Fusing EO with ML for flood risk assessments

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FABDEM

A Forest and Building removed Copernicus DEM – the Why.

– Adapting to and mitigating climate change impact requires accurate local data, particulary over data-scarce areas.

– Accurate elevation data is key for many natural hazard applications.

–Thus far, there was no data combining global coverage with sufficient accuracy for local applications.
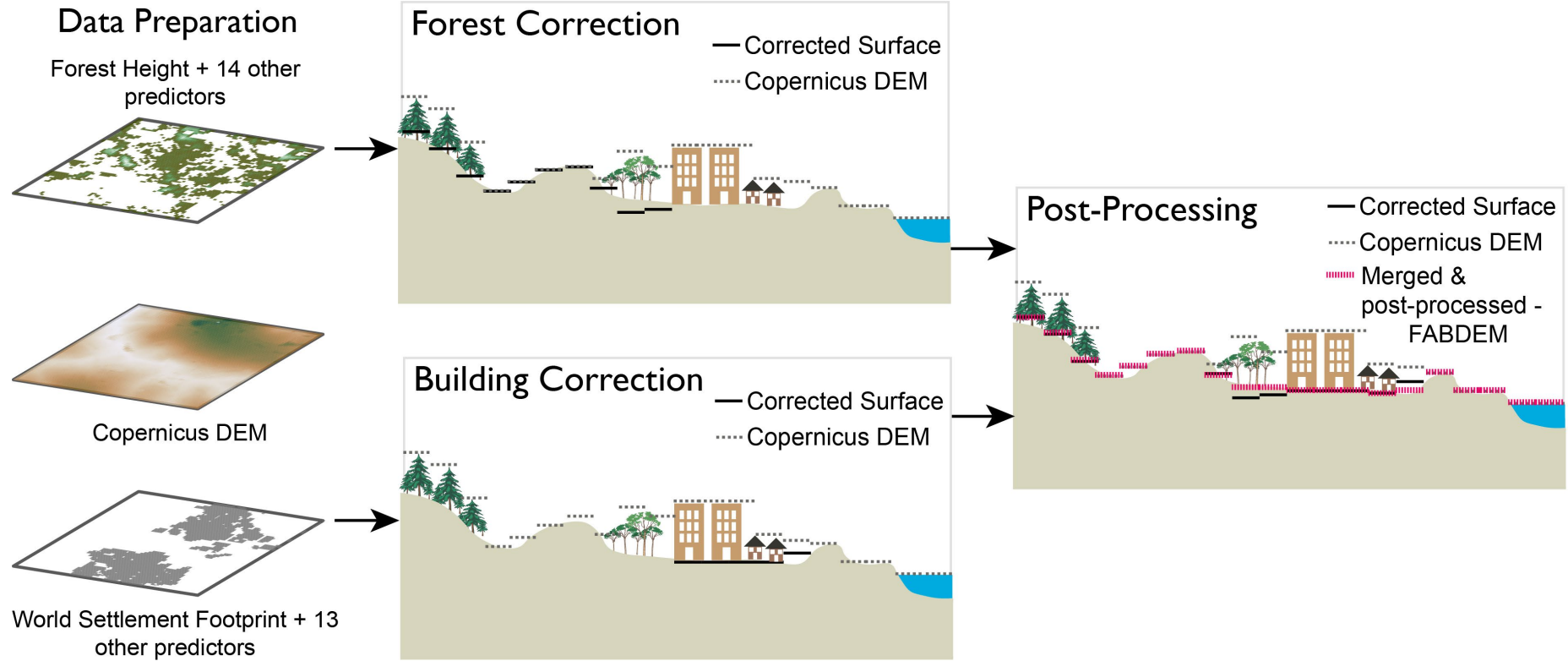
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FABDEM

FABDEM combines state-of-the-art earth observation data with machine learning to produce novel high-resolution surface elevation data.

— COP-DEM at 30 m resolution globally ("GLO-30")

- COP-DEM is a state-of-the-art DSM (Digital Surface Model), outperforming other elevation datasets
- DSMs contain buildings and forests which are not needed for most natural hazard applications

— Machine learning

- Random Forest regression

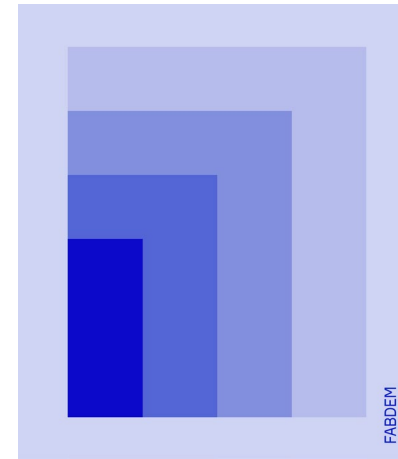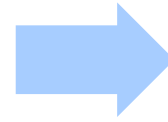- Removing building and forests from COP-DEM GLO30

FABDEM

FABDEM combines state-of-the-art earth observation data with machine learning to produce novel high-resolution surface elevation data.

Data Preparation

Forest Height + 14 other predictors

Copernicus DEM

World Settlement Footprint + 13 other predictors

Forest Correction
— Corrected Surface
····· Copernicus DEM

Building Correction
— Corrected Surface
····· Copernicus DEM

Post-Processing
— Corrected Surface
····· Copernicus DEM
▬ Merged & post-processed - FABDEM

FABDEM

FABDEM sits at a 'sweet spot' combining accuracy of local data with global extent.

Global coverage

- 90m

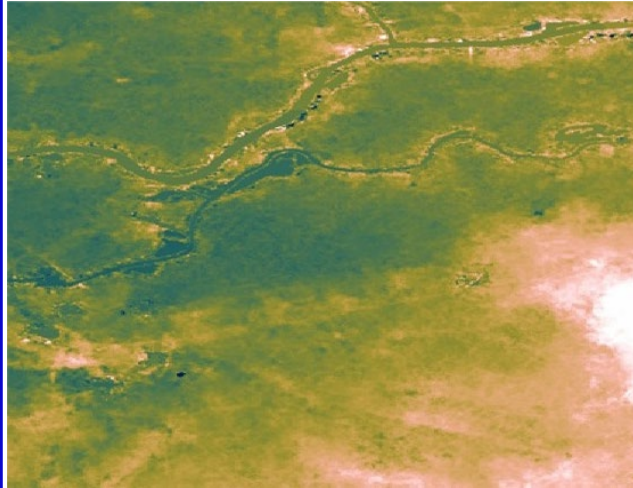Global coverage

- 30m

Local coverage

- 10-1m

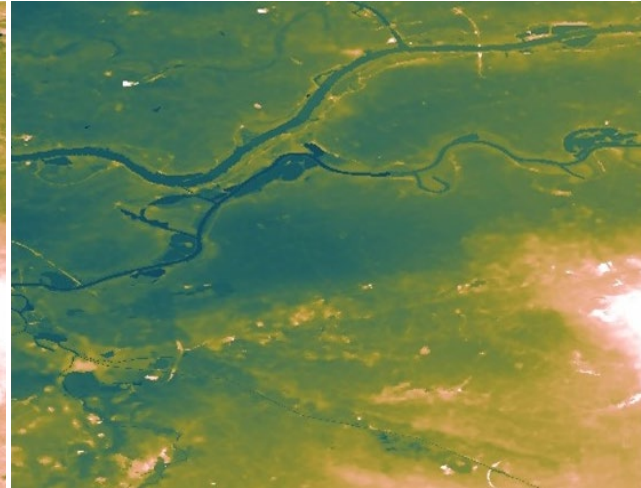Rapid access to global coverage where no LIDAR or site survey data available

FABDEM

Comparing FABDEM with national elevation data (here AHN3 from the Netherlands) and MERIT-DEM, the thus far standard of global elevation data.
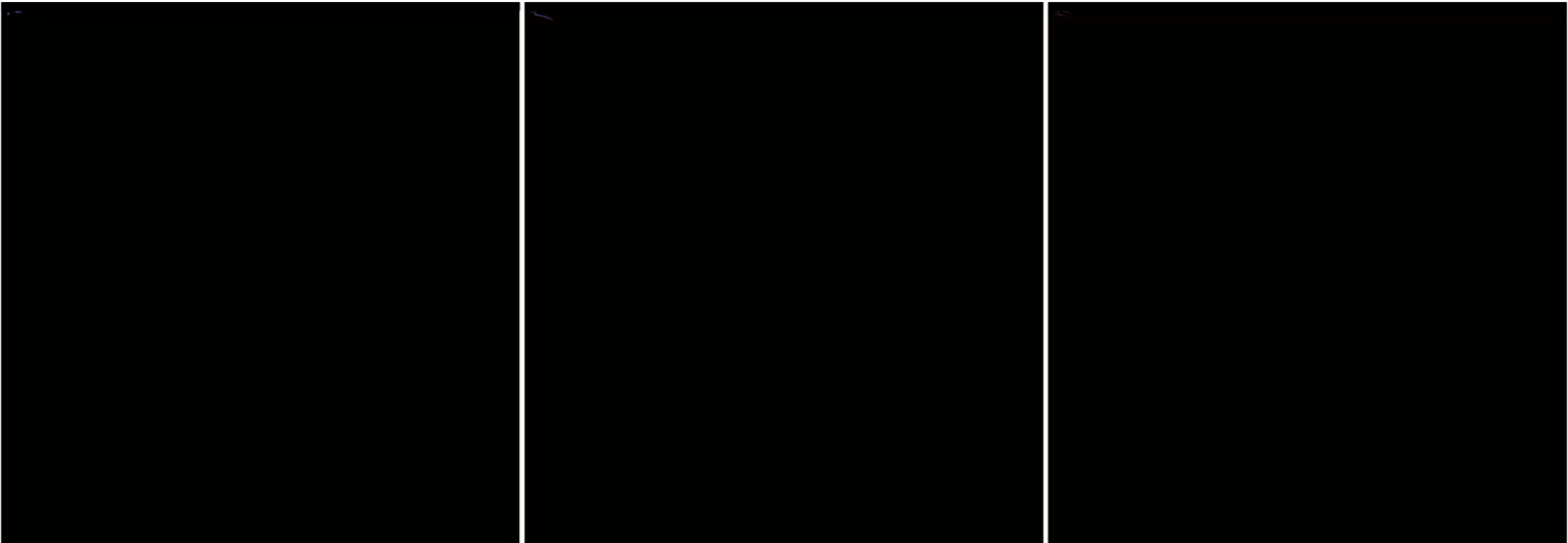
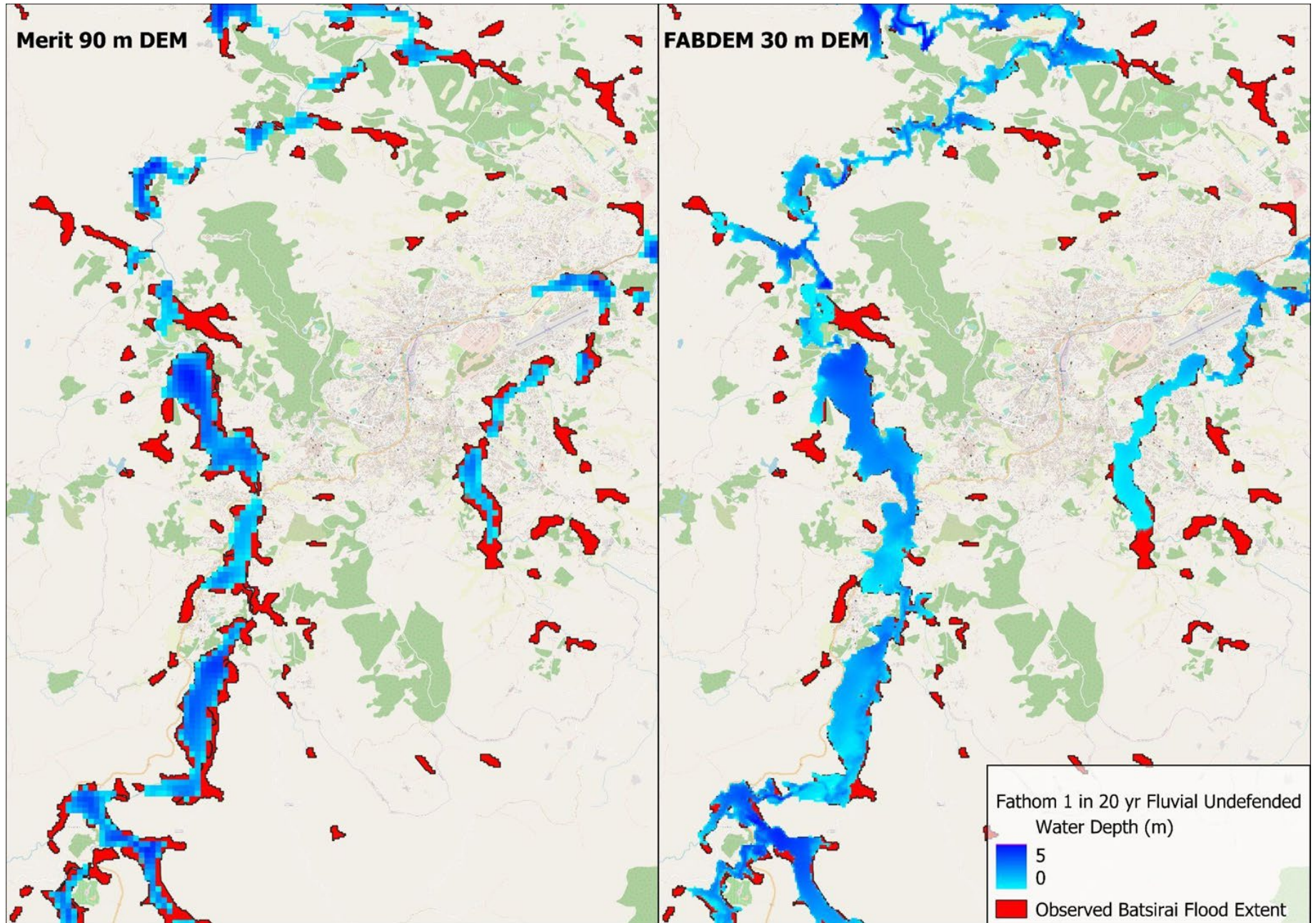MERIT DEM

FABDEM

AHN3

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MERIT DEM | FABDEM | LiDAR

Depth (m)

Use case

Flood inundation related to Cyclone Batsirai, Madagascar, February 2022.

https://www.fathom.global/event-response/tropical-cyclone-batsirai/

fathom.global

Merit 90 m DEM

FABDEM 30 m DEM

Fathom 1 in 20 yr Fluvial Undefended Water Depth (m)

5

0

Observed Batsirai Flood Extent

Applications

High-resolution elevation data with improved accuracy enables a wide range of hazard-related applications.

— Flood hazard and risk:

- Flood modelling
- Flood risk analysis
  - Single asset or portfolio asset management
  - Spatial correlation
  - Linear assets
  - Inter connected assets

— Landslide modelling

— Population modelling

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