

Supplementary Information for
High-Q Spectral Peaks and Non-stationarity in the Geomagnetic Field
over the 400-4000 μHz Band

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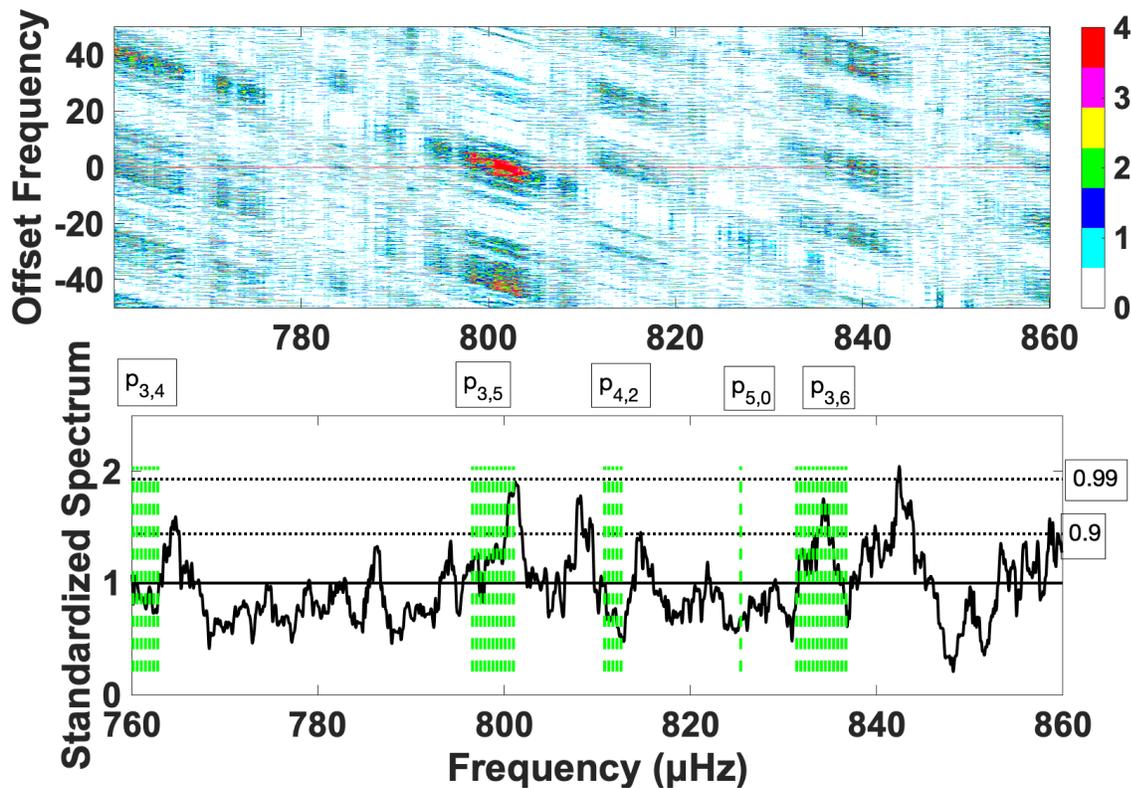


Figure S1. (a, bottom) D component standardized power spectral density versus frequency on linear scales over year–day 298–358 covering 760–860 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p–modes including rotational splitting, as listed at the top. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

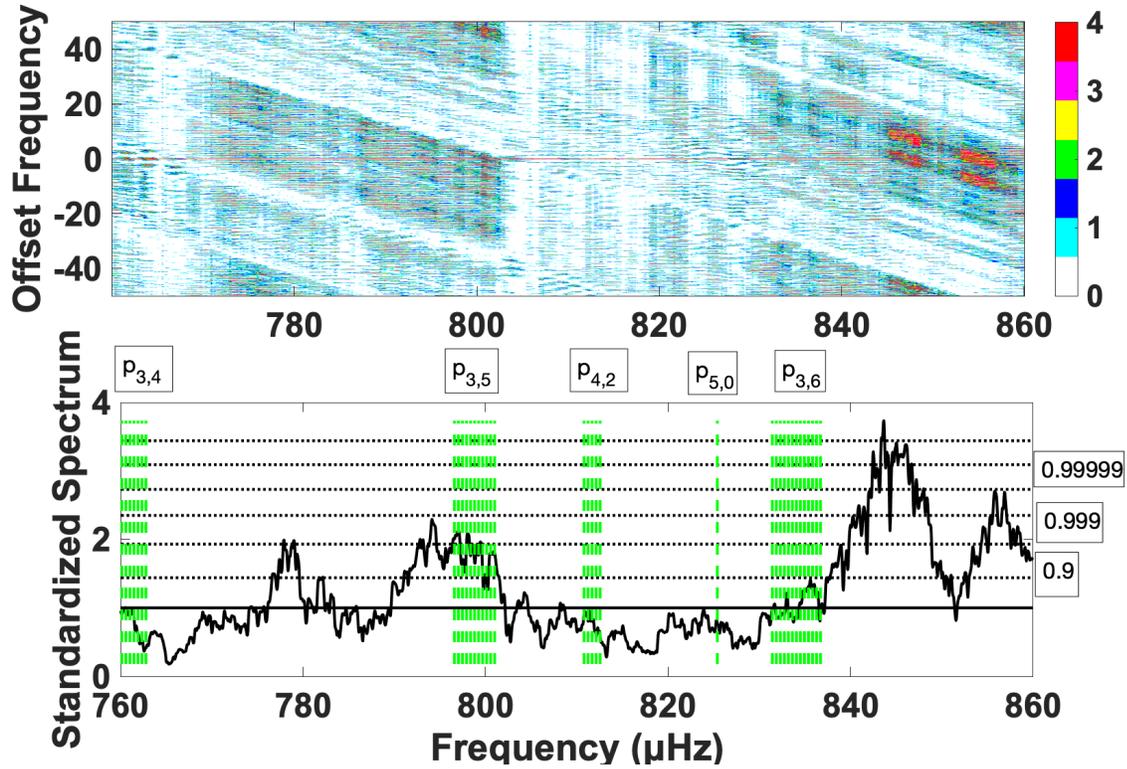


Figure S2. (a, bottom) Z component standardized power spectral density versus frequency on linear scales over year–day 298–358 covering 760–860 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 through 0.999999 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p–modes including rotational splitting, as listed at the top. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

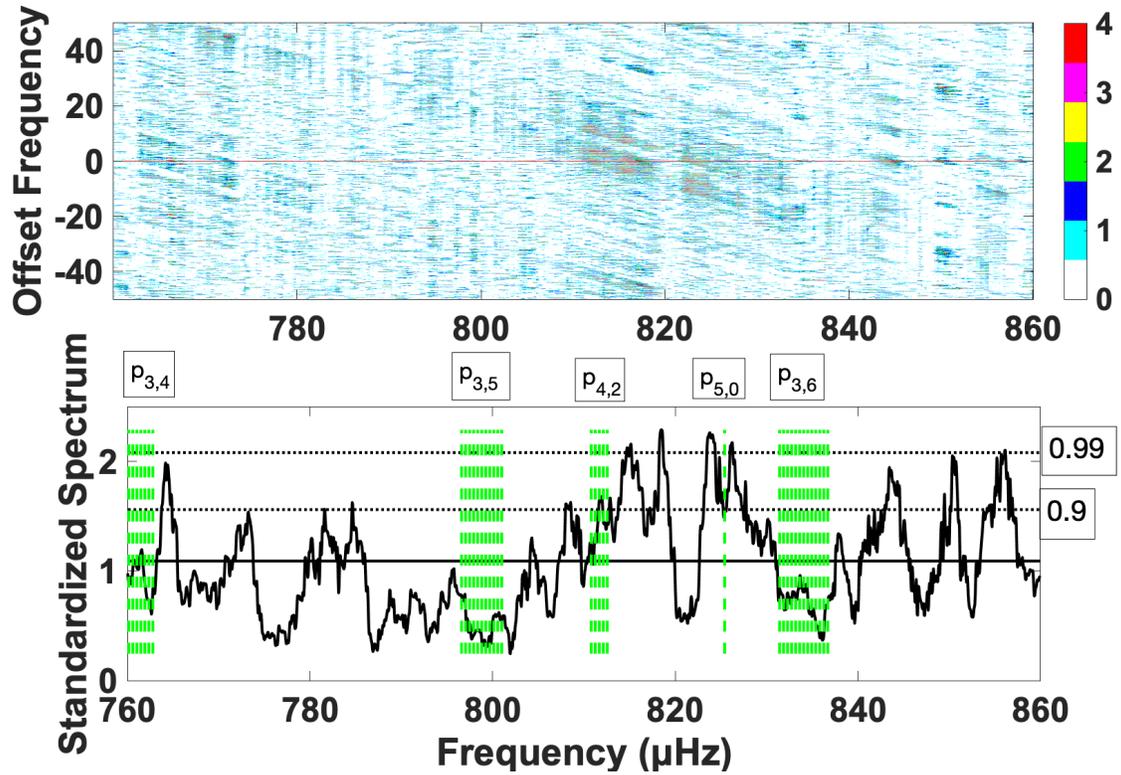


Figure S3. (a, bottom) D component standardized power spectral density versus frequency on linear scales over year–day 358–418 covering 760–860 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p–modes including rotational splitting, as listed at the top. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

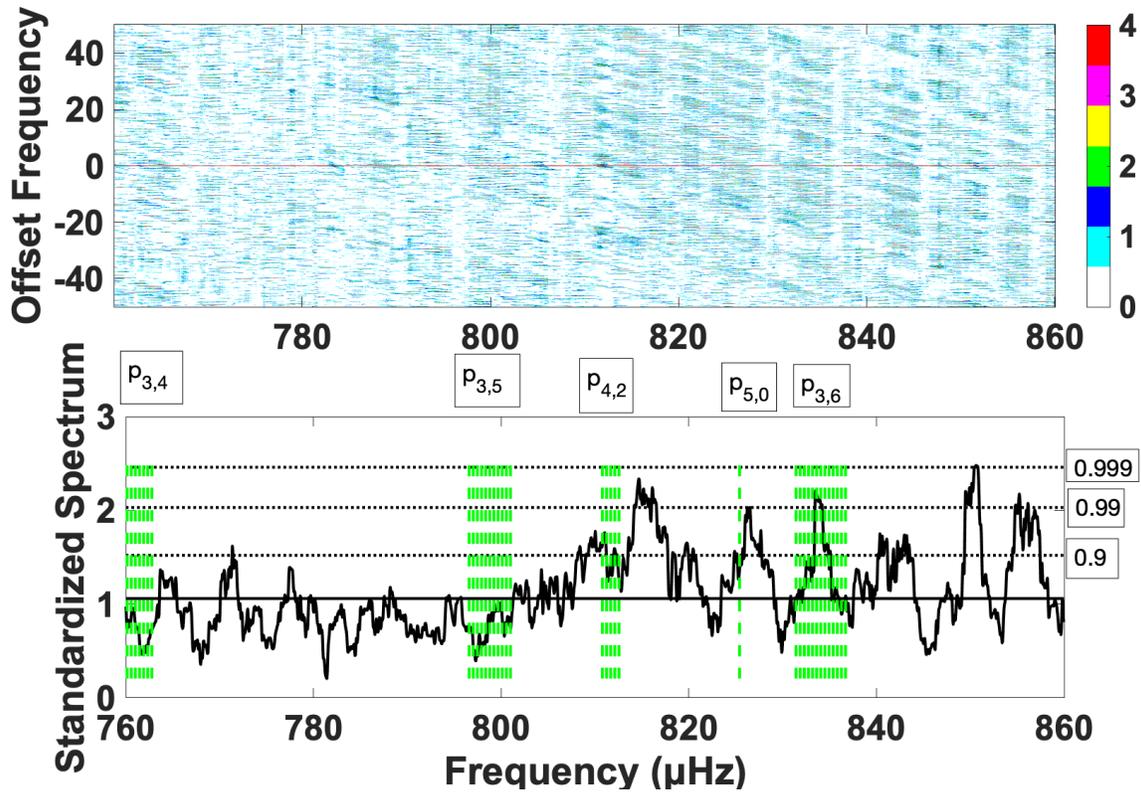


Figure S4. (a, bottom) Z component standardized power spectral density versus frequency on linear scales over year-day 358–418 covering 760–860 μHz . The time-bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 through 0.999 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p-modes including rotational splitting, as listed at the top. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time-bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

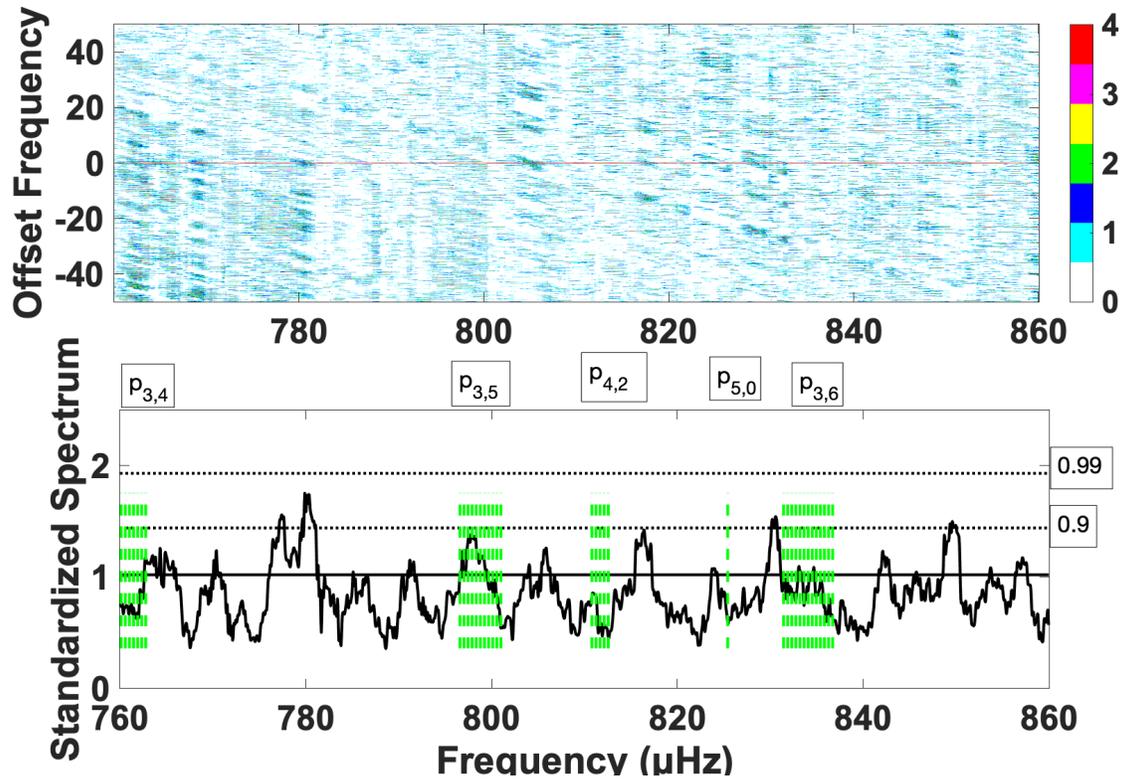


Figure S5. (a, bottom) D component standardized power spectral density versus frequency on linear scales over year–day 424–484 covering 760–860 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p–modes including rotational splitting, as listed at the top. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

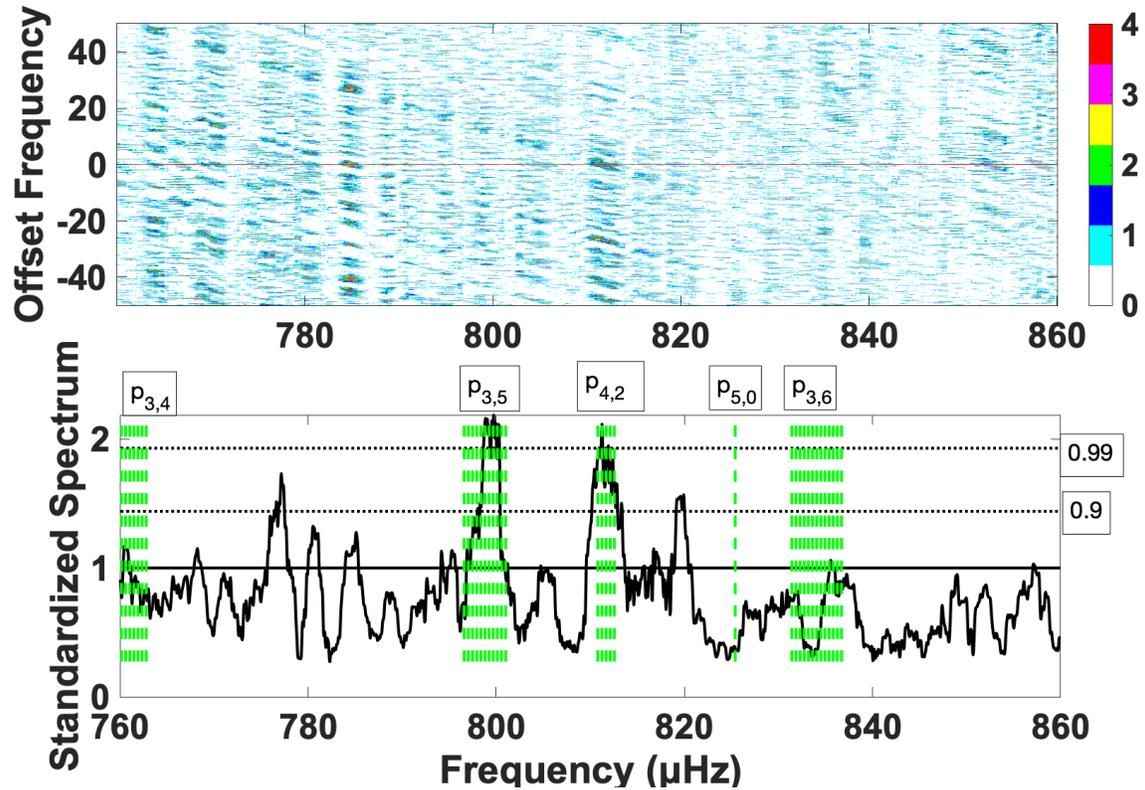


Figure S8. (a, bottom) Z component standardized power spectral density versus frequency on linear scales over year-day 424–484 covering 760–860 μHz . The time-bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 600–1000 μHz , and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The green vertical dashed lines show the locations of solar p-modes including rotational splitting, as listed at the top. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time-bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

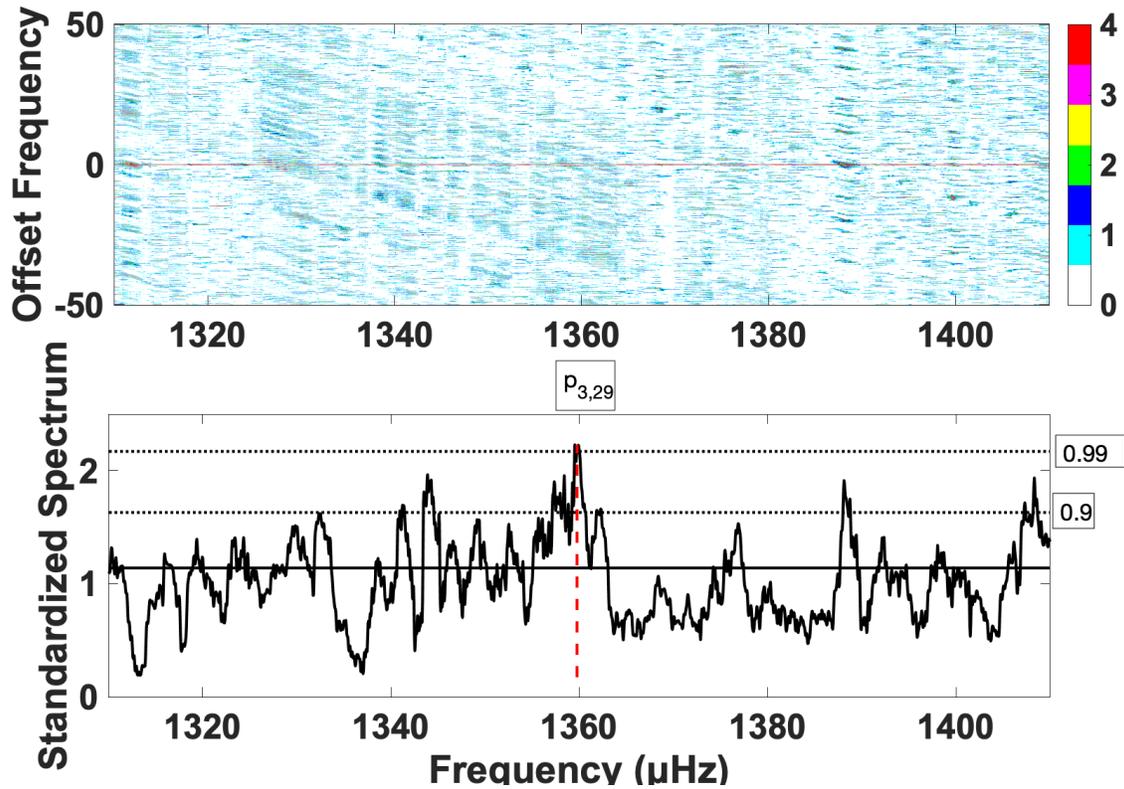


Figure S7. (a, bottom) D component standardized power spectral density versus frequency on linear scales over year–day 424–484 over 1310–1410 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 1200–1800 μHz , and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The red dashed line denotes the center ($m = 0$) frequencies of a medium degree p–modes. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

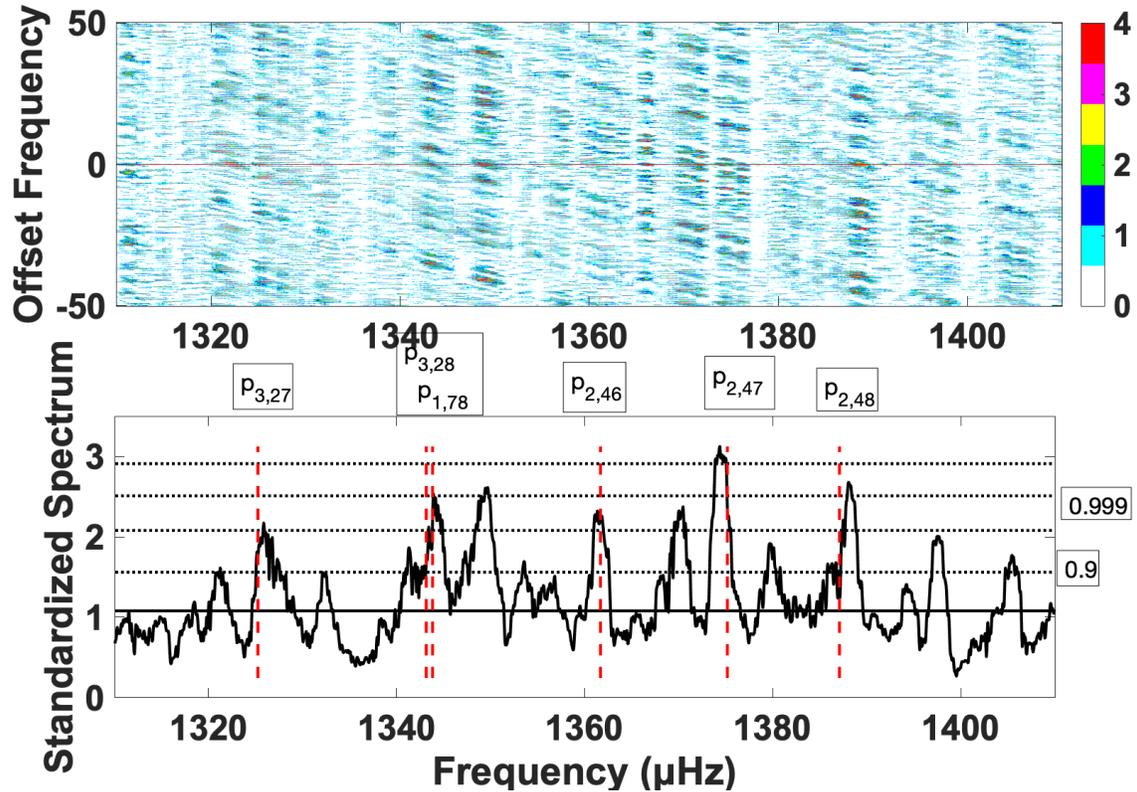


Figure S8. (a, bottom) Z component standardized power spectral density versus frequency on linear scales over year-day 424–484 over 1310–1410 μHz . The time-bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 1200–1800 μHz , and the dashed horizontal lines are the 0.9 through 0.9999 quantiles of that distribution as labeled on the right. The red dashed lines denote the center ($m = 0$) frequencies of medium degree p-modes as labeled. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time-bandwidth is 5 and 9 Slepian tapers were used, yielding 166 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

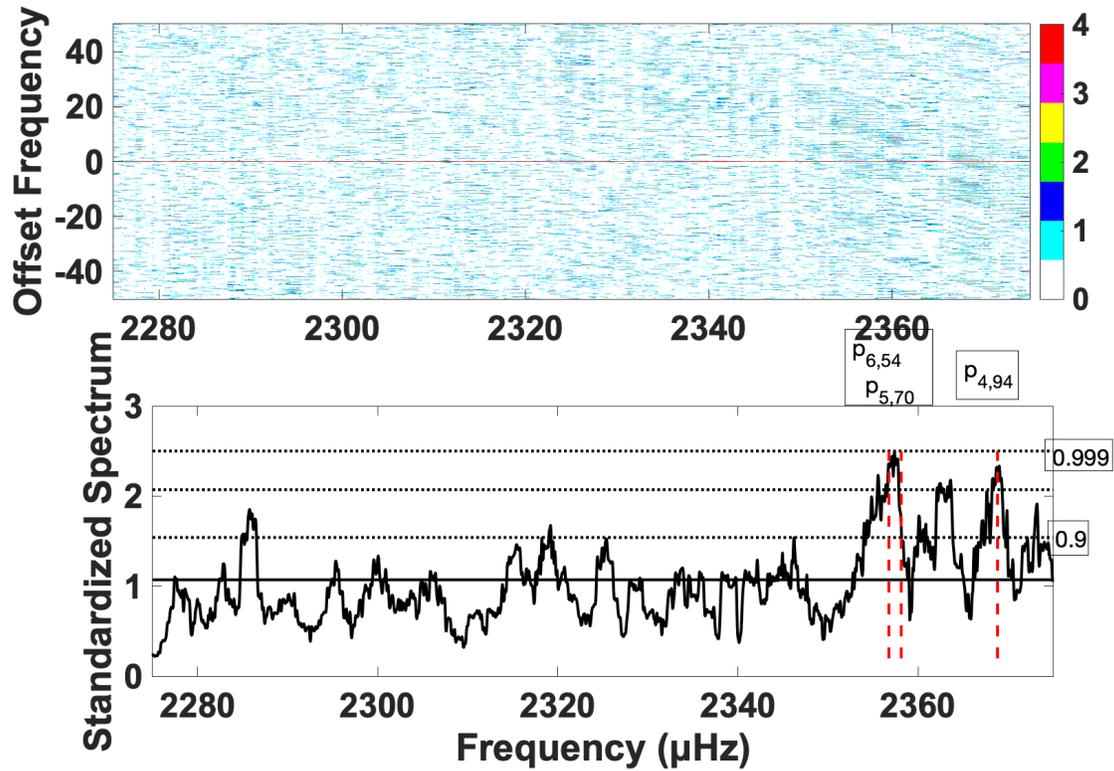


Figure S9. (a, bottom) D component standardized power spectral density versus frequency on linear scales over year–day 358–418 over 2275–2375 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 2000–2600 μHz , and the dashed horizontal lines are the 0.9 through 0.999 quantiles of that distribution as labeled on the right. The red dashed lines denote the center ($m = 0$) frequencies of medium degree p–modes. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

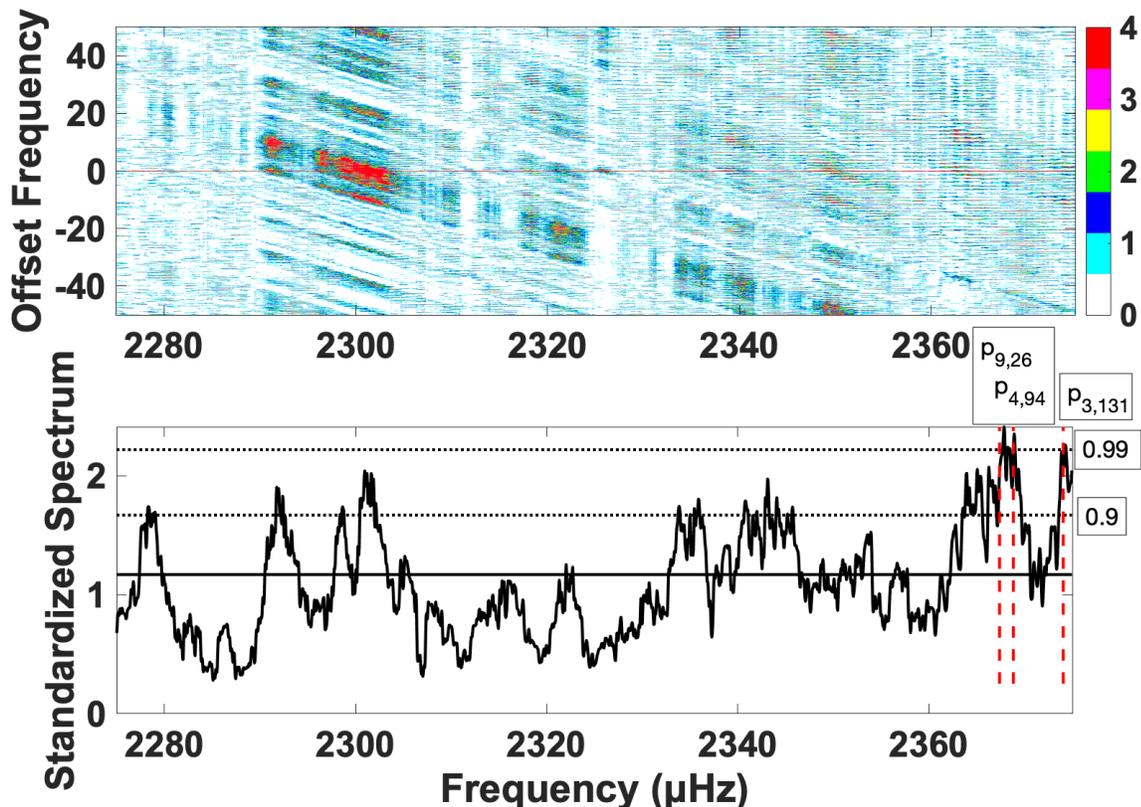


Figure S10. (a, bottom) Z component standardized power spectral density versus frequency on linear scales over year-day 358–418 over 2275–2375 μHz . The time-bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 2000–2600 μHz and the dashed horizontal lines are the 0.9 and 0.99 quantiles of that distribution as labeled on the right. The red dashed lines denote the center ($m = 0$) frequencies of medium degree p-modes. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time-bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

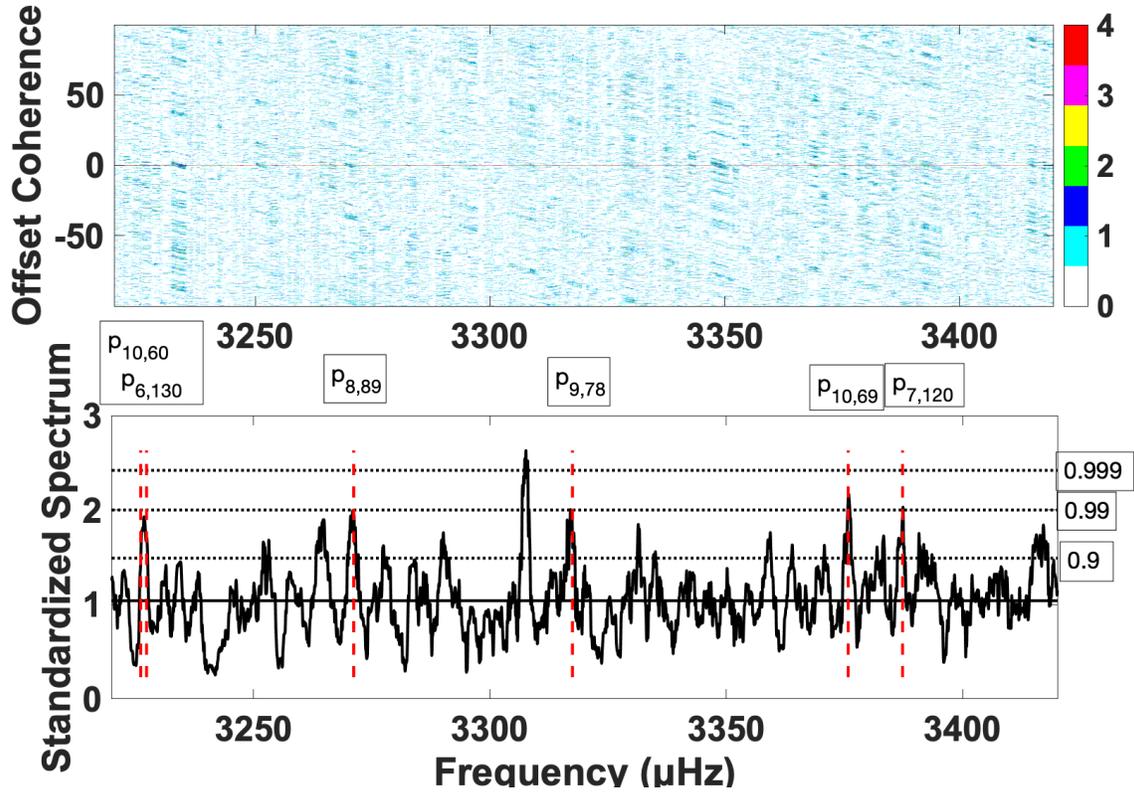


Figure S11. (a. bottom) D component standardized power spectral density versus frequency on linear scales over year–day 358–418 over 3220–3420 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 3000–3600 μHz and the dashed horizontal lines are the 0.9 through 0.999 quantiles of that distribution as labeled on the right. The red dashed lines denote the center ($m = 0$) frequencies of medium degree p–modes. (b, top) Contours of the D component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.

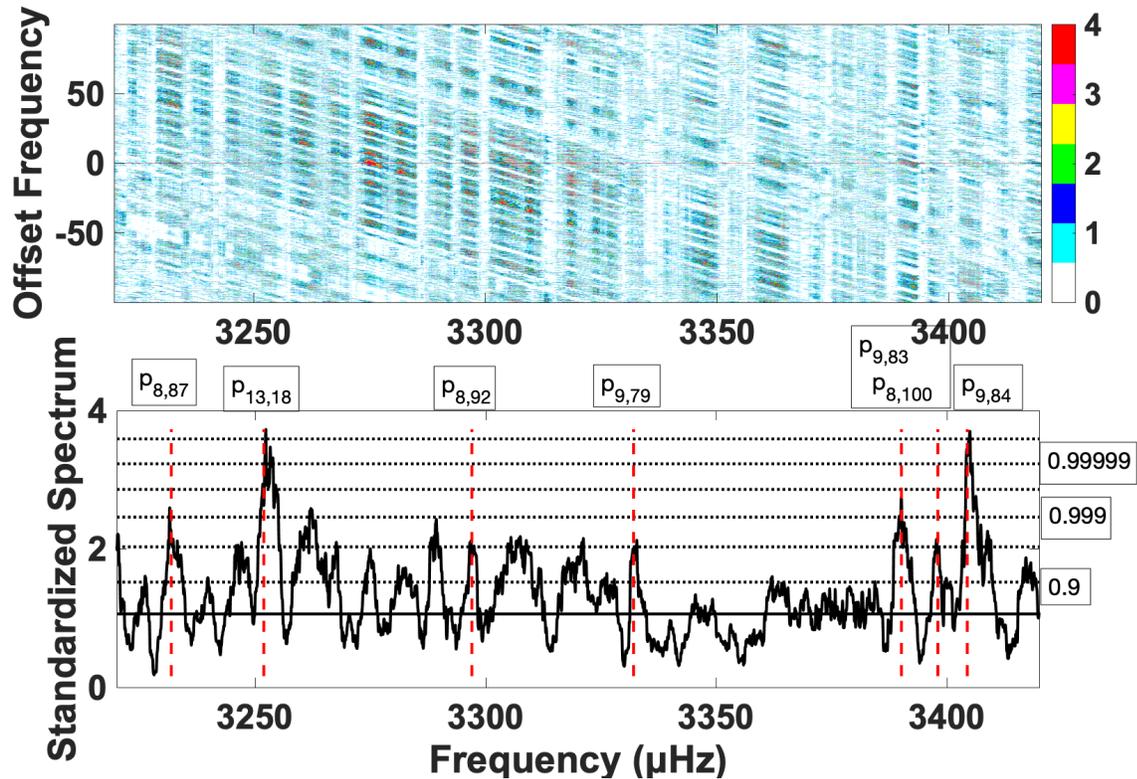


Figure S12. (a, bottom) Z component standardized power spectral density versus frequency on linear scales for year–day 358–418 over 3220–3420 μHz . The time–bandwidth is 5 and there are 9 data tapers, yielding a resolution bandwidth of 1.9 μHz and 18 degrees of freedom per frequency. The solid horizontal line is the mean of the fitted mixture central/noncentral chi square distribution over 3000–3600 μHz , and the dashed horizontal lines are the 0.9 through 0.999999 quantiles of that distribution as labeled on the right. The red dashed lines denote the center ($m = 0$) frequencies of medium degree p–modes. (b, top) Contours of the Z component transformed offset coherence against frequency on the abscissa and offset frequency on the ordinate for the same frequency band and time interval as in (a). The time–bandwidth is 5 and 9 Slepian tapers were used, yielding 16 degrees of freedom per frequency. The color levels 1 through 4 correspond to probability levels of 0.9 to 0.9999 that frequencies are correlated.