

EGU21-6348

<https://doi.org/10.5194/egusphere-egu21-6348>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Effects of Dubai coastline extreme urbanization in land and sea on local near-surface climate variables patterns

Emily Elhacham and Pinhas Alpert

Department of Geophysics, Tel Aviv University, Israel (emilyel1@post.tau.ac.il)

Over a billion people currently live in coastal areas, and coastal urbanization is rapidly growing worldwide. Here, we explore the impact of an extreme and rapid coastal urbanization on near-surface climatic variables, based on MODIS data, Landsat and some in-situ observations. We study Dubai, one of the fastest growing cities in the world over the last two decades. Dubai's urbanization centers along its coastline – in land, massive skyscrapers and infrastructure have been built, while in sea, just nearby, unique artificial islands have been constructed.

Studying the coastline during the years of intense urbanization (2001-2014), we show that the coastline exhibits surface urban heat island characteristics, where the urban center experiences higher temperatures, by as much as 2.0°C and more, compared to the adjacent less urbanized zones. During development, the coastal surface urban heat island has nearly doubled its size, expanding towards the newly developed areas. This newly developed zone also exhibited the largest temperature trend along the coast, exceeding 0.1°C/year on average.

Overall, we found that over land, temperature increases go along with albedo decreases, while in sea, surface temperature decreases and albedo increases were observed particularly over the artificial islands. These trends in land and sea temperatures affect the land-sea temperature gradient which influences the breeze intensity. The above findings, along with the increasing relative humidity shown, directly affect the local population and ecosystem and add additional burden to this area, which is already considered as one of the warmest in the world and a climate change 'hot spot'.

### References:

E. Elhacham and P. Alpert, "Impact of coastline-intensive anthropogenic activities on the atmosphere from moderate resolution imaging spectroradiometer (MODIS) data in Dubai (2001–2014)", *Earth's Future*, 4, 2016. <https://doi.org/10.1002/2015EF000325>

E. Elhacham and P. Alpert, "Temperature patterns along an arid coastline experiencing extreme and rapid urbanization, case study: Dubai", submitted.