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IS THE JET STREAM BECOMING WAVIER IN RESPONSE TO RAPID ARCTIC WARMING?

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Arctic ice and snow cover continue to melt/retreat as the Arctic warms at least twice as fast as are northern-hemisphere mid-latitudes, which is reducing poleward temperature gradients. This fundamental change in a key aspect of the climate system is expected to affect large-scale atmospheric circulation patterns. Francis and Vavrus (2012) proposed a mechanism linking this so-called Arctic amplification to more persistent weather patterns in mid-latitudes, which would increase the likelihood of extreme weather events. While a great deal of new research on this linkage has been performed by many groups, an outstanding question is whether the planetary waves in the jet stream are becoming more highly amplified in response to AA. We will present new analysis showing that regionally and seasonally varying decreases (increases) in poleward temperature gradients are associated with: weaker (stronger) upper-level zonal winds, a more meridional (zonal) character to the upper-level flow, and an increasing (decreasing) frequency of high-amplitude jet-stream trajectories. These amplified patterns are known to be associated with slower planetary waves, thus the types of extreme weather events caused by persistent patterns are expected to increase as global warming continues unabated.