



On the Relationship between Atmospheric Circulation Indices and Precipitation in the Eastern Mediterranean

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Spatial and temporal variability of precipitation in the Mediterranean is partly related to atmospheric circulation patterns (low-variability modes) such as the North Atlantic Oscillation (NAO), the Western Mediterranean Oscillation (WeMO) and the Mediterranean Oscillation (MO), among others. Most of the total precipitation amount in the Eastern Mediterranean (EM) is associated with mid-latitude cyclones and this fact leads us to hypothesize that some teleconnection patterns may exert an important influence on the EM precipitation behaviour. Our database consists of 103 monthly time series, covering the 1961-2013 period, located throughout the EM. To quantify the relationships between the teleconnection patterns and precipitation variability over the EM, we calculated linear correlations between teleconnection indices for the three above-mentioned patterns (i.e. NAO, WeMO and MO) and time series of precipitation data for 103 stations at seasonal and annual scales during 1961-2013. The results show that the most important atmospheric low frequency variability affecting the precipitation variability in the northern parts of the EM region is NAO. A statistically significant and negative relationship between interannual variability of the precipitation and the NAO indices was obtained for the northern parts of the EM. These negative NAO relationships are particularly strong in winter (Turkey) and partly in autumn (Turkey and Greece); in contrast, they are detected to be weak in spring and almost non-existent in summer. In winter, overall precipitation over the EM is positively related to the WeMO and negatively to the NAO. The positive phase of WeMO has a strong effect on winter precipitation over the northern parts of the EM and the absolute correlation values with WeMO are higher than those with NAO in winter over Turkey. The MO is likely to have a significant role in affecting precipitation over the southern parts, especially in Jordan and Egypt. The positive phase of MO has a strong influence on precipitation over the southern parts of the EM in rainy season.

Key words: Precipitation variability, teleconnection patterns, Eastern Mediterranean, NAO, WeMO, MO.