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Intraseasonal rainfall variability in the Bay of Bengal during the Summer Monsoon: Coupling with the ocean and modulation by the Indian Ocean Dipole

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The Indian Summer Monsoon rainfall exhibits pronounced intraseasonal variability in the Bay of Bengal (BoB). This study examines the intraseasonal rainfall variability with foci on the coupling with sea surface temperatures (SST) and its interannual modulation. The lagged composite analysis reveals that, in the northern BoB, SST warming leads the onset of intraseasonal rainfall by 5 days. Latent heat flux is reduced before the rain event but is greatly amplified during the rainfall maxima. Further analysis reveals that this intraseasonal rainfall-SST relationship through latent heating is strengthened in negative Indian Ocean Dipole (IOD) years when the bay-wide local SST is anomalously warm. Latent heat flux is further increased during the intraseasonal rainfall maxima leading to strengthened rainfall variability. The moisture budget analysis shows this is primarily due to stronger low-level moisture convergence in negative IOD years. The results provide important predictive information on the monsoon rainfall and its active/break cycles.