A dominant role of internal climate variability in controlling Atlantic multidecadal variability during the past 1200 years

Subject Code: D02

With the support by the National Natural Science Foundation of China, a collaborative study by the research group led by Prof. Yang Bao (**杨保**) from the Key Laboratory of Desert and Desertification, Northwest Institute of Eco-Environment and Resources of the Chinese Academy of Sciences, and the coauthors from Sweden, Germany and United Kingdom demonstrates a dominant role of internal climate variability in controlling Atlantic multidecadal variability during the past 1200 years, which was published in *Nature Geoscience* (2017, 10: 512—517).

North Atlantic sea surface temperature experiences significant variability on multidecadal timescales, which is referred to as the Atlantic Multidecadal Variability (AMV). The AMV has important influences on the global climate system, including the climate of the adjacent continents, the Atlantic hurricane activity, African Sahel drought, and the Indian summer monsoon system. However, the origins of the AMV remain unclear, in particular the extent to which it is driven by external (e.g., solar, volcanic and anthropogenic) forcings and internal dynamics of the climate system.

By generating a 1200 year-length summer AMV reconstruction using 46 annually-resolved climate proxy records, this collaborative study suggests that external forcings contributed to about 30% of the reconstructed variance of the AMV on multidecadal timescales and internal variability played a dominant role in generating the AMV during the past 1200 years. In addition, based on a comparison of the millennial reconstructions of the AMV and of the Northern Hemisphere temperature, this study identifies a coherence between the internal variability components of AMV and of Northern Hemisphere (NH) temperature, and concluded that the AMV and the NH temperature was dynamically connected during the past 1200 years.

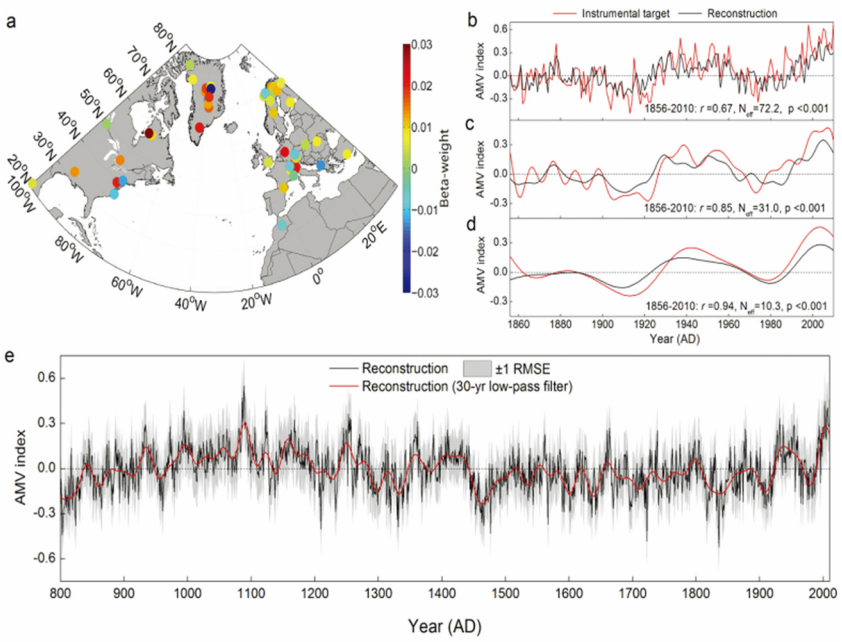

Figure The 1200 year-length AMV reconstruction. (a) Location of the 46 proxy records. (b) Comparison between the reconstructed and instrumental AMV. c, d. As b, but 10-year (c) and 30-year (d) low-pass filtered. (e) The AMV reconstruction for the past 1200 years (AD 800—2010).

These findings have important implications for decadal scale climate projections and also contribute to facilitating a better understanding of the impacts of the AMV during the preindustrial period.