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Dynamics of the future anthropogenic climate change in the Northern Hemisphere coupled stratosphere/troposphere system.

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There is increasing evidence that the response to future anthropogenic climate changes in Northern hemisphere is characterized by weakening of high-latitude westerlies in the coupled stratosphere/troposphere-system and strengthening of mid-latitude tropospheric eddy-driven jet with strong impact on large-scale precipitation.
Here we show using different model experiments and wave geometry diagnostics that the overall dynamics of this response can be understood in the framework of two competing atmospheric bridges. One bridge is located in the stratosphere and connect the tropical Sea Surface Temperature (SST) with the coupled high-latitude stratosphere/troposphere system through changes in the upper flank of subtropical jet and downward stratosphere/troposphere dynamical coupling. This bridge is responsible for the weakening of the westerlies in high latitude stratosphere/troposphere system. The second bridge is in the troposphere and connects the tropical ocean warming with the extra-tropics trough changes in the static stability. This bridge is responsible for the wave-induced strengthening of the tropospheric eddy-driven jet. It is shown that the large-scale precipitation response in mid-to-high latitudes results mainly from the dynamical adjustment to wave-driven changes in the tropospheric meridional overturning circulation.
The competing interaction between the stratospheric and tropospheric pathway constitutes another aspect of stratosphere/troposphere dynamical coupling. Her we will show how that such coupling can help understanding model discrepancies in the Northern Hemisphere future climate change.