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Major differences in regional climate impact between high- and low latitude volcanic eruptions

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Major volcanic eruptions have a cooling effect on Earth's climate. In addition, low latitude volcanic eruptions can impact atmospheric circulation leading to a positive North Atlantic Oscillation index (NAO) during the subsequent winters. However, the question of the climate effect of high latitude eruptions, and whether volcanic eruptions impact atmospheric circulation during summer has received less attention. Here we show that high latitude eruptions lead to negative NAO during winter and summer. In addition, our analysis of novel climate field reconstructions supports the long-lasting positive winter NAO pattern for up to 5 years after major low latitude eruptions in agreement with earlier reconstructions and model experiments. Furthermore, we demonstrate a positive NAO during summer following low-latitude eruptions. The differences in the effect of high- and low-latitude eruptions on atmospheric circulation and regional temperature provide important insights for the understanding of past and future climate changes in response to volcanic forcing.