

Second-Generation Lamb Weather Types - A new generic classification method with evenly-tempered type frequencies

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Lamb Weather Types (LWT) are an empirical classification of sea-level pressure (SLP) circulation patterns, based on regional flow direction and vorticity. An objective method of calculating LWTs from gridded SLP data was introduced by Jenkinson and Collison (JC-LWT) in 1977 and has since been used extensively in climatology studies, both over the British Isles where the original LWTs were defined and adapted to many other regions by analogy. However, a serious drawback of the JC-LWT system is that too many days typically become classified into a small subset of the 27 available types (especially the two types, pure anticyclonic and pure cyclonic). This results in a severe information loss which is detrimental to climatological applications. Here, a new objective LWT method is proposed in which the vorticity-flow ratio thresholds are systematically adjusted, using ERA40 daily mean SLP as a basis, to force the type frequencies to be evenly-tempered between pure directional and hybrid anticyclonic and cyclonic types. Unclassified is no longer allowed, while the pure (anti)cyclonic types are restricted in frequency to a specific proportion of days. The method uses a simple 16-point grid array, sampled from 1x1 degree data, which can be moved to any location on the globe. Algorithms for defining the spatial scale of the grid array, which was always fixed in JC-LWT, are also considered.