

The project HD(CP)<sup>2</sup> (High Definition Clouds and Precipitation for advancing Climate Prediction) addresses the lack of understanding of cloud and precipitation (CP) processes, which is one of the foremost problems of climate simulations and climate predictions. In its first funding phase, the project leveraged rapid developments in simulation and measurement science (through its modeling and observation modules) and thus provided new insights to resolve the CP roadblock. This resulted in a significantly improved representation of clouds and precipitation in the ICON (Icosahedral non-hydrostatic) model that is used for hindcast simulations in HD(CP)<sup>2</sup>. This model is currently utilized on a scale of 150m horizontal resolution over regions so diverse as central Europe, the Tropical and the Northern Atlantic. In its second funding phase, the work of the modeling and observation modules is utilized in several synthesis modules that investigate various topics such as the fast cloud adjustments to aerosols, convective organization of clouds or the influence of land surface heterogeneity. Data from observation campaigns is made available through the project own data base SAMD to the scientific community.