ONEKANA

Modelling thermal inequalities in African urban areas through EO and AI for enhanced climate resilience

Problem: The Data Gap

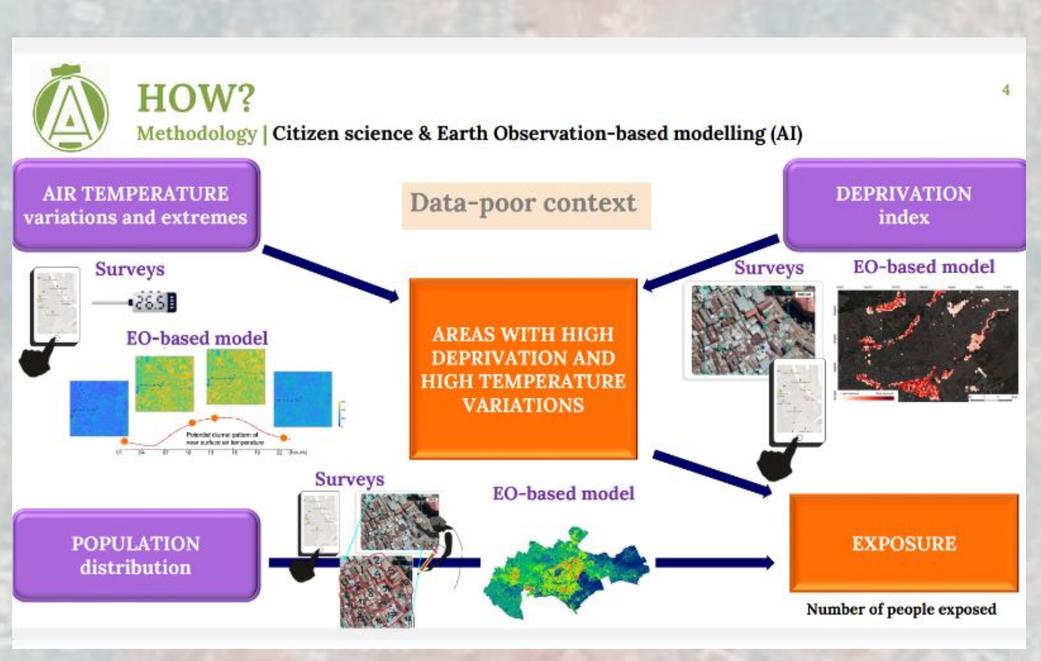
The ONEKANA project addresses the urgent issue of thermal inequalities in African urban areas, intensified by climate change and urbanization. Through innovative use of Earth Observation (EO) technology, ONEKANA examines disparities in heat exposure and develops strategies to mitigate their impact. The project also explores the potential for applying these solutions in other global regions facing similar challenges.

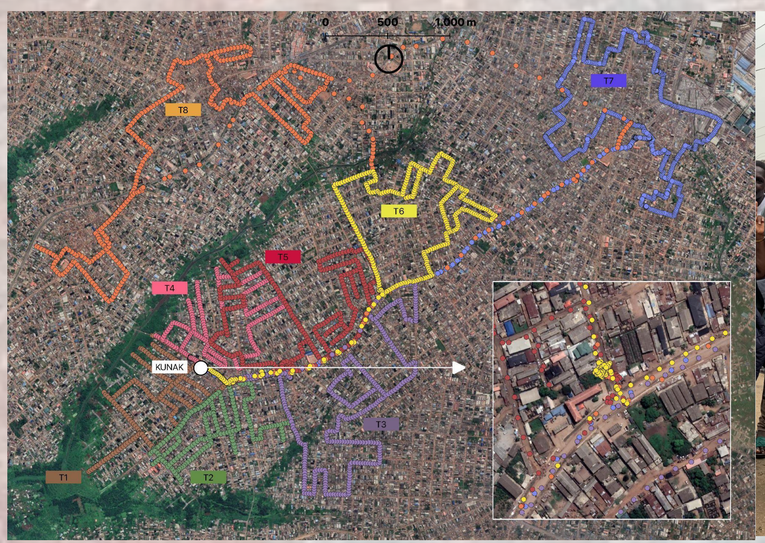
Methodology

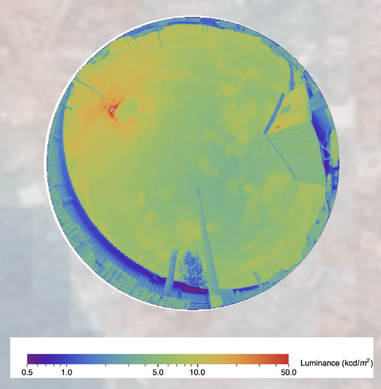
ONEKANA employs advanced EO/AI models, to analyze thermal exposure in urban Africa. The project leverages open satellite imagery sources such as Sentinel and Ecostress along with in-situ citizen science based measurements to ensure adaptability and scalability across diverse urban contexts. The methodology involves:

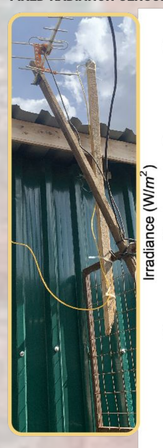
- **Mapping Slum Areas**: integrating open-source EO imagery with unsupervised learning techniques, producing refined and up-to-date maps of urban deprivation.
- **Population Distribution Modelling**: Collecting accurate in-situ population data in Nairobi to challenge and revise existing population estimates, enhancing the accuracy of urban population maps.
- **Thermal Mapping and Exposure Assessments**: Combining EO and citizen science to develop knowledge of near surface air temperature patterns. Combining population data with thermal exposure assessments to identify and locate populations at the greatest risk due to thermal disparities.

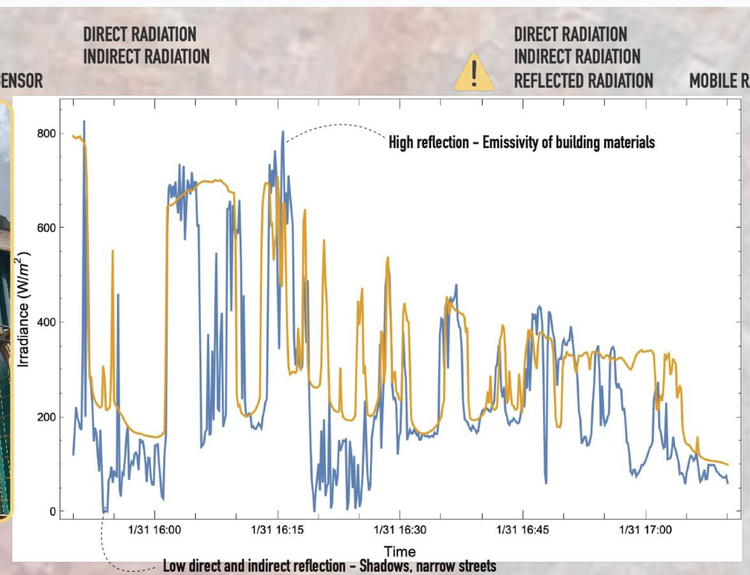
Nairobi Fieldwork





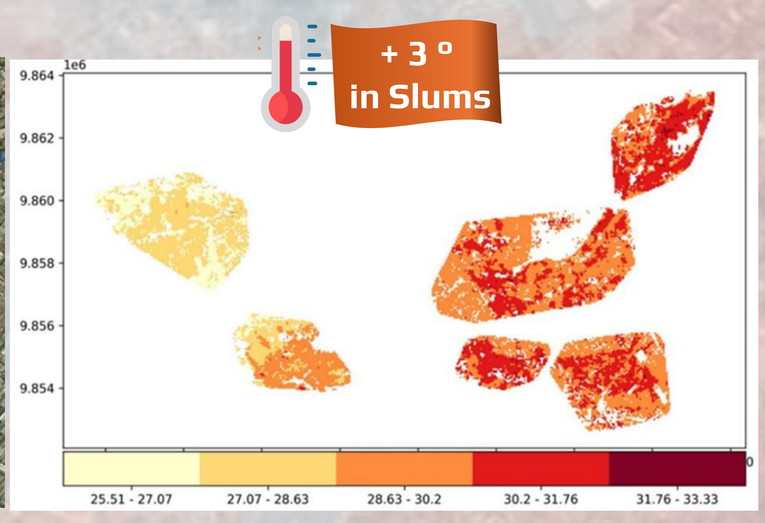






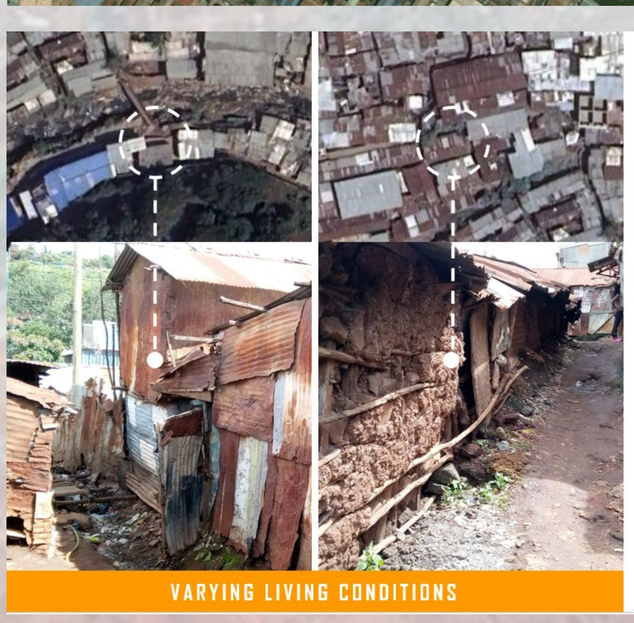
Results

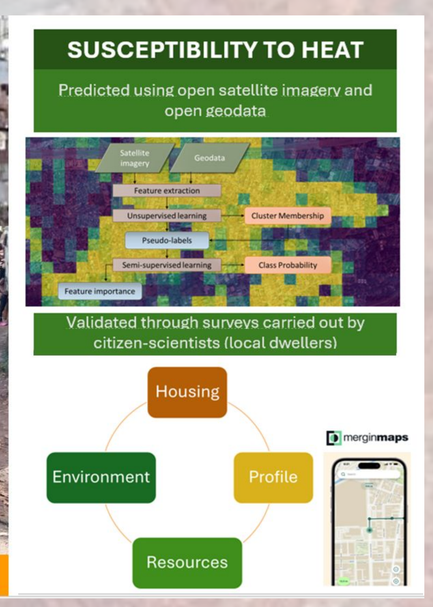
Local variations in thermal exposure reveal distinct spatial patterns of heat vulnerability. By utilizing morphometric and texture indicators, we can effectively identify areas of deprivation. The integration of precise population data with thermal exposure assessments enhances our ability to pinpoint populations most at risk from extreme heat.

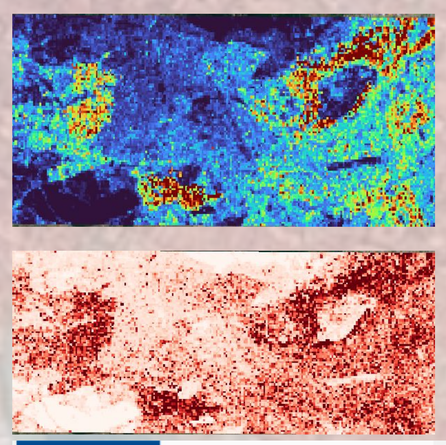


Conclusions

ONEKANA deepens the scientific understanding of urban thermal inequalities while providing a replicable framework for diverse urban environments in the Global South. By incorporating EO-derived insights into urban planning and climate adaptation strategies, the project aims to enhance urban resilience against climate-driven thermal extremes. The scientific rigour and user-centred methodologies of ONEKANA lay the groundwork for transformative urban planning that prioritizes the well-being of the most vulnerable urban populations.







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