



Extended Data Figure 4

Identification of layer boundaries using laminar recordings.

(A) Top: Raster plots of multi-unit activity (MUA) across LEA channels over a 60 sec period of recordings, for one example LEA penetration. The left y-axis indicates channel number (channel #1 is the first channel inside the cortex), while the right y-axis indicates the relative cortical depth, where 0 is the top of the cortex (corresponding to channel #1) and 1 is the border between layer 6 and the white matter (WM). The red curve indicates the mean spiking rate during the interstimulus intervals, and the black curve is the mean spiking rate over the entire recording periods (stimulus-on and interstimulus interval). Red horizontal lines mark the top and bottom of the cortex, and the pink shading highlights the granular (G) layer. SG: supragranular layers; IG: infragranular layers. Bottom: Raster plots of single unit activity (SUA) arranged by channel position, with multiple SUs recorded at the same channel; thus here the stack of recordings does not correspond to cortical depth. A higher firing rate is characteristic of the G layer. (B) Spike-triggered averages of MUA across the depth of the cortex around the time of stimulus offset (time 0). Elevated spontaneous activity after stimulus offset is typical of the G layer. White dashed lines demarcate the G layer boundaries; solid black and white lines: top and bottom of the cortex, respectively. (C) Mean inter-spike interval (ISI; for values >100 ms) for each channel. Channels 8–10 show lower average ISI values, indicative of higher firing rates. (D) Left: Stimulus-evoked LFP profile across layers for one example LEA penetration. Red vertical line: time of stimulus onset. Right: Baseline-corrected (z-scored; see STAR Methods) CSD calculated from the LFPs and displayed as a color map. Black contour indicates estimated onset latency of current sinks, used to determine the location of the earliest current sink, which identifies the G layer. Solid black horizontal lines indicate the top and bottom of the cortex; dashed black lines: G layer boundaries. (E) Stimulus-evoked local coherence spectrum (stimulus evoked-baseline). For each contact the coherence with adjacent contacts was estimated across frequencies (see STAR Methods); coherence is higher in the G layer (contacts 8-10).