Weakening of the Silk Road teleconnection pattern under global warming in CMIP6 projections

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The Silk Road teleconnection pattern is a wavetrain pattern along the summer Asian jet waveguide. It often causes extreme events in East Asia such as extreme heat in Korea and Japan in 2010 and 2018 and heavy rains in Japan in 2018 and 2020. An analysis of a large ensemble AGCM simulations (d4PDF) and CMIP6 ScenarioMIP simulations shows that the interannual Silk Road pattern weakens significantly under global warming. Available potential energy gain through baroclinic energy conversion, which energizes the pattern, becomes less efficient in the mid- to lower troposphere under the warmer climate due to the uplift of the jet axis and enhanced tropospheric stratification. Besides, the southward shift of the Asian jet associated with global warming prevents wave packet injection from the North Atlantic subpolar jet. However, the regional climate influence of the Silk Road pattern on East Asia does not necessarily weaken. In particular, most CMIP6 models show enhanced influence on precipitation around Japan, presumably due to background moisture increase which overwhelms the weakening of circulation anomalies.