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PFFW Conference – KISTERS Presentation

Optimizing Data Sharing for Flood Forecasters & Responders

September 20, 2018 / Steve Elgie /

Overview

KISTERS Overview & Technology

Solution Approach

Integration Drivers in Ontario

Types of Data Sharing

Technology Showcases

Who we are

KISTERS

- Software Developers specializing in Time Series and Environmental Data Management
- Headquartered in Aachen Germany, with NA offices in Sacramento, Colorado, Ohio, Toronto, & BC
- 30+ years of commercial off the shelf implementations in over 50 countries

Ontario

BC hydro
FOR GENERATIONS

OCWA
ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Manitoba Hydro

ONTARIO POWER GENERATION

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

Alberta
Freedom To Create. Spirit To Achieve.

Conservation ONTARIO

KISTERS Water Solutions

KISTERS

KISTERS Technology Stack

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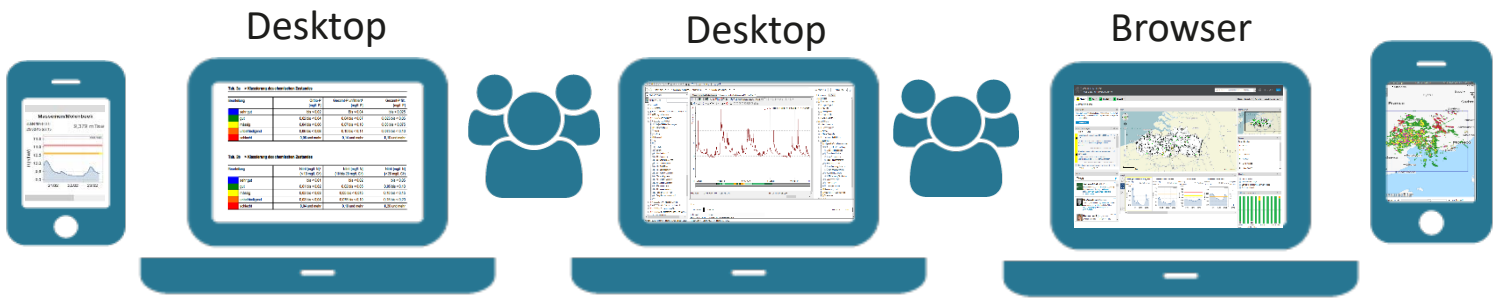
Water data management for experts

Specialists

Government, Authorities,
Flood centers,
Power plant operators



Interfaces

Open standards, Industry standards

Calculations

Time series statistics
Polygons statistics
Raster to point calculations
Load calculations

Interfaces

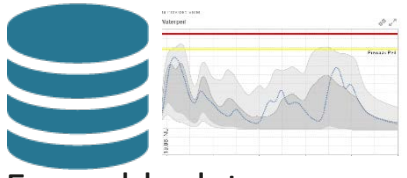
Open standards, Industry standards

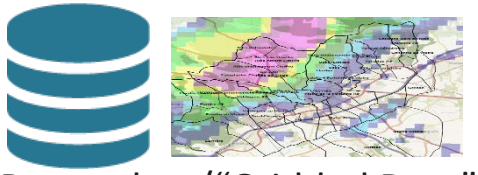
Products

Alerts & Notifications, Water reports, Year books, Extreme- value statistics, Retention periods, Base flow, Inundation maps, Alarm maps, Forecasts

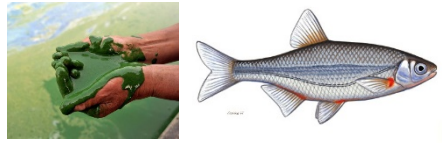

Meta data


Time series data

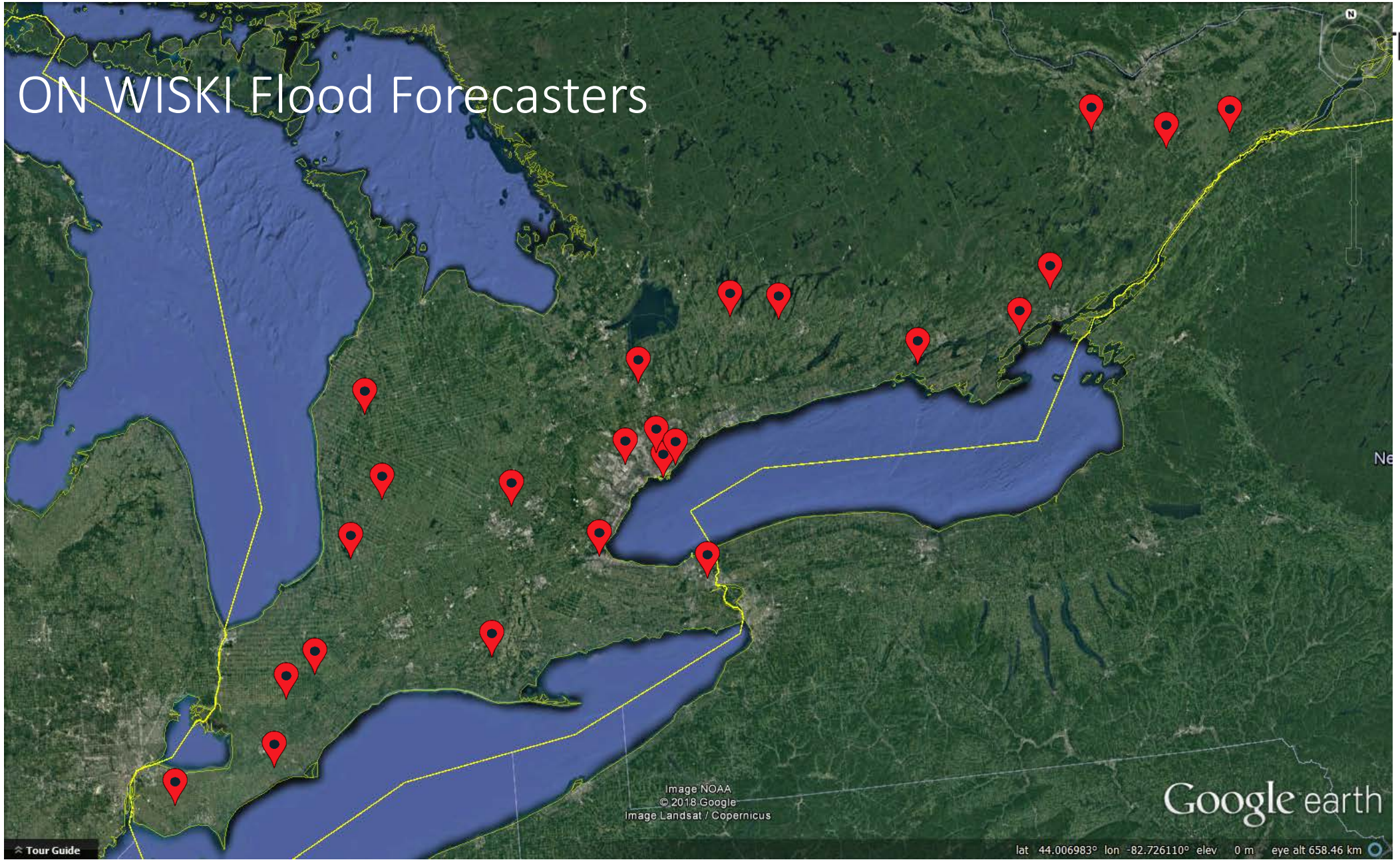

Ensemble data


Raster data/“Gridded Data”


Samplings


Observations

ON WISKI Flood Forecasters



Levels of Sharing

How much is too much?

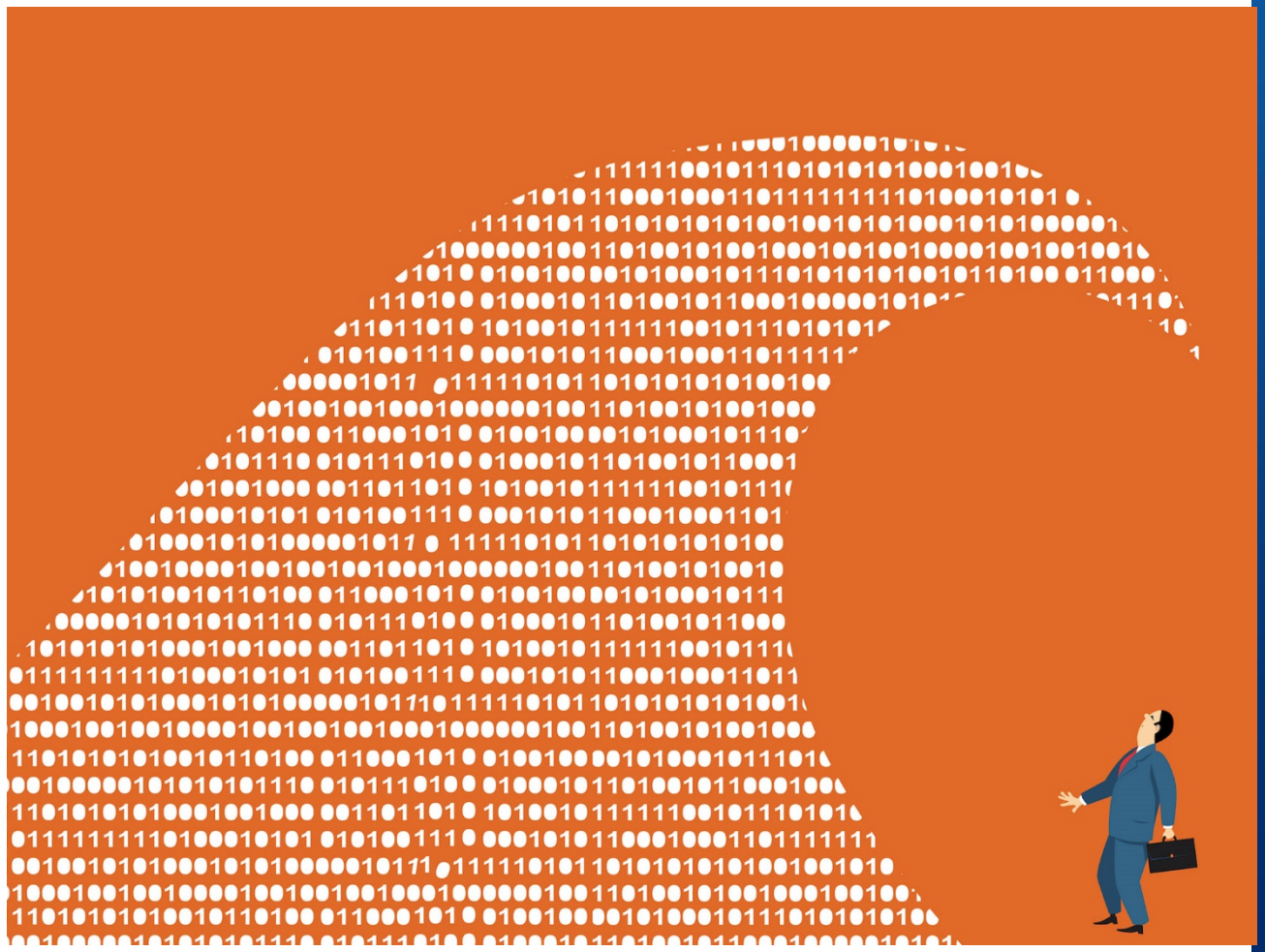
Internal Staff

vs

External Agencies

vs

the Public



Internal Staff

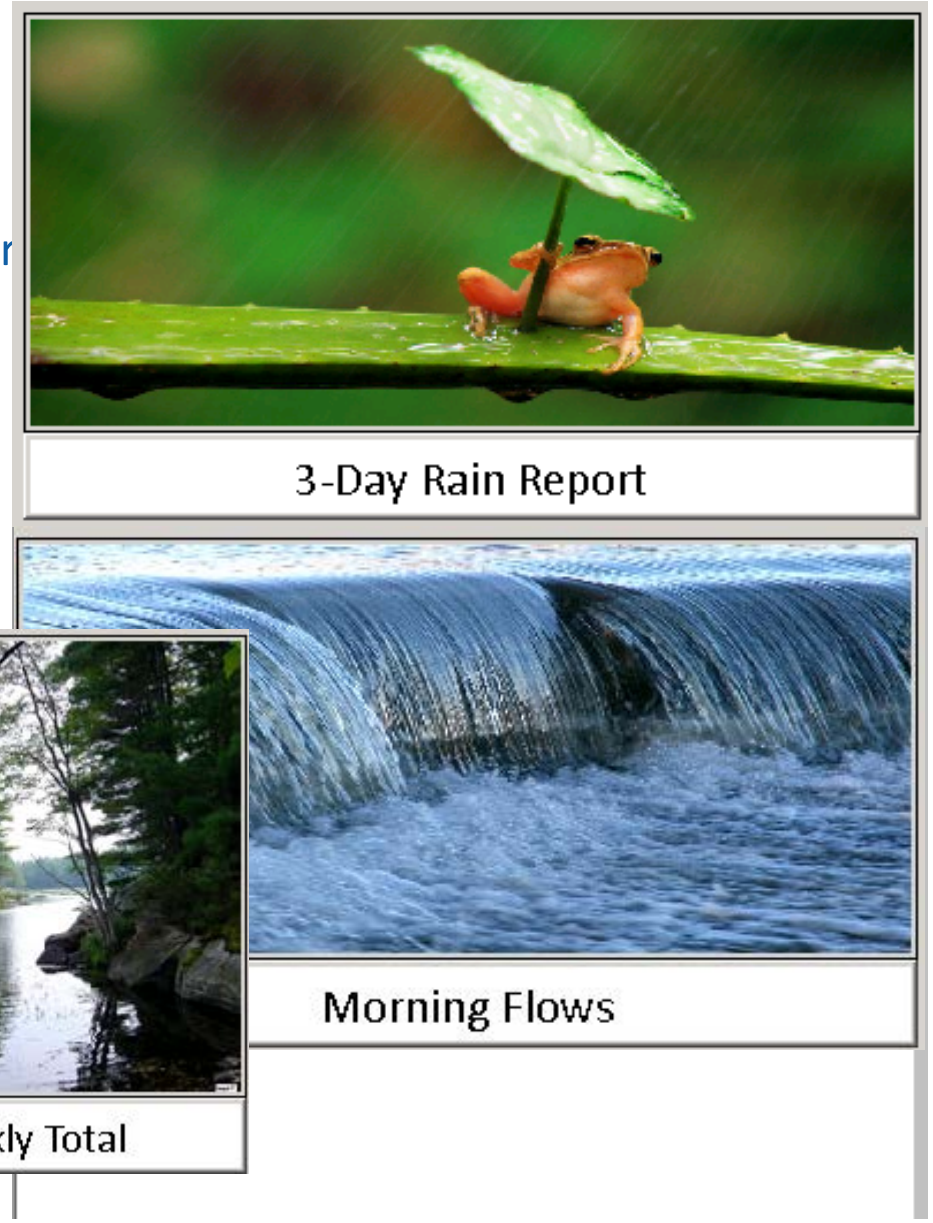
Sorry non-WISKI Users - this is an excellent 2 minutes to check your

How to facilitate data sharing & use in a single agency?

Favourites & Shortcuts

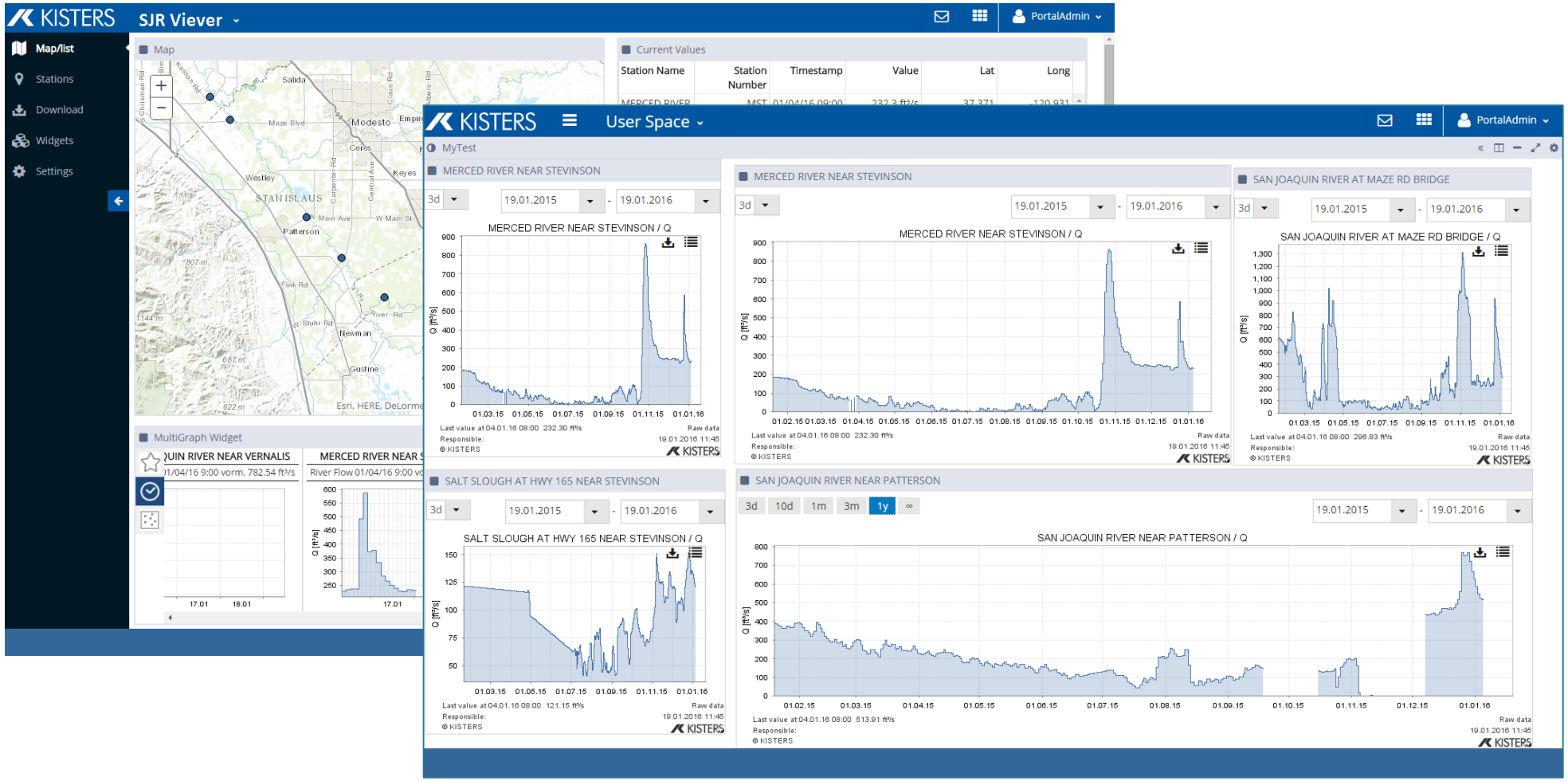
The Launchpad

Web Services



The Public

Never quite sure what they want, but they want it



External Agencies / Experts

The target audience

Individuals and groups that require critical, specific information for events

Specific information relates to:

- Watershed KPI’s
- Nearby / neighbouring gauges
- Real Time / NRT access immediately prior or during emergencies

Must have efficient & readily understood data to drive decision making

Traditional Methods

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Call / SMS / Email

Website monitoring for latest information

Reports

What is the Common theme?

These are all active methods of acquiring data, requiring time & effort

WISKI IoT

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Moving away from active approaches

KISTERS Technology allows users to **passively** acquire data from neighbours

Direct connection to pull external agencies data effortlessly into their system

This data can be used to generate custom alerts, compared to nearby stations as validators, etc.

All WISKI systems can be thought of as **ONE interconnected network**

One with WISKI

KISTERS

Why would I want to open up my environment to outsiders?

Free expansion and unfettered access to a whole new gauge network

Agencies can work together to determine which data is relevant and enforce restrictions on data flow

Track the effects of river levels & storm events across the Province

Further movement away from Reactive Response to Predictive/Prescriptive

Technology Showcase

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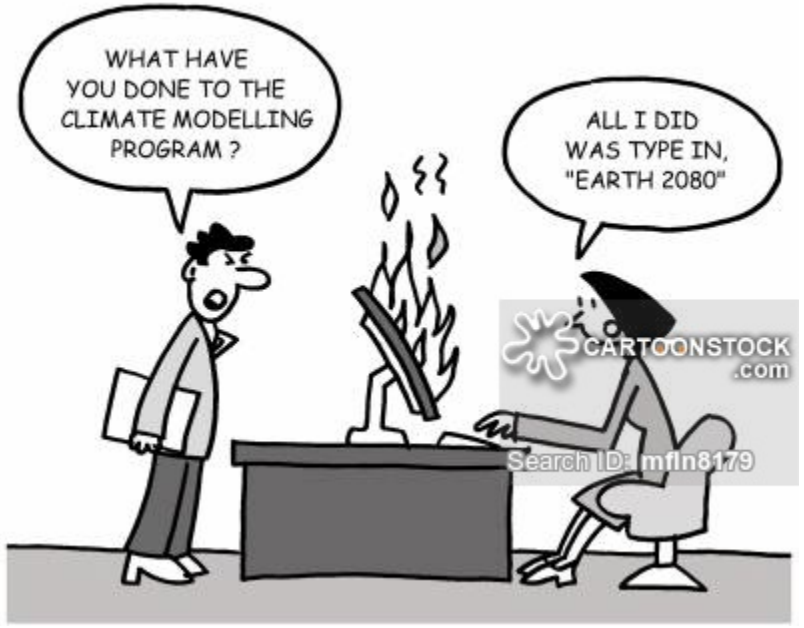
KISTERS Developments For Flood Forecasters

Re-development / Assessment of modelling frameworks within a Climate Change environment

Better / Full Integration of predictive data with observed or NRT data

Focus on understanding of new meteorological paradigm



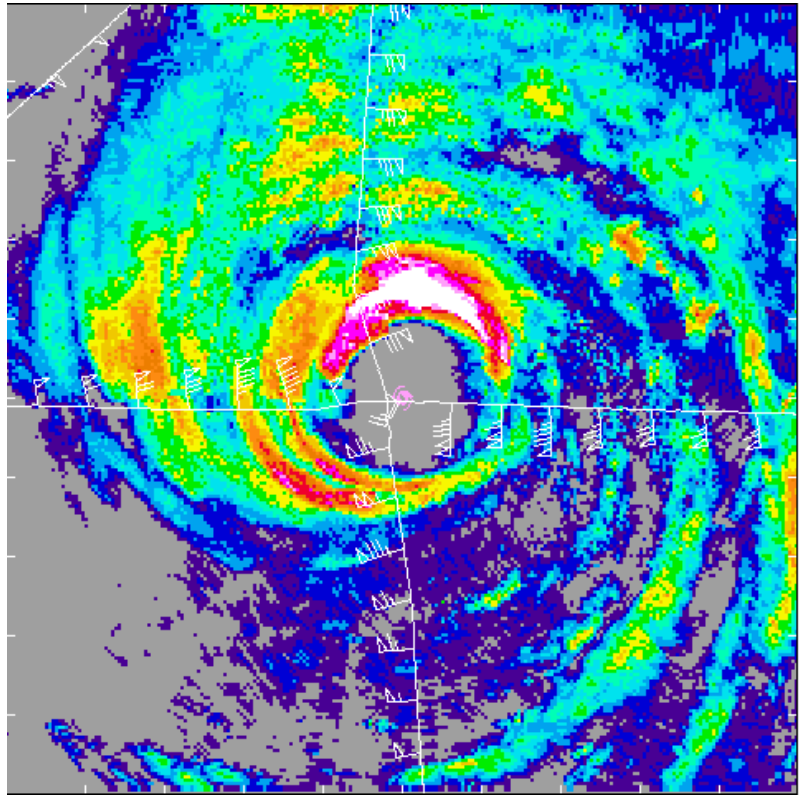
WISKI Raster

Full Integration of Gridded Datasets for Manipulation within WISKI

Fully integrates gridded data products into the WISKI environment

Allows for manipulation and analysis of radar rainfall, including:

- Delineation of basins and subbasins
- Areal calculations and statistics
- Calibration & Validation definition based on input



WISKI

File Edit View Tools Perspective Windows Help

Site list ▾ SJRWMD ▾ Stations of site

from 20/11/2014 00:00:00 until 10/02/2015 23:59:59

Site list

- ---
- Big dam
- Cole Engineering
- DemoSite
- ECCC TEST
- Lower Blue River
- Lower Red River
- Middle Blue River
- Ontario
- RGStations
- SJRWMD
- Upper Blue River
- Upper Red River
- Map [Sites]

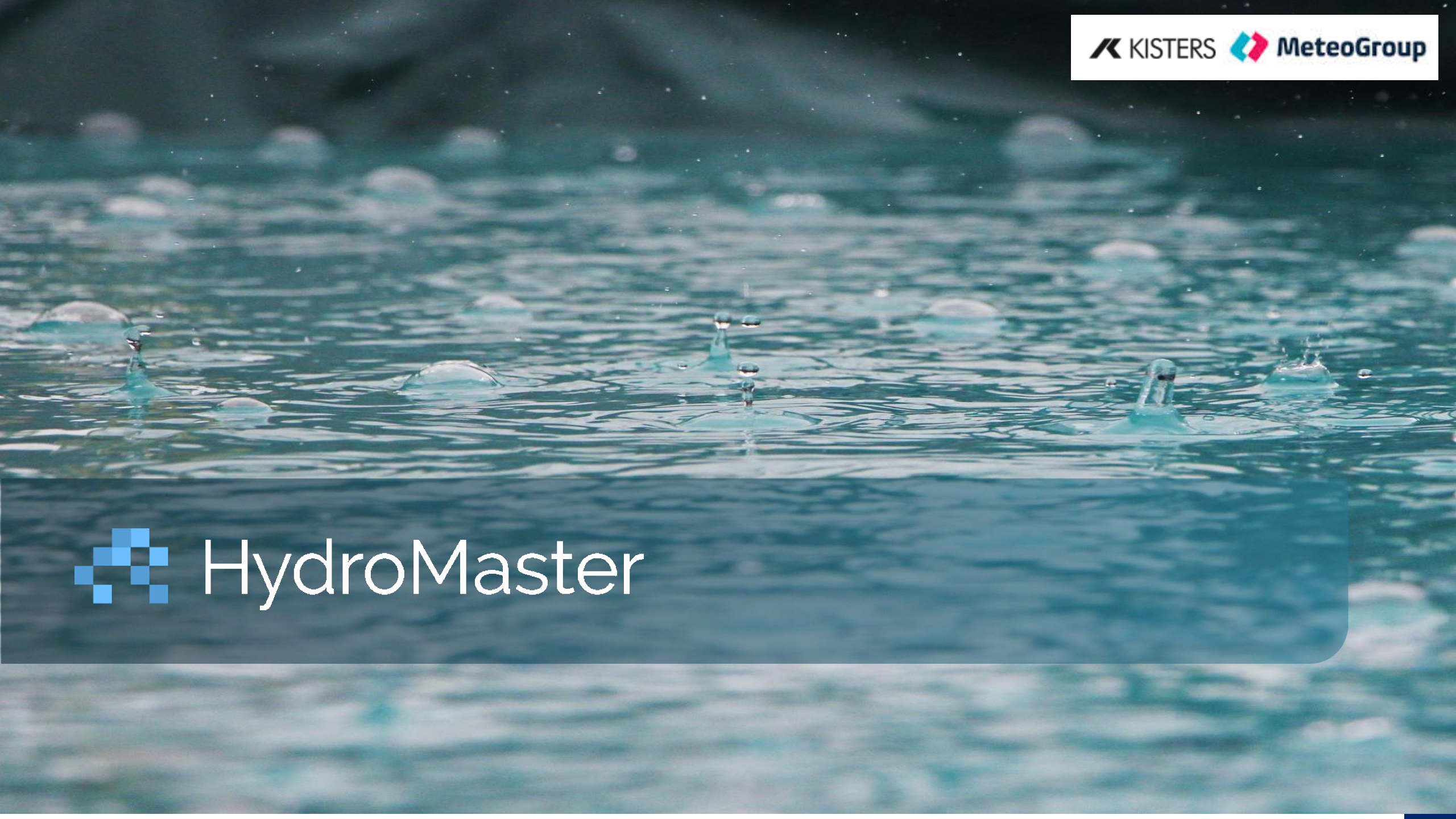
SJRWMD | Standard graph groups

Label	Name	Number
Silver River Near Connor / SILCON	Silver River Near Connor	SILCON

wiskiadm on WISKI@kn-selgie (MsSql) - User: Admin | KiTSM: WISKI / localhost / 17430

1 Records

Ready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MeteoGroup
HydroMaster

HydroMaster: motivation

Understanding the precipitation related challenges are key to risk mitigation

Water managers need to assess precipitation related risks and require an understanding of past and future events.

- Impact of heavy precipitation on water quality and retention
- Risk of sewer overflow in surface water causing pollution
- Optimize inundation prevention and run-off
- Impact of drought on water supply
- Optimize costs of extra staffing, stand-by or terrain action in heavy precipitation events

HydroMaster: key features

HydroMaster is a live web service that allows to

- view
- analyze
- archive
- report

historical and

upcoming

precipitation events

HydroMaster is THE meteorological tool for water managers and those active in protecting private and public assets.

HydroMaster: key features

HydroMaster provides for your defined hotspots, zones and catchments

- radar-based observation and forecast data
- refined deterministic and probabilistic forecasts up to 15 days

HydroMaster is THE meteorological tool for water managers and those active in protecting private and public assets.

HydroMaster: key features

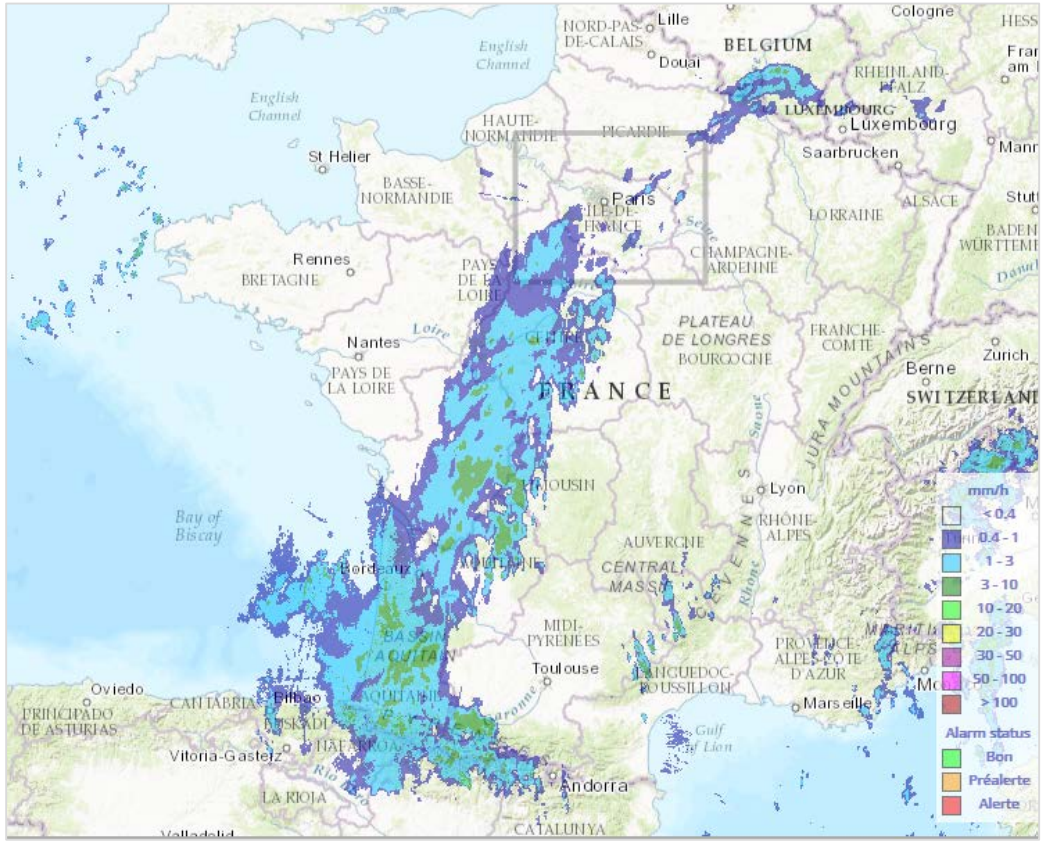
Designed to manage water and to protect public or private assets.

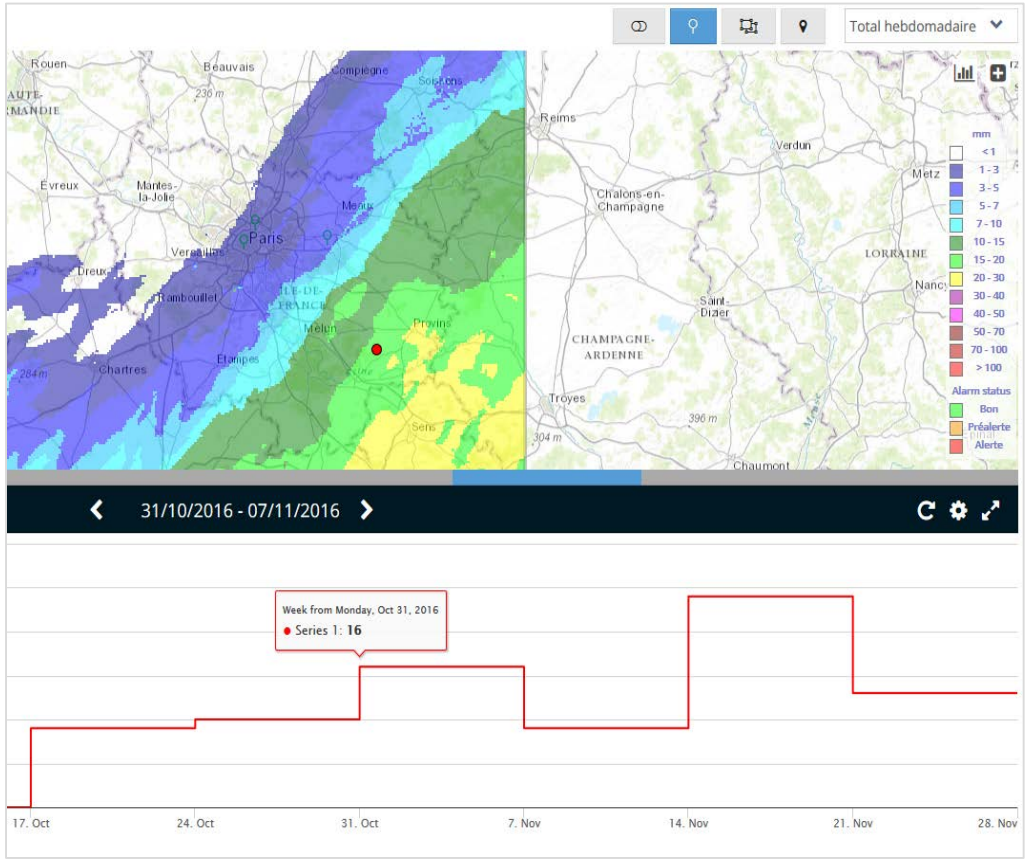
- Powerful radar visualisation and analysis tools
- Integration of client specific rain gauges, catchments and points- and zones of interest
- Combination of measured, near-real-time and forecast precipitation data
- Hands on configuration of location- and client- specific alerts and warnings
- Easy archiving and post event analysis, reports
- Desktop and mobile versions of the application
- Return times of precipitation events

- monitor precipitation and minimize the impact on your operations
- manage effectively precipitation related risks

HydroMaster key features (1/7): Radar visualisation and analysis tools

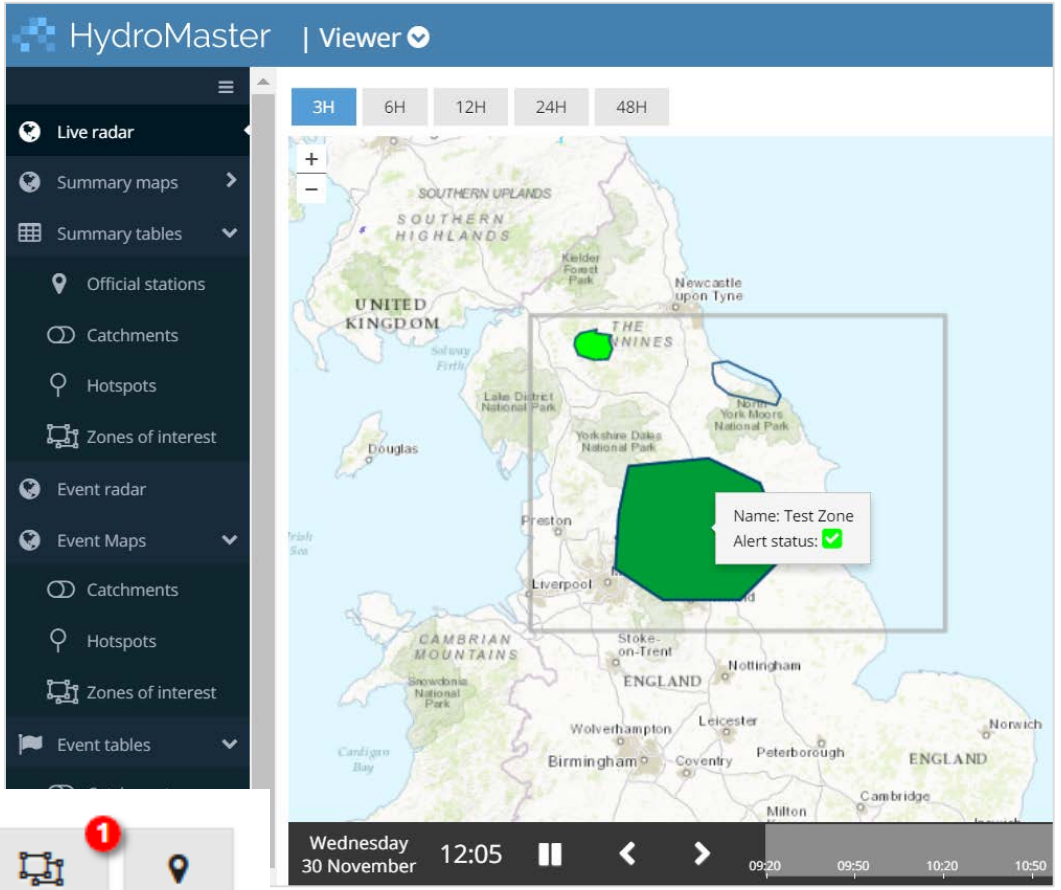
Visualise animated past and future precipitation events to perform quantitative analysis





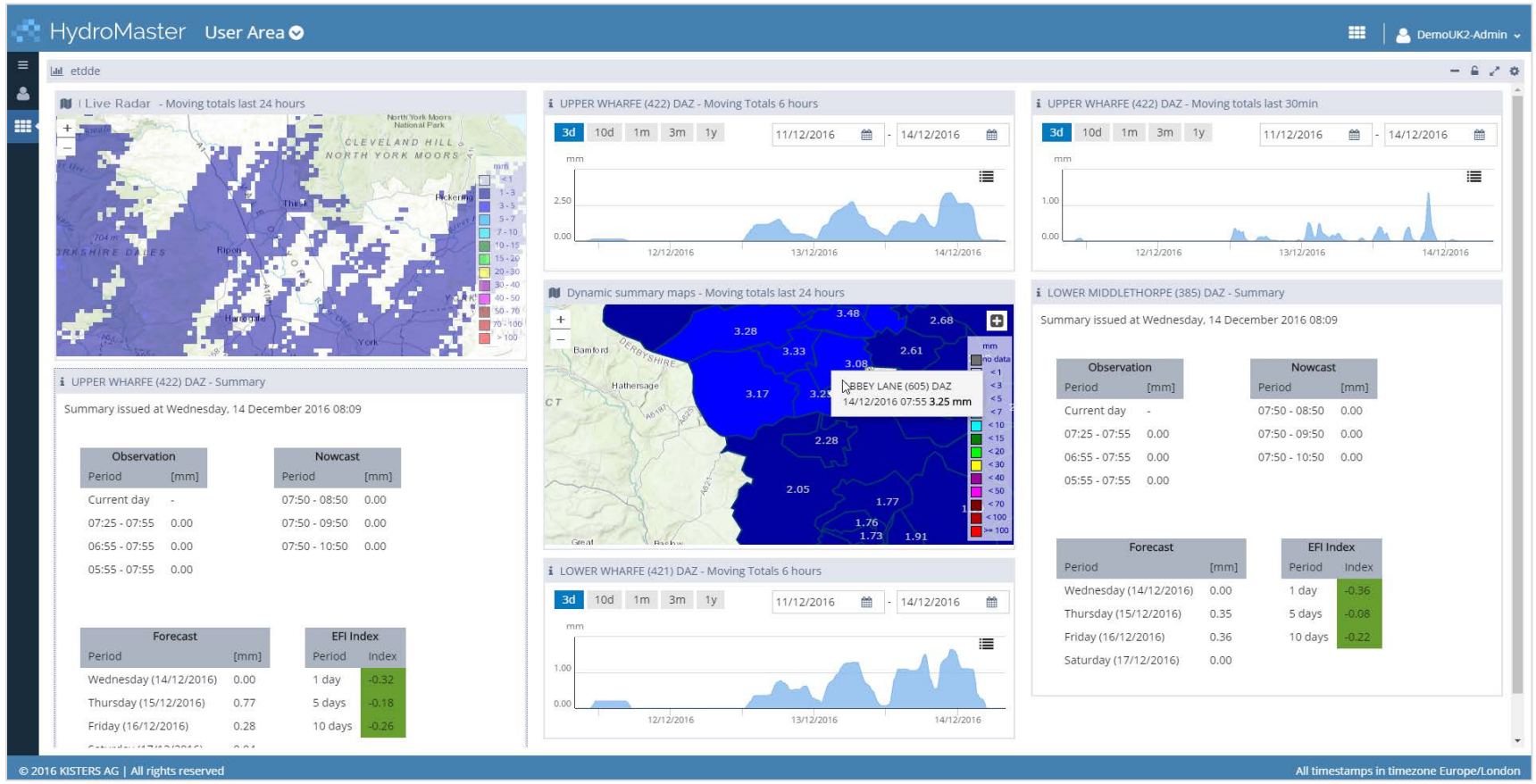
HydroMaster key features (3/7): Tailored warnings and alerts

Easily set your alarm thresholds and immediately see the impact it has on your operations.



HydroMaster key features (6/7): Dashboard

Easily drag and drop the views of your interest into your personal dashboard.



But does it work?

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Hurricane Harvey and the National Water Model

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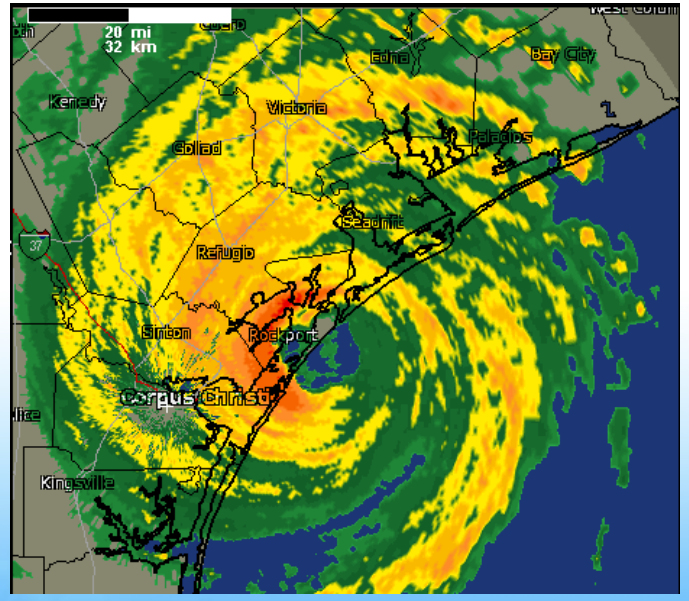
David R. Maidment
Center for Water and Environment
University of Texas at Austin

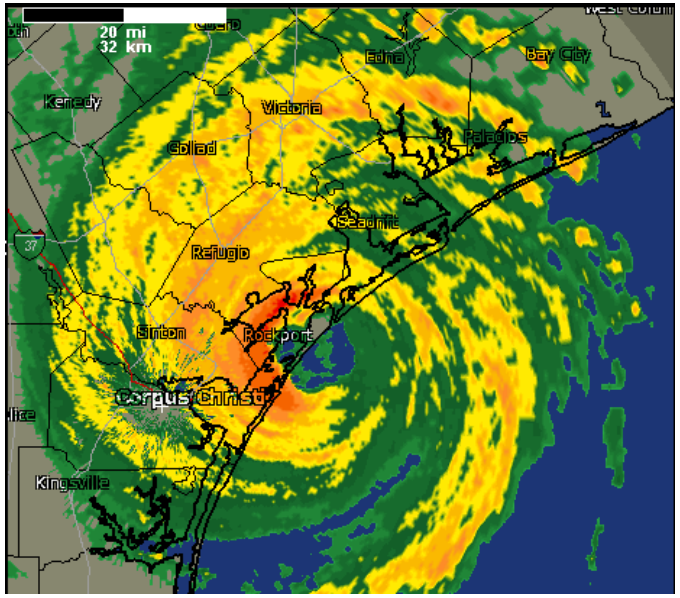


Presentation for Kisters User Conference, September 10, 2018, San Diego, California

Acknowledgements: National Weather Service, Texas Division of Emergency Management, Michael Ouimet, Xing Zheng, David Arctur, Harry Evans, Erika Boghici, Kisters, ESRI, USGS

Hurricane Harvey

- ***Hurricane Harvey***
- **Texas Flood Response System**
- **Improving flood data**



Storm Track for Hurricane Harvey

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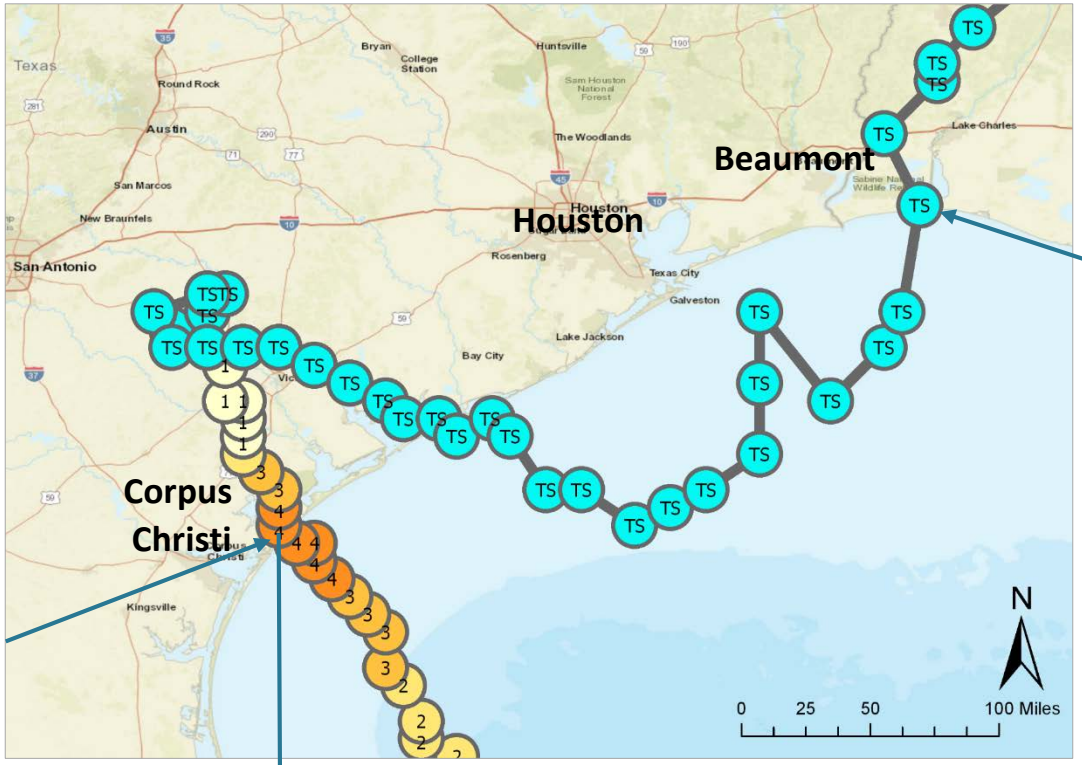
Strength

- 4
- 3
- 2
- 1

Hurricane Category

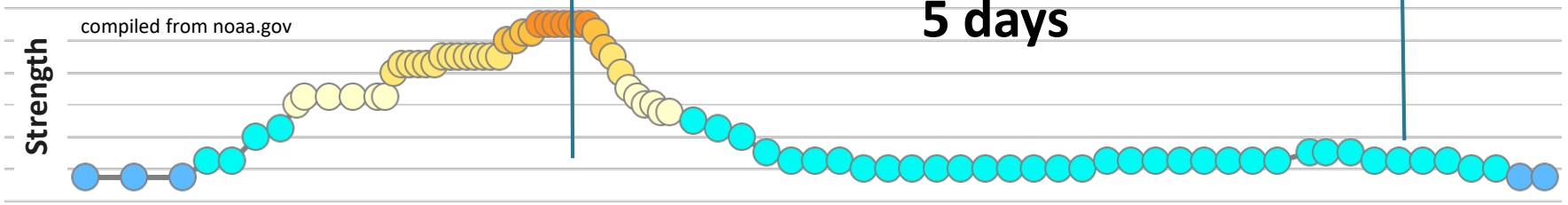
Tropical Storm



First Landfall as **Category 4 Hurricane** at 10PM on Friday 25 August

Second Landfall as **Tropical Storm** at 4 AM on Weds 30 August

5 days



Wednesday Thursday Friday Saturday Sunday Monday Tuesday Wednesday

Hurricane Harvey – Record Precipitation

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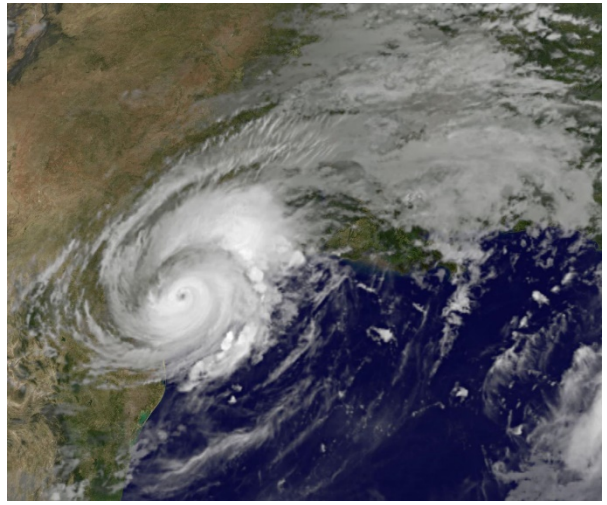
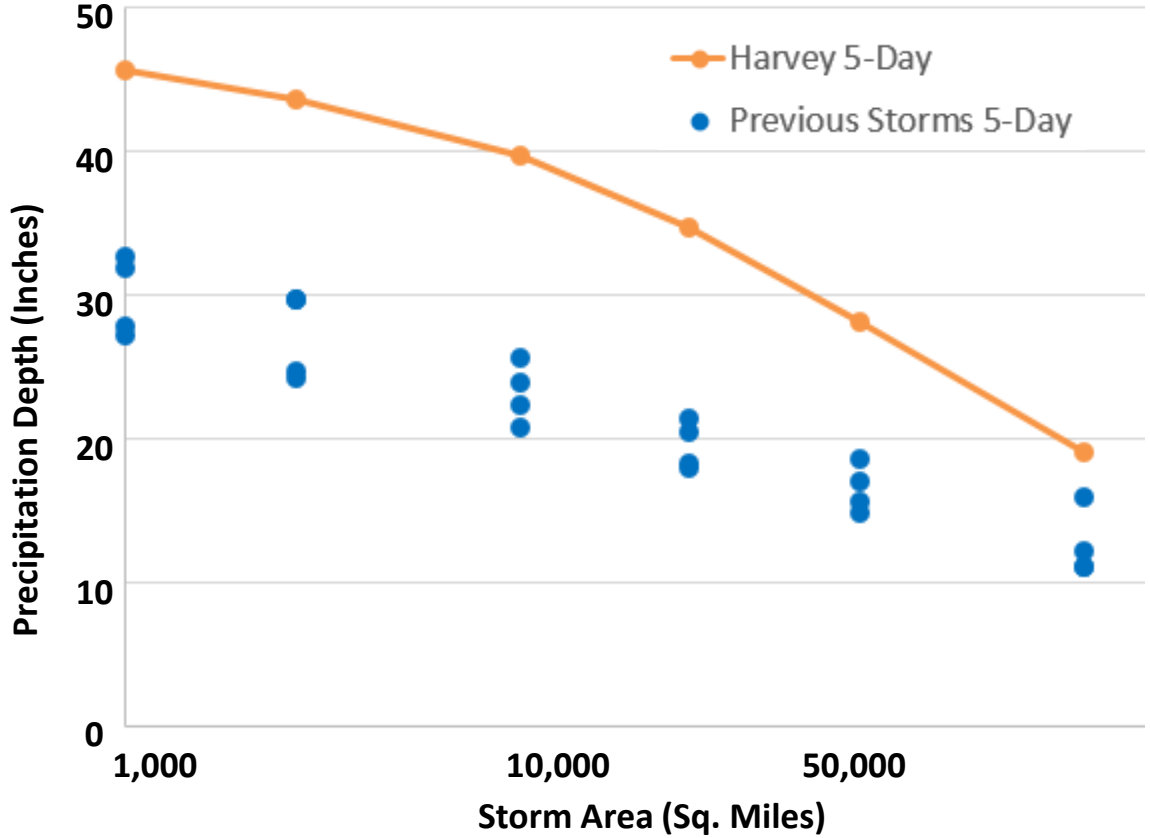
Harvey **2-day** precipitation was the **worst recorded storm** in US history

Harvey **3-day** Precipitation averaged **5 inches more** than previous worst storms

Harvey **5-day** Precipitation averaged ***11 inches more*** than previous worst storms



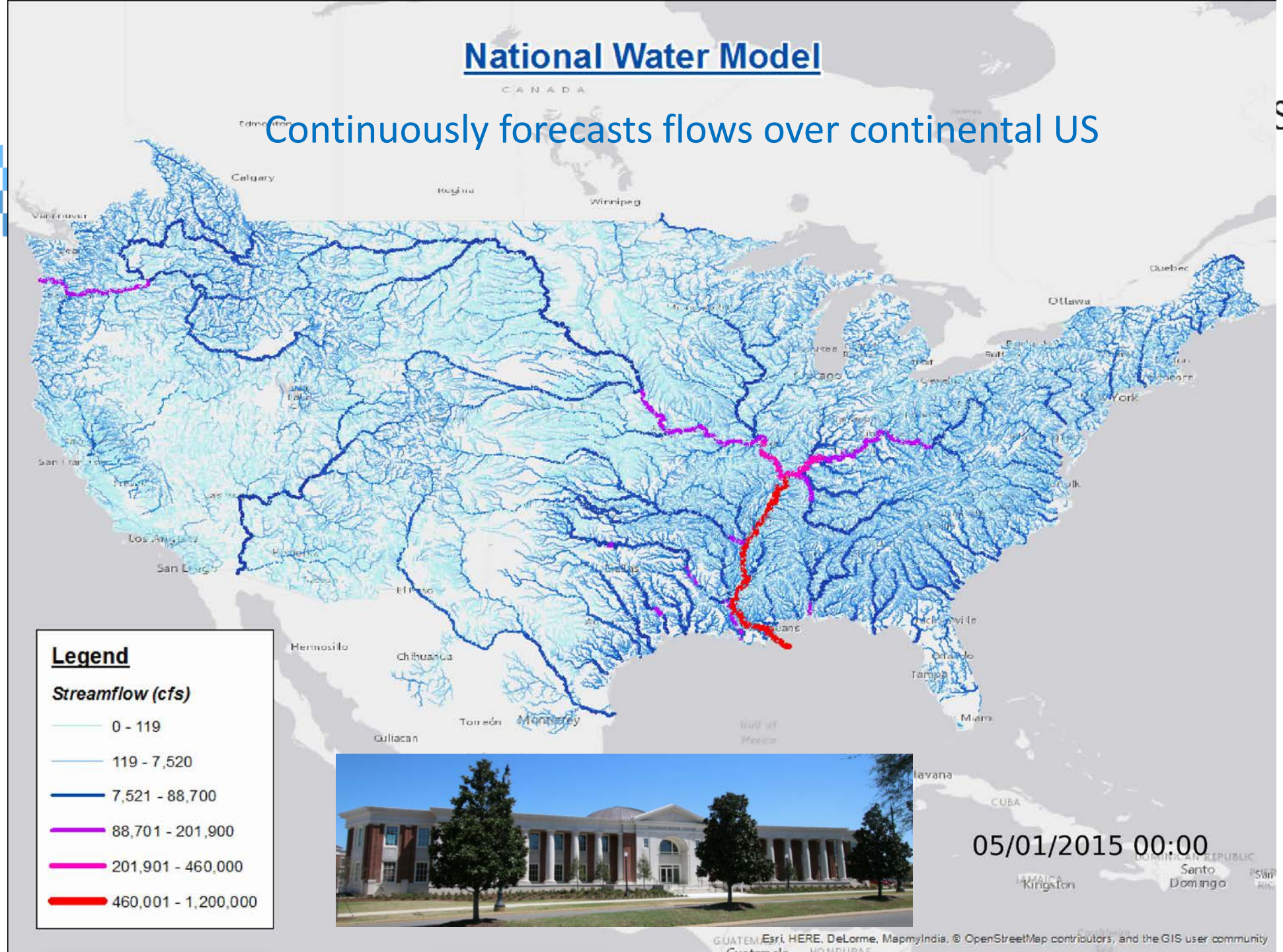


Data Sources: NWS River Forecast Centers; Applied Weather Associates, Inc., NASA.
Analysis: John Nielsen-Gammon and Brent McRoberts, Texas A&M University

National Water Model

Continuously forecasts flows over continental US

STERS



Hurricane Harvey and National Water Model

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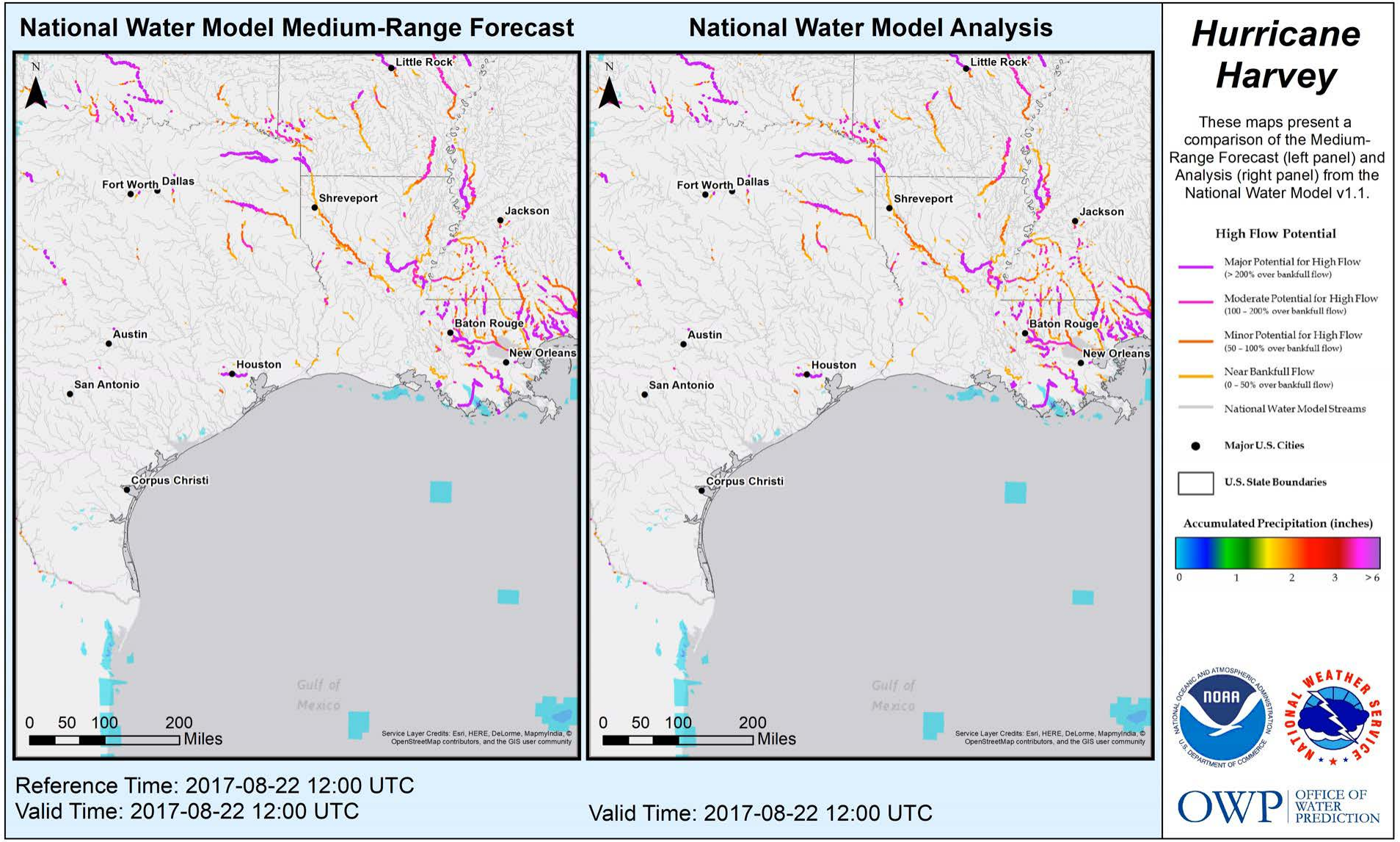
10-day Ahead Forecast **Actual**



Texas Flood Response System

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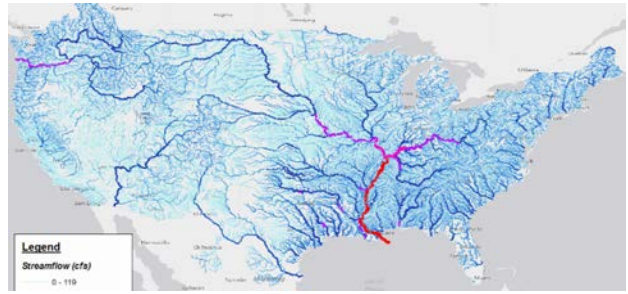
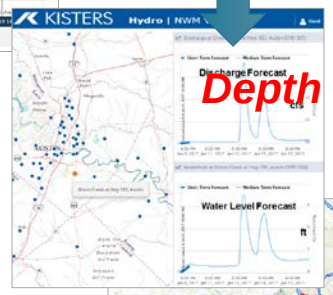


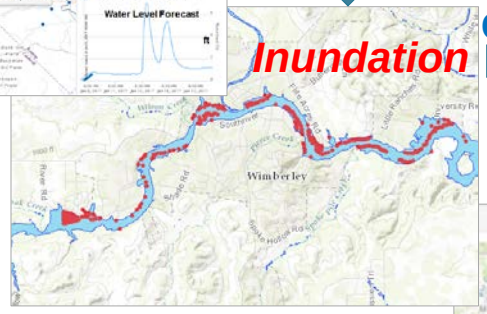
Take discharge forecast from the National Water Model

Discharge



Transform discharge to depth by rating curve or hydraulic model

Depth

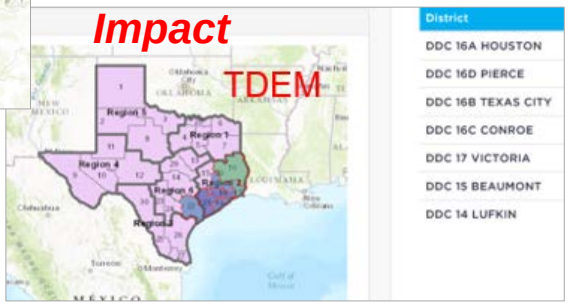


Create flood inundation map from water depth

Inundation

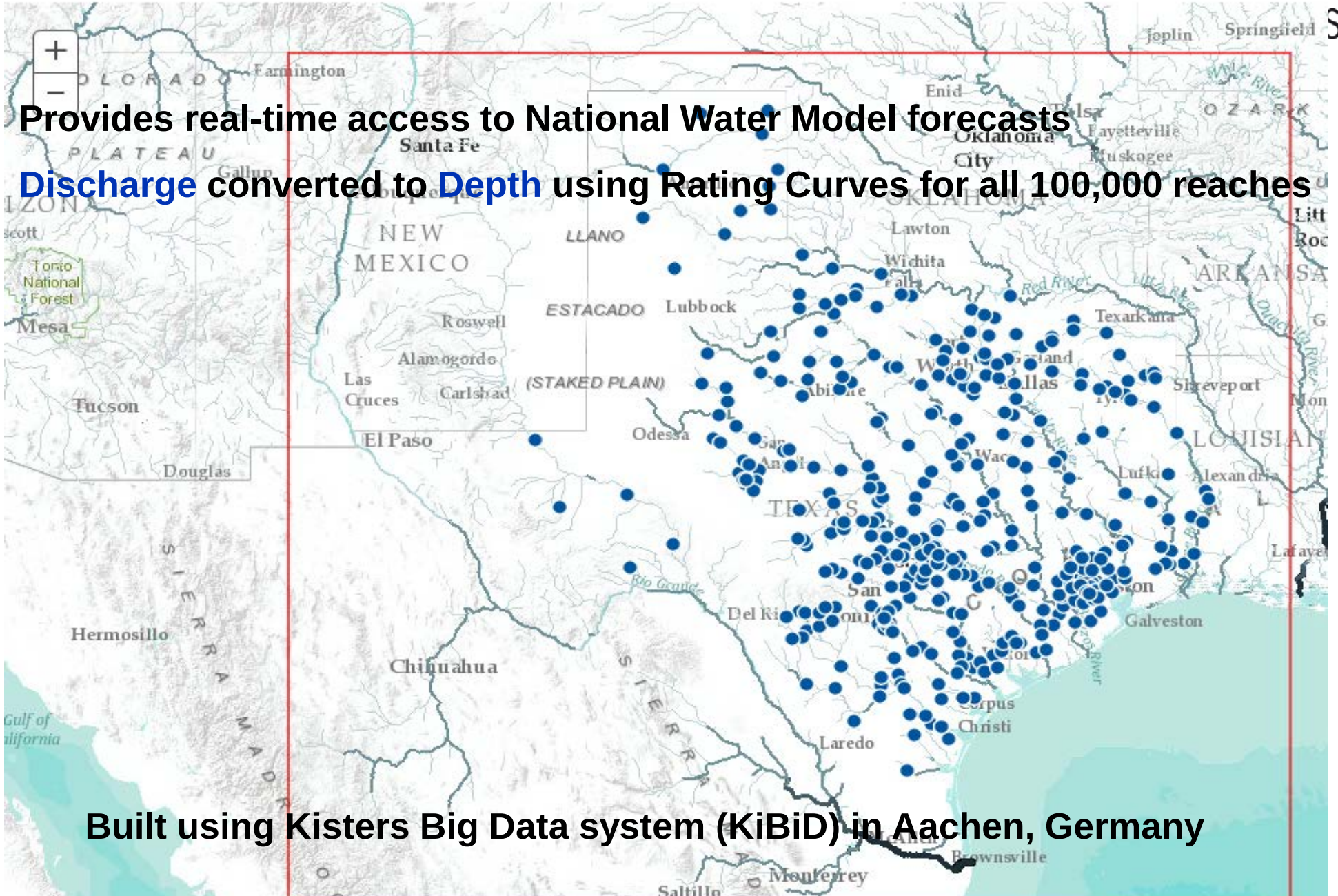
Assess impact on people and property

Impact



Flood emergency response depends on assessment of impact

KISTERS **Hydro** | NWM Viewer



Provides real-time access to National Water Model forecasts

Discharge converted to Depth using Rating Curves for all 100,000 reaches

Built using Kisters Big Data system (KiBiD) in Aachen, Germany

Flood Impact from National Water Model forecast at 3PM Friday 25 August

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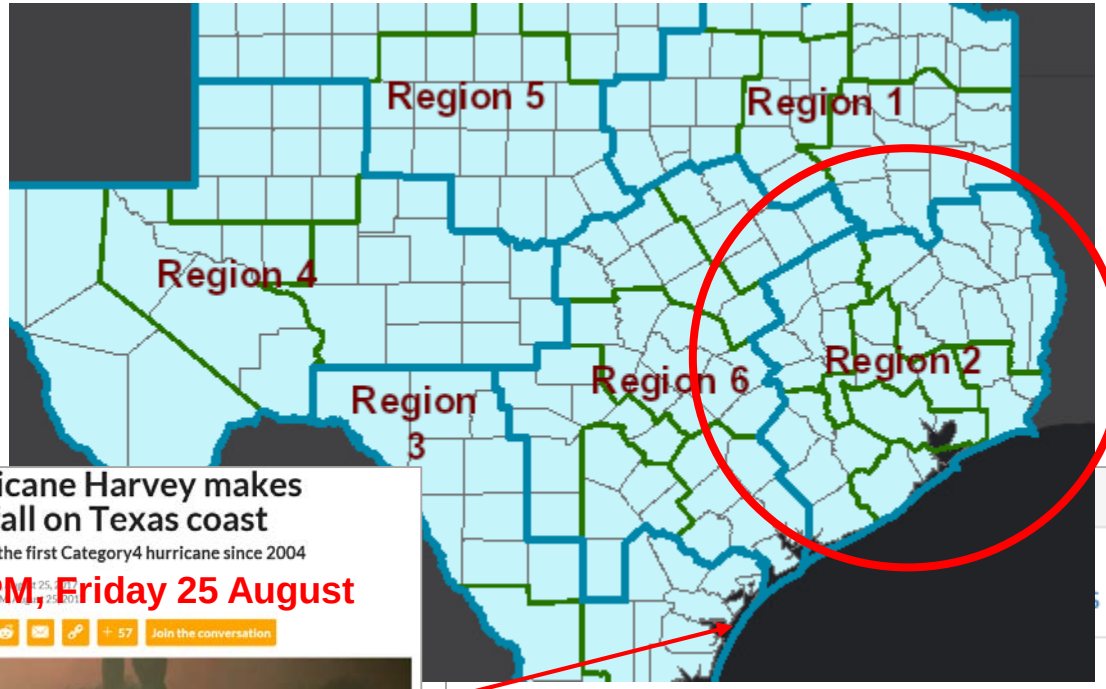

Using National Water Model Medium Range forecast

Houston is going to get inundated

DETAILS

Region	Address Count	Time At Max
Region 2	238465	8/29/2017 6:00:00 AM
Region 6	22120	8/27/2017
Region 1	3209	9/2/2017
Region 4	1761	8/27/2017 3:00:00 AM
Region 3	1425	9/4/2017 12:00:00 PM
Region 5	103	9/4/2017 6:00:00 AM

Buildings Damaged

Data: Texas Division of Emergency Management

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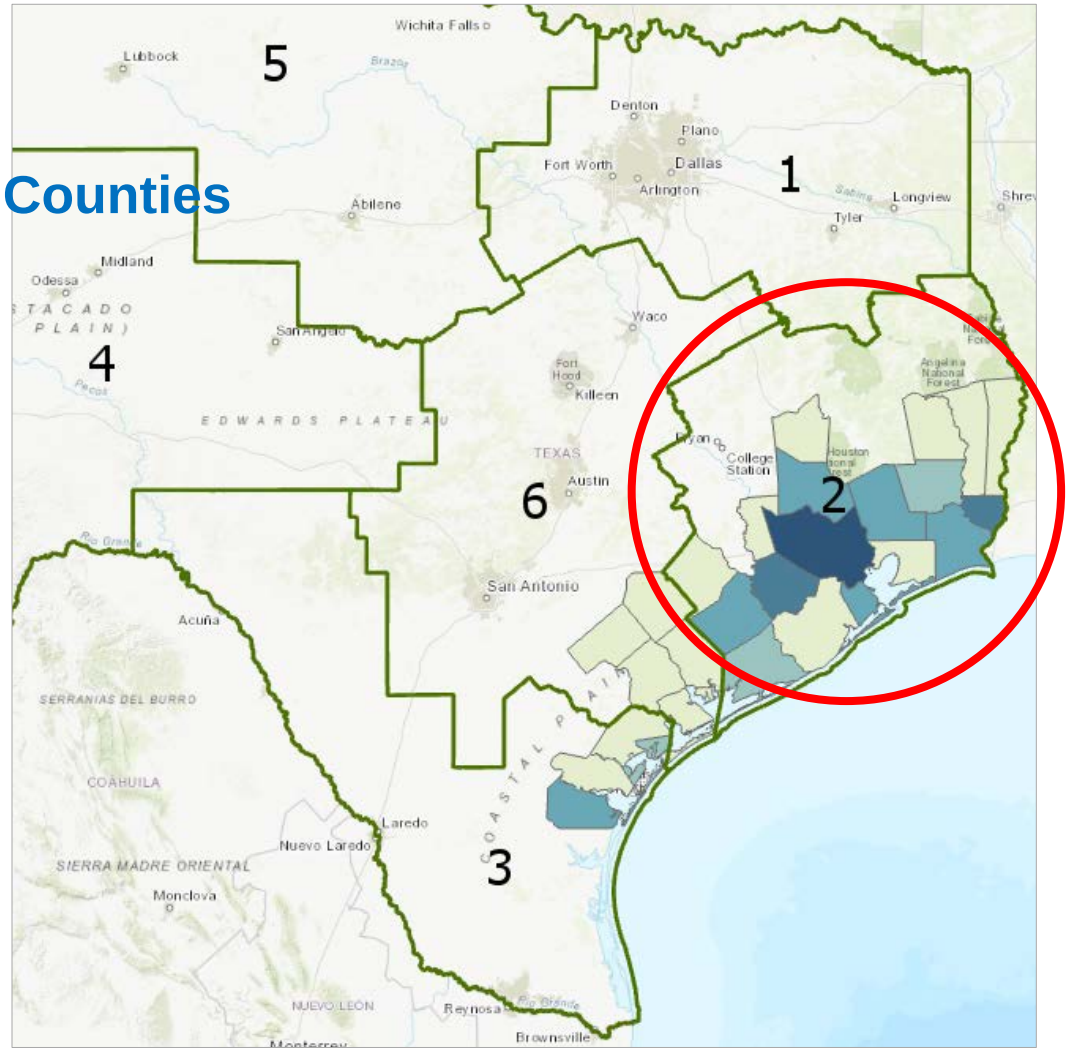
Total = 152,800

NWM Predicted Top 5 Counties

Harris
Fort Bend
Brazoria
Galveston
Montgomery

Actual Top 5 counties

Harris
Orange
Fort Bend
Montgomery
Jefferson



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