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# Understanding the projected decline in polar lows under climate change

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Mesoscale 'polar low' cyclones present a serious hazard to shipping and coastal regions in the northern North Atlantic. These cyclones are projected to become less frequent in the future in response to greenhouse gas forcing, due to an increase in atmospheric static stability. Here we show that this increase in stability is largely controlled by changes in ocean circulation. As the Atlantic Meridional Overturning Circulation (AMOC) weakens under forcing, the surface temperature of the North Atlantic rises less than the temperature of the well-mixed middle troposphere, leading to the increase in stability. These relations are demonstrated using coupled and slab-ocean General Circulation Models and by comparison with earlier Regional Climate Model experiments. The sensitivity is of the order of two polar lows per season per Sverdrup weakening of the AMOC. One consequence of this result is that our confidence in the projected polar low decline is limited by our confidence in the changes in ocean circulation.