

## Causes of Inter-decadal Increase in Intraseasonal Rainfall Variability over Southern China around Early 1990s

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The summer intraseasonal rainfall variability in Southern China (SC) shows a significant increase around 1992/1993, which coincides with the inter-decadal increase in summer mean rainfall. This study explores the causes of the inter-decadal change of 10-30-day rainfall variability over SC from 1979-1993 (P1) to 1994-2008 (P2). The SC intraseasonal rainfall events during 1979-2008 are objectively decomposed into three groups using K-means cluster analysis: southward propagating (SP) type, northwestward propagating (NWP) type and northward propagating (NP) type. A further analysis shows that it is the increase in the occurrence frequency of NP type that results in the enhancement of intraseasonal rainfall variability from P1 to P2, while the intensity of each type doesn't change significantly. Vorticity budget analysis suggests that the northward propagation results from the advection of intraseasonal vorticity anomaly by summer mean southerly wind in the middle-to-lower troposphere. A marked increase in the summer mean southerly wind in P2 relative to P1 causes more frequent occurrence of NP type and thus stronger intraseasonal rainfall variability over SC. No significant inter-decadal increase is found in the atmospheric instability over the south China Sea, suggesting that this factor doesn't contribute to more frequent NP type of rainfall in P2 than P1.

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