



## **The Mediterranean Oscillation and precipitation in the Jordan River region**

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Most of the precipitation in the Eastern Mediterranean (EM) is associated with mid-latitude cyclones (Black, 2011). Furthermore, a low pressure over this region is often accompanied by a high pressure in the Western Mediterranean (WM). This pattern has been referred to as the Mediterranean Oscillation and given rise to the Mediterranean Oscillation Index (MOI), which can be expressed as pressure differences between Algiers in the WM and Cairo in the EM (Palutikof et al., 1996). In this study, the relationship between the MOI and precipitation in the Jordan River region, located in the EM is addressed. First of all, 30 precipitation series were tested for homogeneity and serial correlation. Thereafter, Empirical Orthogonal Function (EOF) analyses were applied to the homogenous series and the years 1960-1993. The results showed that the EOF-1 explained 60-71% of the precipitation variance and received a significant correlation with the MOI in December-February whereas no correlation was obtained for the EOF-2.

In order to obtain the large scale pressure anomalies associated with winter precipitation in the study region, the EOF-1 coefficient time series was correlated with Sea Level Pressure (SLP) obtained for ca. 23° W to 70° E and 5° N to 67° N. This resulted in a correlation coefficient between -0.5 and 0.5; where negative values correspond to below normal SLP, and positive values to above normal SLP by the time of rainfall in the study region. The spatial pattern showed above normal SLP over central Europe and the WM and below normal SLP in the EM. Hence, it was reminiscent of the Mediterranean Oscillation and consistence with the results from the previous correlation analysis.

The probability of precipitation during negative and positive MOI phases was thereafter derived by fitting gamma distributions to monthly precipitation. The result showed that negative MOI phases are associated with low- and below normal winter precipitation whereas positive MOI phases are associated with high- and above normal winter precipitation. As an example; during negative MOI phases the probability of below average precipitation is 78%. During positive MOI phases the probability is 41%. These findings can be considered valuable for the purpose of forecasting drought within the Jordan River region.

### References:

Black, E. (2011). The influence of the North Atlantic Oscillation and European circulation regimes on the daily to interannual variability of winter precipitation in Israel. *International Journal of Climatology*, 1-11. doi:10.1002/joc.2383

Palutikof, J. P., Conte, M., Casimiro Mendes, J., Goodess, C. M., & Espirito Santo, F. (1996). Climate and climate change. In C. J. Brandt & J. B. Thornes (Eds.), *Mediterranean desertification and land use*. London, UK: John Wiley and Sons.