EGU 2015 – BEYOND – Urban Thermal Environment

TITLE

EO-based System for monitoring the Urban Thermal Environment

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ABSTRACT

In recent years the urban thermal environment has adversely changed due to the processes of urbanization and industrialization. One of the most profound effects induced is the urban heat island (UHI) phenomenon, which refers to the increased temperature of the urban areas with respect to their suburban/rural surroundings. UHI has received significant attention in recent years, since it affects more than 50% of the world's population and increases the duration and magnitude of heat waves. However, many research efforts have been limited or hampered by the lack of the appropriate high spatiotemporal urban temperature data. In the framework of BEYOND project, the Institute of Astronomy, Astrophysics, Space Applications, and Remote Sensing of the National Observatory of Athens has developed a EO-based service that spatially enhances Land Surface Temperature (LST) data retrieved from the geostationary MSG-SEVIRI EUMETCast station in real-time . The system utilizes a large number of datasets, such as the Digital Terrain Model, CORINE land cover, MODIS vegetation indices and emissivity maps among others. The system has been designed specifically to facilitate urban climate studies, by producing LST datasets that combine high spatial and temporal resolution.

This activity is developed towards attaining the objective to derive urban biophysical parameters for characterizing urban land surface-atmosphere, as defined by the Group on Earth Observations, Task SB-04 Initiative. The system offers four significant advantages: 1) it exploits the high temporal resolution of SEVIRI imagery, 2) it enhances the spatial resolution of the retrieved LST data down to 1 km (the overall goal is 100 m), 3) it covers a large number of cities around the world, and 4) the derived LST data are available in real time and online. Currently, no Earth Observation system provides data with adequate spatial and temporal resolution for studying and monitoring the surface UHI phenomenon. The wealth of information revealed can be useful to a range of applications, most notably heat-wave risk assessment. Furthermore, the optimized exploitation of the data could be tailored for different purposes, with several different end-users such as urban climate modelers, health responders and energy demand suppliers.

FIGURES

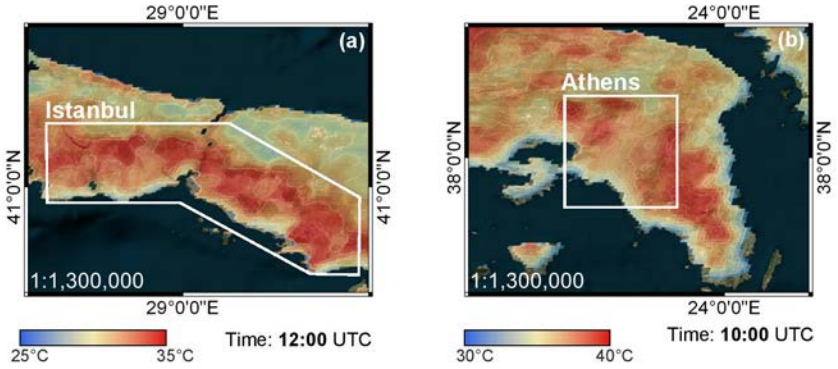

Figure Caption: The SUHI spatial patterns as observed by NOA/IAASARS system for Athens, Greece, and Istanbul, Turkey.

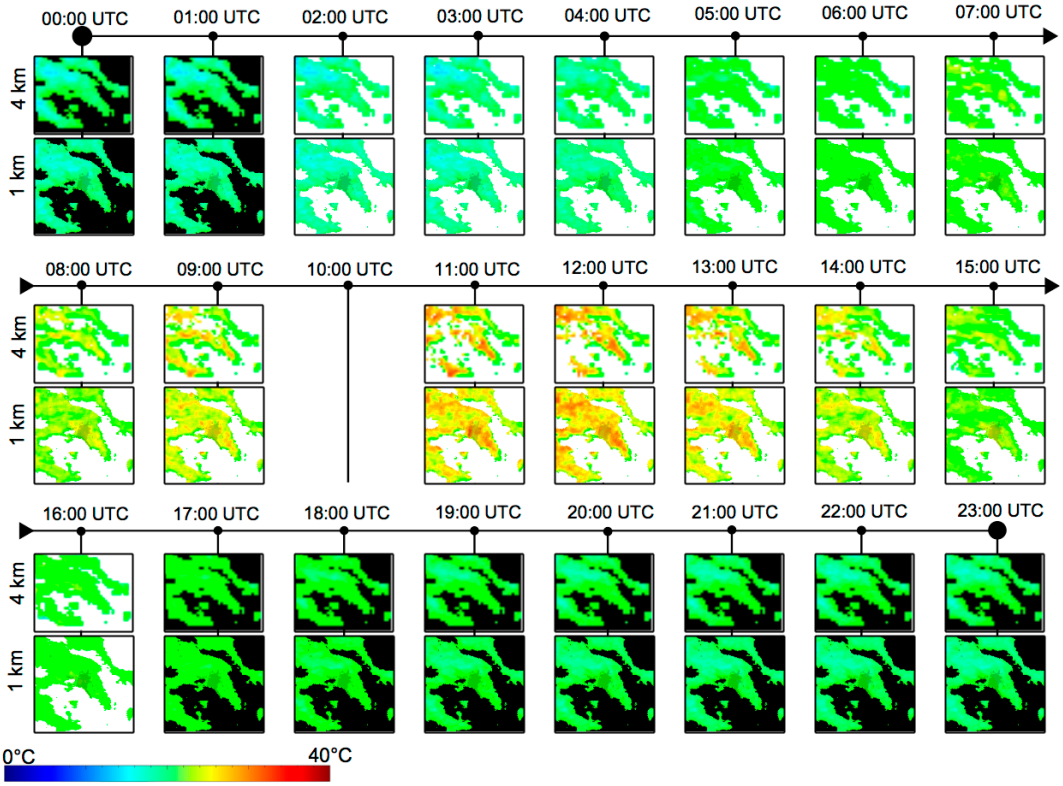

Figure Caption: An example of the hourly LST evolution for the city of Athens on as resulted from the NOA/IAASARS system. The LST data are presented at a spatial resolution of ~4 km, which corresponds to the MSG-SEVIRI raw geometry, and at a spatial resolution of 1 km as derived after the application of the system's downscaling algorithm. The local coordinated universal time (UTC) is UTC+2.