

Roles of 10–20-day oscillation in sustained rainstorms of October 2010 over Hainan, China

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Outline

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- 2. Circulation systems for the sustained rainstorms in October 2010 in Hainan
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1. Motivation

- The summer sustained rainstrom events in southern China are closely related to the intraseasonal oscillation (ISO) propagation activities.
- 10-20-day and 30-60-day oscillations are often dominant in the SCSSM evolution and the south Asian summer monsoon activities .
- 10-20-day oscillation may also modulate the tropical cyclone activities in the northwestern Pacific.
- This study is going to examine the ISO's influence in the sustained rainstorms over Hainan in autumn, based on an extreme case occurred in Oct. 2010.









Rainfall anomalies in October at Haikou (mm)





Questions:

- 1) Is there any connection between the ISO and the sustained rainstorms of Hainan?
- 2) If so, how does the ISO influence the Hainan sustained rainstorms?



Spatial distribution of accumulated rainfall (mm) for two subperiods over Hainan in October 2010





Sub-period I: 30 Sep-09 Oct, 2010

Sub-period II: 13-18 Oct, 2010



Wind at 850 hPa and p-velocity at 500hPa for the two periods of 1-8 Oct and 15-17 (Shading area for the up motion, blank for down motion; thick dashed lines note the low-level convergence belts)



Power spectrum analysis for time series of Aug to Oct 2010





3 Roles of 10-20-day oscillation in the sustained rainstorms



(a) Latitude-time section of 10-20-day u-component at 850 hPa along 110°E (b) Time-longitude section of10-20-day u-component at850 hPa along 18°N





Evolution of 10-20-day filtered wind at 200hPa







Evolution of 10-20-day filtered wind at 200hPa for the second rainstrom













Lagged regression coefficients of the OLR (contours) and 850-hPa wind anomalies (left panel), moisture divergence(right panel), with respect to the normalized 10–20-day component of OLR(X(-1)) at (85°E, 5°S)





Low frequency components of OLR at (110E,18N)





 (a)Hovmöller diagram of 30-60-day filtered OLR
and (b) Time-latitude section of filtered OLR (W/m²; interval is 10)



4 Impacts of Indo-Pacific SSTA on the 10-20-day oscillations





Anomalies of SST and OLR in Oct 2010





Vertical eastlywind shear is in favour of the northward propagation of ISO

 $\frac{\partial U}{\partial z} < 0$

Vertical shear of zonal wind in Oct 2010: (a)U850-U200 and (b) U850-U200 anomalies (based on 1979-2010) (m/s)



5 Summary

• Influence of QBWO in the first sustained raintrom event:





• Influence of QBWO in the second rainstrom event:





Thanks for your attention