Skin Temperature From IASI: Extreme Events And Urban Heat Islands Monitoring

Sarah Safieddine, Maya George, Lieven Clarisse, Simon Whitburn, Cathy Clerbaux

HAL Id: insu-03693267
https://insu.hal.science/insu-03693267

Submitted on 10 Jun 2022

Skin Temperature From IASI: Extreme Events And Urban Heat Islands Monitoring

Sarah Safieddine [1], Maya George[1], Lieven Clarisse [2], Simon Whitburn [2], and Cathy Clerbaux [1,2]

[1] *LATMOS/IPSL, Sorbonne Université, UVSQ, CNRS, Paris, France*

[2] *Université libre de Bruxelles (ULB), Spectroscopy, Quantum Chemistry and Atmospheric Remote Sensing (SQUARES), Brussels, Belgium*

sarah.safieddine@latmos.ipsl.fr

Abstract: in this work, we investigate the skin temperature product from IASI to look at local changes at the city and regional scales and to assess temperature over a period of 13 years. © 2021 The Author(s)

While long-term temperature time series mostly rely on weather stations, only satellite data are able to provide systematic global temperature data, from pole to pole on a regular basis, over both land and sea. Satellites measure the "skin" temperature derived from upwelling radiation at the Earth's land surface.

The series of IASI instruments was launched on the Metop satellites in 2006, 2012 and 2018, providing since a continuous view of the global atmosphere. The evolution of skin temperature from IASI is not yet fully exploited as its measurement and updated retrieval methods are recent. In this presentation, we first describe our iterative method based on entropy reduction combined with artificial neural networks to derive an independent record of IASI's skin temperature.

We show the extent to which Tskin from thermal infrared sensors, such as IASI, can be used to monitor extreme events in the past decade. This includes pollution episodes, land-use change, heat waves and urban heat islands. We show how expanding cities are hotspots for skin temperature reflecting the usefulness of skin temperature as a tracer for human-induced land use and climate change. We focus on the Arabian Peninsula where extreme heat under climate change is becoming a threat.