Developing and Coupling Flood Impact Data with ALERT and Flood Forecast Systems to Enhance Local Flood Warning and Planning
Motivation

1. Simplify the process that converts hydromet data into location-based flood alerts
2. Integrate geospatial infrastructure datasets directly within real-time flood warning systems
Alert Workflow

Data Collection & Transmission

H&H Modeling

Real-time Flood Forecasting

Disaster Aware Data

EM Community
Key Questions

• What end products are emergency managers & decision makers looking for from Alert systems?
  o Rainfall thresholds
  o Observed or predicted river stage
  o Inundation maps

• What are the operational limitations with flood inundation mapping?
  o Legalities?
  o Accuracy/Uncertainty?
  o Interpretation?
  o Cost?
Disaster Aware Data

**Flood-Aware Data** are point and polygon datasets which have been enriched by upfront hydrologic modeling analyses.

**Key Benefits**
- Location-based information
- Cost & time efficient
- Can portray probabilities and uncertainties
- Customizable to a variety of hazards
Flood-Aware Data: Potential Ingredients

Hydrological Input
- Stage Gage Obs
- Forecasted Streamflow
- H&H Model Output

Land Surface Elevation
- DEM
- Lidar
- Height Above Nearest Drainage (HAND)

Geospatial Inventory
- Buildings
- Roads & Bridges
- Critical Infrastructure
National Water Model

- CONUS-scale water resources model developed and maintained by the NWS → ~2.7 million fx locations
- Hourly short-range forecasts out to 18-hours, medium-range forecasts out to 10-days, and long-range ensemble forecasts out to 30-days
- Forecast products include streamflow, soil moisture, snow melt, etc.
The National Water Model offers a full suite of forecasting capabilities.
The National Water Model expands nationwide forecasting capabilities.

Historic forecasting locations overlaid with NWM streams.

Historic forecasting locations: ~3,600
NWM reaches: ~2.7M
To fulfill a DOC Agency Priority Goal, Lynker’s National Water Center team has developed a real-time inundation mapping capability for the West Gulf River Forecast Center region, which serves approximately 25 million Americans.

Mitigate Flood Impacts by Demonstrating Improved Decision Support Services to Emergency Managers

**Goal Leader:** Dr. Neil Jacobs, Assistance Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Undersecretary of Commerce for Oceans and Atmosphere

**Goal Statement:** By September 30, 2019, NOAA National Weather Service will improve decision support services by demonstrating a new flood inundation mapping capability serving 25 million people (i.e., 8 percent of the U.S. continental population) residing in flood-vulnerable freshwater basins and delivering an enhanced excessive rainfall outlook product that extends the lead time of high risk predictions from two to three days.
Geospatial Datasets

- Building footprints
- Parcel datasets
- Transportation (roads, bridges, culverts)
- Critical Infrastructure
- ∞
Operational Utility of Flood Aware Data
Probabilities & Uncertainty

Can probabilistic data help users make more informed decisions?

• Data and model uncertainty accounted for
• Queries can be based on level of risk aversion
• Inverse probabilities for “flood-safe” locations
Rapid Impact Assessment with “Flood-Aware” Data
Rapid Impact Assessment with “Flood-Aware” Data

Occupants: 3
Value: 0.7M
Phone: (123) 768921
Probability: 95%
Rapid Impact Assessment with “Flood-Aware” Data

Occupants: 7
Value: 0.2M
Phone: (123) 15-816
Probability: 25%
With additional geo-enrichment of feature data (such as property value, number of tenants, etc.), financial and human impact assessments may be made almost instantly.

Simply repeat this process with other points of interest.
Questions

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