

1 **Supplementary Materials for**
2 **Global scale analysis and modeling of primary microseisms**

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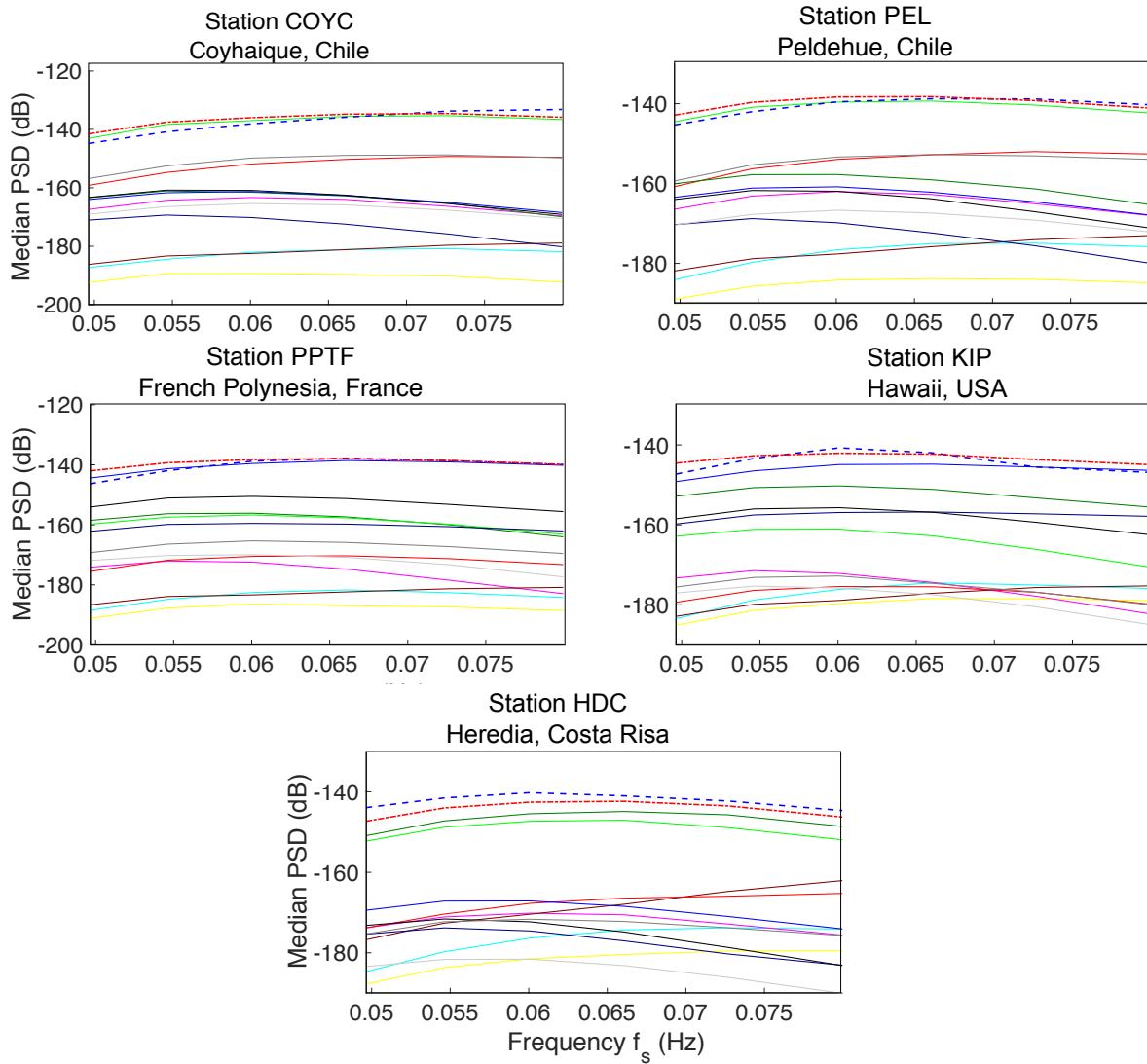


Figure S1. Observed (red dashed line) and synthetic PSD (in dB with respect to $1 \text{ m}^2/\text{Hz}$) computed considering sources at the global scale (blue dashed line). Solid colored lines refer to synthetic spectra computed considering only sources in a given subregion. Source subregions are shown in Figure 5 in the main paper. The observed PSD at these stations can be explained by sources along the west coast of South America (top panels), around islands in the Pacific Ocean (middle panels), and along the west coast of North America (bottom panel).

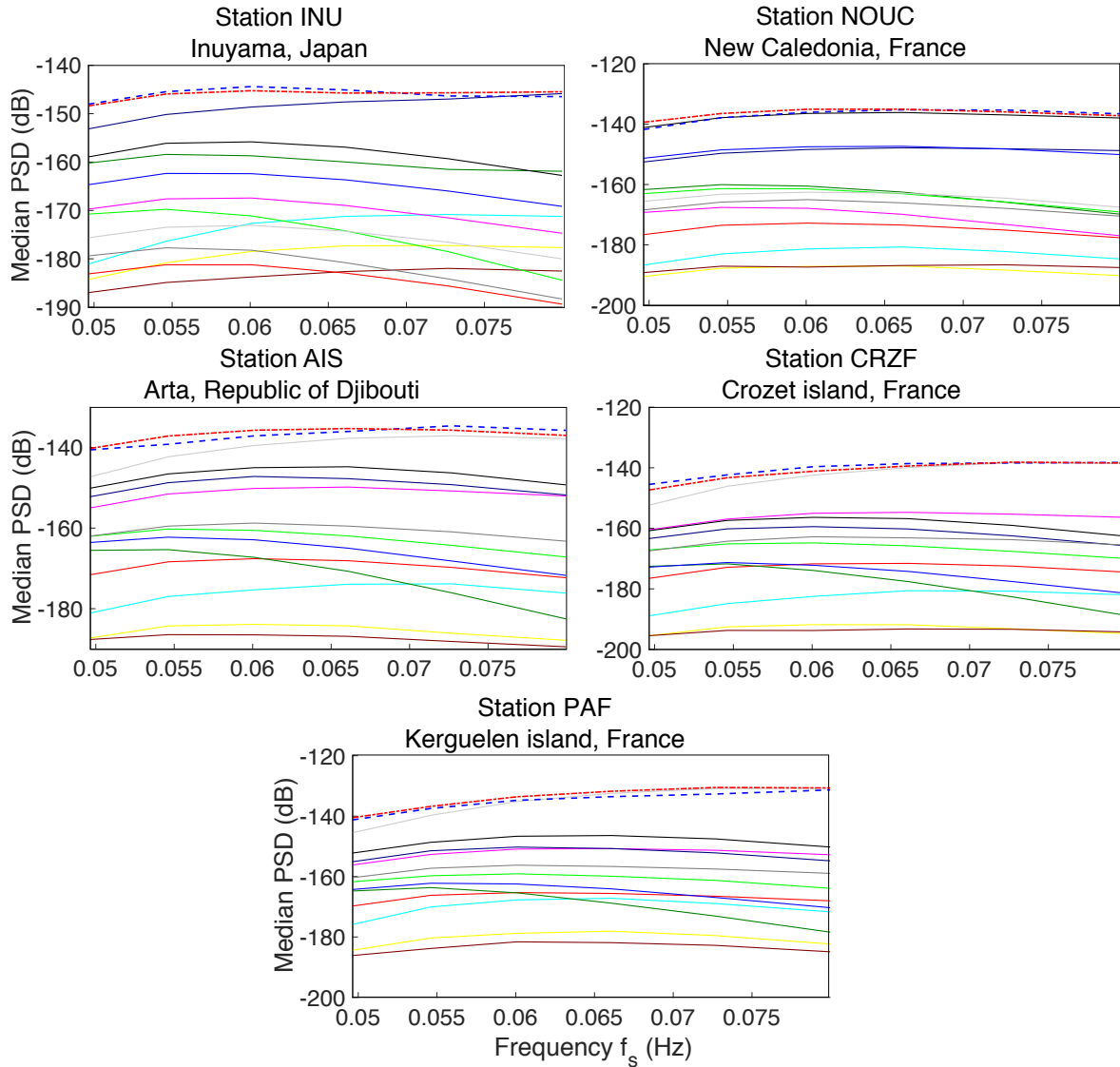


Figure S2. Observed (red dashed line) and synthetic PSD (in dB with respect to $1 \text{ m}^2/\text{Hz}$) computed considering sources at the global scale (blue dashed line). Solid colored lines refer to synthetic spectra computed considering only sources in a given subregion. Source subregions are shown in Figure 5 in the main paper. The observed PSD at these stations can be explained by sources along the coasts of Asia (top, left column), Australia (top, right), East Antarctica (middle and bottom panels).

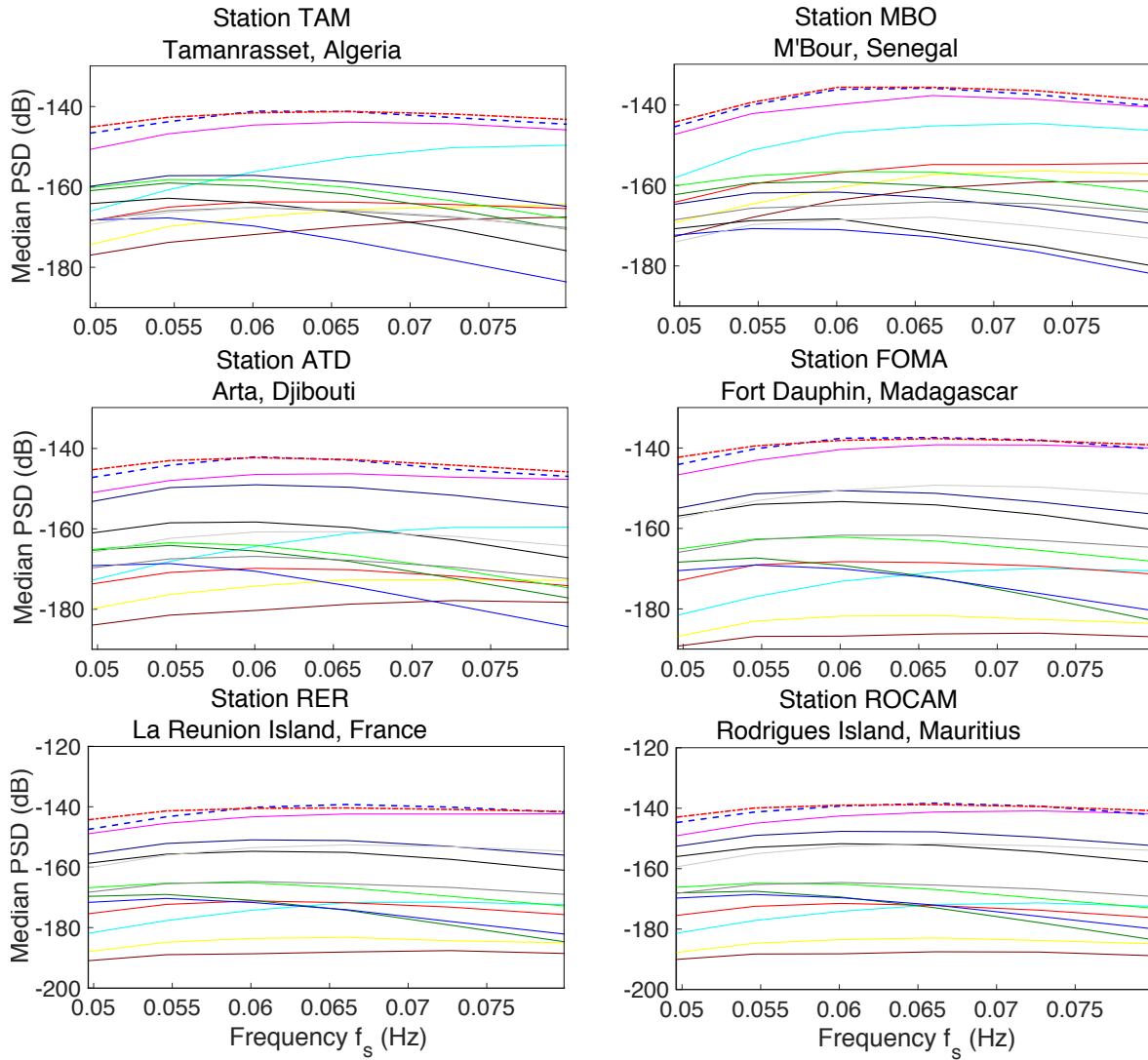


Figure S3. Observed (red dashed line) and synthetic PSD (in dB with respect to $1 \text{ m}^2/\text{Hz}$) computed considering sources at the global scale (blue dashed line). Solid colored lines refer to synthetic spectra computed considering only sources in a given subregion. Source subregions are shown in Figure 5 in the main paper. The observed PSD at these stations can be explained by sources along the coasts of Africa.

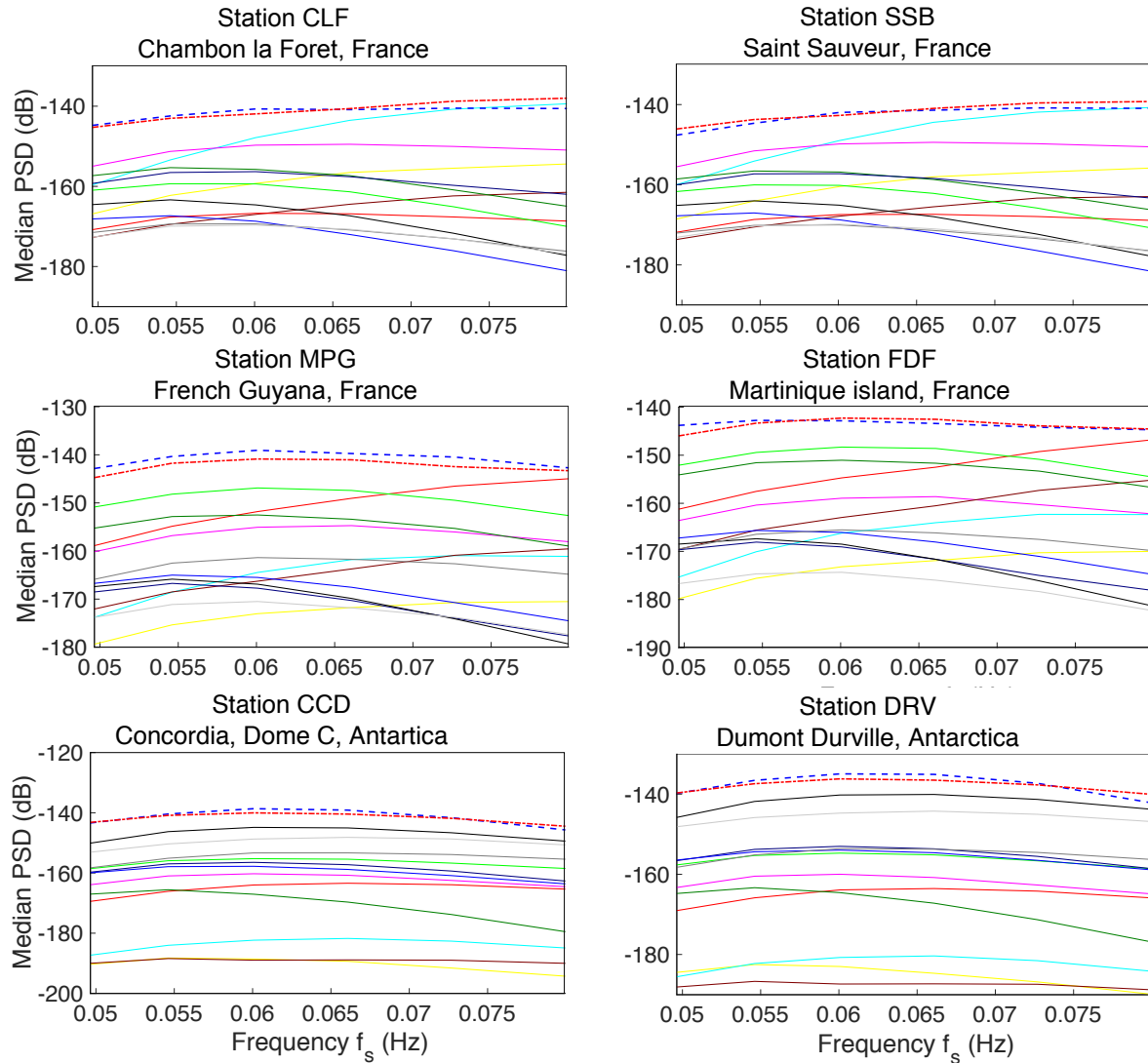


Figure S4. Observed (red dashed line) and synthetic PSD (in dB with respect to $1 \text{ m}^2/\text{Hz}$) computed considering sources at the global scale (blue dashed line). Solid colored lines refer to synthetic spectra computed considering only sources in a given subregion. Source subregions are shown in Figure 5 in the main paper. The observed PSD at these stations can be explained by a two dominant source regions for varying frequency (top four panels) or by sources around Australia (bottom panels).

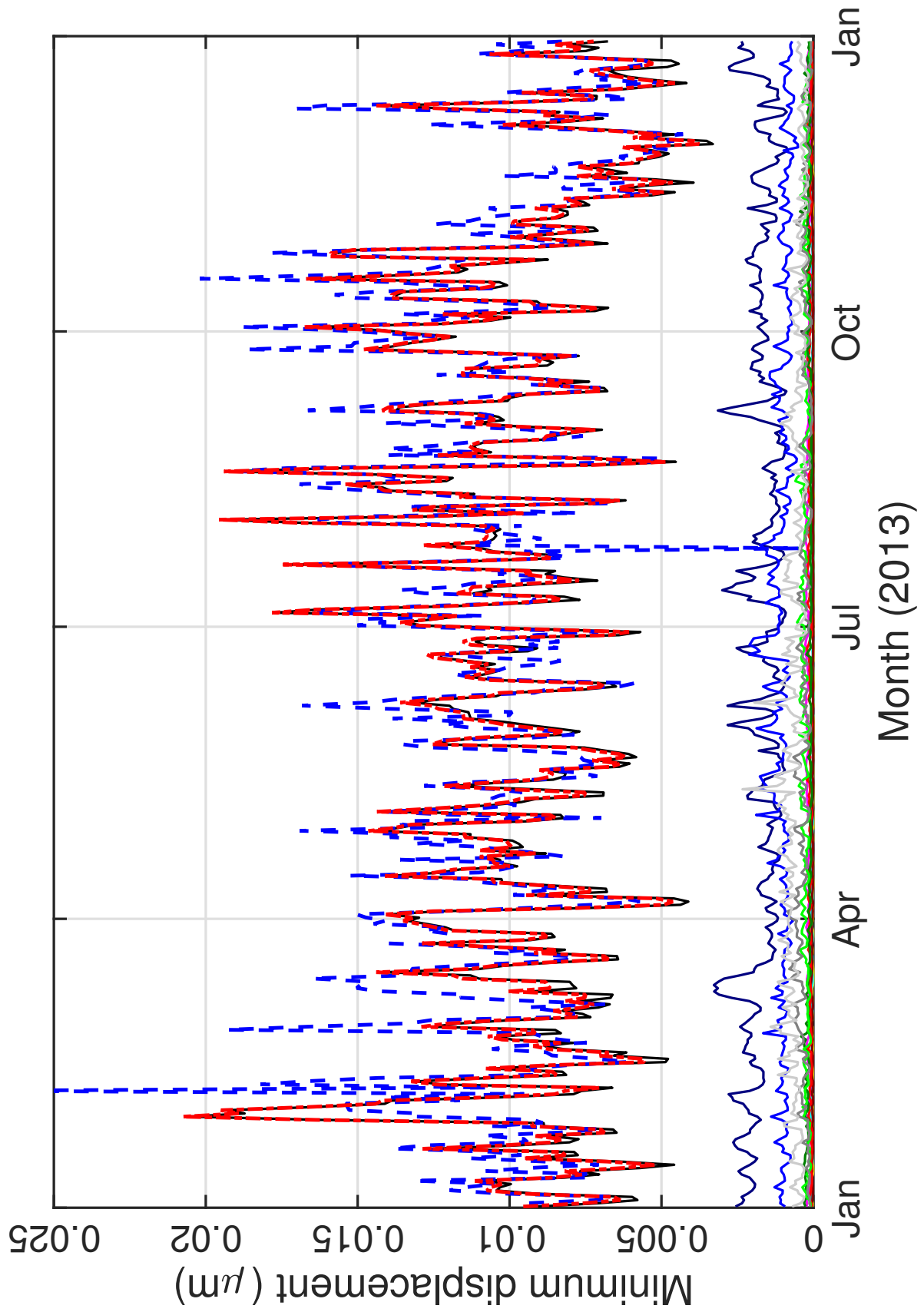


Figure S5. Enlarged version of Figure 6b.

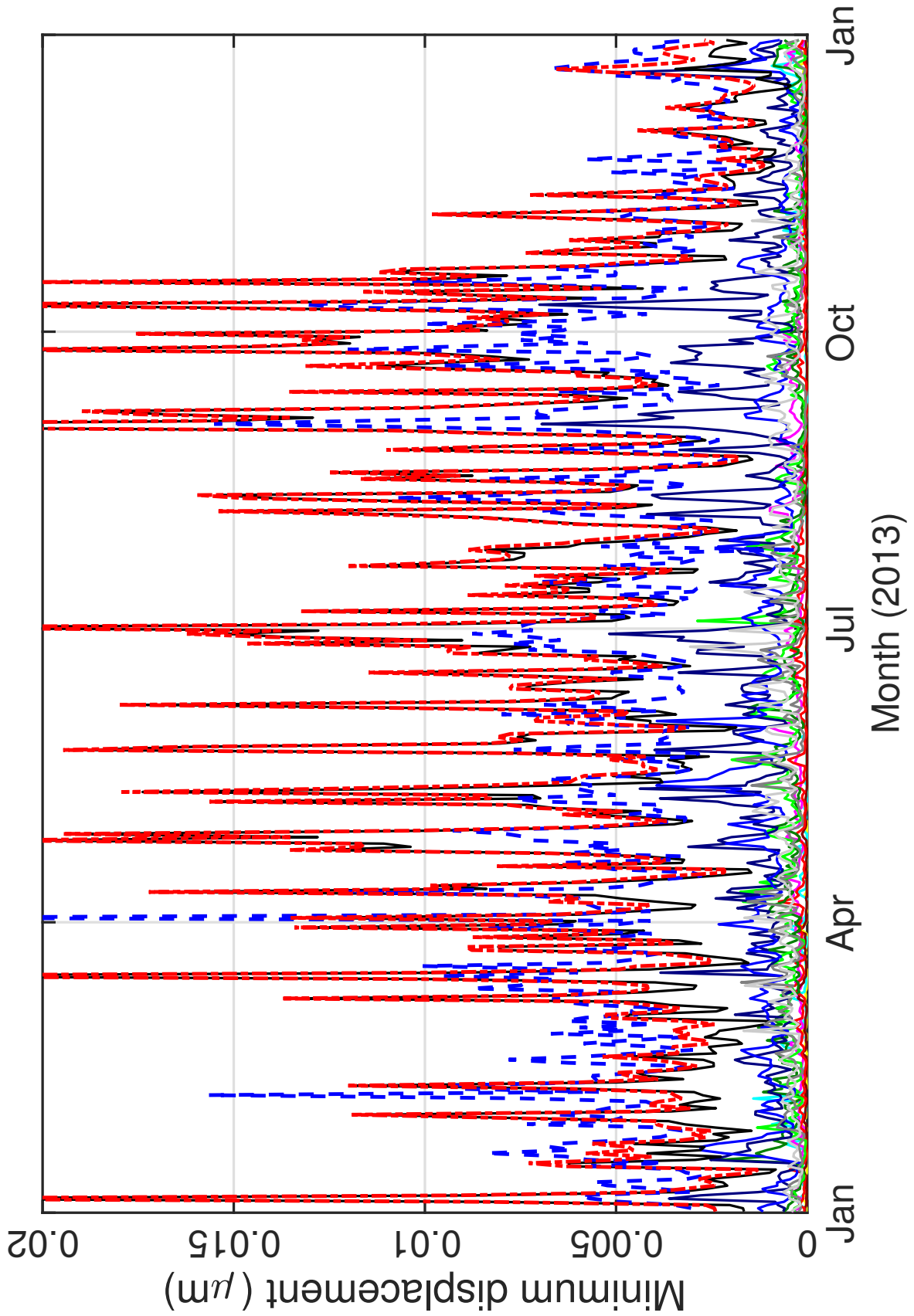


Figure S6. Enlarged version of Figure 6c.

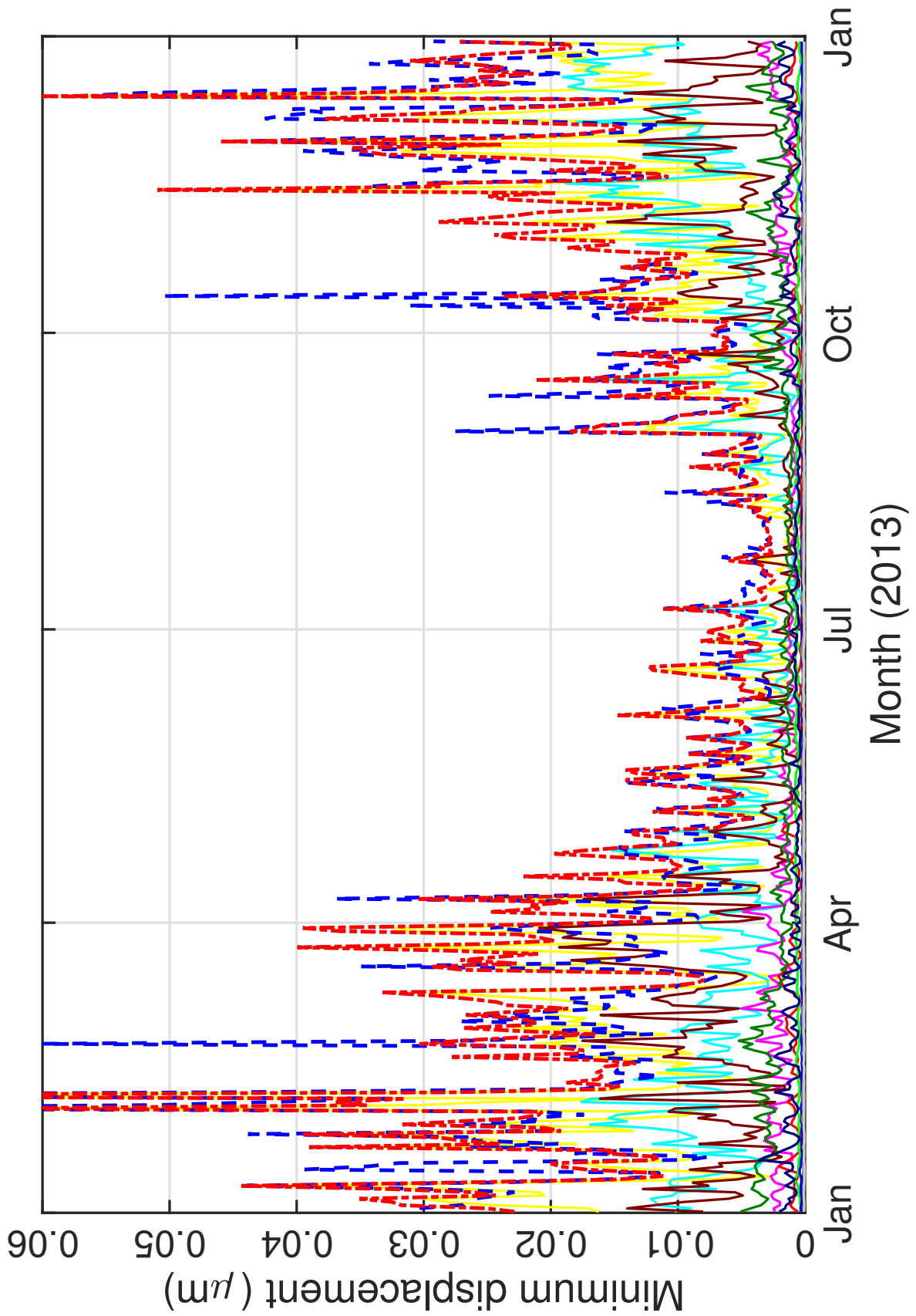


Figure S7. Enlarged version of Figure 7b.

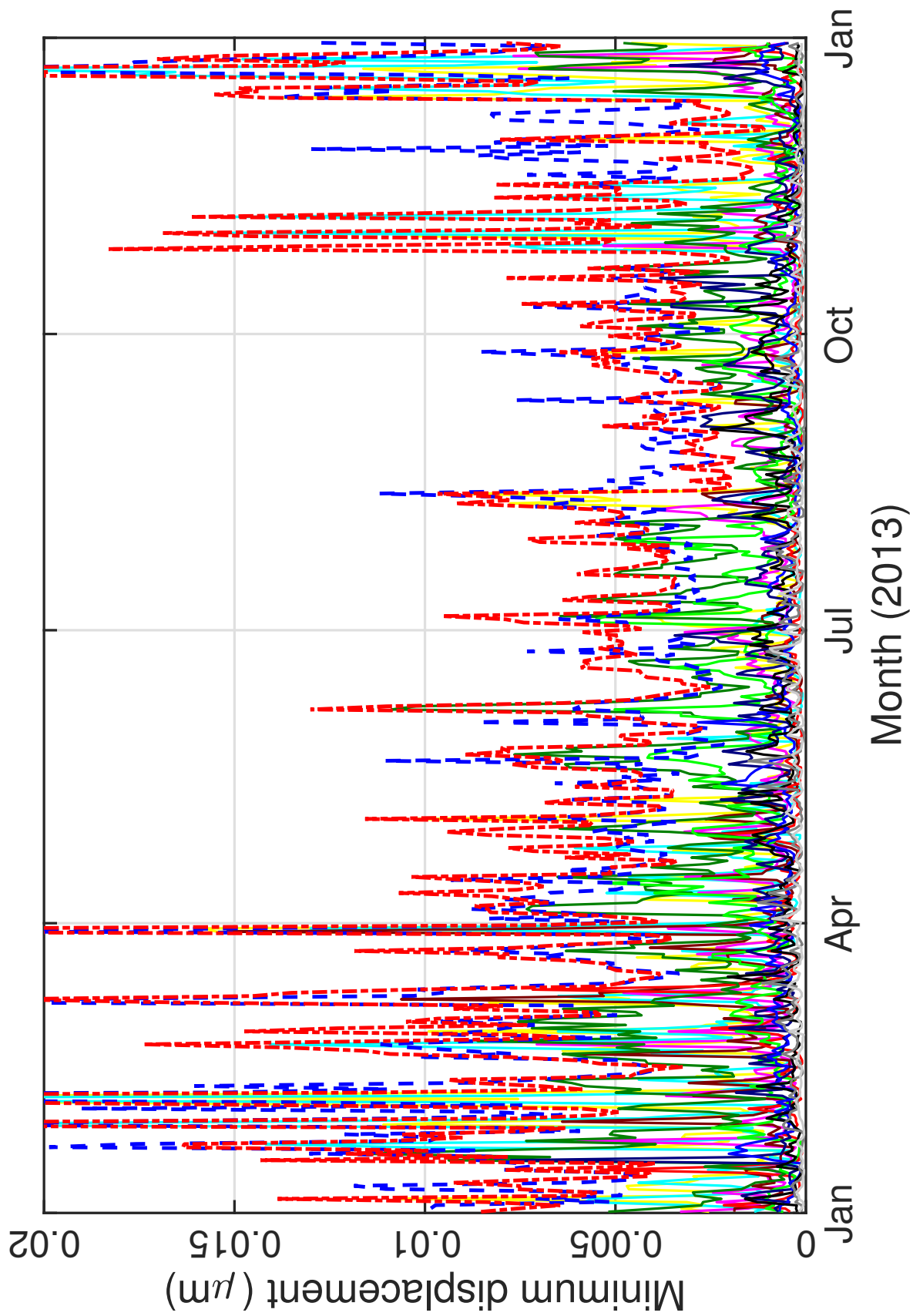


Figure S8. Enlarged version of Figure 7c.

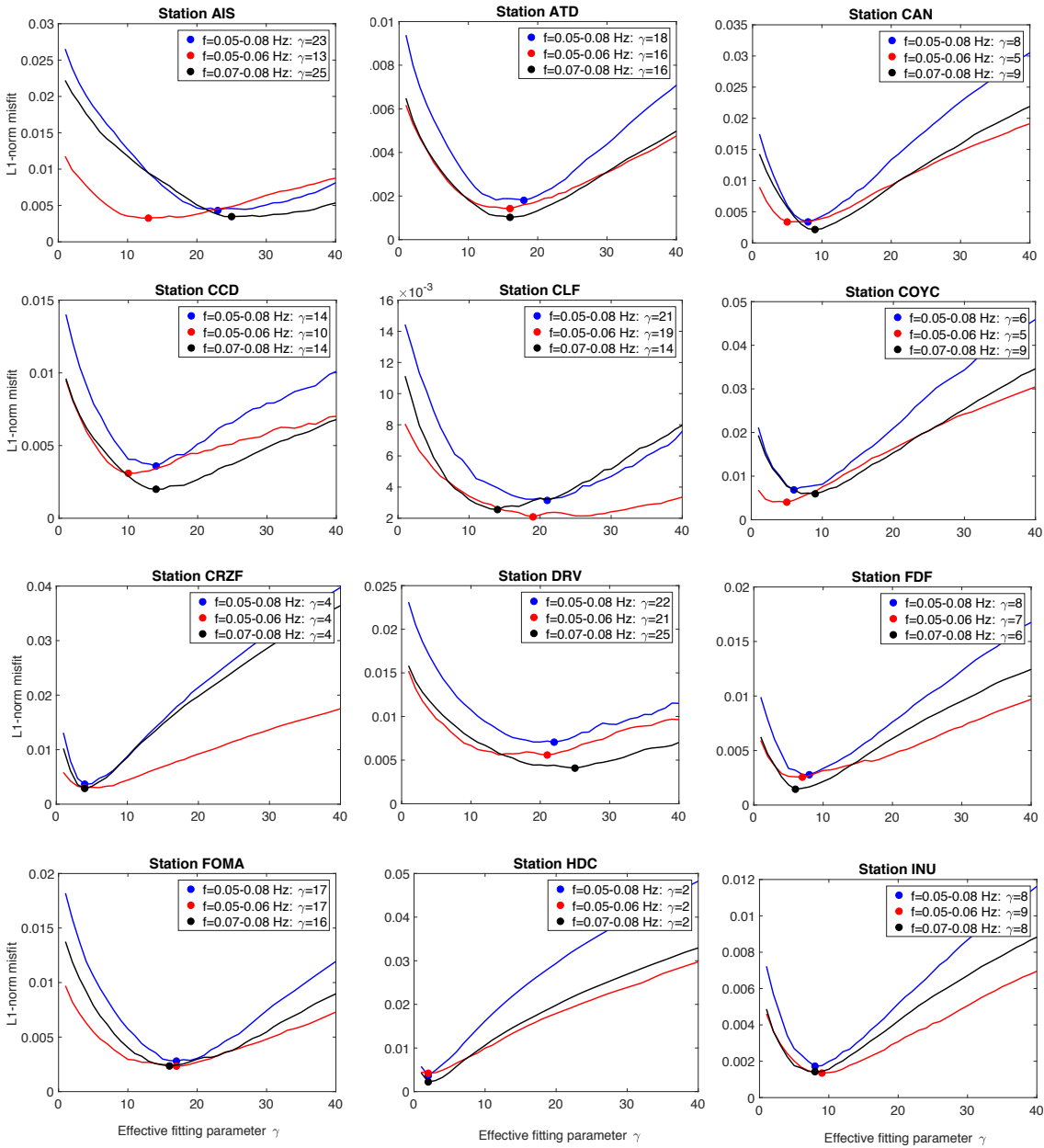


Figure S9. L1-norm misfit between data and synthetics in the frequency band of primary microseisms (0.05-0.08 Hz, blue) compared to the L1-norm misfit in two narrow frequency bands: 0.05-0.06 Hz (red) and 0.07-0.08 Hz (black). Each panel corresponds to a seismic station (see Figure 1 for station location).

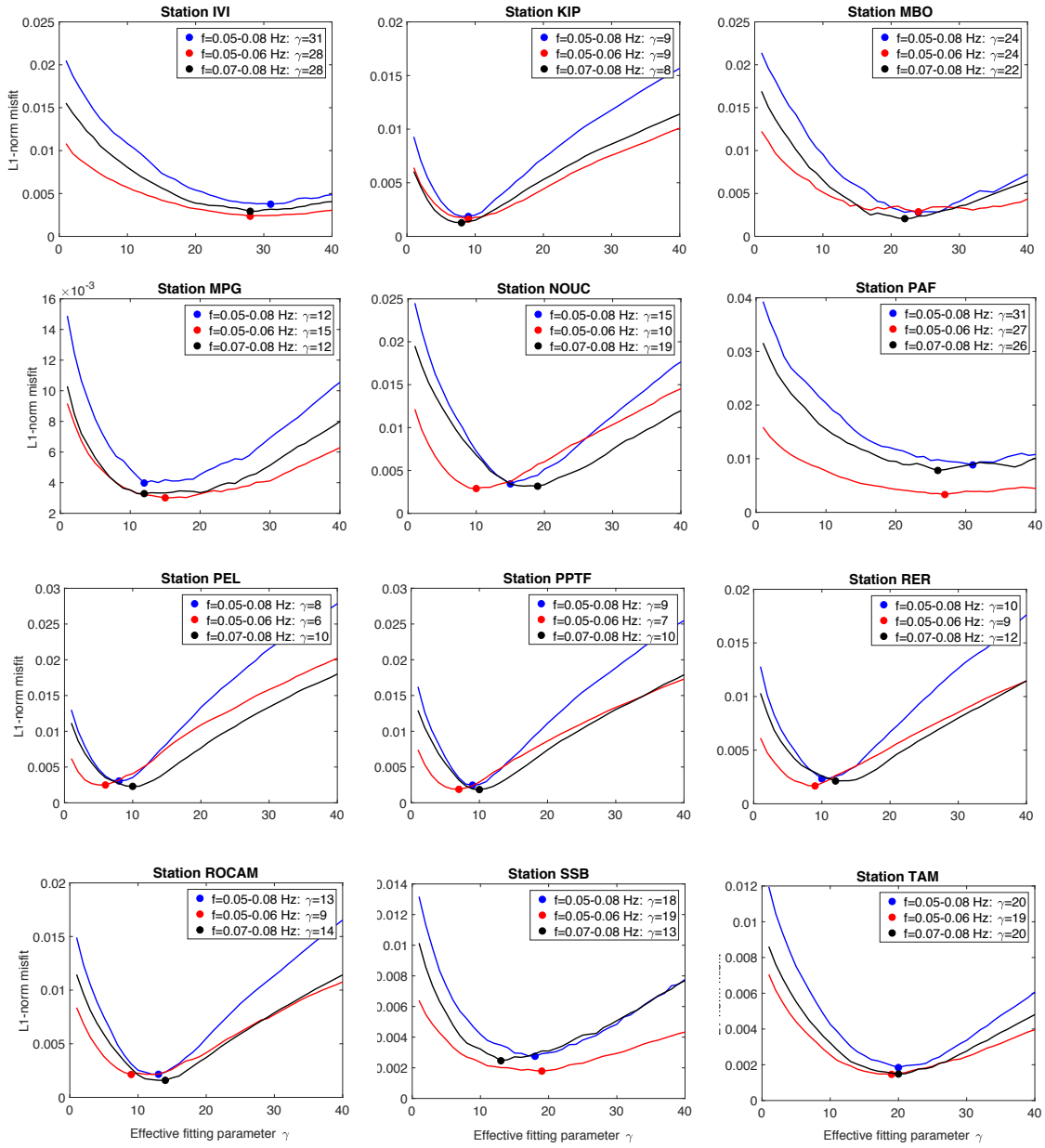


Figure S10. (continued)

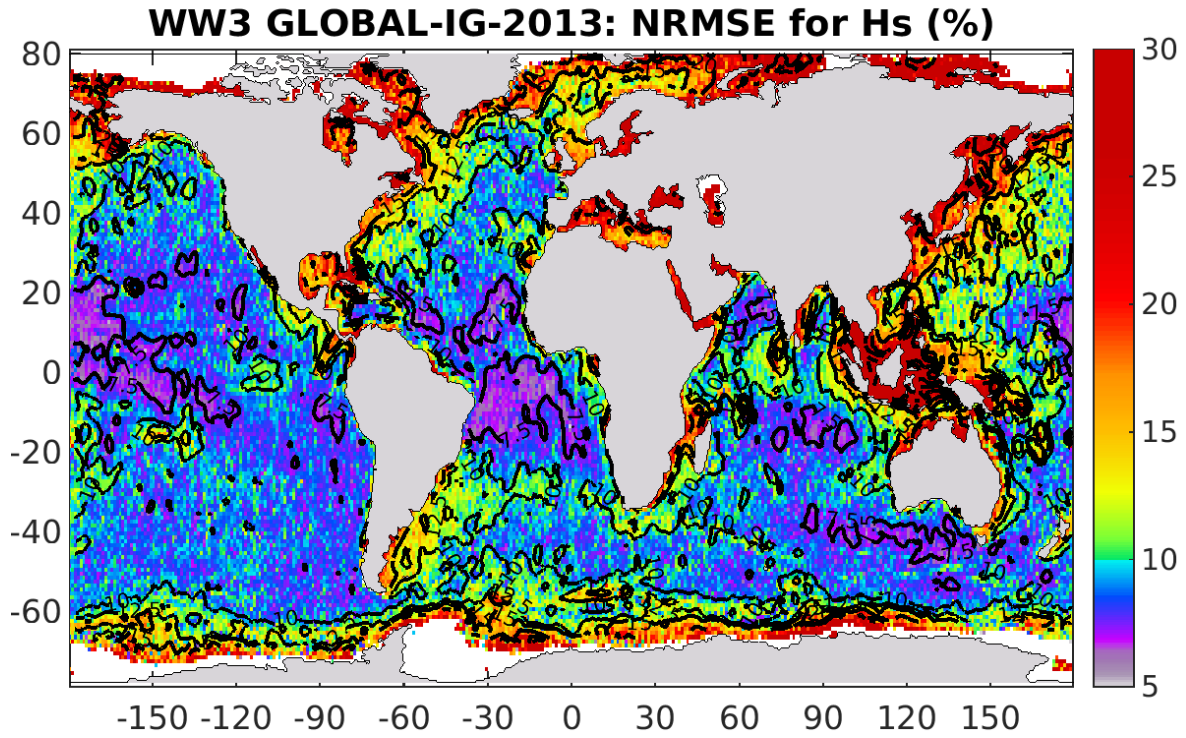


Figure S11. Normalized root mean square error (NRMSE) for the modeled significant wave heights H_s in 2013, against data from Jason-1, Jason-2 and Envisat altimeters.

Table 1. Coordinates of the Geoscope seismic stations used in this study. For each station, the effective fitting parameter γ obtained minimizing the misfit between data and synthetics is given.

Station	Latitude	Longitude	effective fitting parameter γ (%)
AIS	-37.800	77.570	23
ATD	11.530	42.850	18
CAN	-35.320	149.000	8
CCD	-75.106	123.305	14
CLF	48.026	2.260	21
COYC	-45.570	-72.080	6
CRZF	-46.430	51.860	4
DRV	-66.665	140.002	22
FDF	14.735	-61.146	8
FOMA	-24.980	46.980	17
HDC	10.002	-84.111	2
INU	35.350	137.029	8
IVI	61.206	-48.171	31
KIP	21.423	-158.015	9
MBO	14.390	-16.960	24
MPG	5.110	-52.644	12
NOUC	-22.099	166.306	15
PAF	-49.350	70.210	31
PEL	-33.140	-70.670	8
PPTF	-17.569	-149.576	9
RER	-21.170	55.740	10
ROCAM	-19.760	63.370	13
SSB	45.279	4.542	18
TAM	22.790	5.530	20