

“Next Generation” storm- and eddy resolving coupled models: status and perspective for research on climate variability

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Several international programs are focusing on the development and assessment of a new generation of climate models: global storm- and eddy-resolving configurations at km-scale resolution. Using newly developed modelling systems such as ICON and IfS/FESOM, the European Union H2020 projects EERIE and NextGEMS aim to explicitly resolve crucially important, yet unexplored regimes of the Earth system, leveraging latest advances in technology. The promise is to reduce long-standing biases, and to open new frontiers to assess hypothesis underpinning our understanding of climate change, including convective organization, clouds, (sub)mesoscale ocean-atmosphere interactions, and the role of the mesoscale for shaping climate variability. The projects also propose to build new, more integrated user interfaces for innovative forms of participating, serving as prototypes for the Earth’s “Digital Twins”.

EERIE and NextGEMS are now in their production phase and first results demonstrate, for example, that including previously unresolved processes leads to considerable advances. On the other hand, challenges remain, such as remaining mean-state biases, short simulation times, and a high demand in computational power.