MEASUREMENTS OF HNO₄: IMPLICATIONS FOR HOₓ

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Establishing a quantitative understanding of the abundance of peroxynitric acid (HNO₄) is of interest because its reaction with OH is believed to be a significant sink for HOₓ in the lower stratosphere and upper troposphere. Provided the photochemistry of HNO₄ is well understood, space-borne measurements of HNO₄ can be used to diagnose the combined abundance of the hydrogen and nitrogen radical species HO₂ and NO₂. We examine concentration profiles of HNO₄ obtained by the MkIV Fourier transform infrared spectrometer for two flights, one at mid-latitudes, the other at 66°N during spring. Although the mid-latitude observations of HNO₄ agree fairly well with a calculated profile based on standard kinetic parameters, the high-latitude spring time measurements of HNO₄ are about a factor of two less than calculated. Introduction of a speculative long-wave (> 650 nm) photolytic pathway for HNO₄ is shown to lead to good agreement between theory and observation of HNO₄ for both the mid-latitude and high-latitude regions. We discuss why this occurs and implications of the HNO₄ sink for HOₓ.