The Application of Weather Research and Forecasting (WRF) Model to Regional Climate and Environmental Study over Taiwan

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Abstract

Taiwan is an island with a unique geographic landscape in the subtropics off the southeast coast of China. Mountains occupy about two-thirds of Taiwan's land mass. The topographic significantly affect the formation of precipitation systems, as thermal forces influence circulation around the mountains. Monsoon, with their distinct circulations, strongly affect East Asia and Taiwan's climate and even the air quality. For example, the prevailing north easterly monsoon during winter and spring dominates the weather pattern and determines the air quality through the significant long-range transport of Asian dust and anthropogenic pollutants southward to Taiwan. Actually, Taiwan's unique geographic location has received more than just one source in springtime, one is from continental outflow (dust and anthropogenic pollutants) and the other is from IndoChina or South Asia (biomass burning). During summer and autumn, tropical cyclones occur annually around Taiwan with three or four on average. The interaction of the typhoon circulation with mountain could produce significant precipitation distribution over Taiwan.

In this presentation, the application of the Weather Research and Forecasting (WRF) model will be presented on the topics, such as, long-range transport of Asian dust to Taiwan, biomass burning transport from Indochina, typhoon Morakot simulation study and regional climate change study. Currently, the new gLite-based WRF web portal (gWRF) has been successfully set up and run in Grid Computing Center, Academia Sinica Taiwan. GLite middleware enables WRF to run on the global grid infrastructure. To share our model application experiences and collaborate with other climate and weather research communities on disaster mitigation and extend related e-Science activities to other grid infrastructures are our major purposes.