



Recent Flood Monitoring, Modeling, and Characterization Activities of the USGS

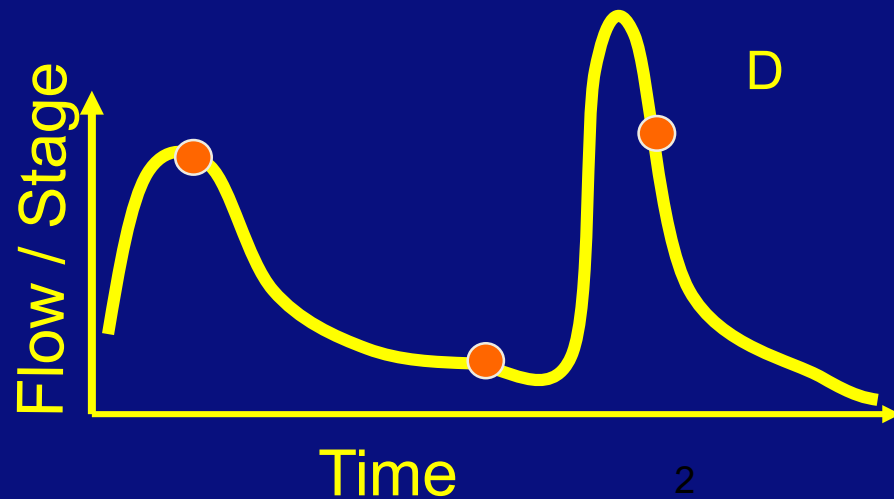
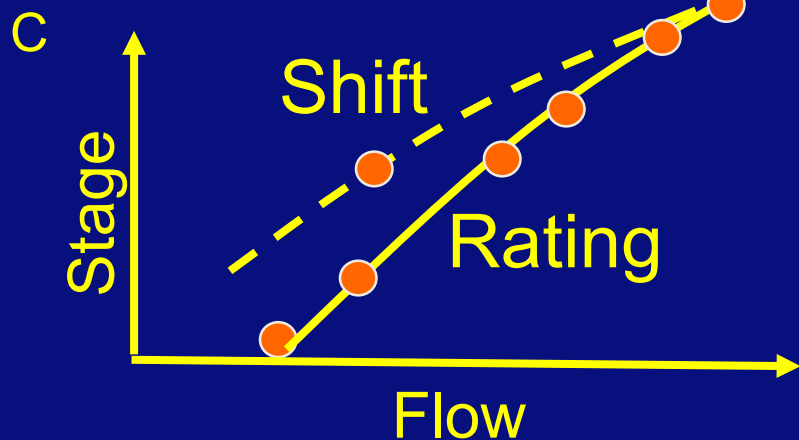
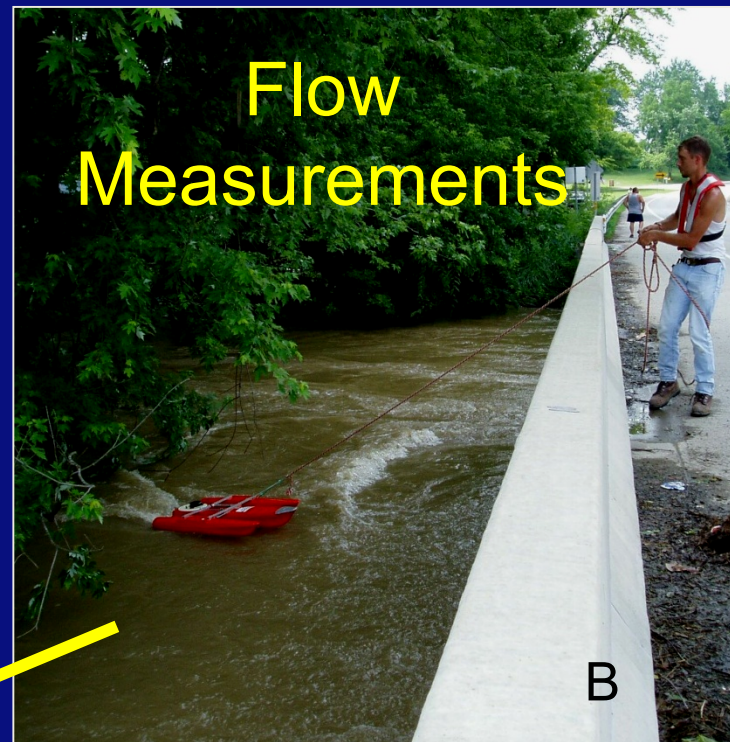
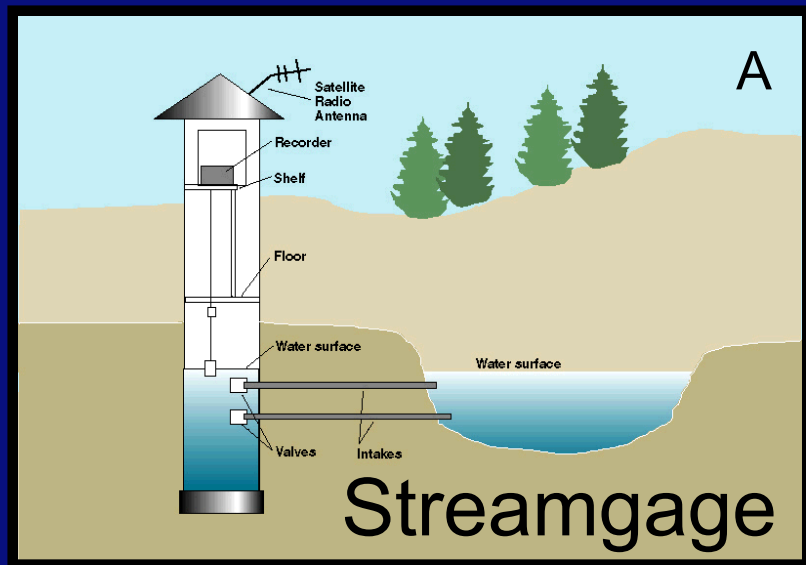
February 22, 2021

Julie Kiang and Robert Mason

U.S. Geological Survey

Watauga River at Sugar Grove, NC

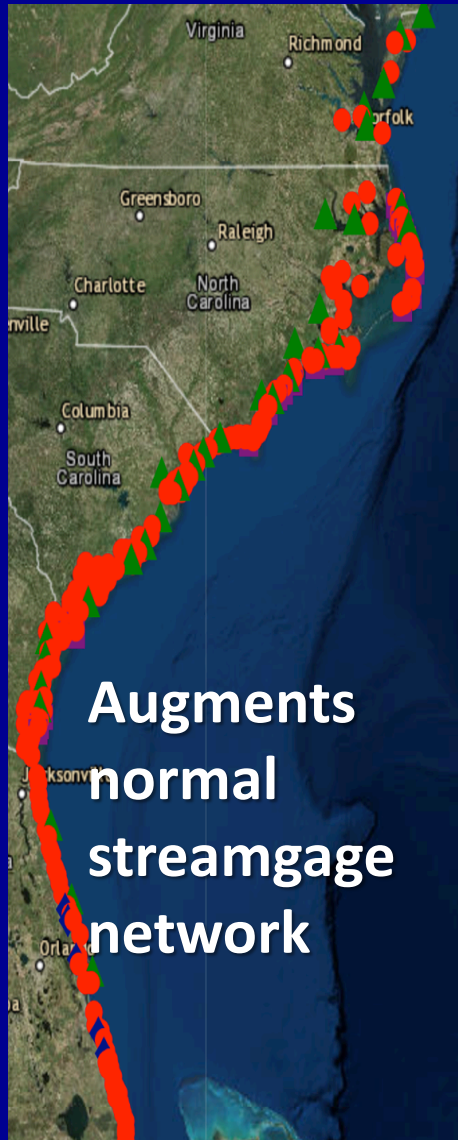
The Streamgaging Process



New Technologies for Flood Measurements

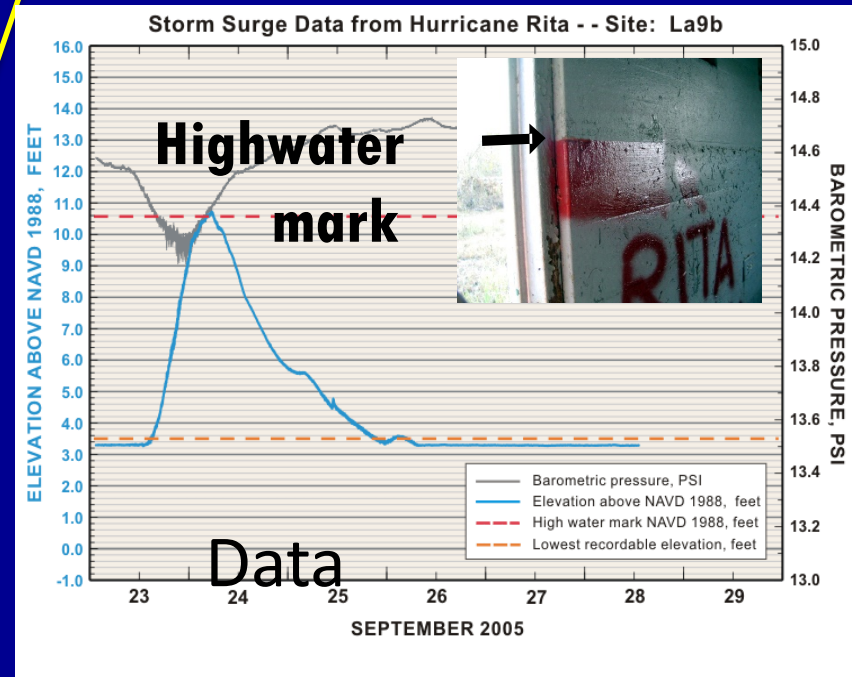


Temporary Storm-Tide Mobile Networks



Storm-Tide Sensor

Rapid Deployment
StreamGage

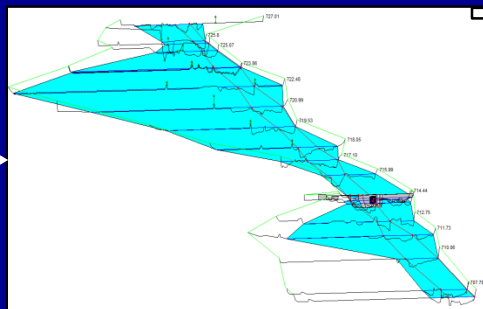


USGS Static Flood Inundation Maps

USGS Streamgage



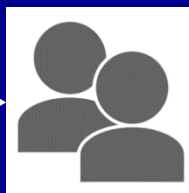
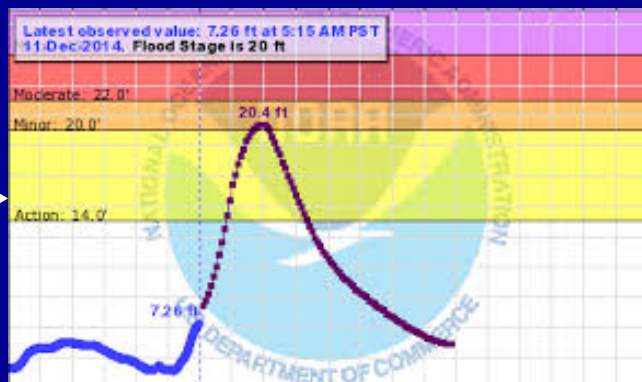
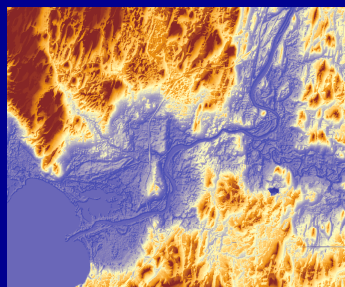
Hydraulic Model



Static map library showing multiple layers of stage-indexed inundation



Digital Elevation Model (LiDAR)

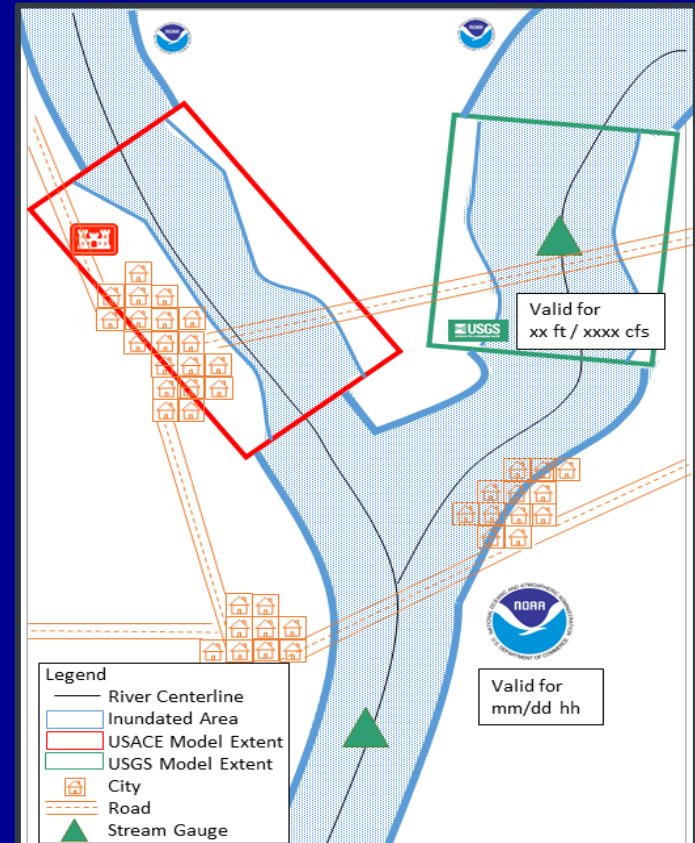


USGS FIM Locations



IWRSS iFIM Development

- Quilting of NWS NWM, USACE dynamic HecRas Maps, and USGS static FIMs
- Coordinated development based on storm forecasts
- Currently FUO to FEMA with aspirations for public dissemination through NWS NWC
- Plan envisions post-event documentation and evaluation (remotely sensed images, HWMs, etc.



Quick Response Flood Inundation Mapping

Multiple Remote Sensing Data Sources + Automated Processing

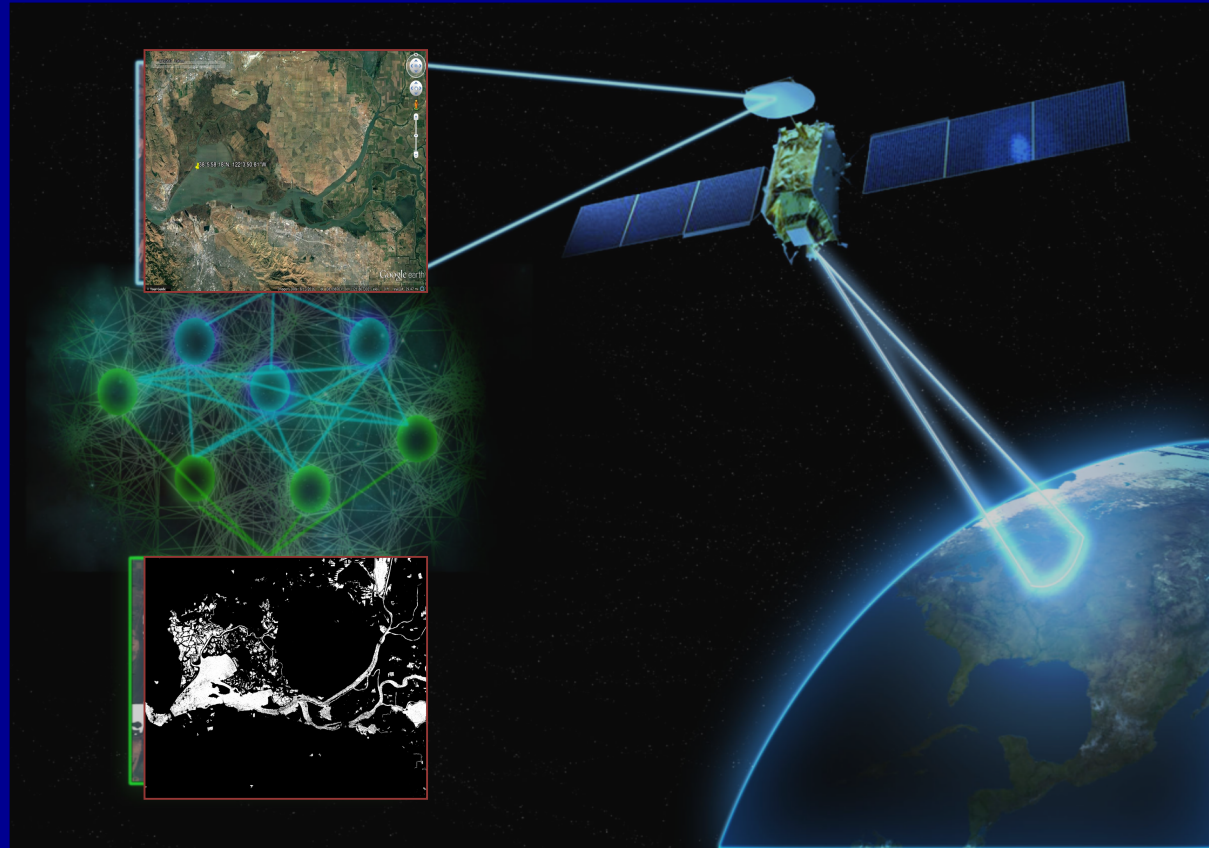
Satellite Images +
Ground Observations



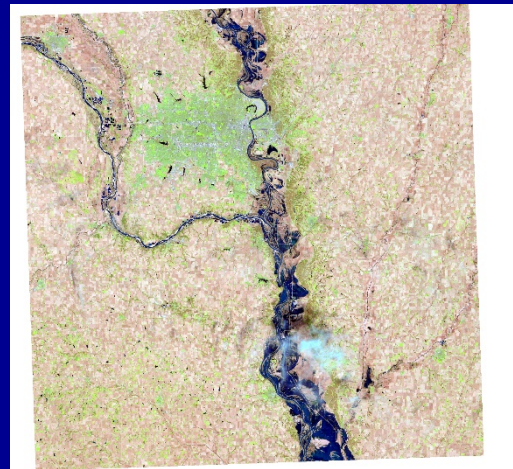
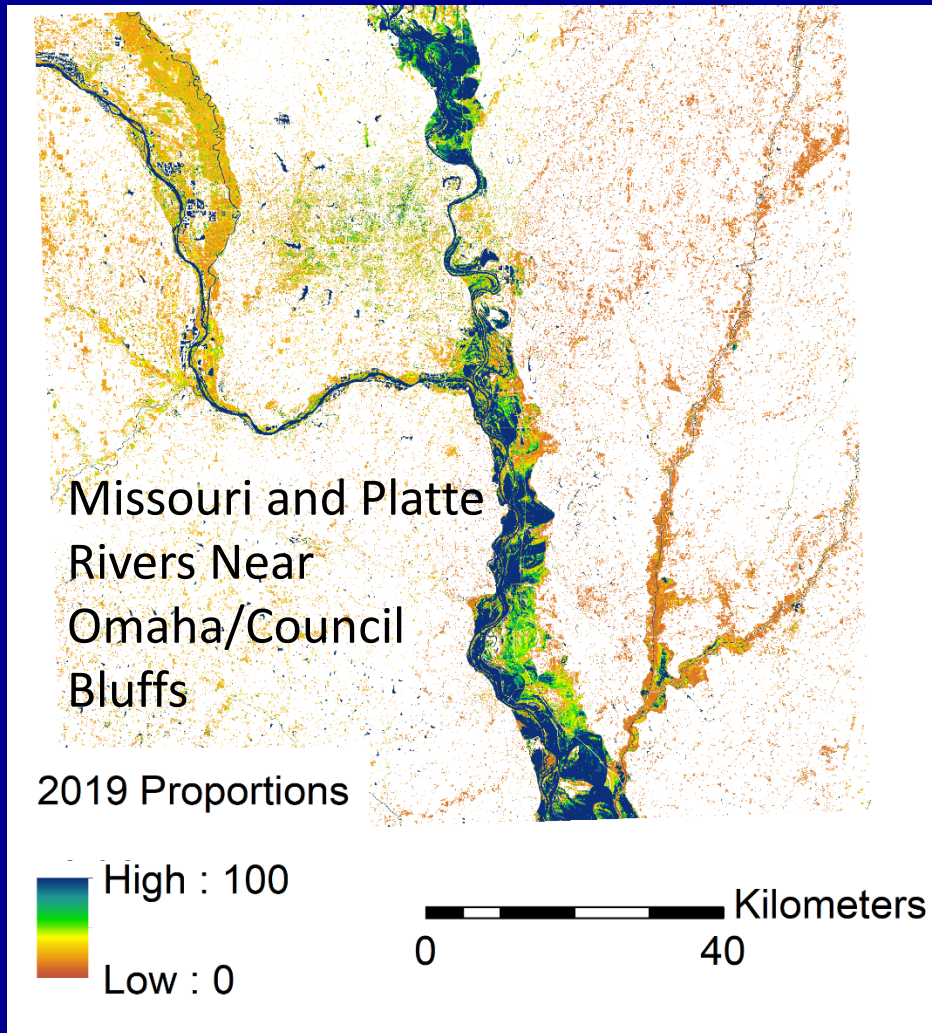
AI/ML Processing
Hydraulic Analysis



Detailed Flood
Inundation Maps



Remotely Sensed Dynamic Surface Water Extent






2019-04-15



2020-04-09


FLOOD FREQUENCY

Bulletin 17C – Progress on regional skew



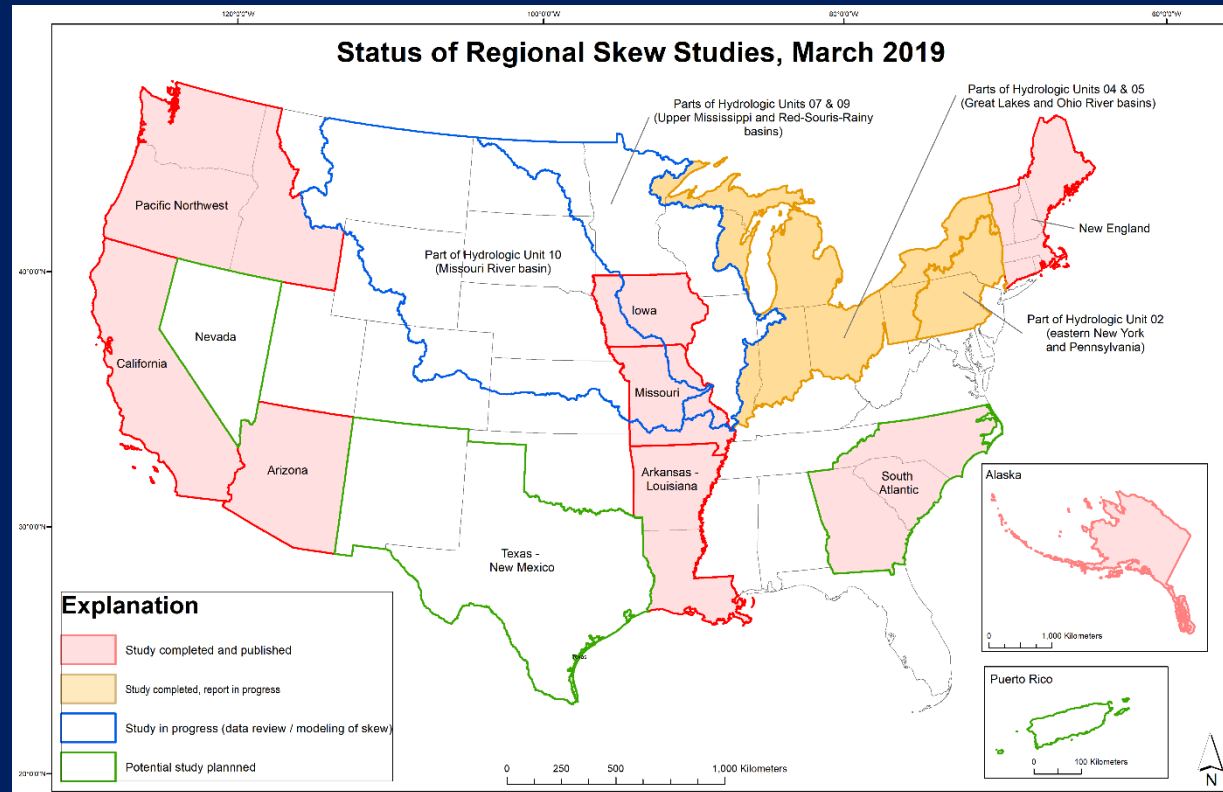
Guidelines for Determining Flood Flow Frequency Bulletin 17C

Chapter 5 of
Section B, Surface Water
Book 4, Hydrologic Analysis and Interpretation



Techniques and Methods 4–B5

U.S. Department of the Interior
U.S. Geological Survey

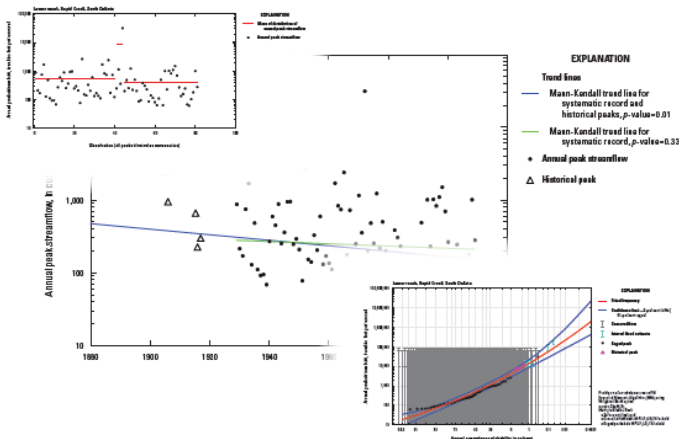


Paleoflood and historical data



Prepared in cooperation with the U.S. Nuclear Regulatory Commission

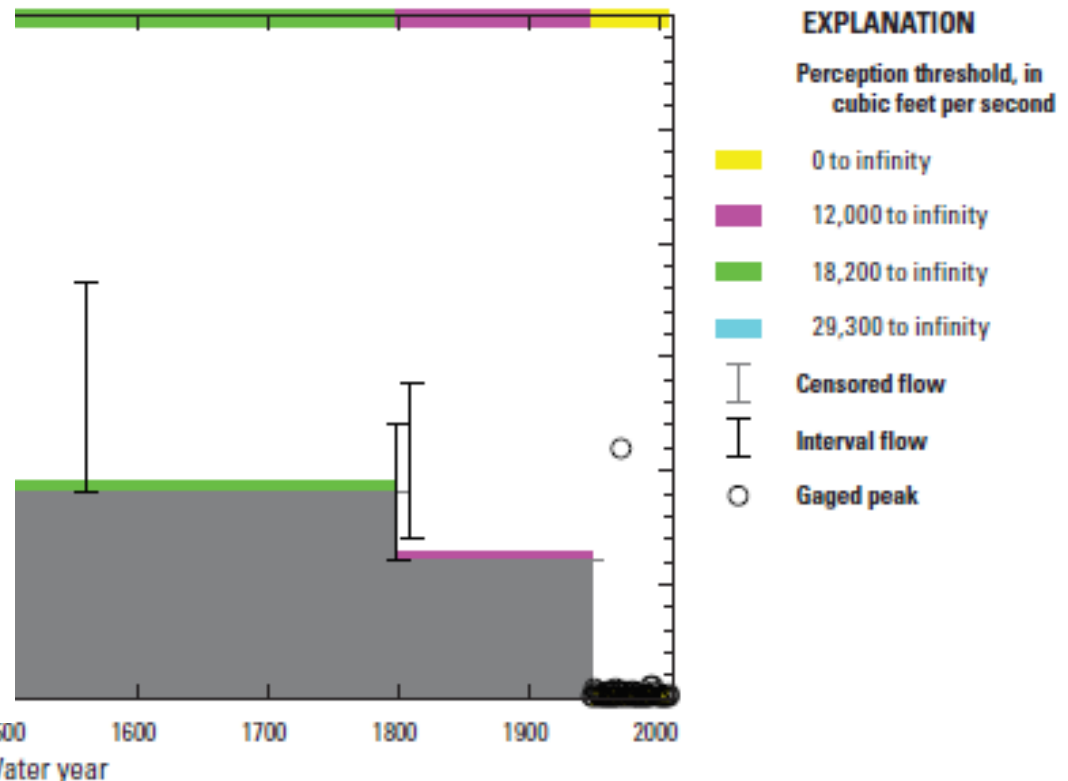
Flood-Frequency Estimation for Very Low Annual Exceedance Probabilities Using Historical, Paleoflood, and Regional Information with Consideration of Nonstationarity



Scientific Investigations Report 2020–5065

U.S. Department of the Interior
U.S. Geological Survey

- Bulletin 17C can make better use of paleoflood and historical data because we can describe it more fully now.

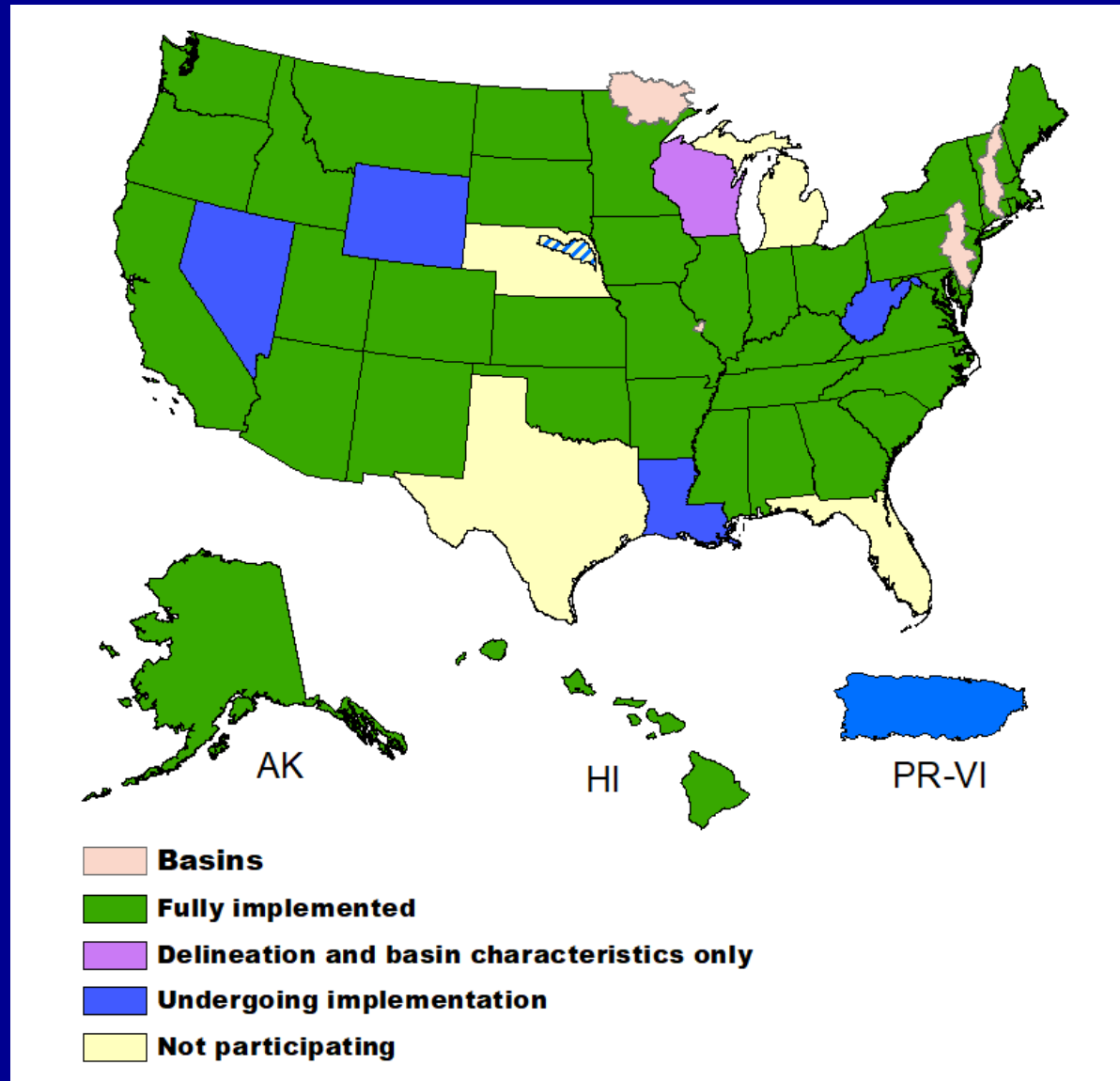


HISTORICAL AND PALEOFLOOD ANALYSES FOR PROBABILISTIC FLOOD HAZARD ASSESSMENTS – APPROACHES AND REVIEW GUIDELINES

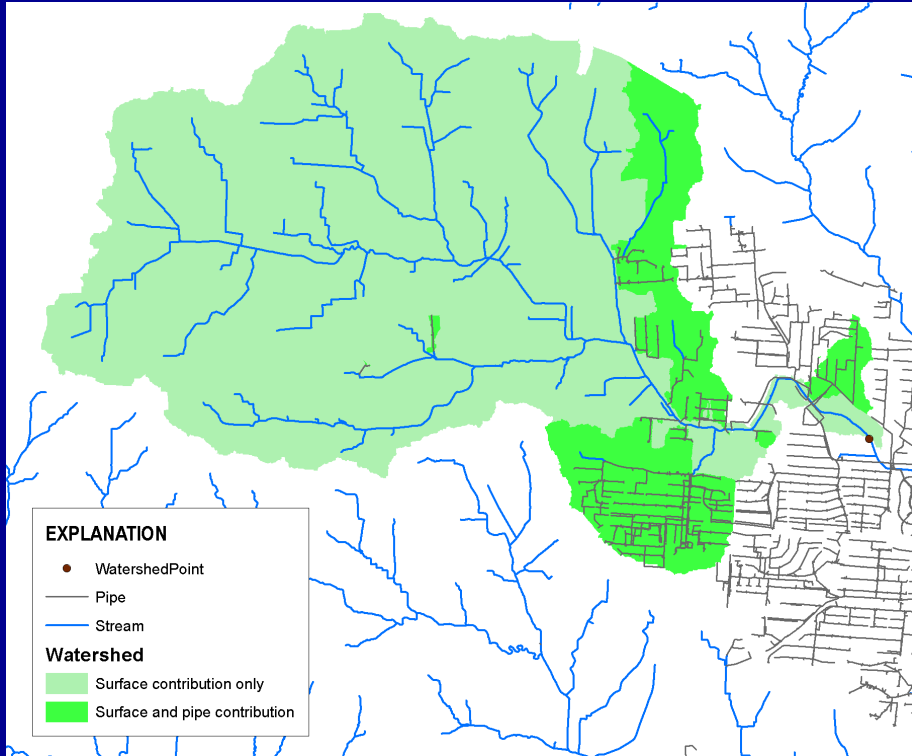
Ryberg, Harden, Friedman, O'Connor
Tuesday, 12:15 Eastern

StreamStats

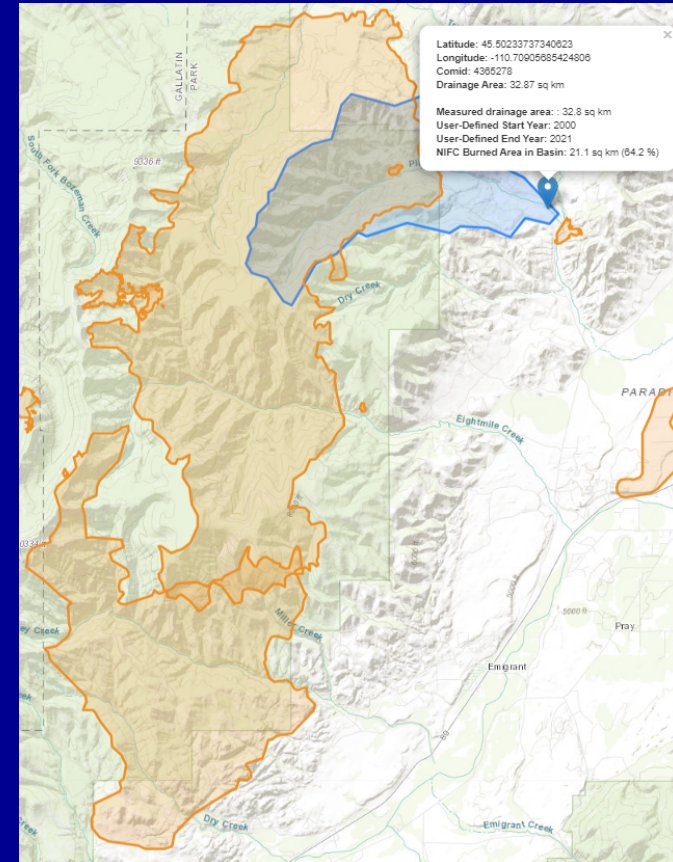
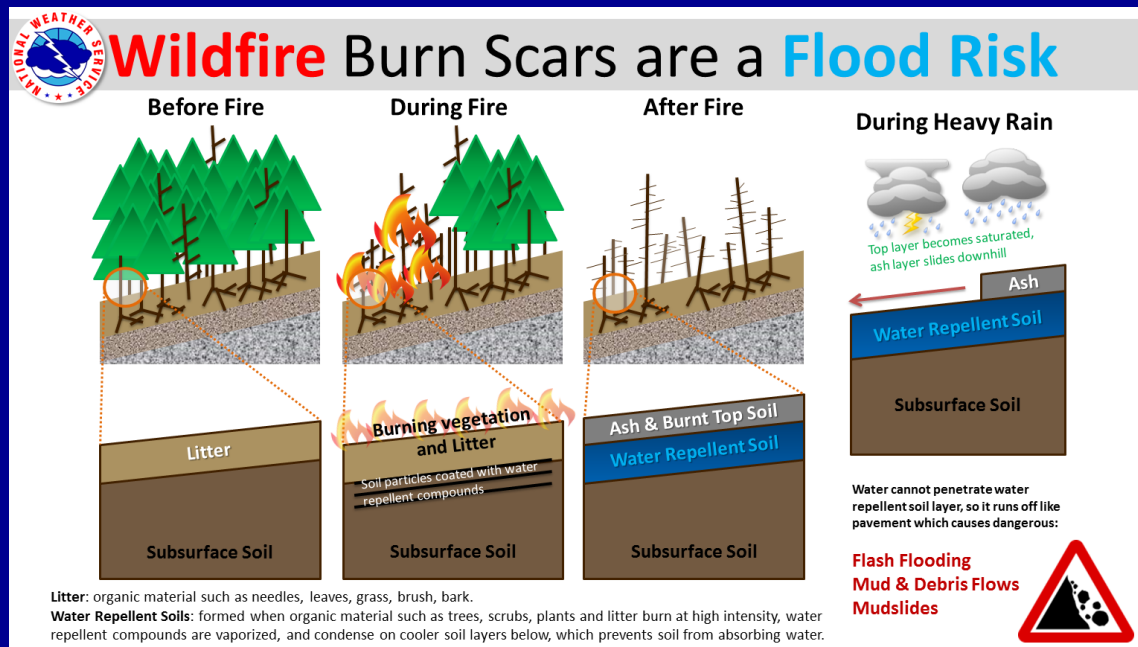
- Most of the nation has been implemented with regional equations
- Evaluating machine learning alternatives
- New custom functions



Urban hydrology: Mapping storm drains for accurate basin delineation

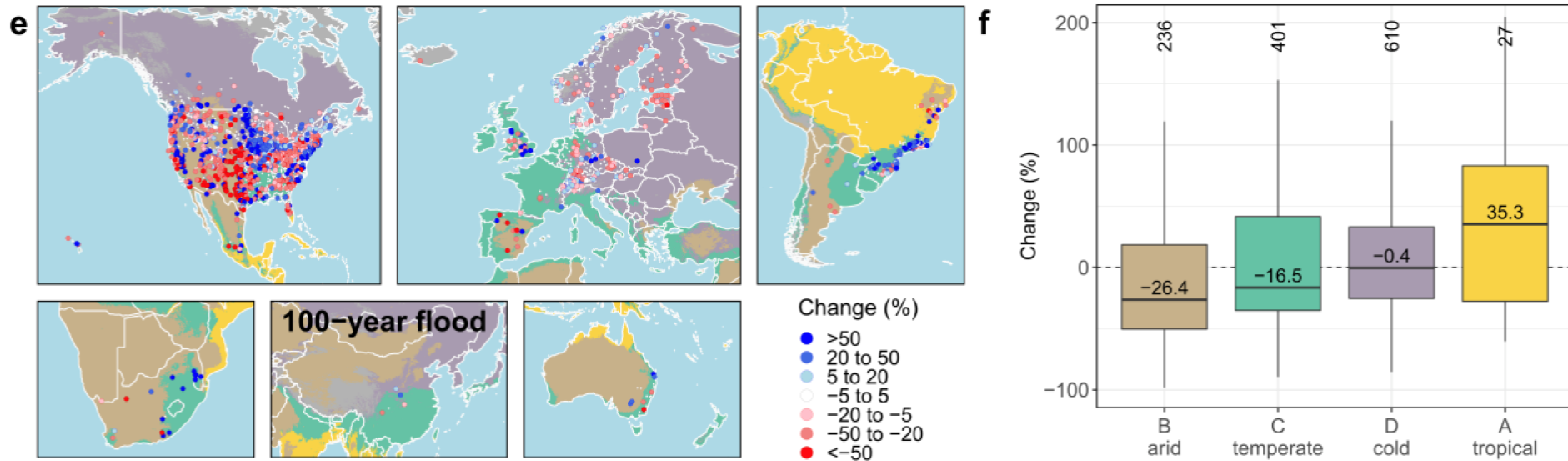


Fire-Hydrology (proof of concept)



FLOOD TRENDS

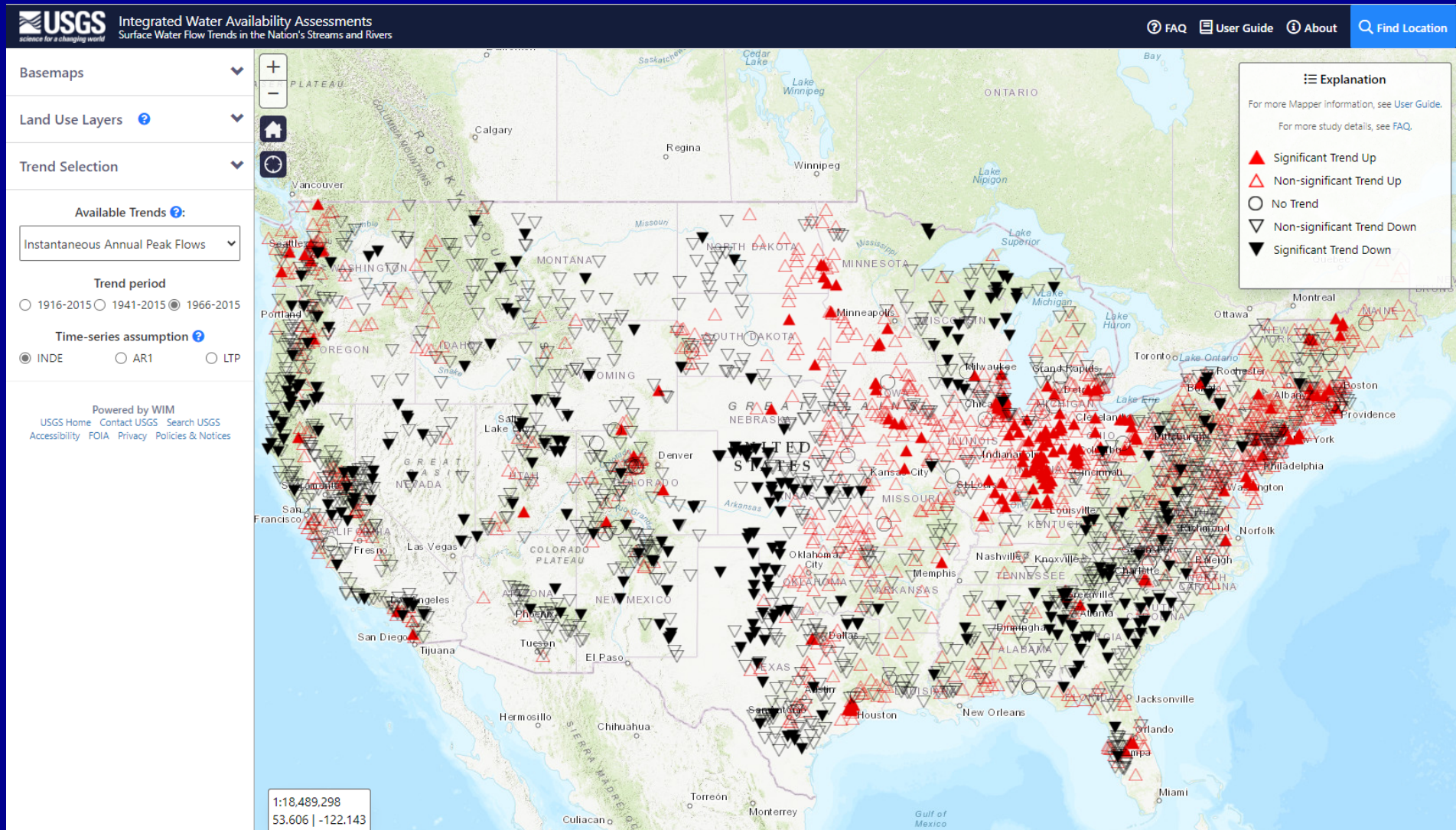
What is the change in the magnitude of the 100-year flood since the 1970s?



The magnitude and frequency of floods are changing substantially in different climates of the globe.

Monitoring our rivers are critical because long-term records are necessary to understand and communicate how major floods are changing relative to the past.

Peak flow trends: interactive map



UPDATING DESIGN FLOOD ESTIMATES AT SITES WITH CHANGING VARIABILITY

Hecht, Barth, Ryberg, and Gregory

Tuesday, 11:45 Eastern



Questions?

Robert Mason

rrmason@usgs.gov

Extreme Hydrologic Events Coordinator

Julie Kiang

jkiang@usgs.gov

Analysis and Prediction Branch Chief