

Holocene sand dunes activities and climate changes in Central Asia

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In Central Asia, there are deserts and semi-deserts under the inter-continental arid and semi-arid climate. Saryyesik-Atyrau Desert is located as a sandy desert within the sand dunes around Lake Balkhash and Ili River delta in Southeast Kazakhstan. This research aims to clearly the relationship between the sand dunes development and regional or global environmental changes in Saryyesik-Atyrau Desert. In our previous study, the types of sand dunes in Saryyseik-Atyrau Desert were classified into three types (Dune I, II and III) that based on the wavelength, the height and the patterns (Sato et al, 2012a). Dune I and Dune II are seemed to classify Draa (known as the unit of mega-linear dune) in the Last Glacial Age. Dune III, the smallest dune unit including variety of dune type (linear, parabolic, vegetated and blow-out), covers the morphology of Dune I and II. In addition, Sato et al (2012b) suggest the development phase of Dune III during Mid-Holocene in Saryyseik-Atyrau Desert by the OSL dating results (Kondo et al (2011). Otherwise, The analyses of lake sediment core (0901core, 0902core) from Lake Balkhash shows the records of the past 8000 ka, and suggest the lake-level regression and the aridification in around Lake Balkhash (Sugai et al, 2011; Endo et al, 2012). And the some other paleoenvironmental records, from the lake sediment (Chen et al, 2008) or the alluvial sediment (Li et al, 2011) in Central Asia, suggest the sifting from humid to dry phase after the Holocene Climatic Optimum (HCO). Therefore, The sand dunes activity of Saryyesik-Atyrau Desert also seemed to be affected by the aridification in Central Asia that a part of the global climate changes from Mid to Late Holocene (Wanner et al, 2008). The climate changes (the sifting of North Atlantic Oscillation (NAO), the westerlies and Siberian high) probably forces to sift the frequency and the direction of regional previous wind and the annual precipitation in Central Asia.

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