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Divergent consensuses on Arctic amplification influence on mid-latitude severe winter weather

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The Arctic has warmed more than twice as fast as the global average since the late 20th century, a phenomenon known as Arctic amplification (AA). Recently, there have been significant advances in understanding the physical contributions to AA and progress has been made in understanding the mechanisms linking AA to mid-latitude weather variability. Observational studies overwhelmingly support that AA is contributing to winter continental cooling. While Arctic warming is strongest at the surface, it extends throughout the mid-troposphere. In addition, the sea ice loss and associated warming is not uniform across the Arctic, but rather regionally focused including in the Barents-Kara Seas, a key region for disrupting the polar vortex. The probability of severe winter weather increases across the Northern Hemisphere continents following polar vortex disruptions. While some model experiments support the observational evidence, the majority of modeling results show little connection between AA and severe mid-latitude weather. Rather the excess warming generated in the Arctic due to sea ice loss and other mechanisms is not redistributed vertically in model simulations, but rather horizontally suggesting the export of excess heating from the Arctic to lower latitudes. Divergent conclusions between model and observational studies, and even intra-model studies, continue to obfuscate a clear understanding of how AA is influencing mid-latitude weather.

Arctic mid-latitude linkages review paper: J. Francis, T. Jung, R. Kwok, J. Overland, T. J. Ballinger, U. S. Bhatt, H. W. Chen, D. Coumou, S. Feldstein1, H. Gu, D. Handorf, G. Henderson, M. Ionita, M. Kretschmer, F. Laliberte, S. Lee, H. W. Linderholm, W. Maslowski, Y. Peings, K. Pfeiffer, I. Rigor, T. Semmler, J. Stroeve, P. C. Taylor, S. Vavrus, T. Vihma, S. Wang, M. Wendisch, Y. Wu, J. Yoon