

Earth and Environmental Science

Transactions of the Royal Society of Edinburgh

volume 109 parts 3–4 2019
(for 2018)



Special Issue

**Earth Surface Processes
and Environmental
Sustainability in China**

Editors

Bojie Fu and Yongguan Zhu

Published by The RSE Scotland Foundation, 22–26 George Street, Edinburgh EH2 2PQ



The Royal Society of Edinburgh is committed to the widespread dissemination of scientific knowledge and has published the *Transactions of the Royal Society of Edinburgh* since 1785, when James Hutton's 'Theory of the Earth' was published in Volume 1. The journal evolved to the *Transactions of the Royal Society of Edinburgh: Earth Sciences* in 1980 and is now (as from 2007) the *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*. Through this journal, the Society continues to encourage and support the international Earth and Environmental Science communities by:

- publishing a journal of international standing and authorship;
- publishing substantial papers on all scientific aspects of **the Earth and its surface environments**;
- publishing without page or colour charges;
- reproducing photographs and artwork to the highest standard, where appropriate at a size larger than is customary; and
- aiming to have papers reviewed within three months by at least two referees of international standing; and usually publishing within six months of acceptance.

The Editorial Board welcomes original manuscripts in the Earth and Environmental Sciences. It also welcomes proposals for Special Issues in these areas.

Editorial Board (as at 31 July 2018)

Ian ALSOP (*Editor*), University of Edinburgh *Tectonics/structural geology*

Donald DAVIDSON (*Chairman & Editor-in-Chief*), University of Stirling *Soil science; soil conservation; anthropogenic impacts on soils; soil biodiversity; geoarchaeology*

Kevin EDWARDS (*Editor*), University of Aberdeen *Environmental change in northern Europe & North Atlantic; Palynology; palaeoecology; Quaternary science; environmental archaeology*

Tony FALLICK (*Editor*), University of Glasgow *Isotope biogeosciences; economic geology; dating & geochronology; the Palaeoproterozoic & Neoproterozoic*

Fiona FORDYCE (*Editor*), British Geological Survey

John GORDON (*Editor*), University of St Andrews *Geodiversity; geoconservation; Quaternary research*

Alistair MCGOWAN (*Editor*), BioGeoD, Edinburgh *Palaeobiology; biodiversity; invertebrate palaeontology; the Fossil Record*

Andrew ROSS (*Editor*), National Museums Scotland, Edinburgh *Invertebrate palaeontology; palaeobiology; palaeoecology; palaeoenvironment; palaeoclimate*

Chris SOULSBY (*Editor*), University of Aberdeen *Hydrogeology; biogeochemistry*

Philip STONE (*Editor*), British Geological Survey, Edinburgh *Scottish and South Atlantic regional geology and tectonics*

Stig WALSH (*Editor*), National Museums Scotland, Edinburgh *Vertebrate palaeobiology; vertebrate palaeontology*

COPYRIGHT: It is the policy of the Royal Society of Edinburgh not to charge any royalty for the production of a single copy of any one article made for private study or research. Specific permission will not be required for photocopying multiple copies of copyright material, to be used for *bona fide* educational purposes, provided this is done by a member of the staff of the university, school or other comparable institution, for distribution without profit to student members of that institution, and provided the copies are made from the original journal. Requests for the copying or reprinting of any article for any other purpose should be sent to the Journals & Archive Officer at the Royal Society of Edinburgh. (publications@theRSE.org.uk).

Earth and Environmental Science Transactions of the Royal Society of Edinburgh is published as one volume of four parts per year, usually in a combination of single and double issues. Volume 108 (2017) will provisionally be published in three parts – one double issue and two single issues.

An annual subscription to *EESTRSE* costs GBP362/ USD663 (Print plus Online); or GBP314/ USD582 (Online only).

Orders should be placed with Cambridge University Press, Journals Fulfilment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK. Telephone: 44 (0)1223 326070; Fax: 44 (0)1223 325150; email: journals@cambridge.org

EESTRSE is indexed/abstracted in the following: Current Contents/Physical, Chemical & Earth Sciences; Biosciences Information Service; Geoabstracts; GEOBASE; Mineralogical Abstracts; Science Citation Index; SciSearch; VINITI (All-Russian Institute of Scientific and Technical Information); *Zoological Record*.

© 2019 The Royal Society of Edinburgh

The Royal Society of Edinburgh, Scotland's National Academy, is Scottish Charity No. SC000470

Cover image: Greening Loess Plateau in China.

Earth Surface Processes and Environmental Sustainability in China

Editors

Bojie Fu and Yongguan Zhu

CONTENTS

B. FU, Y. ZHU and S. WANG Earth surface processes and environmental sustainability in China – preface	373
Q. BAO, L. J. DING, Y. HUANG and K. XIAO Effect of rice straw and/or nitrogen fertiliser inputs on methanogenic archaeal and denitrifying communities in a typical rice paddy soil	375
H. LIANG, Y. XUE, J. SHI, Z. LI, G. LIU and B. FU Soil moisture dynamics under <i>Caragana korshinskii</i> shrubs of different ages in Wuzhai County on the Loess Plateau, China	387
J. LIU, G. GAO, S. WANG and B. FU Combined effects of rainfall regime and plot length on runoff and soil loss in the Loess Plateau of China	397
Q. ZHANG, Z. LI, L. YANG, X. WU and J. ZHANG Separation of environmental effects on community variation of a larch forest in north China	407
P. CHEN, H. Y. WANG, R. L. ZHENG, B. ZHANG and G. X. SUN Long-term effects of biochar on rice production and stabilisation of cadmium and arsenic levels in contaminated paddy soils	415
S. LI, X. YANG, D. BUCHER, H. WANG, H. XU, S. B. HADERLEIN and Y. ZHU Increased copper levels inhibit denitrification in urban soils	421
Y. ZENG, L. WANG, T. XU, X. SONG and Y. YANG Performance of an intermediate soil cover for landfill sites	429
C. WANG, S. WANG, B. FU, L. ZHANG, N. LU and L. JIAO Stochastic soil moisture dynamic modelling: a case study in the Loess Plateau, China	437
J. SUN, Y. LIU, T. ZHOU, G. LIU and J. WANG Soil conservation service on the Tibetan Plateau, 1984–2013	445
H. J. XU, M. DELGADO-BAQUERIZO, F. X. PAN, X. L. AN, B. K. SINGH, S. KHAN G. LI, J. F. TANG, X. F. ZHAO, H. Y. YAO and Y. G. ZHU Relative importance of urban and non-urban land-use types for potential denitrification derived N ₂ O: insights from a regional study	453
X. WANG, F. XIAO, X. FENG, B. FU, Z. ZHOU and C. CHAN Soil conservation on the Loess Plateau and the regional effect: impact of the ‘Grain for Green’ Project	461
K. ZHANG, Y. LÜ, B. FU and T. Li The effects of restoration on vegetation trends: spatiotemporal variability and influencing factors	473
J. BAI, W. LI, Y. ZHANG, L. XIAO, W. LU and Y. LI Distributions and risks of Cu, Cd, Pb and Zn in soils and rice in the North River Basin, South China	483
J. TANG, J. FENG, G. Li, M. LIANG, R. WANG and C. CAI Occurrence and possible sources of organochlorine pesticides in soils of Ningbo, East China	495
W. ZHAO, X. FANG, S. DARYANTO, X. ZHANG and Y. WANG Factors influencing soil moisture in the Loess Plateau, China: a review pesticides in soils of Ningbo, East China	501