

Lab Skills Exam #2

When a graph or figure is required, label axes and title each figure plot. When your figure is complete, copy and paste it into this document at the indicated position. Include a snapshot of your processing flows for both exercises.

1) (10 points) **Assessing stack quality:**

Take a deconvolved stack (from all shots) into a set of three bandpass filters designed to allow estimation of the highest signal frequency in your data. The Ormsby bandpass filter can be found under the filtering heading. Create and plot three different stacks with the bandpass filters defined by the Ormsby parameters:

1. [35 40 50 55] examines the 40-50 Hz band
2. [45 50 60 65] examines the 50-60 Hz band
3. [55 60 70 75] examines the 60-70 Hz band

Compare and contrast these three stacked sections. Signal is indicated by the presence of laterally continuous events. Does your data contain signal in each frequency band? Annotate your sections in PowerPoint or Word using ovals with contrasting colour to indicate examples of where you see signal.

PASTE YOUR FULLY ANNOTATED FIGURES HERE.

FIG1: 40-50 Hz stack

FIG2: 50-60 Hz stack

FIG3: 60-70 Hz stack

Flow Algorithm

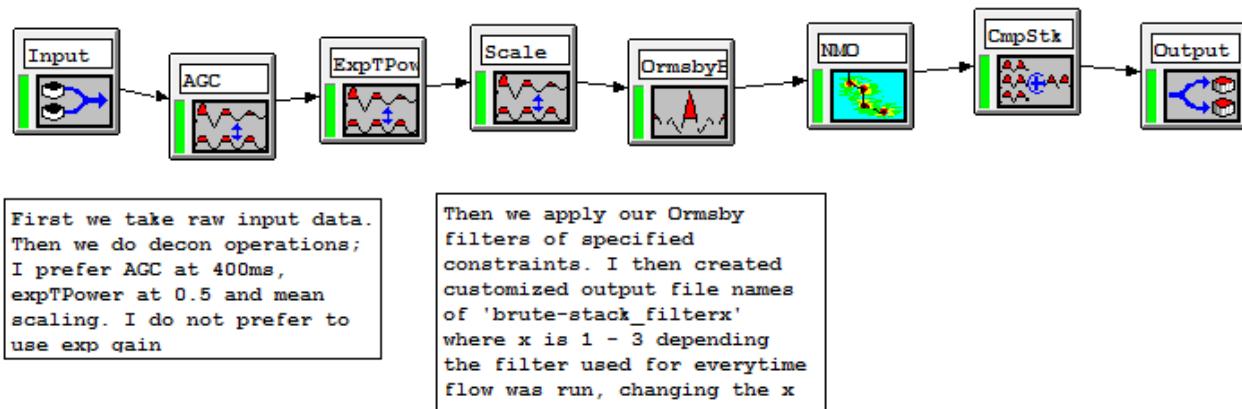
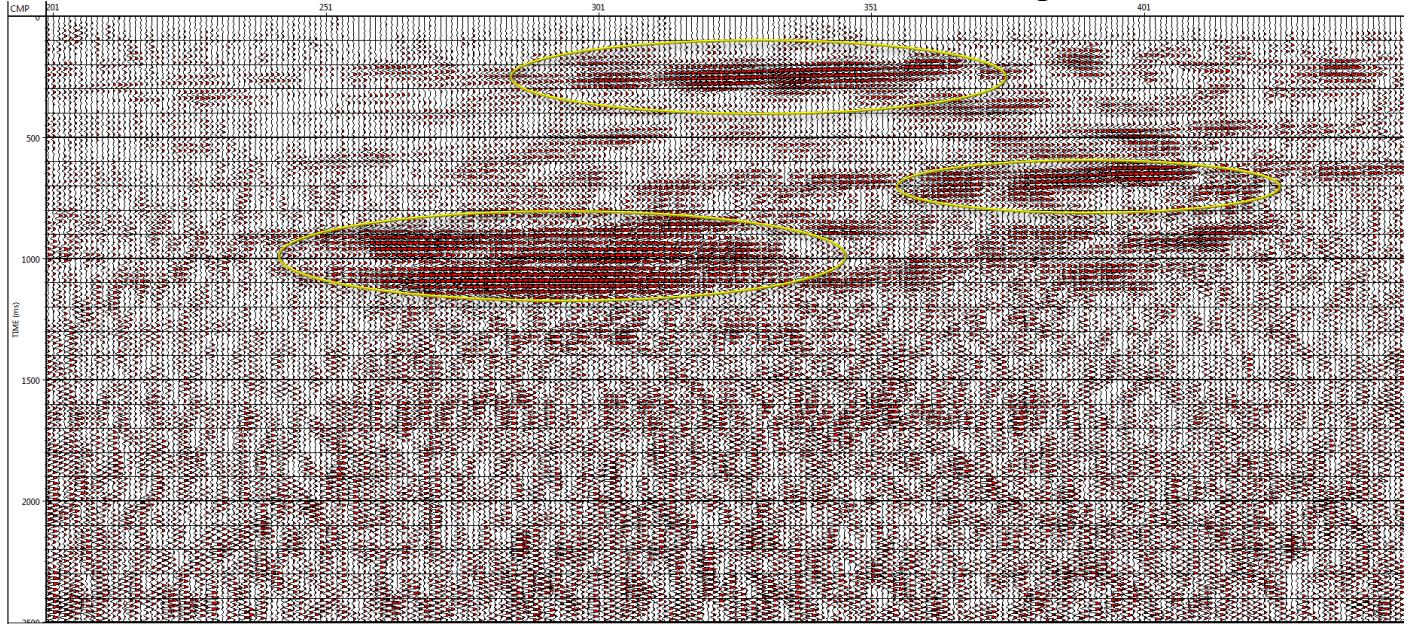
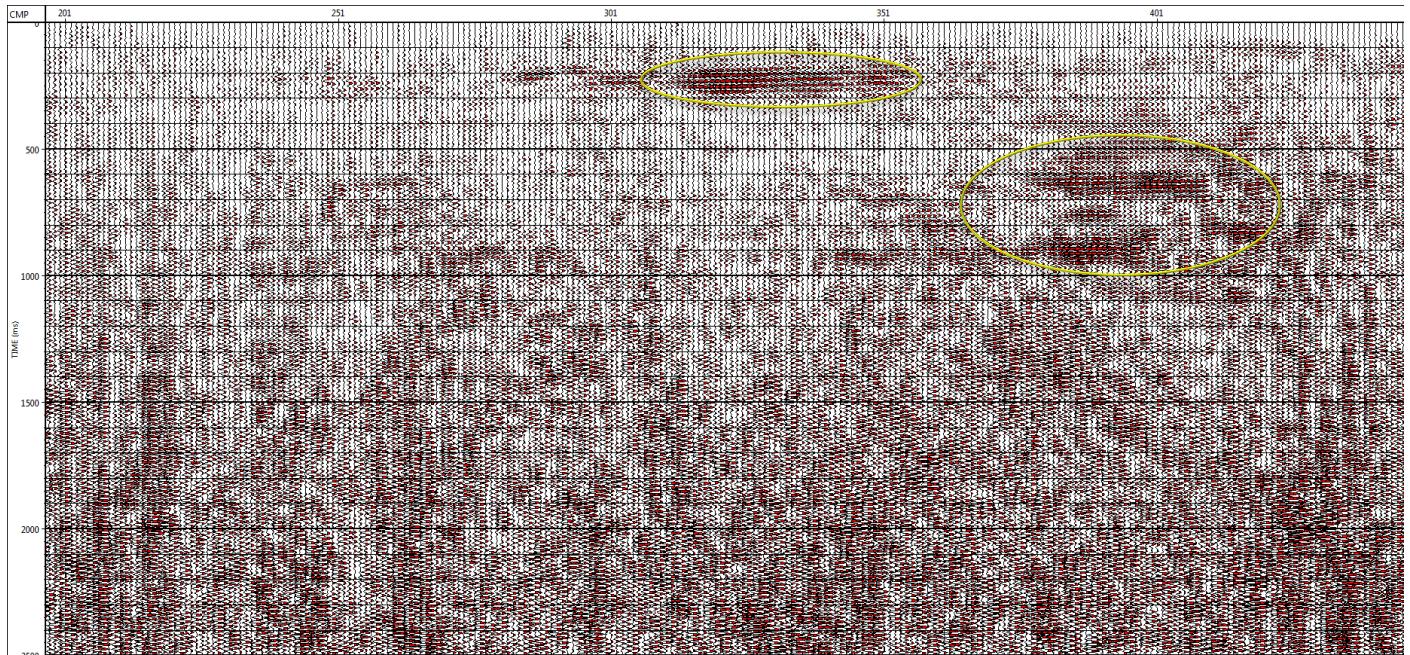


FIG1. Deconvolved CMP Stack 201-500 under 40-50Hz bandpass filter



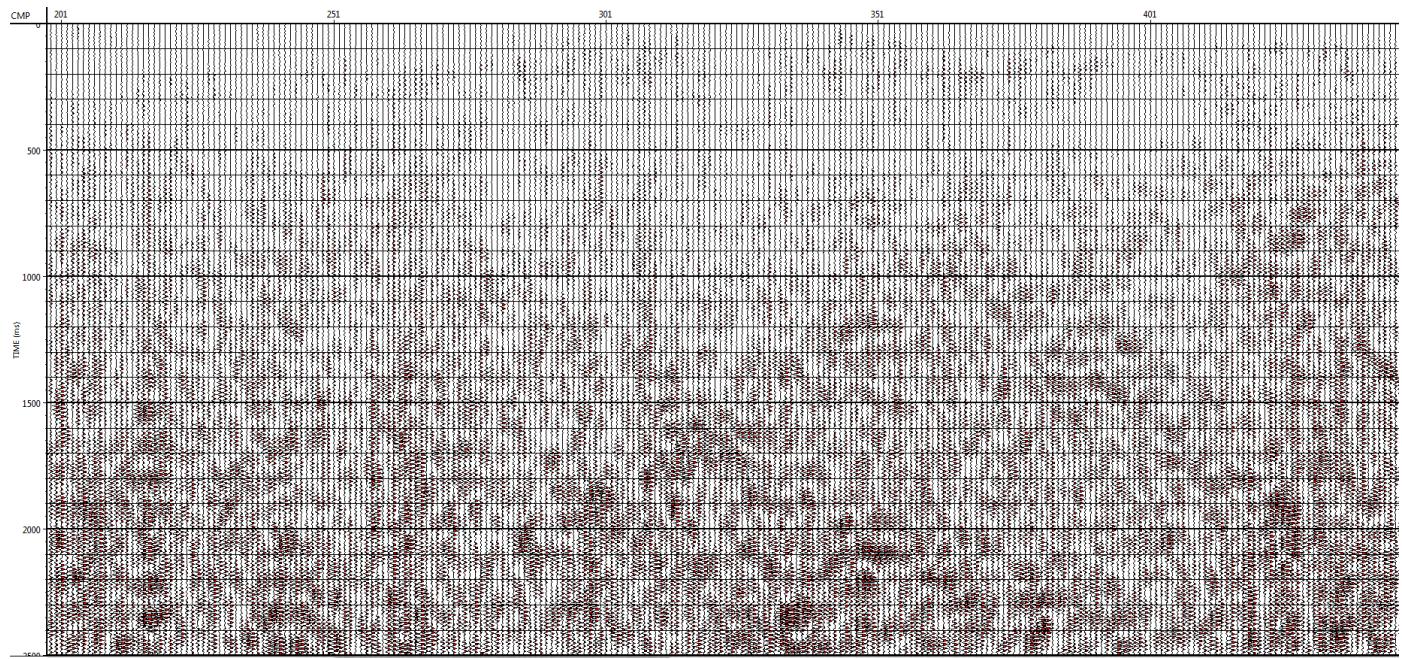
Under a 40-50Hz filter, strong signal is seen at the ~251-350 CMP at 1000ms, indicating a presence of a laterally continuous event. There is another lateral continuous event at signal detected in ~250ms between 300-370CMP. Further, there is also strong signal present at the 600ms mark, for 370-410CMP which again indicates possibility of laterally continuous event.

FIG2. Deconvolved CMP Stack 201-500 under 50-60Hz bandpass filter



On the 50-60Hz filter, the lateral event seen before in the above section may be repeated at 250ms between 300-350CMP again. Some signal is also seen at the 600-800ms time between 360-410 CMP.

FIG3. Deconvolved CMP Stack 201-500 under 60-70Hz bandpass filter



The previous regions where signal was detected doesn't seem to be repeated in the 60-70Hz bandpass filter.

Discussion:

Deconvolution tends to remove source effect to improve resolution. Data doesn't seem to contain signal in each frequency band as the 60-70Hz filter didn't produce any strong signal in the regions where there was in the previous figures. There seems to be more 35-45Hz band in lower times (<500ms) and also very strong at 1000ms. There is slightly less 45-55Hz band, most clearly distinguishable at 250ms between 300-350CMP. And again, no significant signal under the 60-70Hz bandpass filter.

2) (10 pts) *F-K filter*.

Extract shot 360 from the raw data and apply an AGC to it. Design two different F-K filters that

1. Remove the ground roll and the first breaks
2. Remove the ground roll only

Save both filters and apply them to the data in a processing flow. You can apply it only to shot 360 to save time or to all the data. Make a capture of the shot after filters 1 and 2.

Describe which filter you prefer and why.

PASTE YOUR FULLY ANNOTATED FIGURES HERE.

FIG4: Original AGC'd shot record.

FIG5: Screen capture of F-K filter analysis window for filter 1

FIG6: Shot after filter 1.

FIG7: Screen capture of F-K filter analysis window for filter 2

FIG8: Shot after filter 2.

Flow Algorithm

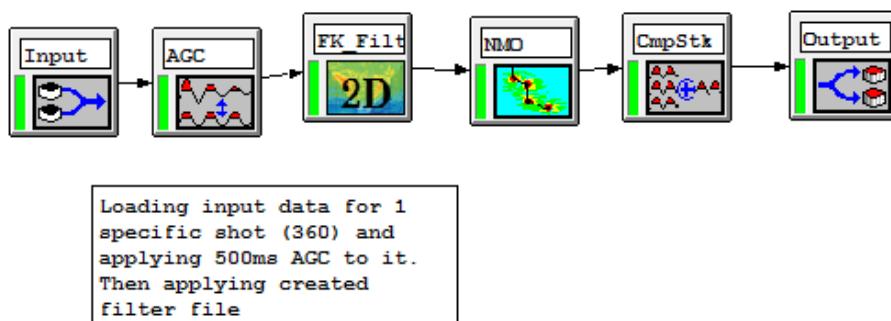


FIG4.Original AGC (500ms) shot record (#360)

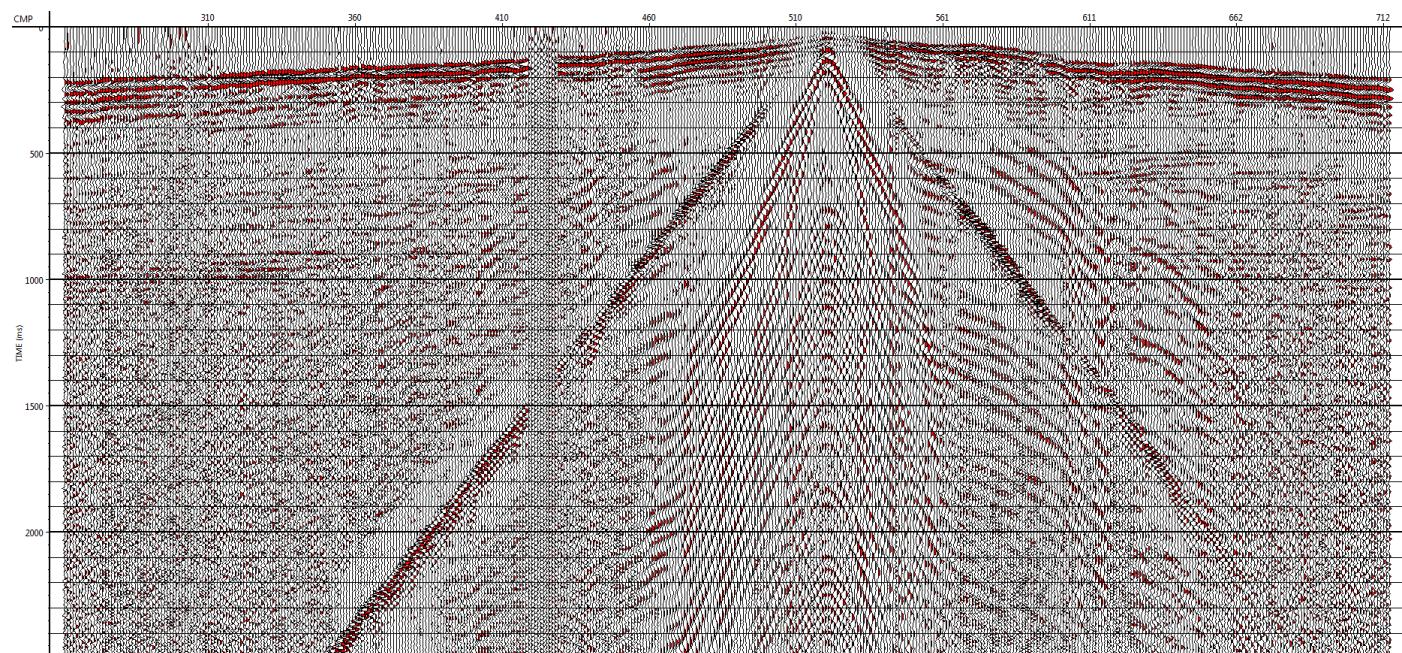


FIG5. Screenshot filter 1 (groundroll and first breaks high cut filter)

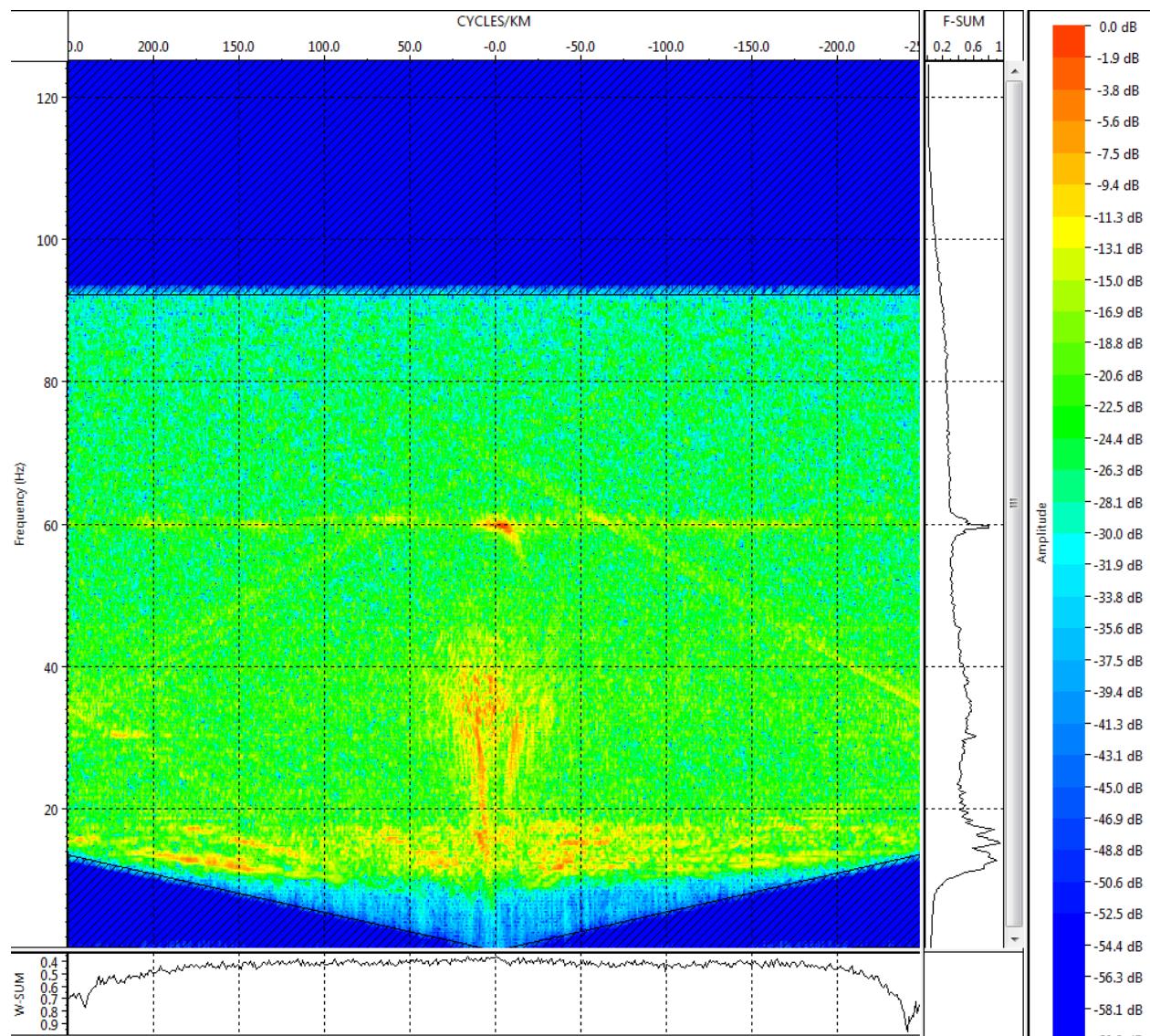


FIG6. Filter 1 Applied to Original AGC (500ms) shot record (#360)

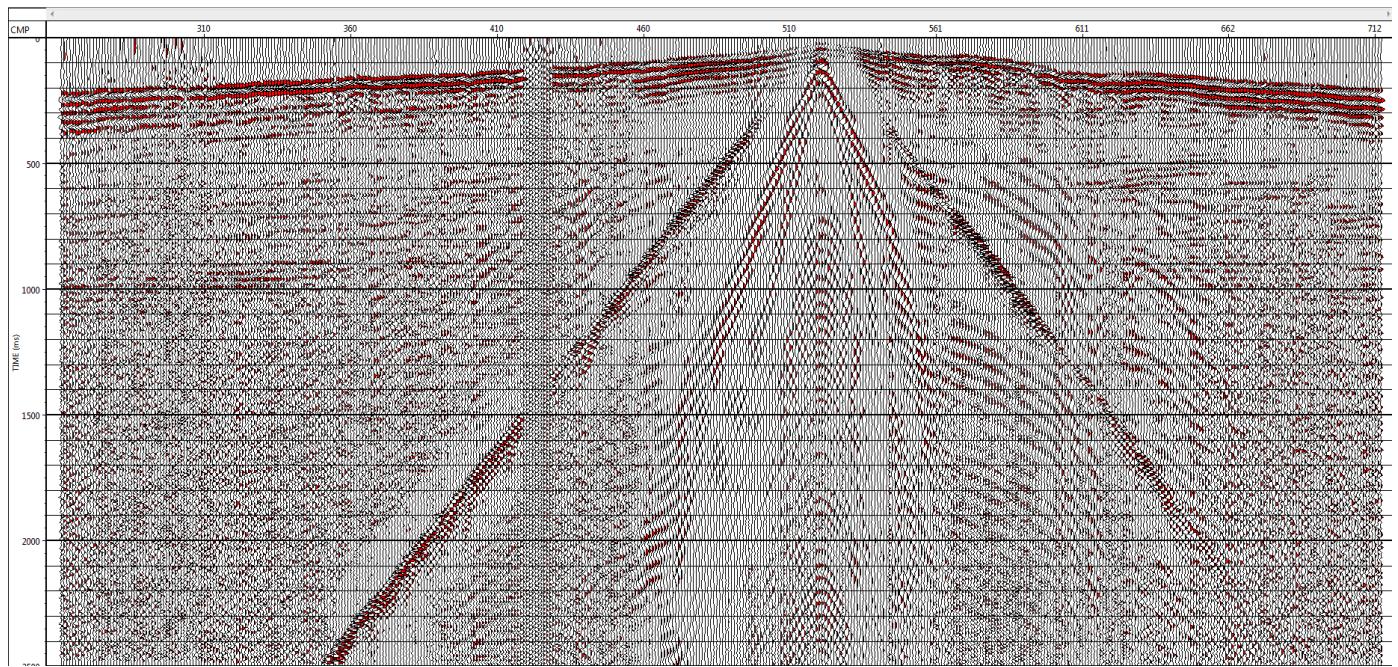


FIG7. Screenshot filter 2 (groundroll only filter)

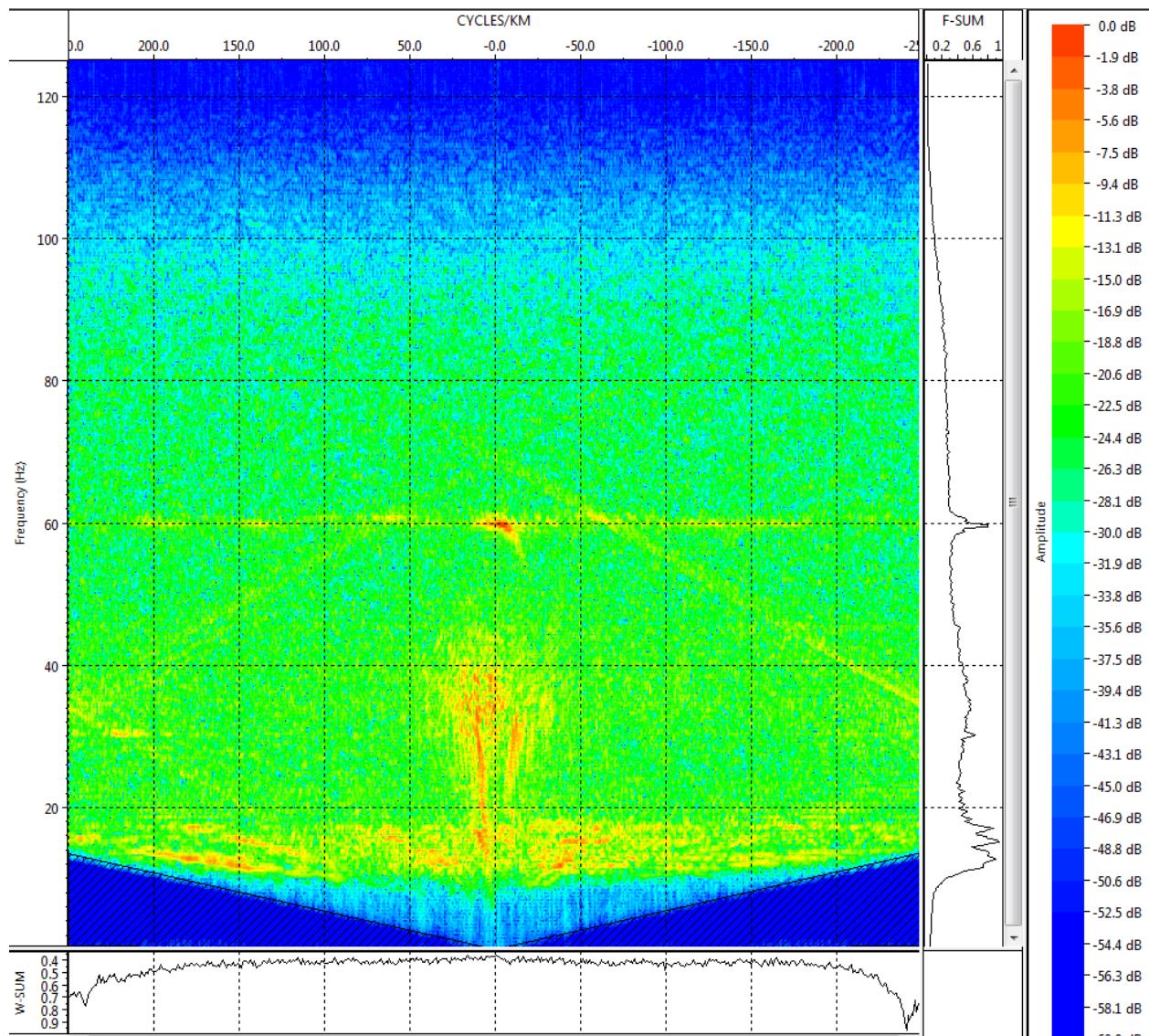
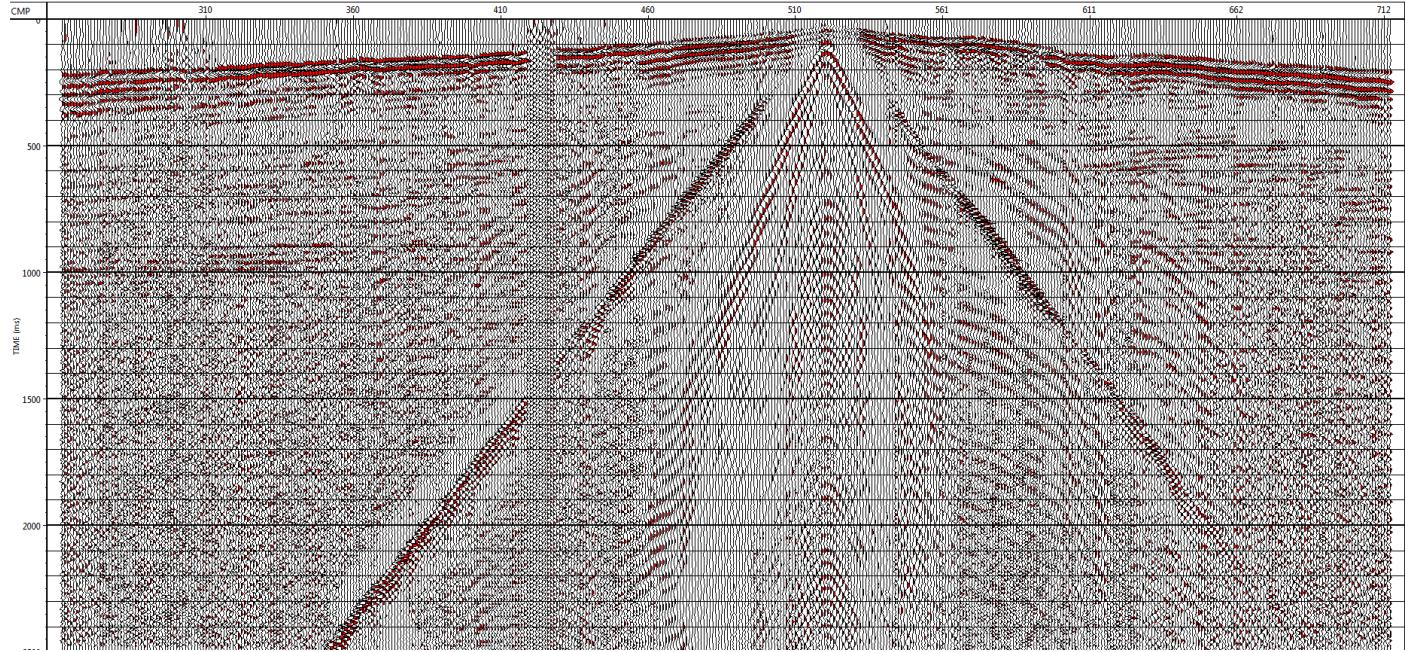


FIG8. Filter 2 Applied to Original AGC (500ms) shot record (#360)



The filter I would prefer is the second one and for next time, I would try to design it better. I believe if we try to play around with the 'F-K Polygon Rejection' menu item, we can create a better region to remove more ground roll. We also do not need to focus too heavily on first breaks too much so it is better to use filter number 2 and focus our time to construct it better. First breaks/high frequency noise can be ignored since it is more beneficial to focus attention on the ground roll and as such, filter 2 would be more desirable.