AOGS 2006
©2006 Asia Oceania Geosciences Society, Singapore

Simulating Weather Around Singapore Using COAMPS

LAN YI[1], TIEH-YONG KOH[1]
[1] *Nanyang Technological University*

From April to October each year, the weather in Singapore is dominated by afternoon convective showers and morning squall lines. In this study, we employed the US Navy's mesoscale numerical weather prediction model COAMPS* to simulate convective weather around Singapore in several real cases from July 2002 to October 2005. Our focus was the Sumatra squall lines which frequently form along the Melaka Straits and sweep across Malaysia and Singapore in the early or late morning hours. Real case studies displayed that the COAMPS model captured well the evolution and organization of the synoptic-scale intensive cloud band activities north of Borneo on 16-17 July 2003. Results in general indicated that COAMPS was able to predict better large scale precipitation systems than small short-lived local systems. It was able to produce reasonably well the diurnal variations of wind, temperature and boundary layer structure around Singapore. A warm start simulation and a cold start simulation were compared, and each claimed better forecast of certain weather systems at different scales, suggesting that the initial analysis (data assimilation) methods are scale dependent, and ought to be applied distinguishingly to appropriate target weather events. Regarding Quantitative Precipitation Forecast (QPF), none of the real case simulations generated enough surface rain in the city of Singapore at the right time and location compared with radar observations. Missing self sustained squall line dynamics on the finest model grid and inadequate initial triggering at mesoscale were thought to be the main causes of the underestimated rainfall forecast in Singapore. As an effort to improve the QPF skill at mesoscale, an Ensemble Kalman Filtering (EnKF) data assimilation program utilizing radar observations was designed and developed. This was a significant expansion and supplement to the current COAMPS data analysis capability. The robustness of the code was tested in a splitting supercell case, and results demonstrated that the EnKF was able to reduce the forecast errors of COAMPS forecast winds to acceptable levels. An idealized assimilation case in the tropics is being configured and the technique will be applied to a real tropical convective storm case in the near future. *COAMPS stands for Coupled Ocean/Atmosphere Mesoscale Prediction System. COAMPS is a registered trademark of US Naval Research Laboratory.