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DHS Science and Technology Directorate

Flood Analytics: Improving Risk Assessment and Community Resilience

Flood Risk Assessment Today

Risks from flood are difficult to calculate. They rely on many factors, including rainfall, storm surge, terrain, the local permeability of ground surfaces and the design and elevation of structures. Putting these factors together for such purposes as estimating insurance premiums, or for issuing real-time alerts and warnings, is data-intensive and complex. Analysts must inevitably simplify and streamline their calculations consistent with available data, time and computing power.

In addition, many of the currently utilized flood maps are outdated, with much of the information based on very old terrain. Factor in the obstacles of communicating the threat to stakeholders and the high monetary and time requirements to properly update the tools, it is clear that major changes are necessary to protect those at risk.

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is ready to take the steps necessary toward cost effective, faster and frequently updated flood risk assessment tools.

Building the Right Methodology

Over the next 12 months, the DHS S&T Flood Apex Program will fund AIR Worldwide, a major provider of catastrophe modeling to the insurance industry, to develop and test a structure-specific Flood Risk Score (FRS) that integrates risk from riverine, coastal and flash floods.

To improve flood risk communication, the methodology will annotate each score to explain the degree to which various factors account for the result. For example, a home that is elevated above the local flood level, or which is built with more flood-proof materials, will receive a better score than one that is not. This rationale will be made clear to the homeowner in the FRS annotations.

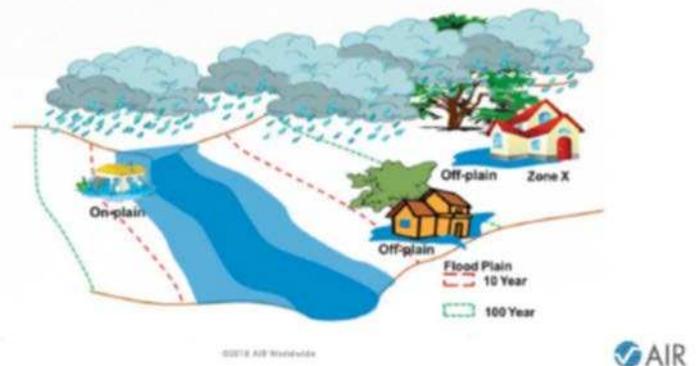
The new methodology will involve consistently updated data sets on terrain, land use, and meteorological and hydrological data. The high resolution and more complete risk assessment will account for flood risk from riverine, flash flood and coastal flooding. By leveraging catastrophe models, the methodology will reflect risk due

to all types of flooding and provide a more granular representation of flood severity, going deeper than just “in or out” of the 100-year floodplain.

In order to improve flood risk communication, the methodology will also include simple and intuitive hazard metrics. Web-based options for communicating flood risk will further enhance the ability for all parties involved to access the information they need.

Delivering on Objectives

AIR Worldwide will test their methodology by comparing their results from a highly-detailed risk study of the Charlotte-Mecklenburg region of North Carolina developed by AECOM. They will adjust their more simplified model as appropriate to incorporate aspects of the more data-intensive and expensive AECOM analysis, then field test the validated tool in study areas already selected in South Carolina and Texas. These areas offer good quality digital terrain data and are places of high interest due to their high flood risk, recent significant flooding, high population density and high property replacement value.



This illustration shows possible flood water damage to buildings based on their location on or off floodplains. (Photo Credit: AIR Worldwide)

AIR Worldwide will also develop web-based tools for communicating flood risk to consumers and insurers, including a “Property Flood Fax” reporting tool and a Flood Risk Score Web Platform. The project will be completed in February 2019.



Homeland Security

Science and Technology

To learn more about the Flood Analytics Project, contact Flood Apex Program support team at Flood.apex@hq.dhs.gov.