Contribution of Lakes in Sustaining Greening of the Sahara during the Mid-Holocene

*Yuheng LI[1], Kanon Kino[1], Alexandre CAUQUOIN[2], Taikan Oki[1]

1. Department of Civil Engineering, The University of Tokyo, 2. Institute of Industrial Science, The University of Tokyo

The contribution of lake-climate feedback to sustain the Green Sahara in the mid-Holocene (MH, 6000 years ago) is debatable. To assess the lake-induced climate response over North Africa, we investigated the roles of western Sahara lakes and Megalake Chad using the isotope-enabled fifth version of the Model for Interdisciplinary Research on Climate (MIROC5-iso) based on reconstructions of MH Sahara lake maps. The western Sahara lakes pushed the West African monsoon northward and extended it eastward by expanding Megalake Chad. Such lake-climate feedback was caused by the cyclonic circulation response related to weakened African Easterly Jet and enhanced Tropical Easterly Jet. Based on Budyko’ s aridity index results, the northwestern Sahara climate region shifted from hyper-arid to arid or semi-arid with lake expansion. Moreover, precipitation scarcity could reduce by up to 13% to sustain semi-humid conditions. Our findings indicate a promising method to understand the contribution of lakes in sustaining the Green Sahara.

Keywords: Green Sahara, West African Monsoon, Lake Contribution

