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## **prediction-induced pre-face phase alignment**

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Ho Ho Ho! Not too late is it?

Here an update on the ECoG data (sorry for the long hiatus). I've been looking into our original goal. That is, can we, in ECoG, find a mechanistic explanation for prediction-induced phase alignment prior to stimulus onset? (as in your PNAS 2015 paper)

Precursor to that is of course, is there prediction-induced phase alignment prior to face onset, in amygdala/others? (replicating the above)

Well, it seems to be more H0 H0 H0 instead of Ha Ha Ha (to be frank, this pun makes me queasy). That is, I cannot convince myself after thoroughly digging through the data that there is consistent phase alignment. I've attached several figures which I base the majority of my conclusion on (details below). If you have any questions or suggestions, feel free.

This doesn't *necessarily* mean end to the hypothesis in the current data. The few weak examples you can see can serve as more targeted ROIs/effect-weighting for other analyses such slope/PAC/phase-coupling/etc, which can gain us some minor statistical power, and still provide some insight into phase alignment from your PNAS paper. Given the non-consistency in the figures below however, I don't expect much of this.

Obviously, this also doesn't end searching for other patterns that *are* sensitive to the temporal prediction.

Happy holidays!  
Roemer

PS: This also serves as an example for not recording a patient for only 25 minutes but to go for the full hour or two per task.

### *What I take from the figures*

Only IR35/38 (tiny bit IR41/44) show some meager prediction-induced alignment prior to the face in amygdala, varying over theta and alpha. (Note, the scales show it to be well below  $Z=2$ , *prior* to additional alpha control). However, looking at the the individual conditions, inter-trial-coherence is at the level of the baseline, without a noticeable increase prior to face onset, although permutation testing coherence within condition reveals some few sections that match those in the figures attached (only for IR35/38). This last comment is the reason I'm still giving it a very minor chance in some targeted RIO/effect-weighted analyses.

There are some various locations that show some minor alignment, but none pass permutation testing within conditions either.

### *Details on the figures*

Attached are figures, 1 per subject, showing the difference between predictive/unpredictive trials in inter-trial-coherence\* as quantified by the Z-statistic (high is stronger for predictive trials). This particular Z is a bias-corrected 'continuous' transformation (inv. hyperb. tangent; see Maris/Schoffelen/Fries 2007 and references therein).

The Z I show is thresholded by the 95th percentile of its permutation distribution. That is, if we permute trials randomly and repeatedly between conditions, what Z-values do we find? Given these Z-values, interpret the real Z-values only if they are larger than 95% of the 'random' Z-values. Note that this procedure is sensitive both to a between-condition difference in the strength of inter-trial-coherence, as well as the preferred *phase* of coherence in case it exists. This permutation procedure is justified, as both of these differences argue in favor of the phase-alignment hypothesis (this is not often the case). Note as well, that the figures that you see still require an additional procedure to control for the alpha-level, which I explicitly didn't use to give a barebones view.

Of the subjects that are included, IR35/38/39/41 had great overall task performance, IR34 less, and IR44 was borderline. Of the subjects that are included, IR34/38/44 had great cleanish data, IR35/39 had somewhat nasty data, IR41 had terrible data.

In each plot, the start is  $t=0$ , the onset of the cue. The first white line indicates when the cue is no longer onscreen ( $t=0.2s$ ). The second white line (the main line of interest) is the onset of the face ( $t=1.2s$ ). Note that anything after the white line shouldn't be interpreted in these figures, as the ratio of the fear/neutral faces can differ quite a bit between conditions due to performance.

The title indicates the depth/grid each electrode is part of. Note that this doesn't indicate whether it's inside the targeted structure (a remaining problem).

R/L = left/right

AM = amygdala

OF = orbitofrontal

IN = insula

AC/PC = anterior/posterior cingulate

TH/HH = tail/head hippocampus

\* inter-trial-phase-locking, i.e. phase alignment without amplitude weighting, was messier

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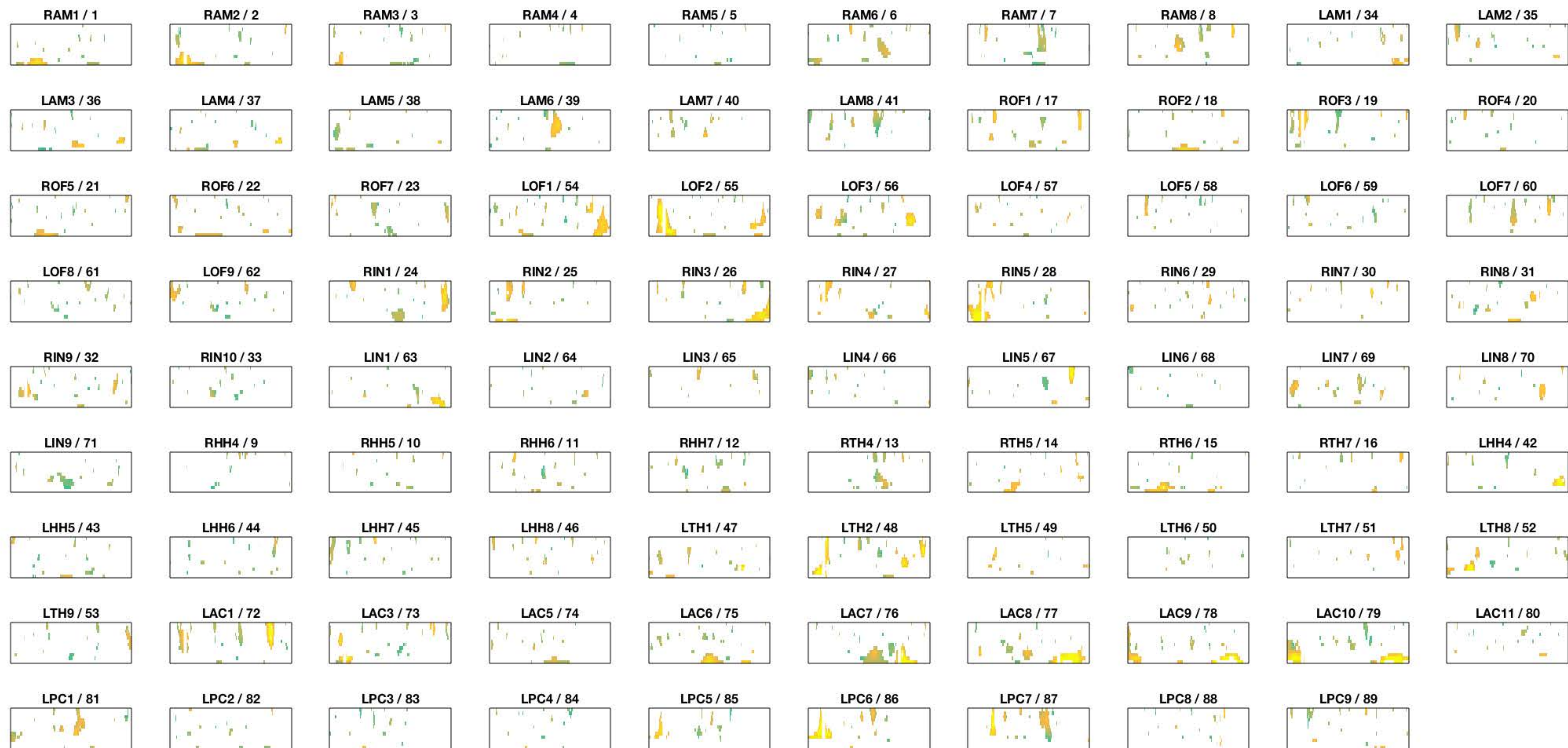
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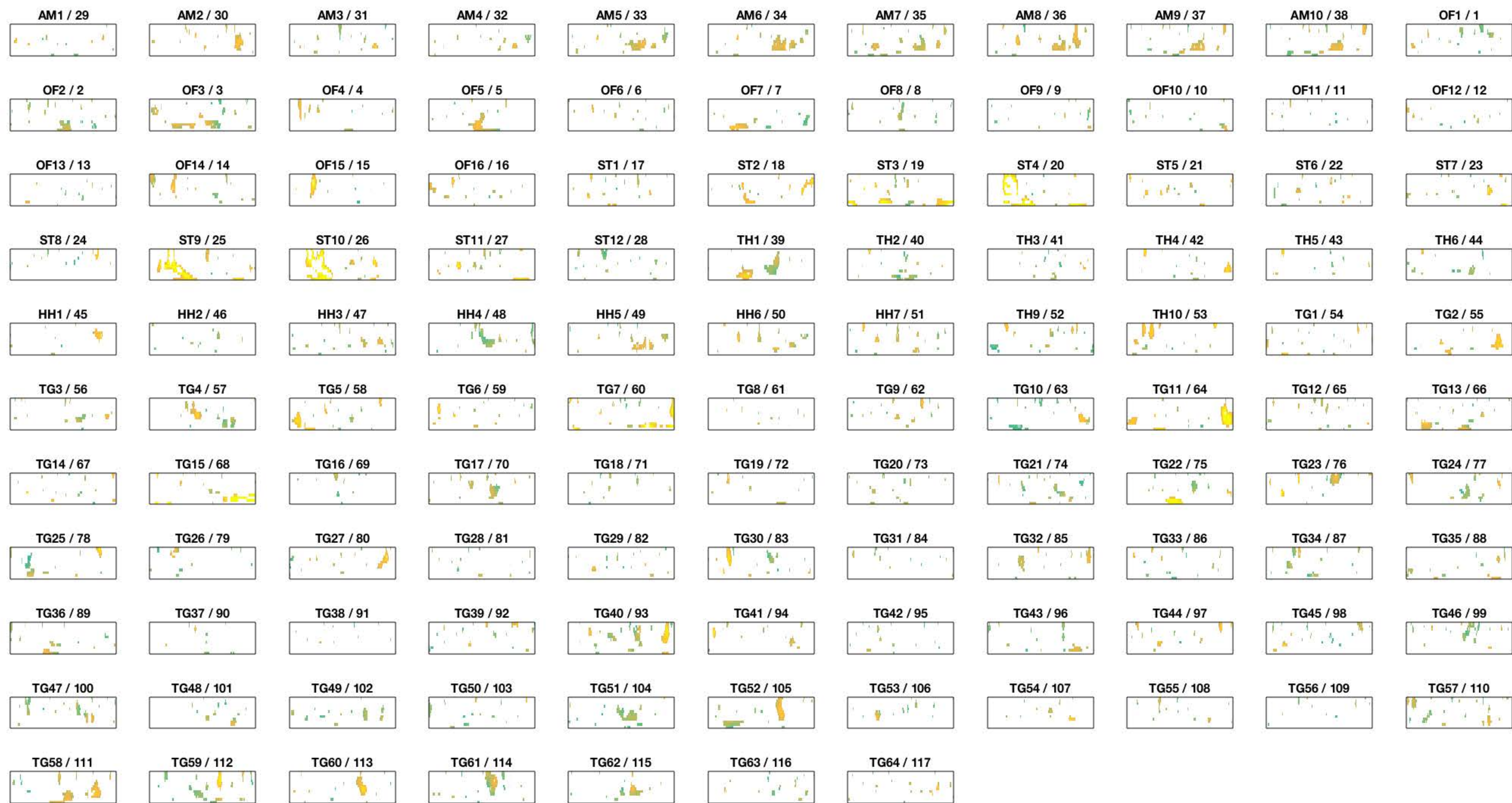








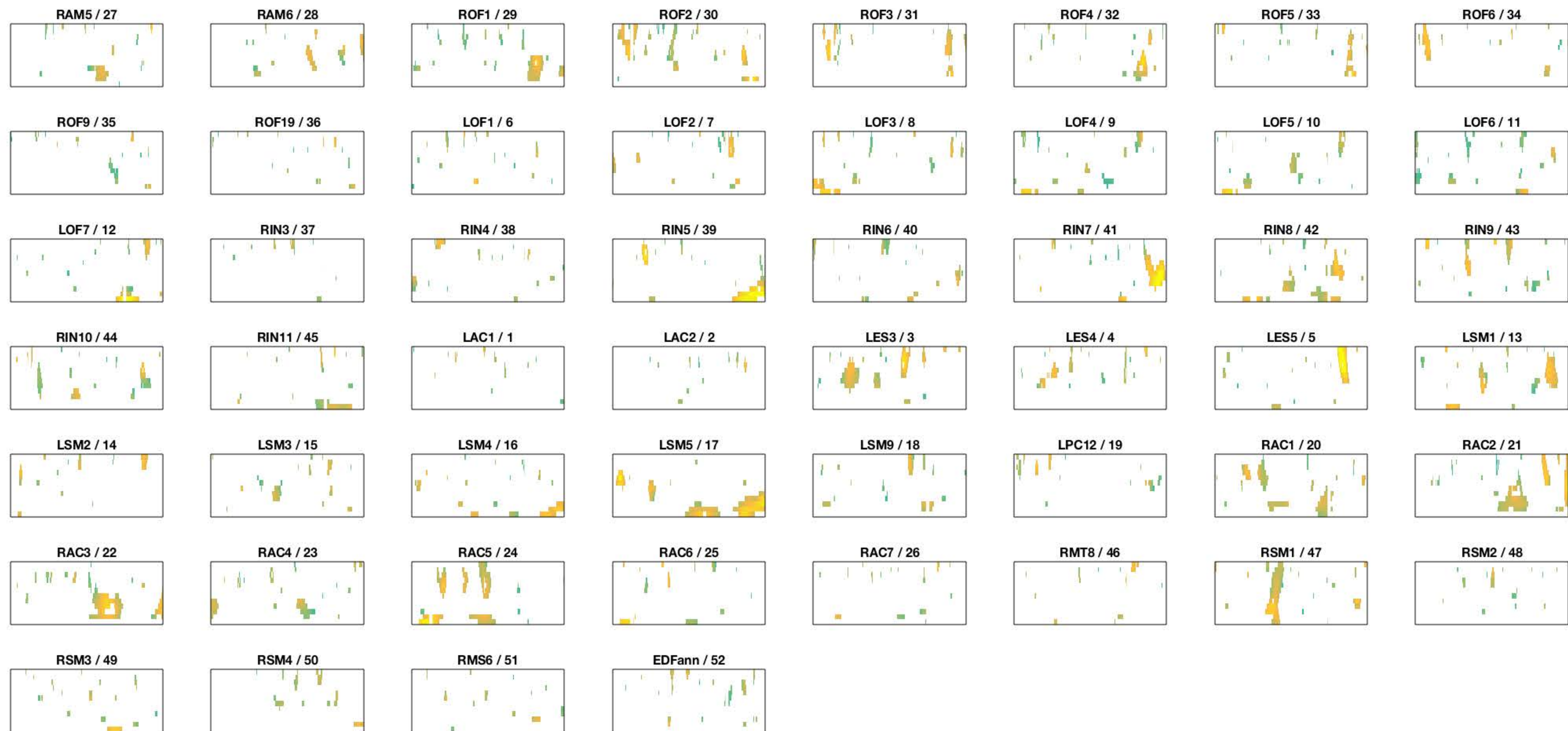




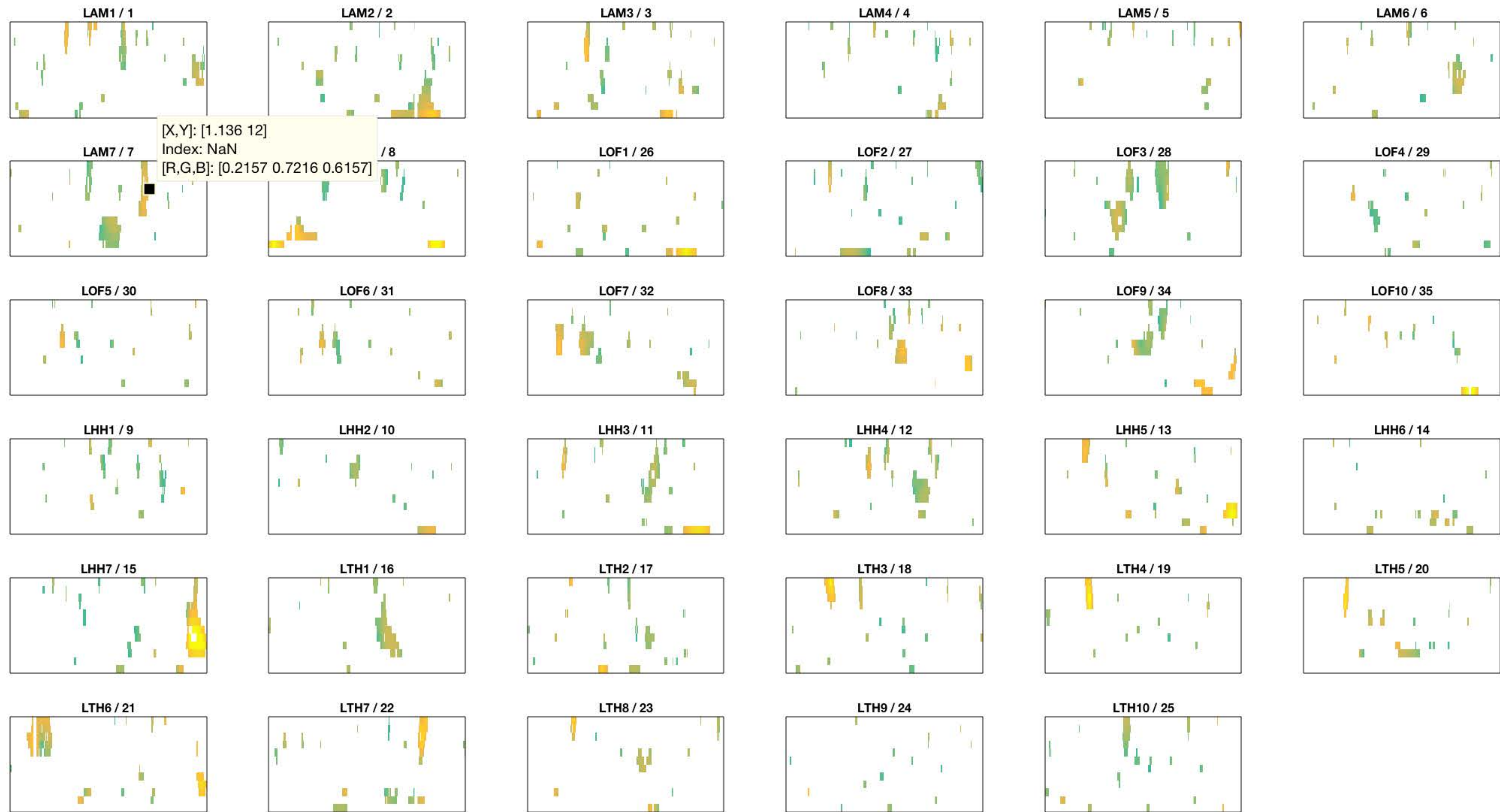














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