

The logo consists of the letters "MOAI" in a bold, black, sans-serif font, centered within a solid green rectangular background.

Automatic leak detection in water canals

Satellite imagery + data fusion + generative AI

TIAFA project · Enel / Endesa × MOAI Analytics

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1. THE PROBLEM

1.1. Collapsing canals: water, money and risk to people



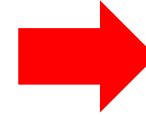
No sensors · Water loss · Risk to people · Economic losses

Sinkhole in the hillside and the road

1. THE PROBLEM

1.2. Until now: manual detection

Camping Remei



Evolution over the years



→ Wet area growing every year, found only by hand

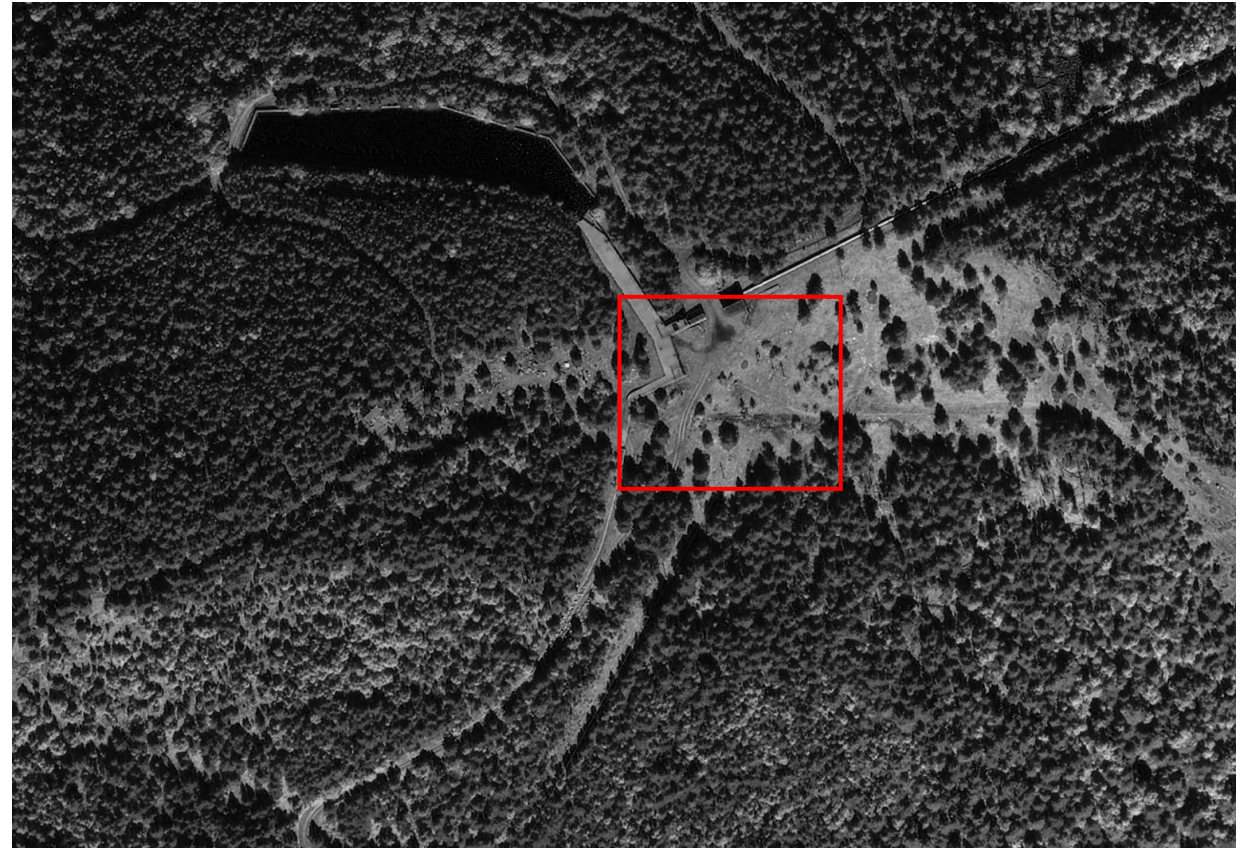
2. THE SOLUTION

2.1. Input images: 4 bands (RGB + NIR), 30 × 30 cm

RGB

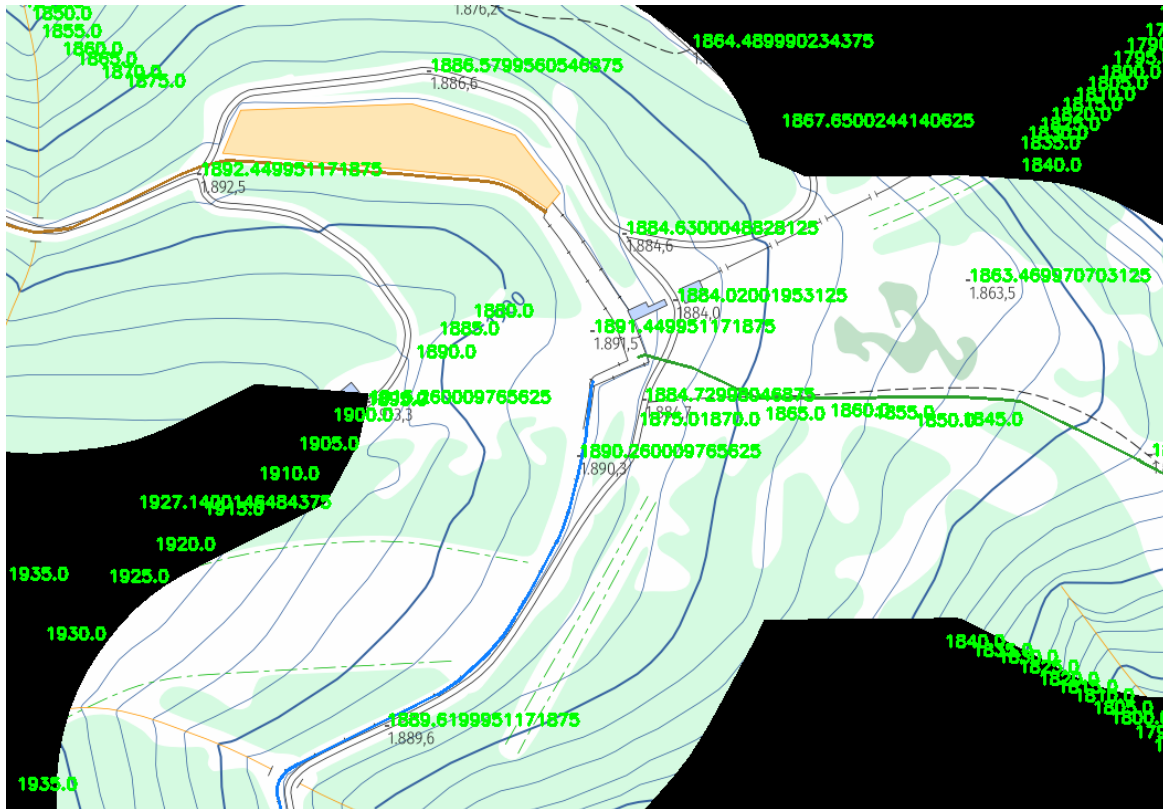


NIR



2.2. Where to look: asymmetric area from topography

Topographic cut



Asymmetric area (RGB)

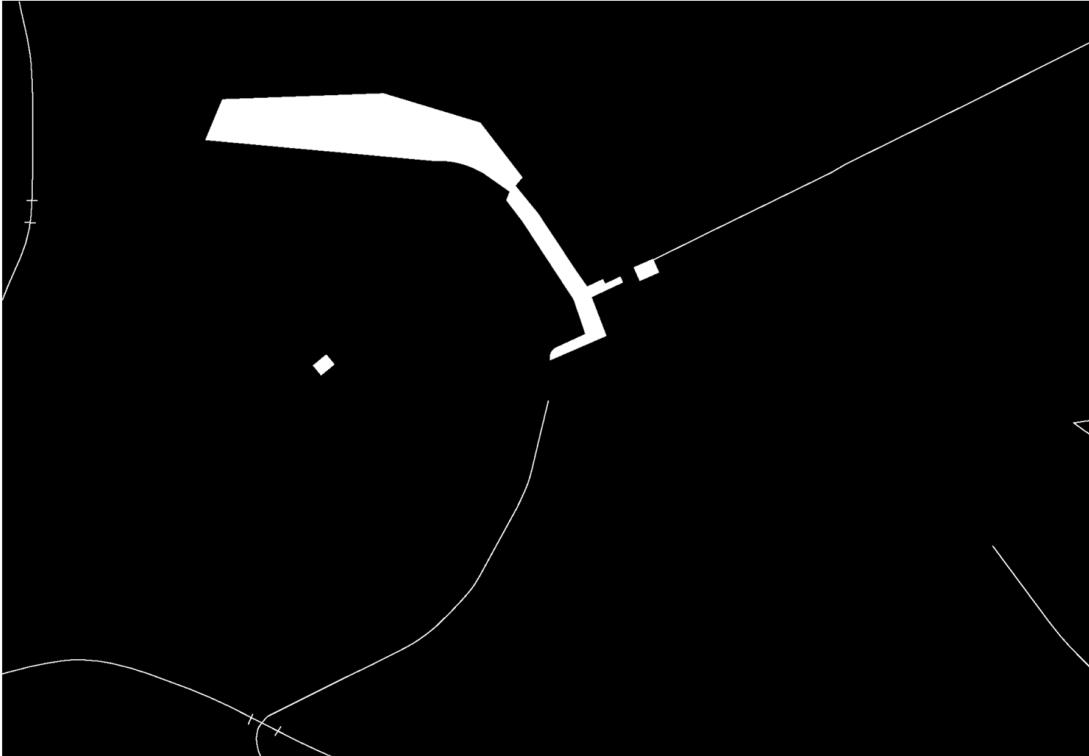


2. THE SOLUTION

2.3. Data fusion: removing objects and shadows

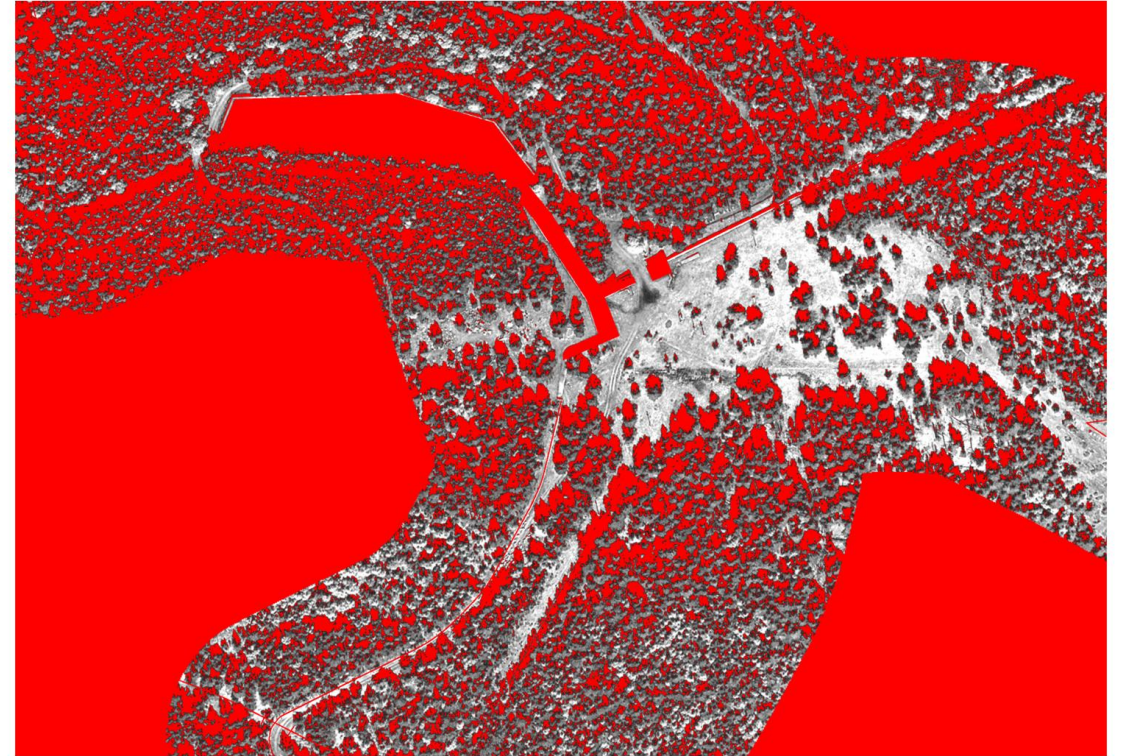
Objects (map data)

Rasterised mask (white = remove)



Objects + shadows

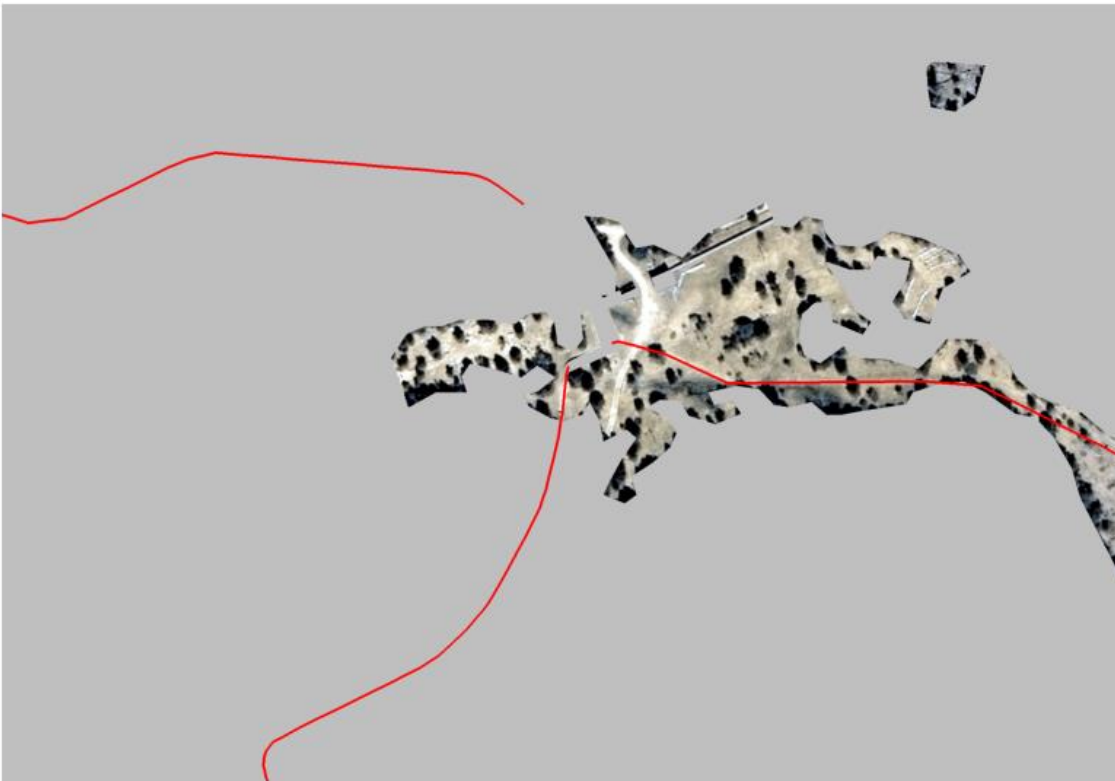
Shadow ($<0.10 \rightarrow$ red)



2. THE SOLUTION

2.4. Detecting and removing trees

1. Trees in the area of interest



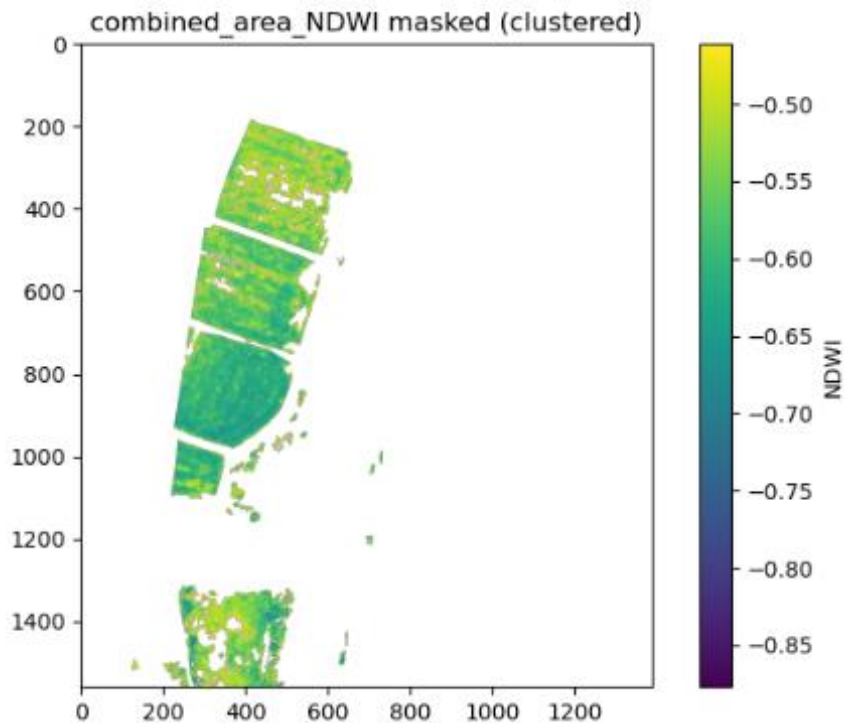
2. Detected trees (in red)



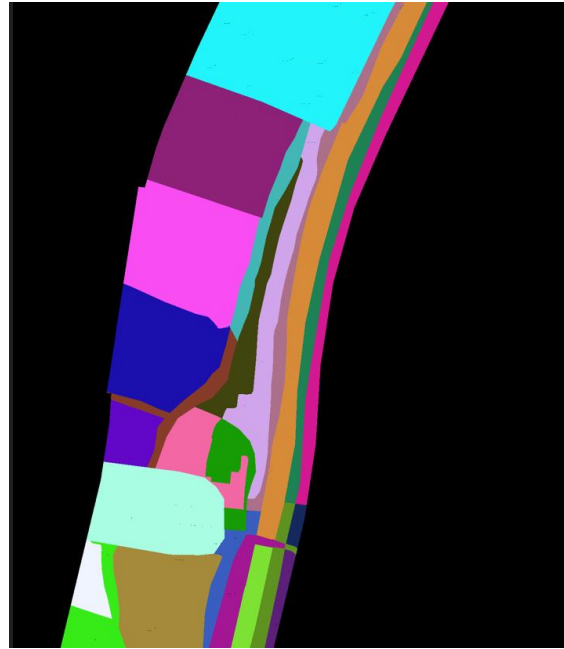
2. THE SOLUTION

2.5. Cadastre fusion: discarding irrigated fields

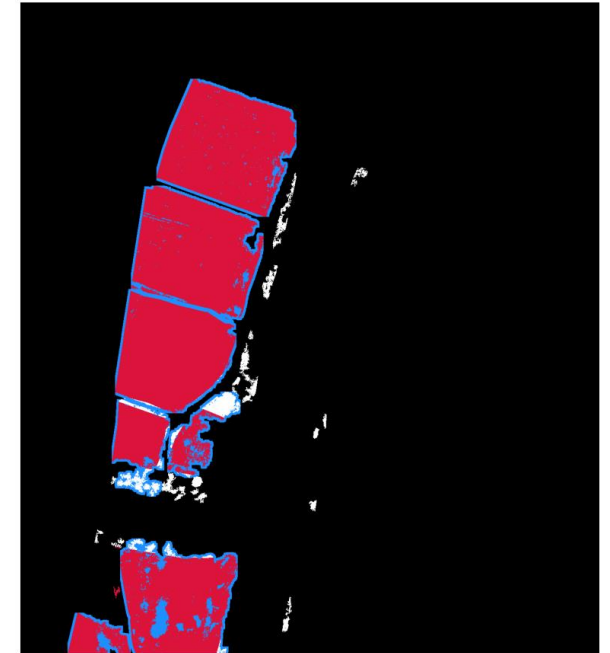
Wet areas



Cadastral data

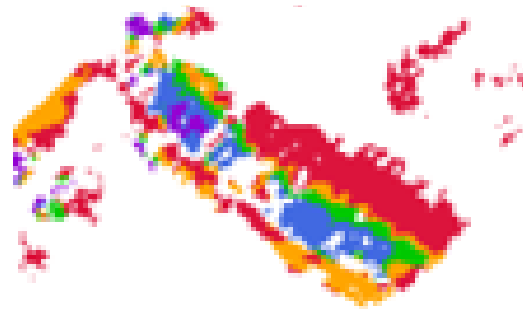


Irrigated fields detected



2.6. Multi-year analysis of wet areas

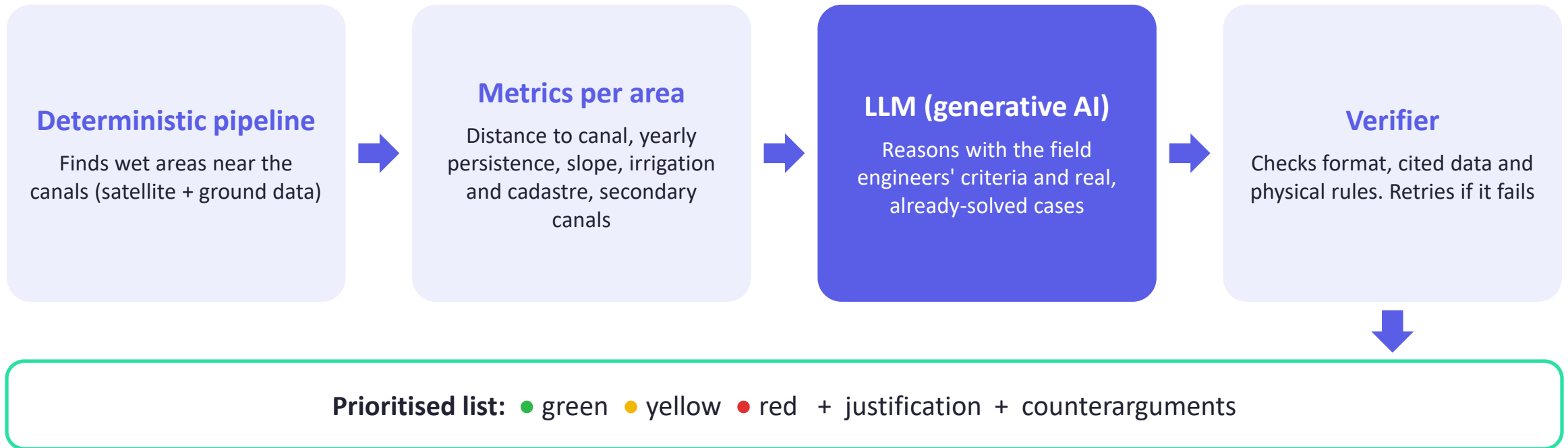
Wet-area persistence (2013–2017): each colour = number of years detected



2. THE SOLUTION

MOAI

2.7. Generative AI: from detection to interpretation



First prototype (v0)

Already works end to end on real cases from the field campaign.

Transparent and verifiable

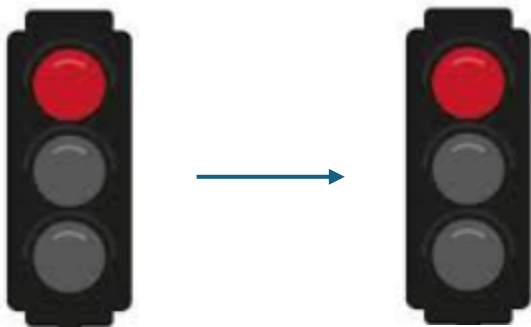
Every assessment cites the metrics behind it, as an engineer would.

Improves with more data

More field cases → better examples and a leak probability in %.

3. RESULTS

Coordinates: X, Y — Ref: ESH-SERO-XX-YYY-ZZ



2021

2022

2023

2024



Leak confirmed during the field visit: water on the upper bank of the canal, seeping from an upstream section.

3. RESULTS

3.2. Operator dashboard



Company-level workspace

Network Management

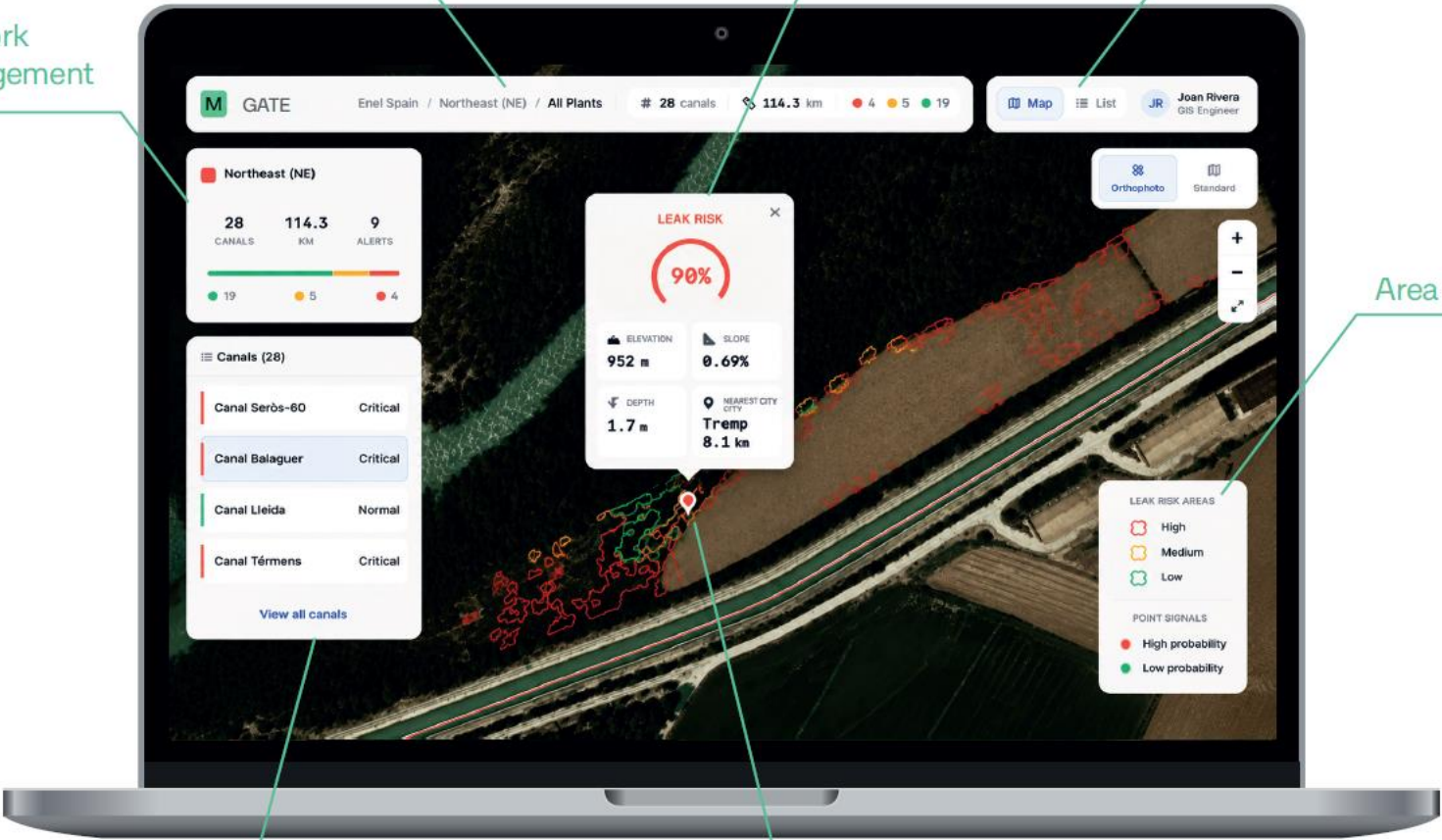
Risk Score

Visualisation Modes

Area risk

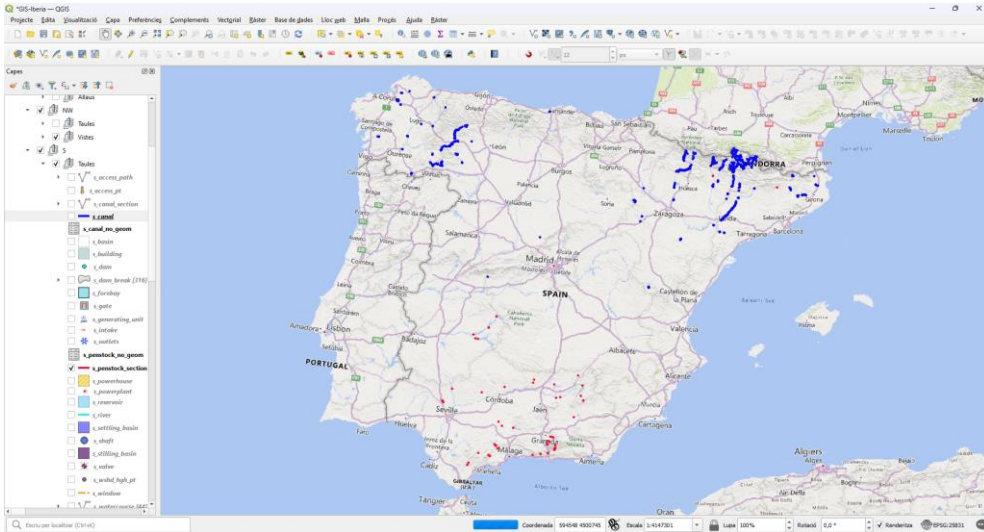
Pipeline list with Status

Technical Metrics per Inspection Point



4. CONCLUSIONS

4.1. From thousands of kilometres to a short list



Canals analysed: Catalonia and Aragon

≈112 km
of canals analysed

25+
sites inspected with Endesa

8
locations with signs of failure

5
breaks confirmed on the ground

- ✓ Satellite imagery finds wet areas automatically, at scale
- ✓ Data fusion removes shadows, trees and irrigation
- ✓ Generative AI adds transparent, expert-like reasoning (v0)

Thank you!