Seasonal Transition – Spring, Autumn, and Seasonal Prediction

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Abstract

Isentropic potential vorticity (IPV) has obvious seasonal changes on the isentropic surface of 340K, with fast propagation rate in winter and slow propagation in summer. The wave propagation slows down in summer, which can be indicated by the length of the PVU=2 contour line retained in the 60-120E region. Correspondingly, the local wave activity (LWA) integrated over the entire troposphere also has obvious signals at 60-120E, indicating that the westerly wind is weakening and the wave transmission is slowing down. During the seasonal transition, such as spring, it can be found that the process of slowing down the fluctuation starts from the pv streamer in the Pacific. That is, Rossby wave breaking begins in the eastern Pacific, causing westerly circulation, and eastward wave propagation begin to be blocked (traffic jammed), and finally become blocked or stationary at 60-120E. The entire change process can be well controlled by IPV at 340K. After the IPV variables are calculated by ISOMAP, the principal components can be trained through neural networks to make seasonal forecasts for 1-3 months.

季節轉換 – 春秋和季節預報

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摘要

等熵位渦（IPV）在 340K 的等熵面上有明顯的季節變化，冬季傳播速率快，夏季傳播慢。夏季波動變慢，可由 60-120E 區域滯留的 PVU=2 等值線長度標示出來。相對呼應的是整層對流層積分的 local wave activity，也在 60-120E 有明顯訊號，標示西風減弱，波動傳遞變慢的訊號。在季節轉換時，如春天，可發現波動變慢的過程是由太平洋上的 pv streamer 開始。也就是東太平洋開始有 Rossby wave breaking，造成西風環流，西風波動開始交通阻塞，最後變成 60-120E 的位置，波動成滯留阻塞。整個變動過程可被 IPV 340K 很好掌握。而 IPV 變數經過 ISOMAP 的計算，主成分可經由神經網路訓練，進行 1-3 個月的季節預報。