"grouping" pattern

- YZ Correction plots are based off of the median dQ/dx across the detector

- the precise structure of the patterns in the dQ/dx plots is dependent on channel "group" size (32 vs. 64 vs. 128)

- "grouping" feature present in most recent MC, but also present in *all processed data*, including December samples (v09_93_xx)

  - most recent version is coincident with turning on coherent/correlated noise removal (CNR) for MC

  - CNR has been on (with slightly different configurations) for all processed data
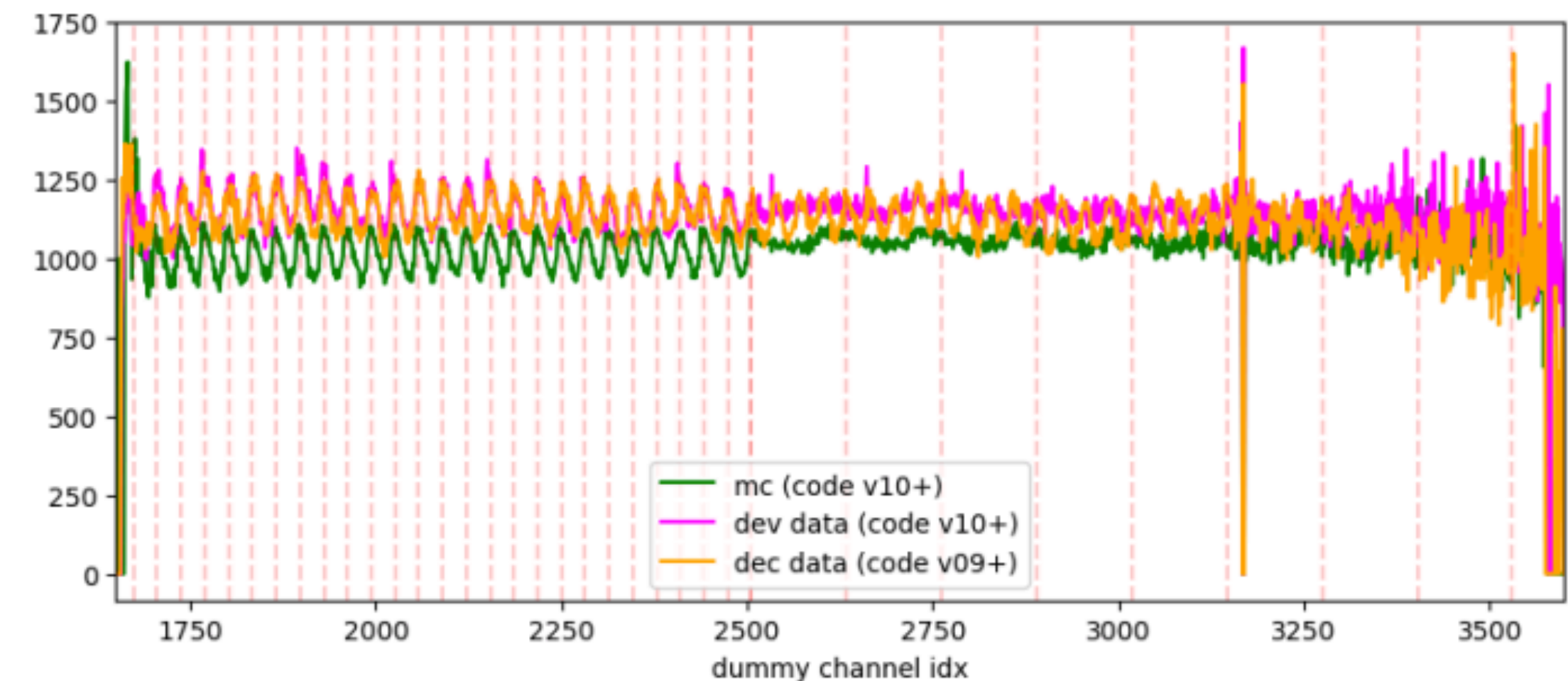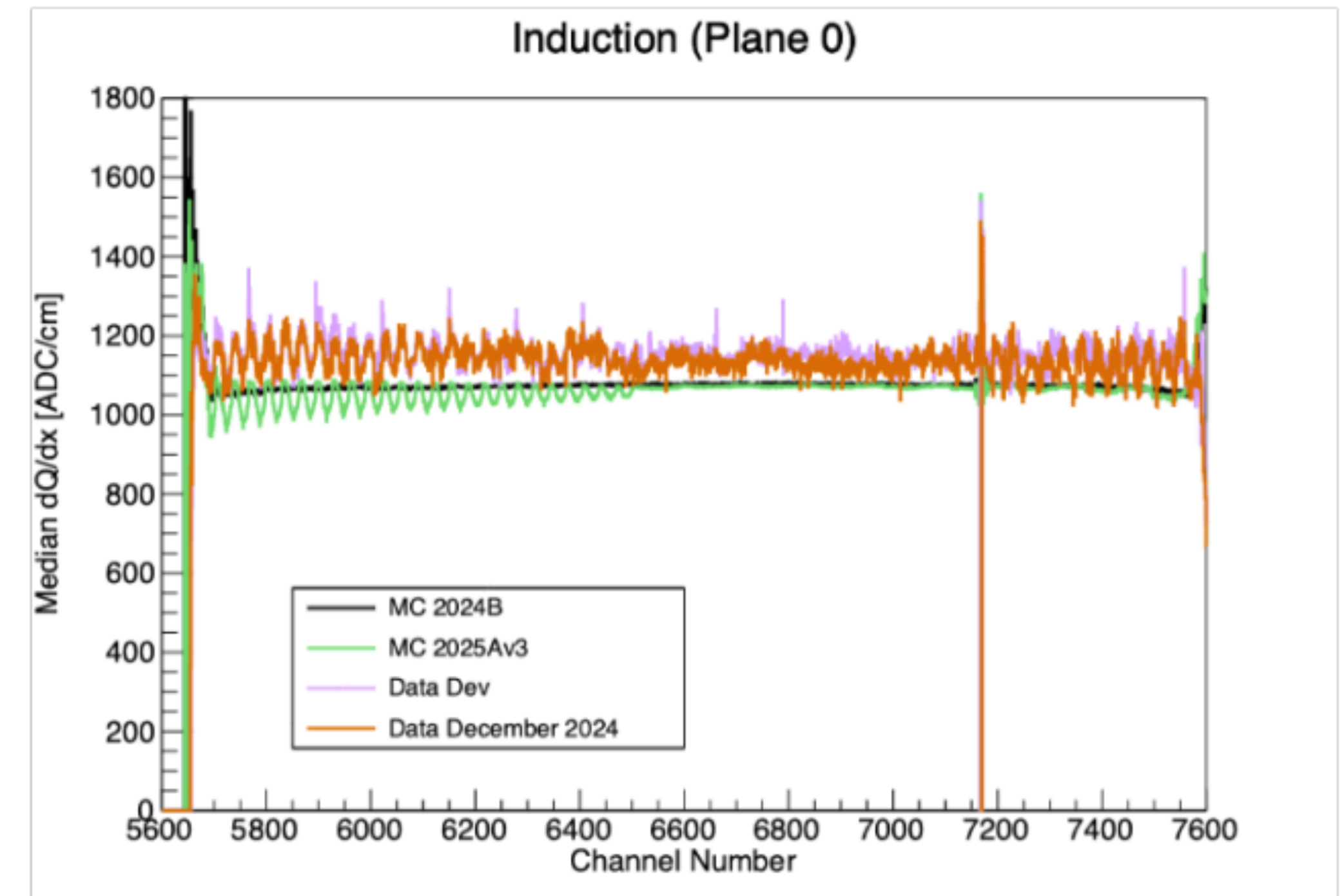
CNR at SBND update

- more investigation revealed that the correction waveform itself has different amounts of correlation with the signal waveform (for small, but nonzero, θ_{xz})
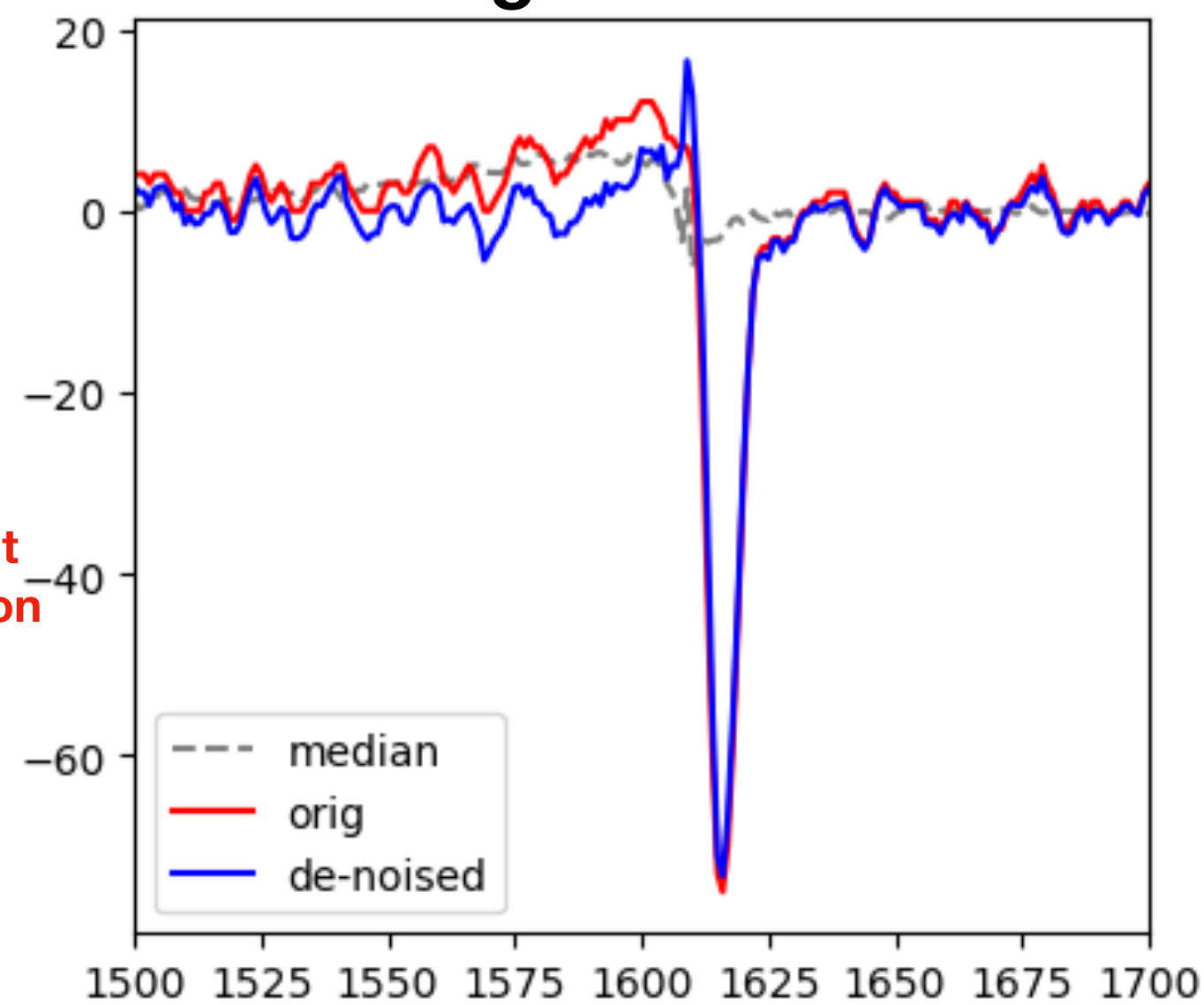
MC: compare median (correction waveform) with edge vs center channels
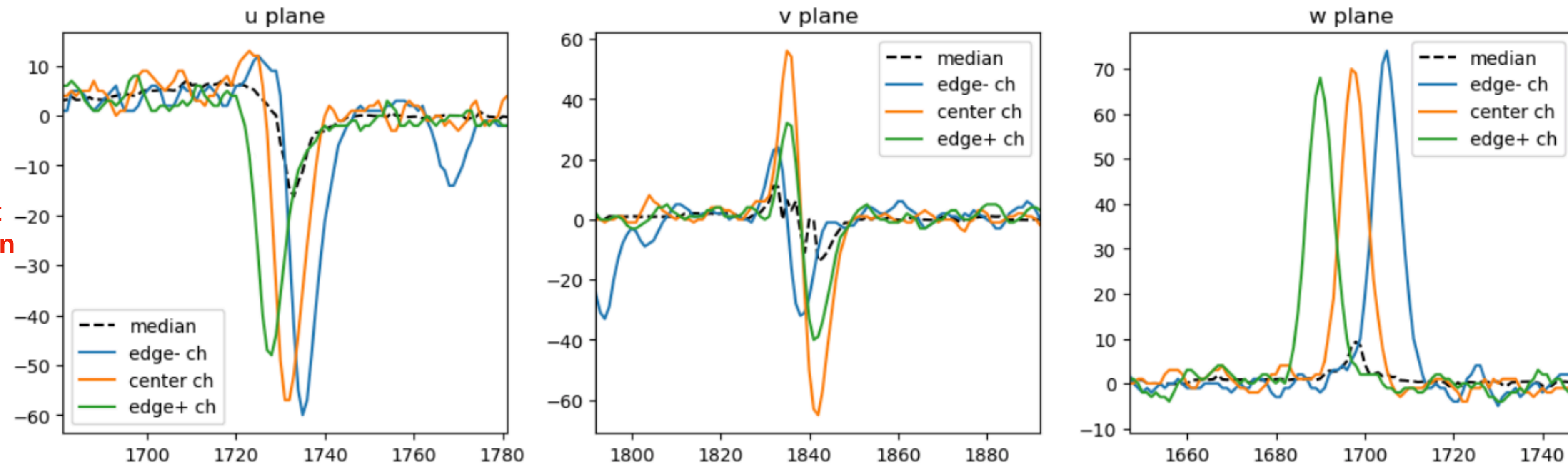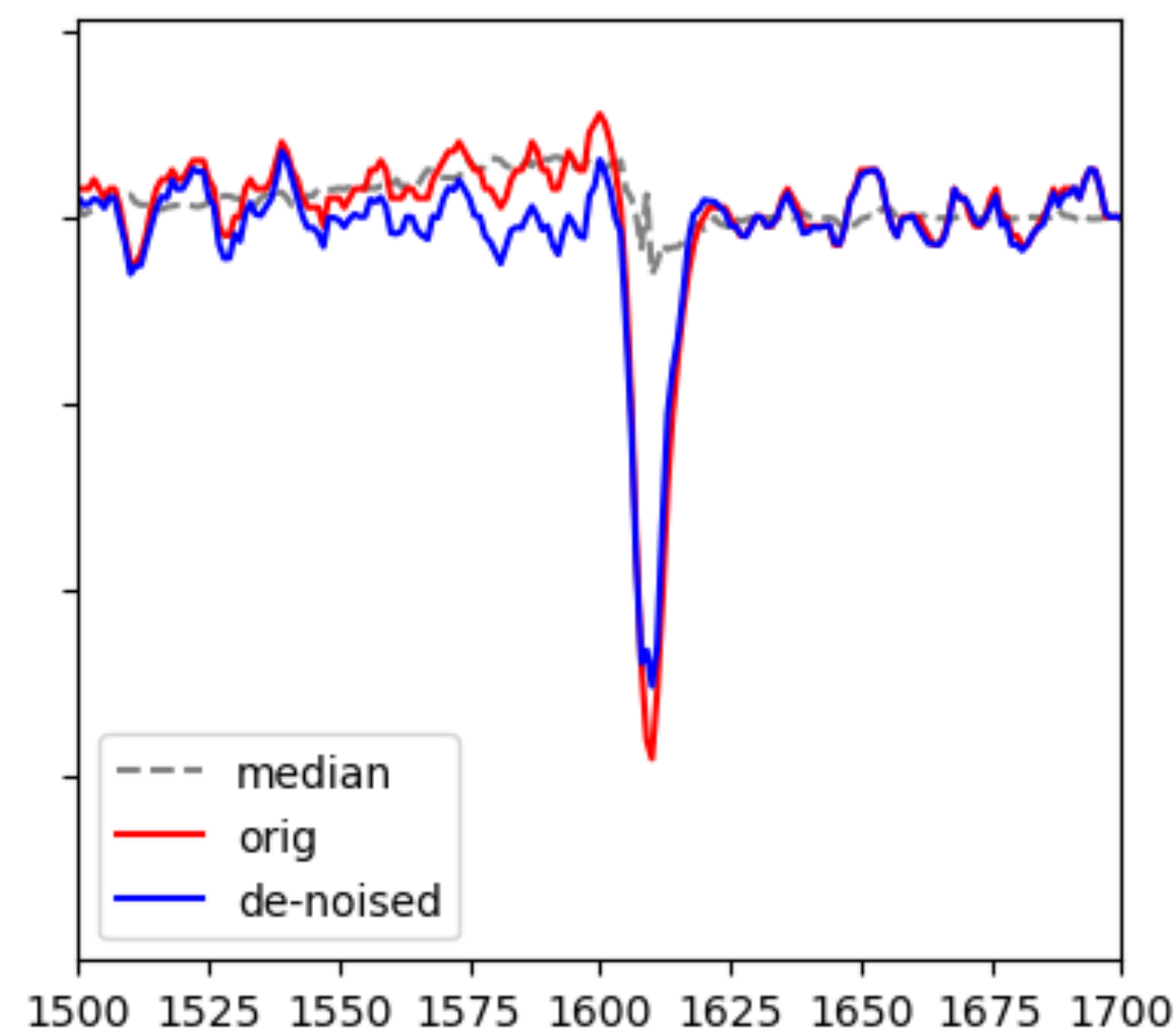
MC: no coherent noise in simulation

- center waveform of the group has higher correlation with median vs. edge channels → leads to "boundary" effects that are follow the grouping
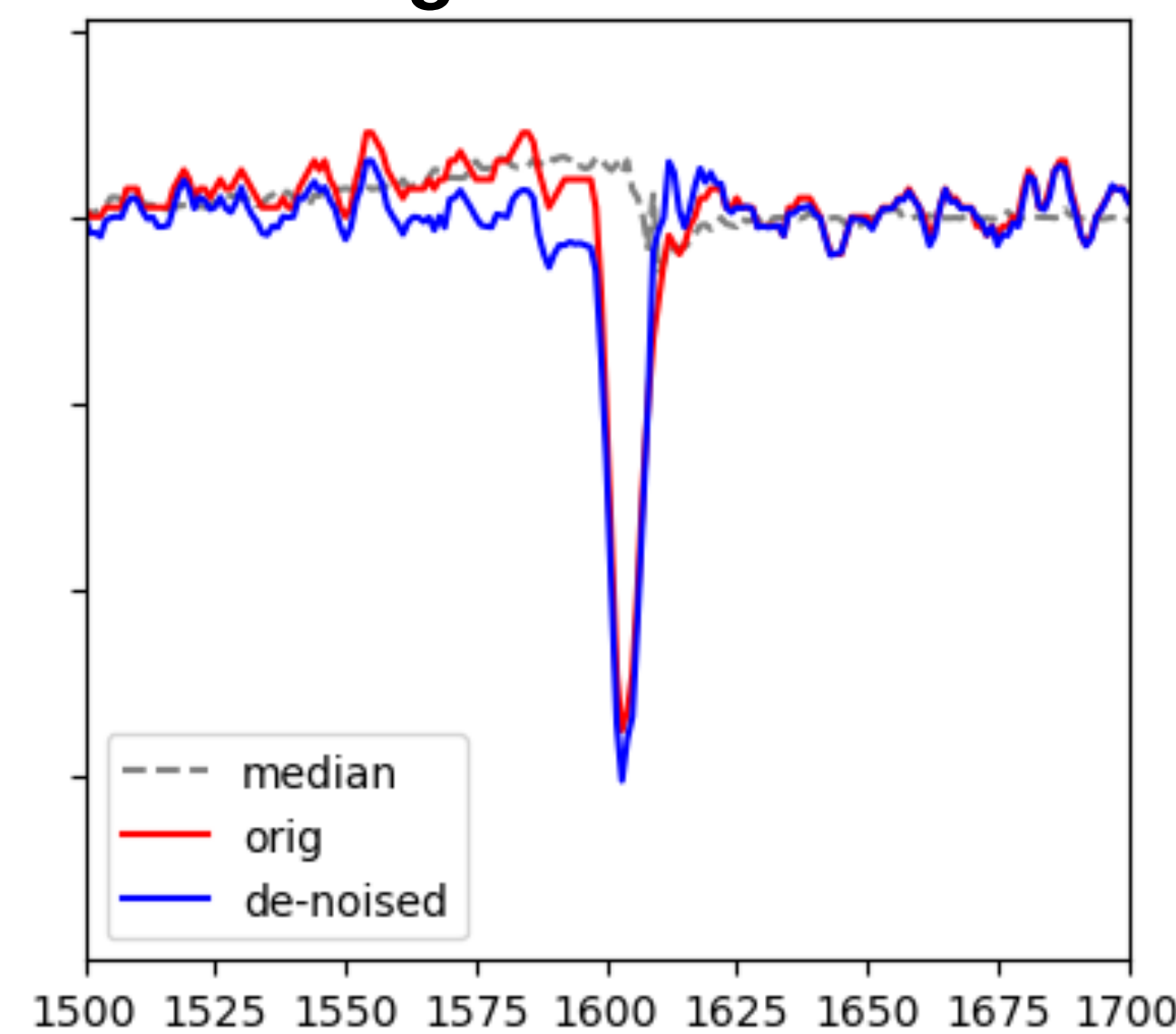
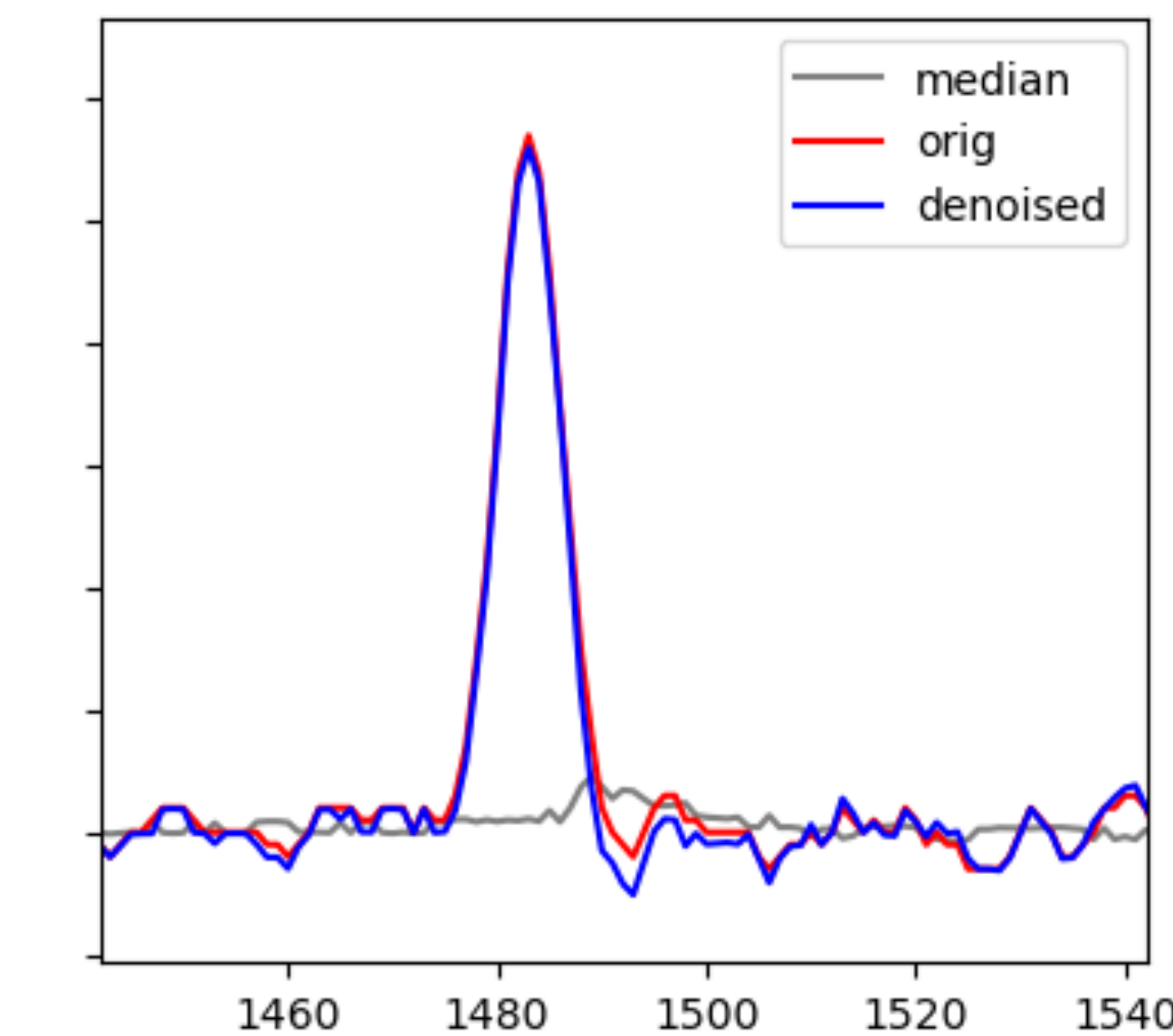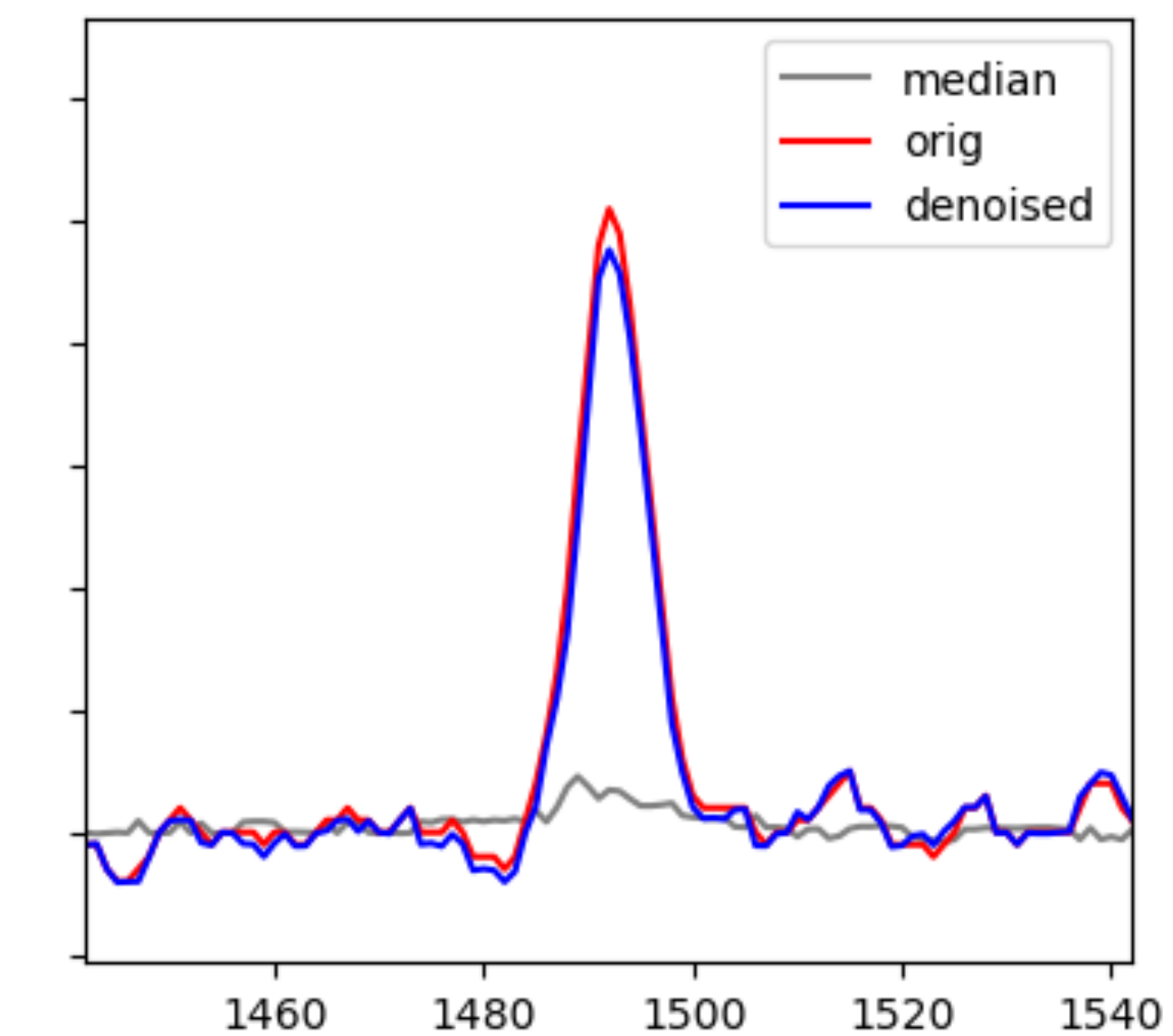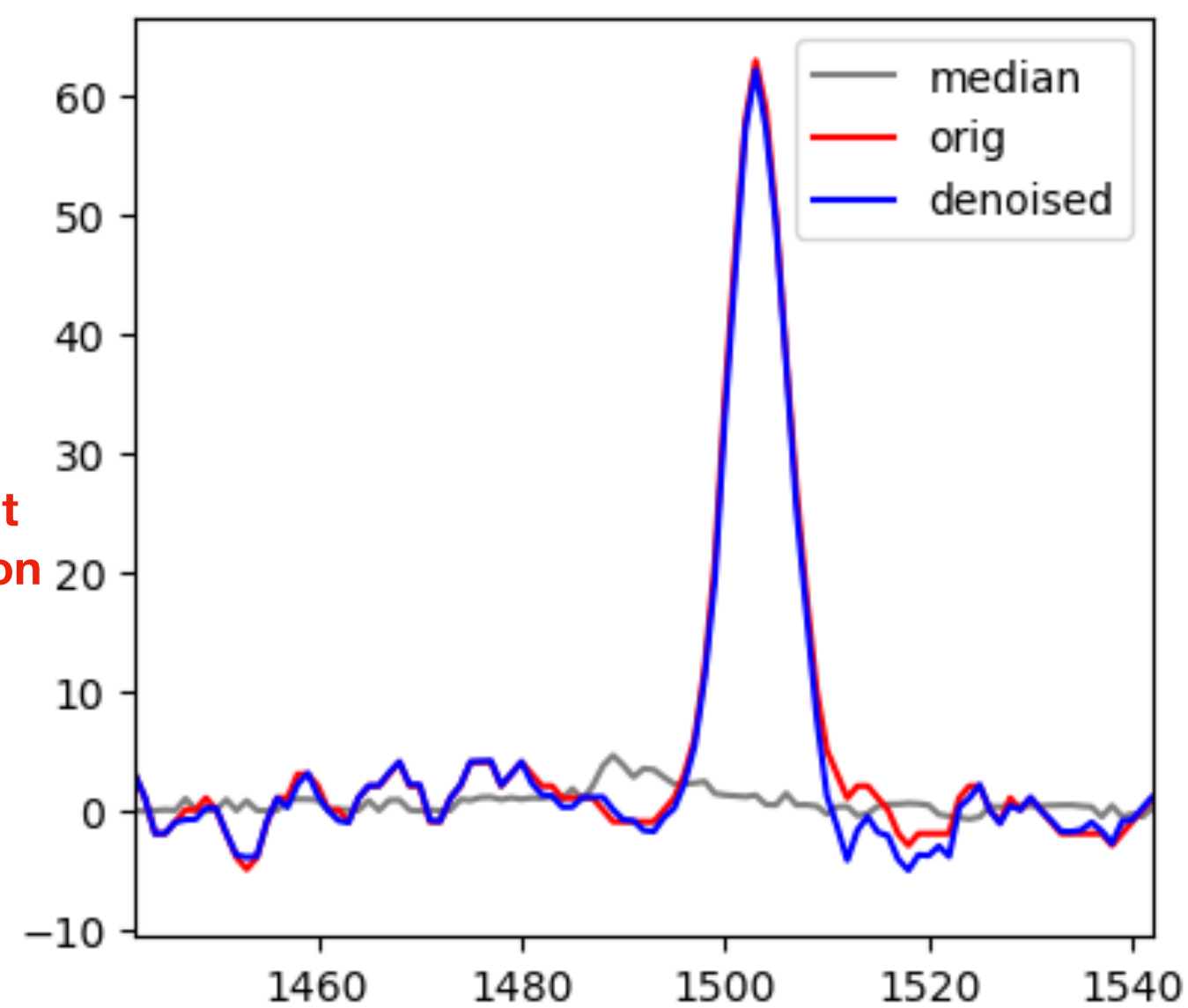edge- channel   center channel   edge+ channel

U plane

MC: no coherent
noise in simulation

median
orig
de-noised

W plane

MC: no coherent
noise in simulation

median
orig
denoised

CNR at SBND update

- attempted tuning some signal identification lines of code, often there is an if statement of the form: **signal/rms < 5** (then identify this bin for noise removal)

- this didn't change the outcome (yet)

- need to strike a balance of preserving signal and still identifying coherent noise

```
52        WireCell::Waveform::realseq_t medians(nbins);
53        for (int ibin = 0; ibin != nbins; ibin++) {
54            WireCell::Waveform::realseq_t temp;
55            for (int ich = 0; ich != nchannel; ich++) {
56                const float cont = content.at(ich * nbins + ibin);
57                if (fabs(cont) < 5 * max_rms && fabs(cont) > 0.001) {
58                    temp.push_back(cont);
59                }
60            }
61            if (temp.size() > 0) {
62                medians.at(ibin) = WireCell::Waveform::median_binned(temp);
63            }
```

in CalcMedian() in Derivations.cxx

```
82        for (int j = 0; j != nbin; j++) {
83            if (fabs(signal.at(j)) < correlation_threshold * temp.second) {
84                sum2 += signal.at(j) * medians.at(j);
85                sum3 += medians.at(j) * medians.at(j);
86            }
87        }
```

in Subtract_WScaling() in Microboone.cxx

DATA: compare median (correction waveform) with edge vs center channels