

# From satellite data to smart solutions for cities: Experience with Citythons



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# About us

# Who we are



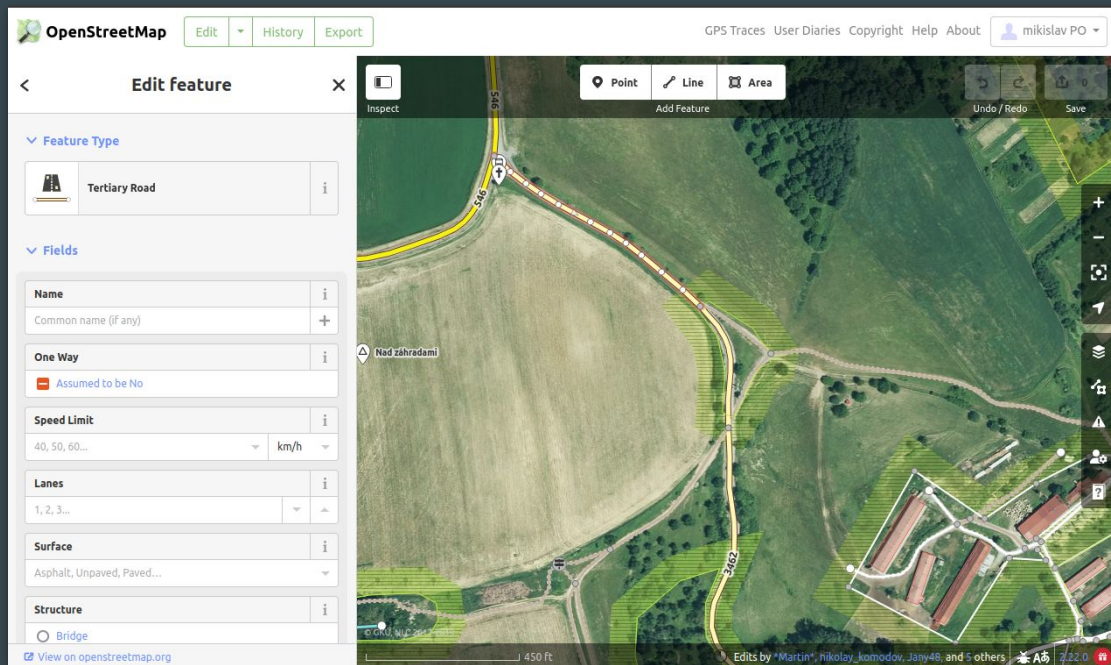
# Why do we map?

- "Christopher Columbus did not actually discover America. When he arrived, the indigenous population already lived in it. But he was the first to put America on the map." (M. Suchý 2021)
- "We work together to provide map data which revolutionises disaster management, reduces risks, and contributes to achievement of the Sustainable Development Goals." (HOTSM.org 2021)



# Satellite imagery in OpenStreetMap (OSM)

- "OSM is a map of the world, built by a community of mappers who contribute and maintain data about roads, trails, cafes, train stations and much more around the world, under an open license."
- since 2004
- 8.3 million registered users (2022-01-10)
- 7.4 billion nodes (2022-01-10)



# **Green Parking Smart Surrounding project**

# Understanding the problem

## DROUGHT

Increasing temperature causes higher evaporation and thus the drying of vegetation and the feeling of heat in the cities

## MOBILITY/PARKING

People in Slovakia cities are still more inclined to use cars rather than public transport

## LACK OF VEGETATION

Due to high temperature in parking lots the cars are overheated

# Use of Earth Observation technologies

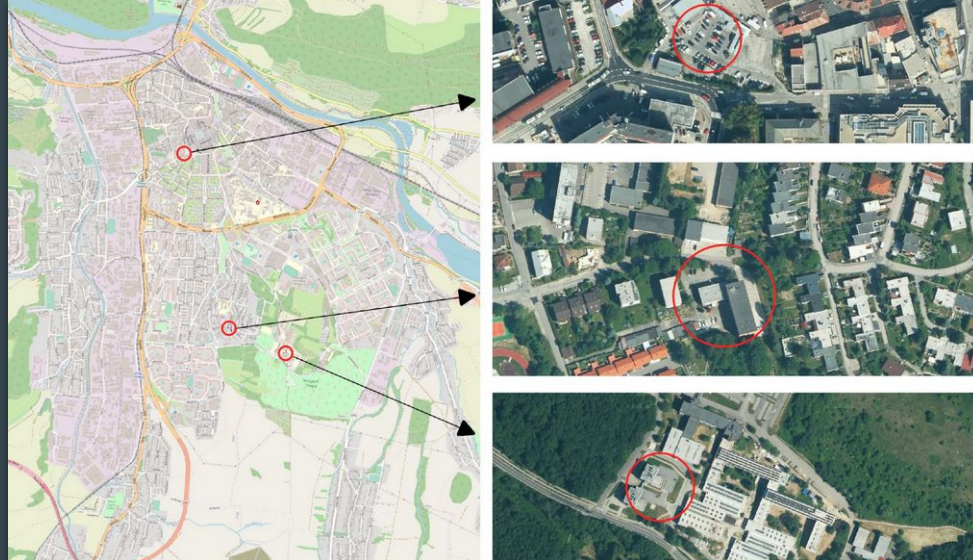
- Identification of the temperature
- Sentinels 3 EU
- LANDSAT 8
- An alternative is to use Smart IoT, what was the case of the city of Žilina



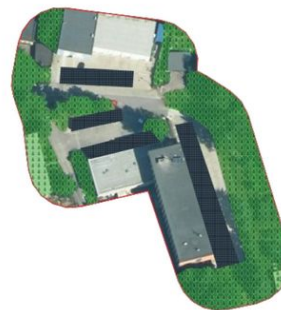
# Specific use case

- 3 bigger parking lots as pilots
- Conducted mapping spatial analysis

*“eliminate the impact of UV radiation by analyzing/computing possible dry areas and combining natural shadowing with smart technologies such as solar and photovoltaic panels with green elements in a sustainable manner.”*



AUPARK



METEOROLOGICAL STATION SOLINKY



UNIZA

# Specific use case

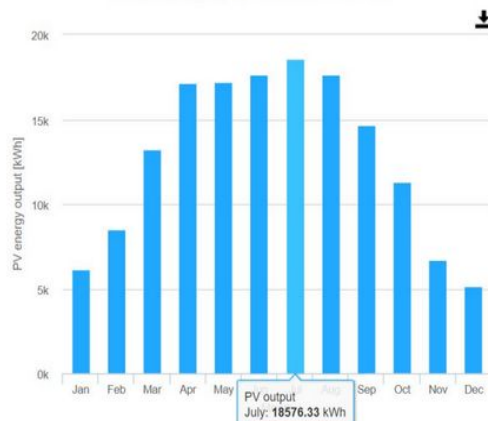
- Counting areas calculations
  - Insloations
  - Annual averages
  - Horizon locations

- Costs estimates
- Financial return

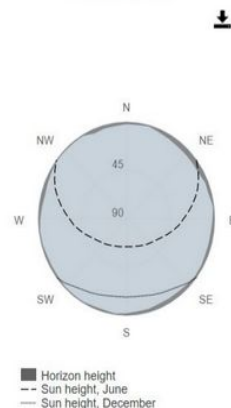
Summary

Provided inputs:	
Location [Lat/Lon]:	49.221,18.737
Horizon:	Calculated
Database used:	PVGIS-SARAH2
PV technology:	Crystalline silicon
PV installed [kWp]:	150
System loss [%]:	14
Simulation outputs:	
Slope angle [°]:	38 (opt)
Azimuth angle [°]:	-2 (opt)
Yearly PV energy production [kWh]:	153990.87
Yearly in-plane irradiation [kWh/m²]:	1328.2
Year-to-year variability [kWh]:	8484.05
Changes in output due to:	
Angle of incidence [%]:	-2.93
Spectral effects [%]:	1.73
Temperature and low irradiance [%]:	-8.98
Total loss [%]:	-22.71

Monthly energy output from fix-angle PV system



Outline of horizon



area	panels area (m2)	price	installed power (kW)	energy generated per year (kWh)	return on investment at 50% utilization	profit after 10 years
Aupark	710	140 000,00 €	150	154 000	8 years	77 000,00 €
UNIZA	284	56 000,00 €	60	61 600	7,3 years	26 000,00 €
*price for kW = 0,25€						

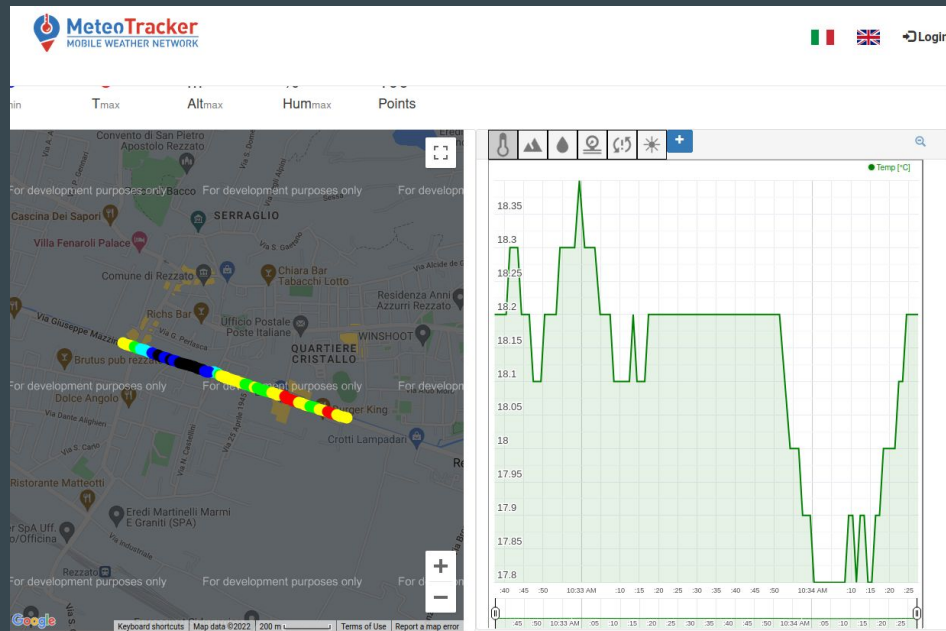
# Citizens science as feature of Smart city mapping

Involving the citizens to take a part in crowd-mapping, or simply just collecting the data could bring:

- higher engagement in public affairs
- spatial touch with their local neighbourhood

Several challenges must be addressed:

- rise awareness on OSM across society,
- address volunteers' motivations,
- build up their spatial literacy skills.



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## Resources:

- <https://www.youthmappers.org/>
- <https://www.facebook.com/unipo.mappers/>
- <https://www.hotosm.org/>
- <https://www.openstreetmap.org/>
- <https://www.missingmaps.org/>
- <https://whatworksgrowth.org/resources/using-data-for-local-economic-policy/>
- <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>
- [https://www.researchgate.net/publication/327779351\\_Citizen\\_Science\\_and\\_Open\\_Street\\_Map\\_-\\_Potential\\_and\\_challenges/figures](https://www.researchgate.net/publication/327779351_Citizen_Science_and_Open_Street_Map_-_Potential_and_challenges/figures)



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