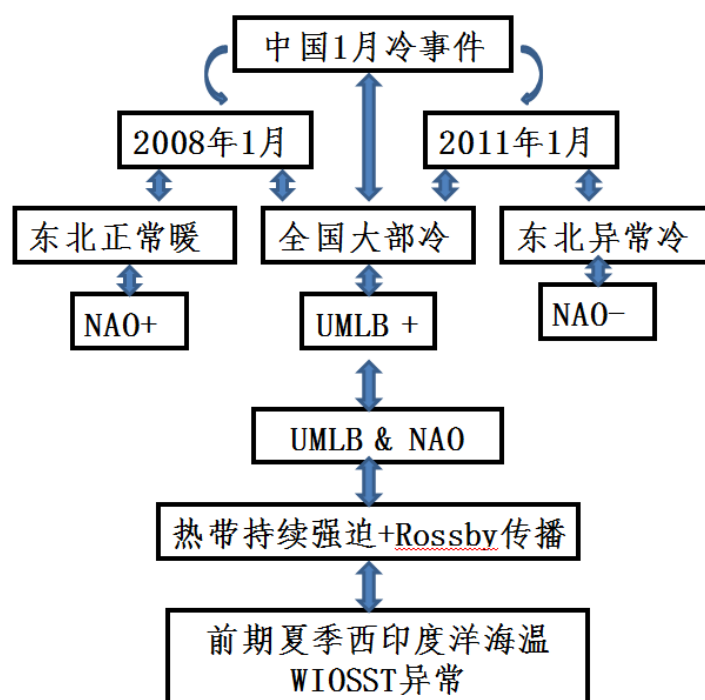


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中文题目：中国 1 月地面气温异常的前兆信号

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本文基于 1979-2008 年全球暖背景下中国 1 月地面气温异常变化的可能机制，通过比较 2008 与 2011 年 1 月中国地面气温异常特征及其成因，探讨了中国 1 月地面气温异常的前兆信号。结果表明，2008 与 2011 年 1 月在亚洲中高纬度地区环流均存在显著的异常变化，高空乌拉尔山及其以南的贝加尔湖地区为北正南负的高度异常同典型年一致；但 2011 年 1 月不同于 2008 年和典型异常低温年，表现出相反的北大西洋涛动位相异常，这是导致 2011 年 1 月东北地区气温异常偏冷的重要原因。进一步分析发现，前期夏季印度洋存在后期 1 月欧亚中高纬遥相关异常环流型的前兆信号，此遥相关环流型同中国 1 月气温的异常变化密切相关。有证据表明前期夏季西印度洋海温异常变化同后期 1 月对应的这种遥相关型环流的变化有较好的关系。当前期夏季西印度洋海温为正异常变化时，后期 1 月欧亚中高纬乌拉尔山到贝加尔湖地区将出现北正南负的环流异常，即有利于乌拉尔山高压脊和贝加尔湖低压增强的环流异常，对应地面西伯利亚和东亚夏季风偏强，从而有利于中国低温异常事件的发生；反之亦然。诊断分析和模式试验均证实了前期夏季西印度洋海温异常可作为后期 1 月中国气温异常变化可用的前兆信号。本文揭示的 UMLB 及 NAO 两种环流型对中国 1 月气温的不同影响，以及前期夏季印度洋的海温异常特征为后期 1 月气温的季节-半年尺度的预测提供了物理基础。



英文题目: **Detecting Primary Precursors of January Surface Air Temperature Anomalies in China**

作者: **TAN Guirong^{*}, REN Hongli, CHEN Haishan, and YOU Qinglong**

英文摘要: This study aims to detect the primary precursors and impact mechanisms for the January surface temperature anomaly (JSTA) events in China under the background of global warming, by comparing the causes of two extreme JSTA events occurring in 2008 and 2011 with the common mechanisms inferring from all typical episodes during 1979-2008. Results show that the two extreme events have experienced atmospheric circulation patterns covering the mid-high latitude Eurasia, with a positive anomaly center over the Ural Mountains' and a negative one to the south of Lake Baikal (UMLB), which are quite similar to that for all the typical events. However, the Eurasian teleconnection patterns in 2011 event, which are accompanied with the negative phase of North Atlantic Oscillation, are different from that in the typical events and also in 2008 event. We further find that a common anomalous signal appearing in the early summer tropical Indian Ocean may be responsible for the following late winter Eurasian teleconnections and the associated JSTA events in China. We show that sea surface temperature anomalies(SSTAs) in the preceding summer over the western Indian Ocean (WIO) are intimately related to the UMLB-like circulation pattern in the following January. Positive WIO-SSTAs in early summer tend to induce strong UMLB-like circulation anomalies in January, which may result in anomalously or extremely cold events in China, which can also be well reproduced in model experiments. Our results suggest that the WIO-SSTAs may be a useful precursor for predicting the JSTA events in China.

