Figure 3: **Fourier analyses for tsunamis generated by two successive earthquakes (M_w 7.4 and M_w 8.1) in Kermadec Islands. Pink and red curves represent the spectra of the first tsunami and the second tsunami, respectively.** **Green dots show the spectral peaks listed in Table 1. The 95% confidence bounds of two tsunami spectra are indicated by dashed curves.** **The background spectra (black curves) are also plotted for comparison.**
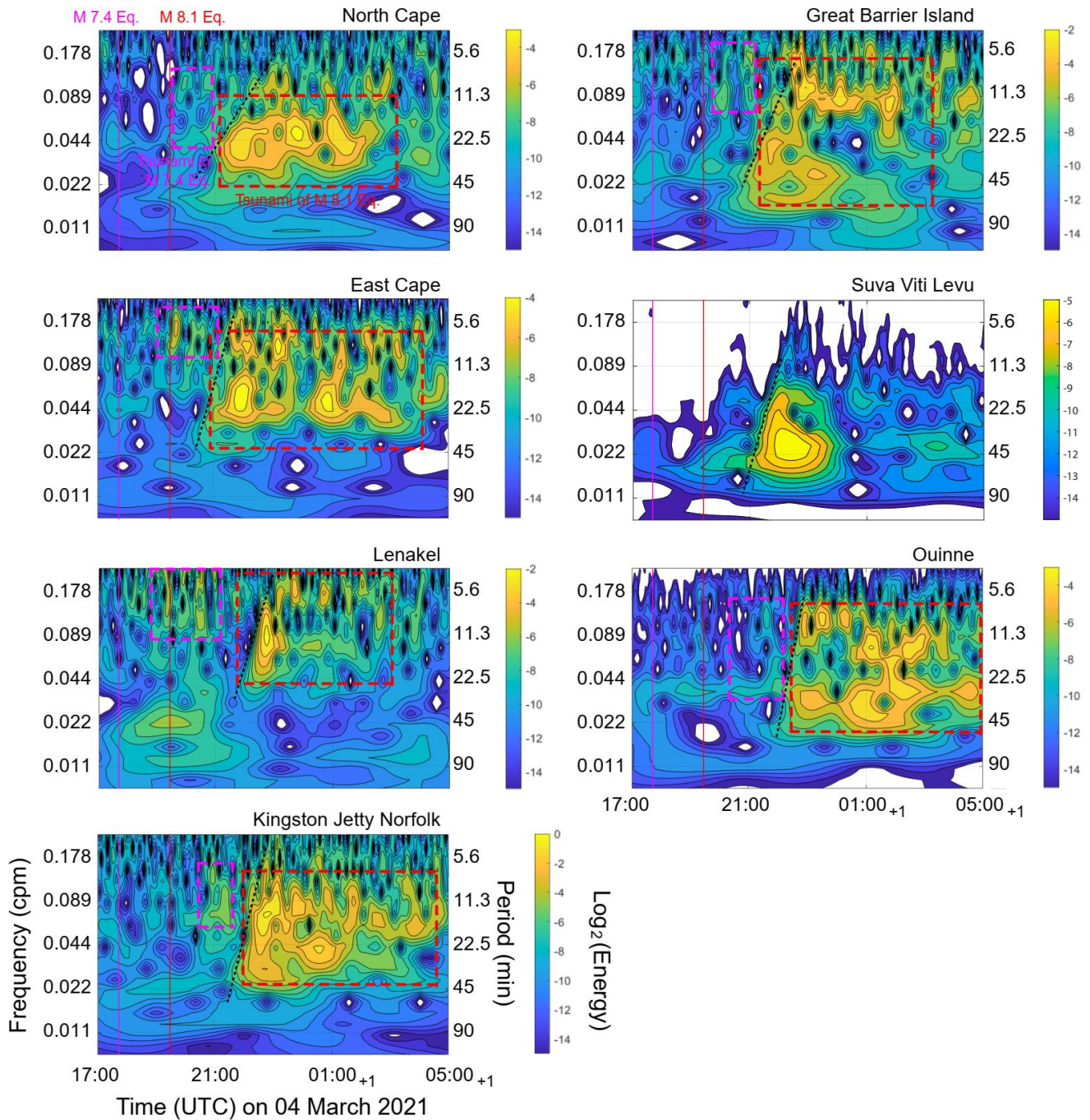
Figure 4: Wavelet (frequency-time) analyses for tsunamis generated by two successive earthquakes (M_w 7.4 and M_w 8.1) in Kermadec Islands. The colormap shows levels of spectral energy at different times and periods. For guidance, we marked the dominant periods of two tsunamis by pink (M_w 7.4) and red (M_w 8.1) rectangles ~~at East Cape~~. The pink and red vertical lines show the origin times of the M_w 7.4 and M_w 8.1 earthquakes, respectively. The dispersion curves are plotted by black dashed lines. On the horizontal axis, plus one (+1) indicates one day passed.

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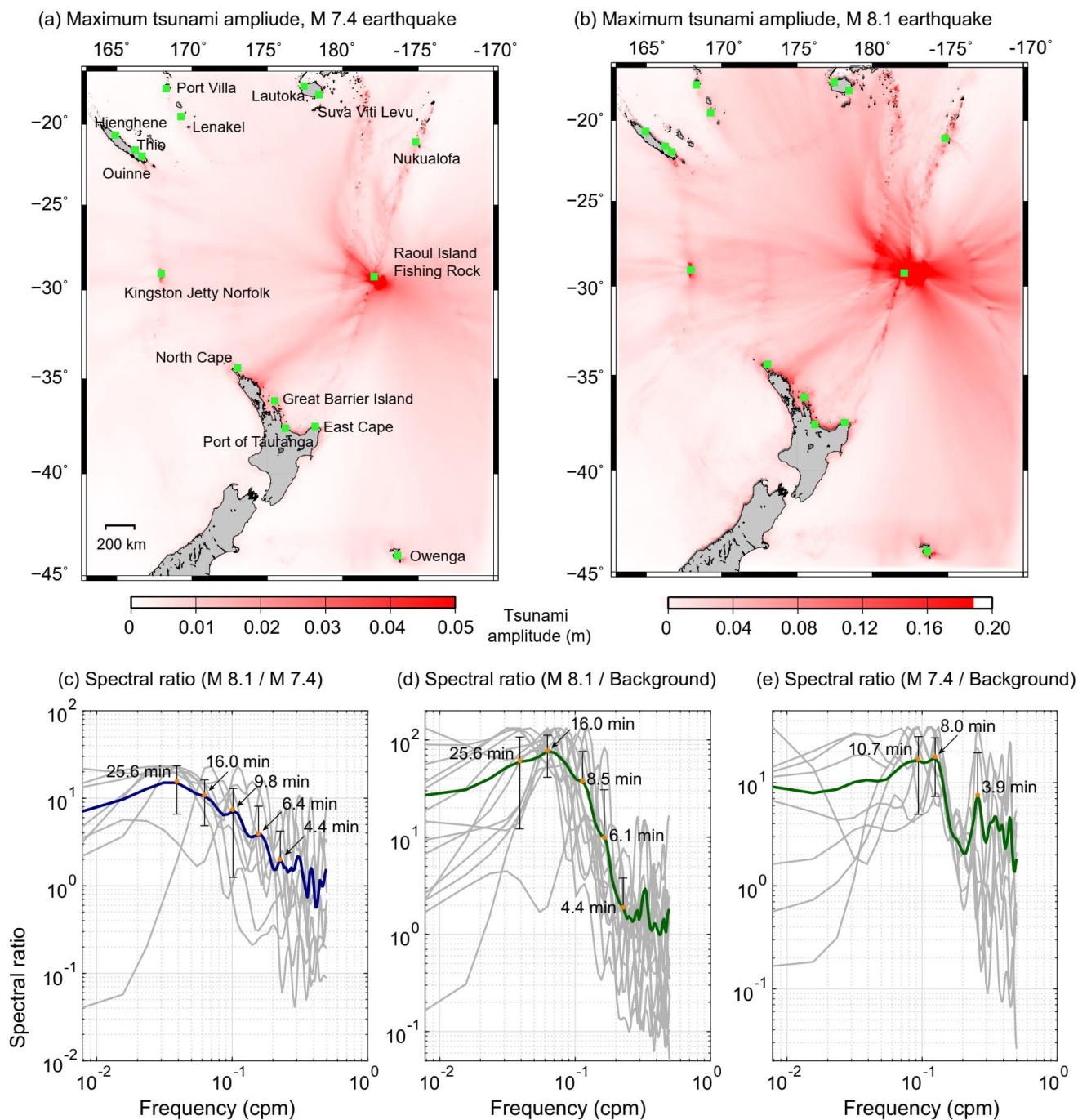
Figure 5: (a, b) Maximum simulated amplitudes for two tsunamis during the entire simulation time. The source models used for numerical simulation are from the USGS. (c) Spectral ratio of two tsunamis by dividing the spectral energy of the second tsunami

to that of the first tsunami (EGF method). Blue curve is the normalized average of tsunami spectral energy at different tide gauges. (d) Spectral ratio of the second tsunami spectrum to the background signal spectrum. Green curve is the normalized average of different tide gauges. (e) Spectral ratio of the first tsunami spectrum to the background signal spectrum. Green curve is the normalized average of different tide gauges.

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Table 1: Peak periods at each tide gauge for two tsunami events. The values were calculated by Fourier analyses.

Station name abbreviations are: North Cape (NC), Great Barrier Island (GBI), East Cape (EC), Suva Viti Levu (SVL), Kingston Jetty Norfolk (KJN), Port Vila (PV), and Raoul Island Fishing Rock (RIFR).

Tide gauge	Peak period(s) for the first tsunami (min)	Peak period(s) for the second tsunami (min)
NC	9.1	9.8; 21.3
GBI	6.5; 10.7	6.4; 10.7; 32.0
PT	N/A	9.8
EC	6.1; 9.8; 16.0	8.5; 18.3
Owenga	N/A	14.2
Nukualofa	N/A	7.1; 21.3
SVL	8.0; 18.3	32.0
Lautoka	N/A	9.8; 25.6
Lenakel	6.1; 8.5	5.6; 12.8
PV	N/A	25.6
Ouinne	8.5; 25.6	9.1; 32.0
Thio	N/A	8.5; 14.2
Hienghene	N/A	7.5; 18.3
KJN	8.5; 14.2	14.2
RIFR	4.6; 9.1	N/A