

Multiscale Features of Line-Shaped Precipitation System Generation in Central Japan during Late Baiu Season

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Multiscale structures near the line-shaped precipitation systems observed around Osaka Bay on 2 and 5 July 2006 were analyzed using observational data and a numerical model. In both cases, a cold front extending from a meso-alpha-scale cyclone in the Sea of Japan moved eastward over central Japan, and just before its passage a meso-beta-scale low (named Tokushima small low) formed over the eastern part of Shikoku Island in the warm sector of the meso-alpha-scale cyclone. On the eastern side of Tokushima small low, the southwesterly below 900-hPa level was intensified (-15 m/s) in the warm sector, and it converged with westerly on the western (cold) side of the cold front. Clockwise rotating vertical shear was produced between this southwesterly and the Baiu jet (20?30 m/s) around 700-hPa level. The stability over Osaka Bay was decreased in warm-moist air transported by the southwesterly (equivalent potential temperature > 345 K at 950-hPa level and < 335 K at 600-hPa level). In addition, meso-gamma-scale lee waves were generated by the westerly on the western side of the cold front flowing over the mountains (Awaji Island and Rokko Mountains) surrounding Osaka Bay, and they triggered the development of the line-shaped precipitation system around Osaka Bay. A Tokushima small low was generated in four cases among 15 cases of meso-alpha-scale cold fronts that passed in July during 2003 to 2007. An intense precipitation system related to Tokushima small low was observed only in the two cases.