

HYDROGRAPHIC SERVICES REVIEW PANEL

A federal advisory committee, advising the NOAA administrator

Automation and Artificial Intelligence in NOAA's Post-disaster Products and Services

More effective and efficient government disaster response—whether local, state, or federal—requires on-demand, actionable, information from the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service (NOS), which includes the Office of the National Geodetic Survey (NGS), the Center for Operational Oceanographic Products and Services (CO-OPS), and the Office of Coast Survey (OCS). It is essential that NOAA's post-disaster products and services such as high-resolution aerial imagery, channel contour verification, and aerial port and waterway surveys are available in near real-time to support response efforts. This requires that the tools are optimized and data are post-processed and analyzed in real or near real-time with minimal human intervention. Automation and analytic tools that rely on artificial intelligence (AI) will be critical to meeting this demand.

Efforts to both enhance and streamline NOAA products and services when disaster strikes, if done so with stakeholder requirements in mind, could improve response and recovery efforts exponentially. Performing research and building partnerships with academia, scientific institutes, and private industry along the topics of the use and implementation of AI, machine learning, and deep learning sciences will strengthen NOAA's ability to provide real-time emergency products and services more efficiently.

CHALLENGES

During times of disasters, NOAA collects and disseminates a wide-range of data and products that support aid delivery for decision-making, damage assessment, port re-opening, setback creation, property recovery and rebuilding, beach replenishment projects and many other efforts. As NOAA data and products become more prolific, end users of such information are eager for technological advances that allow for more rapid development of a clear operating picture regarding what is actually happening on the ground.

- **Current datasets disseminated by NOAA are unwieldy**, increasing the need for additional labor and resources to utilize the data efficiently.
- **Different "ground truths" are generated** when agencies with different interests employ disparate methodologies and interpretations to analyze data.
- **Response agencies struggle to capture a complete or shared common operating plan (COP)**, especially in the midst of the urgent nature of disaster response.
- **Lack of a shared COP impedes response and recovery efforts** and results in a duplication of effort across levels of government.



*Flooding along Interstate 10 in the Houston area after Hurricane Harvey.
Photo credit: NGS*

NOAA has a limited pool of trained personnel and assets to collect and analyze data for disaster response and recovery. This can prove challenging when there are multiple or extended events. This challenge is compounded by the lack of automated, standardized analytic tools that would/could reduce the burden and demand for additional personnel.

NOAA'S ROLE IN EMERGENCY RESPONSE

NOS is the nation's leading expert in seabed surveying, shoreline mapping, nautical charting, geodesy, positioning, tides and water levels. NOS also has specific statutory authority to apply these capabilities to save and protect life and property and support the resumption of commerce in response to emergencies (33 U.S.C. Sec. 892(b)(4)). NOAA also supports FEMA under the National Response Framework and can be tasked with supporting FEMA or other agencies.

Within NOS, the NGS's Remote Sensing Division (RSD), OCS's Regional

Navigation Managers, and the navigation response teams (NRTs), directly support these U.S. homeland security and emergency response requirements. For example, RSD acquires high resolution digital photography and rapidly disseminates the imagery datasets to a variety of users, including the general public. The NRTs, as part of the port's U.S. Coast Guard Marine Transportation System Recovery Unit, work with other NOAA offices, federal agencies, state and local governments, and port authorities to gather data and evaluate conditions so that maritime commerce can quickly resume after disaster strikes.



RECOMMENDATIONS FOR NOAA ACTION

NOAA's navigation services offices should further invest in and undertake research and development in areas such as AI as it relates specifically to data collected in support of disaster response with the intent of creating on-demand actionable information/products for disaster response and recovery in a timely manner.

- As part of this effort, NOAA should consider stakeholder needs (e.g. damaged buildings, debris, and beach erosion) at the local, state, and federal levels in order to efficiently and dynamically engage in disaster response.
- NOAA should team with academia and public-private partnership to tap additional resources and capabilities.
- NOAA and its partners should review current disaster-related products and services and identify areas for improvement to include modernized methods to deliver aerial survey data quickly to facilitate faster resumption of coastal and port operations.

In October 2003, Secretary of Commerce Don Evans established the HSRP as directed by the Hydrographic Services Improvement Act of 2002, Public Law 107-372. Panel members, appointed by the NOAA Administrator, include a diverse field of experts.

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