



Flood Analytics: Satellite Data Meets Population Density

By
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European Big Data Hackathon 2025

Earth Observation: from Space to European Statistics

Brussels, 6–11 March 2025

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Our climate is changing...

...As we learn to live with the impacts of our changing climate, we will make sure we continue to adapt... (Commission's Priorities)

With changing climate, an increasing part of densely populated areas are prone to flooding.



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The Approach

Identification – prediction – prevention

- **Satellite images** used to analyse historical flooding events and map flood-prone areas.
 - Location and time: Valencia, end **October 2024**
 - 3 Sentinel images – before, during, and after the flooding event
- **Population distribution** in the flooded area shows the risk to human life
- **Aggregated results** from individual, lokal areas to different regional levels – a tool to plan ahead and allocate ressources



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Flooded Areas from Sentinel images



1. October



31. Oct.



5. Nov.



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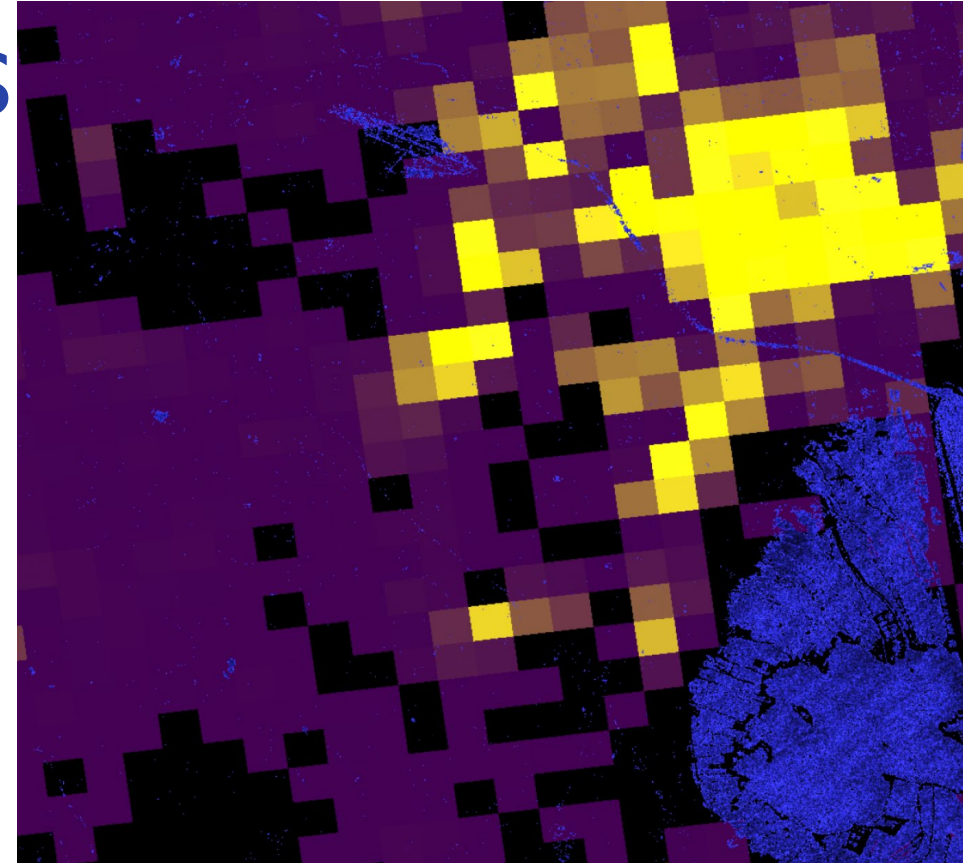


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Satellite image analysis

Mapped water bodies with
superposed population data

Images were used from
Sentinel-1_GRD and
Sentinel-2_L2A



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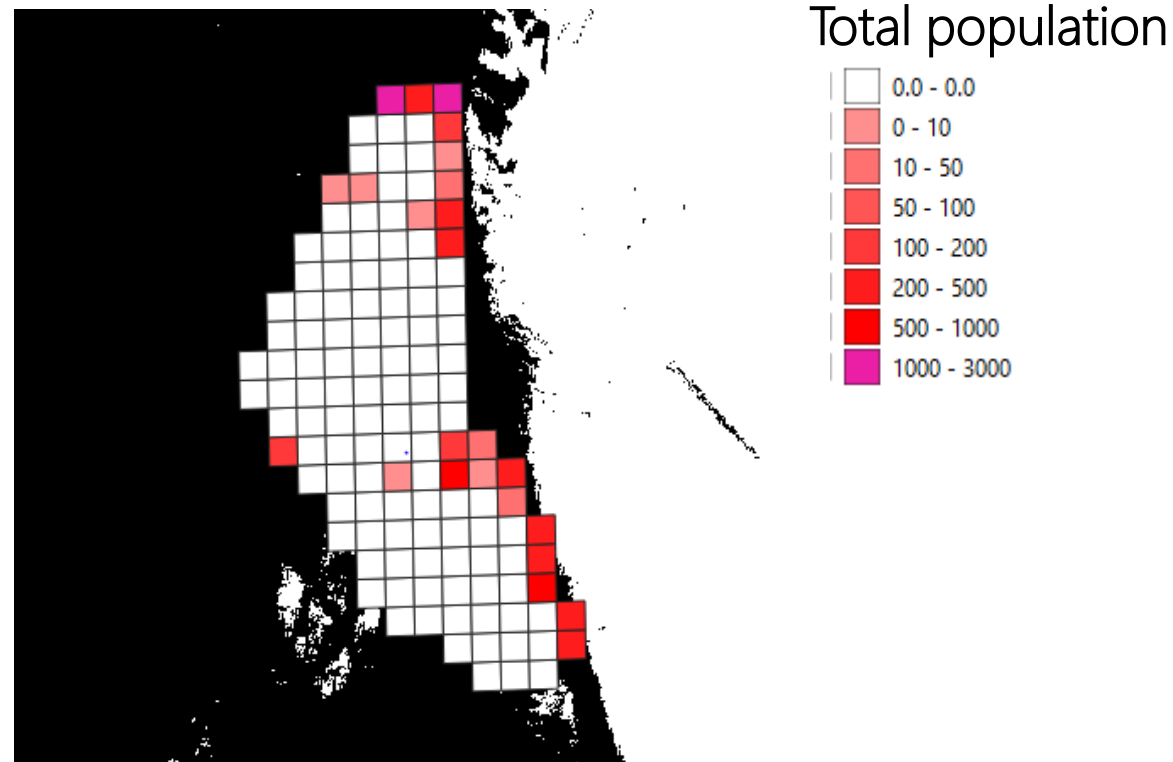
Population distribution in the affected area

Population distribution extracted from the Census grid 2021

The maximum extent of the flood was extracted from the image taken on

31. October 2024

and the total population numbers were extracted from the 1x1 km grid cells



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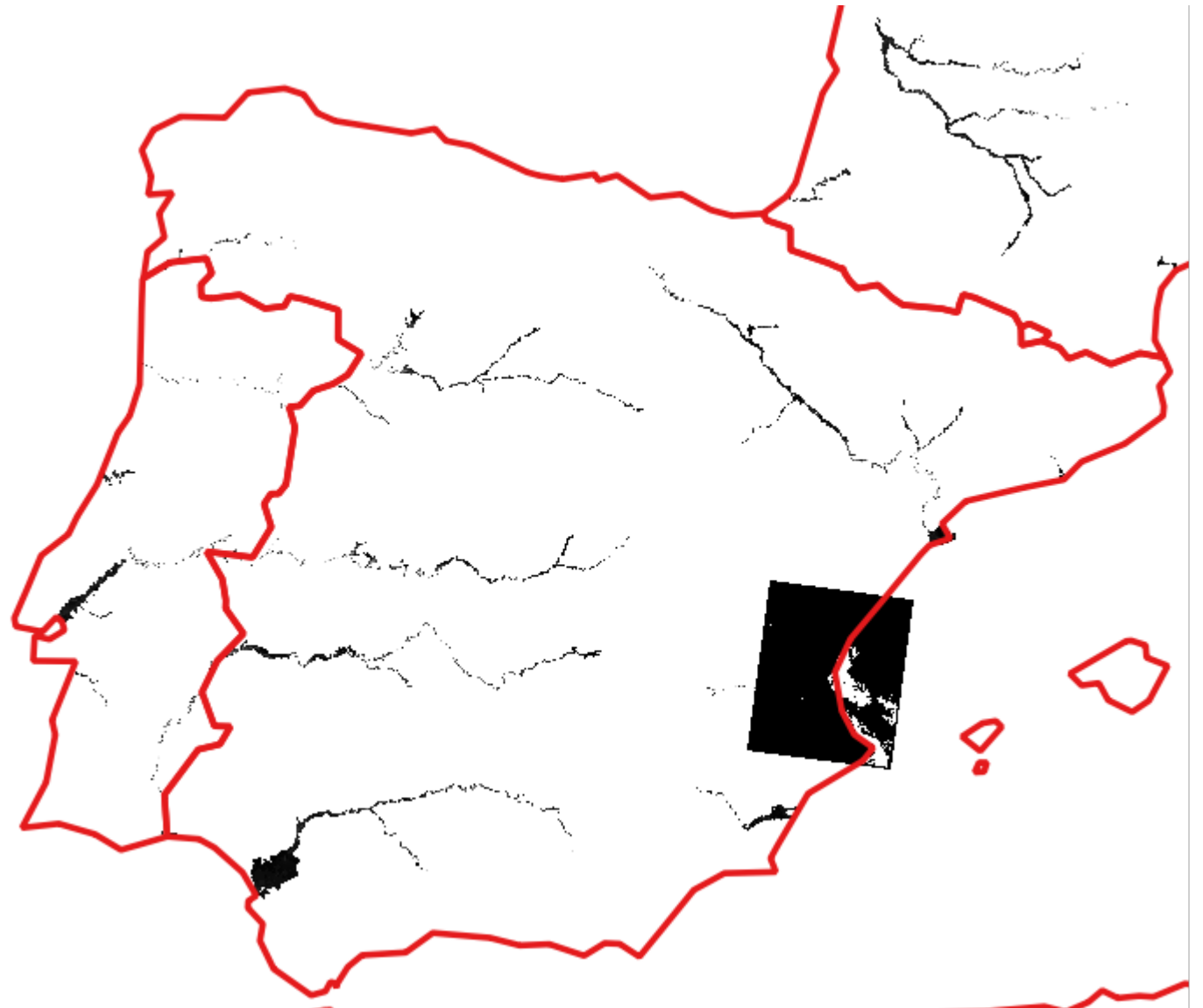
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Other flood-prone areas mapped in Spanish territory

A quick overview of the population affected by major flooding events enables targeted efforts on risk-management and fast decision making.



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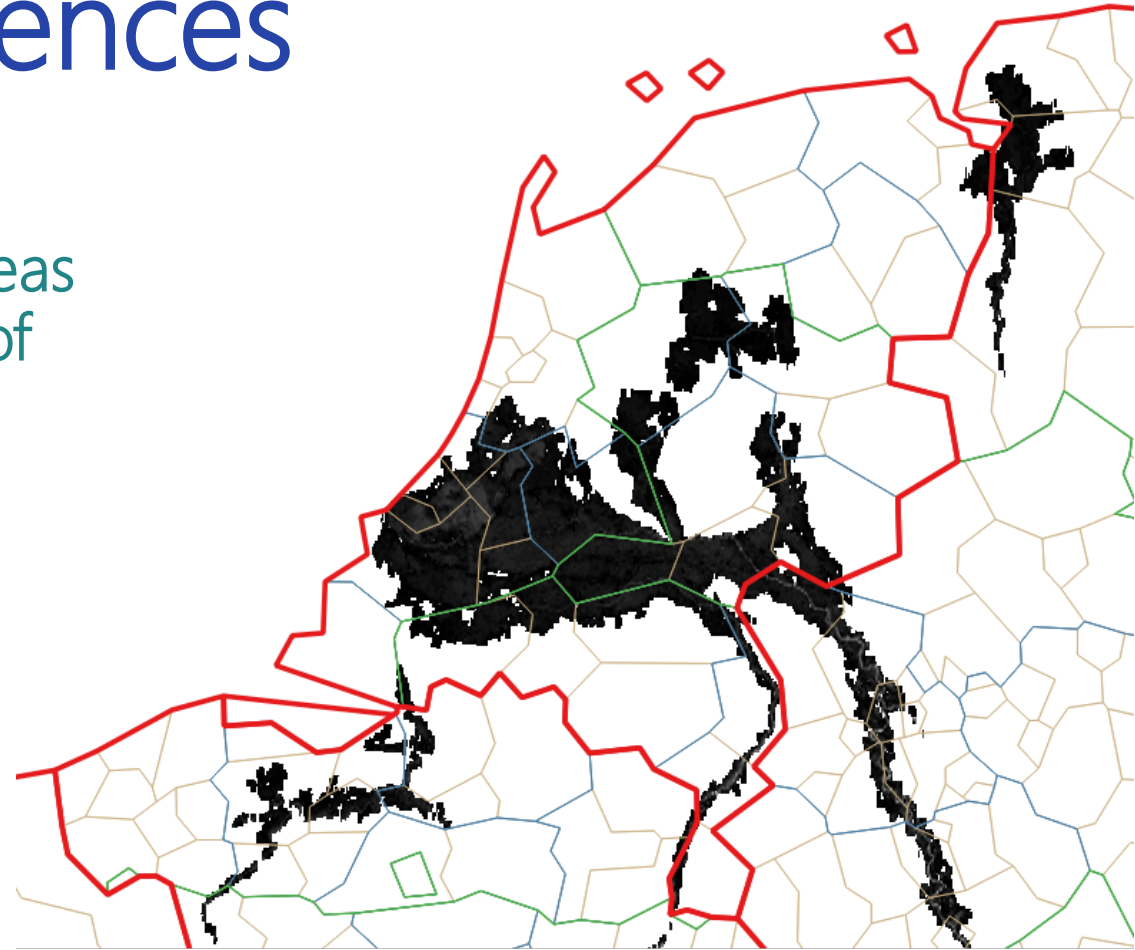
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Regional differences

Regional differences in the proportion of flood-prone areas is obvious. But is the picture of the population similar?



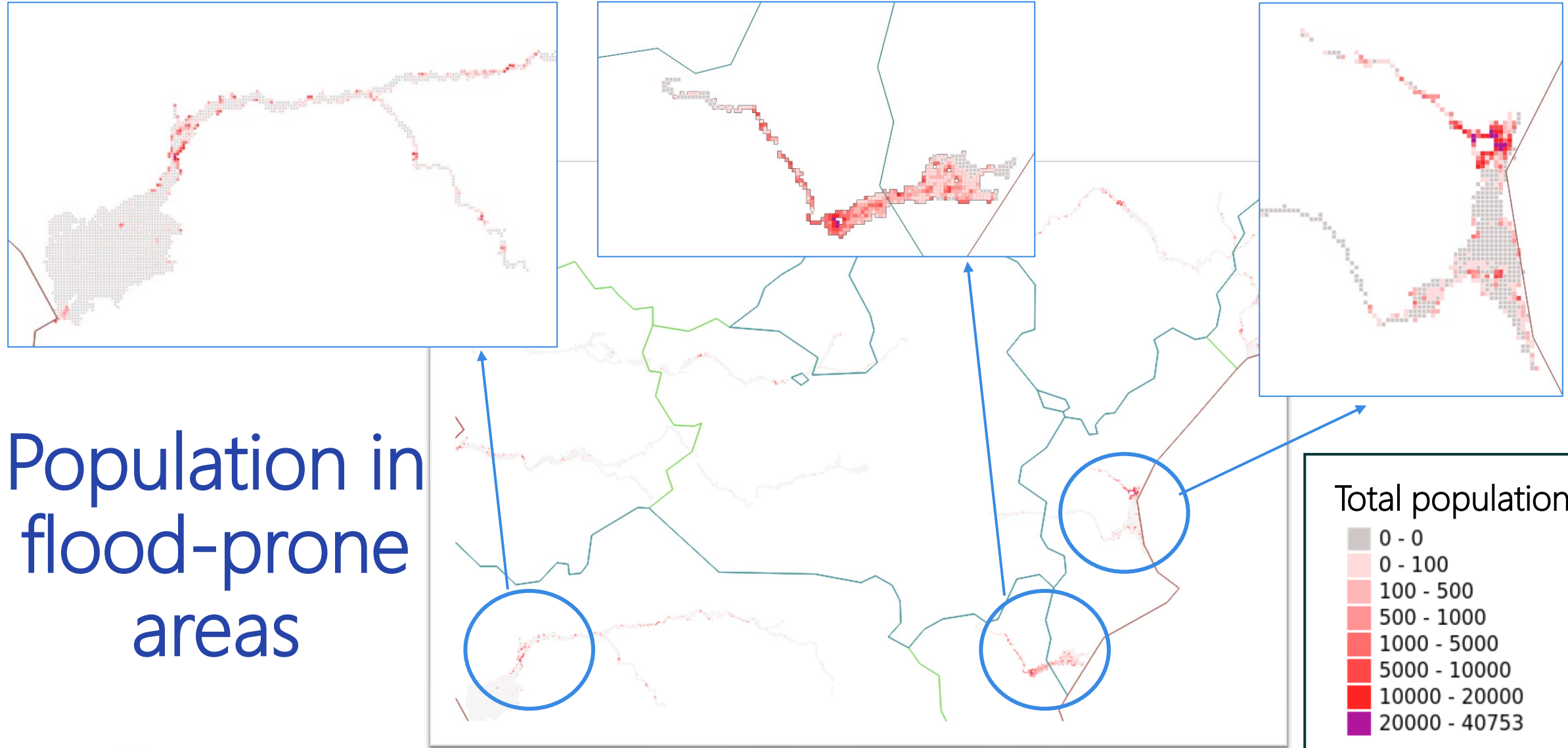
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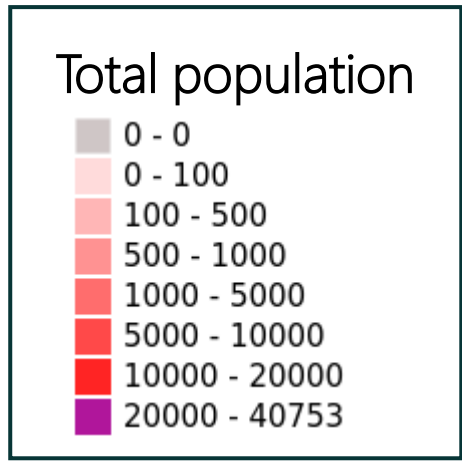
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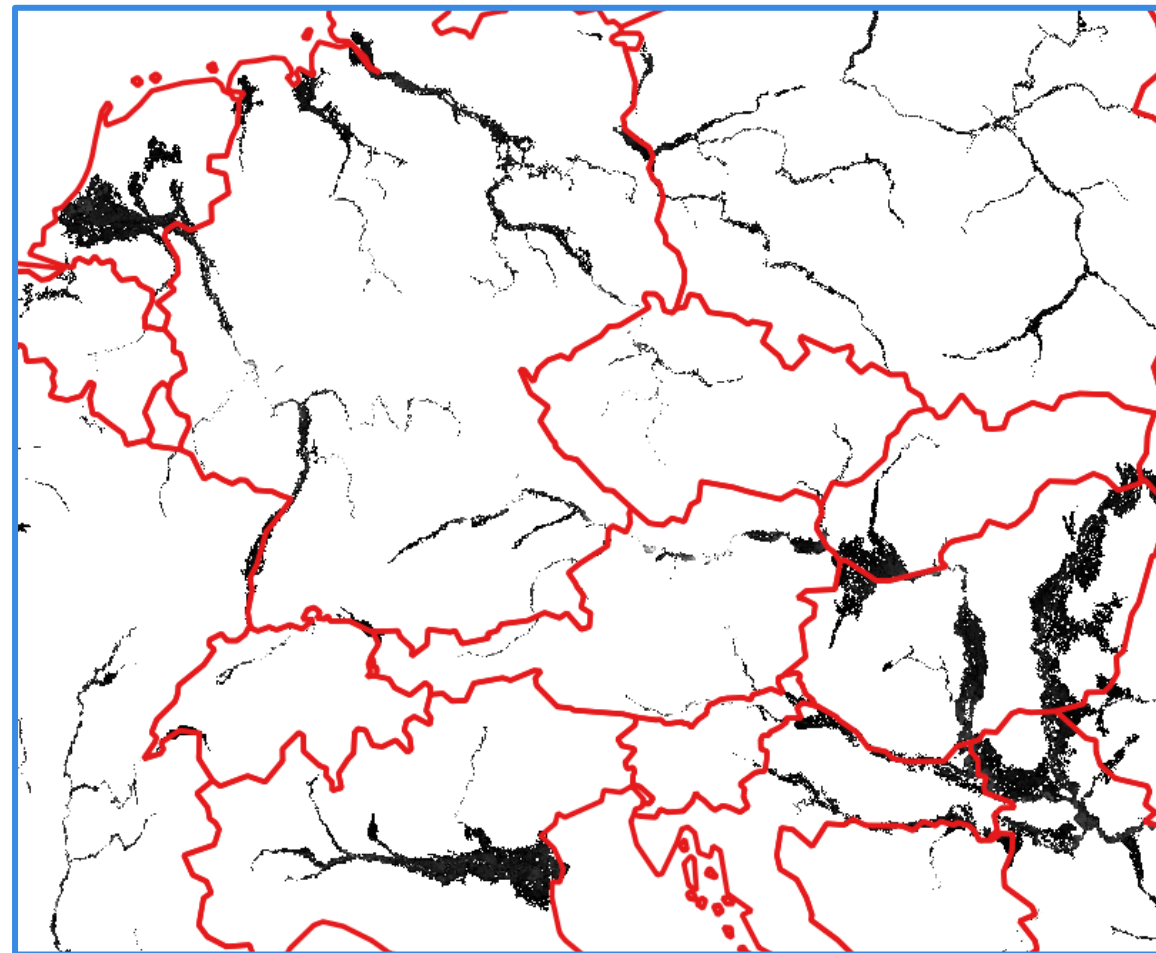


Population in flood-prone areas



Distribution of flood-prone areas in the central part of Europe

Satellite imagery is a good tool for flood mapping and predictions. Combined with statistics, the products can provide new information about the impact of climate change on society



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Conclusions

The Copernicus Data Space Ecosystem provides valuable open data resources to support international statistics

- Using open data based on satellite images provided by the CDSE, it was possible to get an overview of how European population can be affected by flooding events.
- Based on analyses and measurements, flooding risk to human population in different regions can be quantified

Thank You



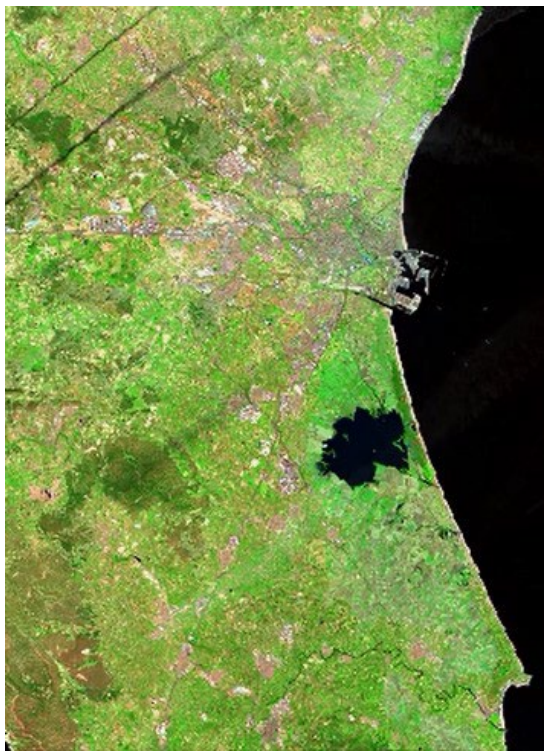
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October - November 2024 – Valencia, Spain



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