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Prospects for climate-scale regional numerical modelling for the Arabian Gulf and Qatar's marine region

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ABSTRACT

Physical oceanographic studies at the Environmental Science Center (ESC) entail observational and numerical aspects. The main objective of observational studies is to build a reference time series for Qatar's marine exclusive economic zone (EEZ), in which prominent spatial and temporal gaps in physical oceanographic knowledge exist due to scarcity of historical observational data. Numerical modelling studies are conducted to counteract the sparse nature of available marine observational data by complementing this space with simulated output. Numerical modelling of ocean circulation along with coupled atmosphere and marine ecosystem components involve high performance computational tools and model coupling interfaces. A high-resolution, multi-component regional numerical model capable of producing short and long-term data products for the Arabian Gulf and Qatar's EEZ is currently being implemented. The model system features a lower trophic level ecosystem module (nutrient-phytoplankton-zooplankton-detritus - NPZD) coupled to dynamical downscaling models of regional marine and atmosphere circulation. The output from this study is expected to: (i) provide a simulated picture of the present situation of Qatar's EEZ, as validated by historical and recent observational data; (ii) provide insight on the interaction among various components of the marine environment (i.e., atmosphere, ocean, ecosystem); (iii) predict regional marine physical-biogeochemical status as forced by forecasted natural and anthropogenic drivers; and (iv) assess and forecast marine resource availability for food, water, and renewable energy.

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