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# Editorial: Aeolian deposition and Earth surface systems

Aeolian dust is a product of the complex interactions of Earth surface systems and is preserved in various geologic archives, including loess on land and sediments in oceans, lakes, and ice sheets. The processes controlling dust production, transportation, deposition and its post-depositional alteration are closely related to regional tectonic and glacial activity, hydrological conditions, atmospheric circulation, and climate conditions (Liu, 1985; Liu and Ding, 1998; Sun, 2002; Stevens et al., 2013; Smalley et al., 2014). In order to improve the understanding of the dynamics of Earth surface systems, the International Symposium on Aeolian Deposition in Earth History (ISADEH) was held between 12th and 15th October 2015 at the University of Chinese Academy of Sciences, Beijing (Fig. 1). The symposium was organized by the Loess Focus Group of International Union for Quaternary Research (INQUA), the Loess Committee of Chinese Association for Quaternary Research, the Key Laboratory of Cenozoic Geology and Environment, Chinese Academy of Sciences and the CNC-IGBP PAGES Working Group. It is the first international symposium on loess research held in China since that took place in Xi'an in 1985.

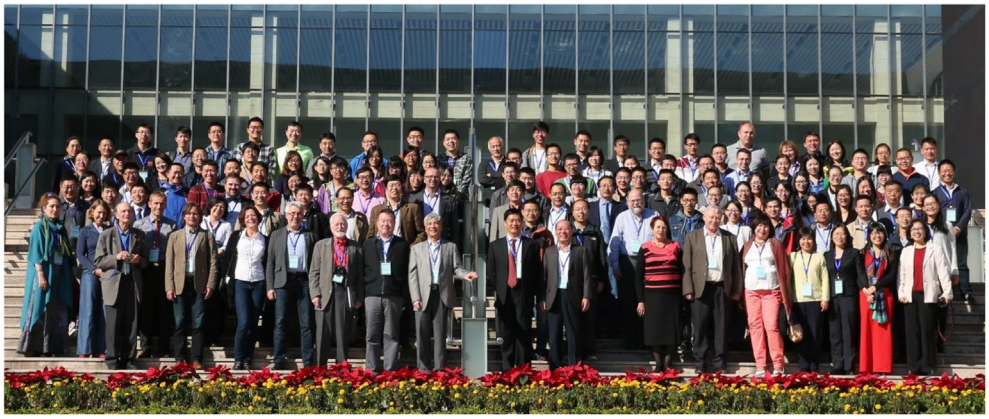

**Fig. 1.** Participants of the ISADEH in front of the Library Building of the University of Chinese Academy of Sciences.

The symposium involved 115 participants from 13 countries, who contributed 46 oral and 38 poster presentations. The papers presented at the symposium dealt with various aspects of aeolian deposits ranging in age from the Eocene to Holocene, but focused on a common theme of aeolian deposition and Earth surface systems. In addition, the symposium excursion provided a unique opportunity to visit some loess sections near Beijing (Fig. 2; Xiong et al., 2001).


**Fig. 2.** Loess deposits at Fanshan visited during the field trip of the ISADEH. A, loess mantle; B, loess-palaeosol sequence.

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This special issue is one of two volumes to be published after the ISADEH conference. This publication again confirms the very successful symbiosis between the Loess and Pedostratigraphy Focus Groups of INQUA and Quaternary International. Since Cremaschi (1990) edited the first Quaternary International special volume on loess, a number of important loess themed special volumes have been published in the official INQUA scientific journal (Pécsi and Lóczy, 1990; Derbyshire, 2001; Velichko et al., 2006; Zöller and Faust, 2009; Marković et al., 2009, 2011, 2014; Frechen, 2011; Jary et al., 2013; Horváth and Frechen, 2014; Catto, 2015; Tasić et al., 2016).

The papers in this special issue cover a range of interests from the story of four outstanding loess scientists and their contributions to loess research (Smalley and Marković, 2018) and a variety of studies related to Holocene (Guo et al., 2018; Liu et al., 2018) and Late/Early Pleistocene paleoenvironmental reconstructions and chronology (An et al., 2018; Fitzsimmons et al., 2018; Khokhlova et al., 2018) to engineering problems such as loess collapse (Assadi-Langroudi et al., 2018). Spatially, this special issue is related to the Asian loess belt, more specifically from Armenia (Khokhlova et al., 2018) through Kazakhstan (Fitzsimmons et al., 2018) to China (An et al., 2018; Guo et al., 2018; Liu et al., 2018).

Loess is a metastable collapsible soil and its collapse can cause significant distress to the built environment across the world. Assadi-Langroudi et al. (2018) developed an improved approach to optimize particle packing parameters, which are particularly important for modeling the collapse process. Khokhlova et al. (2018) investigated age and pedogenesis of loess-like sediments at archaeological sites in northern Armenia and suggested humid sub-tropical climate in the period of the initial hominids dispersion in the early Pleistocene.

Based on detailed data of chronology, sedimentology and pedostratigraphy, Fitzsimmons et al. (2018) found that loess accumulation typically intensifies during phases of mountain glacier advance on the Tian Shan piedmont during Marine Isotope Stage 3. An et al. (2018) investigated a lacustrine core (ISL1A) from Qarhan Salt Lake (QSL) in eastern Qaidam Basin (QB). Using multiple proxies (e.g. Rb/Sr, Sr-Nd isotopes) the authors reconstructed the variations of aeolian input of the paleo-lake and discussed major paleoclimatic drivers for the last 90 ka. Two studies in this special issue deal with Holocene climatic changes in North/Northeast China. Based on OSL dating and three proxies (magnetic susceptibility, total organic carbon and the carbon isotope composition of organic matter) from two aeolian sequences, Guo et al. (2018) provided insight into the vegetation and monsoon precipitation history of the Horqin desert for the last 10 ka. Using grain size distribution data, Liu et al. (2018) reconstructed Holocene water-level changes from a $^{14}$C-dated fluvio-lacustrine sequence at the southeastern margin of the Mu Us Desert in North China and put the inferred hydroclimatic changes into the context of Holocene variations of the East Asian monsoon.

Papers published in this special issue focus on palaeoenvironmental reconstruction for the Pleistocene. However, aeolian deposits are known existed extensively not only in the late Cenozoic (Rea, 1994; Rea et al., 1998; Yang and Ding, 2010; Qiang et al., 2011), but also extended into the deep past of the Earth's history (Soreghan et al., 2002, 2015). The foundational work on aeolian deposits in deep past, such as the major stratigraphic, chronological, sedimentological and paleoclimatic frameworks, remains to be established. Furthermore, accurate quantitative reconstructions of temperature and precipitation, and modeling studies of dust production, transport and deposition in Earth's deep past, are of great importance to gain a better understanding of the complex interactions of Earth surface-climate systems.

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