



A Numerical Study on Clear-Air Turbulence Occurred in South Korea on April 2, 2007

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On 2 April 2007, 12 clear-air turbulence (CAT) cases were reported from pilot report (PIREP), including seven moderate-or-greater intensity, in Korea during 8 hours from 00 to 08 UTC. Those CAT encounters were distributed in three different regions in Korean peninsula: western coast, eastern mountain area, and Jeju Island. Characteristics and possible mechanisms of those CAT events in the different regions are investigated using a non-hydrostatic and fully compressible numerical model Weather Research Forecast (WRF). The model configuration consisted of five nested domains in the East Asian region with the finest 1-km horizontal grid spacing. Simulated wind and temperature fields on 27-km coarse domain at 00 UTC 4 April agree reasonably well with those observed in rawinsondes launched at 5 stations in Korea.

In synoptic features, strong jet stream flows from the west to the east over Korean peninsula, and upper-level frontogenesis associated with strong meridional temperature gradients is intensified. Especially, deep tropopause folding is developed along strong jet core and upper-level front, and it is well coincident with the CAT encounters near the western coast region. Mountain waves over the eastern mountain area propagate to the region below the jet stream in which the static stability is relatively weak and vertical wind shear is strong. The mountain waves are amplified with height and locally breakdown near the CAT encounters in the eastern mountain area. Trapped lee waves are produced by flow over Mt. Halla in Jeju Island due to significant change of background stability passing through the isolated mountain. These lee waves perturb local wind and stability, promoting development of reduced Richardson number conducive to CAT encounters near Jeju Island. Detailed simulation results will be presented in the conference.