Asymmetry in surface temperature between the east and west sides of the Dead Sea under uniform solar radiation

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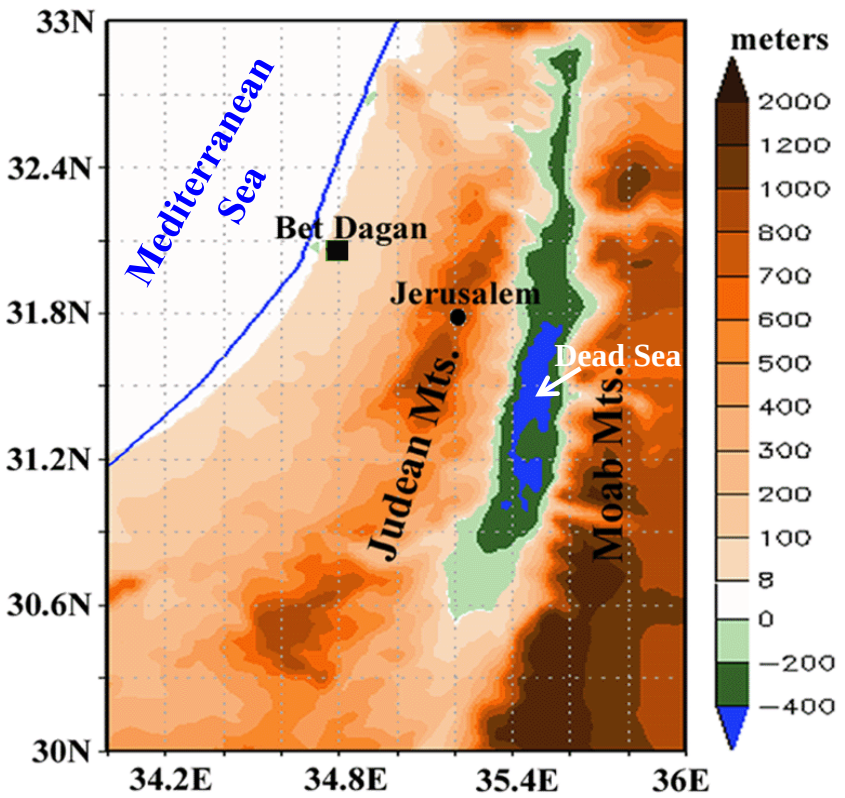
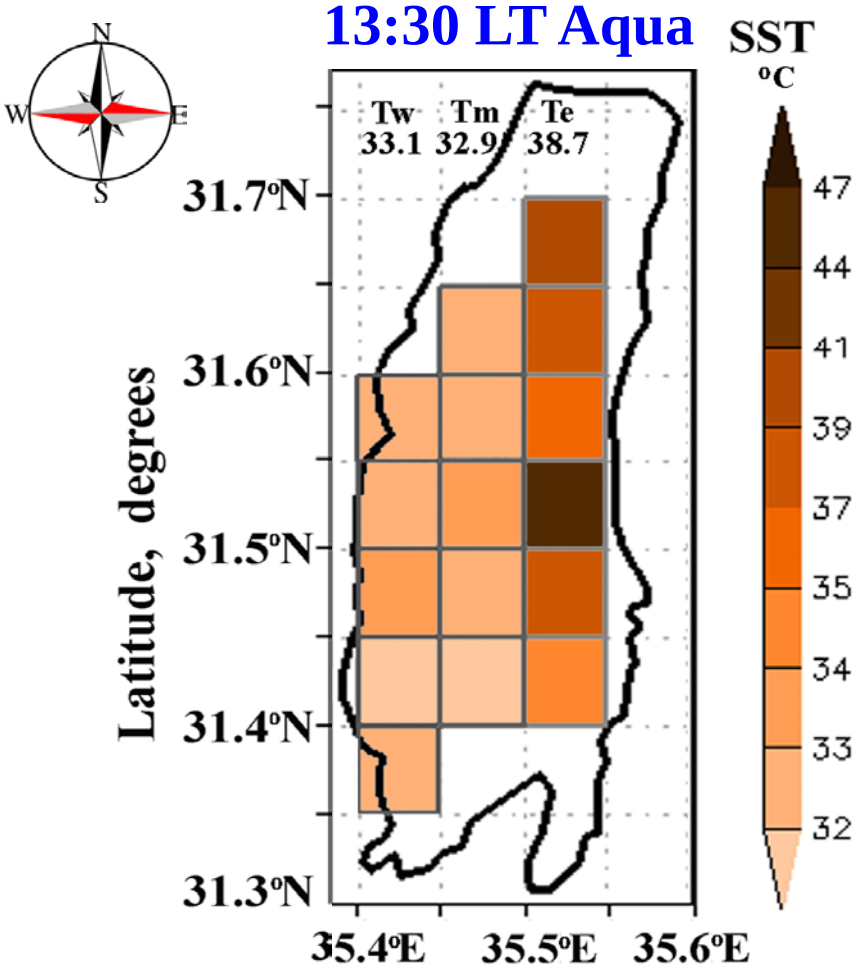


15-year mean spatial distribution of daytime SST based on MODIS-Aqua data (2002 – 2016), averaged over the summer months.

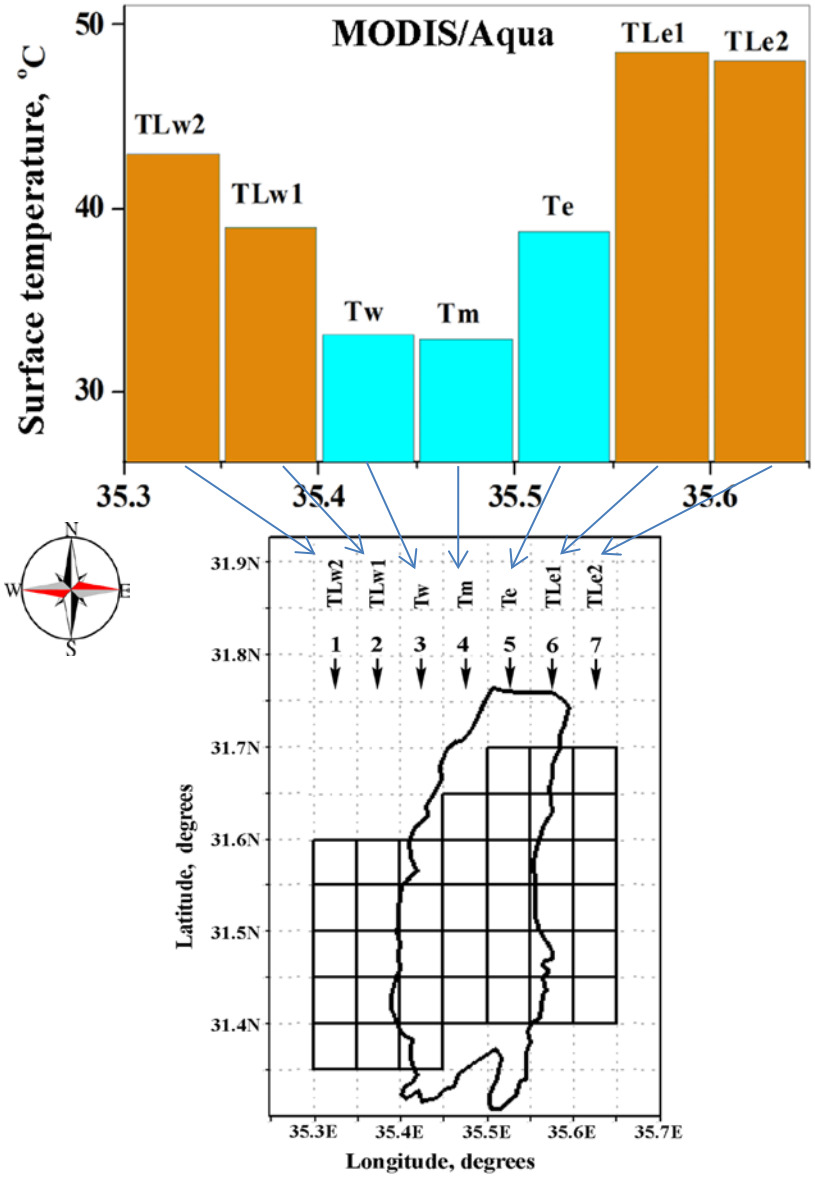


MODIS showed a pronounced asymmetry in daytime SST between the east and west sides of the Dead Sea.

SST over the east side (Te) exceeded by ~5 °C SST that over the west side (Tw).

This asymmetry was observed in the summer months, under uniform solar radiation.

Ref.: Kishcha et al. *Remote Sensing*, 2020, https://doi.org/10.3390/rs12010107



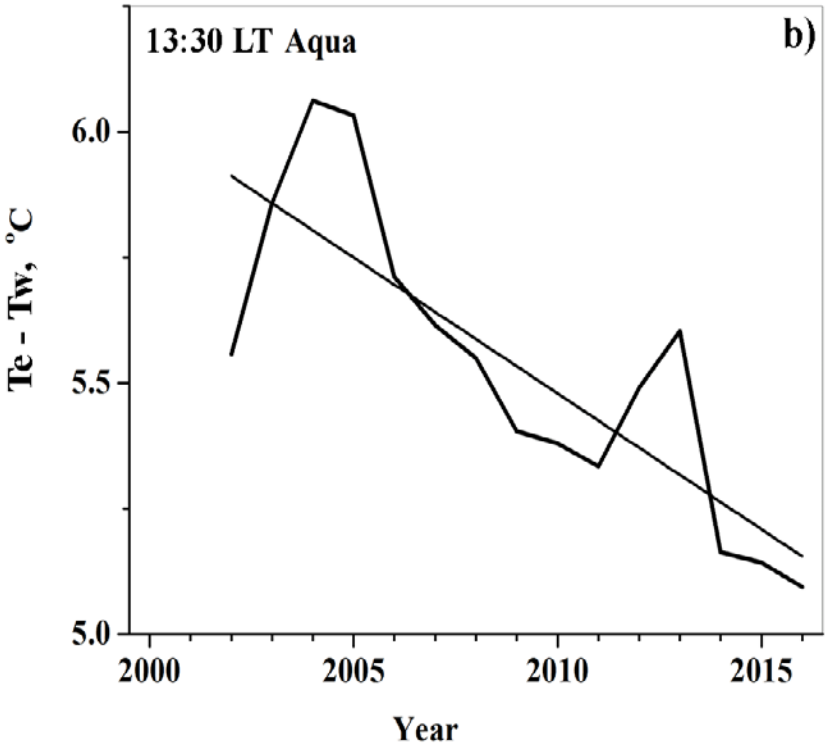
MODIS data (2002-2016) showed that the SST asymmetry was accompanied by asymmetry in land surface temperature (LST) over land areas adjacent to the Dead Sea.

Specifically, LST over land areas adjacent to the east side (TLe1) exceeded that over areas adjacent to the west side (TLw1) by 10 °C.

A causal factor of the LST asymmetry is the presence of surface heat flow at the west side and the absence of surface heat flow at the east side of the Dead Sea.

Ref.: Kishcha et al. *Remote Sensing*, 2020, https://doi.org/10.3390/rs12010107

Year-to-year variations of temperature difference between daytime SST (Te) over the east side and that (Tw) over the west side of the Dead Sea during the study period (2002 – 2016).

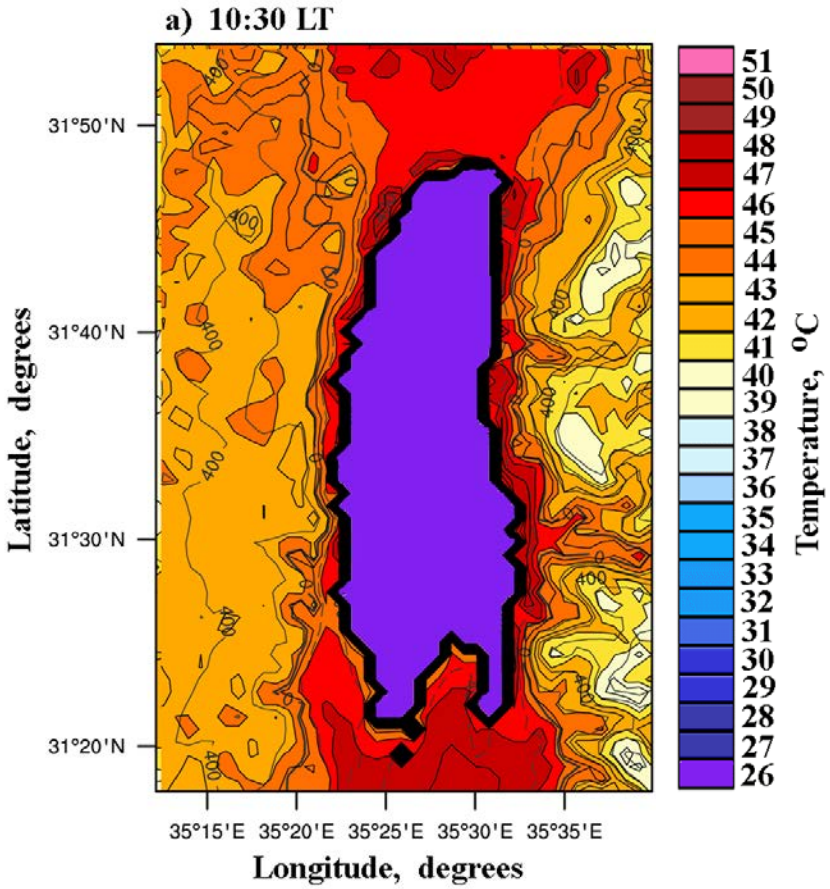


Regional atmospheric warming led to a decrease in the SST asymmetry during the study period.

Based on MODIS/Aqua data, the temperature difference in daytime SST between the east and west parts of the Dead Sea (Te – Tw) steadily decreased at the rate of 0.54 °C per decade.

Ref.: Kishcha et al. *Remote Sensing*, 2020, https://doi.org/10.3390/rs12010107

The WRF model skin temperature over the Dead Sea in August 2014

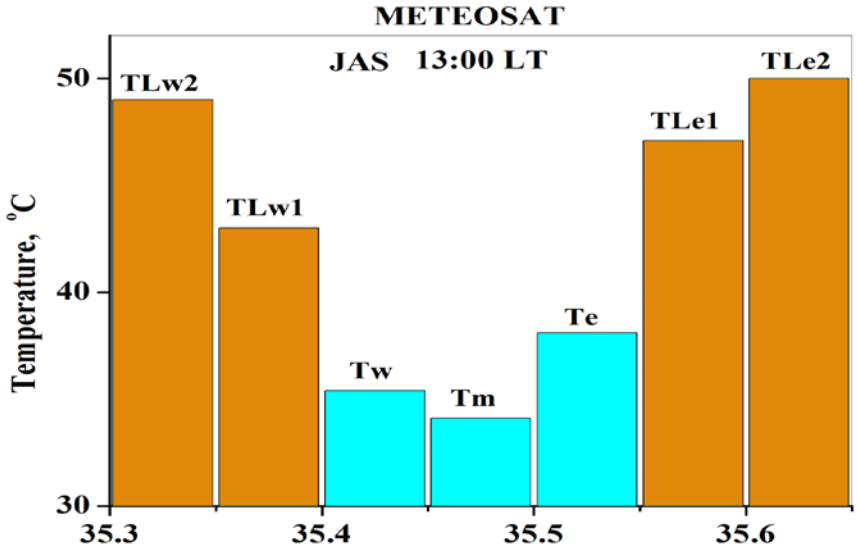


We found that the Weather Forecast and Research (WRF) model distribution of skin temperature over land and sea does not correspond to satellite observations.

At midday, over the sea, WRF was incapable of reproducing the observed SST asymmetry.

Ref.: Kishcha et al. *Remote Sensing*, 2020, https://doi.org/10.3390/rs12010107

The 11-year mean of daytime SST (in blue) and LST (in brown) over land areas to the west and to the east sides of the Dead Sea, based on METEOSAT data (2005-2015).



In addition to MODIS records (on board the two orbital satellites - Terra and Aqua), Meteosat Second Generation records (on board the geostationary satellites) proved the presence of daytime SST/LST asymmetry.

Ref.: Kishcha et al. *Remote Sensing*, 2020.

CONCLUSIONS

1. **Pronounced asymmetry has been obtained in daytime sea surface temperature (SST) between the east and west sides of the Dead Sea. This asymmetry was observed under uniform solar radiation in the summer months;**

2. **MODIS data showed that this SST asymmetry was accompanied by asymmetry in land surface temperature (LST) over land areas adjacent to the Dead Sea.**

3. **A causal factor of the LST asymmetry is the presence of surface heat flow at the west side and the absence of surface heat flow at the east side of the Dead Sea.**

4. **Regional atmospheric warming led to a decrease in the SST asymmetry during the study period. Based on MODIS/Aqua data, the temperature difference in daytime SST between the east and west parts of the Dead Sea steadily decreased at the rate of 0.54 °C per decade.**

Ref.: Kishcha et al. *Remote Sensing*, 2020.