

Formation of networked flow channels in the early Holocene at Lake Tonle Sap, Cambodia

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Lake Tonle Sap is located at the central part of Cambodia, South-East Asia. The water body swells and shrinks at an annual cycle with the water depth ranging from 1 to 10 meters, affected by a seasonal water supply from the Mekong River. Thus, the lake plays an important role as a natural reservoir protecting the region from flooding. A question arises in the paleolimnological context as to how the lake has manifested the function controlling water balance. In this study, we undertook an extensive sonic survey at the lake in order to clarify the subsurface structure of Lake Tonle Sap. In consequence, we discovered deposited valleys forming a complex network of past flow channels in the early Holocene.

The survey was conducted mainly in rainy seasons from 2009 to 2012. Sediment cores were collected at three sites in dry season. Echo sounding was undertaken over the whole part of the lake using a single-channel sub-bottom profiling system (Stratabox, SyQwest Inc.). A prominent sound frequency of 10 KHz was selected in order to observe structure of reflectance planes up to the 40-m depth. The results showed that the subsurface structure of the lake bed was mostly flat with a strongly reflecting plane (#1) observed at the depth of 1-2 meters. The sediments consisted of loose mud up to the #1 plane. At the depth of 10-14 meters, a number of valley-shaped reflecting planes (#2) were observed. A 3-dimensional reconstruction of the #2 plane presented a complex network of deposited flow channels. Radiocarbon dates suggested that the valleys were formed around 10 ka calBP.

Keywords: networked flow channel, Holocene, Lake Tonle Sap