



Major Mid-Winter Warmings and Iberian Peninsula Rainfall

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Abstract: An indirect solar forcing in Iberian rainfall is pursued by means of the occurrence of Major Mid-Winter Warmings (MMW) in the middle-low stratosphere at the North Pole during January and February according to the role of the Quasi-Biennial Oscillation (QBO) / Solar activity relationship (Labitzke, 1987, 2005). MMW are the warmings which break down the polar vortex (PV). Consequently, a wind anomaly is produced in the north polar stratosphere which is connected with a lagged tropospheric anomaly through stratosphere-troposphere coupling in winter (Baldwin and Dunkerton, 1999, 2005). A T-mode Principal Component Analysis is used as an objective pattern classification method for identifying the main daily surface level pressure patterns for January, February and March for the reference period 1961-1990. Afterwards, those winter months with a MMW influence are identified in the whole study period 1958-2000 by means of the Arctic Oscillation Index (AOI). Thus, performing the same analysis for the selected months, new principal patterns are obtained for detecting changes in the surface circulation frequency and morphology. The results show a significant decrease of the westerlies and a southward shift of the storm tracks some weeks after the MMW occurrence. These changes are reflected in the Iberian rainfall anomalies with a precipitation increase in its west part and a slight decrease in the Mediterranean façade.

Key words: QBO / Solar Activity Relationship, Major Mid-Winter Warmings (MMW), Stratosphere-Troposphere Coupling, Principal Component Analysis (PCA), Circulation Patterns and Iberian Rainfall Anomalies.