Geophysical Research Abstracts
Vol. 15, EGU2013-6026, 2013
EGU General Assembly 2013

Satellite observations of surface temperature patterns induced by synoptic circulation over the Eastern Mediterranean

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Land Surface Temperature (LST) controls most physical and biological processes on Earth. Knowledge of the LST at high spatial resolution enables representation of different climate regimes. The main factors controlling LST are the seasonal and diurnal cycles, land cover, cloud cover, and atmospheric processes at several scales. Lensky and Dayan analyzed atmospheric processes at the topoclimatic scale, and the mesoscale (Lensky and Dayan 2011, 2012). Here we will demonstrate an analysis of the spatial distribution of LST anomaly as affected by typical synoptic circulation patterns over the Eastern Mediterranean (EM). LST anomaly is defined as the difference between daily and climatological LST. Using LST anomaly reduces the effects of land cover and the seasonal and diurnal cycles, enabling a better detection of surface temperature patterns induced by synoptic circulation.

In this study we used all available 2000-2012 NASA daily MODIS LST data over the EM, together with NCEP/NCAR Reanalysis data of SLP, surface winds and Omega (at 700hPa). We will present two frequent synoptic circulation patterns as classified by Levy and Dayan (2008) to demonstrate the LST patterns induced by synoptic circulation over the EM.

The first is the “Red Sea Trough” (RST) with eastern axis, which is an extension of a low surface pressure from a tropical depression toward the Red Sea, penetrating up north as far as Turkey. It migrates from south to north and mostly frequent during the autumn. The axis of the RST separates distinctively between regions of positive (warm) anomalies over Turkey and regions of negative anomalies (cold) over Egypt induced by the wind flow from both sides of the axis.

The second synoptic circulation pattern is “shallow Cyprus low to the north”, which is a disturbance of the polar front extending southward. This synoptic system some times migrates over the Mediterranean eastward toward the EM during the winter season. The strong northwesterly flow featuring the cold (western) sector of this low is responsible for strong negative anomaly over most of the domain. The upper air support for this cyclone is confirmed by maximal Omega values over the region.

This study gives the opportunity to quantify the effect of air mass advection on the spatial distribution of LST anomaly.

Lensky, I. M., and U. Dayan, 2011: Detection of fine-scale climatic features from satellites and possible implications Bull. Amer. Meteor. Soc., 92, 1131-1136. doi:10.1175/2011BAMS3160.1

Lensky, I. M., and U. Dayan, 2012: Continuous detection and characterization of the sea breeze in clear sky conditions using Meteosat Second Generation. Atmos. Chem. Phys., 12, 6505–6513. doi:10.5194/acp-12-6505-2012

Levy I., U. Dayan and Y. Mahrer, 2008: A five-year study of coastal recirculation and its effects on air pollutants over the East Mediterranean region. J. Geophy. Res., 113, D16121, doi:10.1029/2007JD009529