

# **Advancements in Implementing the MPAS-A Regional Model at the Central Weather Administration**

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In our ongoing efforts to enhance weather modeling capabilities at the Central Weather Administration (CWA), we have integrated several key components from the Weather Research and Forecasting (WRF) operational model into the MPAS-A Regional Model. Collaborating with National Taiwan University (NTU), we have developed the cloud physics scheme TCWA1, which has been integrated into the model framework.

One key focus of our work has been comparing the surface wind speeds simulated by MPAS-A with those from the Weather Research and Forecasting (WRF) model. Our analyses have revealed notable discrepancies between the two models, prompting the introduction of the `topo_wind` option from WRF. This addition aims to mitigate wind speed biases and improve the overall accuracy of our simulations, particularly in complex terrain regions.

The grid generation program plays a critical role in setting up the computational grid for weather simulations. By leveraging GPU acceleration, we achieved significant improvements in the performance of this program. The tailored GPU acceleration techniques, developed in collaboration with the NVIDIA mentors in NCHC Open Hackathon, allowed for faster data processing and computation, leading to a six-fold speed increase compared to the previous implementation.

Key words : MPAS-A, regional forecasting, mesh grid generation, GPU acceleration