



Trends and Variability of Storminess in the NE Atlantic-European Region during 1874-2007 and their relationship to the North Atlantic Oscillation

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This study builds on the previous studies on storminess conditions in the Northeast Atlantic-European region. The period of surface pressure data analyzed is extended from 1881-1998 to 1874-2007; and the region analyzed is extended south to the Iberian Peninsula. The seasonality and regional differences of storminess conditions in this region are also explored in more detail.

The results show that storminess conditions in this region have undergone substantial decadal or longer time scale fluctuations, with considerable seasonal and regional differences. The most notable differences are seen between winter and summer, and between the North Sea area and other parts of the region. In particular, winter storminess shows an unprecedented maximum in the 1990s in the North Sea area and over southern Iberian Peninsula, while it has declined over the Bay of Biscay and northern Iberian Peninsula, and in the northwest part of the region. In summer, storminess appears to have declined in most parts of this region, except southern Iberian Peninsula where summer storminess has increased significantly. In the transition seasons, the storminess trend is characterized by decreases in the south-central part of the region and increases in the extreme north part, with decreases being most significant over the Bay of Biscay and northern Iberian Peninsula in both seasons, while increases in the extreme north part of the region being most significant in spring.

In particular, the results also show that in the North Sea area the earliest storminess maximum occurred in summer (around 1880), while the latest storminess maximum occurred in winter (in the early 1990s). Looking at the annual metrics alone (as in previous studies), one would conclude that the latest storminess maximum is at about the same level as the earliest storminess maximum, without realizing that this is comparing the highest winter storminess level with the highest summer storminess level in the period of record analyzed, while winter and summer storminess conditions have undergone very different long-term variability and trends.

In the central-north part of the region, storminess conditions are found to have a significant positive correlation with the simultaneous NAO index in all seasons but autumn; the higher the NAO index, the rougher the storminess conditions in this region, especially in winter and spring. The simultaneous storminess-NAO correlation is also significantly positive for northern Iberian Peninsula in summer and for the Bay of Biscay area in spring and summer; but it is significantly negative for southern Iberian Peninsula in winter.