Frontier Simulations for the Monsoon Region

Monsoon systems are characterized by seasonal wind reversals and accompanied by large changes in precipitation. Billions of people are affected by the monsoon systems, because these affect water availability and food production. Our understanding

5 of the monsoon system is still incomplete. The ability to predict seasonal evolution is limited and the behaviour of monsoon systems under climate change is highly uncertain.

We tackle this problem in a multi-institutional effort within the ESM (Advanced Earth System Modelling Capacity) project of HGF by implementing approved sub-models (i.e. FESOM2 (Finite-volumE Sea ice-Ocean Model), CLaMS (Chemical Lagrangian model of the stratosphere) into the Earth system modelling infrastructure of MESSy (Modular Earth Sub-Model System).

This extended and unique Earth system model combining different compartments, but also different atmospheric cores and Lagrangian models is employed for selected frontier simulations. Frontier simulations are a concept to have only a limited number of tailored simulations with such an exclusive Earth system model. They are expected to help reducing uncertainties, specifically in the description of monsoon-related processes and feedback mechanisms, and improve our understanding of

15 related physical processes.

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