

# **Fine Structure of Vertically Propagating Kelvin Waves and Tropopause Height Variability at Upper Troposphere and Lower Stratosphere Observed by Equatorial Atmospheric Radar (EAR)**

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The relationship among local convection, vertically propagating Kelvin waves, and tropopause height variability is examined. This study utilizes the Equatorial Atmospheric Radar (EAR) observational datasets and NCEP-NCAR re-analysis data. Spectral analyses both Fast Fourier Transform (FFT) and Wavelet (WL) techniques are used to investigate the propagation of Kelvin waves over Kototabang, West Sumatera, Indonesia. In addition, the statistical analyses both Cross Correlation Function (CCF) and Cross Spectral (CS) are also done to investigate the correlation between Kelvin waves and Tropical Tropopause Layer (TTL).

Based on EAR data for the period of December 2001 to December 2008, the Kelvin waves are detected by propagation in the zonal wind anomaly eastward and vertically. The analysis of power spectrum during that time is showing a Kelvin wave which has the period of 18 days at 17.41 km altitude. Kelvin waves were found near the tropopause layer (~ 17 km). While, the analysis of power spectrum during wet and dry season is showing Kelvin wave energy in wet season (DJF=December-January-February) is stronger relatively than that in dry season (JJA=June-July-August). In the wet season (DJF) Kelvin wave height of 16.97 MSL (Mean Sea Level) km is more dominant relatively in the period of 15 days. While, in dry season (JJA) Kelvin wave is more dominant relatively at 16.52 km altitude with the period of 18 days.

From statistical analysis, the cross correlation between zonal wind and tropopause height was shown. This means that the zonal wind direction indicating easterlies affect the Kelvin wave height of the tropopause. Furthermore, we analyzed Kelvin wave activities during other wet season (January to March, 2013), transition season (April to June, 2013), and dry season (July to September, 2013), respectively. We found the strongest Kelvin wave activities occurred during wet season comparing with other periods with the period of about 20 days. Detailed information of these preliminary results including the basic idea of this research will be discussed fully at our text paper.

**Keywords:** Kelvin Waves, Propagation, TTL, EAR, and Spectral Analysis