AOGS 2005

Mesoscale simulation study of heavy rain event associated with the southwest flow induced by typhoon mindulle (2004) over Taiwan

LISA TZU-CHI CHANG[1] WEN-TING HUANG[2,3] GEORGE TAI-JEN CHEN[2]

[1]*Department of Environmental Management, Tung-Nan Institute of Technology, Taiwan*
[2]*Department of Atmospheric Sciences, National Taiwan University, Taiwan*
[3]*Central Weather Bureau, Taiwan*

A heavy rainfall event in Taiwan occurred during the period of 2-4 July 2004 associated with the southwestly flow induced by Typhoon Mindulle. Satellite imageries of early July show a cloud band of nearly 1000 km, with a series of embedded mesoscale convective systems (MCSs) developed over the coastal area from southern China to South China Sea. The Navy Global Atmospheric Prediction System (NOGAPS) global analyses with 1° latitude/longitude resolution revealed the prevailing strong southwesterlies over South China Sea from the low levels up to 700 hPa at this time. Significant low level moisture convergence due to the decelerating southwesterlies was found in the position consistent with the MCSs development. The development and northeastward propagation of the MCSs produced heavy rainfall over western Taiwan, with a maximum 24-h accumulated rainfall of 450 mm on 2 July. About one day later, an orographic rainfall event with a maximum 24-h accumulated precipitation up to 800 mm occurred on 4 July over the western Central Mountain Range (CMR). This later rainfall maximum was attributed to the strong southwesterly flow impinging on the CMR.

The dynamical mechanisms of this heavy rainfall event associated with Typhoon Mindulle are investigated by performing triply nested, nonhydrostatic numerical simulations using the atmospheric part of the Coupled Ocean/Atmospheric Mesoscale Prediction Systems (COAMPS) developed in the U.S. Naval Research Laboratory (NRL). The COAMPS control run is conducted with full physics and the ability of the model to reproduce the evolution of the MCSs will be evaluated. Preliminary simulation results show that the overall rainfall pattern is well captured by COAMPS. Some of the more detailed results as an effort to investigate the mechanisms in initiating and maintaining the convective precipitations leading to different spatial distribution of rainfall during early July 2004 will be presented during the conference.