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EDITORIAL

Thematic Issue: Environment and Health in China—I

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Introduction

Combining and solving environment and health is a major issue in China—a country with tremendous economic development perspectives. Recent developments (e.g., the Tianjin Harbor accident in August 2015) show that China is investing more and more resources and efforts to cope with the industrial development (GDP) into alliancing with environmental safeguarding. The Thematic Issue on Environment and Health in China is a starting point for discussion of a variety of environmental issues, such as distribution and fractionation of rare earth elements in soil–water system and human blood (Li et al. 2014a, b, c, d); spatial evaluation of phosphorus retention in riparian zones using remote sensing data concerning the big and scarce data issues (Dong et al. 2014); toxicity contamination and distribution in soils and plants (Li et al. 2014a, b, c, d); the status and challenges of water pollution problems in China: learning from the European experience (Zhou et al. 2014); the Heihe River basin (Xiao et al. 2014), identifying interactions between river water and groundwater in the North China Plain using multiple tracers (Dun et al. 2014); potential hazardous elements (PHEs) in atmospheric particulate matter (APM) in the south of Xi'an during the dust episodes of (2001–2012) chemical fractionation; ecological and health risk assessment (Li et al. 2014a, b, c, d), occurrence and hydrogeochemistry of fluoride in alluvial aquifer of Weihe River (Li et al. 2014a, b, c, d); contamination assessment and health risk of heavy metals in dust from Changqing industrial park of Baoji (Wang et al. 2014a, b); contamination assessment and health risk of heavy metals in dust from Changqing industrial park of Baoji (Su et al. 2014); sources and transports of polycyclic aromatic hydrocarbons in the Nanshan Underground River, China (Alam et al. 2014); introducing a land-use-based spatial analysis method for human health risk evaluation of soil heavy metals (Wang et al. 2013a, b, c);

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environmental quality assessment and spatial pattern of potentially toxic elements in soils of Guangdong Province (Yang et al. 2013); fraction of Cd in oasis soil and its bioavailability to commonly grown crops in Northwest China (Wang et al. 2013a, b, c); microscopic morphology and elemental composition of size-distributed atmospheric particulate matter in Urumqi (Yin et al. 2013); arsenic movement and traces in the groundwater from the Hetao area, Inner Mongolia (Zhang 2013); multivariate statistical approach to identify heavy metal sources in agricultural soil around an abandoned Pb–Zn mine in Guangxi Zhuang (Huang et al. 2013); hydrogeochemical characteristics of central Jianghan (Zhou et al. 2013); contamination and transfer of potentially toxic elements and their relations with iron, vanadium and titanium in the soil–rice system from Suzhou region (Wang et al. 2013a, b, c).

Environment and health in China has an international perspective as well as can be seen (Al-Khashman 2013) about introducing a land-use-based spatial analysis method for human health risk evaluation of soil heavy metals, natural and artificial radioactivity distribution in soil, rock and water of in gold mines (Faanu et al. 2013), exceedance of air quality standards resulting from pyro-metallurgical production of copper (Serbula et al. 2013), exceedance of air quality standards resulting from pyro-metallurgical production of copper (Tay and Biney 2013). Several thematic issues in EES are dedicated to this topic, in particular dealing with safe water supply in growing urban catchments in China related to mega-cities such as Beijing, Chaohu, Hefei, Kunming (Wang et al. 2015a, b, c, d), Shenyang, Harbin (Song et al. 2015) and greater Shanghai (Xi et al. 2015).

Learning from Integrated Water Resources Management (IWRM) research in Europe became a valuable resource of knowledge for China. This includes modeling (Beinhorn et al. 2005; Beyer et al. 2006; Centler et al. 2010; Kalbacher et al. 2012) and benchmarking (Maxwell et al. 2014; Steefel et al. 2015) as well as monitoring concepts (Rink et al. 2012) as well as comprehensive IWRM strategies for different regions of the world (Kalbus et al. 2012; Grathwohl et al. 2013; Seegert et al. 2014; Chen et al. 2015a, b).

Environment and health in China—I

This thematic issue consists of four aspects:

1. Methods for high-accuracy surface modeling (HASM) to reduce uncertainty of spatial simulation,
2. Approaches to speeding up simulation processes to find solutions for big-data problems,
3. Analyses of environmental components for health models,
4. Modeling highly pathogenic avian influenza.

A surface of an environmental component can be simulated with HASM when their spatial resolution is fine enough, which is uniquely defined by both satellite observations and ground observations. HASM can be used for spatial interpolation, data fusion and data assimilation according to availability of data sources and models (Yue et al. 2015). Spatial interpolation provides effective means to construct a continuous surface from discrete data, for which uncertainty can be considerably improved by introducing global information extracted from the discrete data using geostatistics. Data fusion is to improve the quality of the information so that it is more accurate than would be possible if the data sources were used individually (Xu and Gong 2008; Mitchell 2012). Data assimilation is to use measured observations in combination with a system model in order to derive accurate estimates of the current and future states of the system (Nichols 2010). Two parallel algorithms are developed for conducting calculation with big-data, of which one is based on multi-grid method accelerated by graphic processor unit (Yan et al. 2015) and another one is based on master–slave mode (Zhao et al. 2015b). The environmental components include elevation (Yang et al. 2015a, b; Zhao et al. 2015a), land cover (Fan et al. 2015), precipitation (Wang et al. 2015a; Guo et al. 2015), environmental risks of dust storms (Xie et al. 2015a, b), water (Chen et al. 2015a, b), water chemistry (Qu et al. 2015), and physical properties of soils (Cao et al. 2015; Li et al. 2014a, b, c, d; Guo et al. 2015), riverine invertebrate communities (Jähnig et al. 2015), forecasting of precipitation (Zhao et al. 2015b, c) and trees (Wang et al. 2015b) as well as environmental technology development (Xie et al. 2015a, b). The issue also contains a comparison of environmental legislation approaches in China and USA concerning the sustainable development of coal industry (Dzonzi-Undi and Li 2015). Finally, risk of highly pathogenic avian influenza is analyzed on the basis of parameterizing health models by using research results of the environmental components, which will be mainly involved in the forthcoming Thematic Issue "Environment and Health in China—II" (Huang et al. 2016).

Poyang Lake

A special area of research interest is the Poyang Lake area (Fig. 1). This area has a tremendous importance for Chinese aquatic ecosystems research concerning various aspects, the nutrient distribution (Xiang et al. 2015; Yang et al. 2015a, b), spatial and temporal variations of chlorophyll-*a* concentration (Wang et al. 2015a, b, c, d), the impact assessment of Three Gorges Dam's impoundment on river dynamics in the north branch of Yangtze River estuary the ecosystem (Yu et al. 2014) and ecological risk

Fig. 1 Poyang Lake, sources: China map (*left*) https://upload.wikimedia.org/wikipedia/commons/9/99/China_administrative.gif; photography by Olaf Kolditz (*right*) (see also China Maps statement on the journals webpages at http://www.springer.com/earth+sciences+and+geography/geology/journal/12665)

assessment of DDTs in typical wetland surface soils of Poyang Lake (He et al. 2013). The Poyang Lake is one of research areas for the Sino-German cooperation since many years (Chen et al. 2015a, b) and the funding of new efforts by the Sino-German Society for Science Promotion is very much acknowledged.

Acknowledgments This Thematic Issue is a melting point of the Sino-German cooperation activities in Environmental Information Science—Information for Knowledge is a very important issue to tackle environmental problems. The Sino-German Centre for Environmental Information Science (RCEIS) is tackling this challenge. Germany has experience in solving environmental problems concerning integrated water resources management (IWRM) inside and outside of Germany. We are very grateful to the Sino-German Centre for Science Promotion [funded by the German Science Foundation (DFG) and the Natural National Science Foundation of China (NSFC)] for supporting the activities by a Cooperation Group funding for 2015–2017. Chinese lakes—here the Poyang Lake—became an important research object worldwide. Within the German research initiative CLIENT (International Partnership for sustainable climate protection as well as environmental technologies and services) funded by German Federal Ministry of Education and Research (BMBF) several projects were started recently to support China in solving the water problems in several lakes areas such as Chaohu (Jiang et al. 2014; Huo et al. 2013, 2014; Wang et al. 2014a, b), Dianchi (Wang et al. 2015c) and Taihu (Xi et al. 2015).

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