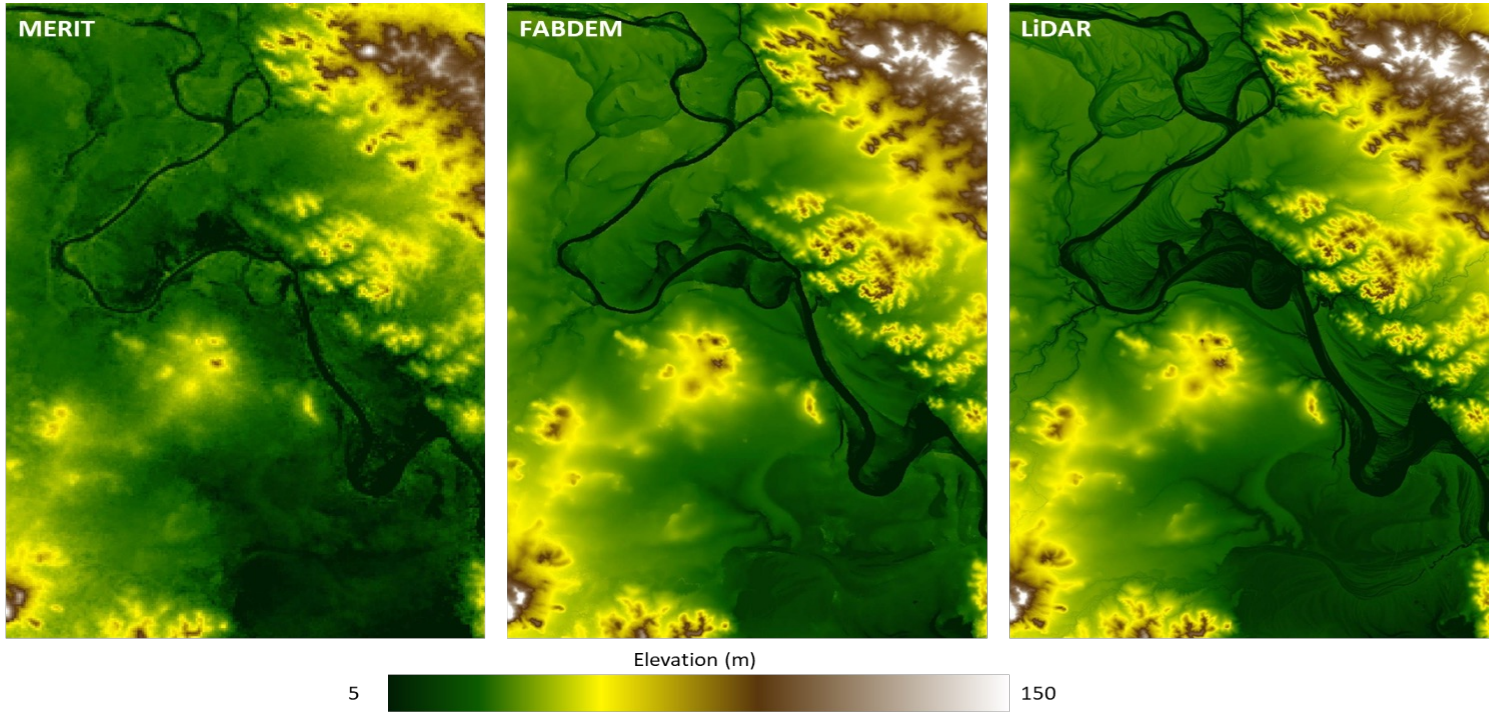
FATHOM

Quantifying Uncertainty: Metadata

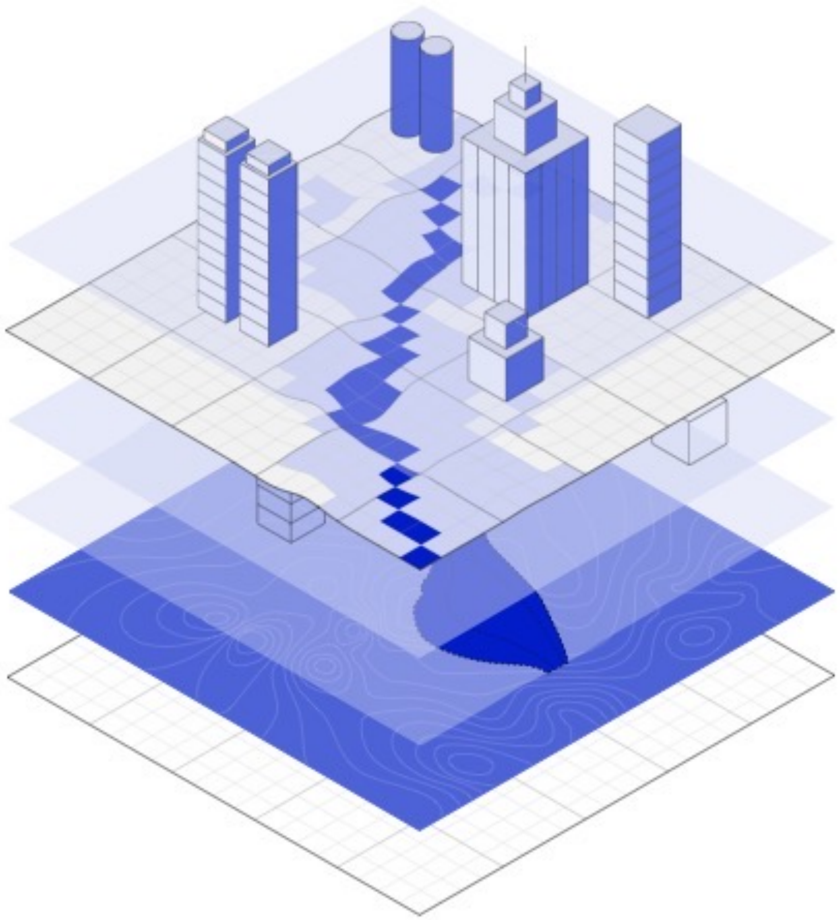
The impact of uncertainty

- Uncertainty underpins insurance: Without uncertainty insurance is not possible
- Blind confidence leads to poor decisions: Not understanding the limitations of models can result in inadequate or ineffective risk management strategies
- Transparency leads to better decisions: Being aware of uncertainty means resilient decisions can be made



Metadata product

- Extension to our Global and US Flood Map Products
- Set of Certainty Ranks (1 – 10)
  - For each model component
  - Weighted to each peril (pluvial, fluvial, coastal)
  - Combined across perils (inland, flood)
- Produced globally at sub-catchment level
- Available via API or in vector format GIS file
  - GeoPackage or GeoParquet



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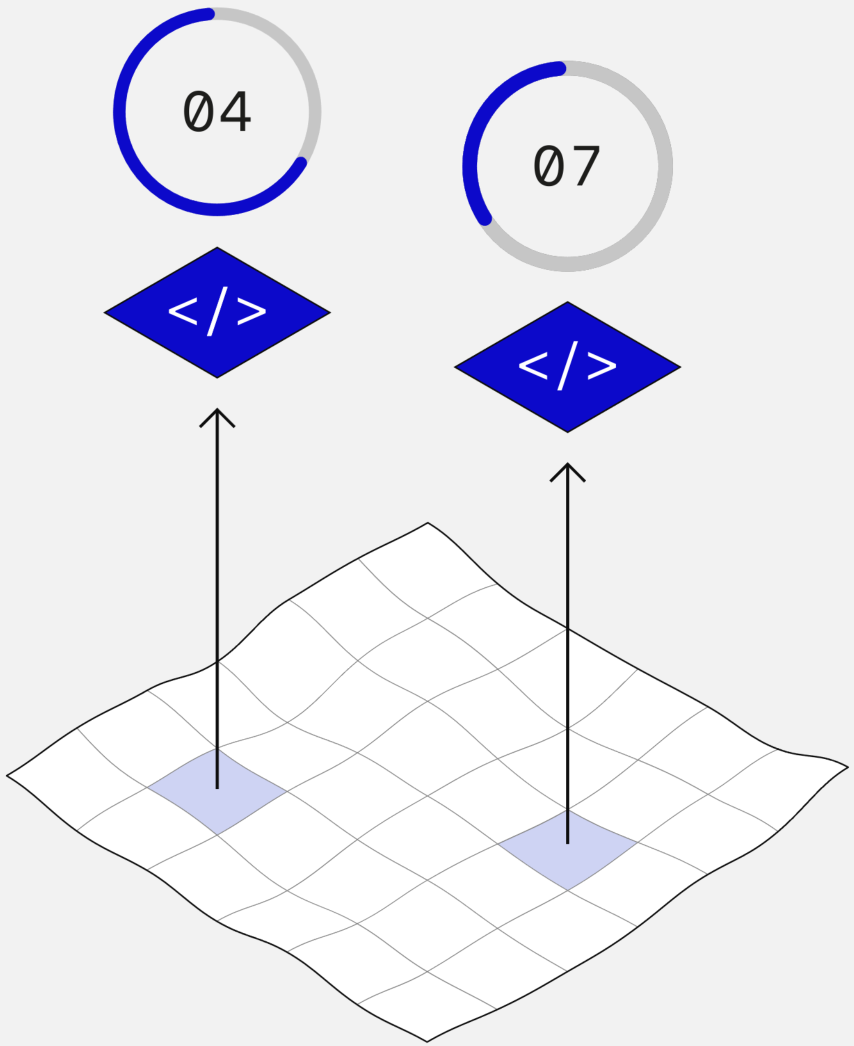
Certainty Ranks

- Provide information on:
  - Relative quality of component data and methods
  - How this varies in different geographic contexts

- Are derived from a mixture of numerically quantified uncertainty and expert judgement

- Communicate uncertainty with consistency on a common scale

Certainty Ranks: 1 (most certain) to 10 (least certain)



Rank definition

1 An idealized ‘best possible’ model run in the most favorable geographic conditions, where local data availability is no constraint.

10 A highly simplified approach deployed amidst severe data scarcity over complex topography.

Components that impact Fathom's Certainty Ranks

Terrain data

The quality of underlying elevation data is a key component in evaluating flood risk certainty. Factors considered include instrument type, slope, urbanization and vegetation.

Boundary condition data (rain, flow, sea levels)

Considers input data point density, climate zone, regression model fit, training data sources. Separate for fluvial, pluvial and coastal.

Hydrodynamics

Controlled by the complexity / completeness of the hydraulic model as well as terrain slope. Separate for fluvial, pluvial and coastal.

River Network

Assessments of certainty in the River Network are mainly based on the size, slope and level of urbanization within a catchment area.

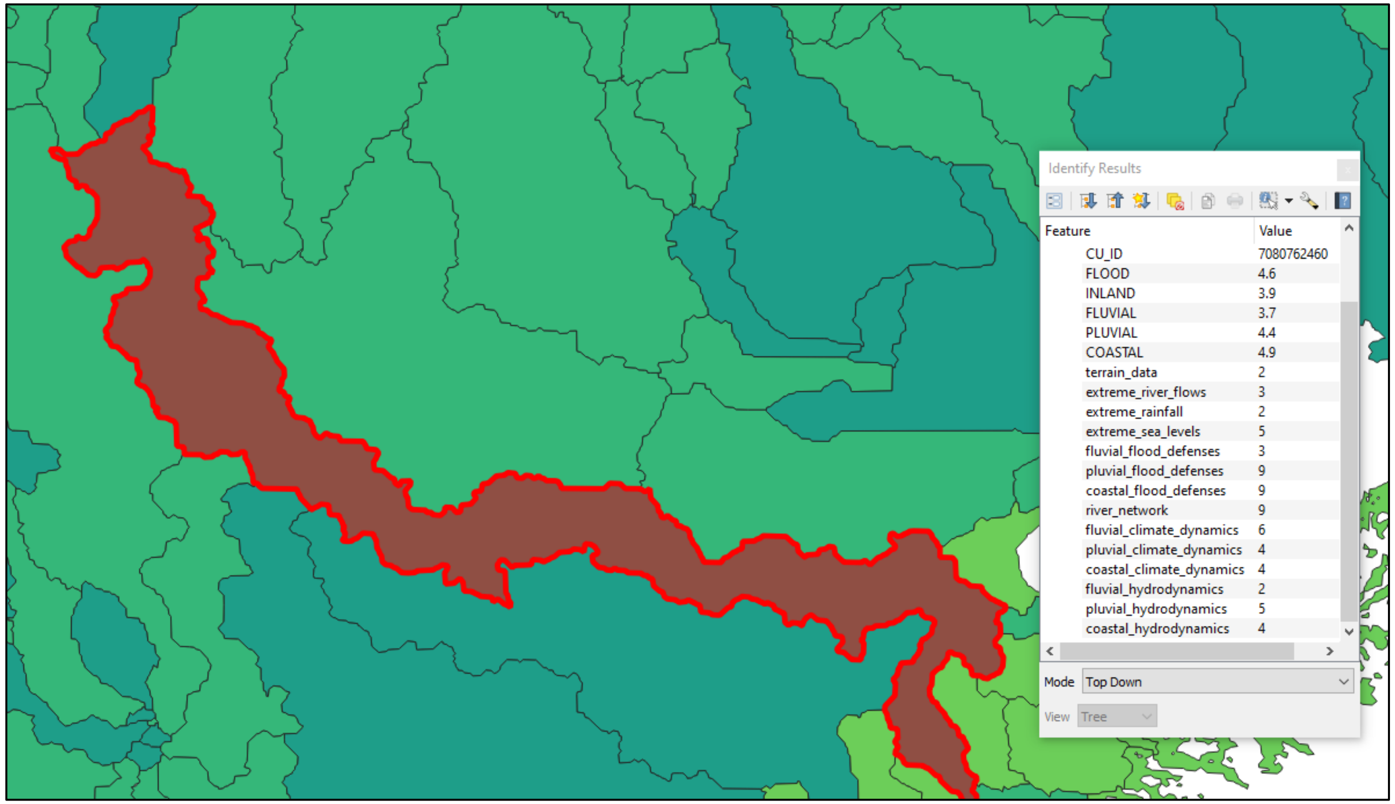
Defences

Based on level of urbanization and the source of the defence data assumptions. Separate for fluvial, pluvial and coastal.

Climate Dynamics

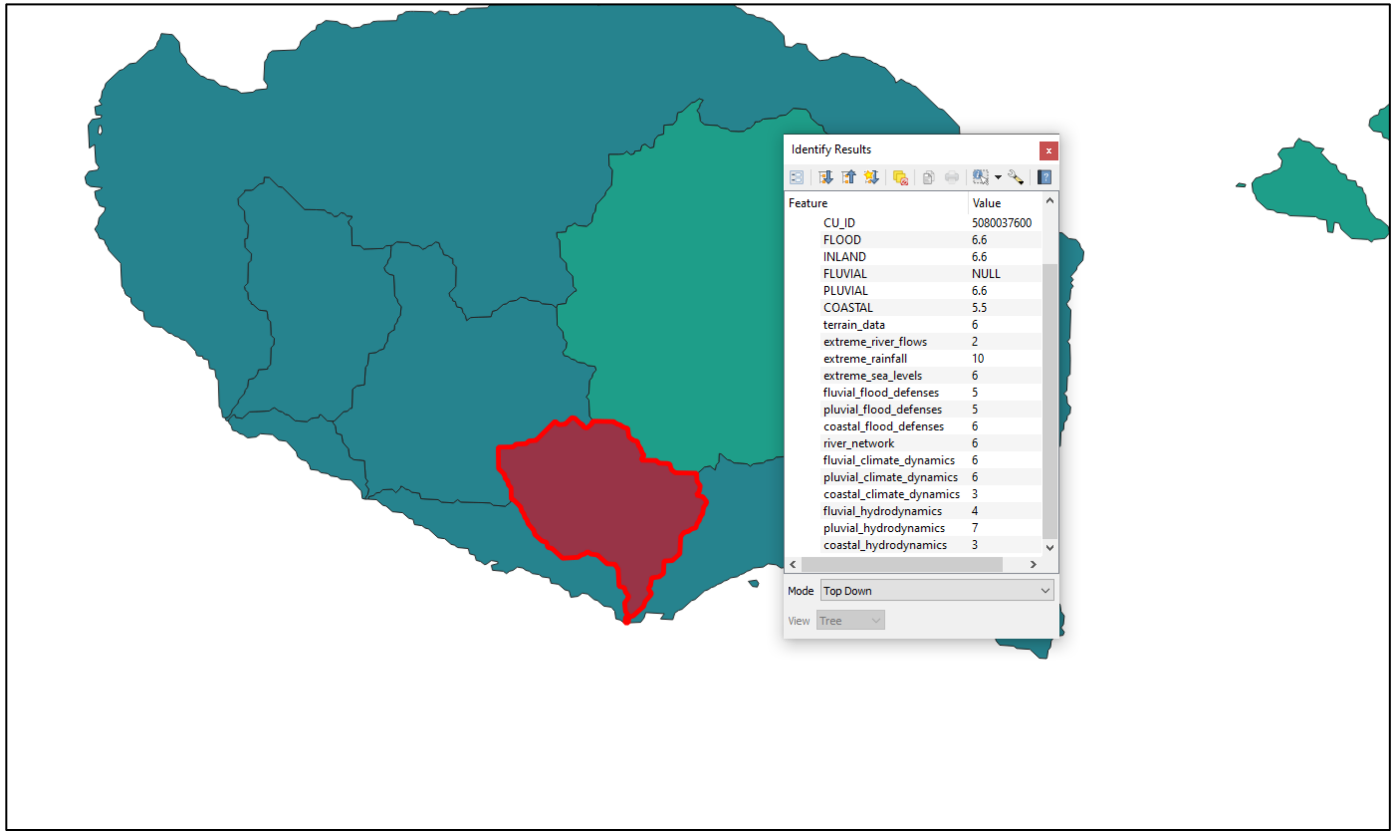
Based on agreement and spread of input climate data. Separate for fluvial, pluvial and coastal.

Example 1: New Orleans, US



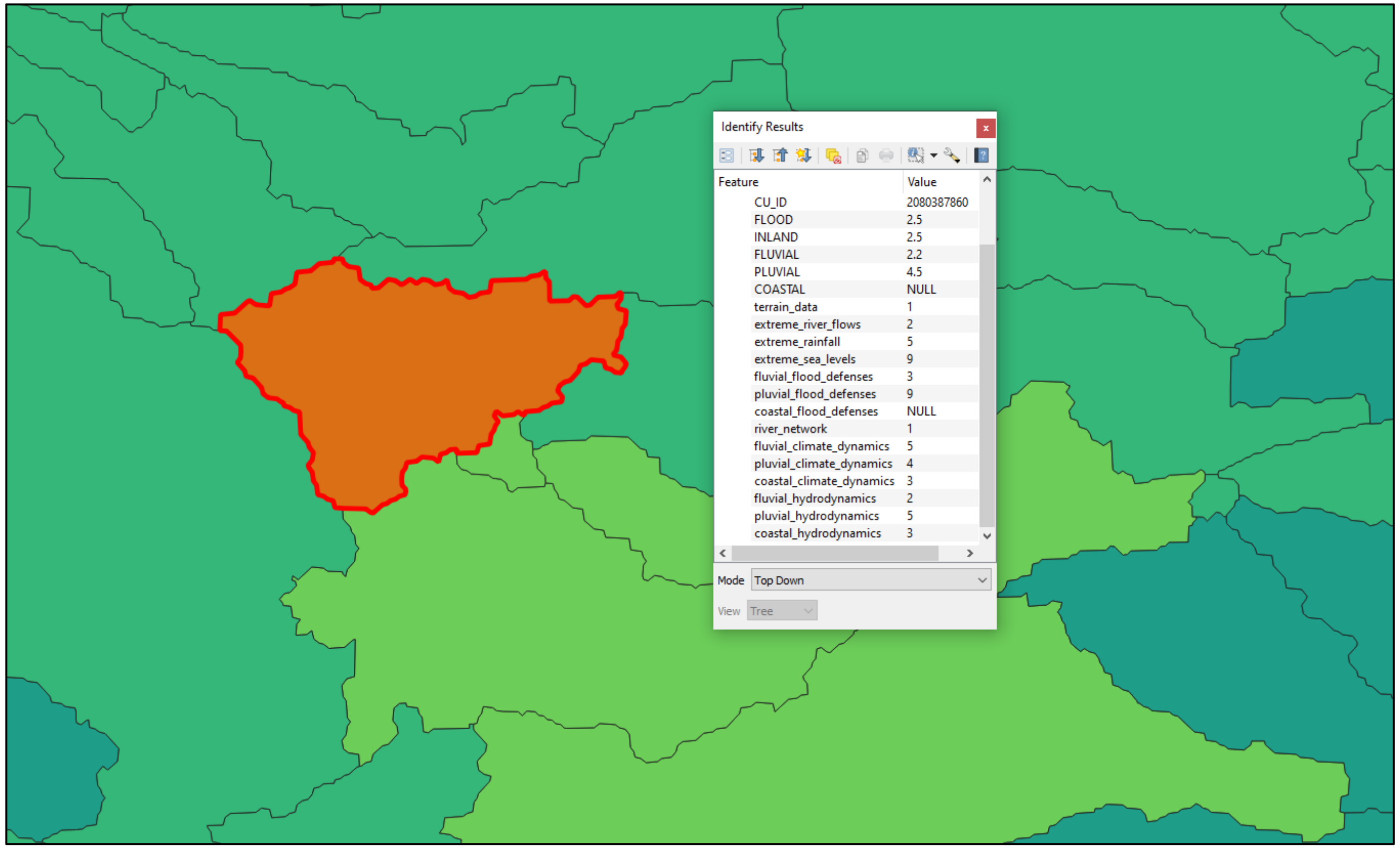
- LiDAR DEM in flat, though urbanized, area
- Boundary conditions generally high quality
- Good fluvial flood defense knowledge, though poor for other perils
- Coastal rank dominates (probably because of defenses)

Example 2: Buru, Indonesia



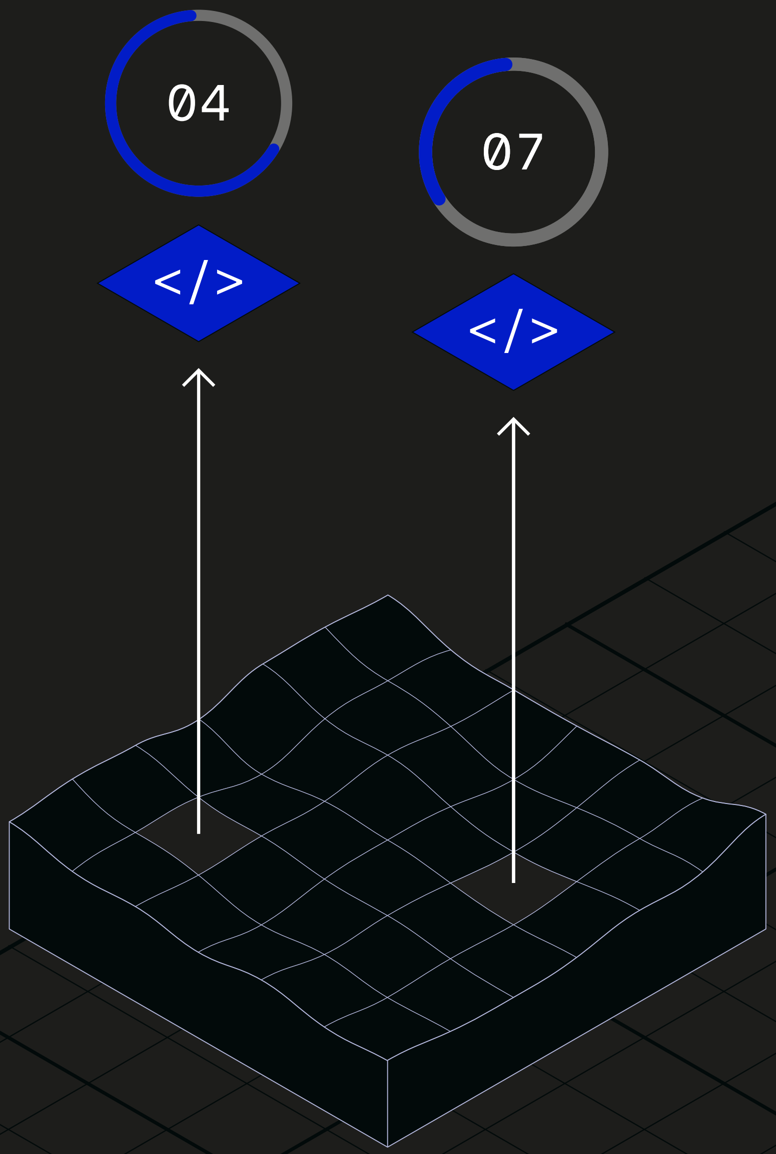
- Satellite DEM in a steep, forested area
- Rural, small river in steep valley
- Predictors in rainfall model have poor coverage for small islands
- Extreme sea levels based on reanalysis data
- Dominance of more uncertain pluvial model

Example 3: Duisberg, Germany

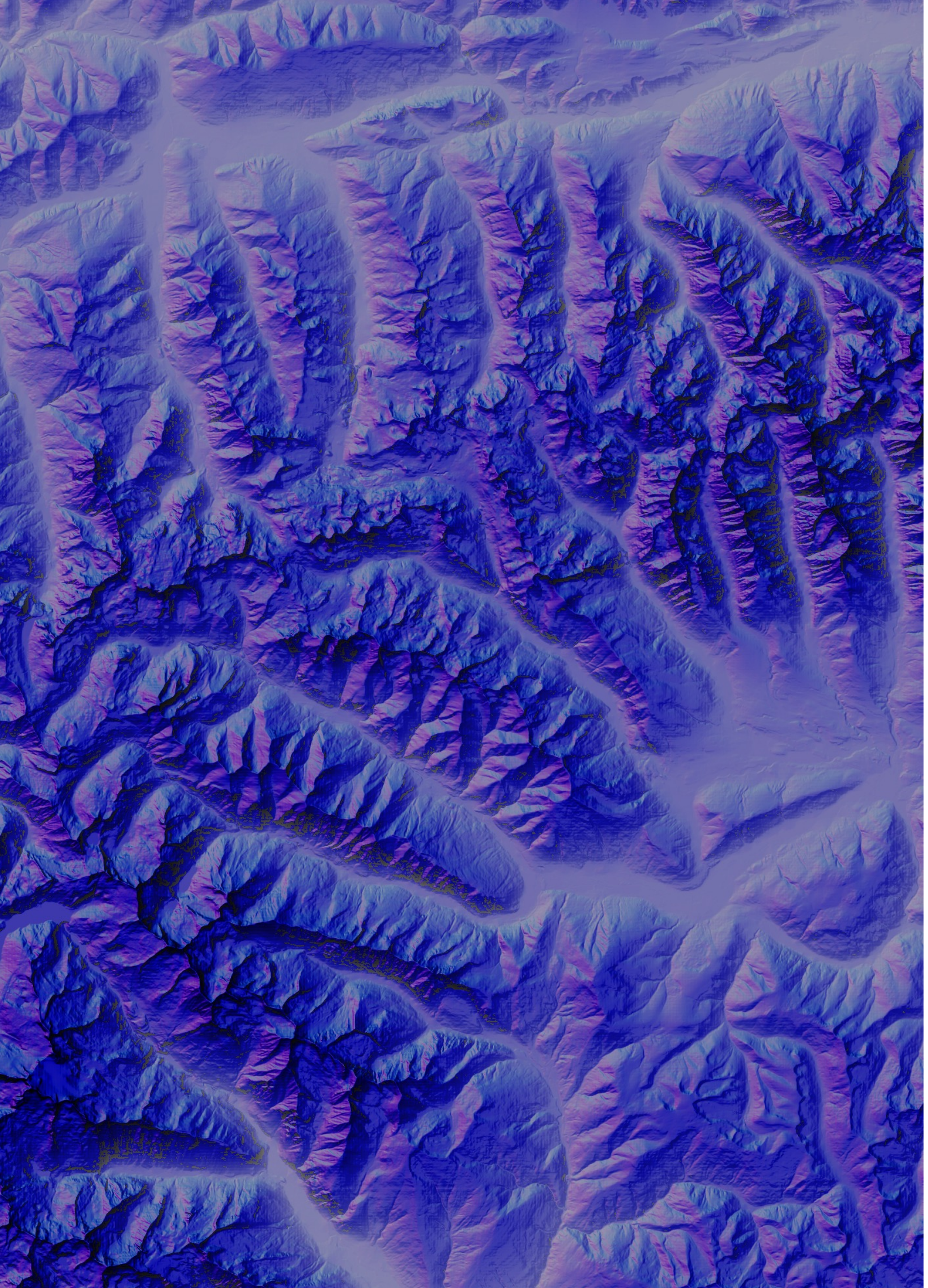


- Excellent DEM in flat Rhine floodplain
- Good fluvial flood defense knowledge
- Extreme river flows estimated as well as they can
- Large, single-threaded river is well defined
- Climate models generally agree on changes for a large river
- Fluvial dominates more uncertain pluvial peril

Summary



- First step towards a richer appraisal of uncertainty, a fundamental component of any risk assessment
- Heavily based on Fathom expert judgement
- Fully transparent working — users can adapt our assumptions for their use case
- Adds an extra dimension to decision making
- Tell us your use case and how we can make Metadata more useful! — info@fathom.global



Thanks for listening. What’s next?

Any questions? Book a consultation with our team of experts —
https://www.fathom.global/book-a-demo/

On-demand: Understanding and managing flood risk uncertainty —

https://www.fathom.global/events/understanding-flood-risk-uncertainty/

Explore where Metadata sits in Fathom’s Product Stack —

https://www.fathom.global/product-stack/