



# Geohazards Indications and Potentials (GeoHIP) Global Flood Potential Model

NGA Geoscience Applications Branch

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NATIONAL GEOSPATIAL **NGA** INTELLIGENCE AGENCY

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# Global Models GeoHazards Indications and Potentials (GeoHIP)

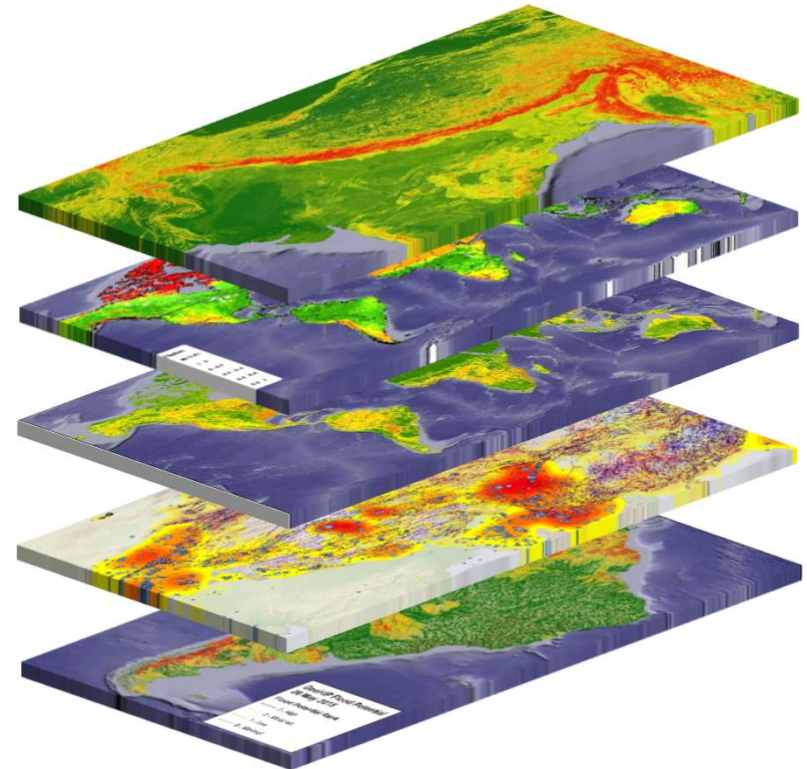
Landslide

Global Spectral Index Suite (GSIS)

Wildfire

Seismic Liquefaction

Flood



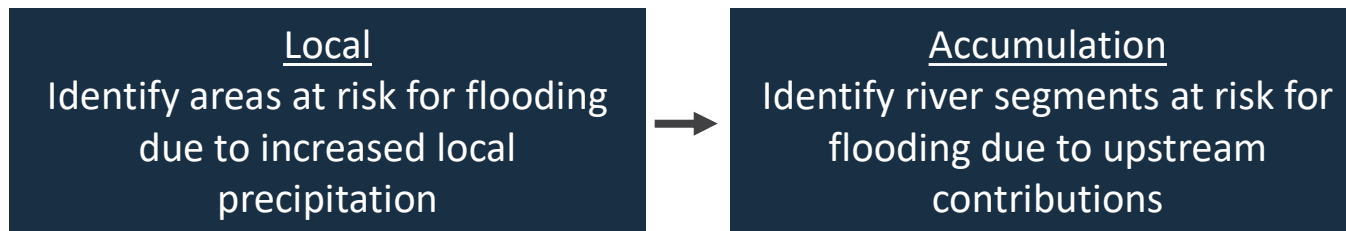


# A Method to Show Flood Potential Globally

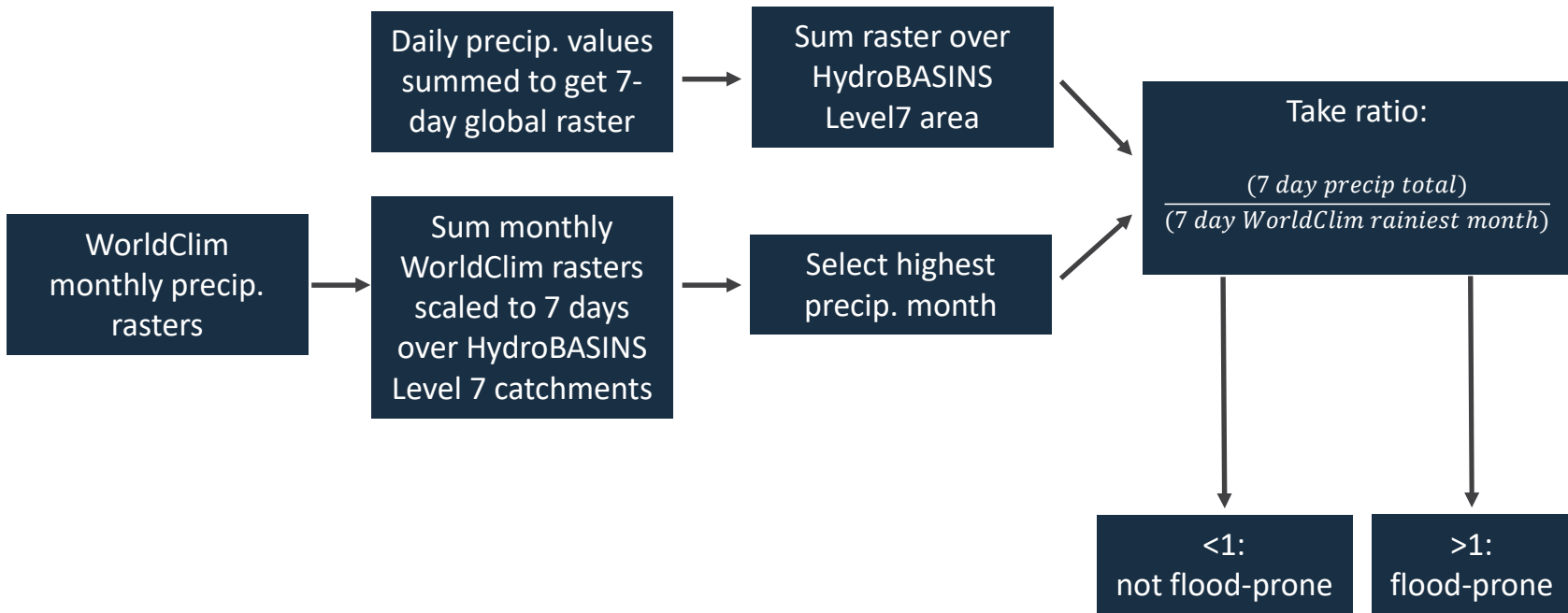
## Objectives:

- To add a flood potential model to our global GeoHIP framework
- To flag areas with potential for flooding for the current day and four forecast days
- Can be run by the Geoscience Applications team within two hours

## Two-Step Model:

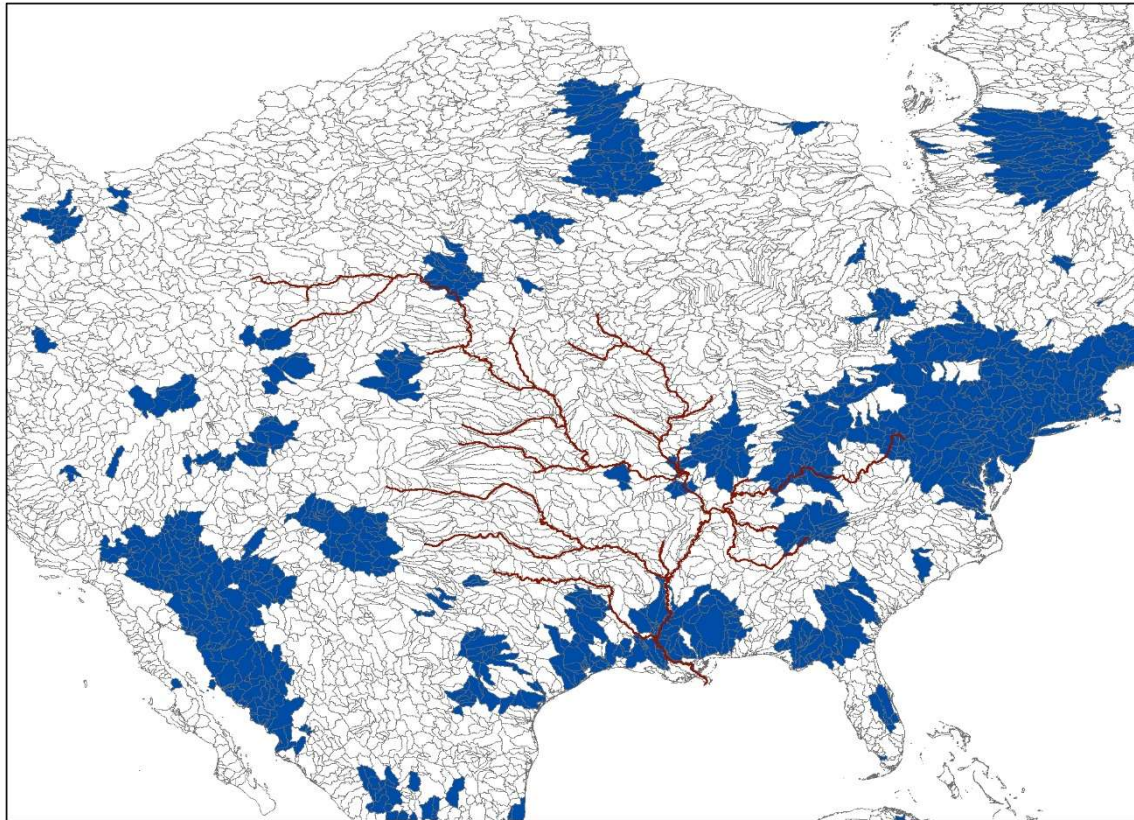


# Method for Local Flood Potential



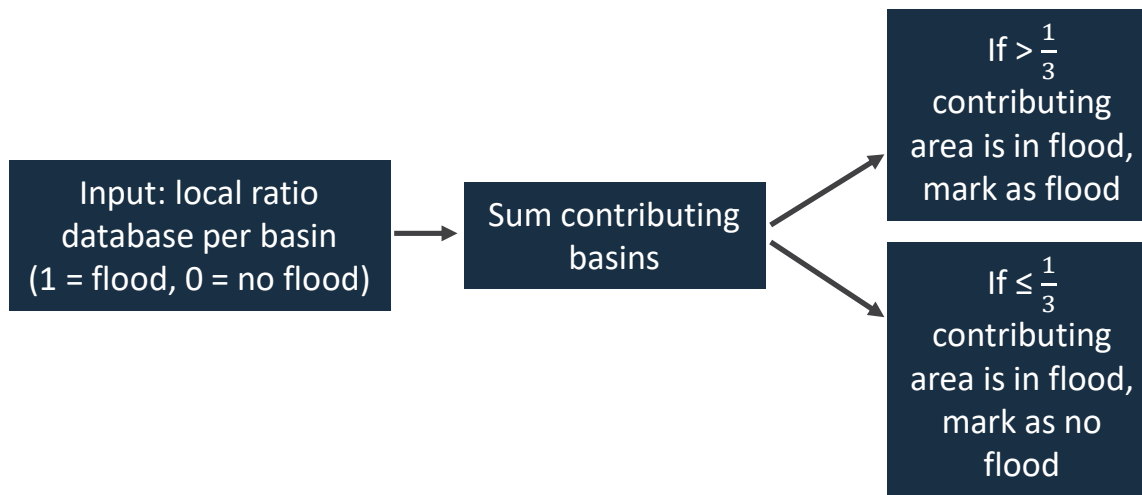
# Local Flood Potential Example

(Blue areas indicate increased risk for July 1, 2015)



Source: HydroBASINS Level 7 (USGS, 2015); NGA-derived stream network; NGA model output

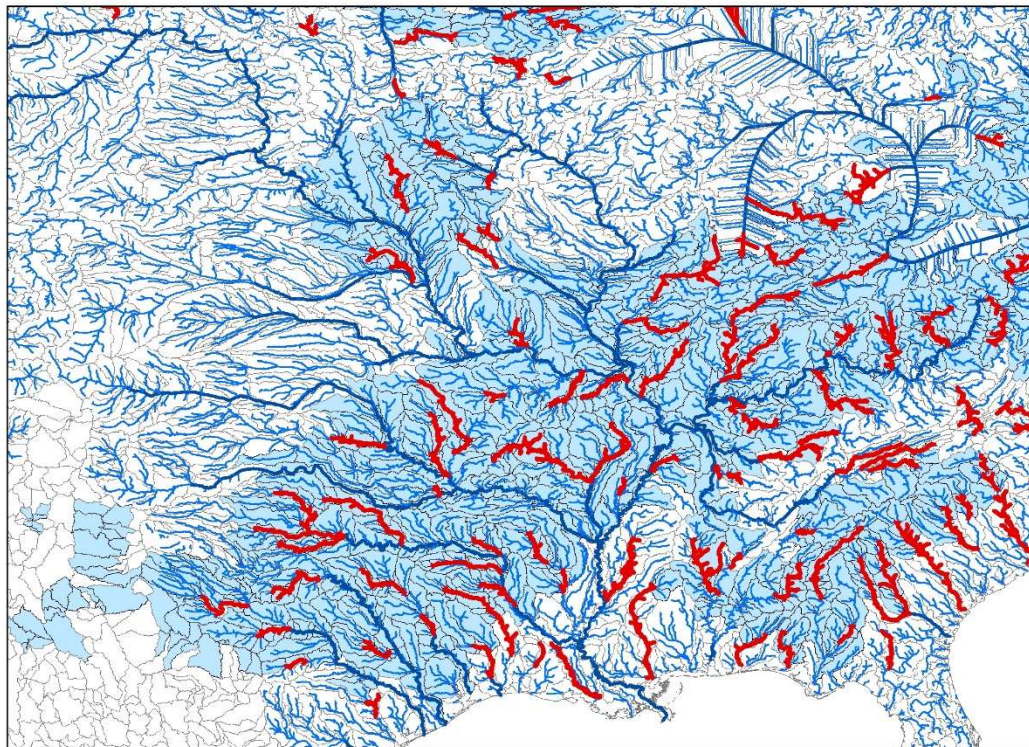
# Method For Cumulative Flood Potential



## Notes:

- Currently assumes constant flood wave celerity
- The cumulative total counts contributing basins based on time in the past (calculated from flood wave celerity)
- Highlight line segments for major rivers within basins with  $> \frac{1}{3}$  contributing area in flood

# Cumulative Flood Potential Graphic Depiction



Source: HydroBASINS Level 7 (USGS, 2015); NGA-derived stream network; NGA model output



# Model Summary

## 1. Local

- Assign 7-day precipitation sums to HydroBASINS Level 7 Catchments
- Assign 7-day monthly precipitation maximums (WorldClim) to HydroBASINS Level 7
- Take the ratio of the two databases (>1 indicates flood potential)
- Store ratios in a database that goes back at least 60 days

## 2. Accumulation

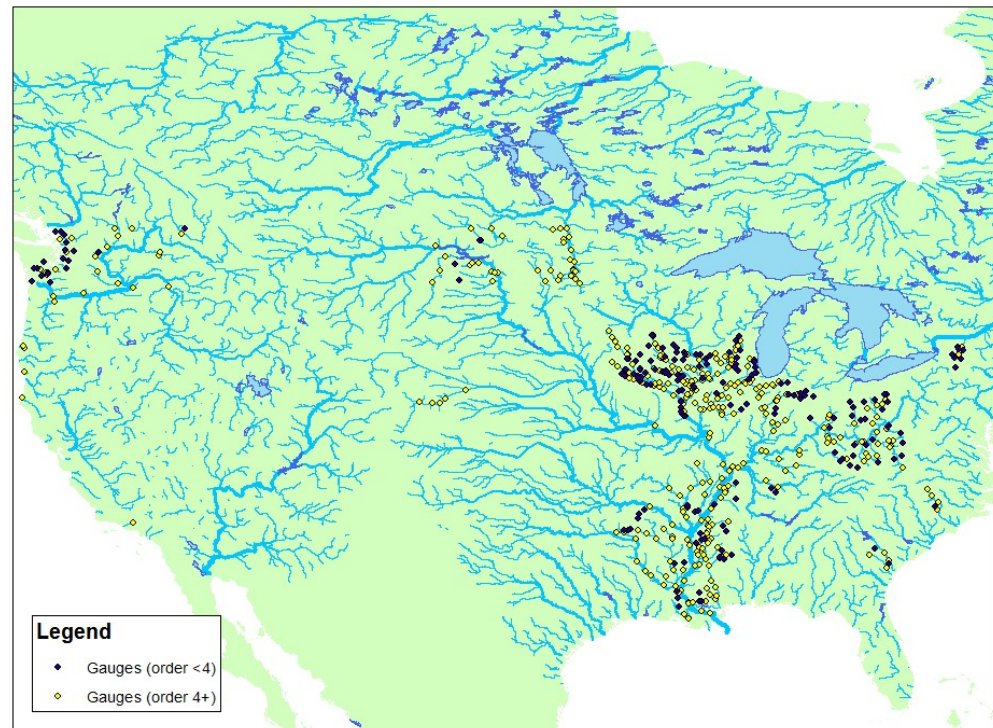
- Use local flood potential database as input
- Determine which basins have contributing basins
- Sum all contributing basins that are marked as flood potential
- If 1/3 of the upstream contribution basin area is marked flood potential, the streams in the basin are marked as flood potential

## 3. Graphic Product

- Shade basins to indicate local flood potential
- Highlight stream segments to indicate cumulative flood potential

# Model Validation

- Compare model results with 2015 USGS stage data from 533 stations
- Aggregate by HydroBASIN Lev.7
- Adjust model parameters to optimize predictions
- Separate stream segments into minor and major (order 4+)
  - ▶ Minor streams (“local”): predicts 85% of floods
  - ▶ Major streams (“accumulation”): in progress



Source: USGS station coordinates; HydroBASINS lake layer (USGS, 2015); NGA-derived stream network



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