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## Reexamination of East Asia summer monsoon from the perspective of Vapor Kinetic Energy

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Traditional analyses of the East Asian summer monsoon (EASM) emphasize precipitation or circulation patterns, leaving the sustained energetics of long-lived rainbands and their intraseasonal migration less quantified. Building on the Integrated Vapor Kinetic Energy (IVKE) originally developed for atmospheric-river dynamics, we extend the IVKE budget to the EASM rainband. Using MJJAS fields over 15–45° N, 110–150° E, we compute IVKE tendency and decompose it into (i) horizontal/vertical advection, (ii) potential-to-kinetic energy conversion, and (iii) loss terms from turbulent dissipation and vapor condensation. IVKE shows strong coherence with integrated vapor transport, featuring a zonally elongated, poleward-migrating band and a high-IVKE pool over the western North Pacific. Projection onto IVKE yields near-zero net local tendency, indicating a quasi-steady structure in which advection primarily governs spatial movement, while energy conversion and decay terms set amplitude. Potential-to-kinetic conversion maximizes near the western North Pacific subtropical high/low-level-jet region, acting as the principal energy source, whereas condensation and turbulence act as sinks. Vertical advection diagnostics at ~850hPa closely track large-scale precipitation. A mean–covariance partition shows that stochastic covariance dominates the seasonal-mean IVKE pattern, while the mean circulation contributes comparably to the early-season poleward march.

**Keywords:** East Asian summer monsoon (EASM), Integrated Vapor Kinetic Energy (IVKE), energy budget, intraseasonal migration