Low-dimensional attractors for the North Atlantic atmospheric circulation

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Atmospheric flows are characterised by a large number of degrees of freedom. We present a novel technique to estimate attractor dimension, and identify a low-dimensional ($D \approx 13$) attractor for the large-scale atmospheric circulation in the North Atlantic. We further demonstrate that extremes in the local dimension of the attractor can be linked to high-impact weather events, thus establishing the usefuleness of our technique for climatological studies. The methodology we present is entirely general and may be applied to a diverse range of physical dynamical systems with large degrees of freedom