



OGC Disasters Interoperability Initiative

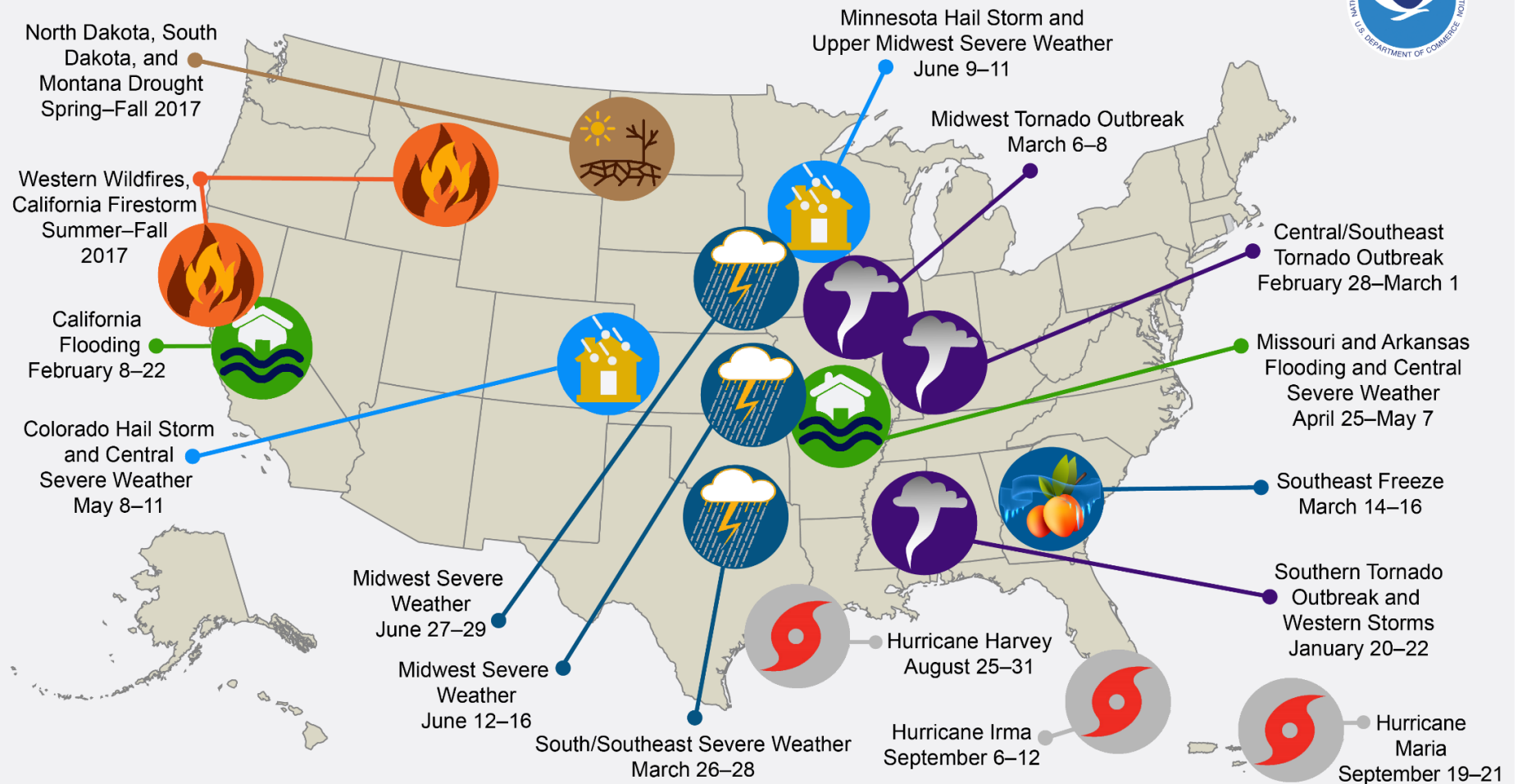
Brief to the ESIP Disaster Cluster Meeting Tacoma, Washington 19 July 2017

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Based on, and expanded from, a presentation by Terry Idol and Robert Thomas, OGC Innovation Program

Why?

U.S. 2017 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 16 billion-dollar weather and climate disasters that impacted the United States during 2017.

NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). <https://www.ncdc.noaa.gov/billions/>

OGC work on disasters



- Testbed 13 (and many other Testbeds)
- Strengthening Disaster Risk Reduction Across the Americas Summit Exercise, 2017
- **Disasters Concept Development Study and now Disasters Resilience Pilot**
- Liaison through the Emergency and Disaster Management Domain Working Group, co-chaired by NASA and US DOD/DISA

OGC Disasters Initiative – Two Phases



- **Phase one: OGC Concept Development Study (CDS)**
 - Assessed the current state of SDI components for the use of disasters.
 - Documented data exchange technologies, developed an inventory of available geospatial Web services across different types of disasters, defined the core components of a SDI architecture
 - The request for information (RFI) was part of phase one, used to gather the knowledge from disasters stakeholders and contributors.
- **Phase two: Pilots**
 - OGC initiatives with active involvement by several OGC member organizations.
 - Goal of Phase 2 is to articulate the value of interoperability and to demonstrate the benefits of standards through pilot(s) and demonstrations.
 - Done by piloting a recommended SDI architecture to support Disasters and developing demonstrations.

Sample Pilot Efforts



Flood

As water levels get higher First Aid Dispatcher must safely route first aid personnel to affected areas taking into account road closures, current traffic information, increasing water levels, and reported incidents.

Wildfire

As the wildfire spreads Fire Fighter Dispatcher must safely route fire fighter response personnel to the highest risk areas taking into account the current weather conditions and winds, road closures, forest types, population demographics and reported incidents.

Agriculture and food security

Time series of information on crop conditions and their progresses can be reflected with different information products generated from EO data

To capture the best practices in discovering EO data suitable for crop condition monitoring, accessing and pre-processing the EO data for crop condition extraction, disaster crop damage assessment, processing and calculating information from EO data for crop conditions, and dissemination of crop condition information in the Web

Real world use case analysis: Texas Flooding - Hurricane & Flooding Harvey Replay Scenario

Texas State EOC Manager wants to quickly curate & federate web services (Esri REST, OGC) (data like: Weather status, Flooding Prediction, Households/Addresses, Roadways, Emergency Crews, Local Lifelines), to do impact analysis to support resource requests from federal government and to know where to pre-position critical resources like water, food and electrical generators.

Another Sample Pilot Effort: Landslide



Landslides Use Cases

Early responses to protected residents

Who?

The "protected residents" are those families live near the hazard areas like potential debris flow torrents.

What information?

The warning alerts of different levels - the yellow and the red alerts.

The yellow alert indicates a potential landslide risk.

The red alert indicates an immediate landslide event and evacuation is recommended.

How?

SDI construction

To collect necessary data to publish the warning, the SDI need the following data

Base maps - the satellite images from WMS

FOI - the shelter, the monitoring station information, etc, from WFS

High Risk Areas - the potential debris flow torrents, etc, from WFS

Real Time Sensors - the rain gauges, the CCD, the soil moisture sensors, etc, from SensorThings API

Evacuation under limited internet connection

Who?

The protected residents

What information?

The evacuation routes and the obstructions on the roads.

How?

An online/offline mobile APP is recommended to be installed on the users' mobile phones.

The APP is capable to calculate the routes to shelters by the local routing engines.

The offline maps using vector tiles in GeoPackages is recommended.

Using GeoSMS to locate the obstructions to help the routing calculations.

Sample Pilot: Healthcare



We consider End Users those who are making the on-the-ground, real-time decisions on healthcare response; as well as those who executing the decisions.

1. What are the high-risk areas for medical evacuation? **Asked By:** FEMA, Hospitals (and other medical facilities)
2. What healthcare assistance is needed, where, and for whom? (Pre-existing conditions, conditions that may be worsened by the disaster such as allergies or asthma, and conditions that are caused by the disaster such as illness or trauma) **Asked By:** FEMA (emergency response), CDC (disease containment)
3. What health conditions are patients likely to present with? (What equipment or drugs should the first responders bring to an area) **Asked By:** FEMA, emergency responders, hospitals, pharmacy distribution personnel
4. What are the possible post-disaster health risks to the wider, surrounding area and population (e.g., such as contaminated water and soil, destroyed infrastructure, crops, food supply)? **Asked By:** CDC, state/local government, economic development representatives, community groups, etc.

Sample Pilot: Evaluations



Use Cases User Questions

In a rural wildfire event, where should I immediately prioritize my manpower and resources? Target User: Emergency Response Logistical Manager Using environmental, social, and infrastructure data, we can create a map that shows what areas are most likely to be affected in a wildfire, which of those areas have a high risk of victim impact, and where the infrastructure helps to support emergency response.

In a suburban flash-flood situation, I need to plot paths for my rescue teams to take through potentially hazardous conditions. Which way can we go? Target User: Emergency Response Logistical Manager Using topographic, flood inundation, and transportation data we can plot courses for water rescue teams to take through a flooded town.

A disaster has struck in a dense urban area. How can we determine the best location for first aid and triage stations while evacuating civilians from the area? Target User: Emergency Response Logistical Manager We can use healthcare provider data to determine the closest first aid providers and where they could optimally set up their stations while transportation data helps to create channels for foot and vehicle traffic out of the disaster area.

Final Reports



- Major difference in this Pilot – Each participant will produce a Guide (cookbook/playbook).

Videos: TBD

Reports: TBD

This will be updated as the videos and final reports become available, mid September 2019

Next Steps



- Additional pilots, building upon Pilot 1 incrementally
- Address Gaps
 - User and Stakeholder Needs
 - Reaching out to OGC Environmental and Disasters Management Domain Working Group members to identify issues and gaps and propose future directions.
- Results will be presented at GEO Week 2019 (Canberra, Australia), OGC TC September meeting (Banff, Canada), International Society for Digital Earth (Florence, Italy), American Geophysical Union (San Francisco, USA)