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Intercomparison of distributed hydrological models for flood forecasting in the Odra River basin

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There are dozens if not hundreds of hydrological models available today; with different levels of complexity, from lumped to distributed, conceptual to physics-based, 1-D to 3-D and so on. The challenge for the practicing hydrologist is to select the model best suited to his or her problem. Here an alternative approach is presented where the hydrologist can select different levels of complexity within the same framework. For flood forecasting the main objective is to accurately predict catchment outflows from upstream subcatchments and flood wave propagation along the drainage network. Therefore many operational flood forecasting models are based on simple modelling approaches. However with the increasing availability of spatially distributed information from weather radar, satellite, meteorological models and GIS databases, considerable opportunities now exist to make improved predictions. This gives rise to a number of scientific and practical questions such as what level of distributed data is needed to make sufficiently accurate flood forecasts, which processes benefit most from distributed data and distributed modelling and how should sub-grid processes be treated?

Within the EU 5^{th} framework project FLOODRELIEF a number of different distributed modelling approaches have been used in the Odra River Basin in Poland to address these questions for operational flood forecasting. One component of this is the development of a process-based hydrological modelling framework that allows the hydrologist to explore different levels of model complexity and spatially distributed data and modelling. This framework is used to explore the effects of using different pro-

cess descriptions and levels of spatial resolution in the surface runoff processes which are critical for modelling flood events. Evaluations are carried out on the mountainous tributary catchments in this basin including the Kaczawa and Bobr River basins, Analysis of catchments in the Odra FLOODRELIEF case study as well as previous work in the US NWS DMIP study catchments suggest that for practical cases the limiting factor is the data availability. The conclusion being that hydrological models should be adaptive both in terms of data requirements, complexity, spatial distributed modelling. The tool presented here provides one possible adaptive approach.