



**Figure 3 – figure supplement 2 | Coherent complex spike firing is specifically enhanced by whisker pad stimulation**

**A**. Field of view of a piece of crus 1 recorded using two-photon  $\text{Ca}^{2+}$  imaging in an awake mouse. The colored areas indicate 22 regions of interest, corresponding to PC dendrites. The accompanying fluorescent traces show  $\text{Ca}^{2+}$  transients, which are most likely complex spikes (**B**; cf. Schultz et al., 2009). In the absence of tactile stimulation coherent activity of groups of PCs is rare. **C**. Following air-puff stimulation of the whisker pad (brown vertical lines), complex spike coherence occurs often as illustrated by five responsive PCs recorded simultaneously. **D**. Aggregate peri-stimulus time histogram of all PCs in the field of view shown in panel **A**. The colors represent the coherence of PC firing, defined as the fraction of PCs active during each frame of 40 ms. Complex spike coherence is relatively rare during inter-trial intervals, but strongly enhanced following air-puff stimulation. **E**. The same peri-stimulus histogram as in **D**, but with colors

indicating the chance of occurrence of the level of coherence found based upon Poisson distribution of all complex spikes in this recording, emphasizing that coherence occurred more than expected, mainly during the sensory response. Indeed, during 1 Hz air-puff stimulation, complex spikes were observed to be produced by large ensembles. In the absence of tactile stimulation, ensemble sizes tended to be smaller (**F**). The data presented in panels **D-F** come from the field of view shown in panel **A**. **G**. There was a shift from complex spikes fired by a single or a few Purkinje cells towards complex spikes fired by larger ensembles when introducing air-puff stimulation. Presented are the median and the inter-quartile range of the differences between the two histograms as illustrated for an example experiment in panel **F** ( $n = 10$ ). The increase in coherence directly after stimulation was highly significant ( $p = 0.001$ ;  $F_r = 28.878$ ;  $df = 9$ ; Friedman's two-way ANOVA). \*  $p < 0.05$ ; \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ , \*\*\*\*  $p < 0.0001$ , \*\*\*\*\*  $p < 0.00001$ .