OceanWeather
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OceanWeather is a common MPI-M/UHH project as part of the HerZ (Hans-Ertel Zentrum) program. HerZ is a networked cooperation between German universities, research institutes and the German Weather Service generating knowledge and expertise on complex research topics in weather, climate and environmental services. HerZ aims at combining basic research and teaching in the atmospheric sciences more effectively with the challenges of operational weather and climate services.

The principle aim of ***OceanWeather*** is to explore at two very contrasting scales how the advent of eddy-resolving sub-mesocale ocean modelling and convection resolving atmosphere modelling, respectively, can advance weather and Earth System predictions. Concerning climatic forecasts, new routes in ocean initialization and the boost of ocean resolution to km scale are examined with the ultimate goal to enhance coupled climate predictability and provision of adequate information of the coupled mean climate and high-impact events on timescale from months to decades. The considered activities offer multiple and strong connections to many of the HErZ areas of competence. One goal relates to the area of data assimilation by considering new initial ocean data for climate predictions, and adapting the grid to the observed variance and observational density. As another goal, the project further complements current activities on the model development of ICON-Seamless for pursuing Earth System predictions. We investigate the role of a higher-resolving ocean component on meso- and sub-mesoscales for the air-sea interaction and impact on key atmospheric processes for climate prediction.

Analogous to the ocean adding predictability on seasonal to climatic time scales, small scale processes, such as cold pools generated by evaporative cooling below precipitating clouds, contribute to predictability on convective scales. We capitalize on the strong background and collaborations in understanding convective processes established over past HErZ phases at DWD, MPI-M and University of Hamburg to extend our knowledge of the spatial and temporal structure of cold pools. This will help to advance both the realism of convection resolving simulations and the quality of nowcasting warnings. Using the wealth of high-quality observations gathered of the recent FESSTVaL campaigns as starting point, we refine and extend the cold pool detection methods developed in the previous HerZ phase. We include yet unexploited sensor synergies of e.g. new data sources like upcoming profiling stations or dense citizen science networks. Integration of the operational observing system of the German Meteorological Service will expand the cold pool analysis from the dedicated FESSTVAL domain to entire Germany. This will enable us to describe the full life cycle of cold pools by statistical relations that can be used to verify convection resolving models. Finally, the density currents of cold pools will be used as testbed to understand atmosphere-surface interaction and to advance its parameterization. Here, the campaigns FESST@HH, FESSTVaL and VITAL offer observational constraint for two contrasting (urban, rural) lower boundaries.