

Flood Radar: Address-Level Evacuation Mapping from SAR and Rainfall
AOI: Kerr County, Kerrville, Texas (07/04/2025-08/01/2025).

Team: SAR Monsters
Antonika Shapovalova

The Problem & Why SAR

People die in floods not for lack of maps, but for lack of timely, trusted routes. Gauges cover small areas, aircraft are grounded in storms, optical is blinded by clouds.

SAR works day & night, through clouds & rain with wide repeatable coverage (Sentinel-1).

Goal: cut evacuation delay from hours to minutes at the address level.



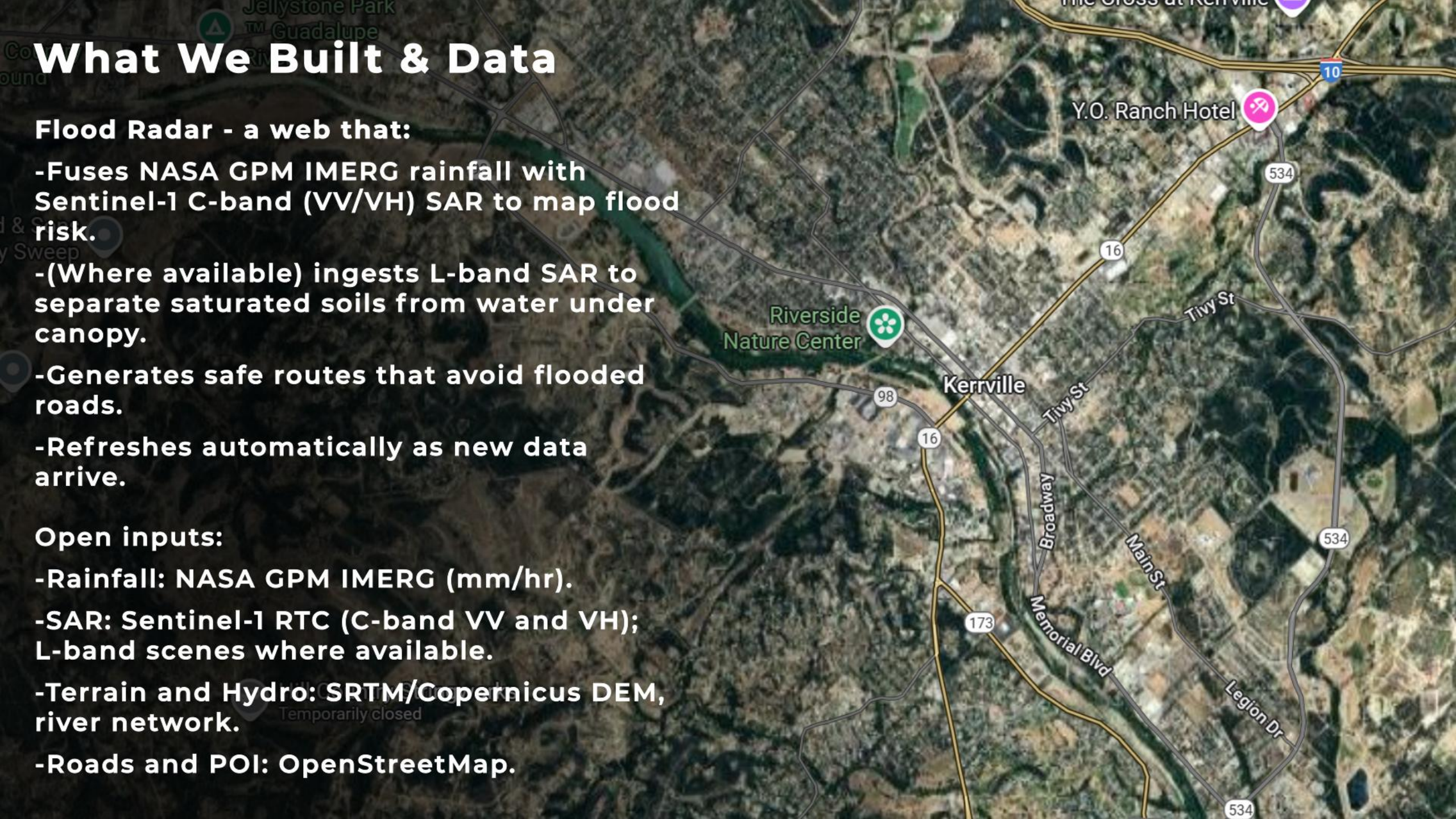
What We Built & Data

Flood Radar - a web that:

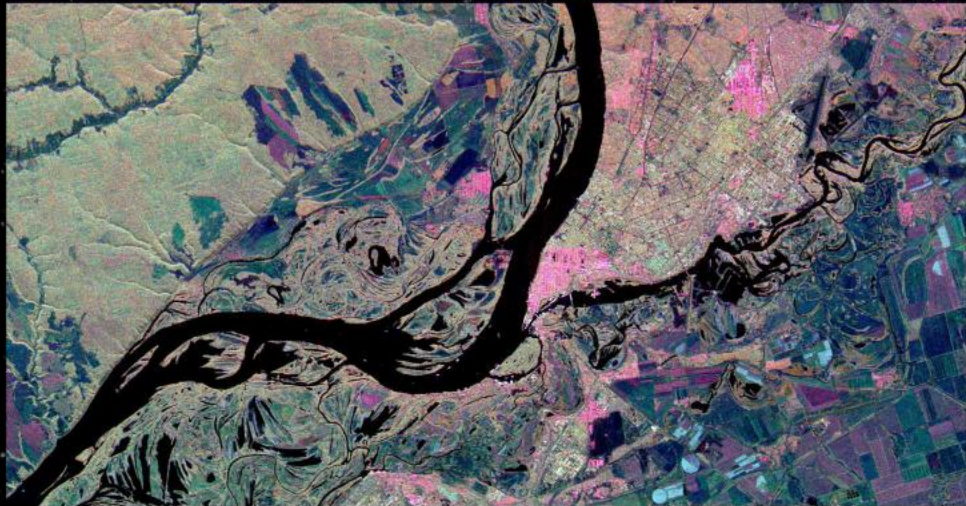
- Fuses NASA GPM IMERG rainfall with Sentinel-1 C-band (VV/VH) SAR to map flood risk.
- (Where available) ingests L-band SAR to separate saturated soils from water under canopy.
- Generates safe routes that avoid flooded roads.
- Refreshes automatically as new data arrive.

Open inputs:

- Rainfall: NASA GPM IMERG (mm/hr).
- SAR: Sentinel-1 RTC (C-band VV and VH); L-band scenes where available.
- Terrain and Hydro: SRTM/Copernicus DEM, river network.
- Roads and POI: OpenStreetMap.



Method: Simple Physics & Reliable Measurements



Inflow (“bowl”) model: integrate recent IMERG rainfall over micro-basins. **Channel capacity:** estimate with depth, slope, expected velocity. **SAR fusion:** correct forecasts with Sentinel-1 water masks (VV and VH; and L-band if present). **Risk map and Routing:** classify each address into 4 alert levels; compute safe foot/drive routes that avoid flooded edges. **Design principle = simple physics + reliable measurements > black-box complexity.**

Results & Change Over Time

Before vs During & After Sentinel-1 comparison; expansion of flooded areas.

RGB composite for story:

R = VV (during & after),

G = VH (during & after),

B = VV (before).

Metrics (hold-out tiles):

IoU, Precision, Recall for flood masks

Lead time (min): IMERG-trigger -

SAR-confirmed extent

Differential exposure (km): flooded road-km removed from suggested routes

Known limits & mitigations: revisit & latency (temporal smoothing), wind & waves (VV & VH logic), layover & shadow (DEM masks), conservative routing.



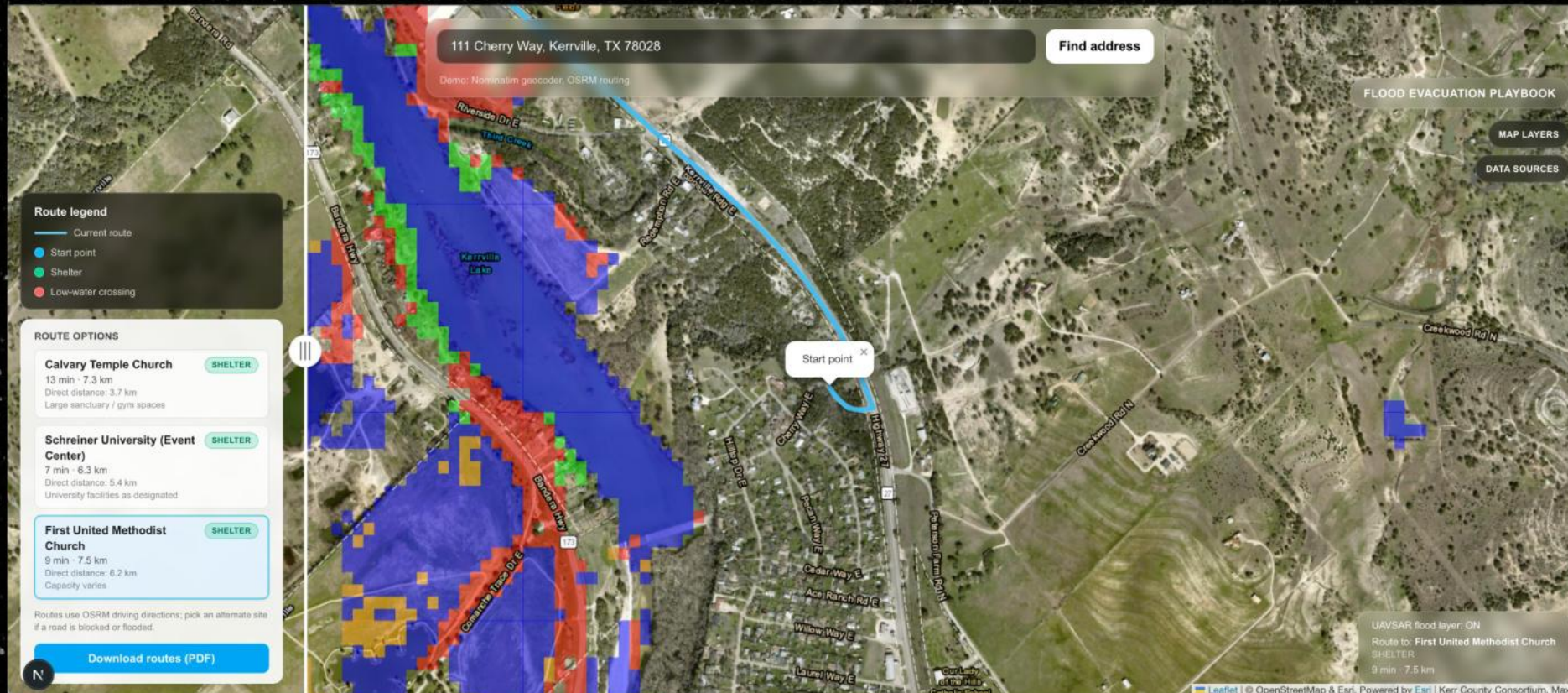
Alert Levels & Per-Address Guidance

No Alarm - conditions normal.

Evacuate by Car - a safe driveable route is available.

**Shelter in Place (Roof) - evacuation unsafe;
move to rooftop and await rescue.**

*Routes are provided for levels 2-3 and are
recalculated as data refresh.*



DRYPATH



Thank you.

From here, the map does the talking—it knows where the water is and shows the fastest way out of harm's way.

Scan the QR for a live demo.

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Data sources: Sentinel-1 (RTC), NASA GPM IMERG, SRTM/Copernicus DEM, OpenStreetMap, UAVSAR

Important: Uses NASA data;

NASA does not endorse non-U.S.

Government entities; data-use terms apply.

Team: **SAR Monsters.**

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