Maresme County Gloria analysis

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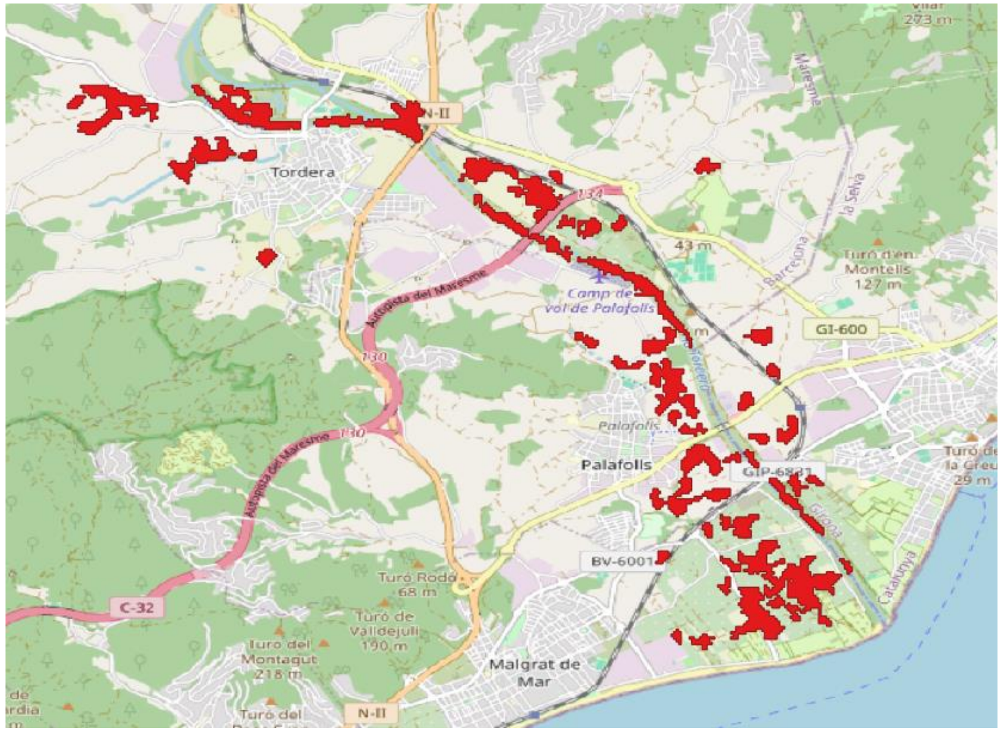
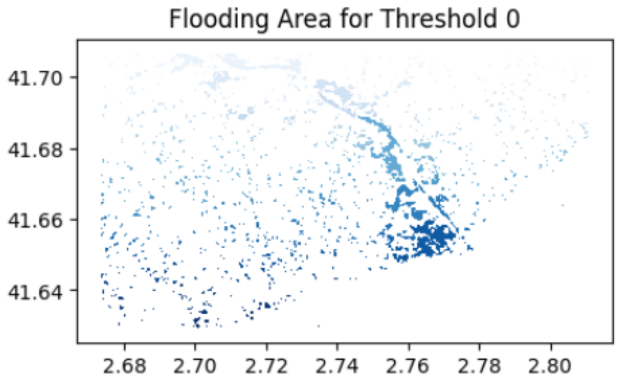
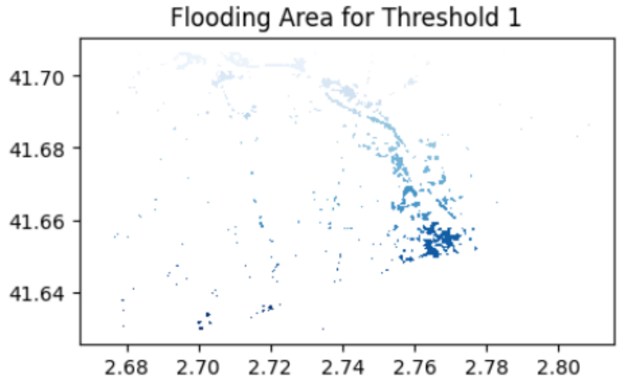
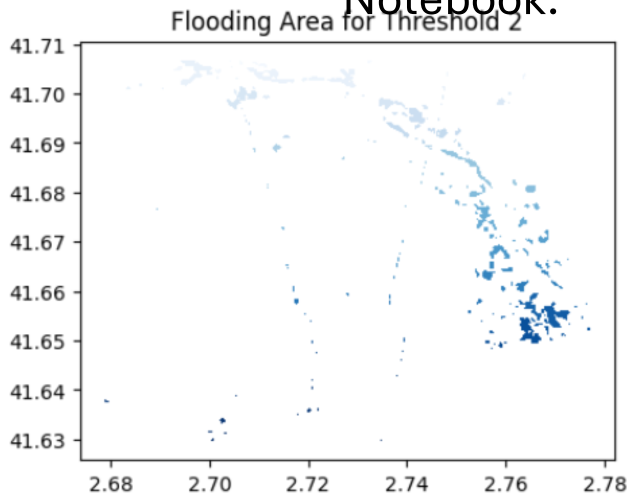


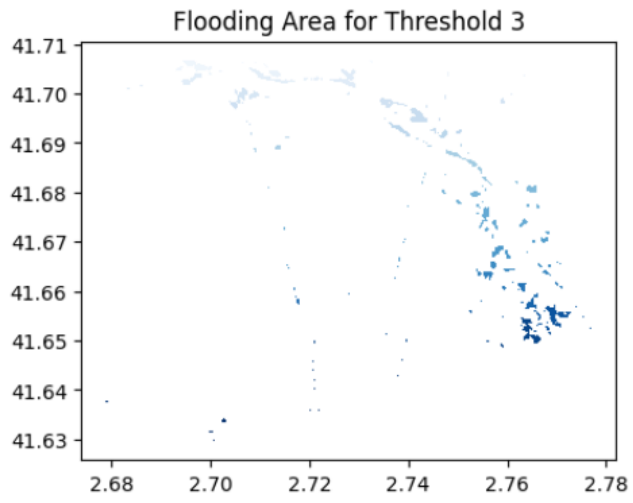
Methodology

- Finding suitable (satellite) data
  - I first wanted to investigate using visual data, but since the results were cloudy I opted for VV radar. I made composites of the radar imagery from VV before and during the flood in Google Earth Engine, and downloaded the data.
- Masking flooded areas
  - I then masked the part that had an increase in VV reflection, without creating many extra flooding areas not near the river (see figure below)
- Population and roads
  - For the population and roads I downloaded data from OpenStreetMap and humdata.org. Then I checked which parts spatially intersected with the mask and summed the length of road or amount of people in that pixel area. I removed tiny polygons so we wouldn't get population info from pixels far away from the river.
- Coding
  - I started with tests to first develop the code to do the processing and then applied this code in the API and Notebook.



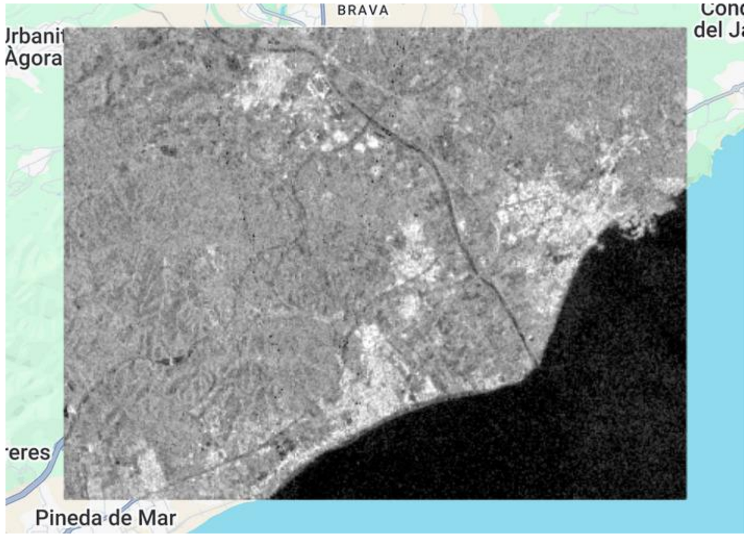


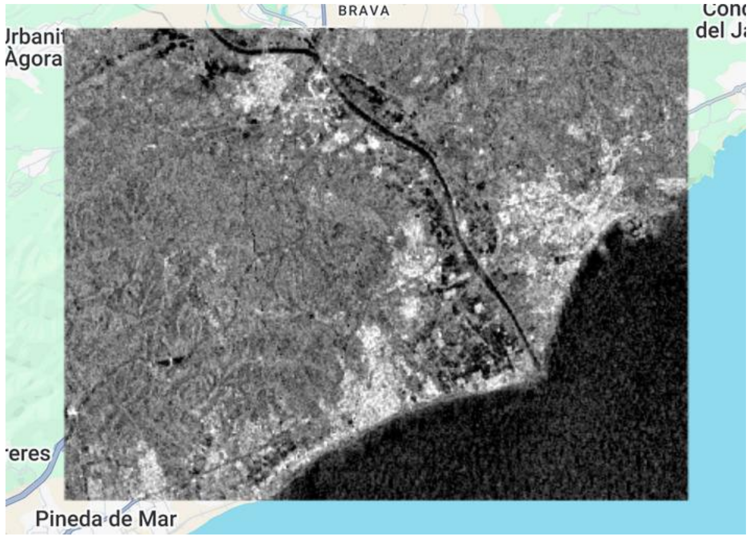




Key findings

- My findings indicate the following results:
  - population impacted: 40951 people
  - road impacted: 76659m
  - flooding area km2: 70.0326
    - This is about five-and-a-half times as big as London Heathrow Airport, which seems the right size





API

- I created the two requested api endpoints /flood_analytics and /flood_map
- /flood_analytics
  - Pydantic for the FloodAnalyticsRequest for clarity
  - I use a post endpoint, since a lot of inputs are required
- /flood_map
  - For the I simply use query parameters. I have tried to keep it simple.

- A nice addition wouuld be a database, authentication, and data input automation.

Some niceties

- I use uv for dependency management, it's really fast
- I use ruff and pre-commit to make sure my code is all aligned in a nice way
- I use typing to keep the code maintainable
- I test the code by writing the tests first. The tests don't check the output but they check if the functionality does what it's supposed to do.