Abstract Details

AOGS 1st Annual Meeting > Ocean and Atmospheres > Multi-scale horizontal convections in tropics >

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Title: Multi-scale horizontal convections in tropics
Abstract: In tropical meteorology vertical convections have been studied relatively well, because the tropical atmosphere is characterized by conditionally unstable stratification with high temperature and humidity and actually many tropical phenomena such as ENSO, ITCZ, intraseasonal variations and equatorial waves are recognized mainly by behaviors of convective clouds and their organizations. However, recent observational studies of our group request us to reconsider importance of horizontal convections such as meridional (Hadley and monsoon) circulations and local (sea-land and mountain-valley) circulations, which have have been studied separately in large- and small-scale dynamics. In this paper I start from general Boussinesq equations and present a unified view for the horizontal convections from local to planetary scales. Results provide interaction mechanisms among local, regional and meridional circulations and those between stationary, travelling (wavy) and transient (unstable) components. The wavy and unstable components may be recognized as intraseasonal variations and individual cloud systems, respectively. Therefore, a unified view of the vertical convections is also obtained by considering the horizontal convections.
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