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Development of strong and persistent ridge episodes in the Eastern North Atlantic

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The development of strong and persistent anticyclonic ridges over the Eastern North Atlantic has been shown to be a major contributor to the occurrence of severe winter droughts over Western Iberia. In this study, strong and persistent ridge episodes are defined as having 300 hPa geopotential height anomalies above 50 gpm and persist at least 10 consecutive days for an area delimited by 40-50ºN; 40ºW-5ºE. The generation and maintenance of these episodes is related to a displacement and strengthening of the stratospheric polar night jet, which shows strong positive stratospheric anomalies over the North American continent and the adjacent North Pacific. When this westward tilted anomaly extends down into the troposphere, positive anomalies tend to be detached from the main stratospheric anomaly and propagate downwards and eastwards along Rossby wave trains. Furthermore, the Eastern North Atlantic ridge is generated and repeatedly reinforced until the stratospheric anomaly dissipates. There is also evidence for waves breaking anticyclonically over the North Atlantic and Western Europe during the episodes, which is dynamically coherent with the persistency and quasi-stationarity of the episodes.