



## **Reconsidering large-scale climate dynamics for improving the attribution of climatic change in High Asia**

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A large number of recent studies has documented significant environmental changes in High Asia over the past decades, including changes in glaciers, lakes, stream flow, and vegetation characteristics. Efforts to tie these changes to drivers in a climate dynamics context are clearly less developed, and focused on monsoon activity or possible teleconnections (ENSO or NAO) on a statistical basis. However, an important "in-situ" dynamical mechanism has largely been neglected in climate proxy studies, which is the interaction between the mid-latitude westerlies and the Asian monsoon over High Asia.

Here we show that an existing westerly wave index can be used to detect widespread influence on climate variability in the mid to upper troposphere over High Asia. We also find that this influence is not limited to single years, but leaves a clear footprint in the total climatic variability both in the monsoon onset season (June) and the main season (JAS). The associated circulation anomalies exhibit action centers in low and high latitudes, demonstrating a non-negligible linkage of tropical and extratropical climate dynamics for the entire High Asian region.

In the final part we ask to what degree the tropospheric influences are manifested at the surface of High Asia, which targets the potential for explaining additional variance in current environmental changes (see above) and paleoclimate proxies (e.g., tree rings, ice cores, sediments). The preliminary results also emphasize the benefits of meshing climate proxy and climate dynamics research more closely together, with regard to better understanding (and projecting) climatic changes in High Asia.