

Empirical Modes of UV Variations

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Empirical Mode Decomposition

(Huang et al., 1998)

1. FFT :

$$x(t) = \Re \sum_j a_j e^{i\omega_j t} \Rightarrow \phi(\omega)$$

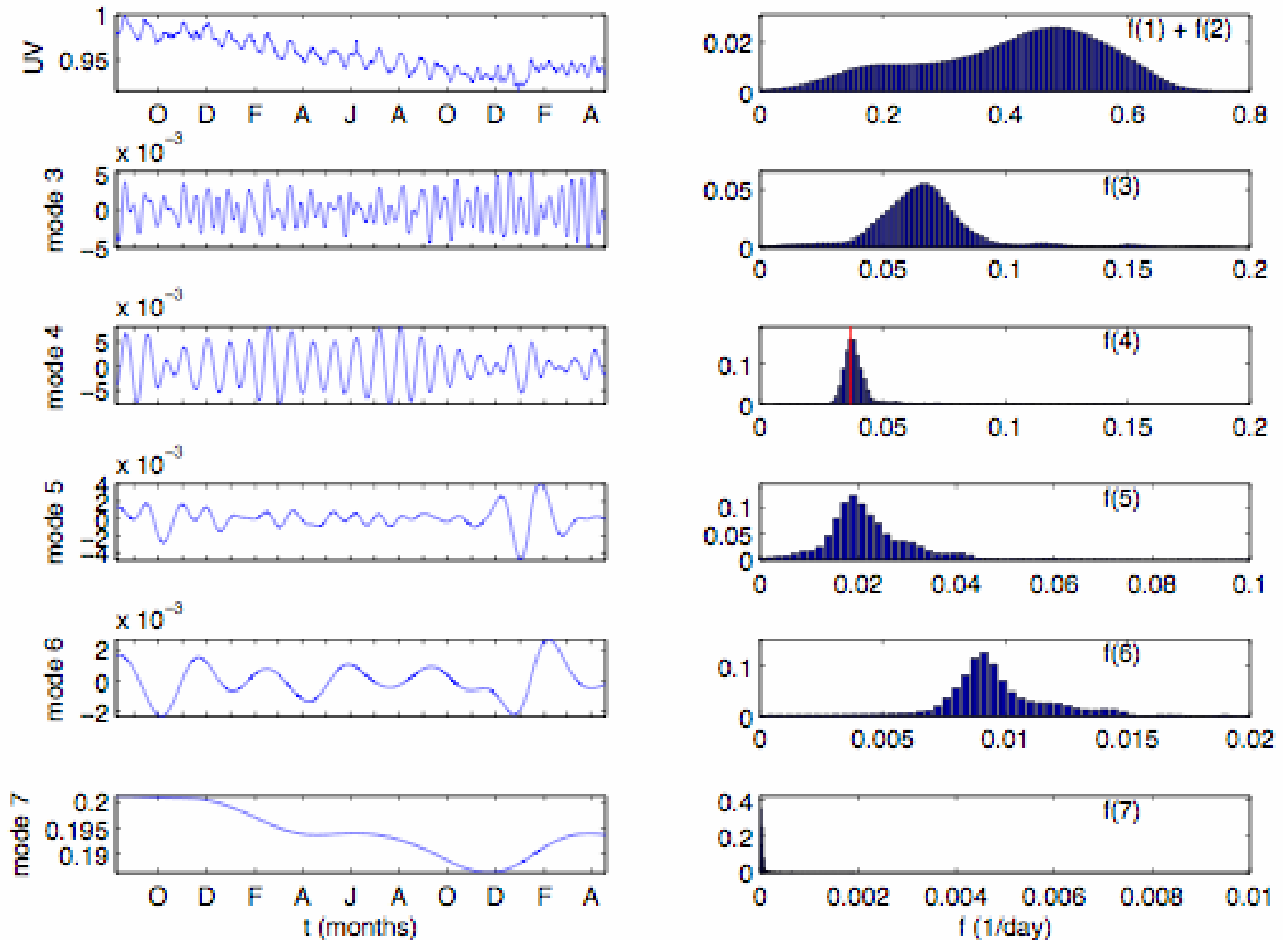
2. HHT :

$$x(t) = \Re \sum_j a_j(t) e^{i \int \omega_j(\tau) d\tau} \Rightarrow H(\omega, t)$$

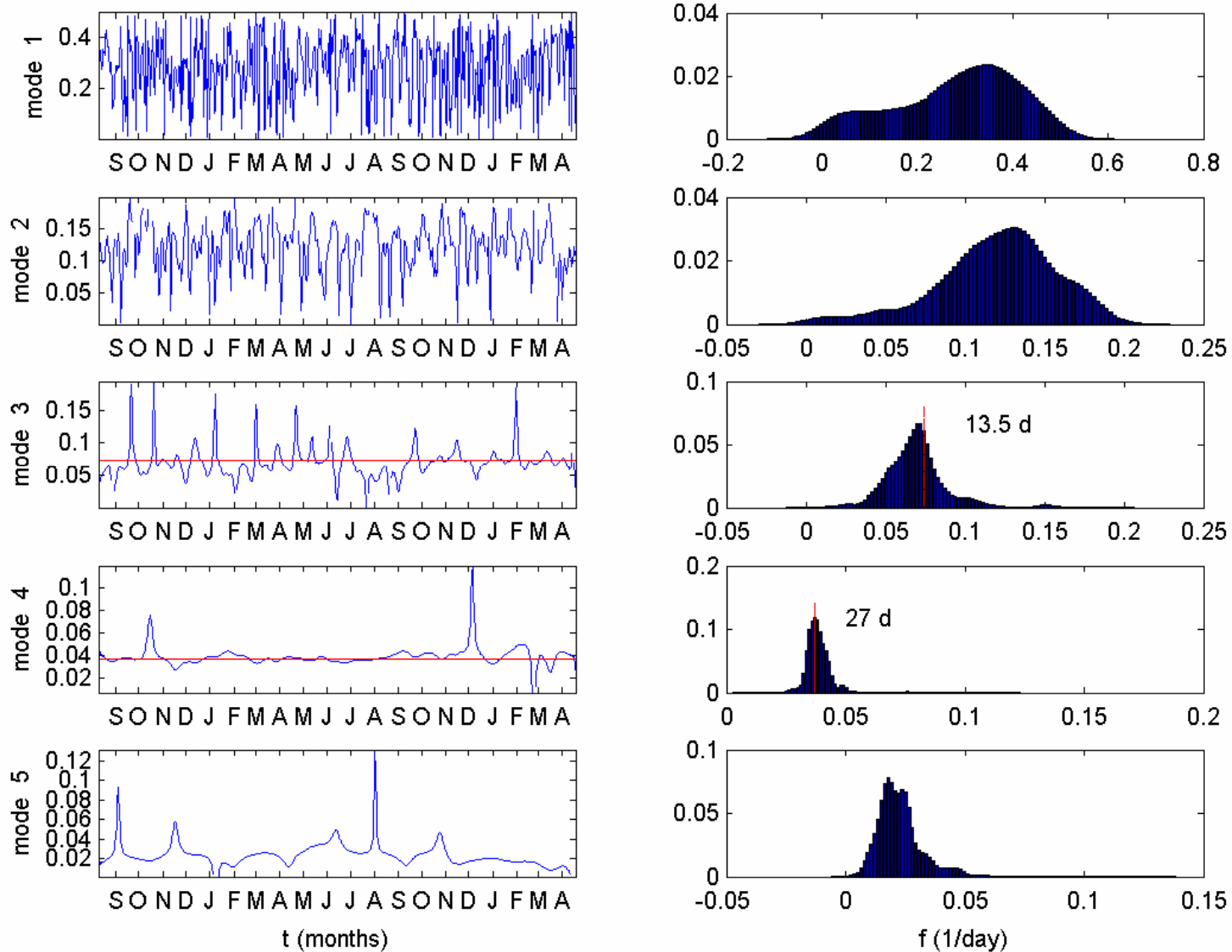
Can be treated as:

1. mode decomposition (like Fourier or wavelet)
2. natural filter

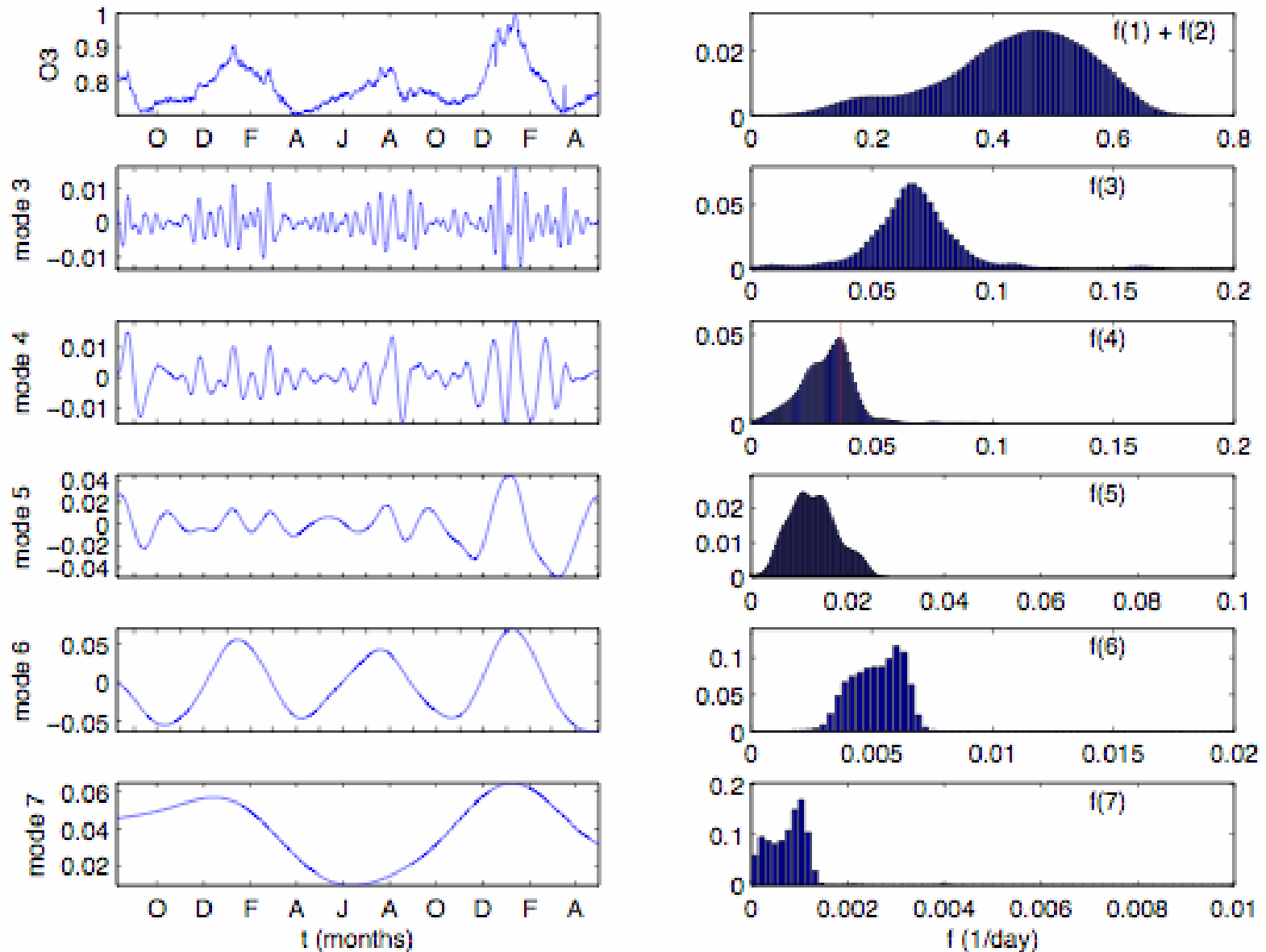
UV 205 nm Modes (2004-2006)



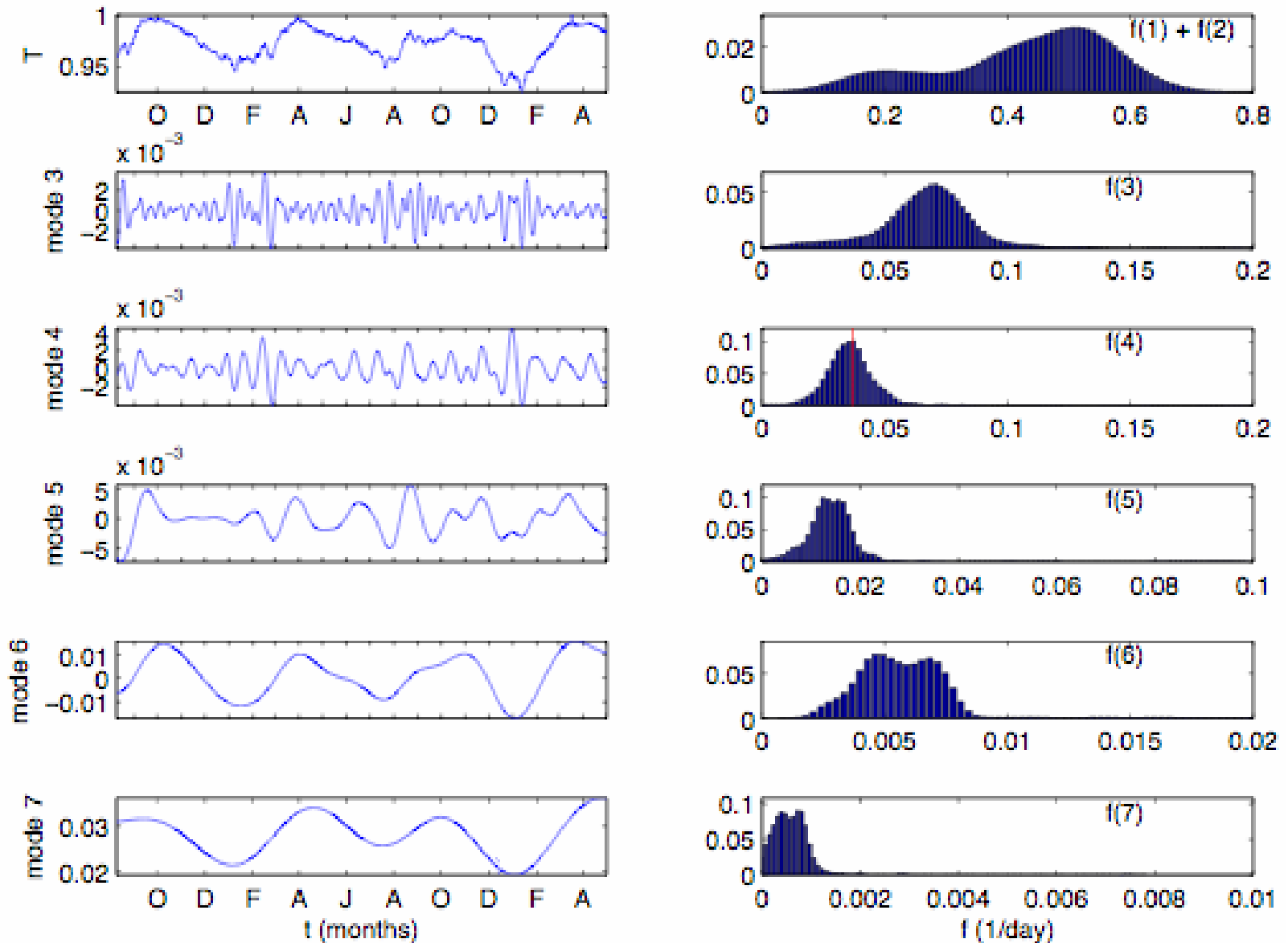
UV 205 nm Frequencies (2004-2006)



EMD of O3 at 2hPa in Tropics



EMD of T at 2 hPa in Tropics



Benefits

- Nonstationarity and nonlinearity are well treated
- No leaks from one mode to another
- 27-day mode and other modes are naturally extracted
- Nonlinear trend comes out as the last mode