



High-Shear/Low-CAPE Environments in Reanalysis Data

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Severe thunderstorms that form in environments with high values of shear over the lowest several kilometers of the troposphere and low values of CAPE (HSLC) are relatively common in Europe and the US, particularly in the southeast cool season. In the US, for example, almost 40% of significant tornadoes occur in those environments. These storms present a significant forecast challenge for operational meteorologists because of the difficulty in identifying the environments in comparison to higher CAPE regimes. Here, we present results from a pilot project looking at the distribution of HSLC environments in the US and Europe over a four-year period. Eventually, we hope to create a multi-decade global climatology of HSLC environments connected, where possible, with severe thunderstorm and tornado reports.

The environmental data are taken from the ERA-Interim reanalysis. The approximately 12,000,000 vertical profiles created were analyzed using the SHARPPy sounding analysis package. In the annual total in the US, HSLC environments are most common in the Pacific Northwest, the Ohio Valley and the southeastern states. In Europe, they are most common over the British Isles, the eastern Mediterranean, and the Iberian Peninsula. An area of relatively high frequency extends in a broad swath from northern France into Russia. HSLC environments at most locations show a strong seasonal cycle and a relatively weak diurnal cycle. In the southeastern US and eastern Mediterranean, the peak frequency is in winter, while in the Plains of the US, it's in the spring, and, in Germany, the peak occurs in the summer, although they are common throughout the year except in winter.