



Planktic foraminiferal assemblages from laminated sediments of the northeastern Arabian Sea: a high-resolution study over the last two millennia

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Modern planktic foraminiferal assemblages in the Arabian Sea are largely controlled by seasonal shifts of surface water properties. Boreal summer (June–September) heating of the Asian landmass and Tibetan Plateau leads to northward migration of the ITCZ and develops an intense atmospheric pressure gradient. Strong monsoonal winds from the southwest lead to coastal- and open ocean upwelling, especially in the western Arabian Sea along the coast of Somalia and Oman. Opposite directed dry and cold winds lead to deep convective mixing during boreal winter (January–March) and breakup of the thermal stratification. Deepening of the mixed-layer thus enables nutrient transport into the photic zone with enhanced primary production.

Here we study planktic foraminiferal assemblages from the dominantly winter monsoon controlled Pakistan Margin off Karachi. We sampled annually laminated sediments from box core SO90-39KG and ca. 2-m-long piston core SO130-275KL from the same station. High sedimentation rates and varve-like lamination provides a particular record with very precise age control. Box core 39KG offers a record of the last 100 years with 2-year-resolution and 275KL provides a ca. 10-year-resolution during the last 2100 years. We calculated foraminiferal flux rates after photometric identification and subtraction of light-colored event layers, consisting solely of terrigenous matter to enable comparison with flux rates from sediment trap stations.

We identified a total of 28 planktic foraminiferal (PF) species/morphotypes in the fraction $>150\mu\text{m}$. During the relatively short period of the past two millennia, several species showed comparatively large fluctuations on decadal time scales, not seen in bioturbated records. *Globigerina bulloides*, a species generally associated with high primary production rates, fluctuates between ca. 10% and 45%. Highest relative share was observed during periods 1593–1413, 1023–923, 483–393, 63– -7 years AD. Average PF accumulation rates follow a general decreasing trend from ca. 30,000 individuals $\text{cm}^{-2} \text{kyr}^{-1}$ at 100 years BC to 9,000 ind. $\text{cm}^{-2} \text{kyr}^{-1}$ at 1890 years AD, suggesting a decrease in absolute PF production.