Late Pleistocene depositional environmental changes in the draining stage of the Paleo-Kathmandu Lake, Central Nepal

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Late Pleistocene depositional environmental changes in the draining stage of the Paleo-Kathmandu Lake in the southern part of the Kathmandu Basin, Central Nepal

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(Key words: Kathmandu Basin, Sunakothi Formation, lacustrine sediments, fluvial sediments, Mahabharat range)

Abstract

The Kathmandu Valley is an intermontane basin located on the southern slope of the Central Nepal Himalaya, and regarded as a valuable archive of recent tectonics and climatic records (Sakai, 2001). The basin fill sediments, especially 200m muddy lacustrine sediments and overlying fluvio-deltaic sediments have an important key to solve the late Pleistocene climate history of Indian monsoon and its relation to the Himalayan uplift. We have studied drilled core of the basin-fill sediments by means of various kinds of analyses since 2001, and reconstructed paleoenvironmental changes of the Paleo-Kathmandu Lake from its birth to drain. In order to clarify the causes of the late Pleistocene environmental changes, whether each change has tectonic origin or climatic origin, we studied the sedimentary facies changes in the Sunakothi Formation, which covers the lacustrine Kalimati Formation.

The Sunakothi Formation is mainly distributed in the southern part of the basin, ranging in altitude from ca.1400m in the southern margin to 1300m in the central part. The whole sequence is gently inclined to the north and gradually thickened toward the center of the basin. Its northern margin is bounded from the fluvio-deltaic Thimi - Gokarna Formation by the Manohara river. In the present study, we redefinded the Sunakothi Formation and divided it into the following four lithostratigraphic units: (1) basal part, (2) lower part, (3) middle part and (4) upper part.

(1) basal part is 2 to 3.5m thick and mainly composed of black to gray muddy rhythmite, which is interpreted to show transition from deep to shallow environment.

(2) lower part is 10 to 12m thick, and mainly consists of sandy fluvial sequence characterized by cross-stratification and ripple drift cross-lamination.

(3) middle part is 8 to 9m thick, and comprises of fining-upward fluvial sequence of gravelly channel-fill, sandy sand bar and muddy flood plain deposits.

(4) upper part is 21 to 22m thick, and composed of sandy to silty rhythmite, which probably indicates marginal shallow lake environments. The upper part is unconformably overlain by terrace gravel of one to 10m thick.

All the detritus of the Sunakothi Formation and overlying gravel beds are composed of meta-sediments, mainly quartzite and sandstone of the Tistung Formation being distributed in the Mahabharat range to the south. Paleo-current directions obtained from both formations also indicate that the provenance was to the south. These facts suggest that the Sunakothi Formation is the southern counterpart of the fluvio-deltaic Gokarna-Thimi Formation deposited in the northern half of the basin. We discuss on the timing and cause of the sedimentary facies changes, on the basis of 14C dating of the Sunakothi and Kalimati Formations and changes in the proxies recorded in the drilled cores.

Reference:

Sakai, H. (2001), Jour. Nepal Geol. Soc., 25 (Sp. Issue), 9-18

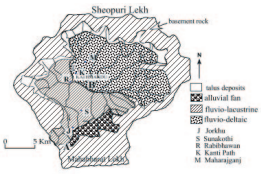

Fig.1.Sedimentary facies map of the Kathmandu Basin

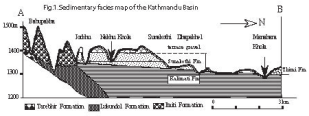

Fig.2. Geological cross-section alongA- B in Fig. 1.

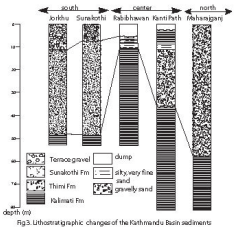

Fig.3. Lithostratigraphic changes of the Kathmandu Basin sediments