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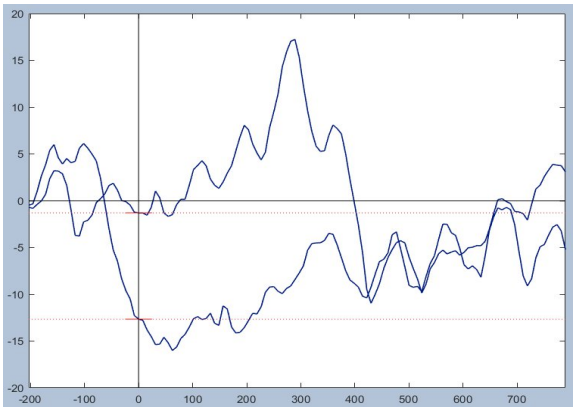
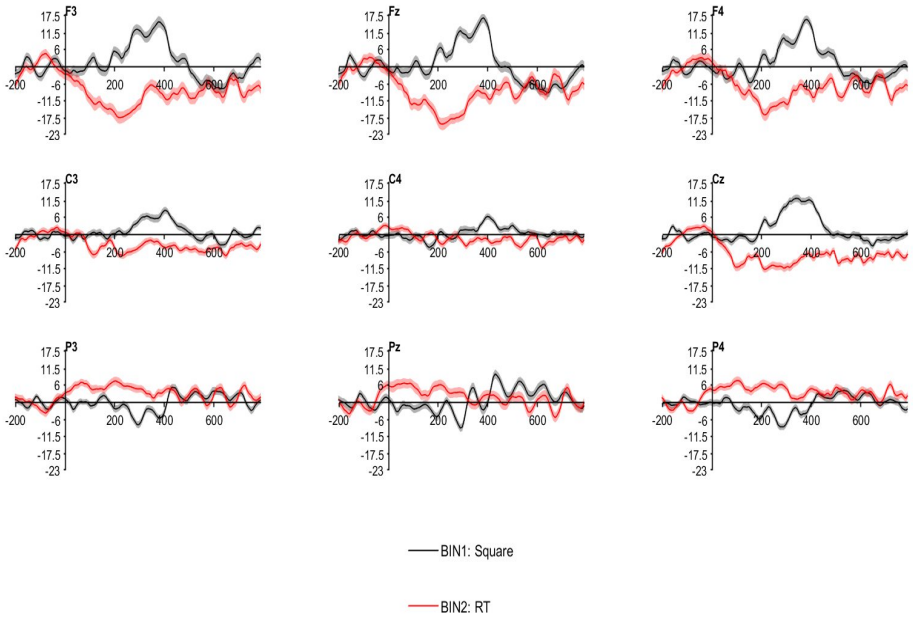
PSYC-406-Introduction to EEG

Assignment 3-Report

Part 1

In this part, we have created ERP frequencies for channels. To do this, at first I created eventlist after converting my data into a continuous dataset. Then, I have created two bin files according to Square and RT variables. Then I found the following graphs. On the first one, frequency line at the top one is Square variable while RT is at the bottom. On the second graph, black ones are Square and red ones are RT. These ERP waveforms are created according to each channel which is provided at the top of vertical line like F3,Fz,F4 for first three.





For Square condition, we observe on frontal channels especially, there is a significant increase around 200-400 ms and for RT condition there are significant decreases on that time. On the midline one(Fz), the decrease exceeds even -17.5. For central electrodes, we observe less increase on lateral sides(C3,C4) while there is still significant increase on midline(Cz) for Square condition(Bin1). For all central electrodes, we observe a stable waveform for RT condition while for midline one the waveform is less stable and the values are around -6 while for lateral sides the values are changing around 0. For Parietal side electrodes, we see an increase in RT condition differently from other electrode sides. For Square condition, however, we see decreases generally around 200-400 ms and the decreases are prevalent for more on bilateral sides(P3,P4) than the midline(Pz).

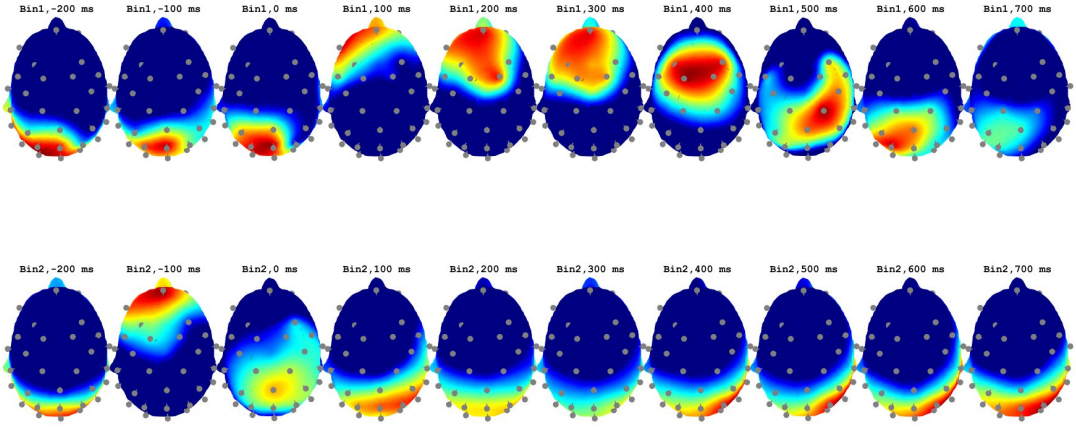
Then, using ERPLAB extension, I created scalp maps according to my bin files including codes: Bin 1—>Square—>.{10}/ Bin2—>RT—>.{11}. After a huge effort and tens of errors, I was able to create scalp maps like below. In this part, we can see an explicit 3D version of effects on a simulation. In this image below, we can observe Bin1

changes in waves on each 100 ms on the top. On the bottom, we can see the changes in wavelengths according to Bin2 means RT.

On Square(Bin1), we observe huge change mostly increasing at the prefrontal side around 200 and 300 ms. However, we observe change in wavelengths on at -100 ms on around prefrontal cortex according to RT variable(Bin 2) in pre-stimuli condition.

Additionally, while we observe a decrease on Square at 700 ms at parietal sides, inversely there is a significant increase on RT condition.

Also, we may see pre-stimulus activation change in wavelengths on Square.



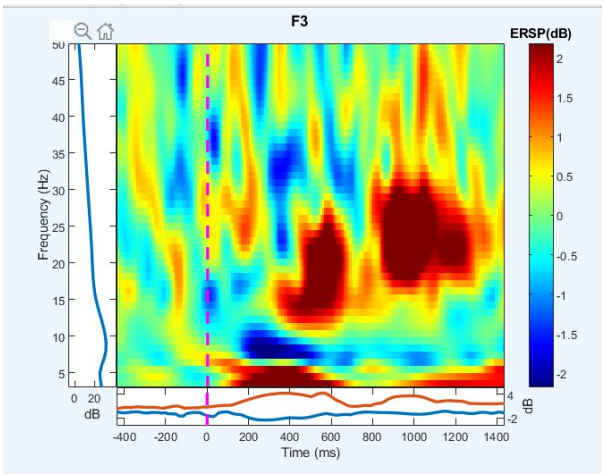
Part 2

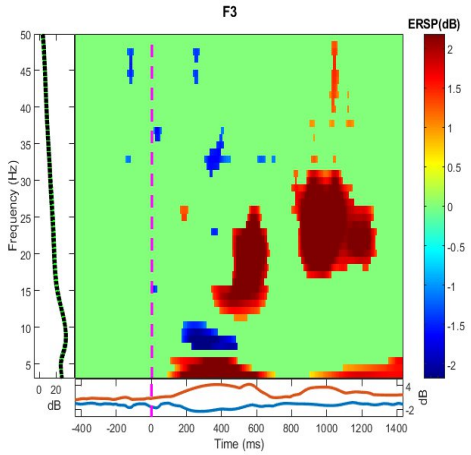
On the second part I have computed ERSPs and plotted event-related changes in spectral power according to pre-stimulus baseline for each channel. In each channel there are three figures; first figure is the channel/time frequency with dB values at each frequency level with time variable.

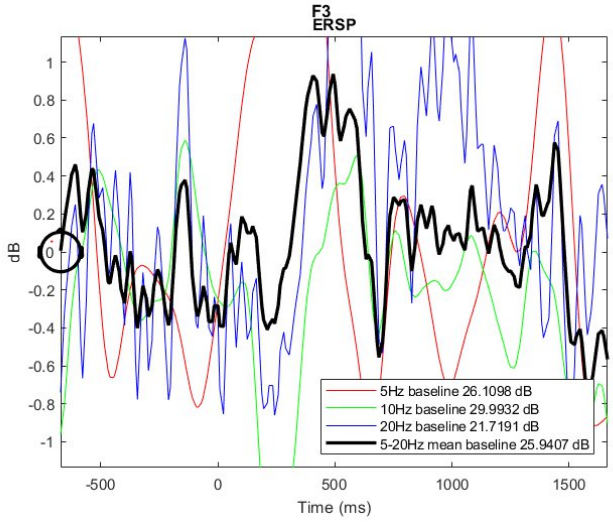
In the second figures, the dB values are masked according to the significance value p=0.05. For instance, on the first channel which is F3, we see only the significant differences according to our level(p=0.05) are shown others are colored as green(neutral).

In the third figures, the frequencies(5,10,20 Hz) are plotted for their dB values corresponding to time variable. On the plots, the black line represents our baseline of mean values which is the average of all dBs of each frequencies. Blue line represents 20 Hz baseline frequency ,as we see on the first channel the major increase in 20 Hz is around 1000 ms and on the plot, we can see the blue line is highest, even over than 1 dB at 1000 ms. Other channel plots can be interpreted like that.

For F3, results were following:

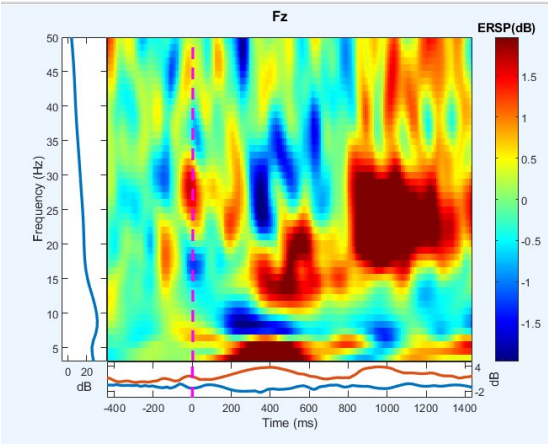


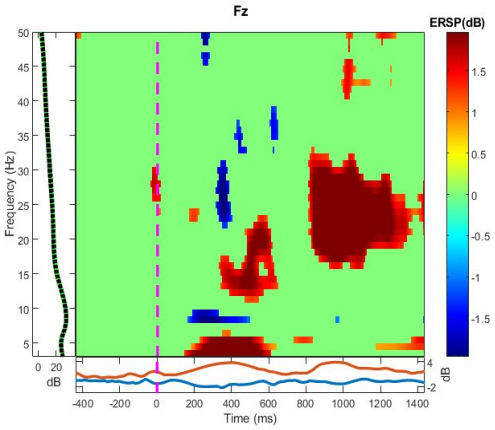


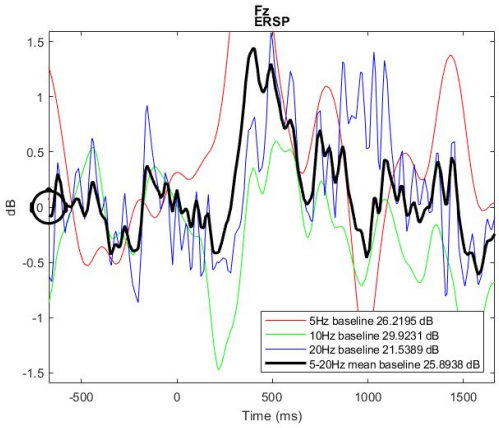


In this image, I observed there is a significant increase at 5, 15 and 25 Hz on different times like around 400, 500 and 1000 ms on average respectively. There is an also important decrease at 10 Hz around 300 ms also around 35 Hz although not much spread.

For Fz, the results we got are :

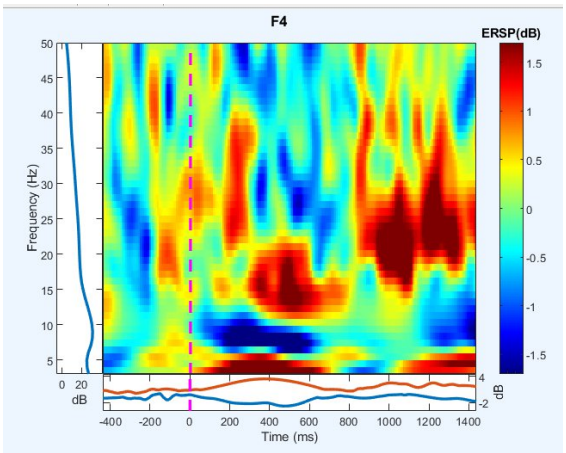


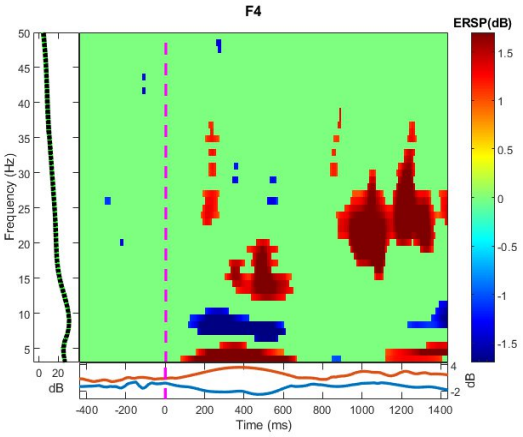


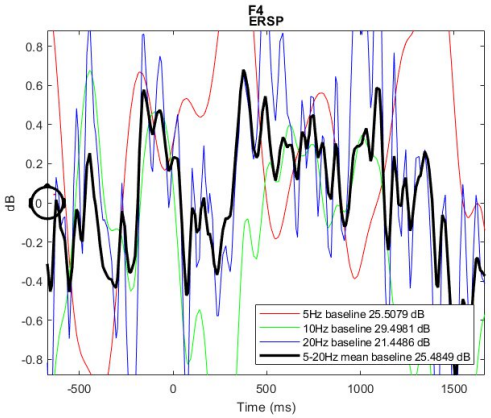


In here, I observed a similar spectral changes but higher density in increase at 25 Hz around 1000 ms.

For F4:

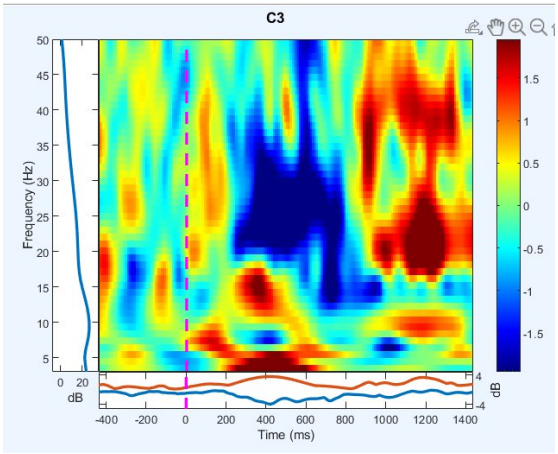


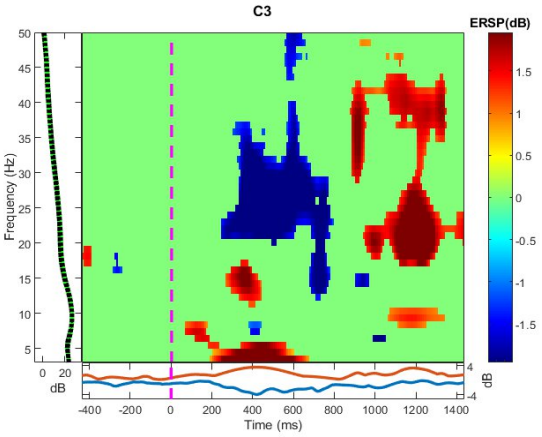


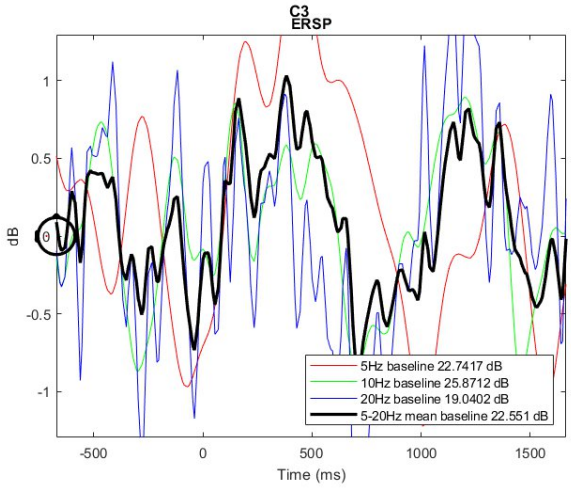


I observed split in 25 Hz increase of density according to two time; one is more accumulated on 1100 ms while another is around 1300 ms. Other changes were not so much different than the former one.

For C3:

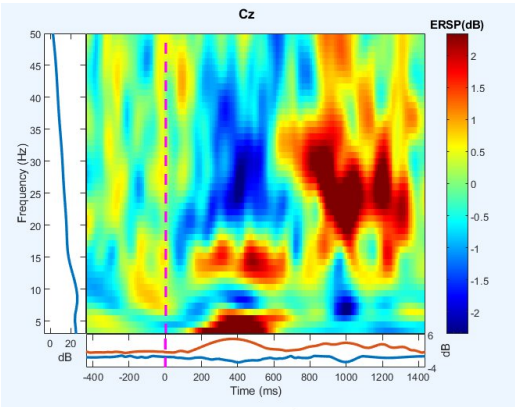


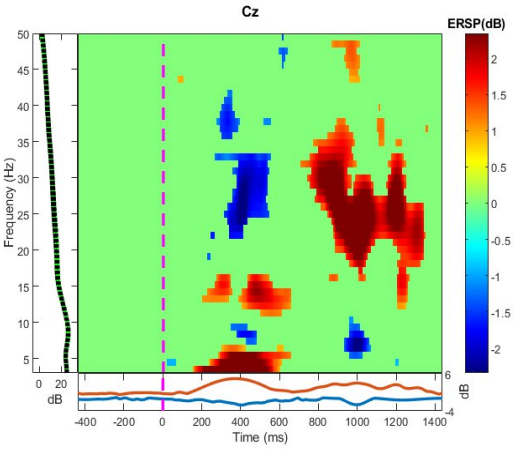


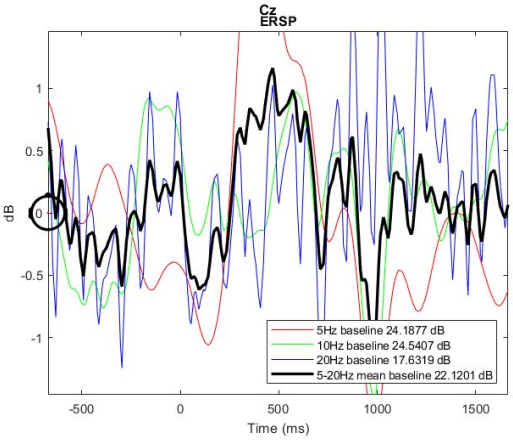


On this channel, I observed an important increase at 20 Hz and a brief increase at 35 Hz. However, In here, I observed a denser decrease at around 25 Hz than former channels.

For Cz

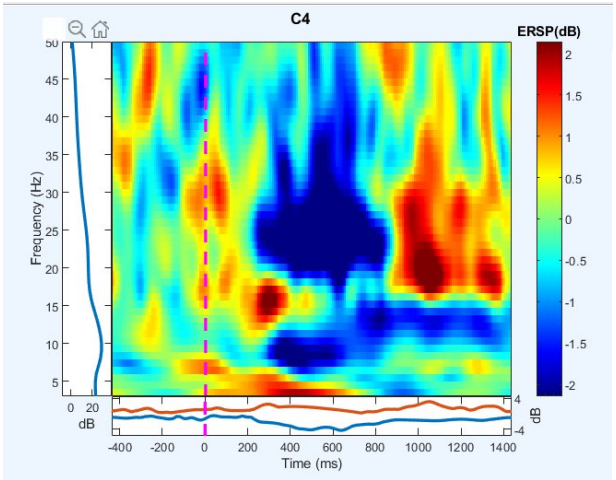


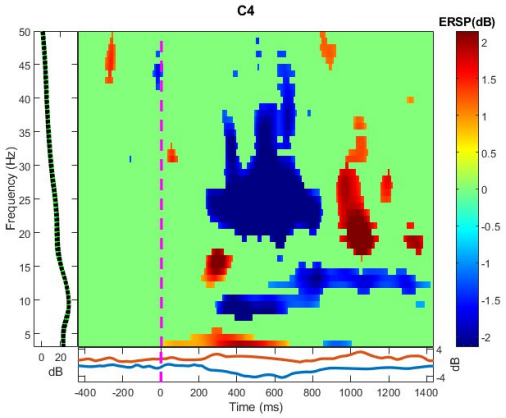


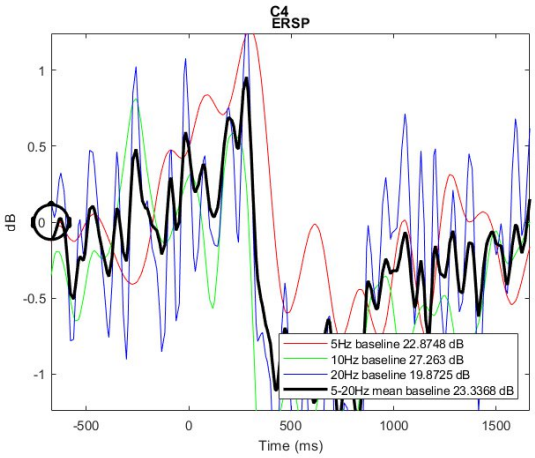


In Cz, I observed mainly significant increases when I compare with other central channel locations. In here especially around 25-30 Hz, there is a significant increase in density of waves.

For C4

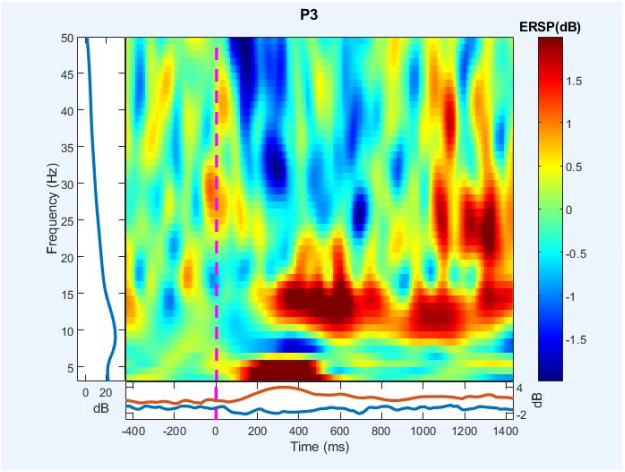


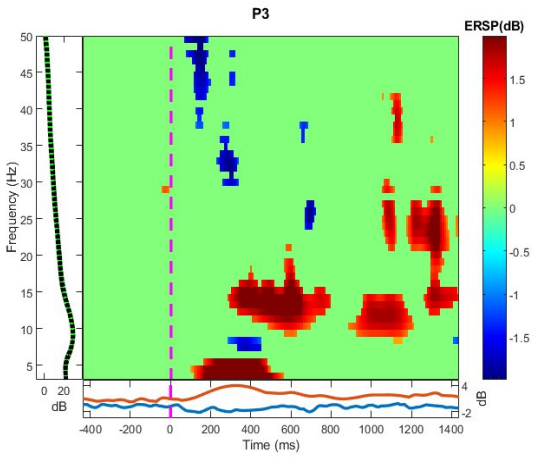


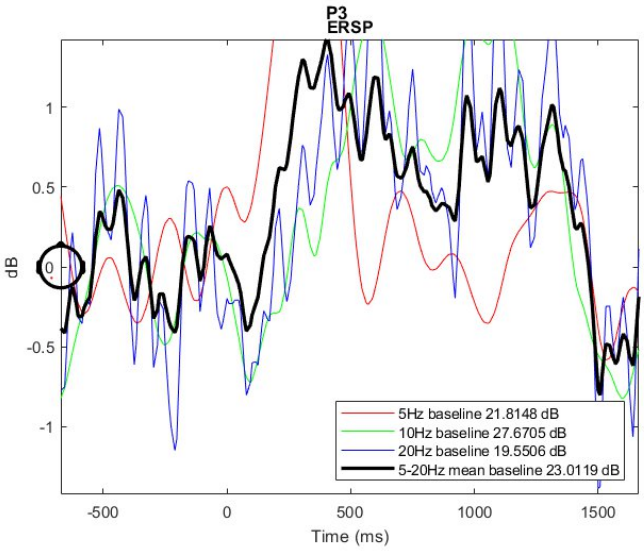


Different from Cz, in C4 channel I observed significant and prevalent decrease in 25 Hz around 400-600 ms. However, the increased difference in 25 Hz has lower density.

For the P3:

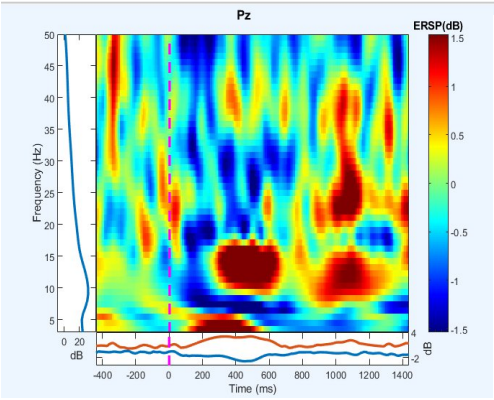


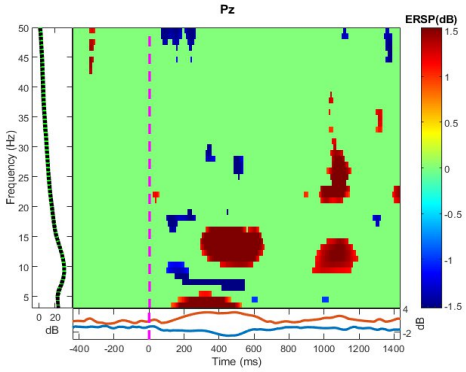


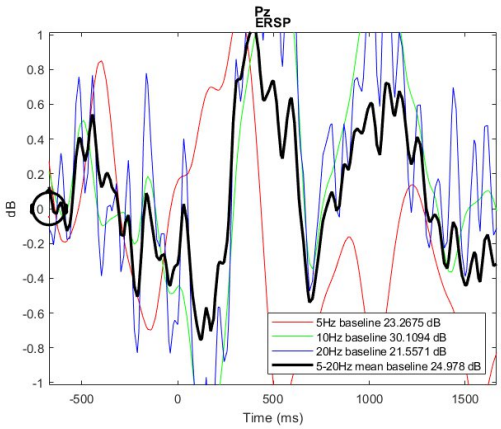


I observed significant increase at around 15 and 25 Hz in different times, but most prevalent at around 500 ms. As usual there was an important increase at 5 Hz too around 400 ms. The decrease in dBs were pretty less than other channels.

For Pz:

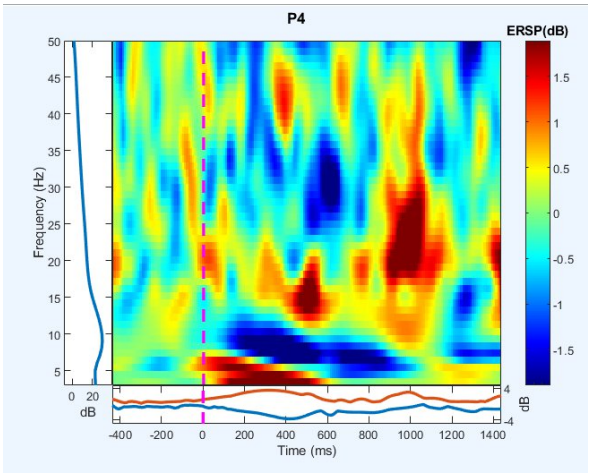


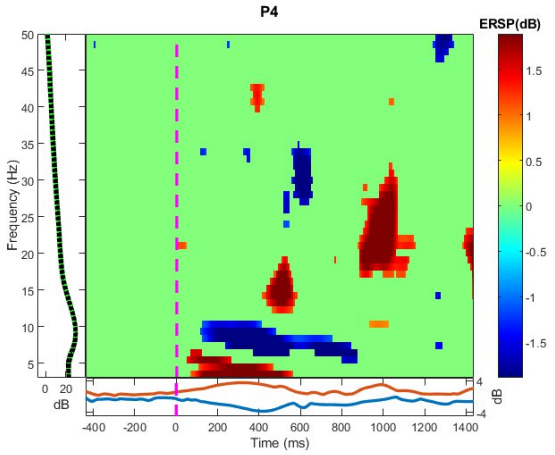


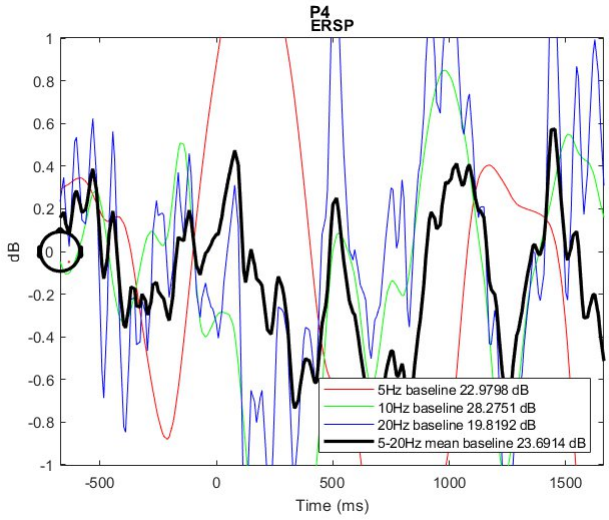


In this channel, besides polarity between increase and decrease in dBs, I observed significant but dispersed decreases in different Hz like around 7, 16, 18, 25, 30, 45 and 50 Hz.

For P4:







For this channel, when compared with Pz, I observed significant increase in 15 Hz is less prevalent around time just like a decrease in prevalence of significant increase between 10-30 Hz. They seem like merged, but less spread than Pz.