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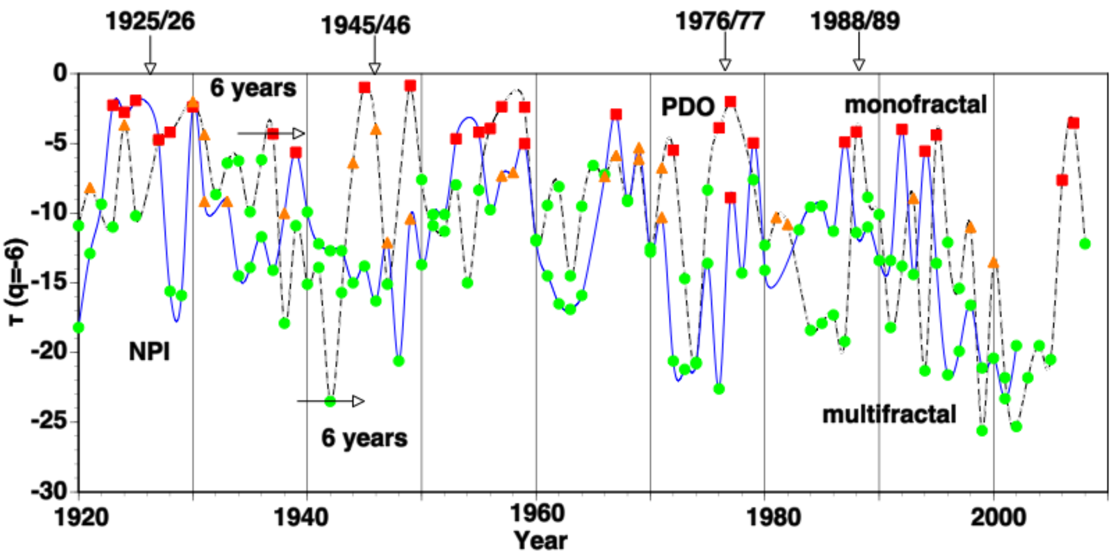

Figure 1. Time series of $\tau(q = -6)$ of the Niño3.4 index and NPI (top). The red squares show monofractality and the green circles show multifractality and the orange triangles show an intermediate state between monofractality and multifractality for a six-year period centered on the year shown. Changes from multifractal to monofractal behavior are observed around the regime shifts of 1925/26, 1945/46, 1957/58, 1970/71, 1976/77, and 1988/89 in the PDO index.

- A climatic regime shift is characterized by an abrupt transition from one quasi-steady climatic state to another. We examined the effectiveness of multifractal analysis to identify climatic regime shift, and attempted to explain the changes of the multifractal behavior of climate indices when regime shift occurs. We used the wavelet transform method to analyze the multifractal behavior of the Niño3.4 index, PDO index, and NPI. We used the Daubechies wavelet as the analyzing wavelet and calculated the multifractal spectrum $\tau(q)$ of different moments q for individual records of the climate indices. We showed the change of multifractality by plotting $\tau(q = -6)$.
- When the wavelet coherence between the Niño3.4 index and NPI, NPI and PDO index, and Niño3.4 and PDO indices became strong, changes from multifractal to monofractal behavior were observed at climatic regime shifts. When fluctuations became large and multifractality became strong, a climatic regime shift occurred and a change of fractality was observed. The strong interactions of climatic phenomena such as the ENSO, PDO, and AL caused climatic regime shift.
- The changes of fractality associated with the PDO index almost corresponded to regime shifts (Fig. 1). In terms of multifractal analysis, we conclude that a climatic regime shift corresponds to a change from multifractality to monofractality of the PDO index.