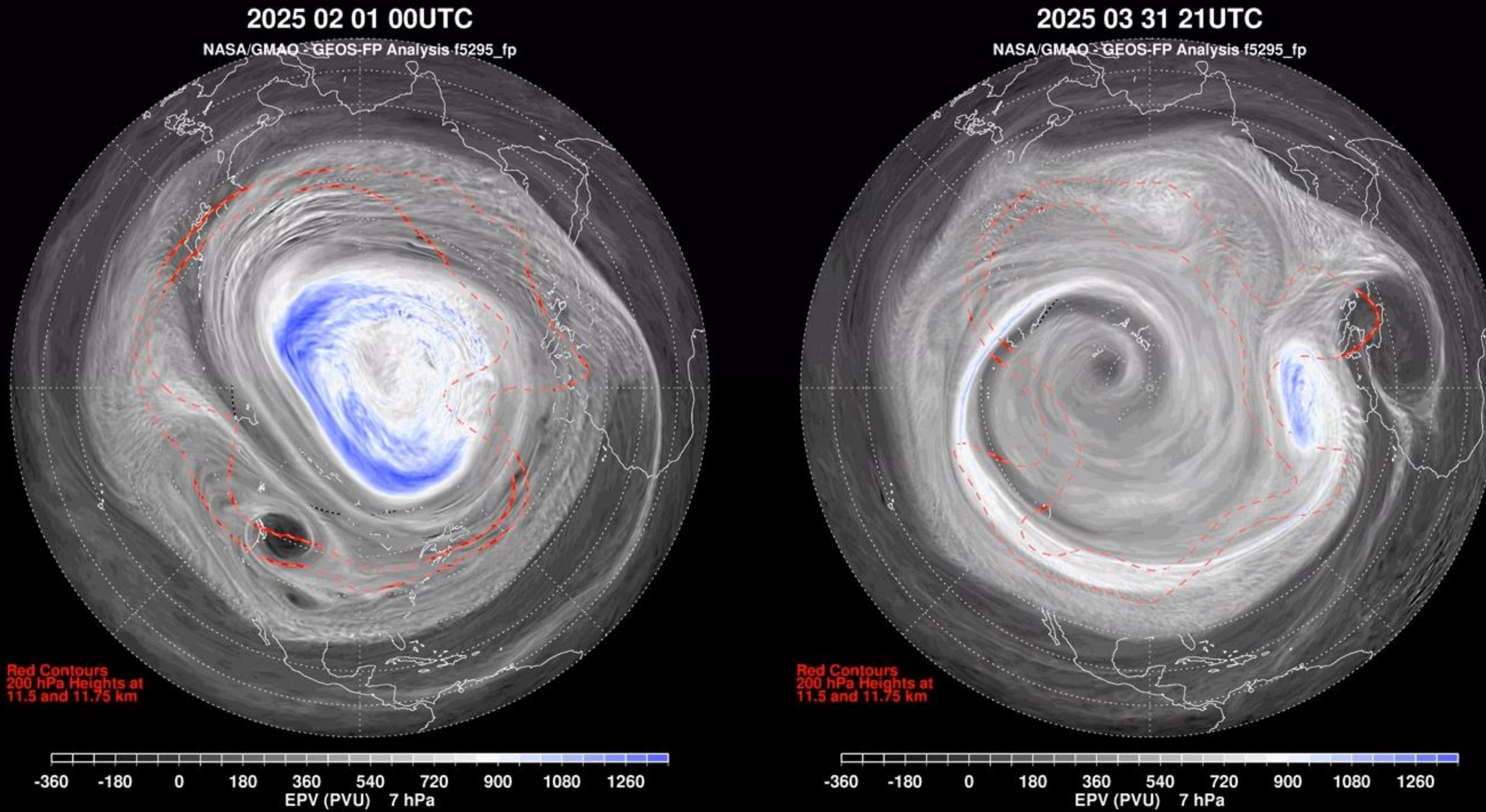


The Stratospheric Sudden Warming of March 2025 Abruptly Ended the NH Stratospheric Polar Vortex



Stratospheric Sudden Warmings (SSW) disrupt the northern hemisphere (NH) wintertime westerly flow, rapidly warming the polar night region. A cold stratospheric polar region characterized most of the NH winter of 2024-2025, with a major final warming in early March. Along with warming the pole and weakening winds, SSW events transport air between the tropics and the polar regions. The Ertel Potential Vorticity (EPV) fields, calculated from wind and temperature, are well conserved following the flow, allowing EPV to act like a tracer of the atmospheric motion. GEOS-FP and S2S products are capable of forecasting and characterizing the evolution of the SSW events, as well as tracking the dramatic mixing of tropical and polar air that occurs during these events.

Ertel Potential Vorticity at 7 hPa for 1 February 2025 (left) and 31 March 2025 (right). The red curves denote the 11.5 and 11.75 km heights on the upper tropospheric 200 hPa surface. Note the tropospheric incursion under the stratospheric vortex near Greenland that precipitated the smaller February warming event.