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GRIDWATCH

A MULTITASKING TOOL FOR A RISK MITIGATION AND PREVENTION IN ELECTRICAL GRIDS

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European Commission

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IREC'S HISTORY

2008 — Foundation of IREC

2009 — First activities

2011 — Stable Team

2012 — Infrastructure ready

2022-3 — Significant expansion

2024 — New IREC headquarters

2025 — Construction of PRIMA

Sant Adrià
IREC headquarters

Barcelona – ETSEIB/ UPC
Headquarters (new)

Tarragona

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INTRODUCTION

Mission

Contribute to the **sustainable development** of society and enhance corporate **competitiveness** via:

- Innovation and the development of new technological products
- Mid- and long-term research
- Dissemination of scientific knowledge to citizens

Vision

Become a **centre of excellence** and an **international benchmark** organization in the energy field through **research**, **development** and **innovation**, working in coordination with the **administration**, the **industry** and the **academia**.

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ORIENTATION

CERCA Research Centre, with a TECNIO accrediation.
IREC has a dual approach:

Market orientation

Market Orientation focusing on **technology development**, **new products** and new **technical solutions** for energy sector companies active in the same fields as IREC's established lines of action.

Long-term research

Long-term research into different aspects of the established lines of action. It will not be initially aimed at the market, but at **generating knowledge** amongst groups in the Institute itself, with a **long-term commercial projection** in mind.

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BOARD OF TRUSTEES

GOVERNMENT OF CATALONIA
Departament de Territori, Habitatge i Transició Ecològica
Direcció General d'Energia
Direcció General de Recerca

GOVERNMENT OF SPAIN
Secretaría de Estado de Energía
Secretaría General de Investigación
CIEMAT (Ministerio de Ciencia, Innovación y Universidades)
IDAE (Instituto para la Diversificación y Ahorro de la Energía - Ministerio de Transición Ecológica)

UNIVERSITIES
Politècnica de Catalunya (UPC)
Barcelona (UB)
Rovira i Virgili (URV)

COMPANIES
Enagás
Endesa
Naturgy

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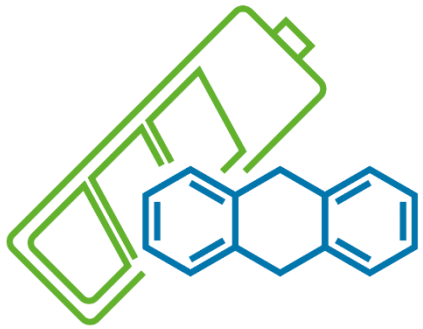
AREAS OF EXPERTISE

Energy & Environment

- Renewable energy sources and integration to the grid
- Sustainable mobility
- Fusion energy
- Environmental impact



Energy Storage

- Batteries
- Chemical storage
- Energy conversion
- Harvesting and other autonomous systems

Smart Energy Management

- Smart cities & districts
- Smart grids
- Distributed energy management and aggregators
- Energy efficiency in buildings

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GRIDWATCH TECHNOLOGY

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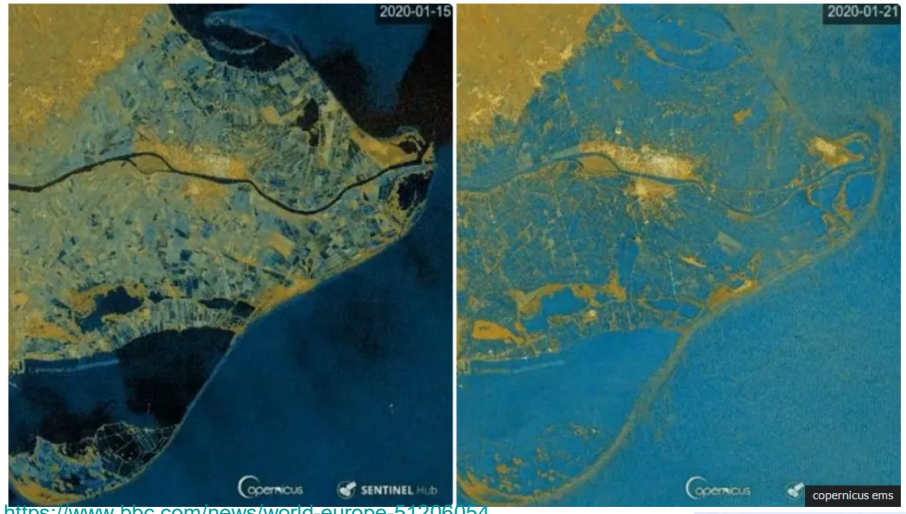
CLIMATE CHANGE IT IS A FACT. GRIDS MUST FACE IT.

Storm Gloria floods major river delta in eastern Spain

22 January 2020

BBC



https://www.bbc.com/news/world-europe-51206054

https://theconversation.com/why-doesnt-the-u-s-bury-its-power-lines-104829

The Guardian

Sam Jones *and* Ashifa Kassam *in Madrid, and* Jon Henley

Tue 29 Apr 2025 06.54 CEST

Electricity restored to 90% of Spain and most of Portugal after massive power outage

https://www.ultrasonicwindsensor.com/wp-content/uploads/2019/03/transmission-line-ultrasonic-anemometer-wind-impact-2-1272x430.jpg

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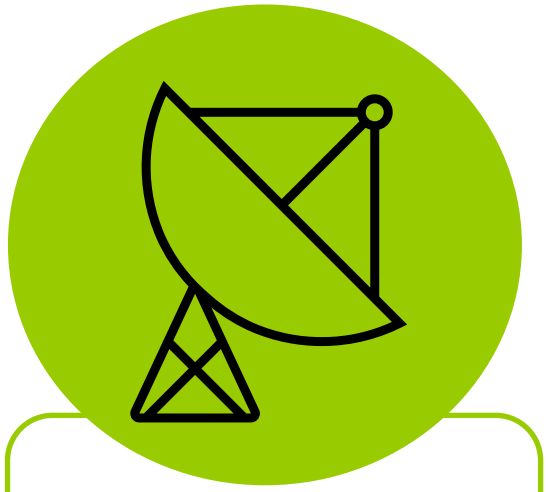
WHAT IS GRIDWATCH?

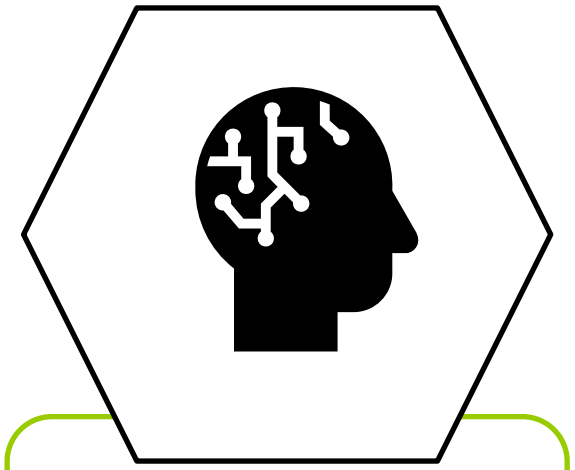
GridWatch is a cutting-edge monitoring and decision support platform which optimizes power grid resilience. It anticipates failures, demand growth and extreme climate risks and optimizes the grid state to keep the lights on and reduce costs.

Data Sources



- Satelite and weather data
- Grid sensors
- Open sources

AI Predective & Mitigation



- Propiertary algorithms
- Predict failures and risk
- Mitigation measures
- Independent analysis

User Plataform

- Real-time dashboards & Alerts
- Modular & Open Source
- Easy-to-use

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GRIDWATCH – GENERAL SCHEME: OPERATION & MAINTENANCE

Monitoring

Alert event

Notification

- Email
- Platform notification geographically represented

Countermeasures

- ML fault location
- Selfhealing tool + DTLR

Mitigation

- Electrical topology change to electrical islands

Recommended actions

- Recommended grid reconfiguration to DSO or TSO

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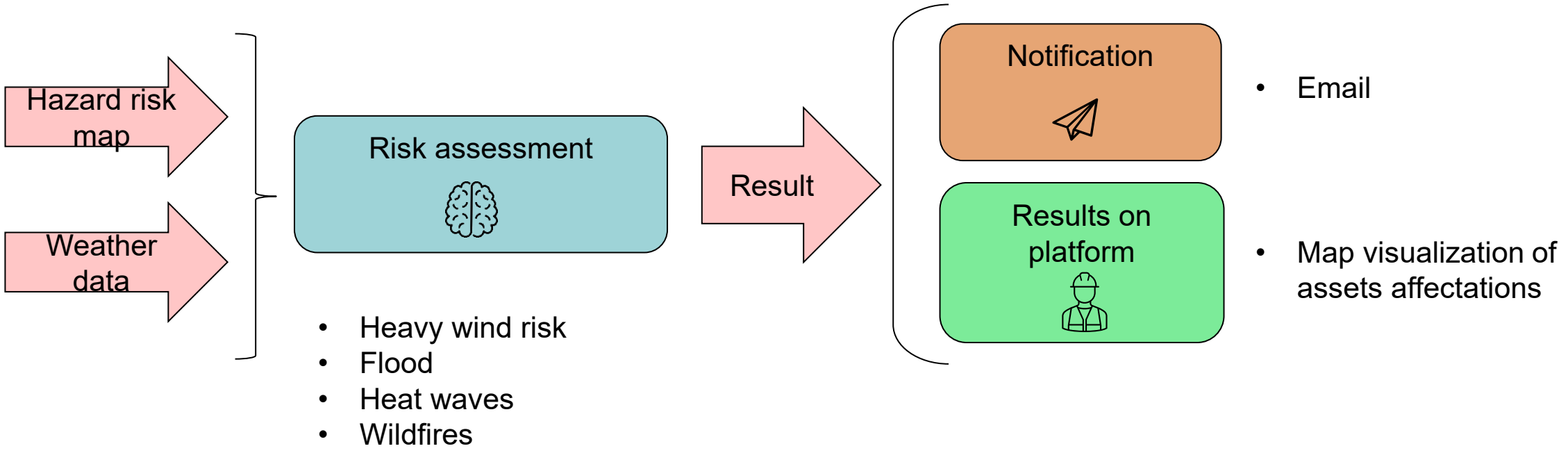
GRIDWATCH - GENERAL SCHEME: PLANNING



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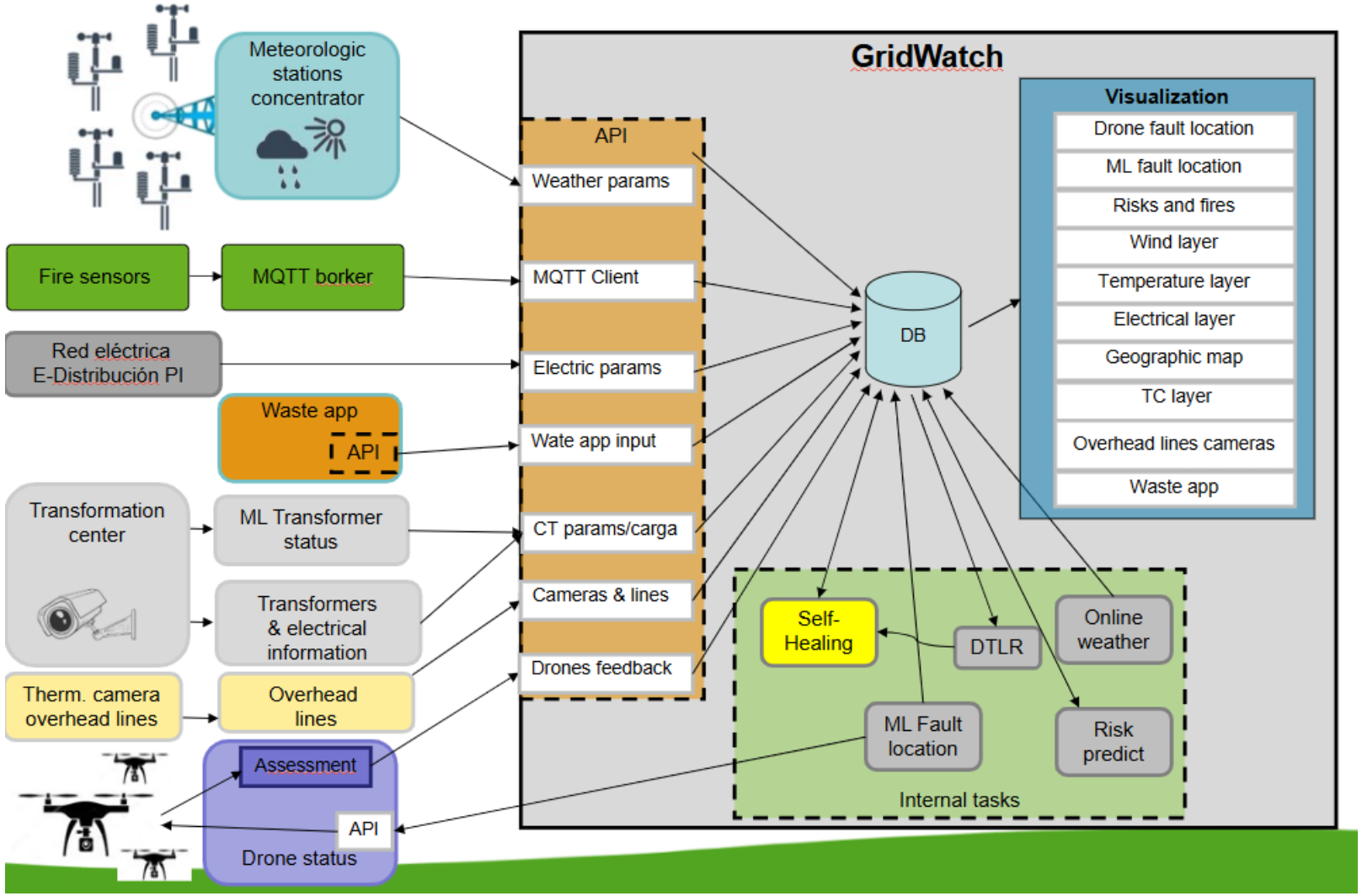
GRIDWATCH ARCHITECTURE



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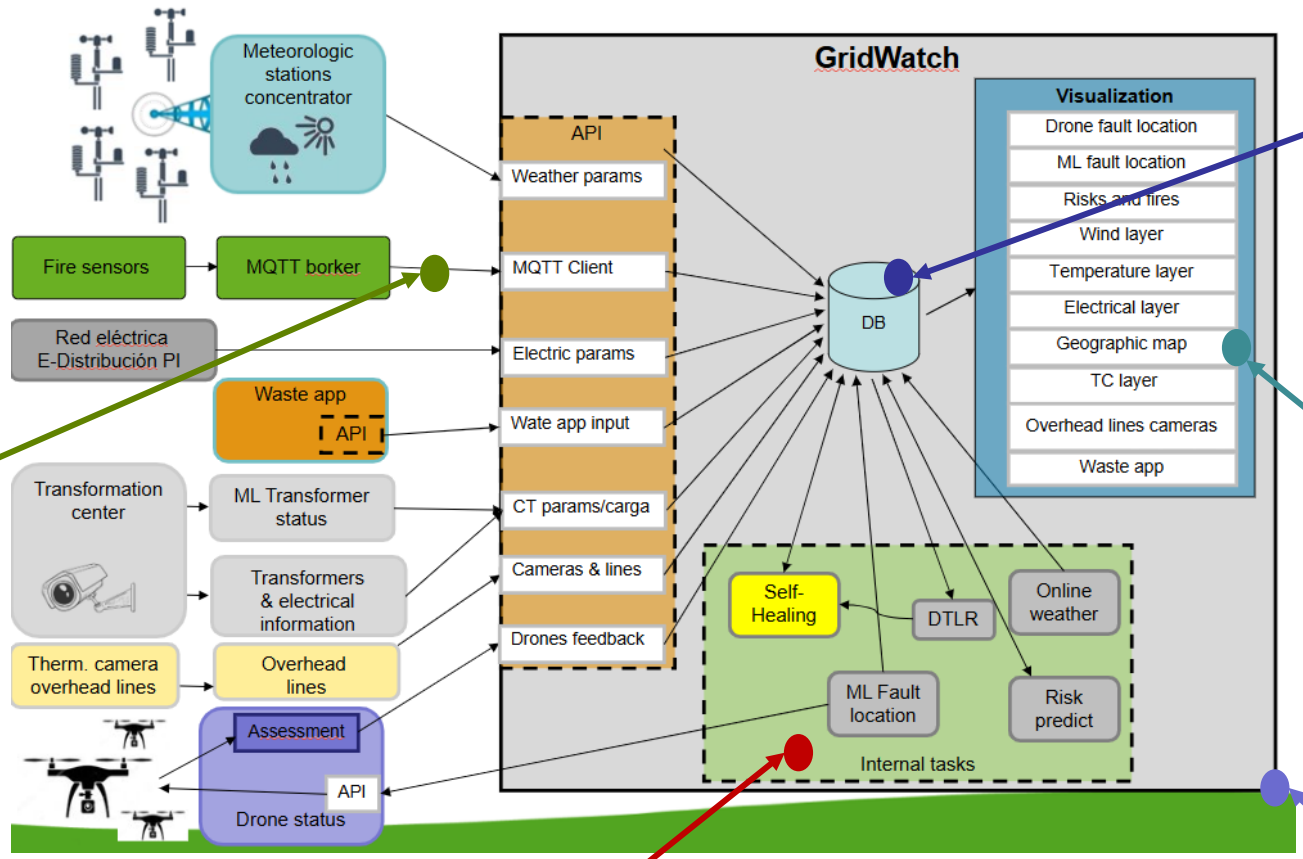
GRIDWATCH TECHNOLOGIES



DATA BASE

PostgreSQL + PostGIS

FROM COMPLEMENTS TO API

FastAPI

MQTT

VISUALIZATION OPEN SOURCE DATA

MapStore

GeoServer

CONNECTION & MAIN STRUCTER

OPENVPN

python

FROM INTERNAL TASKS TO CONTROL

Apache Airflow

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GRIDWATCH APPLICATION EXAMPLES

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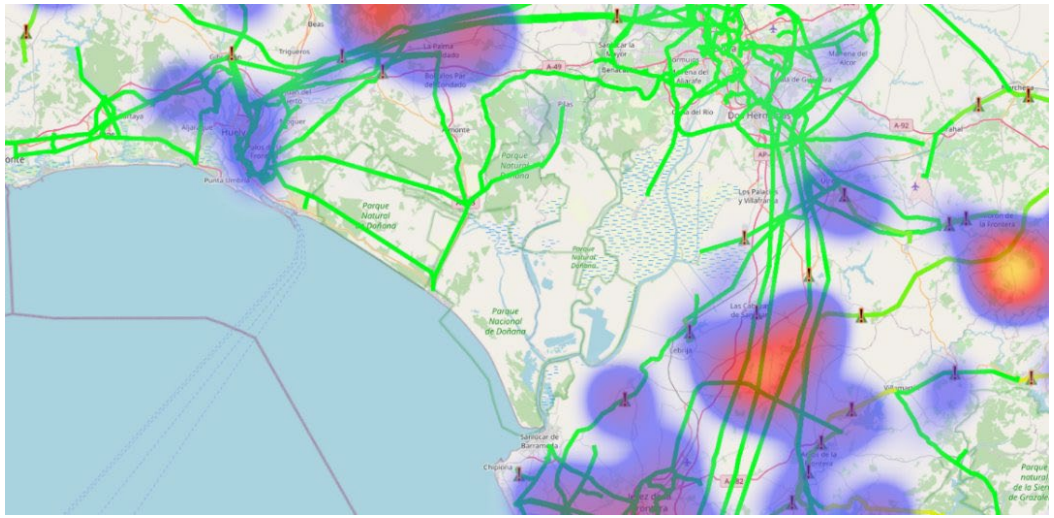
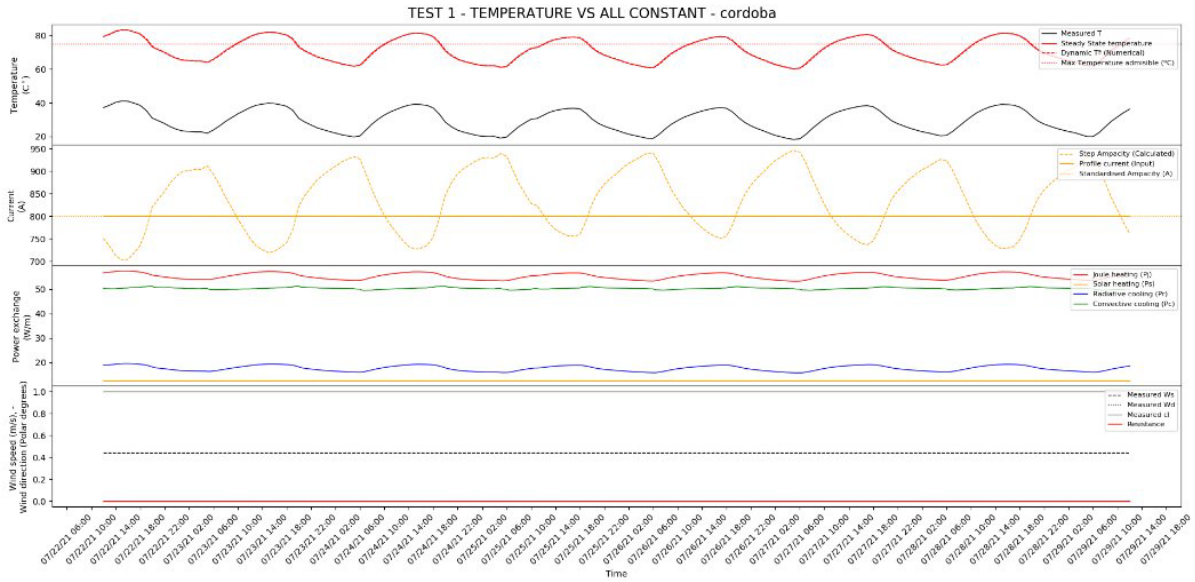
GRIDWATCH TECHNOLOGY VISUALIZATION

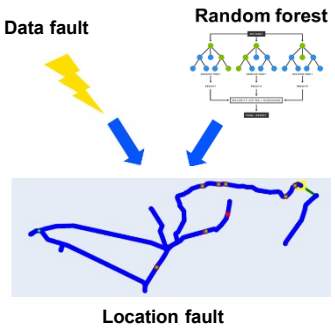
HEATMAP



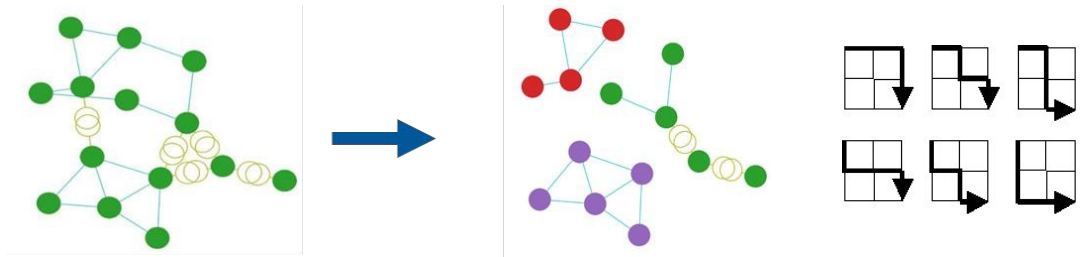
DTLR



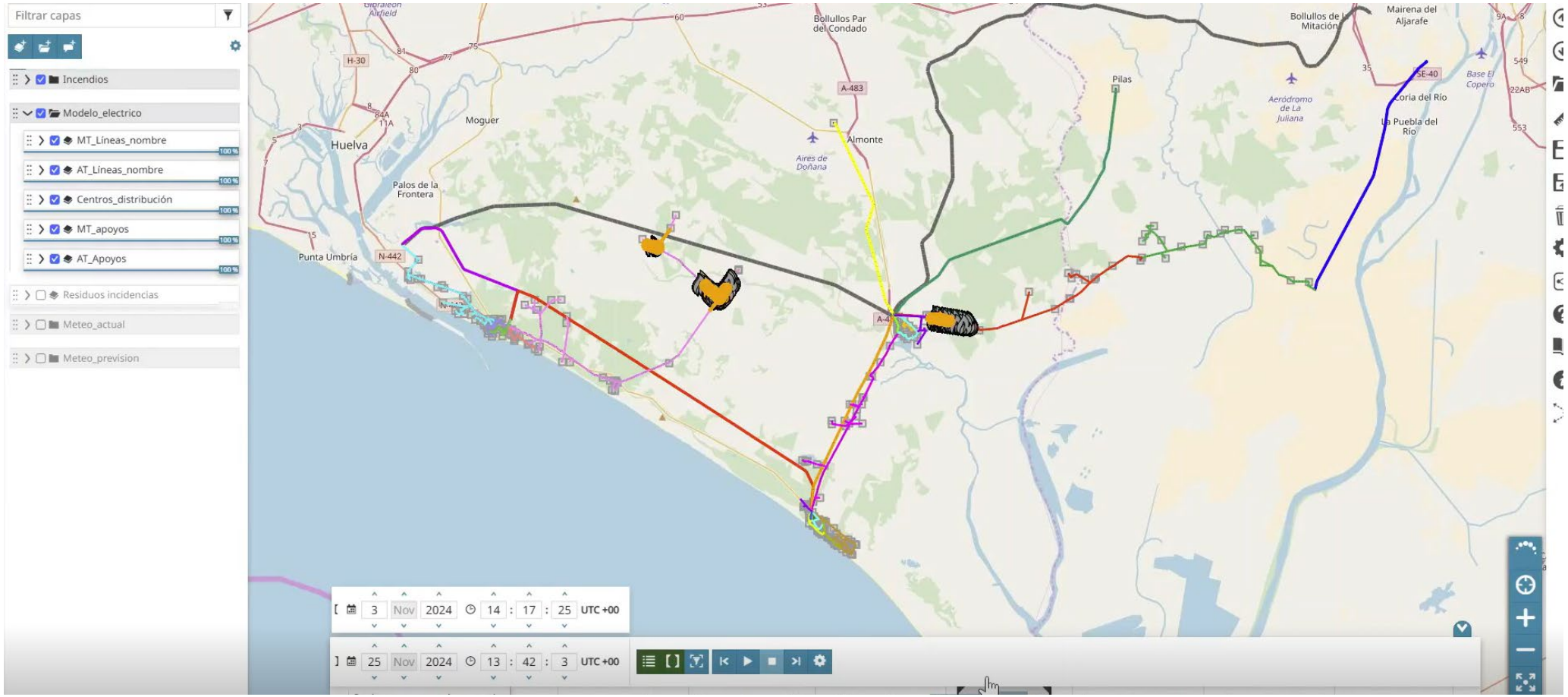
ML FAULT LOCATION



SELF-HEALING: 1) RECONFIGURATION 2) CLUSTER



PLATFORM GRIDWATCH - FIRE RISK



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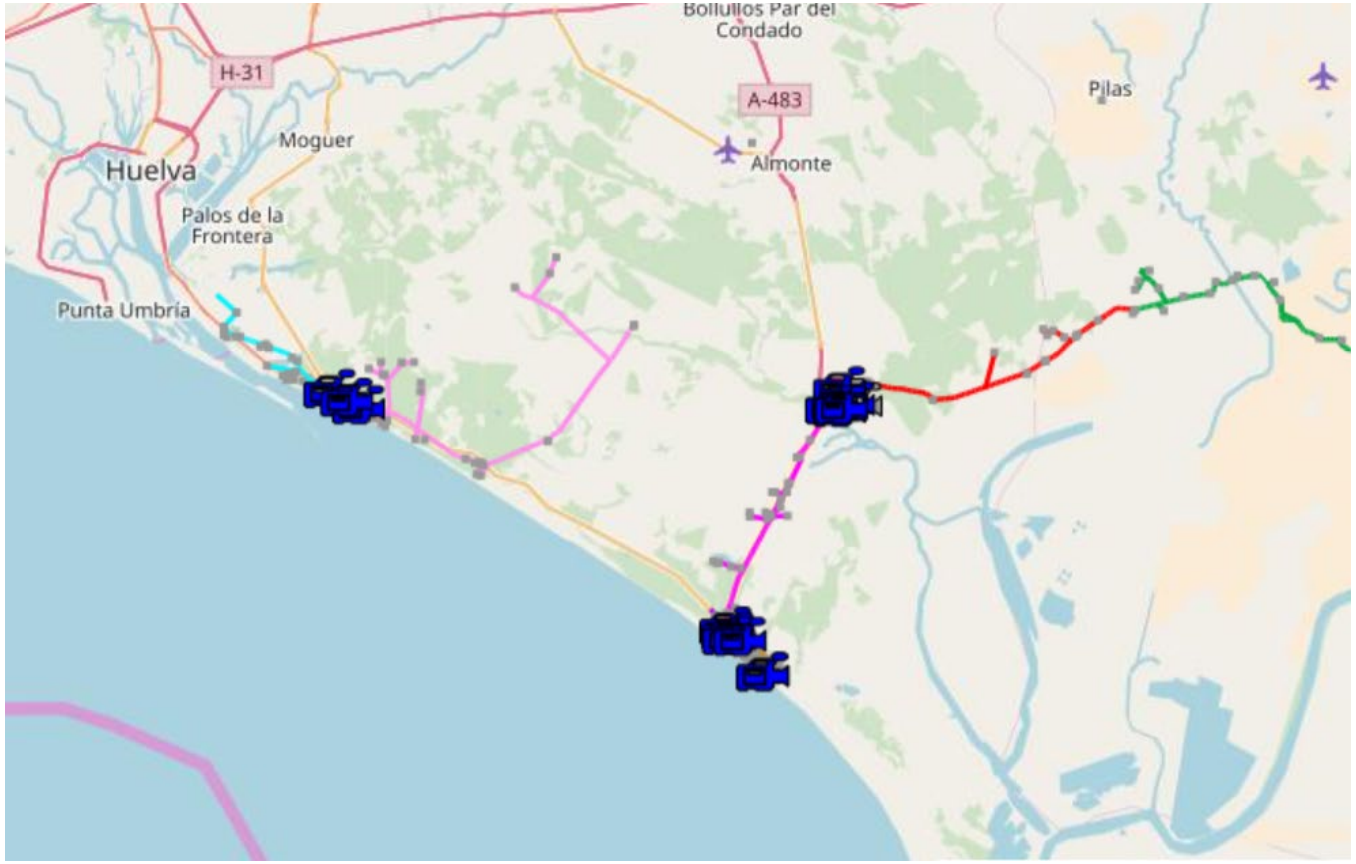
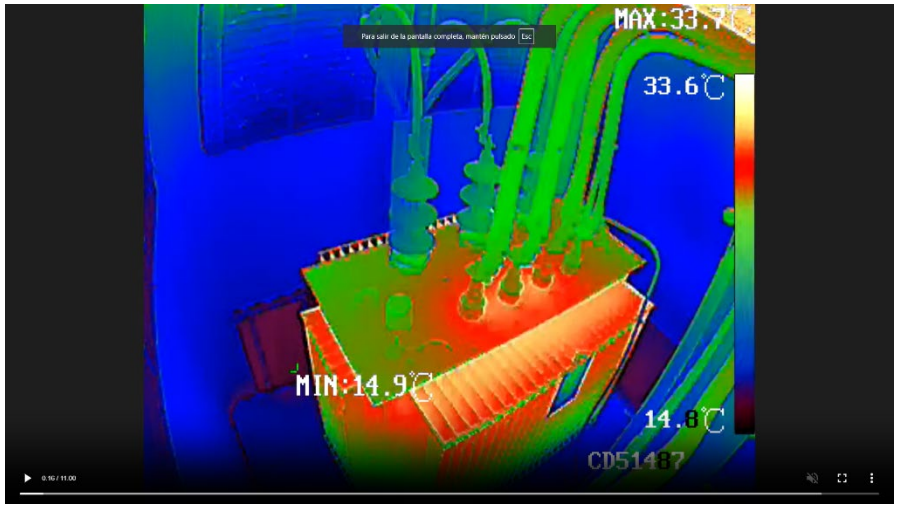
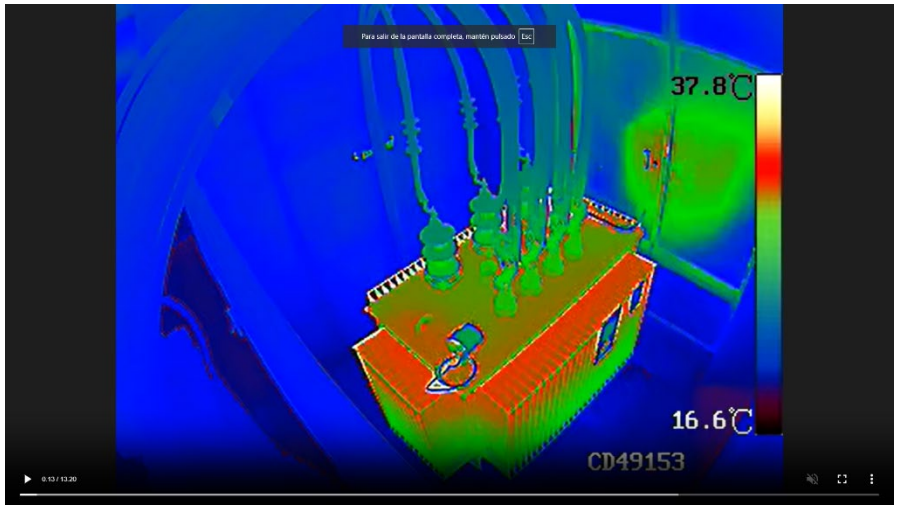
PLATFORM GRIDWATCH – DISTRIBUTION CENTERS







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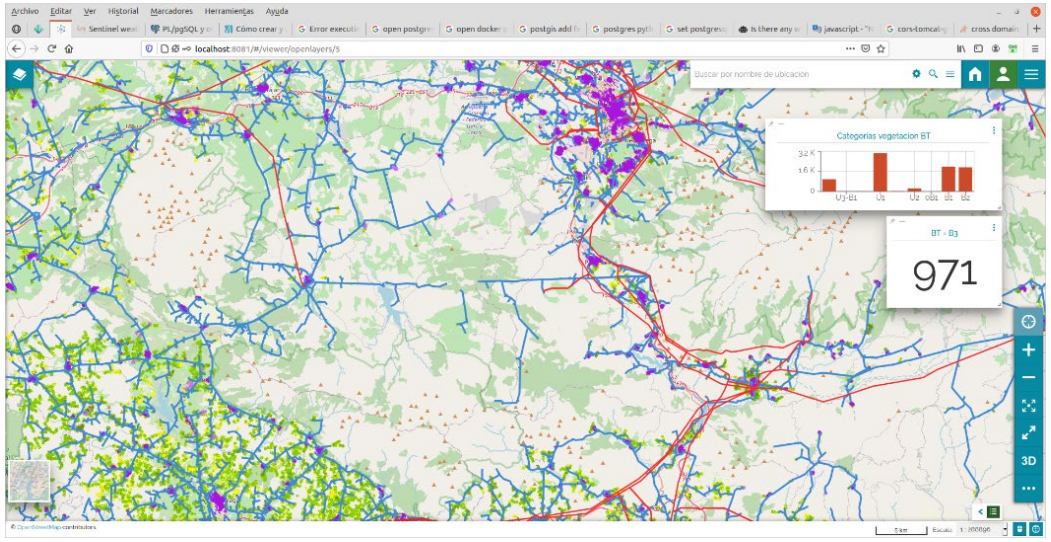
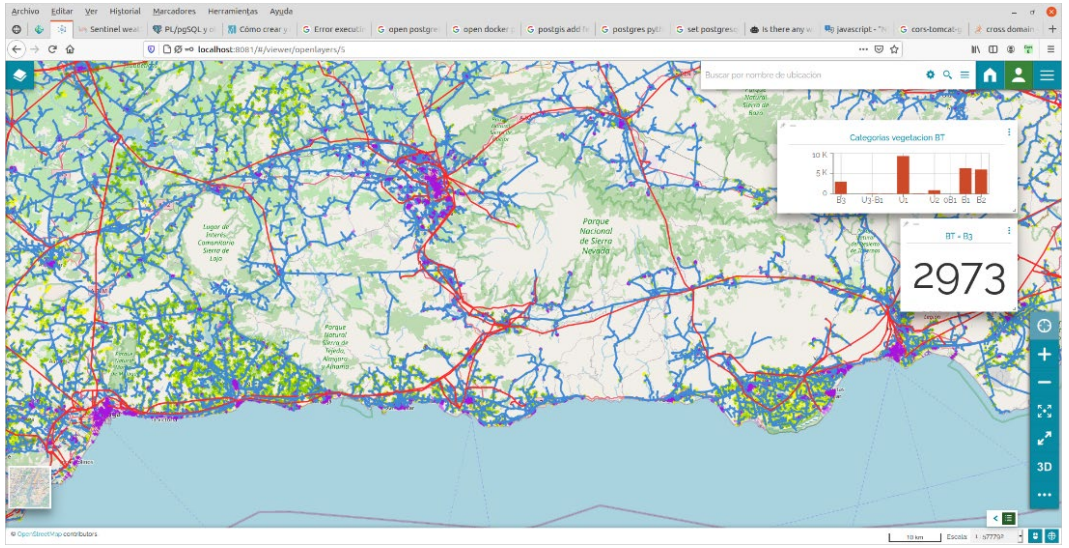
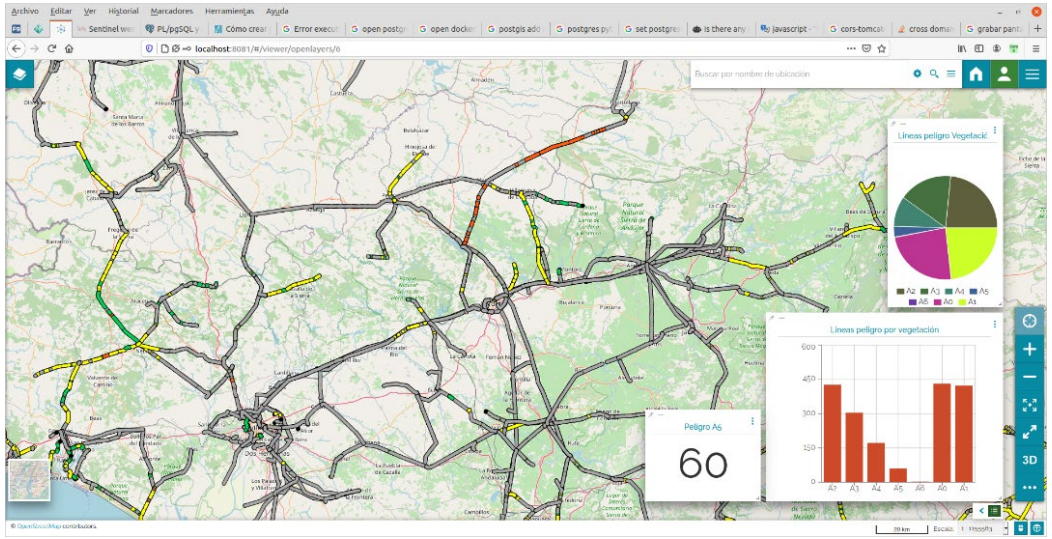
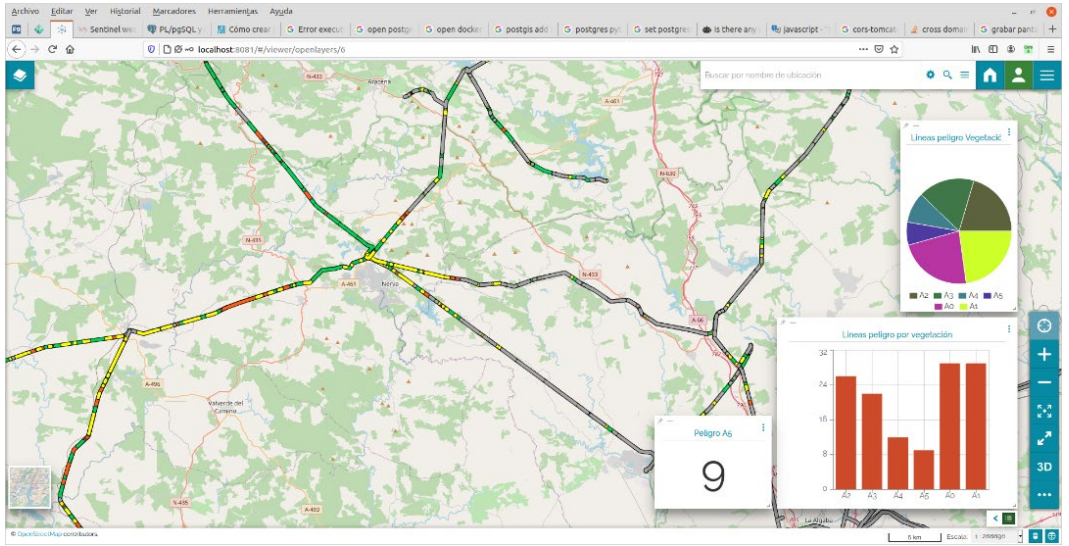
PLATFORM GRIDWATCH – WIND RISK

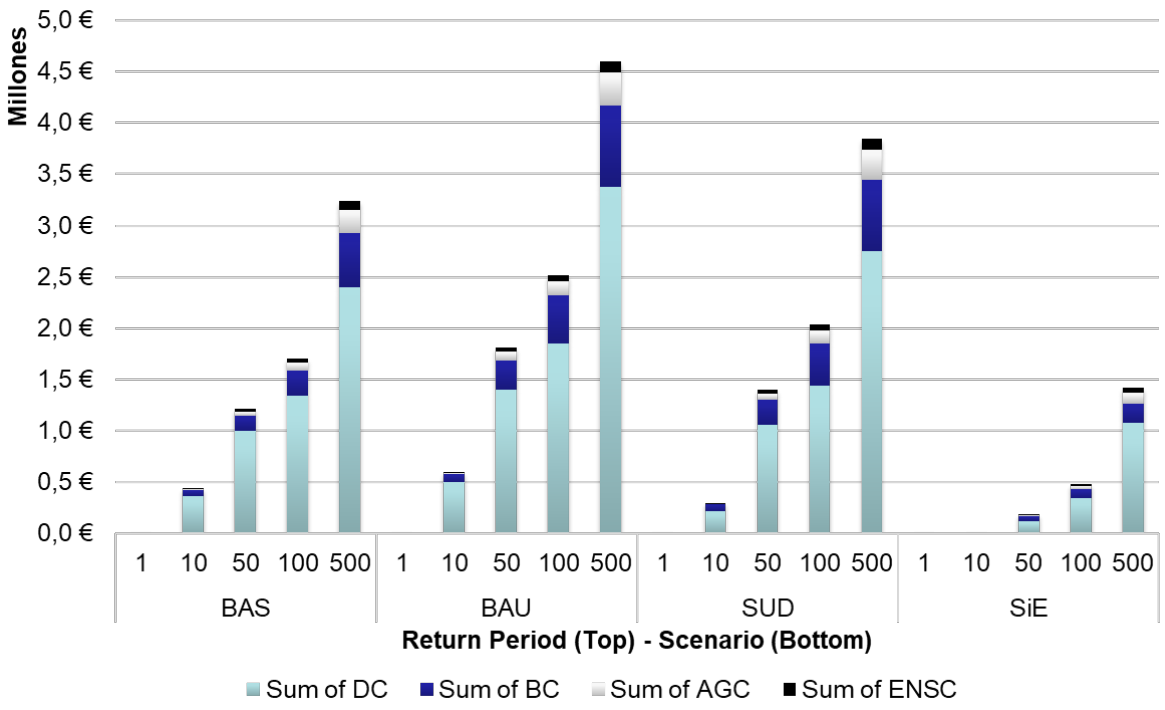


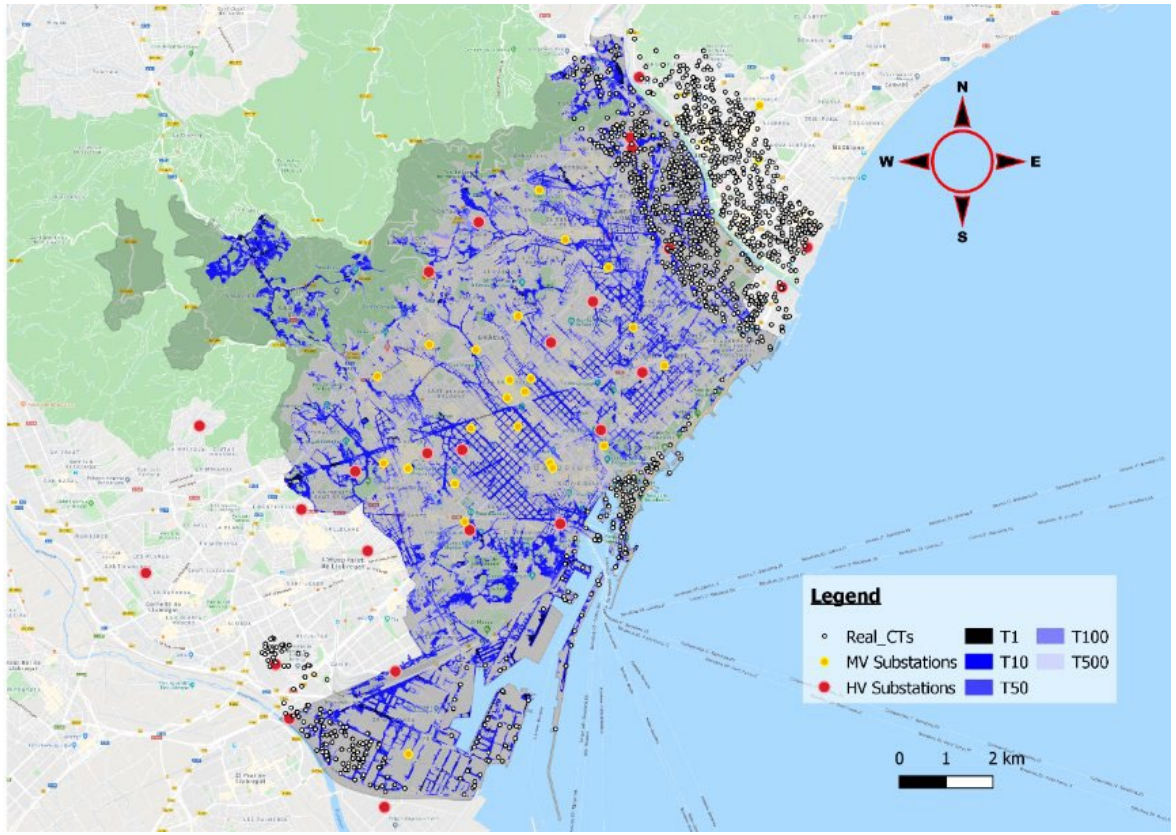






GRIDWATCH EXAMPLES – BARCELONA FLOOD NETWORK ANALISIS





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THANK YOU FOR YOUR ATTENTION!
ANY QUESTIONS?

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