COPERNICUS THEMATIC WORKSHOP

# GIS and EO tools for flood assessment: the case of Mapfre Re

**Adrián Fernández Sánchez**

Mapfre Re

#EUSpace

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Europe's eyes on Earth

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# GIS and EO tools for flood assessment: the case of Mapfre Re


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**Small intro:**

Adrián Fernández Sánchez is a geographer holding a PhD on the influence of climate change on flood events.

Since 2023, he has been working at Mapfre Re in the Natural Perils Department, where he and his team assess the impacts of natural hazards on the Mapfre Group's portfolios.

He is also currently a part-time Professor at the Complutense University of Madrid, teaching courses on remote sensing and climate hazards.

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# GIS and EO tools for flood assessment.

The case of Mapfre Re.

# Mapfre Re – who we are

Mapfre is **the top insurance company** in Spain.

Second leaders in Latinamerican market

125 countries (25 owned centers).

Mapfre Re (Reinsurance company),
**12th reinsurer** in the world.

30 million policies.

Natural Perils Department.

# Mapfre Re – who we are

Natural Perils Department goals:

- **Analyzing Natural Hazards** and their impacts on all Mapfre's portfolio by:
    - Accumulation
    - Modelling
    - Pricing
    - GIS: Events and Hazards

- Purposes: Economic capacity, reporting, underwriting…

# Mapfre Re – EUSPA – NovaSpace Collaboration on Floods

Mapfre Re **used to get flood events** footprints from:

- At first – Newspapers and news.
- EO: Sentinel-2, Landsat and commercial images.
- National organisms: Copernicus, governments…
- We missed accuracy (Clouds, Revisiting orbit).

In 2023, **Mapfre Re - NovaSpace – EUSPA** collaboration on continuous flood products for GIS

## We are final users.

*Source: ESA – Sentinel 2 Abu Dhabi.*

# Mapfre Re – EUSPA – NovaSpace Collaboration on Floods

Accurate products for flood event damages:

- **GIS data** (to cross with our portfolios).
- **No cloud or dust** that avoids detection.
- Global coverage.
- Low revisit time and quick delivery time.

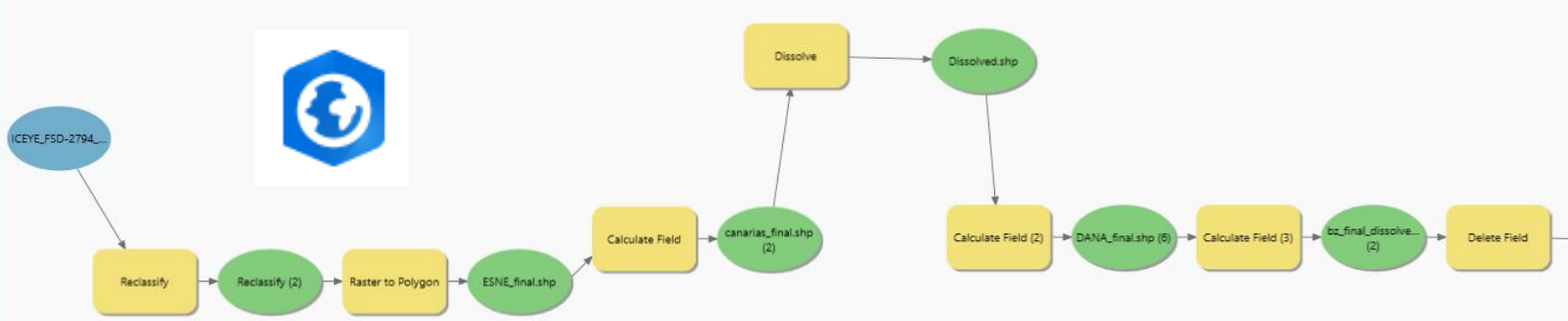
After meeting with partners, we decided to go on with ICEYE.

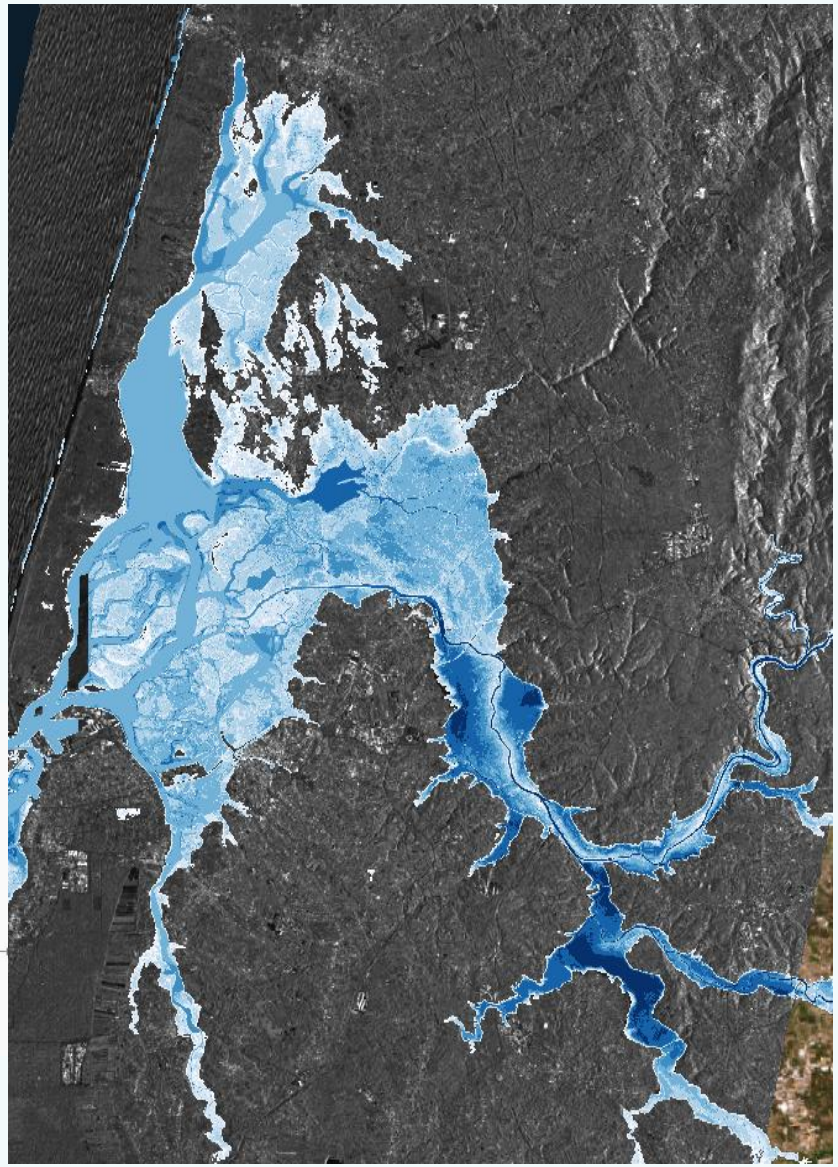
- Raster tiff products
- Own constellation of Synthetic Aperture Radar
- 24 - 48 hours for delivery

# Flood Assessment: Preprocess

Preprocessing ICEYE data:

- ICEYE deliver their data with a raster of depth flooded area.
- ArcGis Pro for **reclassifying depths** (in cm) into a coding.
- Creating a buffer area **for security: 'Expand'** tool. AF1
- For our systems, (ArcGIs Online): data in Shapefile.



# Flood Assessment: Preprocess

When ICEYE data is not available:

Remote sensing: **Sentinel-2 or Sentinel-1** data, processed with GIS or GEE.

*If not available:*

**Copernicus** Rappid Mapping, GloFAS or Google alerts.

*If not available:*

Hydraulical modelling.

*If not available:*

News for matching affected Zip Codes analysis.

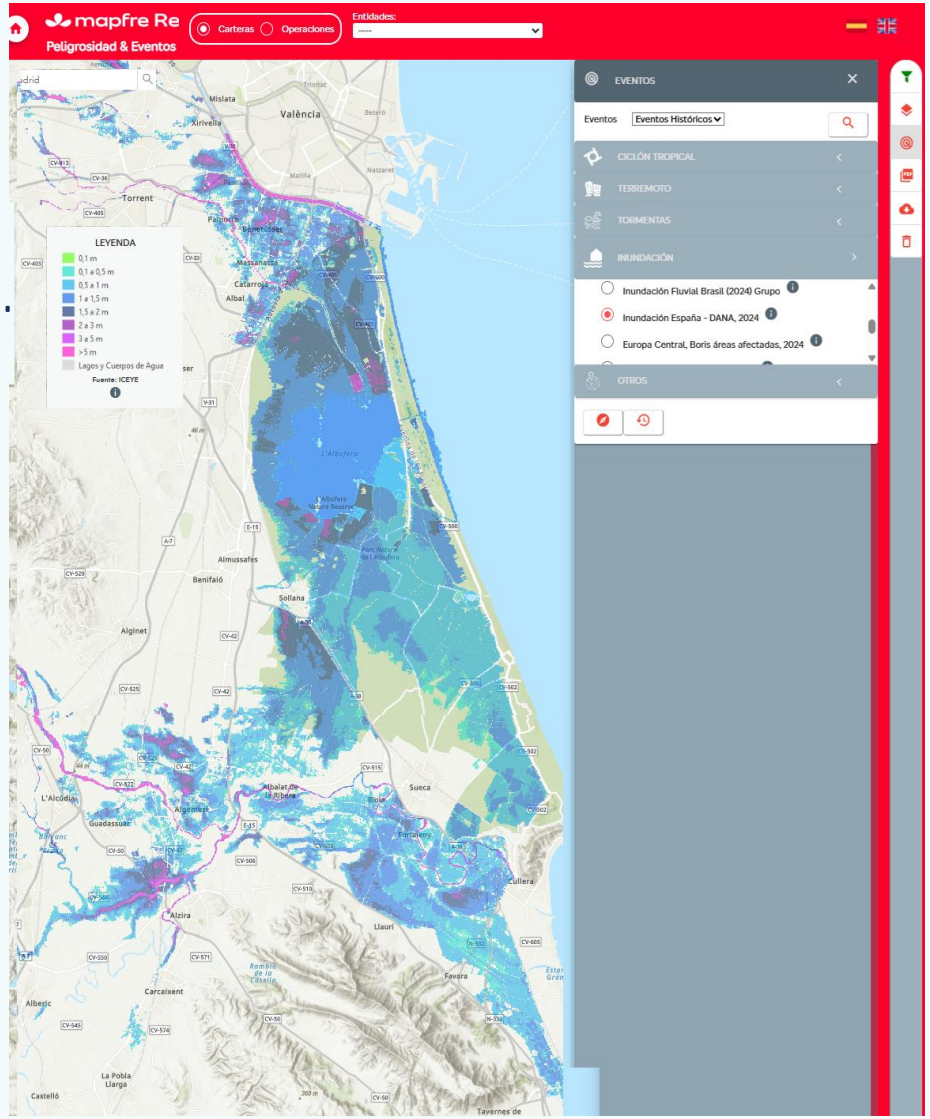
# Flood Assessment: Postprocess

Postprocessing:

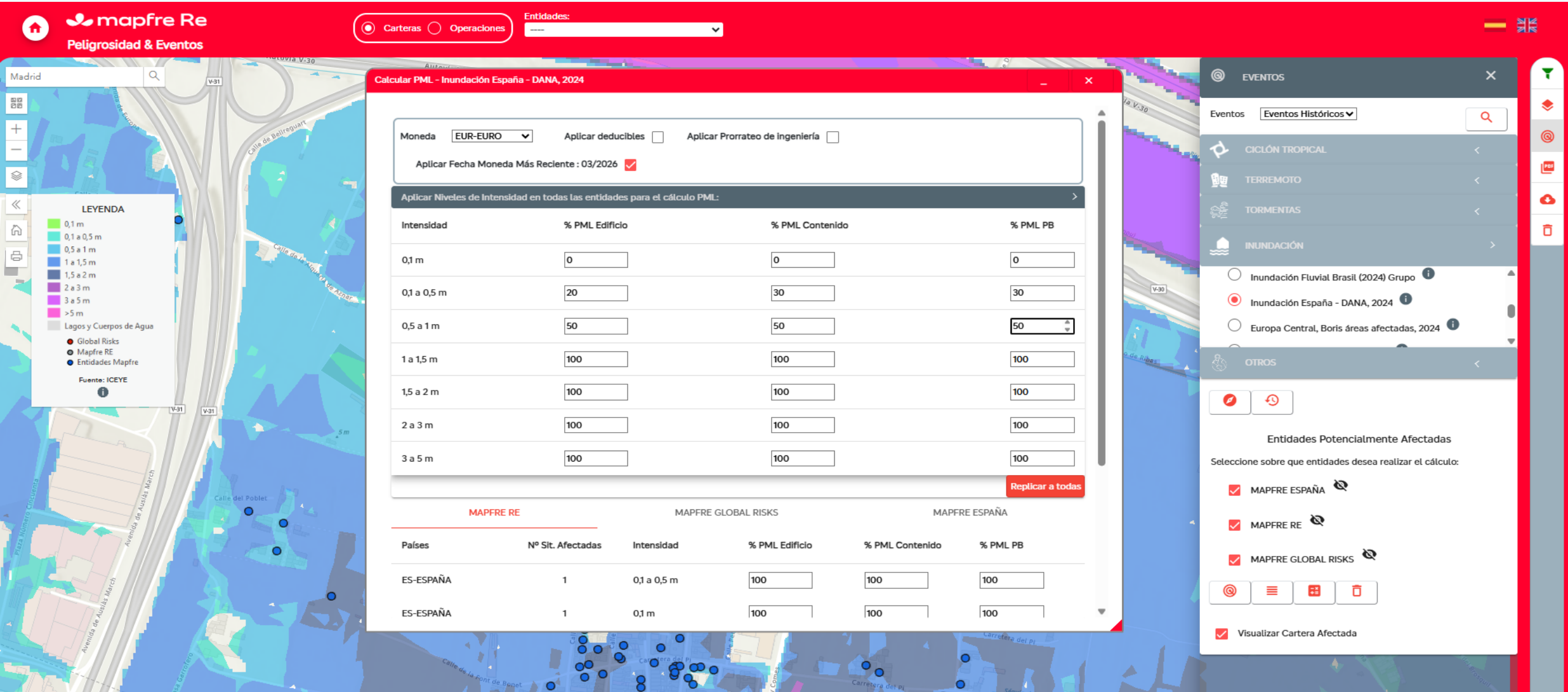
- Footprint event uploaded **into a WebMapping** service (AGOL).
- Uploading may take 1 – 12 hours.
- Our portfolio is geolocated by GIS

Event response: **matching portfolio**
with the event footprint.

Applying vulnerability curves (JCR) and **policy conditions**
for knowing real economic damage.



# Flood Assessment: Postprocess

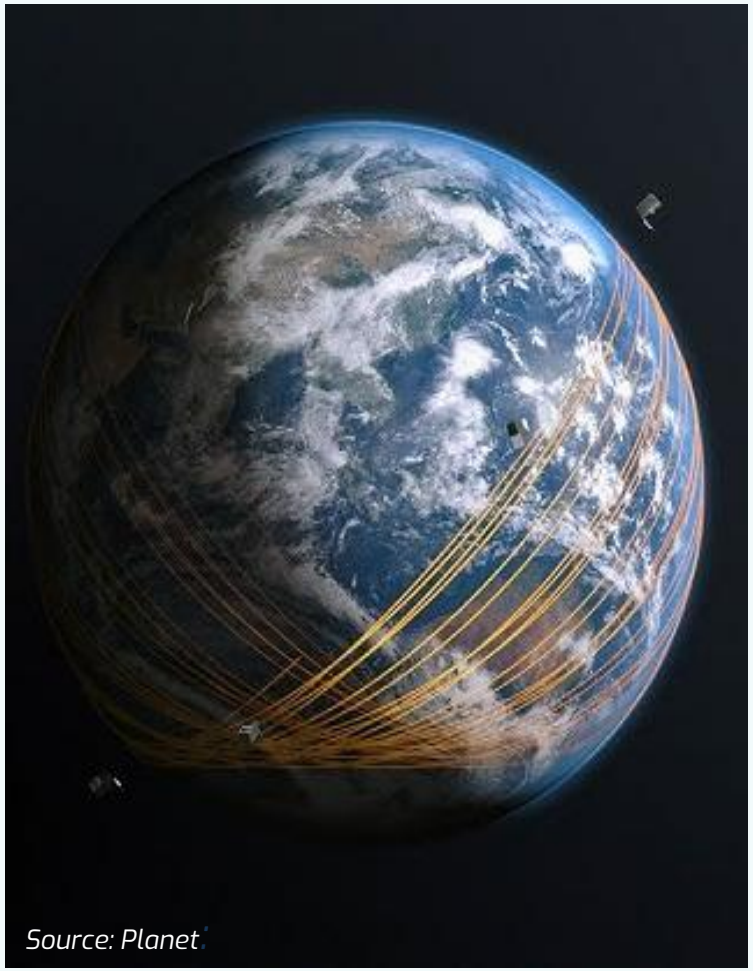


# Flood Assessment: Postprocess

Shortcommings

- **Delivery times within 24 to 48 hours** (revisiting time, and process).
- Mapfre processing within 12 to 24 hours.
- Commercial data is **not always available,** so specialized tools are needed.
- Market needs quick data (less than 1 day for analysis).

- Teams need training in GIS and EO.
- Webmaping is essential for matching policies and flood footprints.



*Source: Planet*

# Flood Assessment: Conclusions

- For insurance: **accuracy in flood** detection is needed.
- Portfolios should be geolocated.
- **Revisiting time** and capturing SAR images are key points.
- Still there is a need on preprocessing the delivered data.

So…

- Flood and **GIS specialized teams** needed in insurance sectors.
- Earth Observation and models play a major role for detecting damages.
- Flash Floods are difficult yet.

# Thank you!

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