

## The meandering properties of the rivers flowing into Balkhash Lake, and paleo-discharge and environment of Ili river.

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Lake Balkhash is a terminal lake in semiarid region and its water level changes depending on the change of the inflowing river discharges. Today, discharge is controlled by Kapchagay reservoir constructed in 1969. To reconstruct change of paleo-discharge enable us not only to understand river discharge has controlled the lake water level, but also to evaluate development of geomorphology around lake and artificial effect on the discharge change like agriculture or resolver construction in surrounding areas.

Focusing on meandering channel of Ili, Karatal, Lepsy and Aksu rivers inflowing into Lake Balkhash, we measured meander wavelength along the river channels and analyzed its relation with hydrological environment in the basin. To plot discharge  $Q$  (m<sup>3</sup>/s) and meander wavelength  $l$  (km) nearby observatory of the discharge, an exponent function was approximated. The relationship between discharge  $Q$  (m<sup>3</sup>/s) and meander wavelength  $l$  (km) can be written as:  $l=0.14 Q^{0.54}$  (1). Meander wave lengths of above four river channels markedly decrease or increase at the points of agricultural tributary or interflow of tributary, indicating that meander wave lengths sensitively change as a result of hydrologic change. Meandering wavelength shortened on the basement rock, suggesting the strong control of local geological and geomorphological conditions on the channel geometry.

Delta region has evolved in the lower Ili. after flowing toward north and forming Bakanas Delta, the paleo-channel of Ili river turned 50 degrees counterclockwise and have flowing through present delta since the latter half of the 18th century. Paleo-discharges from 13th century to 18th century in which channel moved were reconstructed by measuring some meander wavelengths of paleo-channel in Bakanas Delta in the downstream basin of Ili river.

The meander wavelength of Ili River was longer from 13th to 15th century when the river was forming Bakanas Delta. This suggests that the discharge in that period was more than today. Meander shortening likely reflects discharge decrease due to water withdrawal for agriculture and life, evaporation, groundwater infiltration. Adding to say, modern channel geometry should be strongly influenced by flood discharge control by Kapchagay reservoir. Since Ili River had no tributary in Bakanas Delta and flowed into Lake Balkhash at that time, the main channel of Ili River might have had much discharge. Future study should be needed to evaluate the factors triggering meander and discharge changes in detail.

Keywords: paleochannel, meander wavelength, Ili River, Ili delta, discharge