

Motivation of Representation of the Convectively Coupled Kelvin Waves in Modern Reanalysis Products

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Since in former research, convectively coupled Kelvin waves (CCKWs) can't be simulated with fidelity enough. There may be some possible reasons:

- biases in basic state of CCKWs
- errors in the internal dynamics.

Deeper understanding of how CCKWs are modulated by environment variables and how can CCKWs can grow against frictional damping is crucial on solving the two problems above.

This paper starts from discussing former study about active phase of basic state of CCKWs (Kiladis 2009, Yang 2007). Also, these papers suggested that the active phase of CCKWs is mainly happened in relative high SST area (Straub and Kiladis 2002, Roundy and Frank 2004, Yang et al. 2007, Wang and Chen 2016).

The papers above just mentioned this phenomenon, but still unclear about the mechanism of destabilization and the relations between high SST and active phase of basic state of CCKWs.

Also there are some papers researching for the energetic budget in different reanalysis modes, some of which say that first vertical mode is more important, while others say the second mode is important.

All of the papers above is conducting under a hypothesis, which is CCKWs grow as EAPE generation. But which mode is more important had not described yet.

In section 3 of this study, author space-time spectral analysis to explore that the second mode is mainly governing the EAPE growth rate in CCKWs band more, and the first mode is more likely to damp CCKWs.

Also, in section 4, the authors show the mechanism of how relative high SST can affect CCKWs. When the temperature deviation occurs in form of the second mode, CIN near sea surface will become lower, which is a favorable condition for deep convection cumulus to grow. When the deep convection is formed, then it'll moisten the column it occurs. And this moisten anomalies will propagate with CCKWs and cause stratiform heating to help deep convection to develop in higher layer of atmosphere. Therefore, this cause amplification on CCKWs.