Vertical wind observation in the tropical upper troposphere by VHF wind profiler - A case study -

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Features of upper-tropospheric vertical wind (W) over Sumatra, Indonesia are presented using data observed by VHF wind profiler installed at Kototabang (KT), west Sumatra (0.2 degS, 100.32degE). During 5–9 May 2004, W from the middle to upper troposphere (8–14 km) changed in accordance with the cumulus activity over Sumatra.

During 5–6 May, the 3-hourly averaged W continuously showed upward motions up to 0.09 m/s. The upward motions were observed in the vicinity of deep convective events, which were continuously seen over Sumatra within a synoptic-scale convectively active envelope. After 7 May, when cumulus activity was suppressed over Sumatra, 3-hourly averaged upward motions of greater than 0.05 m/s almost disappeared.

During 5–6 May, downward motions up to about 0.11 m/s were observed in the uppermost part of the troposphere (above 14 km). Estimation of W by the ECMWF operational analysis revealed that a major part of observed downward motions is explained by the northeasterly wind and southwestward downward tilt of isentropes existed over the western Sumatra. Several mechanisms that can produce the southwestward downward tilt of isentropes are discussed.