

AN INTEGRATED MODELING SYSTEM FOR STUDYING LONG-RANGE TRANSPORT OF ASIAN DUST

N.H. Lin¹, C.M. Peng¹, H.G. Leu², H.C. Chien²

¹*Department of Atmospheric Sciences, National Central University, Chung-Li, Taiwan*

²*Environmental Protection Administration, Taipei, Taiwan*

This study is aimed at quantifying the impact of Asian dust storms on the air quality of Taiwan using the HYSPLIT model driven by the meteorological fields of MM5 which was initiated with ECWMF global 2.5deg x 2.5deg dataset. Nested grid sizes of 81 and 27 km were adopted for MM5 simulations. Dust source regions were identified through FGGE ground observations. The source strength was determined based on threshold friction velocity, relative humidity and soil type. Three cases which invaded Taiwan were studied. The ground-based observations showed that northern Taiwan was generally impacted by dust storms. For instance, at a baseline air quality monitoring station in Wan-Li, located at the northern coast, PM10 can be enhanced 10 times from below 30 to above 300 ug m⁻³. Quantitatively, simulated PM10 distribution was generally in a good agreement with observations, except for central Taiwan where more complicated topographic effects dominated. However, model can well capture the timing that dust plume reached Taiwan. The spatial dust distribution was also compared with TOMS aerosol index. Moreover, simulations with the 27 km resolution showed a better performance in PM10 distribution over Taiwan than with the coarser one, indicating the advantage of a combined coarse and finer meteorological dataset to drive the dispersion and long-range transport of the Asian dusts for assessing their impact on local air quality.