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Kelvin waves in stratospheric temperature observed by the Microwave Limb Sounder. Mote, P.W., T.J. Dunkerton, and D. Wu, *J. Geophys. Res.*, **107,** 10.1029/2001JD001056 (2002).

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Summary

Kelvin waves influence tropopause structure and upper tropospheric cirrus clouds, giving them an important role in stratosphere-troposphere exchange and the radiative properties of the upper troposphere. The sharp cooling of the tropopause sometimes associated with Kelvin waves may be an important missing factor in the attempt to explain the observed water vapor mixing ratios in the stratosphere. In this study we show the structure of Kelvin waves in great detail to lay a foundation for further investigations on whether the variations in lower stratospheric water vapor can be linked with Kelvin waves. Two Kelvin wave modes are identified in wavenumber-1 variations using extended empirical orthogonal functions. Characteristics of the dominant mode include: a period near 10 days, deep vertical structure extending from 70 to 1 hPa with a vertical wavelength of 14 km in the lower stratosphere and 20 km in the upper stratosphere, and a maximum variance in the upper stratosphere. Characteristics of the second mode include a period near 6.5 days, a vertical wavelength of about 23 km. The structures of the modes in all three dimensions agree with linear theory and satisfy the dispersion relation for Kelvin waves.

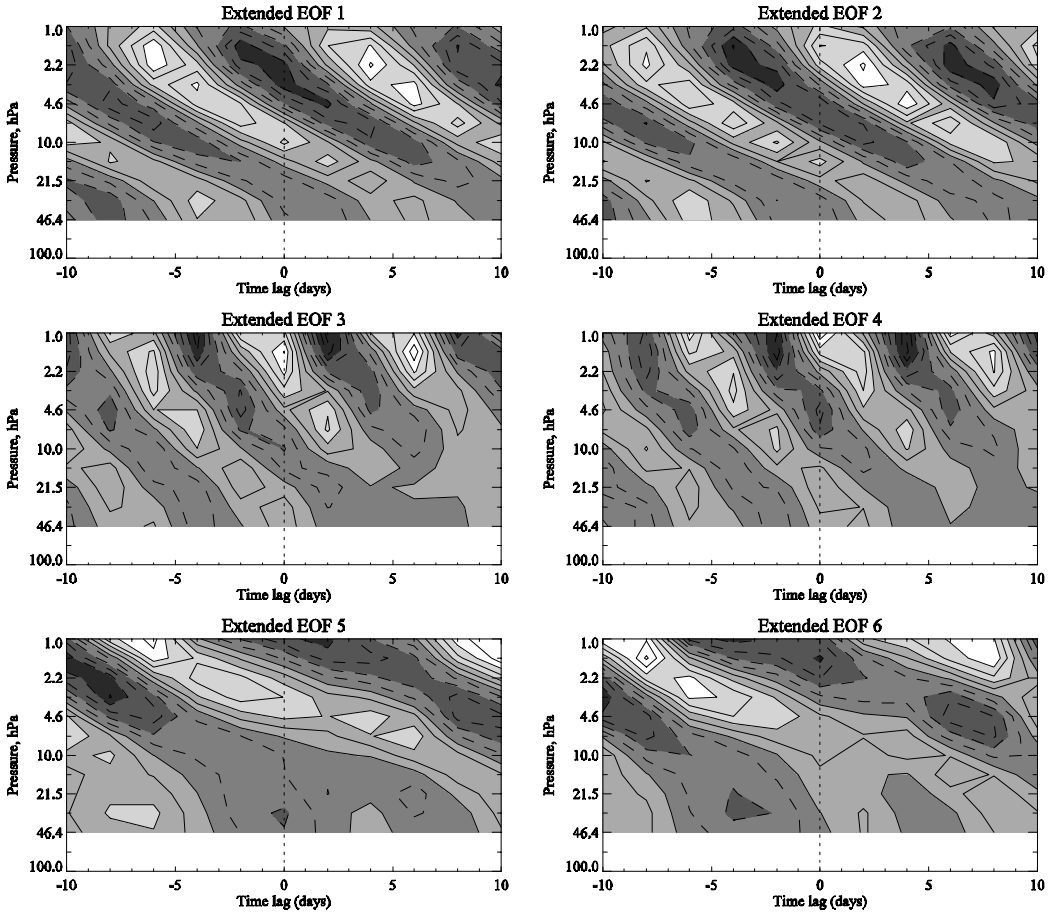

Figure 3. Lag-altitude structure of first 6 EEOFs of equatorial temperature. The first 6 EEOFs represent three conjugate pairs. The first three pairs represent 22%, 13%, and 11% of the variance and describe variations whose periods are 10, 6.5, and 17 days, respectively.