Impact of freshwater plumes on intraseasonal upper ocean variability from moored observations in the Bay of Bengal
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The Monsoon Intraseasonal Oscillations (MISO) is strongly coupled to upper ocean variability in the Bay of Bengal (BoB). This study analyzes high-resolution moored observations from the northern BoB (18°N, 90°E) in comparison to three RAMA moorings to the south (8, 12, and 15°N, at 90°E). Examination of moored mixed layer salinity and satellite sea surface salinity (SSS) fields suggests that this is due to episodic intrusions of river discharge to the northern BoB driven by strong southward Ekman drift. Our results indicate the critical importance of river water intrusions to improved prediction of upper ocean variability in the BoB in relation to MISO and ISM rainfall.

Summary
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Objectives
• Explain the observed fluctuations in sea surface temperature (SST) and sea surface salinity (SSS) from the mooring data by computing mixed layer heat and salt budgets. Satellite data was used to supplement missing measurements from the RAMA dataset.
• Examine how upper ocean variability varies spatially in the BoB by comparing the moorings and satellite data. In particular we will focus on the impact of the episodic intrusions of river discharge, which caused extreme shoaling of the mixed layer – particularly in the northern Bay.

Results
Past studies suggest that net heat flux largely drives changes in sea surface temperature (SST) in the BoB during the Indian Summer Monsoon (ISM). However, our mixed layer heat budget analysis shows that intraseasonal temperature variability deviated greatly from the simple 1-D balance prediction in late summer.

Analysis of satellite SST data and the Price-Weller-Pinkel (PWP) 1-D ocean model further reveals that accounting for entrainment significantly improved the temperature balance in late summer via barrier layer dynamics, while advection was of secondary importance due to the overall weak SST gradients.

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Conclusions
Southward advection of freshwater from river discharge plays an important role in the heat and salt budgets in the northern Bay of Bengal in late summer. However, the exact timing and extent of individual freshwater intrusions depends highly on synoptic wind conditions and the associated Ekman transport. Our results indicate that freshwater plumes have a large role in determining upper ocean variability and air-sea interaction in the northern part of the Bay. This is significant because better understanding air-sea coupling in the Bay of Bengal is necessary to increase monsoon predictability.