EGU21-12314
https://doi.org/10.5194/egusphere-egu21-12314
EGU General Assembly 2021

COSMIC project: COnvective-Scale Modelling In China

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The East Asian Summer Monsoon (EASM) is an inherently multiscale phenomenon and new generations of global convection-permitting climate models hold great promise in representing such multiscale monsoon interactions.

Motivated by the recent availability of multi-year simulations with the HadGEM3 global climate model at about 10km resolution and different treatments of convection, the COSMIC project has delivered new process-based and decision-relevant metrics of diurnal and intraseasonal variability, and of the seasonal progression of the EASM: The newly developed BASMATI (Basin-Scale Model Assessment ToolkIt) tool is used for the scale-selective evaluation of the diurnal cycle of precipitation over Asian river basins and it is used to show that the phase of the diurnal cycle is much better represented in a convection-permitting setup of the global model, whereas mean precipitation biases in this setup are substantial and point to the need for further tuning of this new model version. Furthermore, a new automated method for identifying the EASM front has been developed and applied to ERA5 reanalysis data in a detailed description of the seasonal progression of the front. Lagrangian trajectory analysis is employed to identify air-mass convergence at the EASM front and highlights the specific conditions of converging warm and moist tropical and cooler subtropical air masses during the Mei Yu season. These results offer a new framework for studying the seasonal EASM progression and its representation in models. Finally, the different metrics developed in COSMIC are used for a statistical and dynamical characterisation of the exceptional precipitation and flooding affecting different parts of Asia, and the Yangtze river basin in particular, in June/July 2020.This poster provides a project overview and complements two separate conference papers discussing COSMIC results in greater detail.