

## Contents

### Letters

- 1 **What is the quantitative relation between nitrogen deposition and forest carbon sequestration?**  
Peter Högberg
- 3 **The human-induced imbalance between C, N and P in Earth's life system**  
Josep Peñuelas, Jordi Sardans, Albert Rivas-Ubach and Ivan A. Janssens

### Reviews

- 7 **Effects of biotic disturbances on forest carbon cycling in the United States and Canada**  
Jeffrey A. Hicke, Craig D. Allen, Ankur R. Desai, Michael C. Dietze, Ronald J. Hall, Edward H. (Ted) Hogg, Daniel M. Kashian, David Moore, Kenneth F. Raffa, Rona N. Sturrock and James Vogelmann
- 35 **Agricultural greenhouse gas mitigation potential globally, in Europe and in the UK: what have we learnt in the last 20 years?**  
Pete Smith
- 44 **Quantifying levels of biological invasion: towards the objective classification of invaded and invadable ecosystems**  
Jane A. Catford, Peter A. Vesk, David M. Richardson and Petr Pyšek

### Primary Research Articles

- 63 **Avian body size changes and climate change: warming or increasing variability?**  
Rae E. Goodman, Gretchen Lebuhn, Nathaniel E. Seavy, Thomas Gardali and Jill D. Bluso-Demers
- 74 **Evolutionary change in *Cepaea nemoralis* shell colour over 43 years**  
Malgorzata Ożgo and Menno Schilthuizen
- 82 **Adult exposure influences offspring response to ocean acidification in oysters**  
Laura M. Parker, Pauline M. Ross, Wayne A. O'Connor, Larissa Borysko, David A. Raftos and Hans-Otto Pörtner
- 93 **Changes in aquatic vegetation and fish communities following 5 years of sustained low water levels in coastal marshes of eastern Georgian Bay, Lake Huron**  
Jonathan D. Midwood and Patricia Chow-Fraser
- 106 **Spatial variability of the plankton trophic interaction in the North Sea: a new feature after the early 1970s**  
Marcos Llope, Priscilla Licandro, Kung-Sik Chan and Nils Chr. Stenseth
- 118 **Warmer climates boost cyanobacterial dominance in shallow lakes**  
Sarian Kosten, Vera L. M. Huszar, Eloy Bécares, Luciana S. Costa, Ellen van Donk, Lars-Anders Hansson, Erik Jeppesen, Carla Kruk, Gissell Lacerot, Néstor Mazzeo, Luc De Meester, Brian Moss, Miquel Lürling, Tiina Nöges, Susana Romo and Marten Scheffer
- 127 **The responses of grassland plants to experimentally simulated climate change depend on land use and region**  
Astrid Bütof, Lars R. von Riedmatten, Carsten F. Dormann, Michael Scherer-Lorenzen, Erik Welk and Helge Bruelheide
- 138 **Summer warming accelerates sub-arctic peatland nitrogen cycling without changing enzyme pools or microbial community structure**  
James T. Weedon, George A. Kowalchuk, Rien Aerts, Jurgen van Hal, Richard van Logtestijn, Neslihan Taş, Wilfred F. M. Röling and Peter M. van Bodegom
- 151 **Directional climate change and potential reversal of desertification in arid and semiarid ecosystems**  
Debra P. C. Peters, Jin Yao, Osvaldo E. Sala and John P. Anderson
- 164 **The large Amazonian peatland carbon sink in the subsiding Pastaza-Marañón foreland basin, Peru**  
Outi Lähteenoja, Yully Rojas Reátegui, Matti Räsänen, Dennis Del Castillo Torres, Markku Oinonen and Susan Page
- 179 **The use of CO<sub>2</sub> flux time series for parameter and carbon stock estimation in carbon cycle research**  
Timothy Charles Hill, Edmund Ryan and Mathew Williams

# Contents (continued)

- 194 **An agronomic assessment of greenhouse gas emissions from major cereal crops**  
Bruce Linquist, Kees Jan van Groenigen, Maria Arlene Adviento-Borbe, Cameron Pittelkow and Chris van Kessel
- 210 **Temporal trends in N<sub>2</sub>O flux dynamics in a Danish wetland – effects of plant-mediated gas transport of N<sub>2</sub>O and O<sub>2</sub> following changes in water level and soil mineral-N availability**  
Christian Juncher Jørgensen, Sten Struwe and Bo Elberling
- 223 **Elevated CO<sub>2</sub> affects photosynthetic responses in canopy pine and subcanopy deciduous trees over 10 years: a synthesis from Duke FACE**  
David S. Ellsworth, Richard Thomas, Kristine Y. Crous, Sari Palmroth, Eric Ward, Chris Maier, Evan Delucia and Ram Oren
- 243 **Quantifying small-scale deforestation and forest degradation in African woodlands using radar imagery**  
Casey M. Ryan, Timothy Hill, Emily Woollen, Claire Ghee, Edward Mitchard, Gemma Cassells, John Grace, Iain H. Woodhouse and Mathew Williams
- 258 **Chronic N deposition alters root respiration-tissue N relationship in northern hardwood forests**  
Andrew J. Burton, Julie C. Jarvey, Mickey P. Jarvi, Donald R. Zak and Kurt S. Pregitzer
- 267 **Drought effects on damage by forest insects and pathogens: a meta-analysis**  
Hervé Jactel, Jérôme Petit, Marie-Laure Desprez-Loustau, Sylvain Delzon, Dominique Piou, Andrea Battisti and Julia Koricheva
- 277 **Climate change and the invasion of California by grasses**  
Brody Sandel and Emily M. Dangremond
- 290 **Nitrogen deposition enhances moss growth, but leads to an overall decline in habitat condition of mountain moss-sedge heath**  
Heather F. Armitage, Andrea J. Britton, René van der Wal, Imogen S. K. Pearce, Des B. A. Thompson and Sarah J. Woodin
- 301 **Radiocarbon bomb spike reveals biological effects of Antarctic climate change**  
Laurence J. Clarke, Sharon A. Robinson, Quan Hua, David J. Ayre and David Fink
- 311 **Carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) stable isotope composition in plant and soil in Southern Patagonia's native forests**  
Pablo L. Peri, Brenton Ladd, David A. Pepper, Stephen P. Bonser, Shawn W. Laffan and Wulf Amelung
- 322 **Disentangling direct and indirect effects of water table drawdown on above- and belowground plant litter decomposition: consequences for accumulation of organic matter in boreal peatlands**  
Petra Straková, Timo Penttilä, Jukka Laine and Raija Laiho
- 336 **Effects of soil moisture on the temperature sensitivity of heterotrophic respiration vary seasonally in an old-field climate change experiment**  
Vidya Suseela, Richard T. Conant, Matthew D. Wallenstein and Jeffrey S. Dukes
- 349 **Selective decay of terrestrial organic carbon during transport from land to sea**  
Gesá A. Weyhenmeyer, Mats Fröberg, Erik Karlton, Maria Khalili, Dolly Kothawala, Johan Temnerud and Lars J. Tranvik
- Technical Advances**
- 356 **Deciphering the oxygen isotope composition of nitrous oxide produced by nitrification**  
David M. Snider, Jason J. Venkiteswaran, Sherry L. Schiff and John Spoelstra
- 371 **The Dual Arrhenius and Michaelis–Menten kinetics model for decomposition of soil organic matter at hourly to seasonal time scales**  
Eric A. Davidson, Sudeep Samanta, Samantha S. Caramori and Kathleen Savage
- 385 **Calculating CO<sub>2</sub> and H<sub>2</sub>O eddy covariance fluxes from an enclosed gas analyzer using an instantaneous mixing ratio**  
George Burba, Andres Schmidt, Russell L. Scott, Taro Nakai, James Kathilankal, Gerardo Fratini, Chad Hanson, Beverly Law, Dayle K. McDermitt, Robert Eckles, Michael Furtaw and Michael Velgersdyk
- Corrigendum**
- 400 **The response of heterotrophic activity and carbon cycling to nitrogen additions and warming in two tropical soils**  
Daniela F. Cusack, Margaret S. Torn, William H. McDowell and Whendee L. Silver