

Supplementary Information

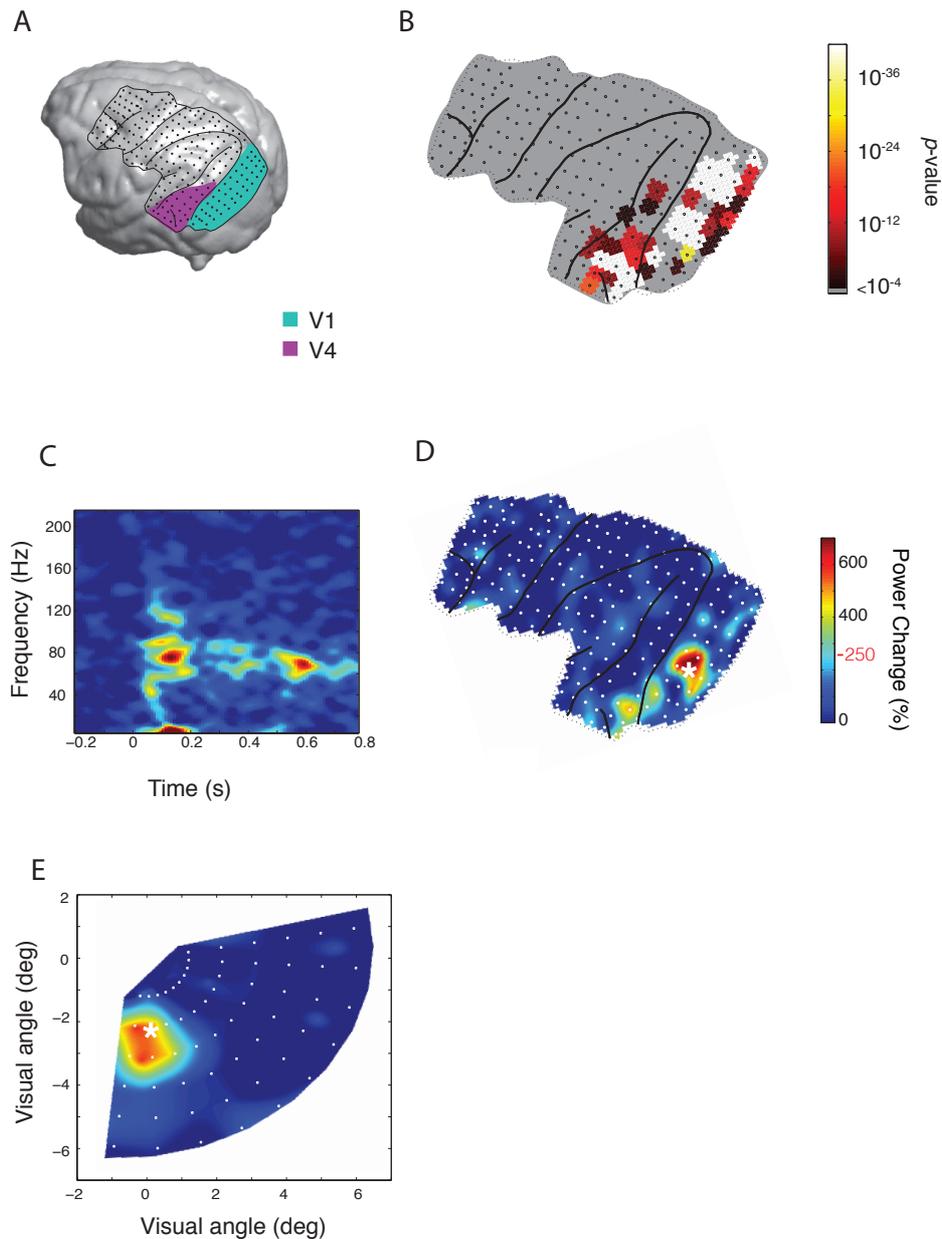


Figure S1

High-density ECoG layout and retinotopic selectivity. (A) Rendering of the brain of monkey K with ECoG overlaid. Lines indicate the covered area with the major sulci. Dots indicate the 218 bipolar electrode derivations. Sites considered as lying in areas V1 and V2 are highlighted in green and those in areas V4 and TEO are highlighted in purple. (B) Selectivity of all ECoG sites for stimulus position based on stimulus induced power in all frequency bands. (C-E) Example average response to stimulation at the position marked in (Fig. 1B). (C) Time-Frequency plot at the site marked by a star in (D). Topographic plot of induced gamma power (80-95 Hz) for each ECoG site. (E) Induced gamma band response across all positions for the site marked in (D). Colorbar is the same for (C-E), red line and value next to colorbar indicate significance.

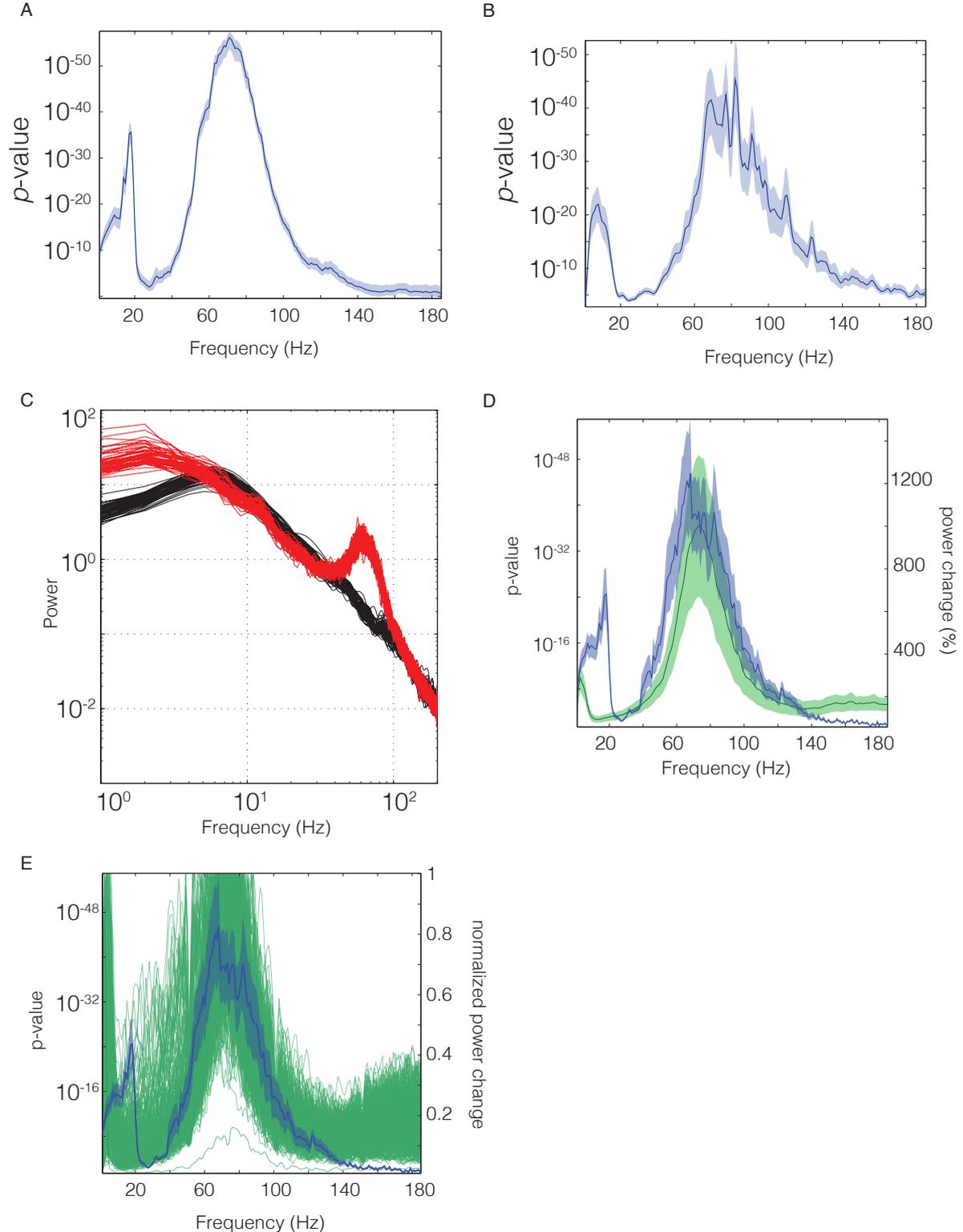


Figure S2

Selectivity of position-tuned sites as a function of frequency for each monkey: (A) Monkey P, (B) Monkey K. Mean across visual channels in dark and variance around the mean in shaded region. (C) Spectrum of LFP power for pre-stimulus (black) and post stimulus (red) periods computed for the top 5 stimulus positions for all visual sites in both monkeys. The shaded region displays the 95% confidence interval across all visual sites in both monkeys. (D) Spectrum of LFP power for pre-stimulus (black) and post-stimulus (red) periods computed on each individual trial for the stimulus position and recording site shown in figure 1E. (E) Comparison of the stimulus position selectivity of the power as a function of frequency (blue curves) and the stimulus-induced relative power increase (green curves) for both monkeys. (F) Same as (E), but showing the relative power increase for all visually tuned recordings sites to their top 5 stimulus locations for both monkeys.

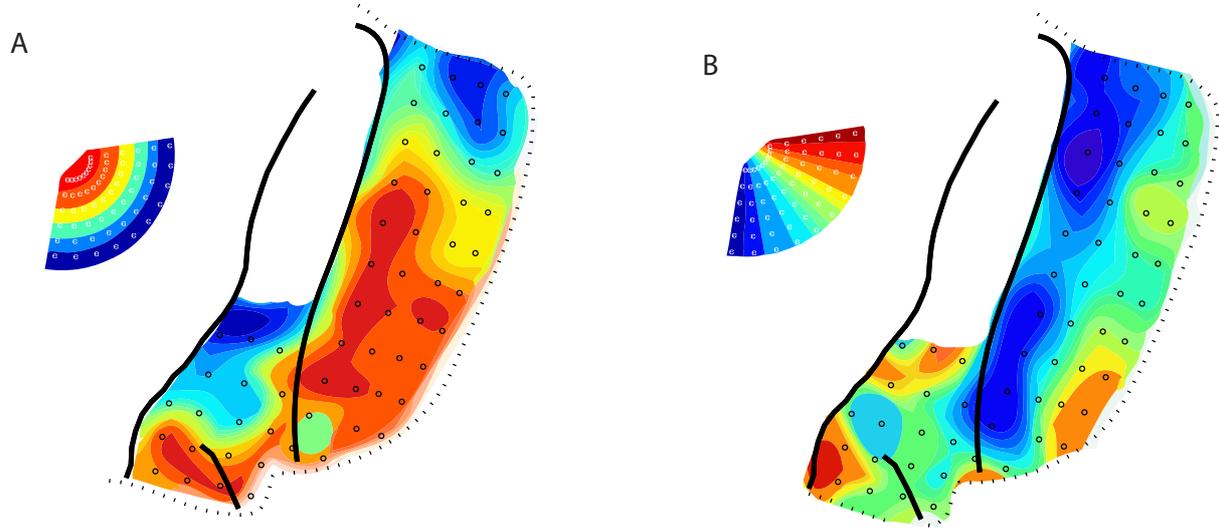


Figure S3

Retinotopic maps based on gamma band (80-95 Hz) activity in monkey K. (A) Map of eccentricity; each recording site is colored to indicate the mean eccentricity of the 5 stimuli giving the largest gamma band response. (B) Map of elevation; each recording site is colored to indicate the mean elevation as estimated above. Inset shows how the 60 stimulus locations are represented across eccentricity and elevation.

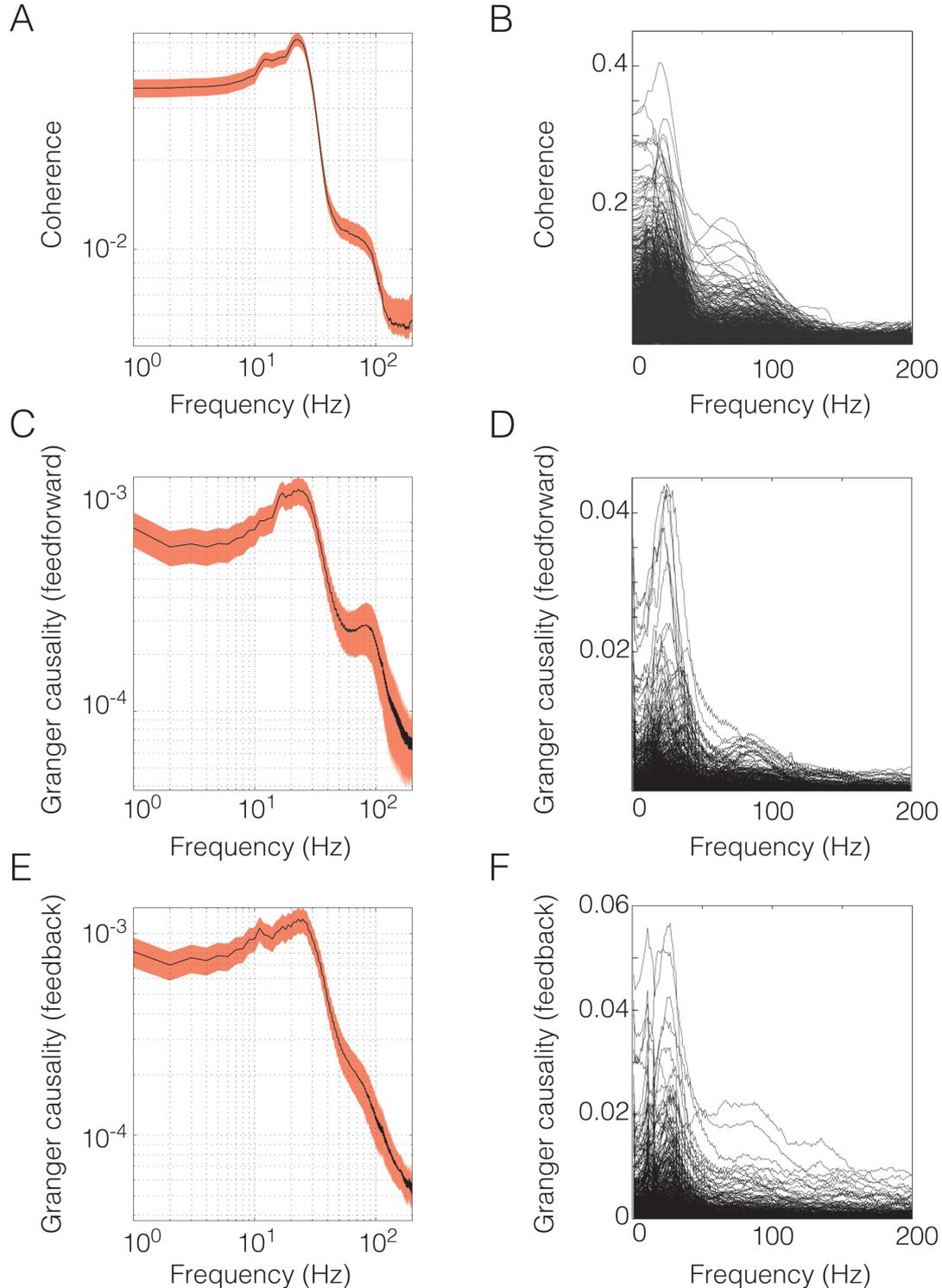


Figure S4

Spontaneous coherence and granger causality spectra. (A) Log-log plot of coherence between all V1 and V4 pairs for both monkeys during the fixation period. (B) Coherence for all V1-V4 pairs during fixation for monkey P. Gamma band activity is visible, although there is no conspicuous gamma activity in the power spectrum for these recording sites (Figure 5 G). (C) Log-log plot of feed-forward Granger Causality between all V1 and V4 pairs for both monkeys during the fixation period. (D) Feed-forward granger causality for all V1-V4 pairs during fixation for monkey P. Gamma band activity is visible, although there is no conspicuous gamma activity in the power spectrum for these recording sites (Figure 5 G). (E) Log-log plot of feedback Granger Causality between all V1 and V4 pairs for both monkeys during the fixation period. (F) Feedback granger causality for all V1-V4 pairs during fixation for monkey P. Gamma band activity is visible, although to a lesser extent than for coherence or feed-forward granger causality.

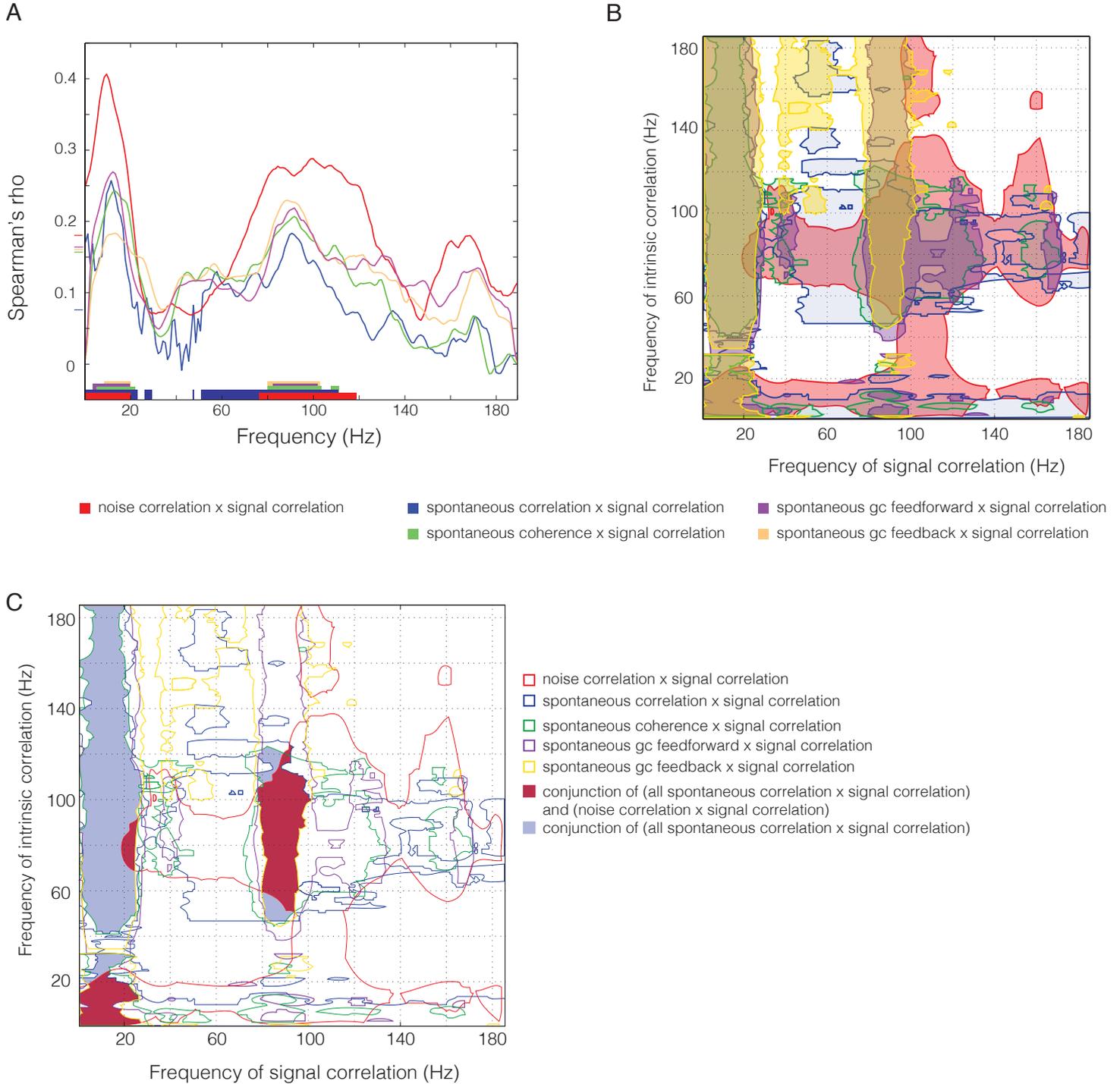


Figure S5

Comparison of frequency-frequency correspondence of intrinsic and signal correlations. (A) Line spectra from the diagonal of each respective frequency-frequency plane. The spectra illustrate the pervasive pattern of correspondence between intrinsic and signal correlations. Noise correlations, spontaneous power correlations, spontaneous coherence, and spontaneous granger causality all show two regions of correspondence with the pattern of inter-areal signal correlations. One region is between 8 and 20 Hz and the other is between 80-105 Hz. (B) Frequency-frequency plots illustrating the consistent pattern of correspondence between intrinsic and signal correlations. Same as in (A), but for all frequency-frequency pairs. (C) Same as in (B), but highlighting the consistent patterns of frequency-frequency correspondence exhibited by all measures of intrinsic correlation presented here (red regions) and those exhibited by spontaneous correlation (blue regions + red regions). The broadband correspondence observed during spontaneous activity can be seen along with the band-limited components occurring during both stimulation and passive fixation.