Air-sea coupling improves the simulation of the western North Pacific summer monsoon

25 November 2020

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Regional air-sea coupling plays a crucial role in modulating the climatology and variability of the Asian summer monsoon. The Weather Research and Forecasting (WRF) model, which is a community regional climate model, has been widely used for regional climate studies over Asia.

"Version 4 of the WRF model, namely WRF4, has just been released, and so a comparison of ocean-atmosphere coupled versus atmosphere-only WRF4 models over the WNP is a necessary but as yet unreported line of investigation," explains Dr. Liwei Zou from the Institute of Atmospheric Physics, Chinese Academy of Sciences, and author of a paper on this topic recently published in *Atmospheric and Oceanic Science Letters*.

Zou and his colleagues developed a new regional ocean-atmosphere coupled model based on WRF4 and the high-resolution regional version of LICOM (the LASG/IAP Climate Ocean Model) to investigate the impacts of regional air-sea coupling on the simulation of the western North Pacific summer monsoon. The resolution is set to 15 km (10 km) in the atmospheric (oceanic) model component, which is able to resolve the weather (ocean mesoscale eddies).

"Our model results indicate that WRF4-LICOM improves the simulation of the summer mean monsoon rainfall, circulations, sea surface net heat fluxes, and propagations of the daily rainband over the WNP", states Dr. Zou.

The local observed daily SST over the WNP is a response to the overlying summer monsoon. In the WRF4 model, the modeled atmosphere exhibits a passive response to the underlying daily SST anomalies. With the inclusion of regional air-sea coupling, the simulated daily SST-rainfall relationship is significantly improved.

"We recommend using the regional coupled model WRF4-LICOM for future dynamical downscaling of simulations and projections over this region," concludes Dr. Zou.

More information: Liwei Zou. Does regional air–sea coupling improve the simulation of the summer monsoon over the western North Pacific in the WRF4 model?, *Atmospheric and Oceanic Science Letters* (2020). DOI: 10.1080/16742834.2020.1819755

Provided by Chinese Academy of Sciences