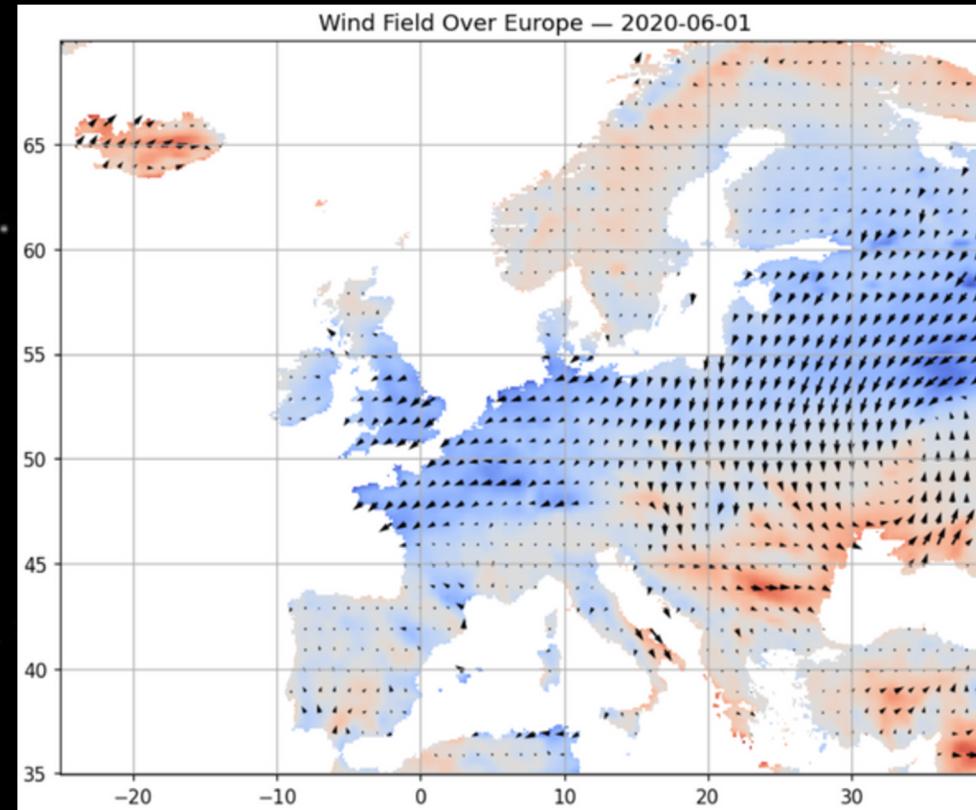


CODELLERA ANDINA

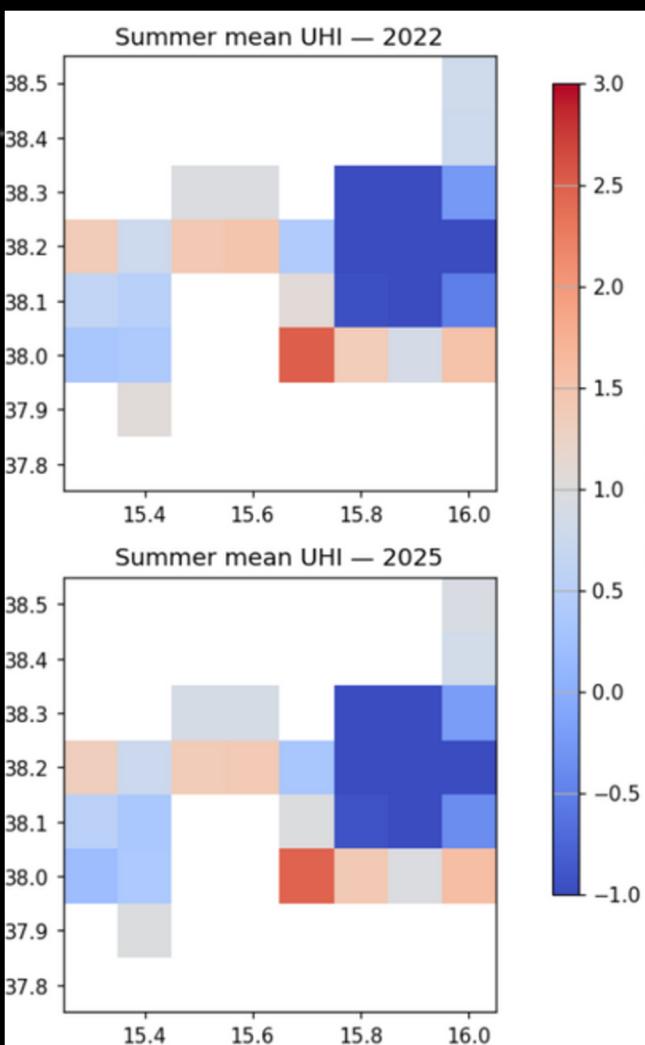


María Fernanda Molina
Nataly Sarmiento Ospina
Isabela Saud-Miño

ERA5

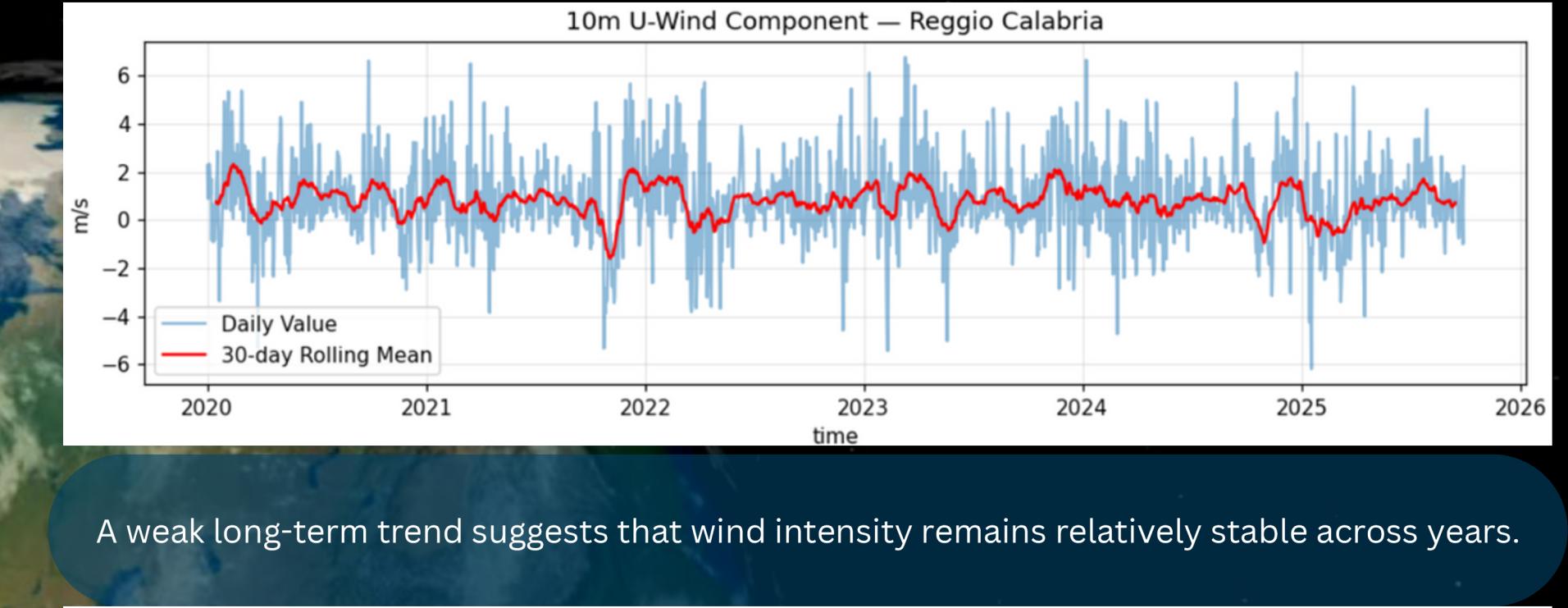


Reggio Calabria lies in an area of weak to moderate easterly circulation during this example date.

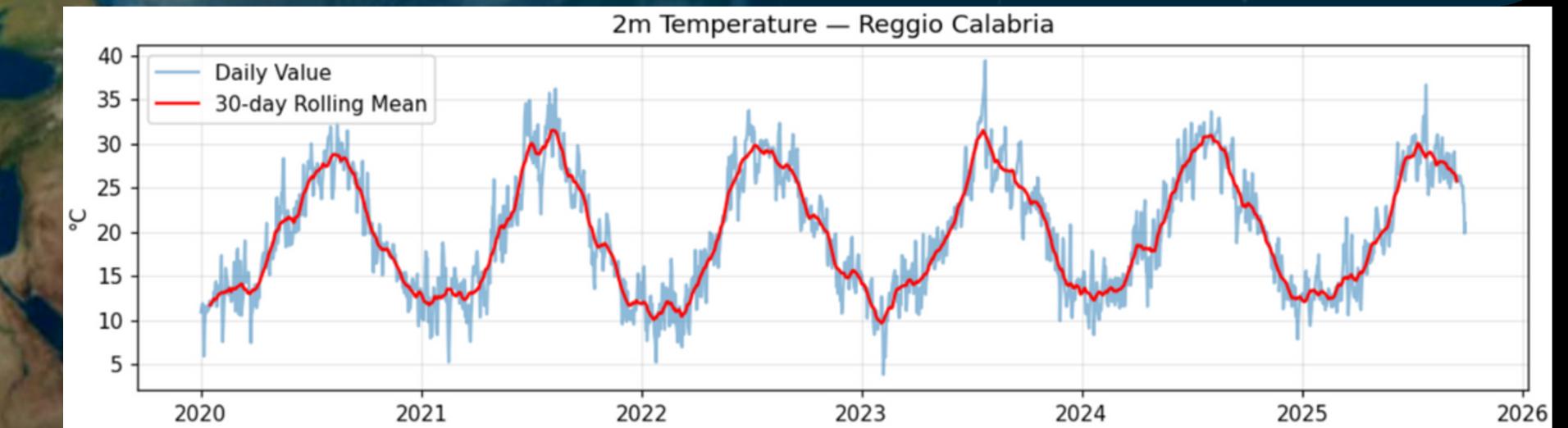


Localized warm core inside the Reggio Calabria urban area (warm red cells). Surrounding rural/coastal areas remain cooler (blue cells).

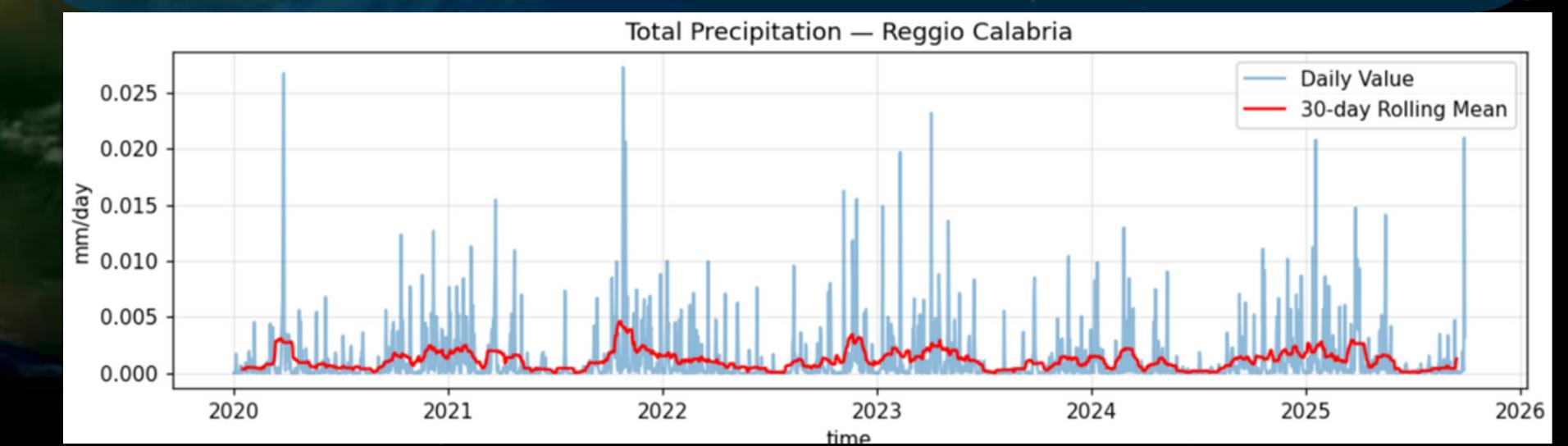
The magnitude of mean UHI is ~1 to 3°C, which is typical for a medium-sized Mediterranean coastal city.



A weak long-term trend suggests that wind intensity remains relatively stable across years.



This seasonal dryness likely amplifies UHI effects during summer due to reduced soil moisture and vegetation cooling.



SENTINEL

Original Characteristics of the Datasets

Dataset	Resolution	CRS	Notes
Sentinel-2	10–20 m	EPSG:3035	ETRS-LAEA projection
Sentinel-3	300 m	EPSG:4326	Lat/Lon
ERA5-Land	0.1°	EPSG:4326	Global grid



Original Values

- Sentinel-2 NDVI comes already scaled (-1 to +1).
- Sentinel-3 NDVI was encoded as uint8 [0–255].

Problem

If not corrected, Sentinel-3 appears as NDVI=1 everywhere.

Fix

Correct scaling formula:

$$NDVI = \frac{\text{uint8}}{255} \times 2 - 1$$

Issues:

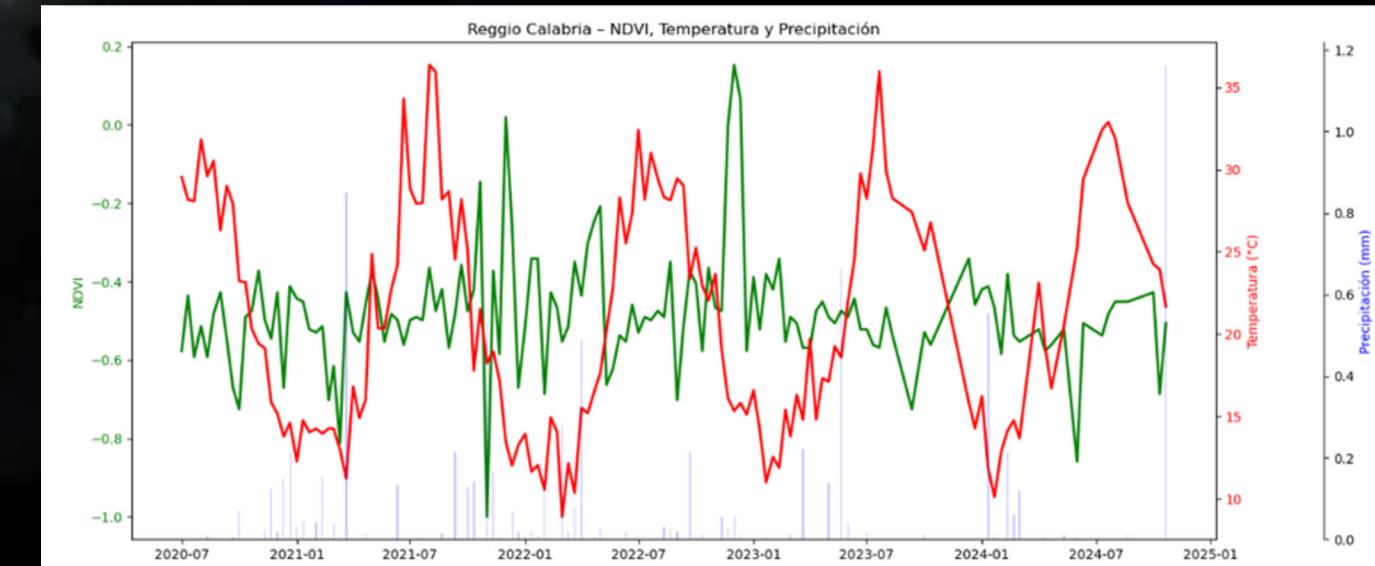
- Datasets were not in the same projection.
- Reprojecting full Sentinel-3 imagery produces MemoryError (>3 GB).
- Spatial windows from Sentinel-2 and Sentinel-3 did not match.

Initial Problem

Reprojecting the full Sentinel-3 raster to EPSG:3035 required gigabytes of RAM → failure.

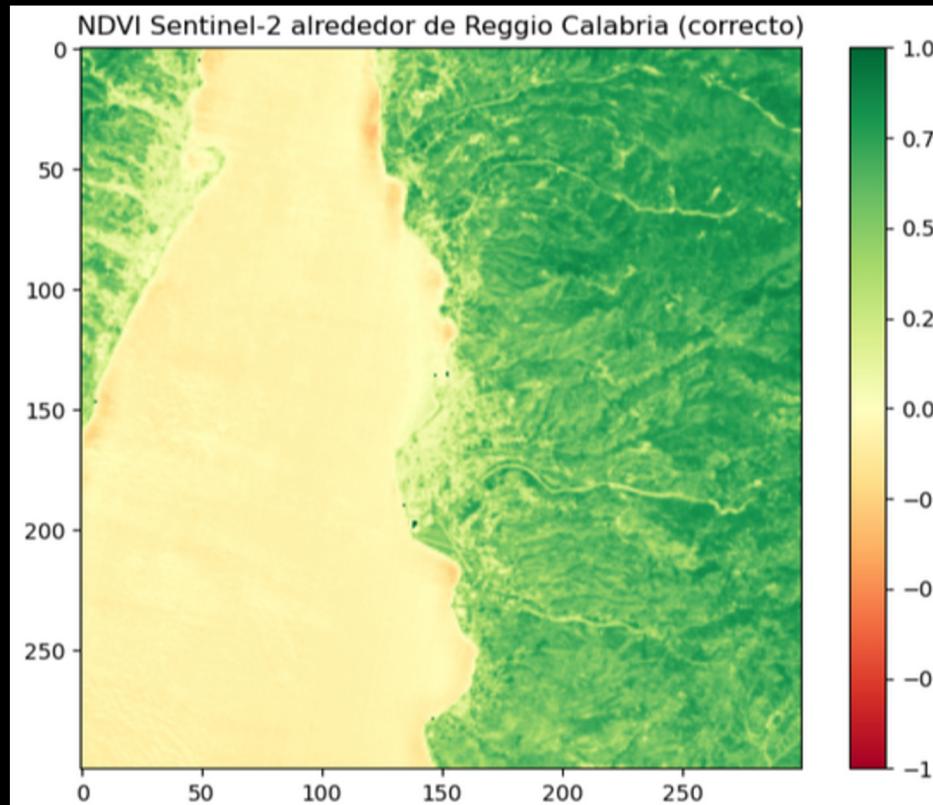
Optimal Solution

Work directly in the original CRS of each dataset and extract a local window only.



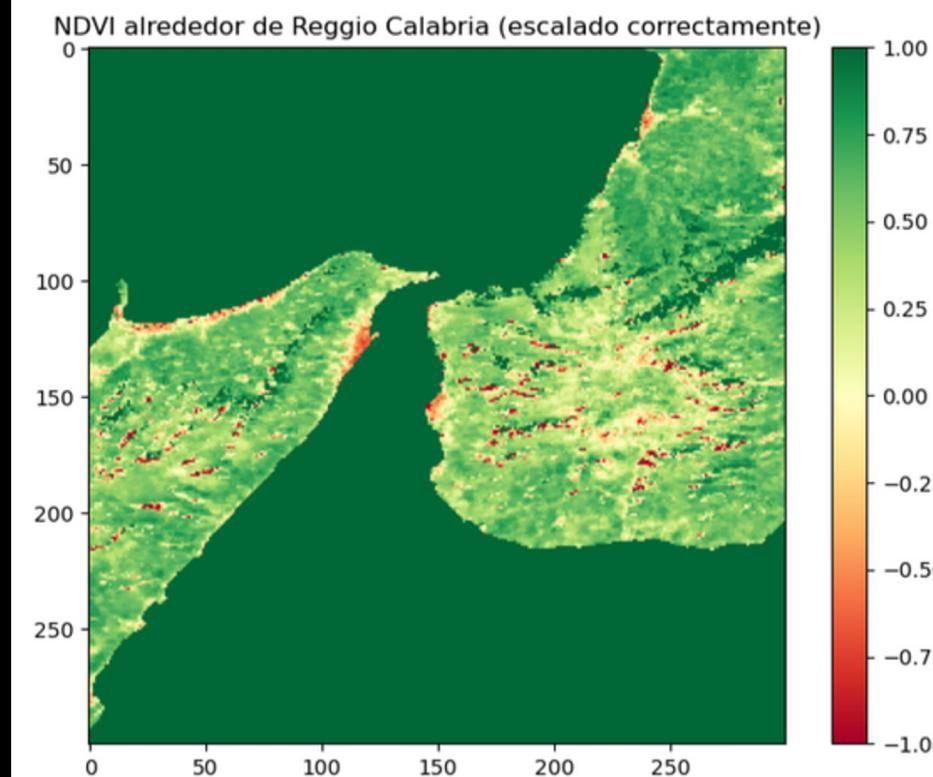
● Sentinel 2

- Very high spatial detail
- Croplands, roads, vegetation patches clearly visible
- Excellent for local land-use and agricultural monitoring



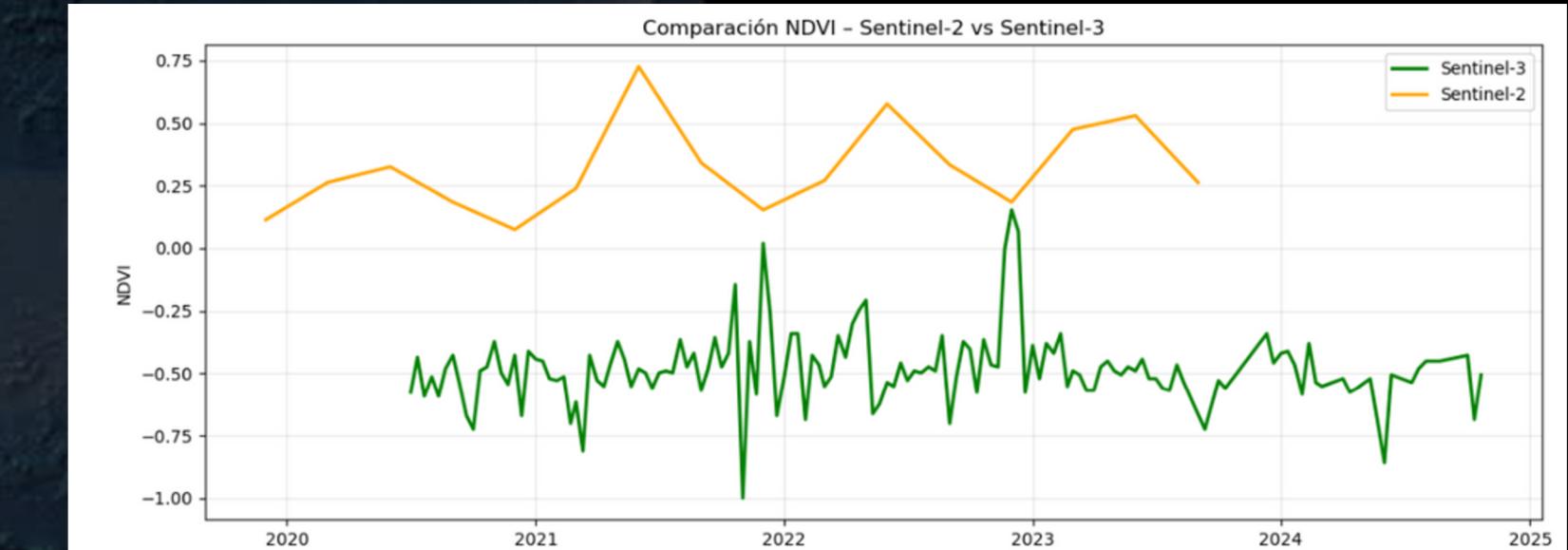
● ● Sentinel 3

- Low resolution but highly stable over time
- Captures broad vegetation trends
- Useful for continuous regional monitoring



● ● S2 vs S3

- Sentinel-2 → local detail
- Sentinel-3 → regional structure
- After correct coordinate matching, both instruments align spatially



WEATHER STATIONS



What information do we use here?

From ECAD we use daily maximum temperature (TX) for many stations across Europe.

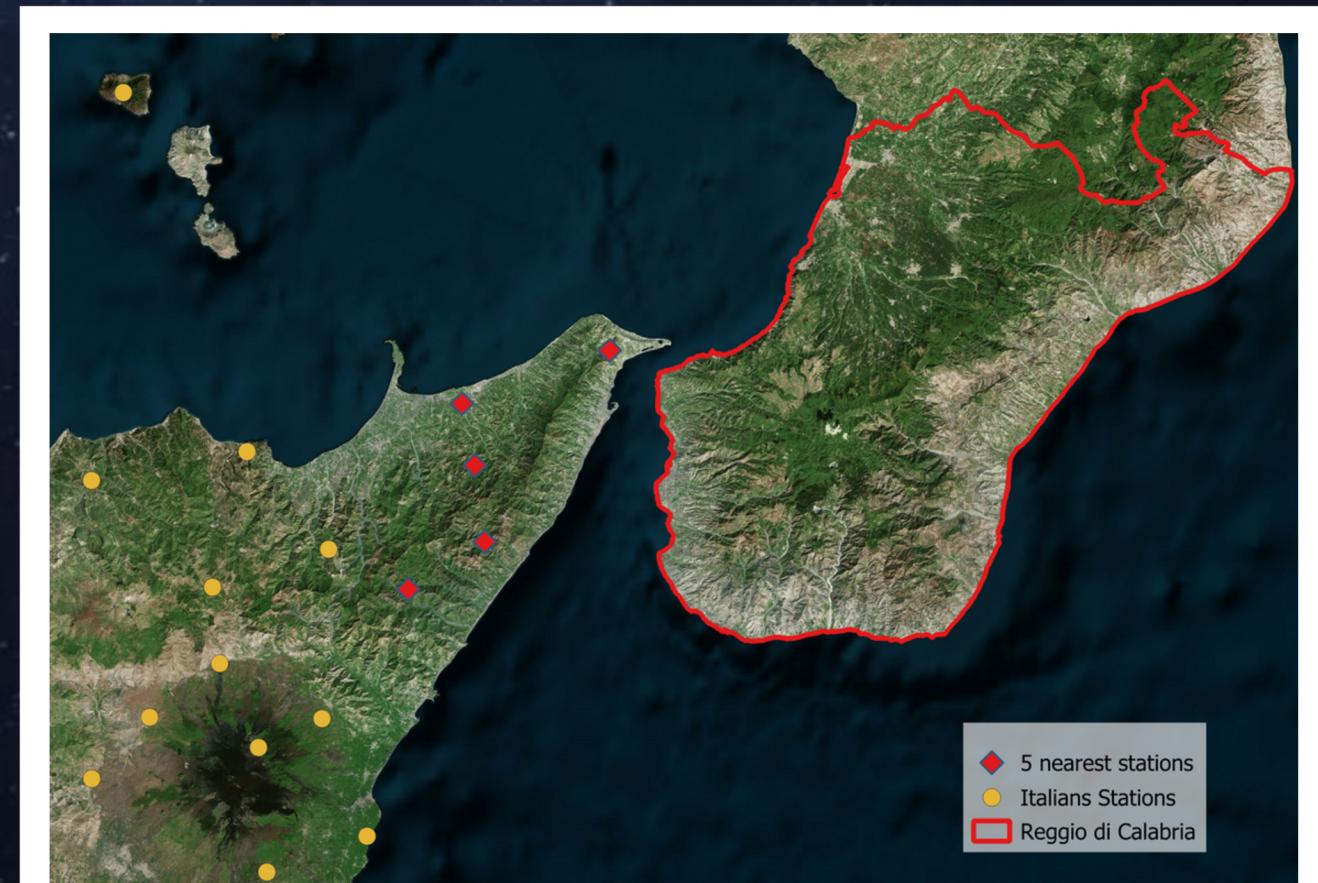
Why is this information important

They act as ground truth to evaluate how well ERA5 and downscaled temperature maps capture real heat, especially urban heat extremes.

INSIGHTS:

- **No station in Reggio:** Our AOI for Reggio di Calabria has no ECAD weather station inside it.
- **Closest stations in Sicily:** The 5 nearest stations are on the Sicilian side of the Strait of Messina (e.g. Messina, San Pier Niceto, Torregrotta), a few tens of km away.
- **Using them as proxies:** We use these nearby Sicilian stations as proxies for Reggio's temperature.
- **Uncertainty:** This adds representativeness uncertainty (different coastline, topography, urban form), especially for heat extremes.
- **Next step:** Compare ERA5 / downscaled temps over Reggio with ERA5 + TX at these stations to check biases and consistency.

Script with EDA



Reggio di Calabria is a good example of a city that needs reanalysis and satellite data, because there are no weather stations in the city and only a few nearby in Sicily.



**THANK
YOU FOR
LISTENING!**