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Brief communication

Urban Environment and Sustainability: A Key Challenge for Earth Observation

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1. Brief communication

Earth observation systems offer a repetitive, synoptic and therefore privileged view of the territory. The advantages that a platform to a certain height can offer us have been exploited from aerial platforms, for more than a century. Relatively recent is the operational use of satellite systems, Nowadays, the range of spectral, space and temporal resolutions provided by Earth observation platforms represent an equation of use and applicability that runs from optical, thermal or active systems, such as lidar systems or radar, and allow us to better approximate the knowledge of the territory, the management of its resources, the impacts, the affections and changes that they produce.

The indicators of urban ecosystem sustainability are tools that must be able to allow urban managers and decision makers, the measure of the socioeconomic and environmental impacts as well as the diagnosis of problems and potential actions to undertake. The observation of the Earth, from its capture of data to the transformation in geoinformation, represents a spatial and temporal approximation of measurement of these indicators. The perspective of providing indicators and knowledge in the search for a better design and sustainable management of urban ecosystems has become paramount at the an scenario of climate Change and growing urban population.

For the management of urban and peri-urban ecosystems, it is essential to have specific information related to anthropic and environmental variables. In this sense, it works with data from the hyperspectral and photogrammetric, in the analysis and evaluation of light pollution, understood as the determination of the light that is not adequately used (luminance maps) and the nature of the background of lighting These works affect a better knowledge and use of resources and the consequent reduction of energy consumption and equivalent CO2 footprint.

Within the framework of the operation of the thermal, work is being carried out on the analysis of the thermal behavior of urban ecosystems and, in particular, on the determination of the potential phenomenon known as the Island of Heat (UHI). The processing of the data offers the delimitation of the spatial distribution of thermal behavior and therefore the most exposed areas to possible hot island events in situations of heat waves (tropical nights). This thematic information can be analyzed later, in conjunction with city models on their morphology or covers, in particular, the vegetated covers and their impact.

Additionally, the study of the variability between two thermal hyper spectral flights gives us data on heat loss in roofs, which can be transformed into information and knowledge in terms of thermal efficiency.

The importance of the covered vegetation, in the mechanisms of evapotranspiration or permeability, before the impacts of heat waves or floods, in a climate change scenario, are of vital importance, both in the spatial and temporal determination of its location and vegetative state.

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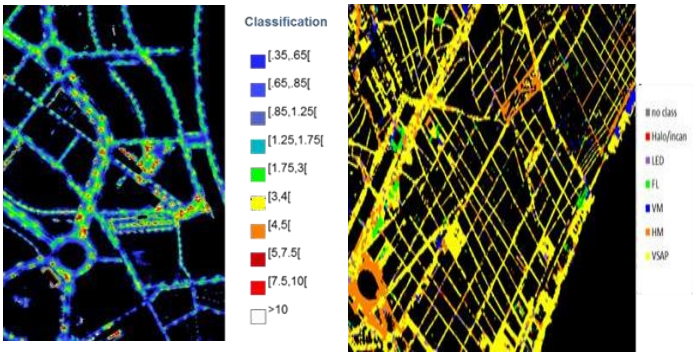
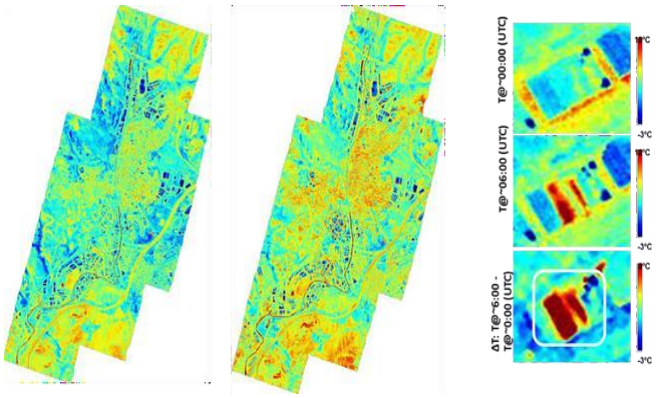
To determinate urban morphology by using active and passive sensing is also paramount. These data are a basic information on all urban climate modeling, the risks associated with a scenario of climate change and a tool to support decision making in new actions, in order to improve the health and quality of life of citizens.

Last but not least, dealing with criterions of sustainability and resilience of urban and peri-urban environments, the search for clean energy and energy sustainability models, go through a good knowledge of the capacities of domestic and industrial covers for photovoltaic generation. Flights with lidar sensors provide us with a top priority when it comes to the geometry and servitudes of the roofs, which, integrated with solar radiation models and topography of the urban ecosystem, allow us to determine its potential.

To transform Earth Observation data into friendly and useful tools for decision makers is a key challenge at the urban environment. Earth Observation new competences and professionals are paving the way to generate new added value for current and next generations.



Luminance emissionsmap in cd / m2 and nature of light by ICGC



Thermal differences and detection losses of heat in industrial buildings by ICGC.

Web tool for consulting the photovoltaic potential of the roofs by ICGC.