Implementation of Forecast Flood Inundation Mapping Services for the Nation

David Vallee (NOAA/NWS/OWP, Norton, MA)

The NOAA National Weather Service (NWS) has a mission to provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy. Emergency Management partners across the nation have expressed a critical need for the provision of more detailed flood forecasts and for event-driven flood inundation mapping (FIM) as a high value source of actionable information to prepare, mitigate, and respond to flood impacts.   In response, the NWS National Water Center, in coordination with River Forecast Centers (RFC) and Weather Forecast Offices (WFO) and Federal and academic partners, has developed high-resolution inundation modeling capabilities providing geo-referenced visualizations of forecast flooding extent at the continental scale.

In support of Department of Commerce agency goals to mitigate flood impacts, the NWS's Office of Water Prediction demonstrated a novel real-time Flood Inundation Mapping (FIM) capability, first for the state of Texas and later for the Northeast. This capability uses synthetic or USGS rating curves to estimate river stage from the forecast streamflow, and applies the Height Above Nearest Drainage (HAND) method to produce a map showing forecast inundation extents.   The NWS FIM methods deploy a model agnostic approach to map the inundation with 10-meter horizontal resolution for rivers and streams in the National Hydrography Dataset network. The use of synthetic rating curves and the application of the Height Above Nearest Drainage method allow projection of the water surface elevation in the channel to neighboring cells in the digital terrain model. The inundation extent determination uses forecast streamflow from the National Water Model (NWM) and from NWS River Forecast Centers (RFCs).

Over the next 4 years, NOAA will revolutionize water prediction capabilities by providing event-driven high spatial resolution forecast FIM services for nearly 100% of the U.S. population, covering over 3 million miles of the national stream network.   This information represents a profound expansion in the actionable information available to the public, emergency managers, and the weather enterprise community including broadcast meteorologists.

This session will highlight these demonstrations, explore the new forecast inundation services, and will present the initial rollout of services to 10% of the nation which commenced on September 26th, 2023 for areas in the Northeast, Mid-Atlantic and Texas. FIM services include an hourly updated analysis FIM and 5-day forecast FIM driven by the official NWS RFC and NWM streamflow predictions.