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TPE Newsletter

April, 2023

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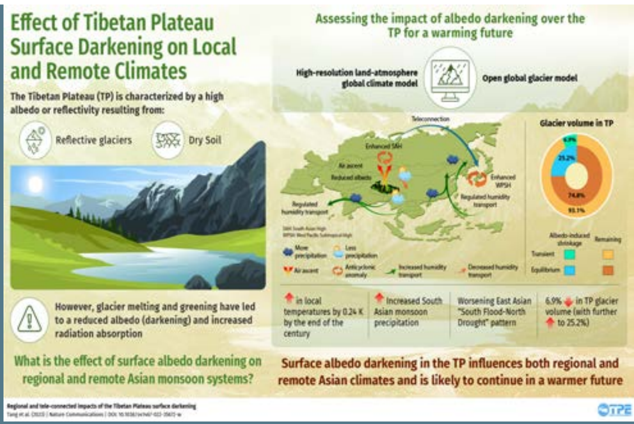

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A new climate phenomenon called TRC wave train was discovered which could improve our ability to predict extreme hydroclimate events

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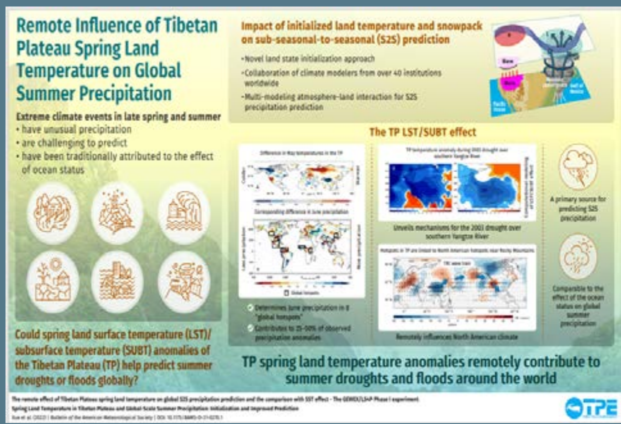

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Get ready for the most exciting stories going on at TPE.

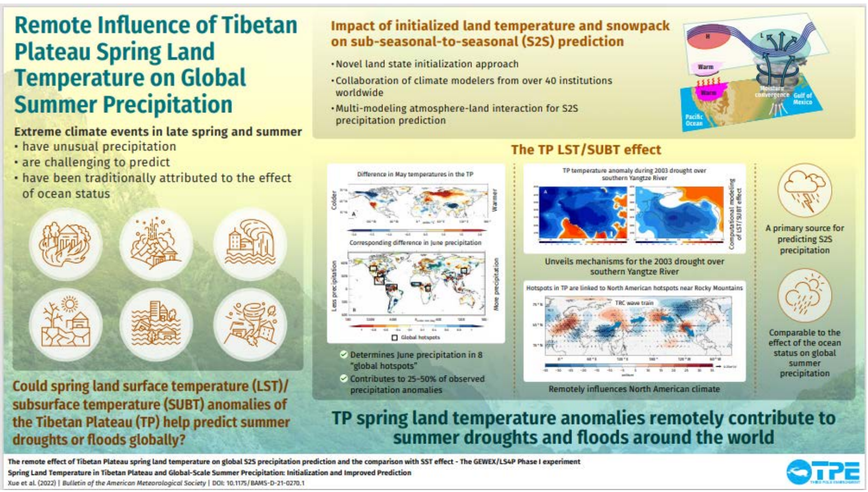
Uncovering the Missing Link in Extreme Climate Event Prediction: The TRC Wave Train

a new climate phenomenon called TRC wave train was discovered which could improve our ability to predict extreme hydroclimate events

March 20,2023 | Deep Sarkar,XIA Cuihui

Print

The scientific team from TPE and their international collaborators have made a groundbreaking discovery in climate science that could improve our ability to predict extreme hydroclimate events. The team has discovered a new climate phenomenon called the Tibetan Plateau-Rocky Mountain Circumglobal (TRC) wave train.



The TRC wave train is a previously unknown oscillation between the surface temperatures of the Tibetan Plateau (TP) and the Rocky Mountains. The researchers have found that the TRC wave train has a significant impact on global summer precipitation in the Northern Hemisphere, leading to droughts, floods, and other extreme climate events, such as the 2003 drought over the southern Yangtze River. The researchers are further working on to evaluate whether this discovery is comparable in importance to the well-known El Nino-Southern Oscillation (ENSO) in forecasting weather patterns.

By developing a new modeling methodology, the researchers have explained the mechanisms behind previously observed extreme climate events and can now predict future events with substantially improved accuracy. They identified eight “hotspot” regions around the world where summer precipitation was significantly related to the anomalies of TP land temperature during May. The numerical simulations showed consistency in the hotspot regions along the TRC wave train, where the perturbations produced by the TP spring land temperature anomalies modulate the TRC wave train from TP through northeast Asia and the Bering Strait to the western part of North America, generating significant consequences on the North American climate.

"The TRC Wave Train is a significant milestone in climate science. With it, we can take steps to mitigate effects of extreme hydroclimate events and protect our communities from the impacts of climate change,” said lead researcher Prof. Yongkang Xue from the University of California, Los Angeles, USA, a partner of the Global Energy and Water Exchanges (GEWEX) program in the investigation of the “Impact of Initialized Land Temperature and Snowpack on Subseasonal-to-Seasonal Prediction (LS4P) which consists of top scientists from over 40 institutions from around the world.

This breakthrough opens up a new avenue for subseasonal-to-seasonal (S2S) prediction, which has been extremely challenging in northern hemisphere regions. The current global land-atmosphere coupled models using sea surface temperature (SST) as a predictor are unable to accurately predict many severe droughts or floods events. However, the TRC wave train has been identified as a consistent, asynchronous "out-of-phase" oscillation that can help us predict unusual summer precipitation and subsequent extreme hydroclimate conditions worldwide.

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