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Quantitative reconstruction of river discharge due to East Asian summer monsoon since the last glacial period in the nor

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In this study, $d^{18}O$ of seawater ($d^{18}O_w$), which is a indirect indicator of sea surface salinity, in the northern ECS during the last 45 ka is reconstructed using Mg/Ca ratio and $d^{18}O$ of planktic foraminiferal shells. According to modern observation, interannual variations in sea surface salinity in summer in the northern past of the ECS is mainly controllled by the discharge from the Changjiang, i.e., rainfall in the drainage area of the Changjiang River. Thus, changes in the sea surface salinity in the northern ECS are interpreted as reflecting variations in the EASM precipitation in South China. It is confirmed that the relationship between salinity in the northern ECS and Changjiang discharge by analyzing the observational salinity data from 1950 to 1994.

The reconstructed freshwater discharge from the Changjiang revealed that there is no long-term decreasing trend in the Changjiang freshwater discharge since the middle Holocene to the present, implying that there is no significant change in EASM precipitation in South China. This result reveals that temporal change in summer precipitation in south China during the Holocene does not follow the summer insolation changes in the northern hemisphere. Instead millennial-scale variations in the discharge of the Changjiang freshwater are predominant and its variability is larger than decadal variability. The result reveled that variability of the flux of the Changjiang freshwater during the Holocene on centennial to millennial timescale is larger than decadal scale, but much smaller than interannual scale.

On the other hand, based on the $d^{18}O$ balance calculation in this study it is suggested that surface water in the northern ECS become fresher (1-1.5 PUS lower than present), but estimated average freshwater flux was approximately 25% lower during MIS 3 than during the Holocene. On millennial time scale lower events of the freshwater discharge coincide with Dansgaard-Oeschgar (DO) stadials and Heinrich events in North Atlantic high latitude, while higher discharge events coincide with DO interstadials.