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Effects of the 11-year solar cycle on the cyclonic and blocking activity in the Euro-Atlantic sector

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We examine solar activity effects on specific features of cyclonic and blocking activity in the lower and mid troposphere over the Euro-Atlantic sector of the northern Extratropics in winter during the second half of the 20th century. Separate analyses are conducted for periods of low and high solar activity, which is characterized by the 10.7 cm radio flux; in some cases, a separate class of a moderate solar activity is also analyzed. The cyclonic activity is described in both the Eulerian and Lagrangian frameworks. We study the changes between high and low solar activity in (i) the position and intensity of the stormtrack, defined as a standard deviation of bandpass filtered geopotential heights, (ii) the position of cyclone tracks, cyclone density, lifetime, and depth, the areas of cyclogenesis and cyclolysis for cyclones objectively identified and tracked at the 1000 hPa level, and (iii) the position, intensity, and lifetime of atmospheric blocks. Statistically significant differences between solar maxima and minima appear for many of the cyclone and blocking characteristics. Finally, we put the results into the context of previous work on the solar effects on tropospheric circulation, including the modes of low-frequency variability, teleconnectivity, and the occurrence of circulation types.