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# Ground temperature measurement and emissivity determination to understand the thermal anomaly and its significance on the development of an arid environmental ecosystem in the sand dunes across the Israel–Egypt border

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## Abstract

The Israel–Egypt border region composed of longitudinal sand dunes is a very unique arid environmental ecosystem in the world: the Israeli side with much more vegetation cover has notably higher land surface temperature (LST) during daytime than the Egyptian side where bare sand prevails. In order to understand this thermal anomaly and its scientific significance in the arid environmental ecosystem development, a series of intensive research activities have been conducted in the past several years, including remote sensing analysis and meteorological modeling. In the paper, we present part of the series studies on the issue: the ground temperature measurement and emissivity determination. The region is mainly composed of four basic surface patterns: biogenic crust, bare sand, vegetation and playa (physical crust). Our hypothesis to occurrence of the thermal anomaly is that it is the direct result of the different surface composition structures and ground emissivities on both sides. Results from our ground temperature measurements during 1997–1998 validate the hypothesis of a significant LST difference existing among the main surface patterns of the region. Biogenic crust covering 72% on the Israeli side and only about 12% on the Egyptian side has an

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