Geophysical Research Abstracts
Vol. 20, EGU2018-486, 2018
EGU General Assembly 2018

Robustness of the link between the precipitation in the North Africa and standard modes of atmospheric variability

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Precipitation in North Africa displays high spatial and temporal variability which impacts droughts occurrence in the region. This study aims to analyze rainfall variability in North Africa during last decades. The relationship between rainfall variability and atmospheric circulation patterns, mainly the North Atlantic Oscillation(NAO), the Mediterranean Oscillation(MO) and the Western Mediterranean Oscillation (WeMO) are analysed by the mean of simple statistical methods. The correlation coefficient between the NAO index and winter (DJF) precipitation data for the core period (1979-2013), varies between -0.6 to -0.1 from the Western coast of Morocco to North Algeria. The correlation between WeMO, MO and precipitations in North Africa for the same core period, shows more homogeneous relationship allover this region with high negative correlation values (-0.4) in North-West of Morocco (Gibraltar), for the WeMO index, and high negative correlation values (-0.3) in North-West of Morocco and Eastern Mediterranean part, for the MO index. The North Africa winter precipitations is also strongly correlated with the zonal wind at 850 hpa(U850hpa) with positive values varying between 0.4 to 0.6 in the North-West Africa, and less than 0.4 in the Eastern part. Additionally, we have tested the connection of sea surface temperature (SST) with the precipitation data for the same core period, and we have found a weak correlation coefficient varying between (-0.2 to 0.3) with dipole (negative values in North Atlantic area and positive values in Eastern part of the Mediterranean region, witch is consistent with earlier studies. Finally, the same analyses repeated for different periods, showing that the links between atmospheric circulation and precipitation are not stationary. It is thus necessary to identify the most robust elements and understand the origin of these changes.