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Atmospheric Dynamics Footprint on the January 2016 Ice Sheet Melting in West Antarctica

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In January of 2016, the Ross Sea sector of the West Antarctic Ice Sheet experienced a three-week long melting episode. Here we quantify the association of the large-extent and long-lasting melting event with the enhancement of the downward longwave (LW) radiative fluxes at the surface due to water vapor, cloud, and atmospheric dynamic feedbacks using the ERA-Interim dataset. The abnormally long-lasting temporal surges of atmospheric moisture, warm air, and low clouds increase the downward LW radiative energy flux at the surface during the massive ice-melting period. The concurrent timing and spatial overlap between poleward wind anomalies and positive downward LW radiative surface energy flux anomalies due to warmer air temperature provides direct evidence that warm air advection from lower latitudes to West Antarctica causes the rapid long-lasting warming and vast ice mass loss in January of 2016.