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Climate Knowledge Facility model platform: a system to investigate the effects of climate change on the Dutch water system

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In this paper, we present the Climate Knowledge Facility (CKF) model platform, hereafter referred to as the CKF-system. The CKF-system is a coupled model system built in the open model shell Delft-FEWS. It contains one-way coupled hydrological and hydraulic models of the Rhine, Meuse, Northern Delta area, North and Wadden Sea, and the Dutch water system. CKF can be used to consistently investigate the effects of different climate scenarios and forcings on the Dutch water system. The CKF-system has been set up in such a way that models can be easily substituted or added (water quality and effect models for example).

To demonstrate the capabilities of the system, we performed a case study, requiring a full run of the complete model suite. As input, we used a 30-year dataset from the "Ensemble SimulationS of Extreme weather events under Nonlinear Climate change" (ESSENCE) project made available by the Royal Netherlands Meteorological Institute (KNMI). From the results, we investigated the joint probability distribution of extreme discharges from the main rivers and extreme water levels, at the North Sea coast. The CKF-system can estimate these variables jointly using a consistent input dataset.

We showed that the CKF-system can be used to estimate consistent joint probability distributions of events at different locations. Future work will focus on longer climate time series (up to 150 years), bias correction of the input data and including sea level rise scenarios for the North Sea and Wadden Sea.