Earth surface processes and environmental sustainability in China

Preface

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The study of earth surface processes in China has always been a multidisciplinary subject (Lu *et al*. 2017). Research on these processes includes the investigation of water, soil, the atmosphere and the biosphere, which need to be monitored, analysed and simulated at a range of scales (Fu & Pan 2016). Ecologically fragile areas in China are widely distributed and are subject to large population pressures. Rapid urbanisation, increasing consumer demand and rapid economic growth have put enormous pressures on fragile environments (Fu *et al*. 2007), and the contrasts between human and natural environments in China are striking. Intensive resource development and global change further exacerbate any conflict between economic development and environmental conservation. In the past, governments have, with some success, paid much attention to ecosystem management through increased investment in ecological reconstruction (Ouyang *et al*. 2016). Nevertheless, the ecological problems remain serious, and progress in environmental sustainability continues to pose a significant challenge for China.

This Special Issue of 15 papers focuses on earth surface processes and environmental sustainability in China. The study areas include the Loess Plateau, the Qinghai–Tibet Plateau in the northwest of China and the industrialised region in East and South China. The topics cover field survey methods, model development and comprehensive regional evaluation. The Special Issue also includes the examination of a range of surface processes and regional sustainability issues such as soil moisture, soil conservation, vegetation restoration, heavy metal pollution and microbial processes.

Bao *et al*. (in press) present a study on the effects of rice straw and/or nitrogen fertiliser inputs on methanogenic archaeal and denitrifying communities in typical rice paddy soil. Liang *et al*. (in press) report the results from monitoring soil moisture under different-aged *Caraganakorshinskii* shrubland in Wuzhai County in the Loess Plateau. Liu *et al*. (in press) describe the combined effects of rainfall and plot length on run-off and soil loss in the Loess Plateau. Qindi Zhang *et al*. (in press) present the results from separating the environmental effects on community variation in a larch forest in the Pangquangou National Nature Reserve of North China. Chen *et al*. (in press) describe a field experiment carried out in 2014–2015 to investigate the long-term effects of different biochar amendments on cadmium and arsenic immobilisation in contaminated paddy fields in southern China. Li *et al.* (in press) suggest that Cu accumulation in urban soils from urbanisation may influence denitrification in urban ecosystems based on an urban park soil experiment. Zeng *et al*. (in press) report the performance of an intermediate soil cover for landfill sites.

The modelling of soil moisture processes is central to the development of models such as that by Cong Wang *et al*. (in press), who develop a stochastic soil moisture dynamic model for typical vegetation in the Loess Plateau. Sun *et al*. (in press) use the Revised Universal Soil Loss Equation (RUSLE) model to investigate soil erosion and evaluate its economic value in alpine steppe, alpine meadow, alpine desert steppe and forest on the Tibetan Plateau from 1984 to 2013, and show that the annual averages of potential soil erosion, practical soil erosion and soil conservation were 2.19×10^9 t a^{-1}, 2.16×10^9 t a^{-1} and 2.72×10^7 t a^{-1}, respectively.

Regional evaluation focuses on the cities of southern China and the northern Loess Plateau. Xu *et al*. (in press) use a regional dataset from Ningbo City, China, including 197 soil samples and six land-use types to evaluate the main predictors (land use, heavy metals, soil pH, soil moisture, substrate availability, functional and broad microbial abundances) of potential denitrification in urban and non-urban land-use types. Xiaofeng Wang *et al*. (in press) assess the soil conservation effects of the 'Grain for Green' project on the Loess Plateau. Kun Zhang *et al*. (in press) analyse spatiotemporal variability and the influencing factors relevant to policy on ecological restoration. Bai *et al*. (in press) report results on the distribution and risks of Cu, Cd, Pb and Zn in soils and rice plants in the North River Basin, South China. Tang *et al*. (in press) assess the levels, distribution and risk of organochlorine pesticides in the soils of Ningbo, an industrialised region in East China. Zhao *et al*. (in press) comprehensively review the factors influencing soil moisture in the Loess Plateau.

Overall, earth surface processes are very complex. Data monitoring and analysis, simulation and integrated systems and decision support systems provide the main research themes in earth surface system research (Fu & Pan 2016). The core objectives of earth surface science are to meet the needs

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of complex decision-making through systematic studies on earth surface processes at different spatial and temporal scales.

This Special Issue reports the processes of land surface change within a rapidly developing China. These papers can, therefore, not only help with China's research on earth surface processes and environmental sustainability, but also contribute to China's environmental protection and sustainable development.

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