



The Siberian High and precipitation over Cyprus

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The aim of this study is to find possible teleconnection patterns associated with the Siberian High (SH) and precipitation in Cyprus. In this respect, the study examines the impacts that the SH exerts on local climate in areas far beyond the area of its domination; in particular, the relation of the teleconnection patterns derived from the SH Sea Level Pressure (SLP) characteristics and precipitation over Cyprus are examined. Four indices are used describing the characteristics of the SH (strength and geographical displacement). In an attempt to identify possible relations between precipitation, on the one hand, and the SH indices, on the other hand, a network of 32 rain gauge stations in Cyprus, both coastal and inland, was carefully selected to cover the whole island.

Precipitation in Cyprus is mainly the result of baroclinic depressions traveling in the eastern Mediterranean Basin. SH as one of the dominant centers of action in the northern hemisphere, acts as one of the regulators of the preferred paths of these frontal depressions. The overall effect of the SH on these depressions is connected to characteristics and behavior of the SH, such as its intensity and location, as it may act as a blocking system preventing the propagation of migratory depressions eastwards or diverting them towards the North or South. The depressions arriving or forming over the island have a short lifespan and they are not frequent.

The mean monthly sea-level pressure (SLP) was obtained from the dataset of the Climatic Research Unit of the University of East Anglia, with horizontal analysis of 5 degree latitude and 10 degree longitude grid. The 5 degree resolution global mean monthly temperature anomaly values taken were also taken from the same source. Monthly total precipitation amounts from 32 rain gauges in Cyprus were obtained from the Cyprus Meteorological Service for the period 1961 – 2000. Finally, use has been made of the reanalysis data at 2.5x2.5 degree resolution of global monthly mean SLP and precipitation rate from the National Centers for Environmental Prediction (NCEP).

Principal Component Analysis (PCA) for the gridded SLP dataset for each month was performed. From this analysis, the first four Principal Components (PC) were obtained, explaining for the winter months 89-90% of the total variance and for all months 81- 90%. From the PCA and for each of the four Principal Components (hereafter denoted as PC1, PC2, PC3 and PC4), graphs of the loading distributions and the respective time series resulting from the scores of each PC were constructed. The scores were used as indices for further calculations. Subsequently, the correlation coefficients between the PC scores and mean SLP for each month were calculated.

The data from the 32 rain gauges were used to calculate the monthly mean precipitation over Cyprus. Extrapolation using distance weighted average algorithm was used to plot the spatial distribution of precipitation of each month over the island. Correlation coefficients were calculated between the four PC indices and the precipitation at each one of the rain gauge stations; these correlation coefficients were subsequently plotted on geographical maps in an attempt to visualize any recognizable patterns. Also, to investigate the overall effect of the four indices (i.e. PC1 to PC4) on precipitation over Cyprus, multiple correlation analysis was employed between these four indices and the total amount of precipitation of each month (the sum of all rain gauges used for each month).