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Propagation of Planetary Waves in the Horizontal Non-uniform Basic Flow and Interactions of the Asian-Australian Monsoon systems

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In view of the separately location of the Asian and Australian Monsoon systems in the Northern and Southern Hemisphere, the interactions of them has to be studied in terms of the interactions between these two hemispheric atmospheres, which is supposed to involve the hemispheric propagation of planetary waves. Although the planetary waves propagation has been studied a lot, most of them were based on the zonal symmetric basic flow in which planetary waves are trapped by the zero line of zonal wind. For this reason, the characteristics of stationary and non-stationary waves propagation in the zonal symmetric and horizontal non-uniform basic flow are researched separately in theory. After analyses of the periodic characteristics of waves propagation in zonal symmetric flow, the conclusion that the period of the ultra-long waves with eastward phase propagation in westerlies and those with westward phase propagation in easterlies is more and less than 30 days separately is obtained. And then the spherical waves propagation in horizontal non-uniform basic flow is theorized from the aspects of the variation of amplitude, the spatial and periodic characteristics of propagation. Some interesting results are as follows. Stationary waves can propagate through the easterlies with a weak meridional wind, so the interactions between the Northern and Southern Hemisphere can be turned out in the view of planetary waves. Besides this, the variation of the amplitude also depends on the meridional wind and the latitude. The wind direct from south(north) to north(south) in Northern Hemisphere and that direct from north (south) to south (north) in Southern Hemisphere make waves grow (decay). The stronger meridional flow and higher latitude, the more intense evolution.