

Foraminiferal response to a monsoon variation during a recent 100 years in Lake Chilika, northeastern India

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Lagoon environment is not only affected by human activities, but also sensitive to a climate variation. During a recent 100 years the decreased bio-diversities have been globally noted in coastal lagoon area. In order to better understand the variability of the coastal environment and its relation to the climate variation, we examined foraminiferal response to a decadal or annual variations of Indian monsoon. Two cores, ca. 70cm long respectively, were obtained in 2005 from Lake Chilika, Orissa State, India. Lake Chilika is an ideal lagoon to understand the abovementioned objects, because the water area varies with climatic contrast of the rainy and dry seasons, ranging 906km² to 1165Km². The water depths are also seasonally varied with averaged water depth of 1.5m.

Location 1 is near the middle of sand bar to understand the marine influences from the new lake mouth and Location 2 is positioned in the central part of the lake to understand the main body of lake. Sediment cores were cut into 1 cm interval and they were analyzed for the ²¹⁰Pb(xs) and ¹³⁷Cs radioactivities to estimate the sedimentation rate, organic matter content and foraminiferal occurrences. The sedimentation rate calculated with a simple exponential model for ²¹⁰Pb(xs) shows 1.28cm/yr, while ¹³⁷Cs distribution shows slightly different rate of 0.98 cm/yr at loc. 1. We used the latter sedimentation rate, since we found a prominent radioactivity as more reliable age at 1963. We used 0.77cm/yr of sedimentation rate at Loc 3, since no significant peak of ¹³⁷Cs radioactivity was found. Based on these sedimentation rates, we were able to refer each sample to the 1900s.

In general, total organic carbon (TOC) content of the top sediment is not high in this lake, but maximum values of 2.8% is recognized at Loc 1 near the lake mouth. There are clear positive correlation between TOC and the annual precipitation at Loc 1, and that between TOC and the summer precipitation at Loc 3. These relations suggest that the productivity of lake water is controlled by the monsoon intensity in this lake. Minor variation of ²¹⁰Pb(xs) is also well correlated with the TOC variation at both cores, and supports the high productivity during the strong monsoon season. *Ammonia beccarii* occupies the foraminiferal assemblage of this lake and shows a clear negative correlation with organic matter content. This negative correlation is clear at Loc 1, where abundant *Ammonia* occurred in the decreased total nitrogen (TN) content. The lowered foraminiferal occurrence during the time of increased TN suggests the lowered influences of marine water in the lake due to the active input of riverine water. In contrast, high foraminiferal occurrences suggest the decreased input of riverine water. It is clearer the foraminiferal occurrences are intimately related to the monsoon activities. We will discuss monsoon activities in the 1900s based on the foraminiferal occurrences.