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What controls the inter-annual variability of Arctic ozone?

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Understanding the processes that control the inter-annual variability of Arctic ozone during winter and spring is important to predict how the ozone layer will evolve in a changing climate. It is now well accepted that high latitude total ozone during spring is largely controlled by the flux of planetary-scale waves into the stratosphere during mid-winter, as measured by the Eliassen-Palm (EP) flux. E.g., years with low wave activity during mid-winter exhibit reduced poleward and downward ozone transport, enhanced confinement of air masses at high latitudes and low temperatures that favour chemical ozone destruction. Recently an unexpected correlation between high latitude total ozone in March and high latitude ozone in the mid-stratosphere during the previous summer and autumn was found, which raises the question of what controls the inter-annual variability of meteorological conditions and ozone in the Arctic stratosphere during spring. In order to investigate the mechanisms of this correlation, we are performing an assimilation of satellite ozone data into a chemical transport model. Thus a long-term dataset of reconstructed stratospheric ozone is generated, which allows for the observation of inter-annual ozone variability and offers a perspective of studying the underlying processes in greater detail.