

1245 - MULTI-ASSESSMENT TOOL FOR ELECTRIC DISTRIBUTION SYSTEMS

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Introduction

A multi-assessment tool designed to enhance the resilience of electrical distribution grids, by integrating risk analysis, meteorological data, and advanced algorithms. It facilitates fault detection, vulnerability visualization, and supports safe grid operation on open-source platforms.

Results

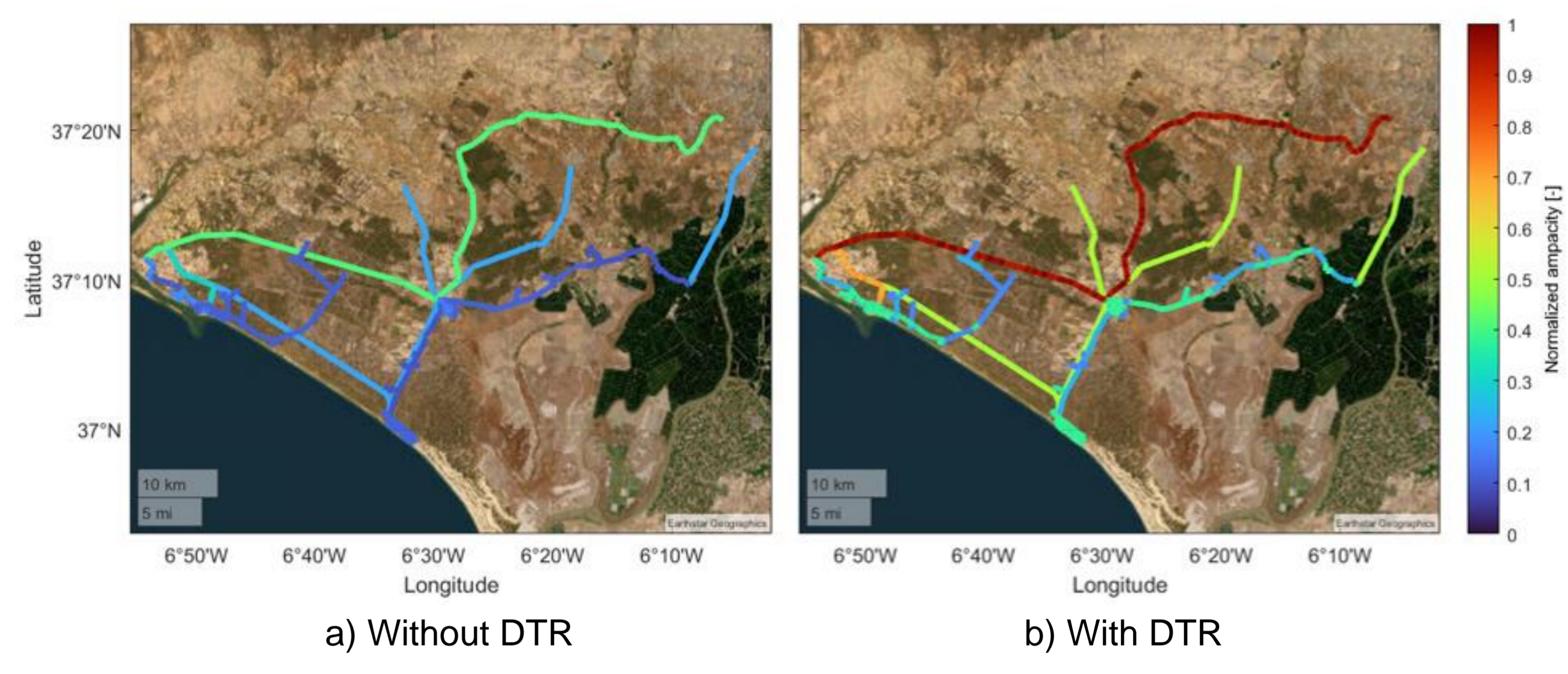


Figure 2. Difference in ampacity when considering static (a) and dynamic (b) thermal ratings.

Methods of the work

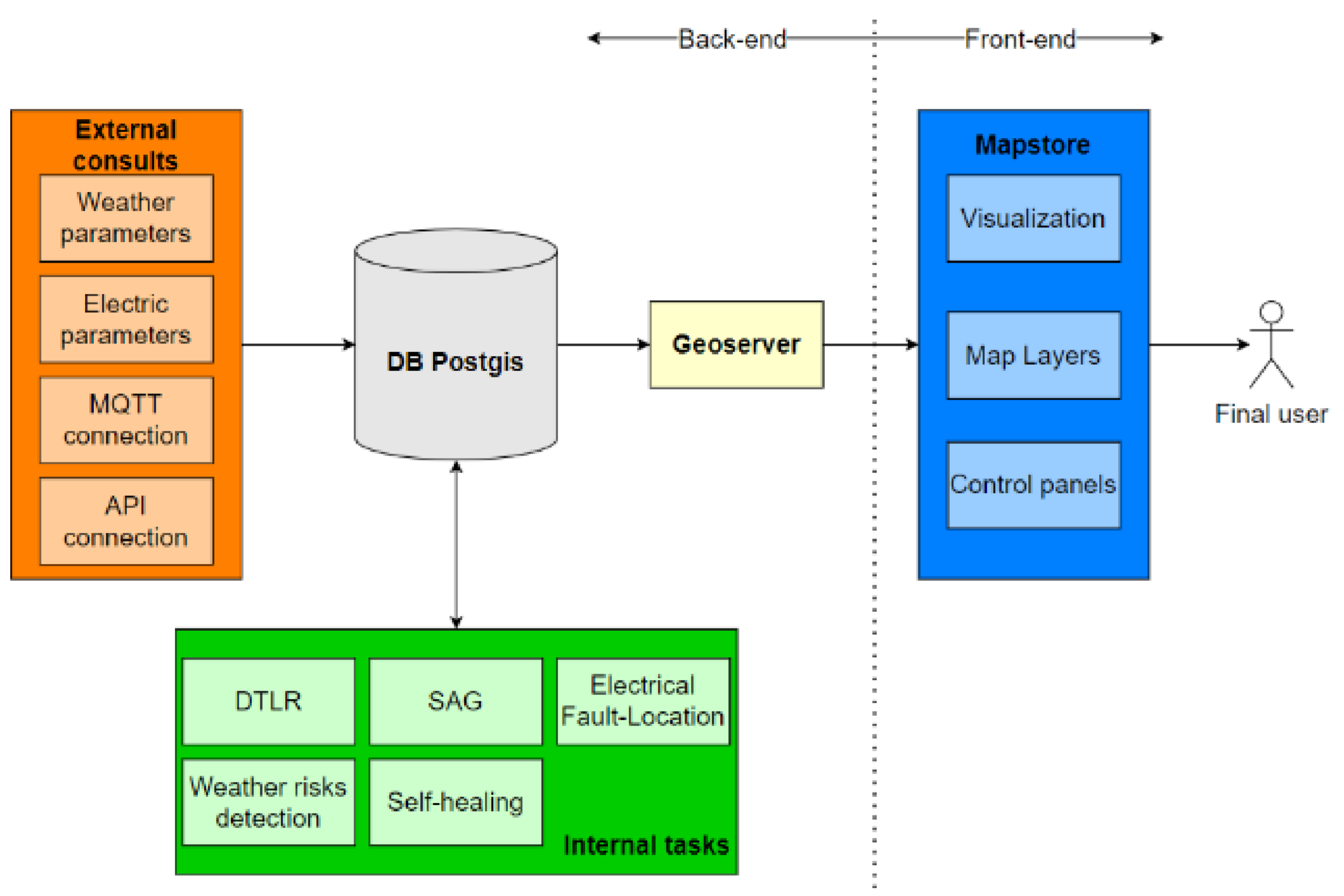


Figure 1. Tool's architecture schema.

The tool's core is a georeferenced PostGIS database representing electrical networks and meteorological data. It features a back end for data processing and a front-end for visualization.

The back-end manages data and integrates GeoServer for WMS standards. The front end, using MapStore, allows users to visualize and analyze data through interactive maps and control panels.

Tool tested in Doñana Park's electrical grid

- DTLR evaluates if increasing line ampacity is feasible, thus improving operational flexibility based on grid conditions.
- The weather parameters detect the risk regions.
- Electrical Fault-Location allows the detection of the possible fault.
- Self-healing proposes power flow reconfiguration during grid faults.

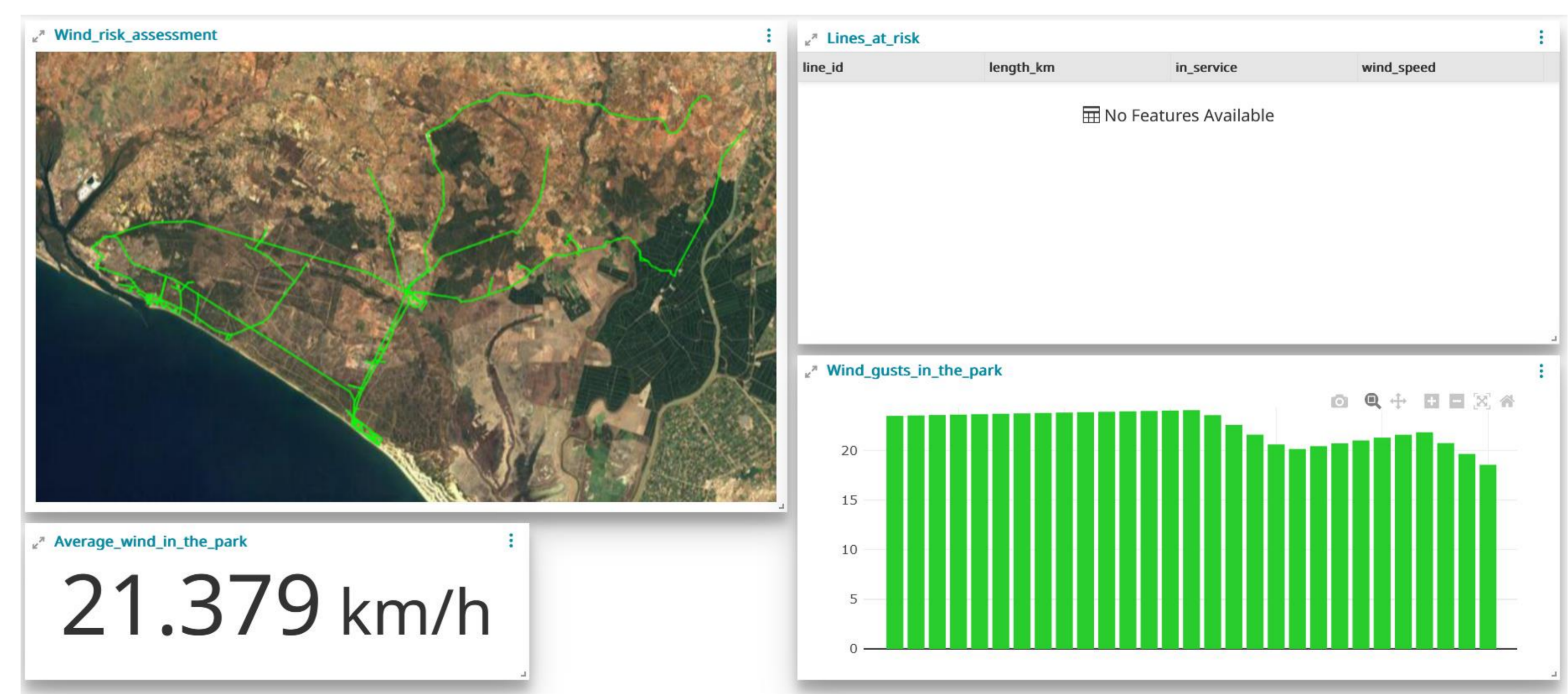


Figure 3. Panel control of the tool that assesses the wind risk in the lines of the park.

Conclusions

A flexible, open-source georeferenced tool integrates key electrical system components, enhancing vulnerability analysis and improving grid resilience and safety.