

MULTI-SCALE REMOTE SENSING ASSESSMENT OF THERMAL STRESS ON CULTURAL HERITAGE IN LIMASSOL

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Kulturgüterschutz aus dem Weltraum: Potenziale der Nutzung von Satellitendaten

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EFFECTS OF THERMAL STRESS ON HERITAGE BUILDINGS

- Material Expansion and contraction: cracking, joint failure
- Structural Deformation: warping, buckling
- Degradation of materials: thermal fatigue, material breakdown
- Aesthetic damage: discoloration, peeling paint
- Increased energy consumption
- Thermal discomfort and poor air quality
- Increased maintenance costs
- Fire risk

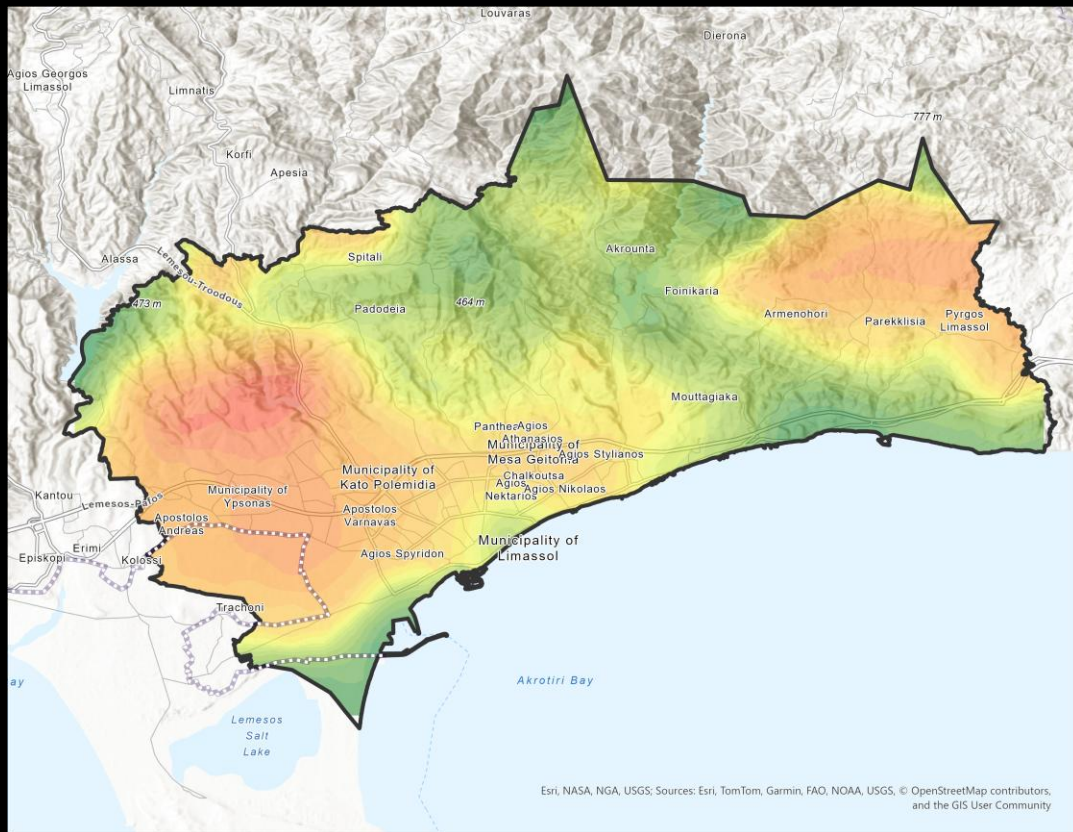


COMPARISONS

Sentinel-3 – Landsat 9

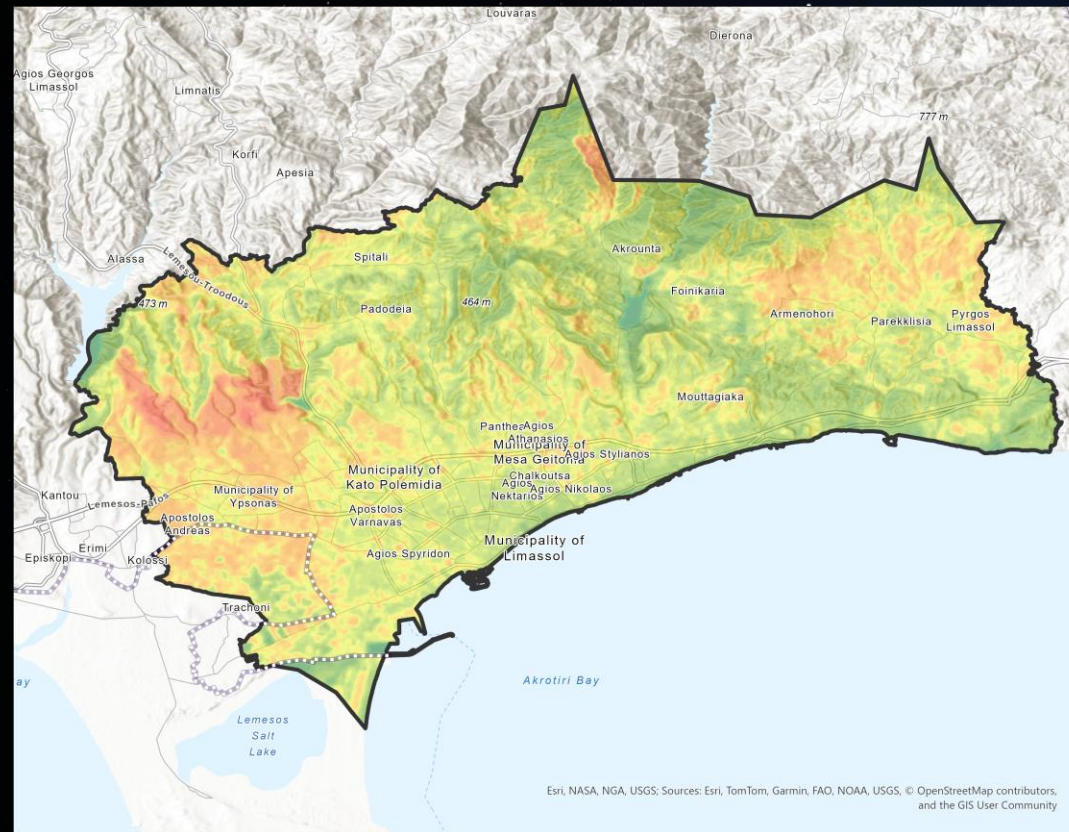
Feature	Sentinel-3	Landsat 9
Satellite Operator	ESA (European Space Agency)	NASA / USGS
Thermal Imaging Instrument	Sea and Land Surface Temperature Radiometer (SLSTR)	Thermal Infrared Sensor 2 (TIRS-2)
Primary Purpose	Ocean and land surface temperature (climate monitoring, marine studies)	Land surface temperature (agriculture, urban heat, water resources)
Land Surface Temperature Monitoring	✓ Good for large-scale temperature trends	✓ Suitable for detailed land temperature studies
Spatial Resolution	500–1000 m per pixel	100 m per pixel
Revisit Time	1-2 days (global coverage)	16 days
Urban Heat Island Monitoring	⚠ Lower resolution, less detailed for urban areas	✓ High resolution helps analyze city heat patterns

Sentinel-3 imagery



Date: 24 JUL 2024
Time: 08:00 a.m
Resolution 1000m x 1000m

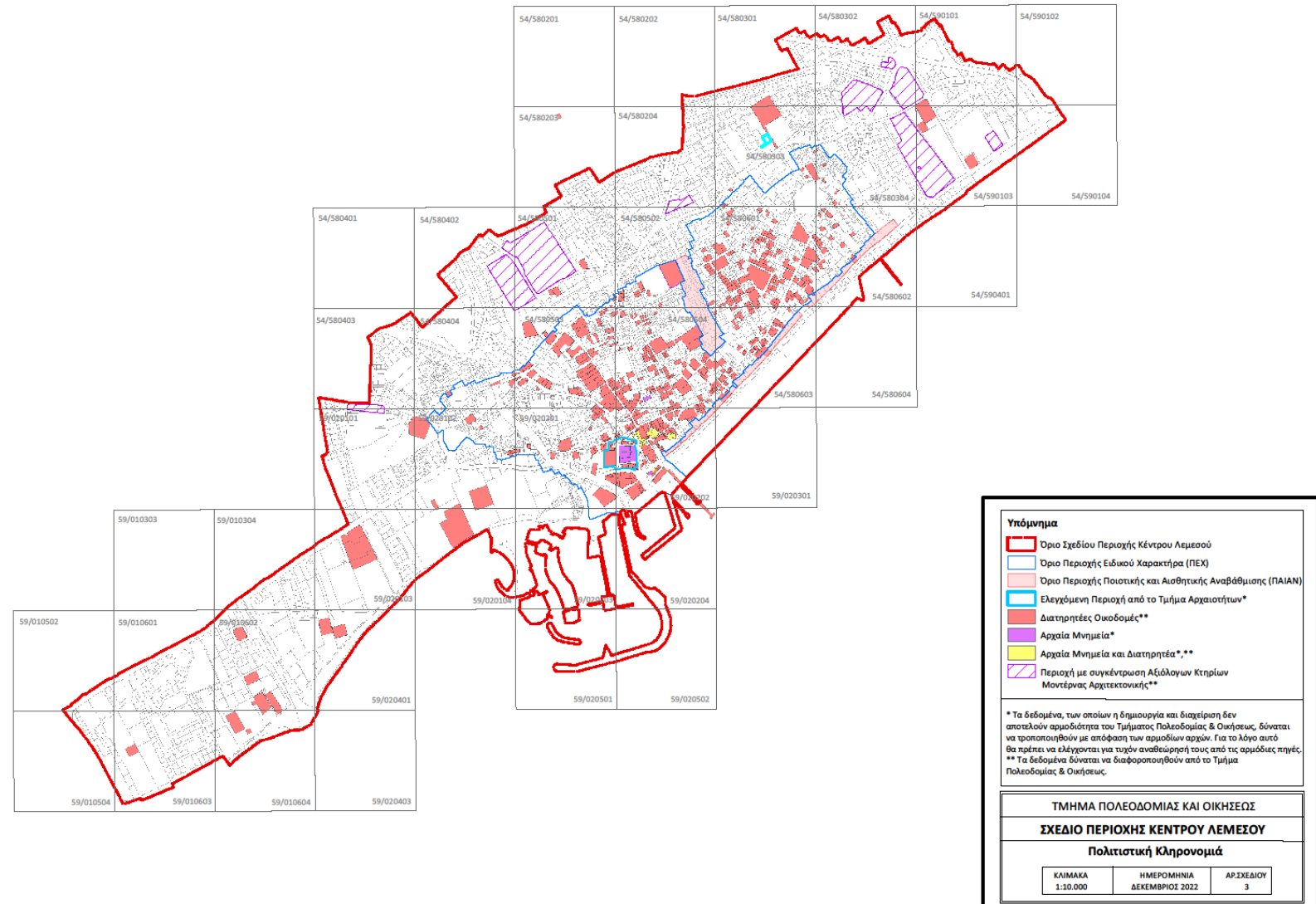
Landsat-9 imagery



Date: 24 JUL 2024
Time: 08:21 a.m
Resolution 30m x 30m

City center - Listed and historical buildings

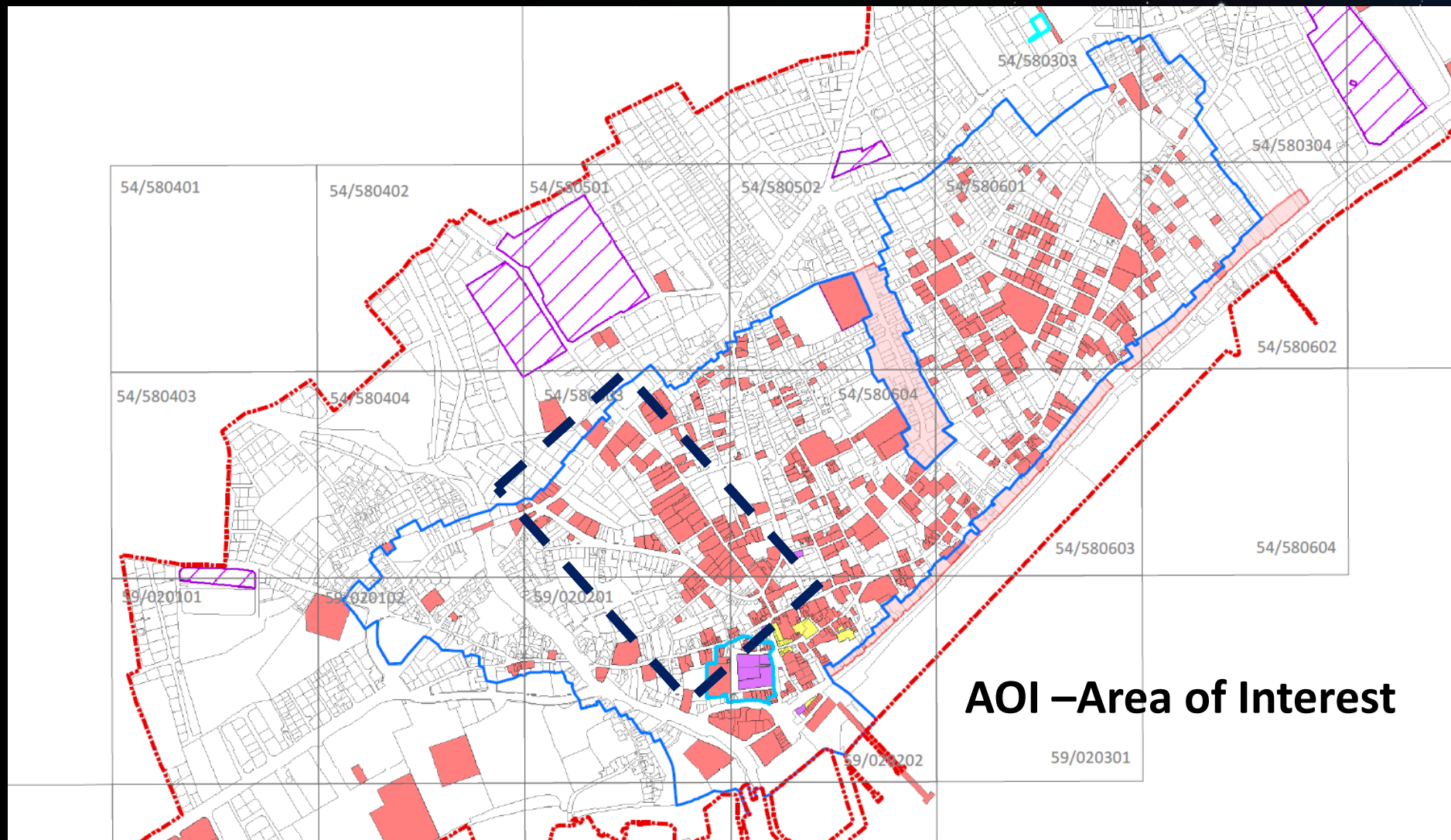
Department of Town
Planning and
Housing
of Limassol



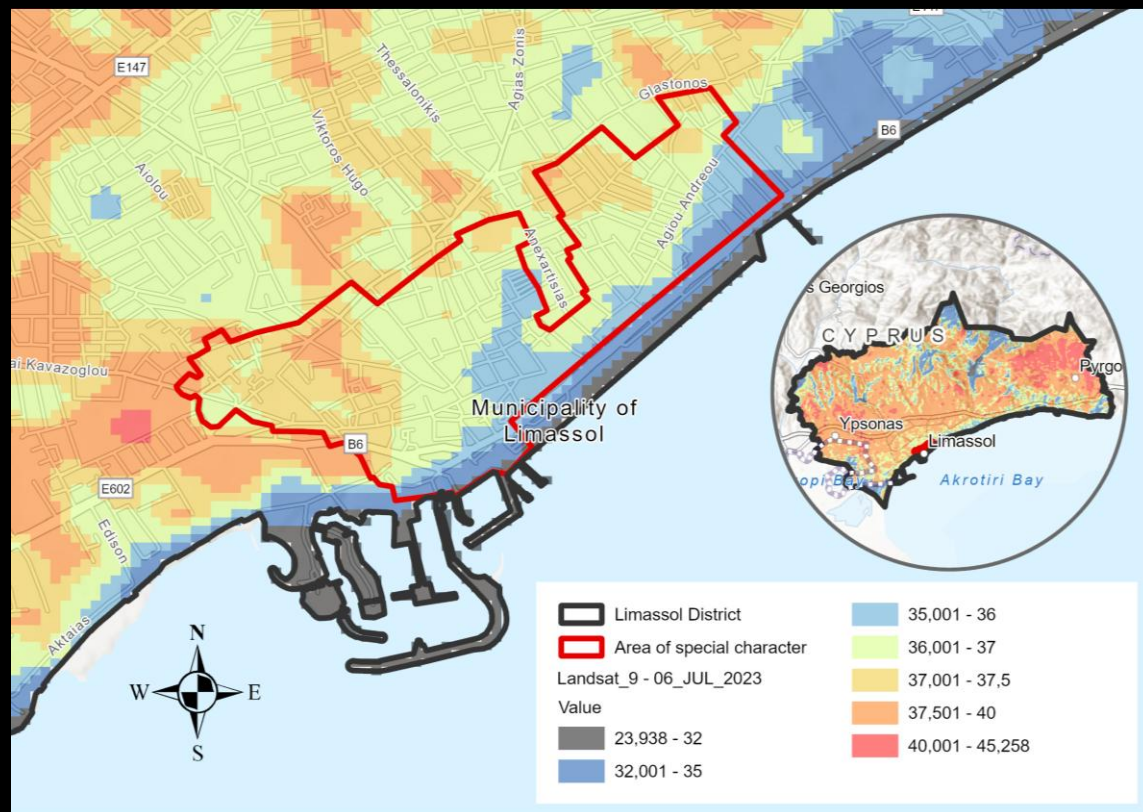
Area of Interest

City center -
Listed and
historical buildings

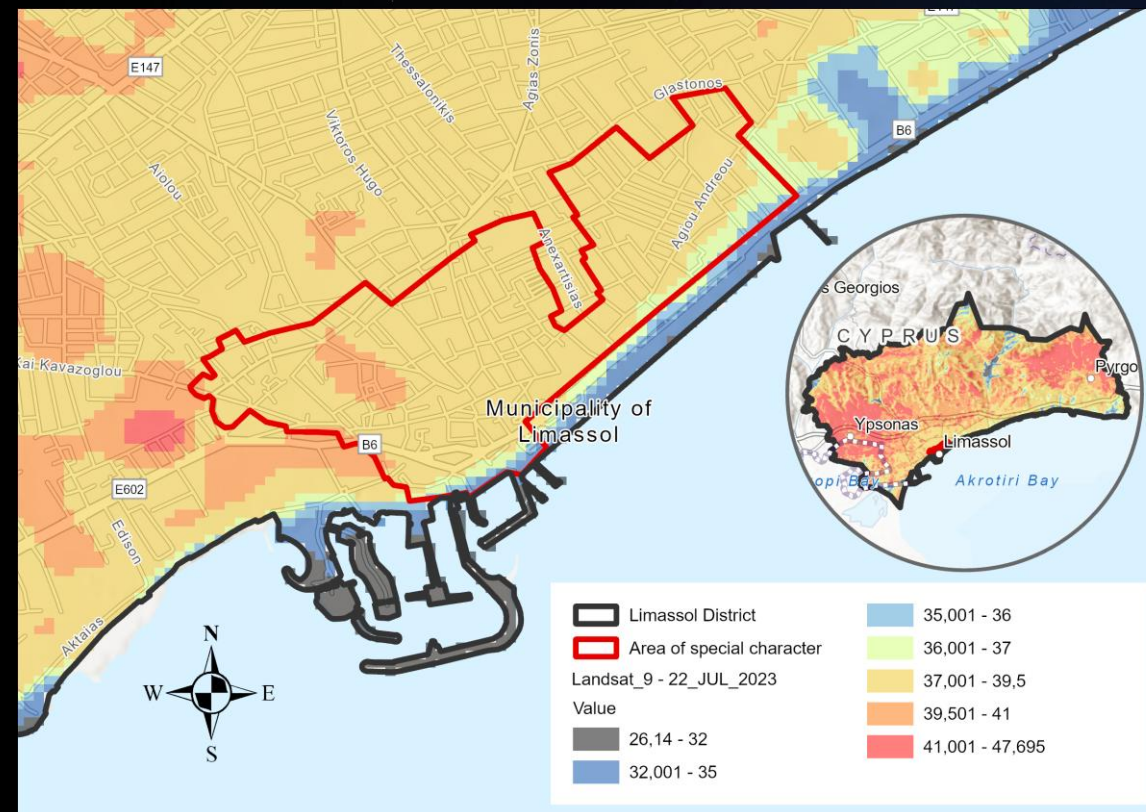
Department of
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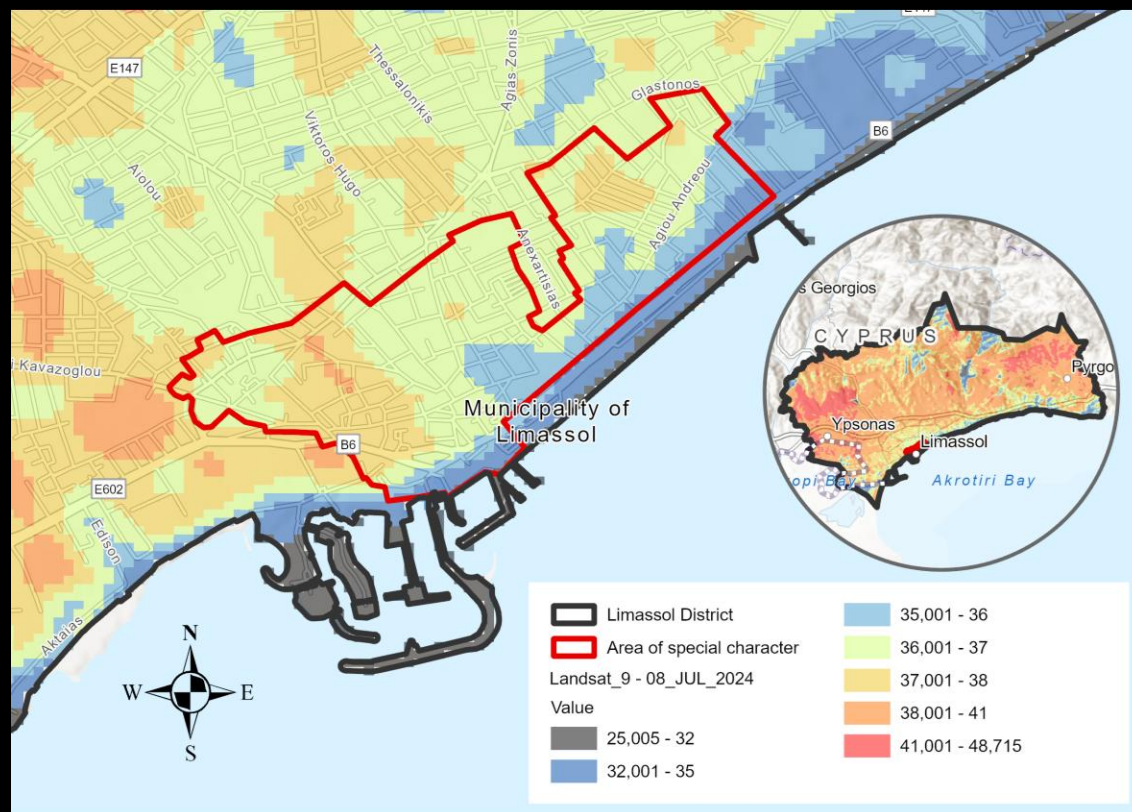
06 JUL 2023 – Landsat-9 imagery



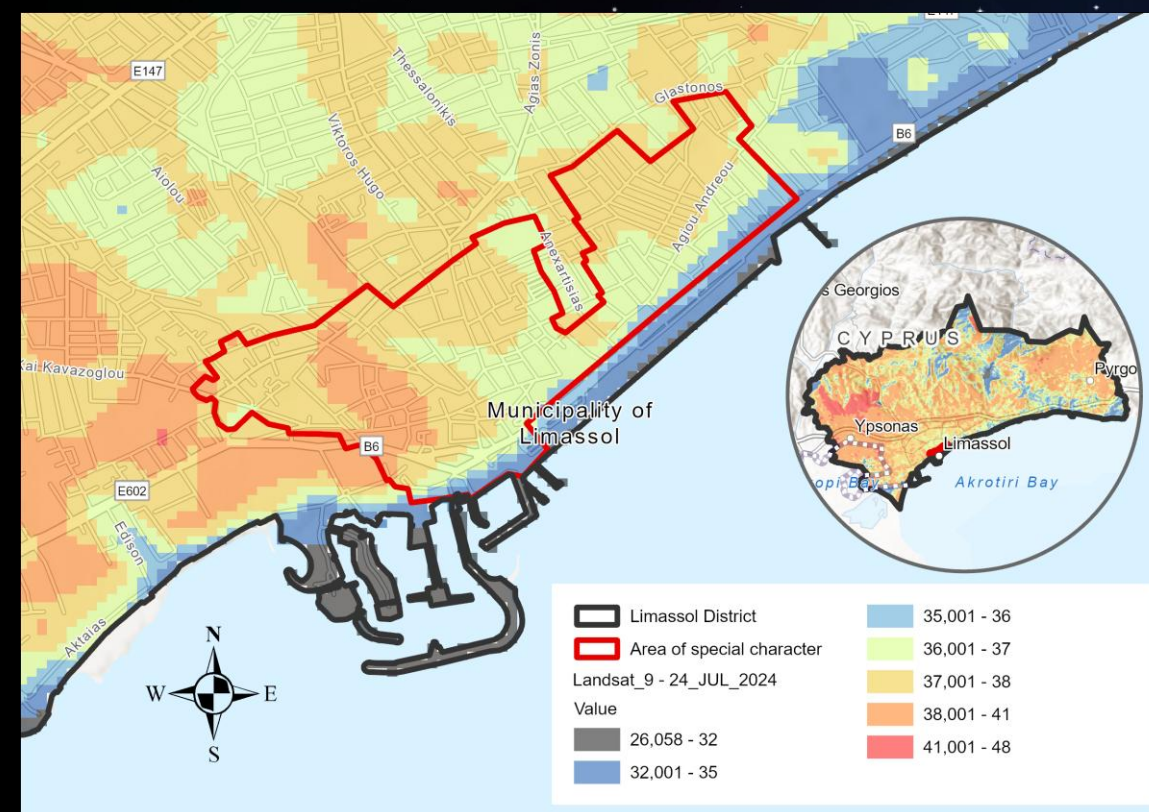
22 JUL 2023 – Landsat-9 imagery



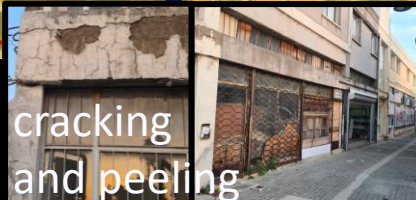
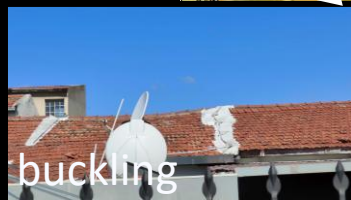
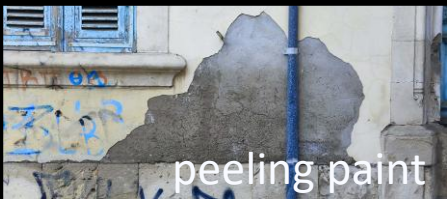
08 JUL 2024 – Landsat-9 imagery



24 JUL 2024 – Landsat-9 imagery



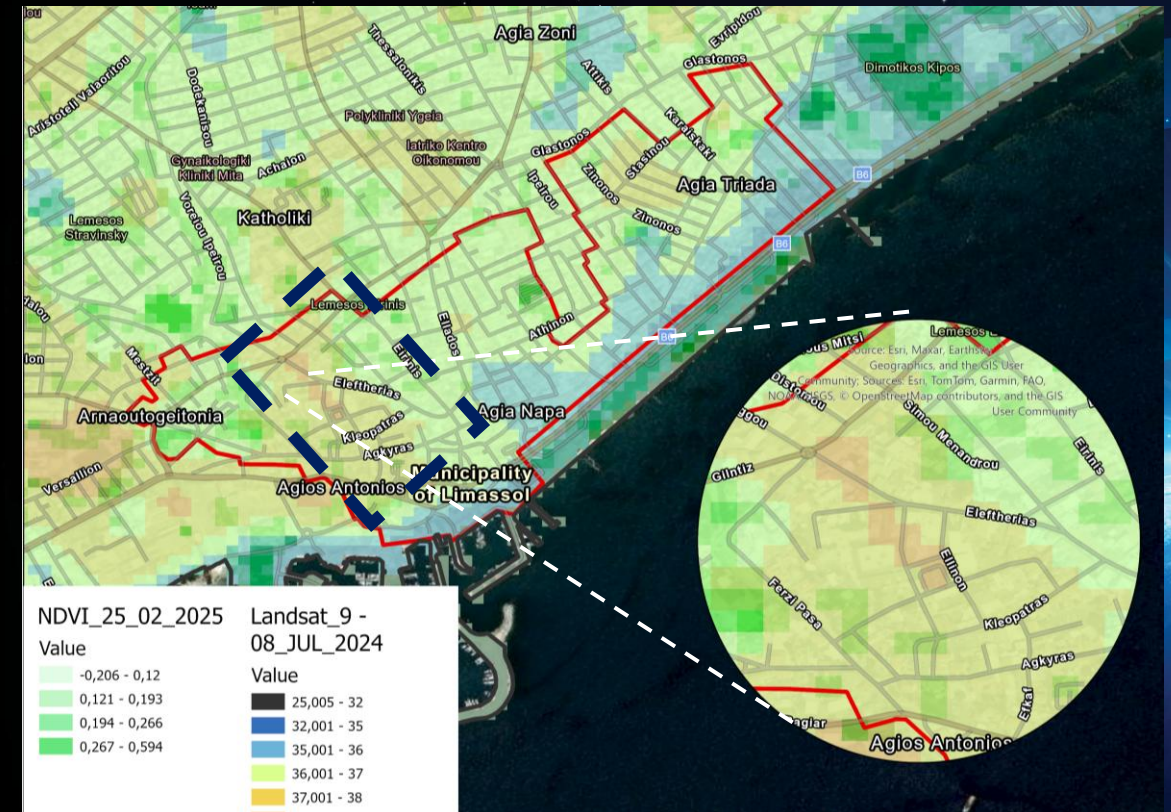




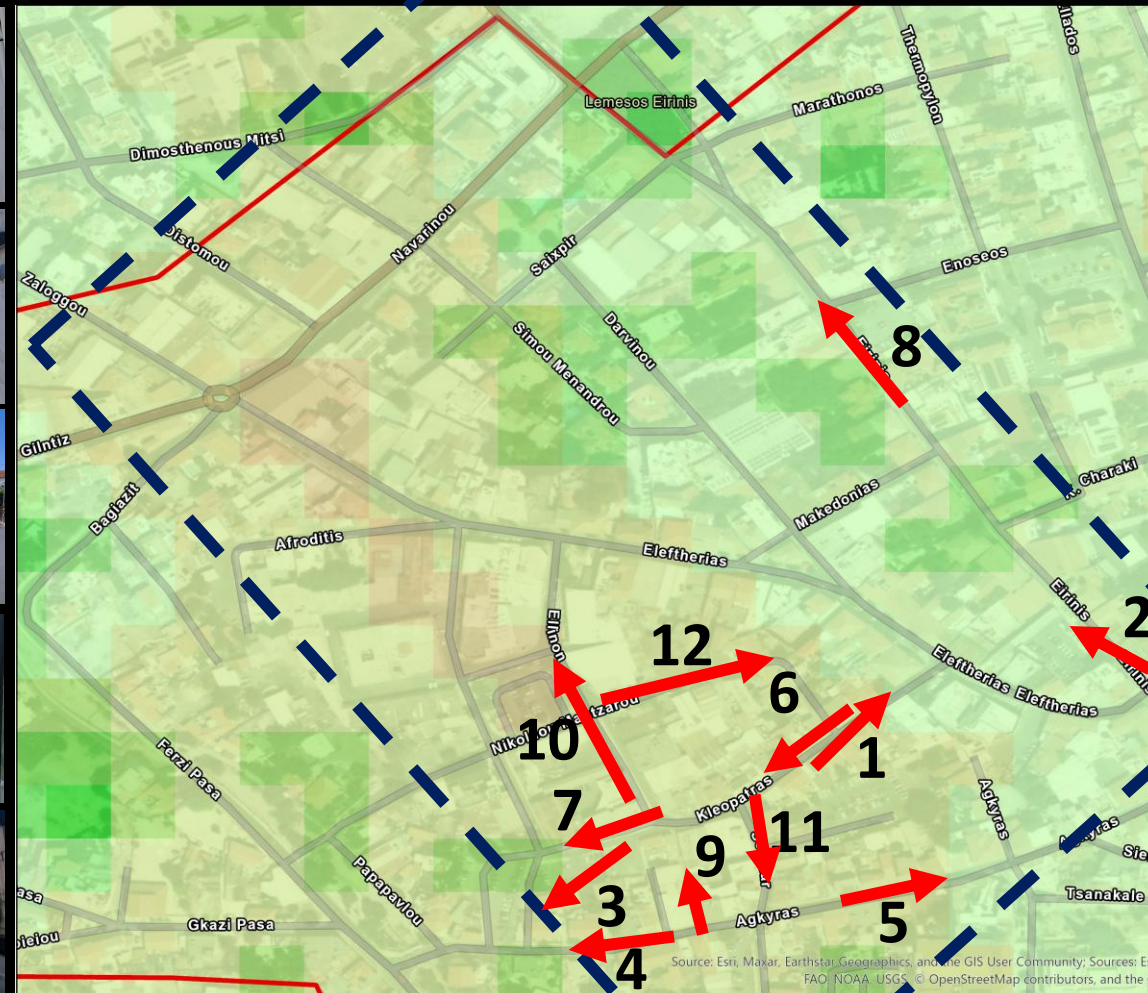
NDVI – Landsat 8



NDVI – Landsat 8 and Landsat-9 Thermal



Current situation: LACK OF GREEN SPACES inside the city



ADVANTAGES OF USING EO & SATELLITE DATA

- Cost-effective: Cheaper than extensive ground monitoring campaigns.
- Preventive tool: Early detection of hotspots → proactive conservation.
- Supports decision-making: Evidence-based planning for heritage preservation.
- Replicable: Can be applied to other Mediterranean cities.

PRACTICAL INSIGHTS



- Build supportive partnerships
- Strengthen basic skills and capacity
- Grow networks and interdisciplinary links
- Demonstrate cost–benefit value
- Combine EO with ground-based surveys
- Integrate EO data into heritage management plans
- Promote open data & tools
- Raise awareness among local communities

Thank you for your attention !

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