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# To run cat\_mov\_reg\_power.m

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## Credit and date

Code developed by Oscar Miranda-Dominguez.

## Intro

This function concatenate the relative contribution of power of each frequency band from multiple subjects.

## Repo location

[https://gitlab.com/Fair\\_lab/movement\\_regressors\\_power\\_plots](https://gitlab.com/Fair_lab/movement_regressors_power_plots)

## Dependencies:

Dependancies have been included in this version. Extra functions are found within this repo's folder named 'utilities'

## Basic usage

The two mandatory input arguments for this function are:

1. the path to the Movement Regressors files made by the pipeline, formatted as a cell of size  $n \times 1$ , where  $n$  represents the number of files
2. TR, BOLD's repetition time

## Example 1

To run this example, you need to have the movement regressors files used for the power analysis. We are including in this documentation Movement regressors files from 63 participants with 4 resting state scans each. Hence we have 252 ( $63 \times 4 = 252$ ) Movement regressors files. Furthermore, the data was processed using 3 different methods, or versions:

- ver1: No filtering
- ver2: applying a notch filter with fixed cutting frequencies located at 0.31 and 0.43 HZ to the estimations of head movement (Movement regressors files)
- ver3: applying a notch filter to the estimations of head movement but selecting the filter bandwidth based on "guesing" the participant's respiration rate.

The movement regressors files for the 3 versions are saved on the folders ver1, ver2, and ver3. The files paths\_v1\_native\_folder.mat, paths\_v2\_native\_folder.mat, and paths\_v3\_native\_folder.mat have the paths to those files. You might need to update those paths accordingly to the location of the files in your system

Here is the first example:

Adding paths | Update this accordingly to your system

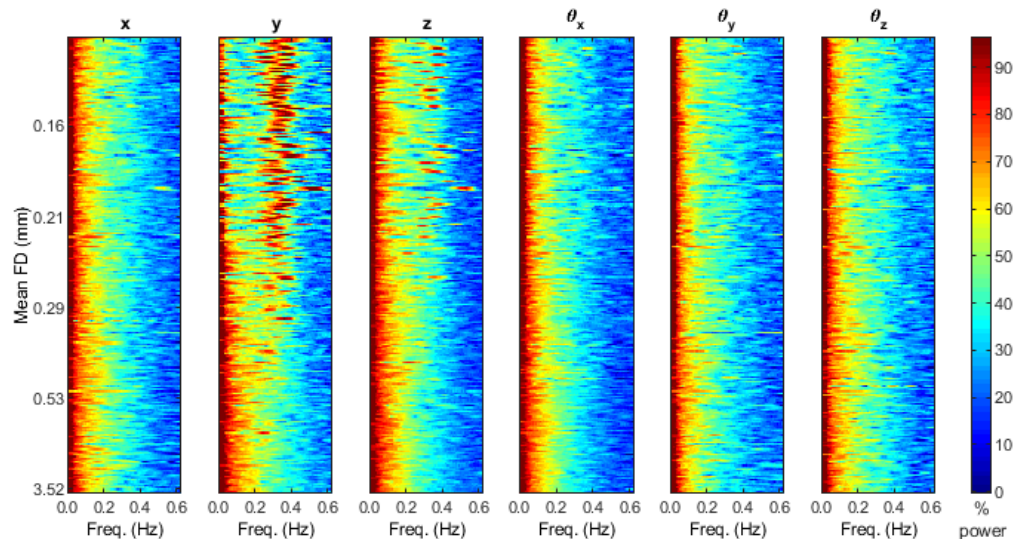
```
path_code='P:\code\internal\utilities\OSCAR_WIP
\movement_regressors_power_plots';
addpath(genpath(path_code))

% cd /mnt/max/shared/code/internal/utilities/mov_reg_power % move to
the folder to save the data
f=filesep;
TR=0.8;% TR in seconds

ver=1;
filename=['paths_v' num2str(ver) '_local_folder.mat'];
load(filename)

% YOu might have to update the paths
old='/mnt/max/shared/code/internal/utilities/mov_reg_power/';
new='P:\code\internal\utilities\OSCAR_WIP
\movement_regressors_power_plots\';
paths = strrep(paths,old,new);

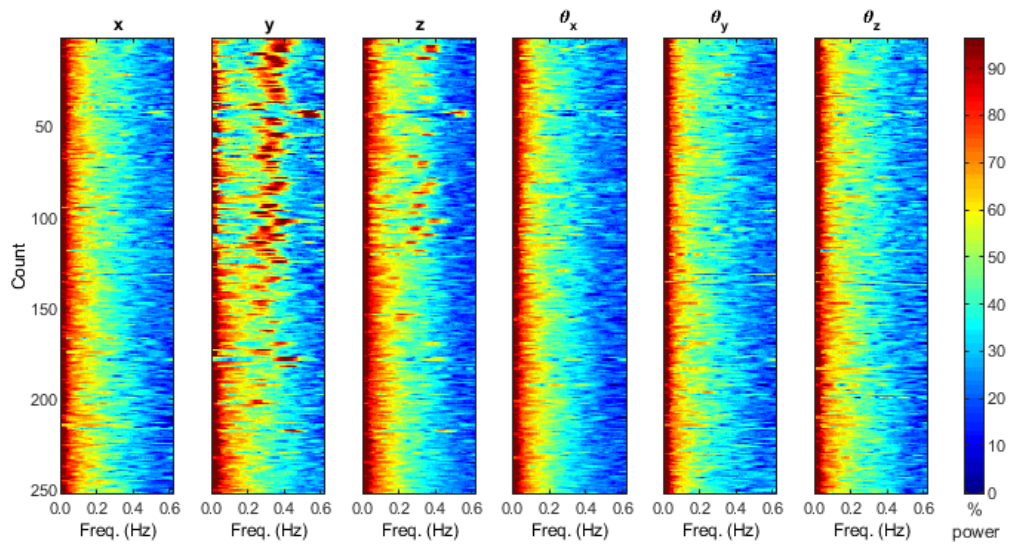
[CLIM, ix_subject_scan,MU,SIGMA,P]=cat_mov_reg_power(paths,TR);
```



This figure shows the power spectrum of the 252 unique scans, sorted by mean frame displacement. Each subplot indicates the direction of the displacement

## Sort participants as provided in the paths's list and define head brain radius

```
brain_radius_in_mm=50; % this is the default value. Explicitly shown
    here to demonstrate you can provide a different one if needed (ie for
    babies you might want to use 45mm instead);
sort_by_mean_FD_flag=0;
tit_prefix='sorted_as_in_the_list';
[CLIM, ix_subject_scan,MU,SIGMA,P]=cat_mov_reg_power(paths,TR,...
    'brain_radius_in_mm',45,...
    'sort_by_mean_FD_flag',0,...
    'tit_prefix',tit_prefix);
```



## Advanced usage, matching the colormap for different filtering strategies

If you like to use the same colormap and scaling using from one filtering strategy on the other filtering versions, you need to run the function first using the output arguments of the function and then run the function again using those output arguments as input arguments

## Run the loop for the first time to pick the scale

```
CLIM=zeros(3,6,2);
IX=cell(3,1);
MU=cell(3,1);
SIGMA=cell(3,1);
P=cell(3,1);
```

```

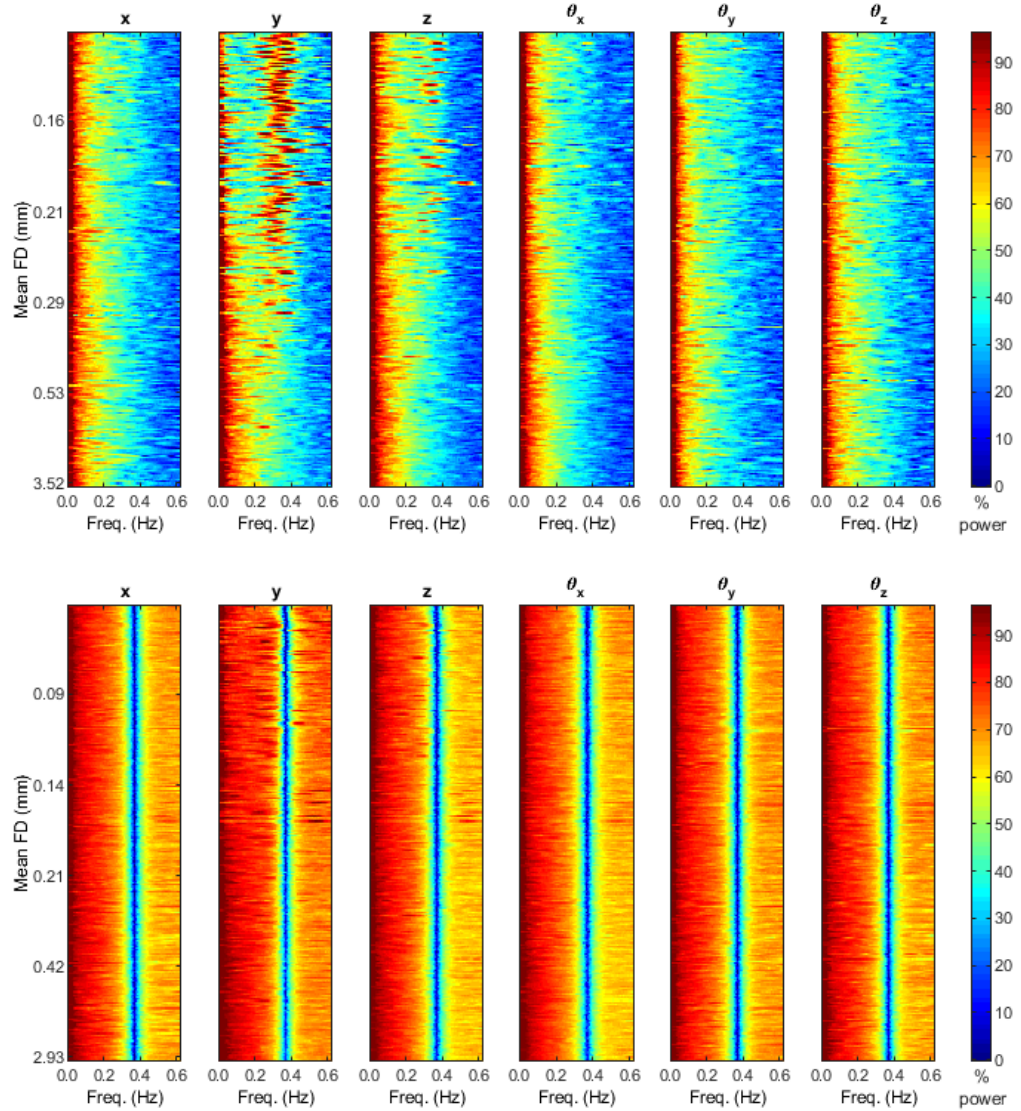
for ver=1:3
    filename=['paths_v' num2str(ver) '_local_folder.mat'];
    load(filename)

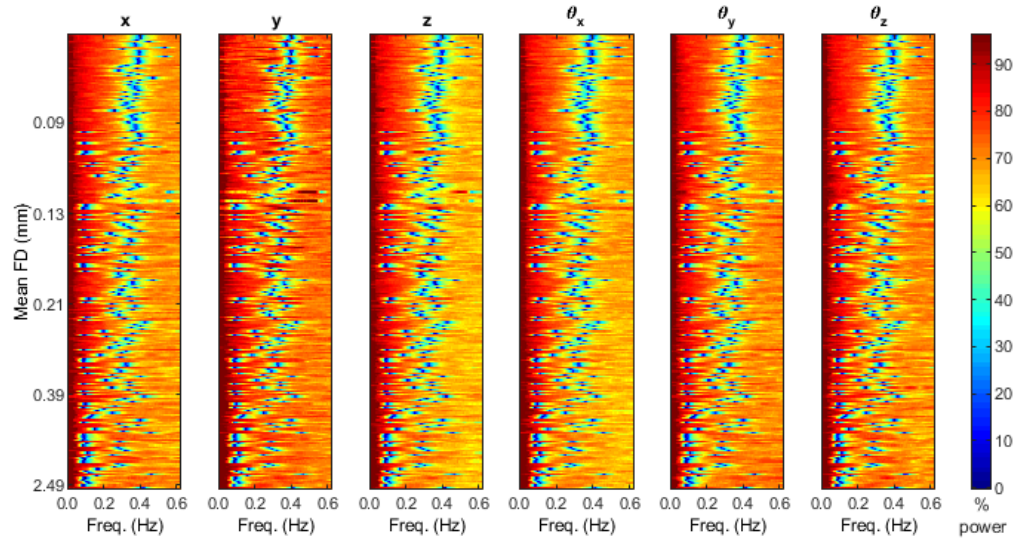
    % YOu might have to update the paths
    old='/mnt/max/shared/code/internal/utilities/mov_reg_power/';
    new='P:\code\internal\utilities\OSCAR_WIP
\movement_regressors_power_plots\';
    paths = strrep(paths,old,new);

    tit_prefix=['FNL_ver' num2str(ver) '_autoscale_'];
    [CLIM(ver,:),:],
    IX{ver},MU{ver},SIGMA{ver},P{ver}]=cat_mov_reg_power(paths,0.8,'tit_prefix',tit_

end

```





## Re run the loop selecting your preferred color

```

pick=1;
same_CLIM=squeeze(CLIM(pick,:,:));

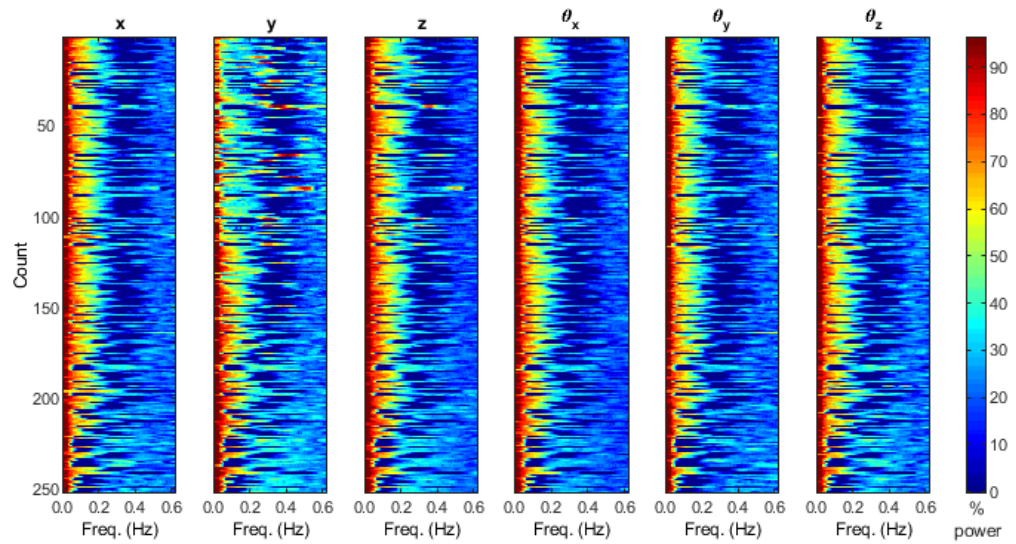
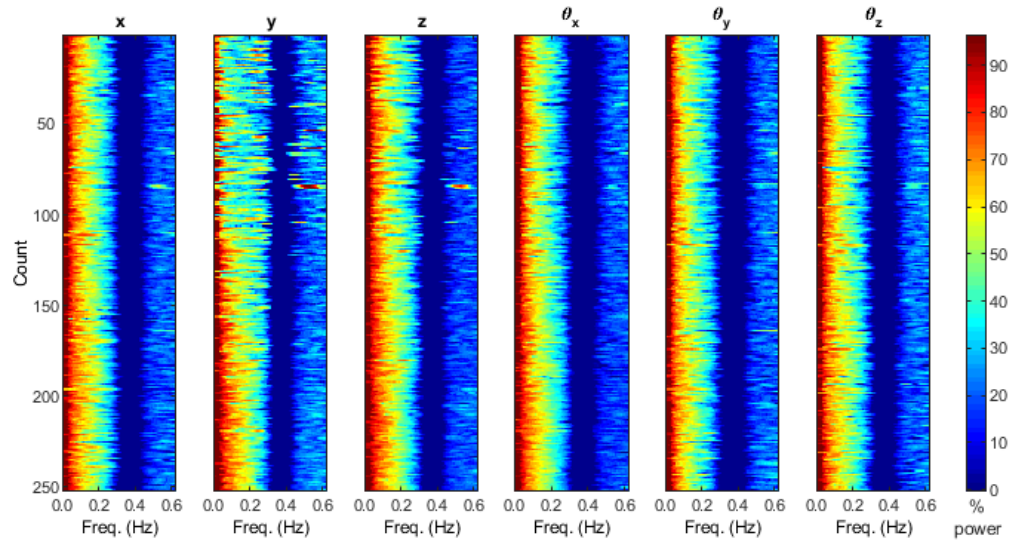
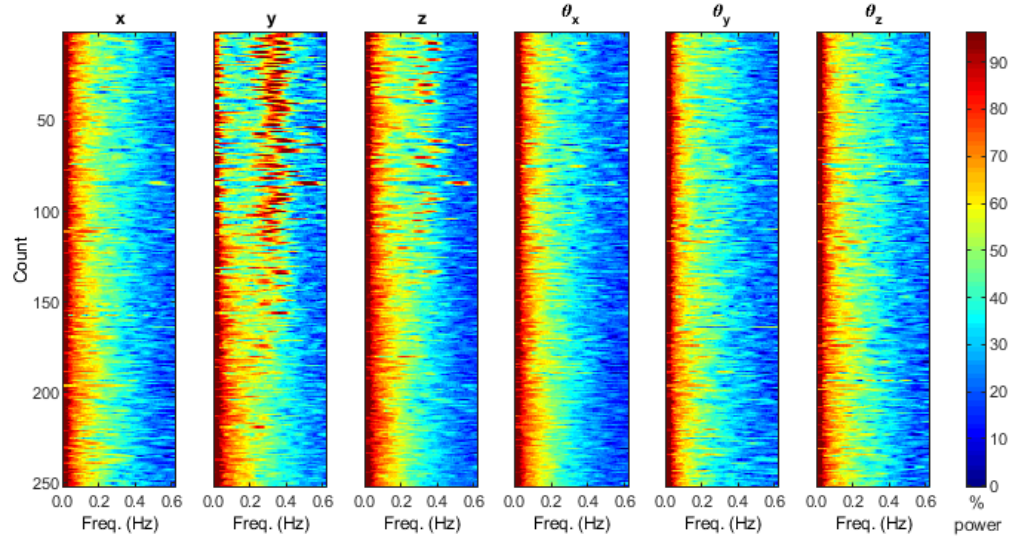
for ver=1:3
    filename=['paths_v' num2str(ver) '_local_folder.mat'];
    load(filename)

    % YOu might have to update the paths
    old='/mnt/max/shared/code/internal/utilities/mov_reg_power/';
    new='P:\code\internal\utilities\OSCAR_WIP
\movement_regressors_power_plots\';
    paths = strrep(paths,old,new);

    tit_prefix=['FNL_ver' num2str(ver) '_same_scale_as_Ver1_'];
    ix=IX{pick};
    mu=MU{pick};
    sigma=SIGMA{pick};
    p=P{pick};
    cat_mov_reg_power(paths,0.8,...
        'tit_prefix',tit_prefix,...
        'clim',same_CLIM,...
        'ix_subject_scan',ix,...
        'MU',mu,...
        'SIGMA',sigma,...
        'P',p);
end

```





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