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# Topoclimatic features as deduced from remote sensing and their impacts on ecological systems

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Several recent studies have shown that global models are not capable to predict accurately the evolution of climate changes and variability on the regional scale. Misinterpretation of the anticipated climate change impacts on plants and animals are caused by failure of models to capture topoclimatic conditions. In order to capture the climate spatial variability induced by topography it is necessary to conduct topoclimatological studies. The steady growth in remote sensing and its capacities to monitor spatial patterns in climate driven by topography seems to be an indispensable tool to fill the spatial gap existing in topoclimatic studies. We analyzed time series of Land Surface Temperature (LST) from MODerate resolution Imaging Spectroradiometer (MODIS) on NASA's TERRA satellite using temporal Fourier analysis for the Eastern Mediterranean (EM). RGB display of the mean, amplitude and phase of the first harmonic (annual) were used to decipher topoclimatic features, e.g. cold patches of few kilometers differing much from their vicinity, driven by local topography. These time series were also used to calculate recent decadal trends on a fine spatial resolution of 1 km. The decadal trend over the EM is of about 0.3oC with very large local variability (-1.5 to 1.5oC). The day LST trends values are larger than those obtained for the night time, implying tendency towards a more continental climate (desertification).
The thermal heterogeneity resulting from topographic diversity has strong impacts on ecological systems (e.g. biodiversity) and on agriculture (e.g. pest management, crop production). Examples of such impacts will be shown for present and predicted climate for 20 years over the EM.