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Towards the Development of a High-resolution, Global Streamflow and Flood Forecasting System – An U.S. Interagency Collaboration Effort

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This work provides an envisioned overview of scientific collaboration among multiple United States agencies including the National Aeronautics and Space Administration (NASA), U.S. Army Engineer Research and Development Center (ERDC), Oak Ridge National Laboratory (ORNL), and National Geospatial-Intelligence Agency (NGA) for the integration of existing data and model capabilities to support global scale water security applications. The primary objective is to develop a high-resolution, operational streamflow and flood forecasting system at the global scale, leveraging multiple process-based models, remote sensing data assimilation, and high-performance computing techniques. We present a preliminary case study that demonstrates the integration of the modeling framework using NASA's Land Information System (LIS), ERDC's Streamflow Prediction Tool (SPT), and ORNL's GPU-accelerated 2D flood model (TRITON). Using the high-resolution terrain data from NGA, a historic flood event that occurred in March 2019 at Offutt Air Force Base in Nebraska, USA, was simulated on ORNL's supercomputer, *Summit*. This benchmark test case is used to validate the modeling framework and to help establish a roadmap for the expanded modeling efforts at the global scale. In a broader sense, the proposed infrastructure will enable decision-makers to address issues such as transboundary water conflicts, flood and drought monitoring, and sustainable water resources management and to study their impacts on human, water-energy and natural systems in the short, medium and long term.