

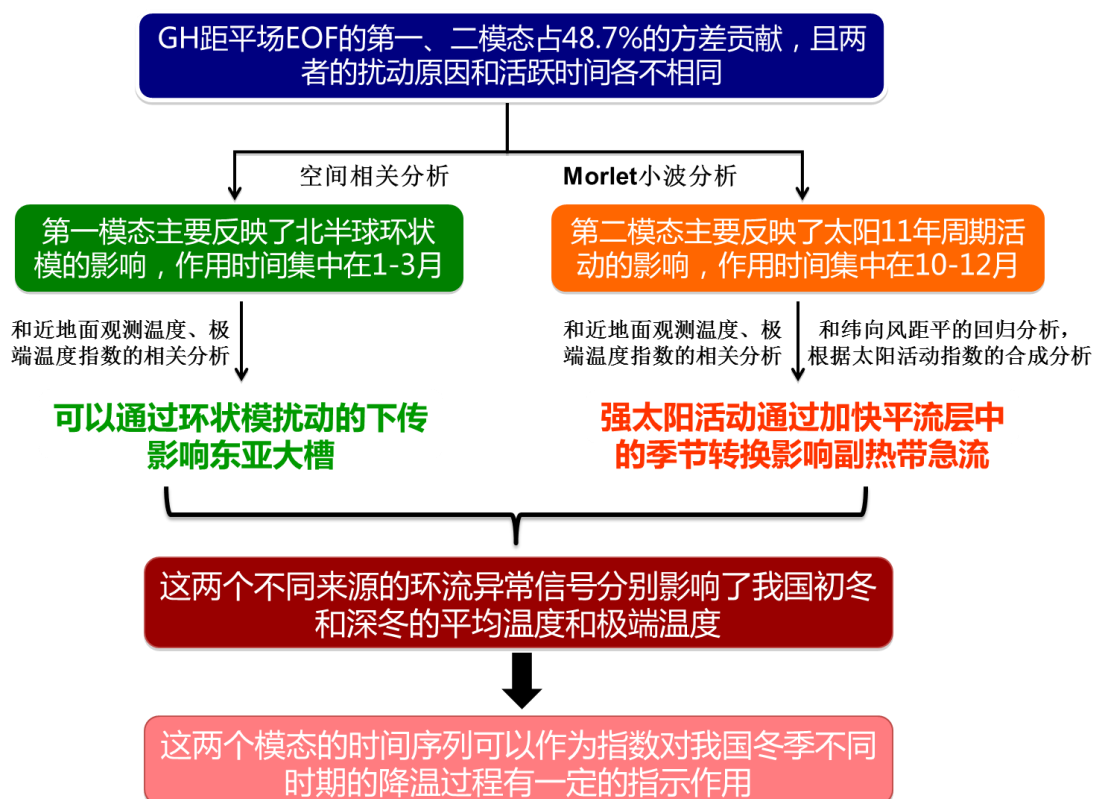
Lu, C. H., B. T. Zhou, 2018: Influences of the 11-yr Sunspot Cycle and Polar Vortex Oscillation on Observed Winter Temperature Variations in China. *J. Meteor. Res.*, **32**(3): 367-379. doi: 10.1007/s13351-018-7101-2.

太阳 11 年周期活动和极涡扰动对我国冬季温度变化的影响

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将平流层-对流层耦合系统近几十年的变化特征归因到极涡扰动和太阳 11 年周期活动, 随后解析了两者对我国冬季温度及极端温度变化的影响。对位势高度距平场的 EOF 分析表明前两个模态可以解释约 50% 的方差贡献, 并且两者有不同的驱动源、作用时间和范围。第一模态反映了极涡的扰动, 主要作用时间是冬季中后期, 弱极涡过程带来“冷效应”, 对应较低的日平均、最高和最低温度, 及更频繁的冷日冷夜, 主要影响我国的东北地区; 而第二模态反映了太阳活动, 影响集中在秋末冬初, 强太阳活动会加速平流层环流的季节转换, 对应副热带急流的增强, 使得近地面气温偏低, 暖夜、暖日减少, 冷日、冷夜增加。因此这两个模态对我国冬季不同时期的降温过程有一定指示作用。

思维导图或文章结构框图:



The first and second EOF modes of GH anomalies account for 48.7% of the total variance, and they have different driving sources, active periods and regions.

Spatial correlation analysis Morlet wavelet analysis

The first EOF mode mainly represents the variation features of the polar vortex, and its active periods are focused in late winter

The second EOF mode is closely related to the sunspot cycle, and its major active periods are in late autumn and early winter.

Correlation analysis with observed T and extreme T indices

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Regression analysis and composite analysis base

Affect the Eastern Asian trough through the propagation of NAM anomalies

Strong SC can enhance the intensity of subtropical westerly jet in UTLS zone by accelerating the seasonal transformation of the stratospheric circulation

These two anomalous signals can affect the average and extreme temperature in early and late winter respectively

The time series of these two modes can be used as indices to indicate the cooling process in different periods of winter in China