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Late Holocene fluvial landform development in the middle basin of Ili River, Kazakhstan

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Ili River runs from Tien-Sian Mountain as a source and flows into Balkhash Lake in the central Kazakhstan, Central Asia. The basin of Ili River belongs in the semi-arid area, and from the middle basin to the downstream basin is large plain called Ili Delta and observed paleo-channel clearly. Near Bakanas, modern channel runs to the west, meanwhile paleo-channel runs to the north. This means avulsion occurred.

About environmental change in Balkhash Lake, water level change past 2000 years is getting reconstructed for diatom and chemical analyses of drilling core (Endo et al., 2010; Chiba et al., 2010; Sugai et al., 2010 etc.). Shimizu and Sugai (2010) tried to reconstruct paleo-discharge of Ili River from the meander wavelength of Ili River course.

Since the 80 percent of influent water of Balkhash Lake is from the water of Ili River, to reveal the process and chronology of fluvial landforms in the middle and downstream part of Ili River will be useful for not only the key of clarification of landform development but also the key of environmental change in Balkhash Lake.

Fluvial landforms of Ili River including its paleo-channels were classified by field survey in August 2010 and interpretation of satellite images by Google Earth and DEM data from SRTM3.

The paleo-channels and fluvial surfaces were dated by AMS-14C method for the materials in the same fluvial sediment layer obtained through trenching survey. Particle analysis and magnetic susceptibility were also examined.

Fluvial landform along the middle part of Ili River was classified into five surfaces from T1 to T5.

T1 is the oldest, probably Pleistocene terrace covered with vegetated dune sand. At least, two cycles of upper-fining fluvial sediment units consist of T1. T2 is distributed along paleo-channel turning to the north at Bakbakhly. Aeolian sand dune partly covers T2. The paleo-channel is buried at least 30cm with fine aeolian sand.

T3 has paleo-channels whose meander length is larger than that of present channel. This implies that paleo discharge of T3 stage was larger than present discharge (Shimizu and Sugai, 2010). Two radiocarbon ages were obtained. One is about 1500 years ago from shell in sorted sand; the other is about 700 years ago from humic soil showing that the channel changed back marsh. That is to say, about 1500 years ago, the main channel of Ili River was forming T3, and after 700 years ago, this channel was abandoned and T3 became terrace.

T4 is distributed along the main stream of modern Ili River and formed after the main channel of Ili River moved to the west. Large flood is likely to flow into paleo-channels on T4.

T5 is the small floodplain of modern channel of Ili River and along the channel.

Fluvial landform development in the middle part of Ili River basin can be summarized as follows.

At first, Ili River ran on T2. Before 1500 years ago, an avulsion occurred in Ili River and T3 started forming. In this period, Ili River had large discharge and sediment. After T3 formed, Ili River channel shifted to west after 700 years ago, and T3 became terrace and T4 started forming. Today, T4 became terrace, and T5 is forming.

Reference

Chiba et al., (2010) Project report on an Oasis-region, 8, 1

Endo et al., (2010) Reconceptualizing Cultural and Environmental Change in Central Asia: An Historical Perspective on the Future.

Shimizu and Sugai (2010) Project report on an Oasis-region, 8, 1

Sugai et al., (2010) abstract Asian 2k symposium

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