Geomicrobiology Journal*, **21**, 445-455.
- Comeau PG, Kimmins JP (1999) NPP Boreal Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.,  
<http://www.daac.ornl.gov>.
- Cronan CS (2003) Belowground biomass, production, and carbon cycling in mature Norway spruce, Maine, USA. *Canadian Journal of Forest Research- Revue Canadienne De Recherche Forestiere*, **33**, 339-350.
- Cronan CS, Grigal DF (1995) Use of calcium aluminum ratios as indicators of stress in forest ecosystems. *Journal of Environmental Quality*, **24**, 209-226.
- Curtis PS, Hanson PJ, Bolstad P, Barford C, Randolph JC, Schmid HP, Wilson KB (2002) Biometric and eddy-covariance based estimates of annual carbon storage in five eastern North American deciduous forests. *Agricultural and Forest Meteorology*, **113**, 3-19.
- Davidson EA, Savage K, Bolstad P *et al.* (2002) Belowground carbon allocation in forests estimated from litterfall and IRGA-based soil respiration measurements. *Agricultural and Forest Meteorology*, **113**, 39-51.

- DeAngelis DL, Gardner RH, Shugart HH (1981) Productivity of forest ecosystems studied during the IBP: the woodlands data set. In: *Dynamics of forest ecosystems*. Vol. (ed. Reichle D. E.), pp. 683. Cambridge University Press, Cambridge.
- DeLucia EH, Hamilton JG, Naidu SL *et al.* (1999) Net primary production of a forest ecosystem with experimental CO<sub>2</sub> enrichment. *Science*, **284**, 1177-1179.
- Dentener F. J. 2006. Global Maps of Atmospheric Nitrogen Deposition, 1860, 1993, and 2050. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/830
- Desai AR, Bolstad PV, Cook BD, Davis KJ, Carey EV (2005) Comparing net ecosystem exchange of carbon dioxide between an old-growth and mature forest in the upper Midwest, USA. *Agricultural and Forest Meteorology*, **128**, 33-55.
- Dorr H, Munnich KO (1987) Annual variation in soil respiration in selected areas of the temperate zone. *Tellus B*, **39**, 114-121.
- Dunn AL, Barford CC, Wofsy SC, Goulden ML, Daube BC (2007) A long-term record of carbon exchange in a boreal black spruce forest: means, responses to interannual variability, and decadal trends. *Global Change Biology*, **13**, 577-590.
- Edwards NT, Harris WF (1977) Carbon cycling in a mixed deciduous forest floor. *Ecology*, **58**, 431-435.
- Ehman JL, Schmid HP, Grimmond CSB, Randolph JC, Hanson PJ, Wayson CA, Cropley FD (2002) An initial intercomparison of micrometeorological and ecological inventory estimates of carbon exchange in a mid-latitude deciduous forest. *Global Change Biology*, **8**, 575-589.
- Eliasson PE, McMurtrie RE, Pepper DA, Stromgren M, Linder S, Agren GI (2005) The response of heterotrophic CO<sub>2</sub> flux to soil warming. *Global Change Biology*, **11**, 167-181.
- Epron D, Farque L, Lucot E, Badot PM (1999) Soil CO<sub>2</sub> efflux in a beech forest: dependence on soil temperature and soil water content. *Annals of Forest Science*, **56**, 221-226.
- Epron D, Le Dantec V, Dufrene E, Granier A (2001) Seasonal dynamics of soil carbon dioxide efflux and simulated rhizosphere respiration in a beech forest. *Tree Physiology*, **21**, 145-152.
- Epron D, Nouvellon Y, Deleporte P *et al.* (2006) Soil carbon balance in a clonal Eucalyptus plantation in Congo: effects of logging on carbon inputs and soil CO<sub>2</sub> efflux. *Global Change Biology*, **12**, 1021-1031.
- Esser G, Lieth HFH, Scurlock JMO, Olson RJ (1997) Worldwide Estimates and Bibliography of Net Primary Productivity derived from Pre-1982. Publications ORNL Technical Memorandum TM-13485. Oak Ridge National Laboratory pp. 132.
- Ewel KC, Cropper WP, Gholz HL (1987) Soil CO<sub>2</sub> Evolution In Florida Slash Pine Plantations .2. Importance Of Root Respiration. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **17**, 330-333.

- Fahey TJ, Hughes JW (1994) Fine-Root Dynamics In A Northern Hardwood Forest Ecosystem, Hubbard Brook Experimental Forest, Nh. *Journal of Ecology*, **82**, 533-548.
- Fahey TJ, Tierney GL, Fitzhugh RD, Wilson GF, Siccama TG (2005) Soil respiration and soil carbon balance in a northern hardwood forest ecosystem. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **35**, 244-253.
- Falge E, Baldocchi D, Tenhunen J *et al.* (2002) Seasonality of ecosystem respiration and gross primary production as derived from FLUXNET measurements. *Agricultural and Forest Meteorology*, **113**, 53.
- Fluxnet (2006) Fluxnet database <http://www.fluxnet.ornl.gov/fluxnet/index.cfm>.
- Fredeen AL, Waughtal JD, Pypker TG (2007) When do replanted sub-boreal clearcuts become net sinks for CO<sub>2</sub>? *Forest Ecology and Management*, **239**, 210.
- Freser F (2001) Multi-decadal atmospheric modeling for Europe GKSS, Galloway J. N., F. J. Dentener, D. G. Capone *et al.* 2004. Nitrogen cycles: past, present, and future. *Biogeochemistry*, 70: 153-226.
- Gaumont-Guay D, Black TA, Griffis TJ, Barr AG, Morgenstern K, Jassal RS, Nesic Z (2006) Influence of temperature and drought on seasonal and interannual variations of soil, bole and ecosystem respiration in a boreal aspen stand. *Agricultural and Forest Meteorology*, **140**, 203-219.
- Giardina CP, Binkley D, Ryan MG, Fownes JH, Senock RS (2004) Belowground carbon cycling in a humid tropical forest decreases with fertilization. *Oecologia*, **139**, 545-550.
- Giardina CP, Ryan MG, Binkley D, Fownes JH (2003) Primary production and carbon allocation in relation to nutrient supply in a tropical experimental forest. *Global Change Biology*, **9**, 1438-1450.
- Gielen B, Calfapietra C, Lukac M *et al.* (2005) Net carbon storage in a poplar plantation (POPFACE) after three years of free-air CO<sub>2</sub> enrichment. *Tree Physiology*, **25**, 1399-1408.
- Global Soil Data Task Group (2000) Global Gridded Surfaces of Selected Soil Characteristics (IGBP-DIS). [Global Gridded Surfaces of Selected Soil Characteristics (International Geosphere-Biosphere Programme - Data and Information System)]. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAAC/569
- GKSS (2001). Multi-decadal atmospheric modeling for Europe GKSS, Frauke, Freser.
- Goulden ML, Miller SD, da Rocha HR, Menton MC, de Freitas HC, Figueira A, de Sousa CAD (2004) Diel and seasonal patterns of tropical forest CO<sub>2</sub> exchange. *Ecological Applications*, **14**, S42-S54.
- Goulden ML, Wofsy SC, Harden JW *et al.* (1998) Sensitivity of boreal forest carbon balance to soil thaw. *Science*, **279**, 214-217.
- Gower ST, Krankina O, Olson RJ, Apps M, Linder S, Wang C (2001) Net primary production and carbon allocation patterns of boreal forest ecosystems. *Ecological Applications*, **11**, 1395-1411.



- Gower ST, Vogel JG, Norman JM, Kucharik CJ, Steele SJ, Stow TK (1997) Carbon distribution and aboveground net primary production in aspen, jack pine, and black spruce stands in Saskatchewan and Manitoba, Canada. *Journal of Geophysical Research-Atmospheres*, **102**, 29029-29041.
- Grace J (2004) CARBO-AGE Age related dynamics of carbon exchange in European forests. Contract EVK2-CT-1999-00045, Final Report. University of Edinburgh, pp.
- Greco S, Baldocchi DD (1996) Seasonal variations of CO<sub>2</sub> and water vapour exchange rates over a temperate deciduous forest. *Global Change Biology*, **2**, 183-197.
- Griffis TJ, Black TA, Gaumont-Guay D, Drewitt GB, Nesic Z, Barr AG, Morgenstern K, Kljun N (2004) Seasonal variation and partitioning of ecosystem respiration in a southern boreal aspen forest. *Agricultural and Forest Meteorology*, **125**, 207-223.
- Grimm U, Fassbender HW (1999) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Guan DX, Wu JB, Zhao XS, Han SJ, Yu GR, Sun XM, Jin CJ (2006) CO<sub>2</sub> fluxes over an old, temperate mixed forest in northeastern China. *Agricultural and Forest Meteorology*, **137**, 138-149.
- Hamilton JG, DeLucia EH, George K, Naidu SL, Finzi AC, Schlesinger WH (2002) Forest carbon balance under elevated CO<sub>2</sub>. *Oecologia*, **131**, 250-260.
- Hanson PJ, Edwards NT, Tschaplinski TJ, Wullschlegel SD, J.D. J (2003) Estimating the net primary and net ecosystem production of a southeastern upland *Quercus* forest from an 8-year biometric record. In: *North American temperate deciduous forest responses to changing precipitation regimes*. Vol. (ed. Hanson P. J. and S. D. Wullschlegel), pp. 472. Springer, New York.
- Harmon ME, Bible K, Ryan MG, Shaw DC, Chen H, Klopatek J, Li X (2004) Production, respiration, and overall carbon balance in an old-growth *Pseudotsuga-tsuga* forest ecosystem. *Ecosystems*, **7**, 498-512.
- Havas P (1999) NPP Boreal Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Haynes BE, Gower ST (1995) Belowground Carbon Allocation In Unfertilized And Fertilized Red Pine Plantations In Northern Wisconsin. *Tree Physiology*, **15**, 317-325.
- Hirano T, Hirata R, Fujinuma Y *et al.* (2003) CO<sub>2</sub> and water vapor exchange of a larch forest in northern Japan. *Tellus Series B-Chemical and Physical Meteorology*, **55**, 244-257.
- Hirano T, Segah H, Harada T, Limin S, June T, Hirata R, Osaki M (2007) Carbon dioxide balance of a tropical peat swamp forest in Kalimantan, Indonesia. *Global Change Biology*, **13**, 412-425.
- Hogberg P, Nordgren A, Buchmann N *et al.* (2001) Large-scale forest girdling shows that current photosynthesis drives soil respiration. *Nature*, **411**, 789-792.

- Hollinger DY, Aber J, Dail B *et al.* (2004) Spatial and temporal variability in forest-atmosphere CO<sub>2</sub> exchange. *Global Change Biology*, **10**, 1689-1706.
- Humphreys ER, Black TA, Morgenstern K, Cai TB, Drewitt GB, Nestic Z, Trofymow JA (2006) Carbon dioxide fluxes in coastal Douglas-fir stands at different stages of development after clearcut harvesting. *Agricultural and Forest Meteorology*, **140**, 6-22.
- Hutyra LR, Munger JW, Saleska SR *et al.* (2006) Seasonal controls on the exchange of carbon and water in an Amazonian rainforest. *Journal of geophysical Research*, **112**, G03008.
- Irvine J, Law BE (2002) Contrasting soil respiration in young and old-growth ponderosa pine forests. *Global Change Biology*, **8**, 1183-1194.
- Ito A, Oikawa T (2002) A simulation model of the carbon cycle in land ecosystems (Sim-CYCLE): a description based on dry-matter production theory and plot-scale validation. *Ecological Modelling*, **151**, 143-176.
- Ito A, Saigusa N, Murayama S, Yamamoto S (2005) Modeling of gross and net carbon dioxide exchange over a cool-temperate deciduous broad-leaved forest in Japan: Analysis of seasonal and interannual change. *Agricultural and Forest Meteorology*, **134**, 122-134.
- Janssens IA, Crookshanks M, Taylor G, Ceulemans R (1998) Elevated atmospheric CO<sub>2</sub> increases fine root production, respiration, rhizosphere respiration and soil CO<sub>2</sub> efflux in Scots pine seedlings. *Global Change Biology*, **4**, 871-878.
- Jordan CF, Cuevas E, Medina E (1999) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- JRC (2006) FAPAR database. Global Environmental Monitoring (GEM) Unit, Institute for Environment and Sustainability (IES), EC Joint Research Centre (JRC), Ispra, Italy  
[http://fapar.jrc.it/WWW/Data/Pages/FAPAR\\_Home/FAPAR\\_Home.php](http://fapar.jrc.it/WWW/Data/Pages/FAPAR_Home/FAPAR_Home.php).
- Kalyn AL, Van Rees KCJ (2006) Contribution of fine roots to ecosystem biomass and net primary production in black spruce, aspen, and jack pine forests in Saskatchewan. *Agricultural and Forest Meteorology*, **140**, 236-243.
- Khomik M, Arain MA, McCaughey JH (2006) Temporal and spatial variability of soil respiration in a boreal mixedwood forest. *Agricultural and Forest Meteorology*, **140**, 244-256.
- Kidwell KB (1997) NOAA global vegetation index user's guide. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center, Climate Services Division, Satellite Services Branch, pp.
- Kimball JS, Thornton PE, White MA, Running SW (1997) Simulating forest productivity and surface-atmosphere carbon exchange in the BOREAS study region. *Tree Physiology*, **17**, 589-599.
- Kira T, Manokaran N, Appanah S (1998) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.

- Knohl A, Schulze ED, Kolle O, Buchmann N (2003) Large carbon uptake by an unmanaged 250-year-old deciduous forest in Central Germany. *Agricultural and Forest Meteorology*, **118**, 151-167.
- Kolari P, Pumpanen J, Rannik Ü, Ilvesniemi H, Hari P, Berninger F (2004) Carbon balance of different aged Scots pine forests in Southern Finland. *Global Change Biology*, **10**, 1106-1119.
- Kowalski AS, Loustau D, Berbigier P *et al.* (2004) Paired comparisons of carbon exchange between undisturbed and regenerating stands in four managed forests in Europe. *Global Change Biology*, **10**, 1707-1723.
- Kowalski S, Sartore M, Burllett R, Berbigier P, Loustau D (2003) The annual carbon budget of a French pine forest (*Pinus pinaster*) following harvest. *Global Change Biology*, **9**, 1051-1065.
- Krakina (1999) NPP Boreal Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Krinner G, Viovy N, de Noblet-Ducoudre N *et al.* (2005) A dynamic global vegetation model for studies of the coupled atmosphere-biosphere system. *Global Biogeochemical Cycles*, **19**, GB1015.
- Kutsch W, Eschenbach C, Dilly O *et al.* (2001a) The Carbon Cycle of Contrasting Landscape Elements of the Bornhöved District. In: *Ecosystem Approaches to Landscape Management in Central Europe. Ecological Studies*, Vol. 147 (ed. Tenhunen J.), pp. 75-95. Springer-Verlag, Berlin Heidelberg.
- Kutsch WL, Liu CJ, Hormann G, Herbst M (2005) Spatial heterogeneity of ecosystem carbon fluxes in a broadleaved forest in Northern Germany. *Global Change Biology*, **11**, 70-88.
- Kutsch WL, Staack A, Wojtzel J, Middelhoff U, Kappen L (2001b) Field measurements of root respiration and total soil respiration in an alder forest. *New Phytologist*, **150**, 157-168.
- Lagergren F, Eklundh L, Grelle A, Lundblad M, Molder M, Lankreijer H, Lindroth A (2005) Net primary production and light use efficiency in a mixed coniferous forest in Sweden. *Plant Cell and Environment*, **28**, 412-423.
- Lai C-T, Katul G, Butnor J, Ellsworth D, Oren R (2002) Modelling night time ecosystem respiration by a constrained source optimization method. *Global Change Biology*, **8**, 124-141.
- Lavigne MB, Boutin R, Foster RJ, Goodine G, Bernier PY, Robitaille G (2003) Soil respiration responses to temperature are controlled more by roots than by decomposition in balsam fir ecosystems. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **33**, 1744-1753.
- Law BE, Falge E, Gu L *et al.* (2002) Environmental controls over carbon dioxide and water vapor exchange of terrestrial vegetation. *Agricultural and Forest Meteorology*, **113**, 97-120.
- Law BE, Kelliher FM, Baldocchi DD, Anthoni PM, Irvine J, Moore D, Van Tuyl S (2001a) Spatial and temporal variation in respiration in a young ponderosa pine forests during a summer drought. *Agricultural and Forest Meteorology*, **110**, 27-43.



- Law BE, Ryan MG, Anthoni PM (1999) Seasonal and annual respiration of a ponderosa pine ecosystem. *Global Change Biology*, **5**, 169-182.
- Law BE, Thornton PE, Irvine J, Anthoni PM, Van Tuyl S (2001b) Carbon storage and fluxes in ponderosa pine forests at different developmental stages. *Global Change Biology*, **7**, 755-777.
- Law BE, Turner D, Campbell J, Sun OJ, Van Tuyl S, Ritts WD, Cohen WB (2004) Disturbance and climate effects on carbon stocks and fluxes across Western Oregon USA. *Global Change Biology*, **10**, 1429-1444.
- Law BE, Waring RH, Anthoni PM, Aber JD (2000) Measurements of gross and net ecosystem productivity and water vapour exchange of a *Pinus ponderosa* ecosystem, and an evaluation of two generalized models. *Global Change Biology*, **6**, 155-168.
- Lee MS, Nakane K, Nakatsubo T, Koizumi H (2003) Seasonal changes in the contribution of root respiration to total soil respiration in a cool-temperate deciduous forest. *Plant and Soil*, **255**, 311-318.
- Lee MS, Nakane K, Nakatsubo T, Mo WH, Koizumi H (2002) Effects of rainfall events on soil CO<sub>2</sub> flux in a cool temperate deciduous broad-leaved forest. *Ecological Research*, **17**, 401-409.
- Li YQ, Xu M, Sun OJ, Cui WC (2004) Effects of root and litter exclusion on soil CO<sub>2</sub> efflux and microbial biomass in wet tropical forests. *Soil Biology & Biochemistry*, **36**, 2111-2114.
- Linder S (1998) NPP Boreal Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Linder S, Agren GI (1998) NPP Boreal Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Lloyd JON, Shibistova O, Zolotoukhine D *et al.* (2002) Seasonal and annual variations in the photosynthetic productivity and carbon balance of a central Siberian pine forest. *Tellus B*, **54**, 590-610.
- Loescher HW, Oberbauer SF, Gholz HL, Clark DB (2003) Environmental controls on net ecosystem-level carbon exchange and productivity in a Central American tropical wet forest. *Global Change Biology*, **9**, 396-412.
- Lugo AE (1992) Comparison of tropical tree plantations with secondary forests of similar age. *Ecological Monographs*, **62**, 1-41.
- Maass M, Martinez-Yrizar A (2001) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Maier CA, Albaugh TJ, Allen HL, Dougherty PM (2004) Respiratory carbon use and carbon storage in mid-rotation loblolly pine (*Pinus taeda* L.) plantations: the effect of site resources on the stand carbon balance. *Global Change Biology*, **10**, 1335-1350.
- Maier CA, Kress LW (2000) Soil CO<sub>2</sub> evolution and root respiration in 11 year-old loblolly pine (*Pinus taeda*) plantations as affected by moisture and nutrient availability. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **30**, 347-359.

- Malhi Y, Baldocchi DD, Jarvis PG (1999) The carbon balance of tropical, temperate and boreal forests. *Plant Cell and Environment*, **22**, 715-740.
- Malhi Y, Nobre AD, Grace J, Kruijt B, Pereira MGP, Culf A, Scott S (1998) Carbon dioxide transfer over a Central Amazonian rain forest. *Journal of Geophysical Research-Atmospheres*, **103**, 31593-31612.
- Markkanen T, Rannik Ü, Keronen P, Suni T, Vesala T (2001) Eddy covariance fluxes over a boreal Scots pine forest. *Boreal Environment Research*, **6**, 65-78.
- Martin JG, Kloeppel BD, Schaefer TL, Kimbler DL, McNulty SG (1998) Aboveground biomass and nitrogen allocation of ten deciduous southern Appalachian tree species. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **28**, 1648-1659.
- Mateus J, Rodrigues AM, Pita GP (2006) Seasonal evolution of Evapotranspiration (regime) and carbon assimilation over a Eucalyptus Globulus plantation. *Silva Lusitana*, **14**, 135-147.
- McCaughey JH, Pejam MR, Arain MA, Cameron DA (2006) Carbon dioxide and energy fluxes from a boreal mixedwood forest ecosystem in Ontario, Canada. *Agricultural and Forest Meteorology*, **140**, 79-96.
- McDowell NG, Balster NJ, Marshall JD (2001) Belowground carbon allocation of Rocky Mountain Douglas-fir. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **31**, 1425-1436.
- Medlyn BE, Berbigier P, Clement R *et al.* (2005) Carbon balance of coniferous forests growing in contrasting climates: Model-based analysis. *Agricultural and Forest Meteorology*, **131**, 97-124.
- Mialet-Serra I, Clement A, Sonderegger N, Roupsard O, Jourdan C, Labouisse JP, Dingkuhn N (2005) Assimilate storage in vegetative organs of coconut (*Cocos nucifera*). *Experimental Agriculture*, **41**, 161-174.
- Miller SD, Goulden ML, Menton MC, da Rocha HR, de Freitas HC, Figueira A, de Sousa CAD (2004) Biometric and micrometeorological measurements of tropical forest carbon balance. *Ecological Applications*, **14**, S114-S126.
- Milyukova IM, Kolle O, Varlagin AV, Vygodskaya NN, Schulze ED, Lloyd J (2002) Carbon balance of a southern taiga spruce stand in European Russia. *Tellus Series B-Chemical and Physical Meteorology*, **54**, 429-442.
- Misson L, Tang JW, Xu M, McKay M, Goldstein A (2005) Influences of recovery from clear-cut, climate variability, and thinning on the carbon balance of a young ponderosa pine plantation. *Agricultural and Forest Meteorology*, **130**, 207-222.
- Mitchell TD, Jones PD (2005) An improved method of constructing a database of monthly climate observations and associated high-resolution grids. *International Journal of Climatology*, **25**, 693-712.
- Mo W, Lee MS, Uchida M, Inatomi M, Saigusa N, Mariko S, Koizumi H (2005) Seasonal and annual variations in soil respiration in a cool-temperate deciduous broad-leaved forest in Japan. *Agricultural and Forest Meteorology*, **134**, 81-94.
- Mollicone D, Matteucci G, Köble R, Masci A, Chiesi M, Smits PC (2003) A Model-Based Approach for Estimation of Carbon Sinks in European Forests. In:

- Fluxes of carbon water and energy of European forests. Ecological Applications*, Vol. 163 (ed. Valentini R.), pp. 179-206. Springer Verlag, Berlin.
- Moncrieff JB, Fang C (1999) A model for soil CO<sub>2</sub> production and transport 2: Application to a Florida Pinus elliotte plantation. *Agricultural and Forest Meteorology*, **95**, 237-256.
- Morgenstern K, Black TA, Humphreys ER *et al.* (2004) Sensitivity and uncertainty of the carbon balance of a Pacific Northwest Douglas-fir forest during El Nino/La Nina cycle. *Agricultural and Forest Meteorology*, **123**, 201-219.
- Mund M, Kummetz E, Hein M, Bauer GA, Schulze ED (2002) Growth and carbon stocks of a spruce forest chronosequence in central Europe. *Forest Ecology and Management*, **171**, 275-296.
- Munger JW, Barford C, Wofsy S (2004) Exchanges between the forest and the atmosphere. In: *Forest Landscape Dynamics in Forests in Time: The Environmental Consequences of 1,000 years of Change in New England*. Vol. (ed. Foster D. and J. Aber), pp. 477. Yale University Press, Yale.
- Murty D, McMurtrie RE, Ryan MG (1996) Declining forest productivity in aging forest stands: A modeling analysis of alternative hypotheses. *Tree Physiology*, **16**, 187-200.
- Nagy NT, Janssens IA, Yuste JC, Carrara A, Ceulemans R (2006) Footprint-adjusted net ecosystem CO<sub>2</sub> exchange and corresponding carbon balance components of a mixed temperate forest. *Agricultural and Forest Meteorology*, **139**, 344-360.
- Nakai Y, Kitamura K, Suzuki S, Abe S (2003) Year-long carbon dioxide exchange above a broadleaf deciduous forest in Sapporo, Northern Japan. *Tellus Series B-Chemical and Physical Meteorology*, **55**, 305-312.
- Nakane K (1980) Comparative studies of cycling of soil organic carbon in three primeval moist forests. *Japanese Journal of Ecology*, **30**, 155-172.
- Nakane K (1995) Soil Carbon Cycling In A Japanese Cedar (*Cryptomeria-Japonica*) Plantation. *Forest Ecology and Management*, **72**, 185-197.
- Nakane K, Tsubota H, Yamamoto M (1984) Cycling of soil carbon in a Japanese red pine forest. I. Before a clear-felling. *Botanical Magazine Tokyo*, **97**, 39-60.
- Nakane K, Tsubota H, Yamamoto M (1986) Cycling of soil carbon in a Japanese red pine forest II. Changes occurring in the first year after a clear-felling *Ecological Research*, **1**, 47-58.
- Nakane K, Yamamoto M, Tsubota H (1983) Estimation of root respiration rate in a mature forest ecosystem. *Japanese Journal of Ecology*, **33**, 397-408.
- Navarro M, Jourdan C, Sileye T *et al.* (2007) Fruit carbon demand drives NPP in a tropical humid coconut agroforest with high GPP. *Tree Physiology*, **Submitted**,
- Norby RJ, Hanson PJ, O'Neill EG *et al.* (2002) Net primary productivity of a CO<sub>2</sub>-enriched deciduous forest and the implications for carbon storage. *Ecological Applications*, **12**, 1261-1266.
- Nye PH, Greenland DJ (1998) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.

- O'Connell KEB, Gower ST, Norman JM (2003) Net ecosystem production of two contrasting boreal black spruce forest communities. *Ecosystems*, **6**, 248-260.
- Ohashi M, Gyokusen K, Saito A (2000) Contribution of root respiration to total soil respiration in a Japanese cedar (*Cryptomeria japonica* D. Don) artificial forest. *Ecological Research*, **15**, 323-333.
- Ohtsuka T, Akiyama T, Hashimoto Y *et al.* (2005) Biometric based estimates of net primary production (NPP) in a cool-temperate deciduous forest stand beneath a flux tower. *Agricultural and Forest Meteorology*, **134**, 27-38.
- Ollinger SV, Smith ML (2005) Net primary production and canopy nitrogen in a temperate forest landscape: An analysis using imaging spectroscopy, modeling and field data. *Ecosystems*, **8**, 760-778.
- Olson RJ, Scurlock JMO, Prince SD, Zheng DL, Johnson KR (2001) NPP Multi-Biome: NPP and Driver Data for Ecosystem Model-Data Intercomparison. Data set. Available on-line [<http://daac.ornl.gov>] from the Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAAC/615
- Oren RAM, Hsieh C-I, Stoy P, Albertson J, McCarthy HR, Harrell P, Katul GG (2006) Estimating the uncertainty in annual net ecosystem carbon exchange: spatial variation in turbulent fluxes and sampling errors in eddy-covariance measurements. *Global Change Biology*, **12**, 883-896.
- Papale, D., M. Reichstein, M. Aubinet, *et al.* (2006) Towards a standardized processing of net ecosystem exchange measured with eddy covariance technique: algorithms and uncertainty estimation. *Biogeosciences*, **3**: 571-583
- Pereira JS, Pita GP, Carneira M *et al.* (2003) Full Carbon Balance in an Eucalypt Plantation in Portugal. *Comparative Biochemistry and Physiology*, **134**, S177.
- Pilegaard K, Hummelshoj P, Jensen NO, Chen Z (2001) Two years of continuous CO<sub>2</sub> eddy-flux measurements over a Danish beech forest. *Agricultural and Forest Meteorology*, **107**, 29-41.
- Powell TL, Bracho R, Li JH, Dore S, Hinkle CR, Drake BG (2006) Environmental controls over net ecosystem carbon exchange of scrub oak in central Florida. *Agricultural and Forest Meteorology*, **141**, 19-34.
- Reichstein M, Rey A, Freibauer A *et al.* (2003) Modeling temporal and large-scale spatial variability of soil respiration from soil water availability, temperature and vegetation productivity indices. *Global Biogeochemical Cycles*, **17**, 1104-1118.
- Reichstein M, Tenhunen JD, Rouspard O, Ourcival JM, Rambal S, Dore S, Valentini R (2002) Ecosystem respiration in two Mediterranean evergreen Holm Oak forests: drought effects and decomposition dynamics. *Functional Ecology*, **16**, 27-39.
- Rodeghiero M, Cescatti A (2006) Indirect partitioning of soil respiration in a series of evergreen forest ecosystem. *Plant and Soil*, **284**, 7-22.
- Rodrigues AM, Pita GP, Mateus J (2005) Turbulent Fluxes of Carbon Dioxide and Water Vapour Over an Eucalyptus Forest in Portugal. *Silvae Lusitana*, **13**, 169-180.

- Roser C, Montagnani L, Schulze ED *et al.* (2002) Net CO<sub>2</sub> exchange rates in three different successional stages of the "Dark Taiga" of central Siberia. *Tellus B*, **54**, 642-654.
- Roupsard O, Bonnefond JM, Irvine M *et al.* (2006) Partitioning of energy and evapo-transpiration above and below a tropical palm canopy (*Cocos nucifera* L.). *Agricultural and Forest Meteorology*, **139**, 252-268.
- Ruess RW, Hendrick RL, Burton AJ, Pregitzer KS, Sveinbjornsson B, Allen ME, Maurer GE (2003) Coupling fine root dynamics with ecosystem carbon cycling in black spruce forests of interior Alaska. *Ecological Monographs*, **73**, 643-662.
- Ruess RW, VanCleve K, Yarie J, Viereck LA (1996) Contributions of fine root production and turnover to the carbon and nitrogen cycling in taiga forests of the Alaskan interior. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **26**, 1326-1336.
- Running SW, Gower ST (1991) Forest-Bgc, A General-Model Of Forest Ecosystem Processes For Regional Applications .2. Dynamic Carbon Allocation And Nitrogen Budgets. *Tree Physiology*, **9**, 147-160.
- Runyon J, Waring RH, Goward SN, Welles JM (1994) Environmental Limits On Net Primary Production And Light-Use Efficiency Across The Oregon Transect. *Ecological Applications*, **4**, 226-237.
- Ryan MG (1991) A Simple Method For Estimating Gross Carbon Budgets For Vegetation In Forest Ecosystems. *Tree Physiology*, **9**, 255-266.
- Ryan MG, Hubbard RM, Pongracic S, Raison RJ, McMurtrie RE (1996) Foliage, fine-root, woody-tissue and stand respiration in *Pinus radiata* in relation to nitrogen status. *Tree Physiology*, **16**, 333-343.
- Ryan MG, Lavigne MB, Gower ST (1997) Annual carbon cost of autotrophic respiration in boreal forest ecosystems in relation to species and climate. *Journal of Geophysical Research-Atmospheres*, **102**, 28871-28883.
- Ryan MG, Waring RH (1992) Maintenance Respiration And Stand Development In A Sub-Alpine Lodgepole Pine Forest. *Ecology*, **73**, 2100-2108.
- Saigusa N, Yamamoto S, Murayama S, Kondo H (2005) Inter-annual variability of carbon budget components in an AsiaFlux forest site estimated by long-term flux measurements. *Agricultural and Forest Meteorology*, **134**, 4-16.
- Saigusa N, Yamamoto S, Murayama S, Kondo H, Nishimura N (2002) Gross primary production and net ecosystem exchange of a cool-temperate deciduous forest estimated by the eddy covariance method. *Agricultural and Forest Meteorology*, **112**, 203-215.
- Saiz G, Byrne KA, Butterbach-Bahl K, Kiese R, Blujdeas V, Farrell EP (2006) Stand age-related effects on soil respiration in a first rotation Sitka spruce chronosequence in central Ireland. *Global Change Biology*, **12**, 1007-1020.
- Saiz G, Green C, Butterbach-Bahl K, Kiese R, Avitable V, Farrell EP (2006) Seasonal and spatial variability of soil respiration in four Sitka spruce stands. *Plant Soil*, **287**, 161-176, DOI 10.1007/s11104-006-9052-0.
- Saleska SR, Miller SD, Matross DM *et al.* (2003) Carbon in amazon forests: Unexpected seasonal fluxes and disturbance-induced losses. *Science*, **302**, 1554-1557.



- Schmid HP, Grimmer CSB, Cropley F, Offerle B, Su HB (2000) Measurements of CO<sub>2</sub> and energy fluxes over a mixed hardwood forest in the mid-western United States. *Agricultural and Forest Meteorology*, **103**, 357-374.
- Schulze E-D (2000) The carbon and nitrogen cycle in forest ecosystems. In: *Carbon and nitrogen cycling in European forest ecosystems. Ecological Studies*, Vol. 142 (ed. Schulz E.-D.), pp. 500. Springer, Berlin.
- Schulze ED, Lloyd J, Kelliher FM *et al.* (1999) Productivity of forests in the Eurosiberian boreal region and their potential to act as a carbon sink - a synthesis. *Global Change Biology*, **5**, 703-722.
- Schuur EAG (2005) NPP Tropical Forest. Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A., <http://www.daac.ornl.gov>.
- Steele SJ, Gower ST, Vogel JG, Norman JM (1997) Root mass, net primary production and turnover in aspen, jack pine and black spruce forests in Saskatchewan and Manitoba, Canada. *Tree Physiology*, **17**, 577-587.
- Subke JA (2002) Forest floor CO<sub>2</sub> fluxes in temperate forest ecosystems An investigation of spatial and temporal patterns and abiotic controls. Ph.D. Thesis. Institution, pp. Pages.
- Subke JA, Hahn V, Battipaglia G, Linder S, Buchmann N, Cotrufo MF (2004) Feedback interactions between needle litter decomposition and rhizosphere activity. *Oecologia*, **139**, 551-559.
- Sulzman EW, Brant JB, Bowden RD, Lajtha K (2005) Contribution of aboveground litter, belowground litter, and rhizosphere respiration to total soil CO<sub>2</sub> efflux in an old growth coniferous forest. *Biogeochemistry*, **73**, 231-256.
- Sun OJ, Campbell J, Law BE, Wolf V (2004) Dynamics of carbon stocks in soils and detritus across chronosequences of different forest types in the Pacific Northwest, USA. *Global Change Biology*, **10**, 1470-1481.
- Tagesson T, Lindroth A (2007) High soil carbon efflux rates in several ecosystems in southern Sweden. *Boreal Environment Research*, **12**, 65-80.
- Tate KR, Ross DJ, O'Brien BJ, Kelliher FM (1993) Carbon Storage And Turnover, And Respiratory Activity, In The Litter And Soil Of An Old-Growth Southern Beech (*Nothofagus*) Forest. *Soil Biology & Biochemistry*, **25**, 1601-1612.
- Thierron V, Laudelout H (1996) Contribution of root respiration to total CO<sub>2</sub> efflux from the soil of a deciduous forest. *Canadian Journal of Forest Research*, **26**, 1142-1148.
- Trumbore SE, Chadwick OA, Amundson R (1996) Rapid exchange between soil carbon and atmospheric carbon dioxide driven by temperature change. *Science*, **272**, 393-396.
- Tucker CJ, Pinzon JE, Brown ME, Slayback DA, Pak EW, Mahoney R, Vermote EF, El Saleous N (2005) An extended AVHRR 8-km NDVI dataset compatible with MODIS and SPOT vegetation NDVI data. *International Journal Of Remote Sensing*, **26**, 4485-4498.
- Urbanski S, Barford C, Wofsy S *et al.* (2007) Factors controlling CO<sub>2</sub> exchange on time scales from hourly to decadal at Harvard Forest. *Journal of Geophysical Research-Biogeoscience*, **112**, G02020.

- Valentini R, DeAngelis P, Matteucci G, Monaco R, Dore S, Mugnozza GES (1996) Seasonal net carbon dioxide exchange of a beech forest with the atmosphere. *Global Change Biology*, **2**, 199-207.
- Valentini R, Matteucci G, Dolman AJ *et al.* (2000) Respiration as the main determinant of carbon balance in European forests. *Nature*, **404**, 861-865.
- Vogel JG, Valentine DW, Ruess RW (2005) Soil and root respiration in mature Alaskan black spruce forests that vary in soil organic matter decomposition rates. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **35**, 161-174.
- Wang C, Yang J (2007) Rhizospheric and heterotrophic components of soil respiration in six Chinese temperate forests. *Global Change Biology*, **13**, 123-131.
- Wang KY, Kellomaki S, Zha TS, Peltola H (2004) Component carbon fluxes and their contribution to ecosystem carbon exchange in a pine forest: an assessment based on eddy covariance measurements and an integrated model. *Tree Physiology*, **24**, 19-34.
- Wang Y, Amundson R, Niu XF (2000) Seasonal and altitudinal variation in decomposition of soil organic matter inferred from radiocarbon measurements of soil CO<sub>2</sub> flux. *Global Biogeochemical Cycles*, **14**, 199-211.
- Williams M, Rastetter EB, Fernandes DN, Goulden ML, Shaver GR, Johnson LC (1997) Predicting gross primary productivity in terrestrial ecosystems. *Ecological Applications*, **7**, 882-894.
- Williams M, Schwarz PA, Law BE, Irvine J, Kurpius MR (2005) An improved analysis of forest carbon dynamics using data assimilation. *Global Change Biology*, **11**, 89-105.
- Wilson KB, Baldocchi DD (2001) Comparing independent estimates of carbon dioxide exchange over 5 years at a deciduous forest in the southeastern United States. *Journal of Geophysical Research-Atmospheres*, **106**, 34167-34178.
- Wirth C, Czimczik CI, Schulze ED (2002) Beyond annual budgets: carbon flux at different temporal scales in fire-prone Siberian Scots pine forests. *Tellus Series B-Chemical and Physical Meteorology*, **54**, 611-630.
- Wofsy SC, Goulden ML, Munger JW, Fan SM, Bakwin PS, Daube BC, Bassow SL, Bazzaz FA (1993) Net Exchange of CO<sub>2</sub> In a Midlatitude Forest. *Science*, **260**, 1314-1317.
- Wu JB, Guan DX, Wang M, Pei TF, Han SJ, Jin CJ (2006) Year-round soil and ecosystem respiration in a temperate broad-leaved Korean Pine forest. *Forest Ecology and Management*, **223**, 35-44.
- Xu L, Baldocchi DD (2004) Seasonal variation in carbon dioxide exchange over a Mediterranean annual grassland in California. *Agricultural and Forest Meteorology*, **123**, 79.
- Yan J, Wang Y, Zhou G, Zhang D (2006) Estimates of soil respiration and net primary production of three forests at different succession stages in South China. *Global Change Biology*, **12**, 810-821.

- Yanai RD, Park BB, Hamburg SP (2006) The vertical and horizontal distribution of roots in northern hardwood stands of varying age. *Canadian Journal of Forest Research-Revue Canadienne De Recherche Forestiere*, **36**, 450-459.
- Yuste JC, Konopka B, Janssens IA, Coenen K, Xiao CW, Ceulemans R (2005) Contrasting net primary productivity and carbon distribution between neighboring stands of *Quercus robur* and *Pinus sylvestris*. *Tree Physiology*, **25**, 701-712.
- Zha TS, Xing ZS, Wang KY, Kellomaki S, Barr AG (2007) Total and component carbon fluxes of a Scots pine ecosystem from chamber measurements and eddy covariance. *Annals Of Botany*, **99**, 345-353.
- Zhang JH, Han SJ, Yu GR (2006) Seasonal variation in carbon dioxide exchange over a 200-year-old Chinese broad-leaved Korean pine mixed forest. *Agricultural and Forest Meteorology*, **137**, 150-165.

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