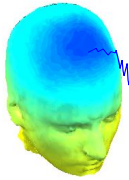
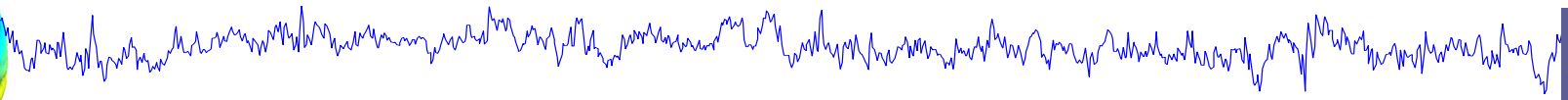
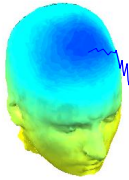
DIPFIT and model co-registration

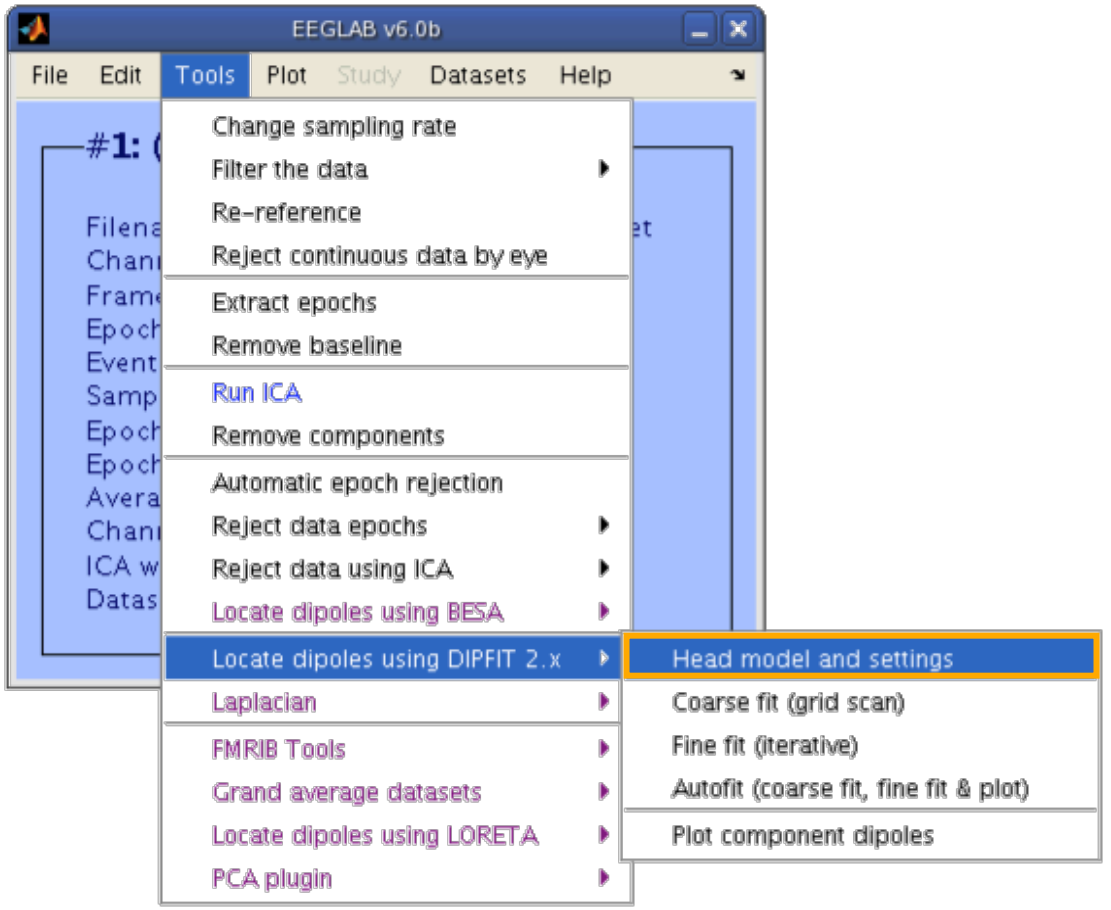




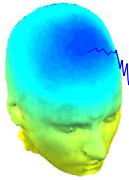
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration

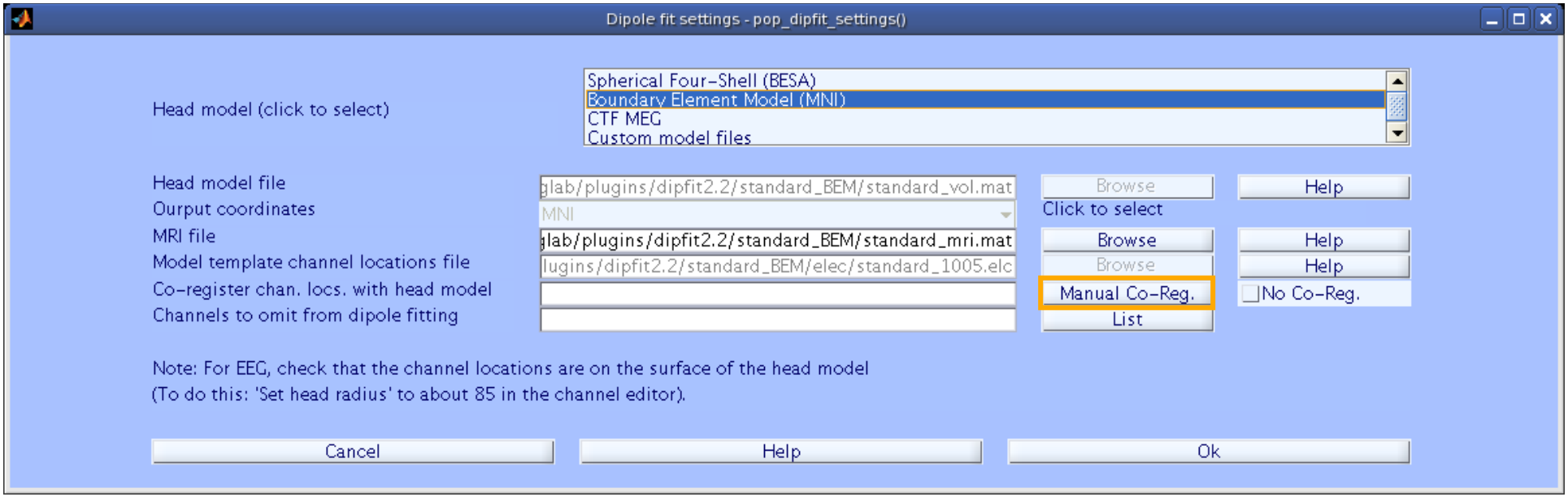
Finding dipole locations using DIPFIT in EEGLAB



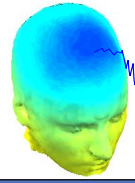


Co-register to model





Alternatively, warp to standard montage



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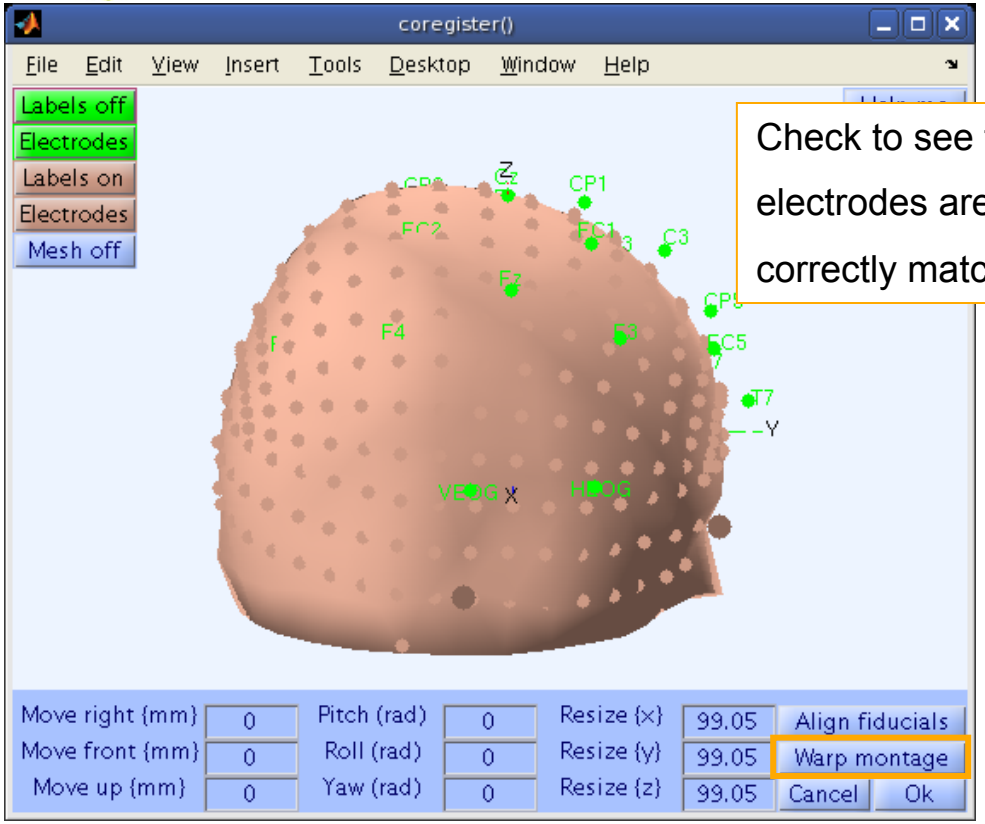
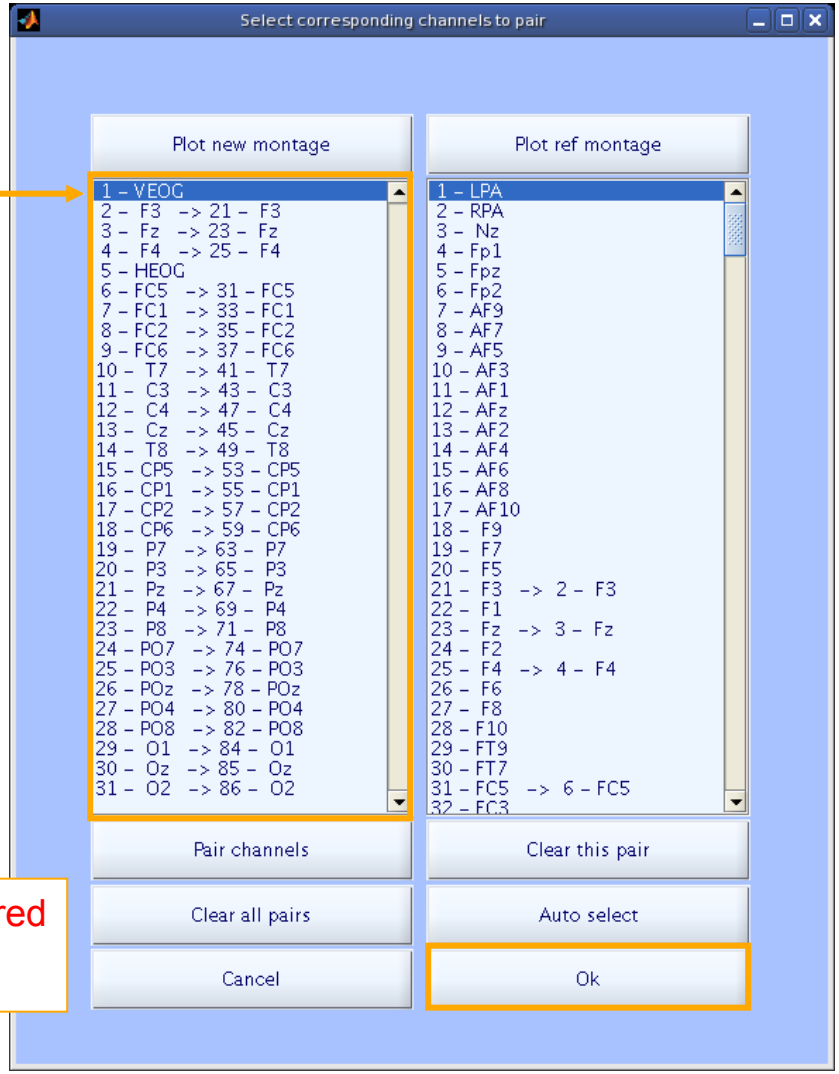
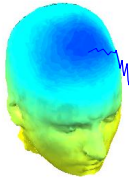


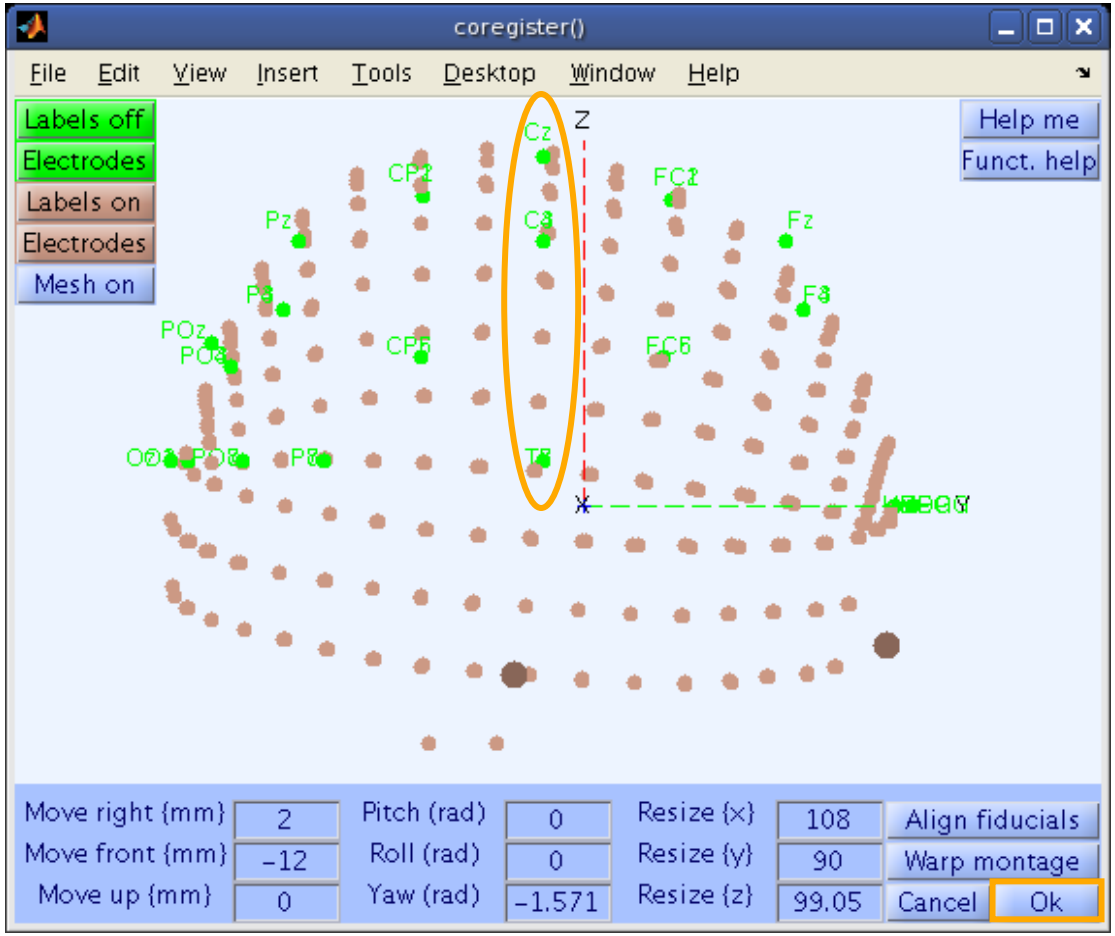
Check to see that electrodes are correctly matched



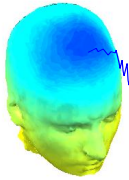
stats toolbox required for warping

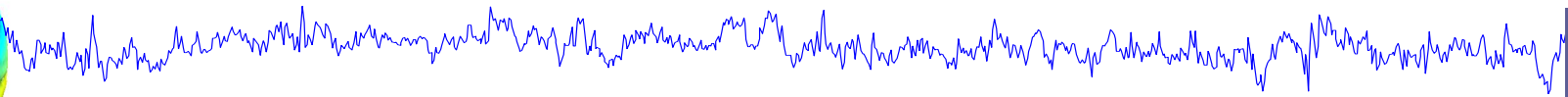
Check coregistration with model





Confirm electrode transformation





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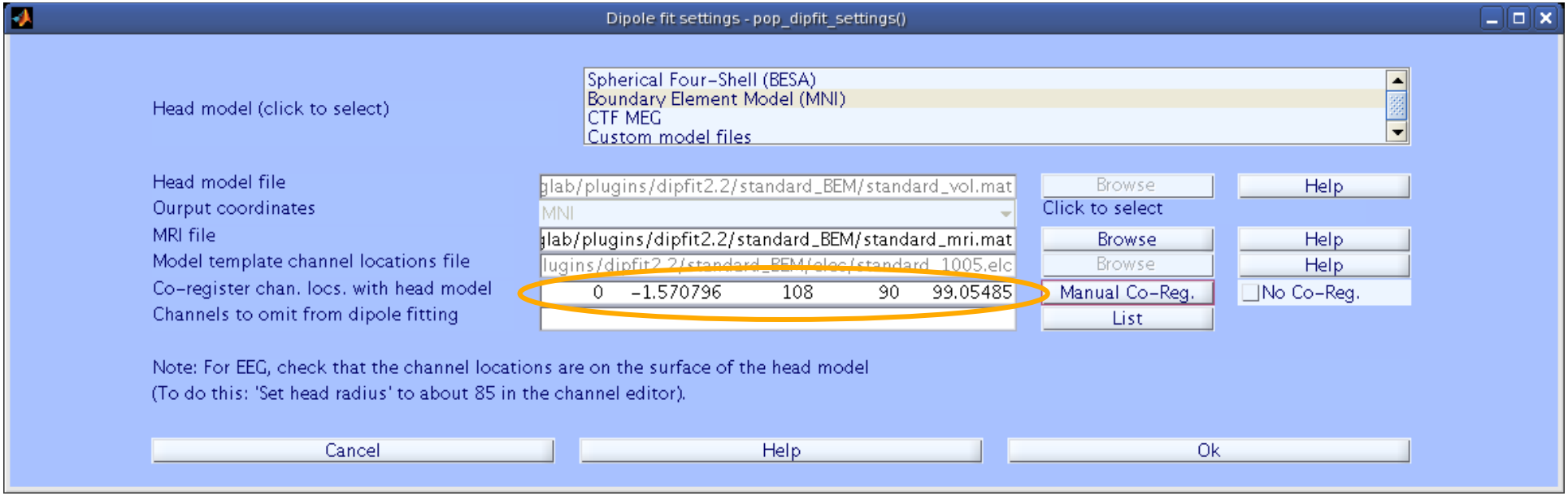
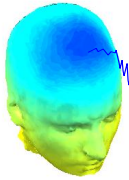
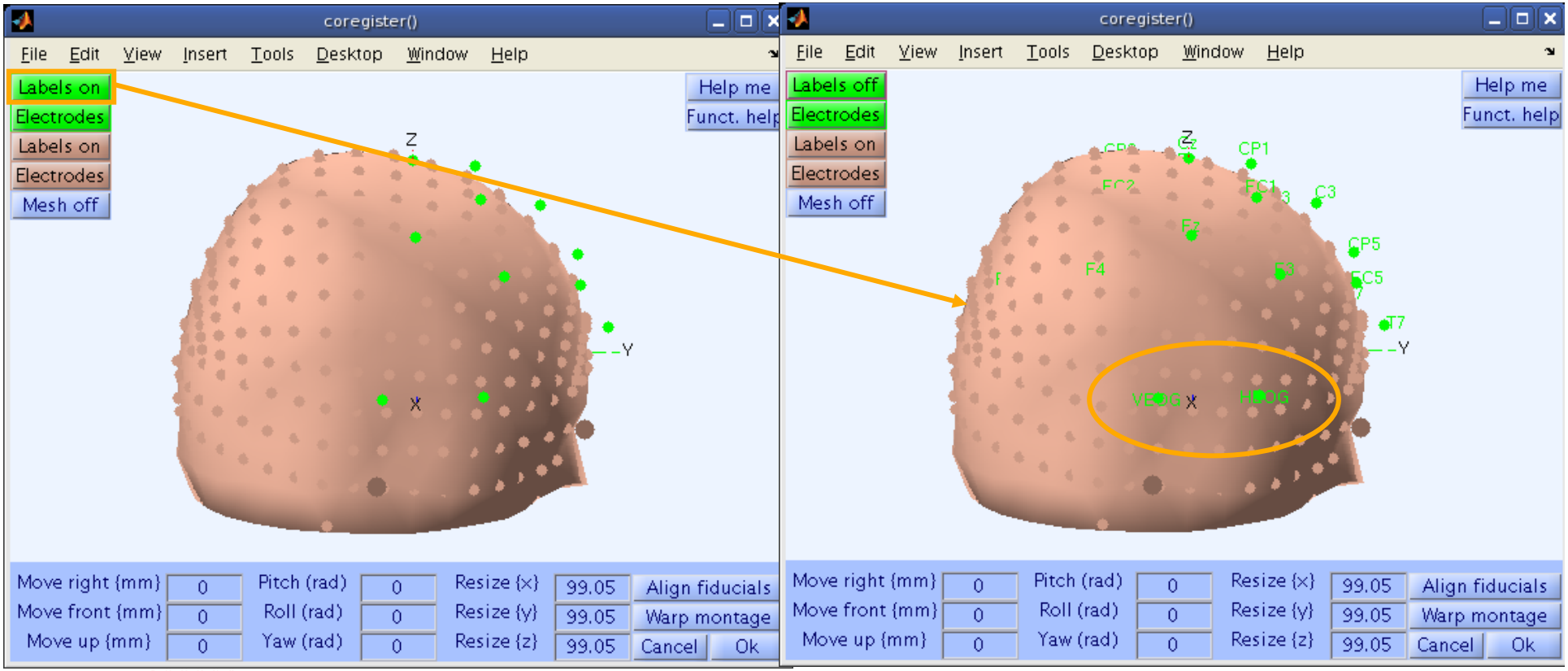
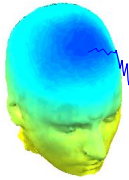


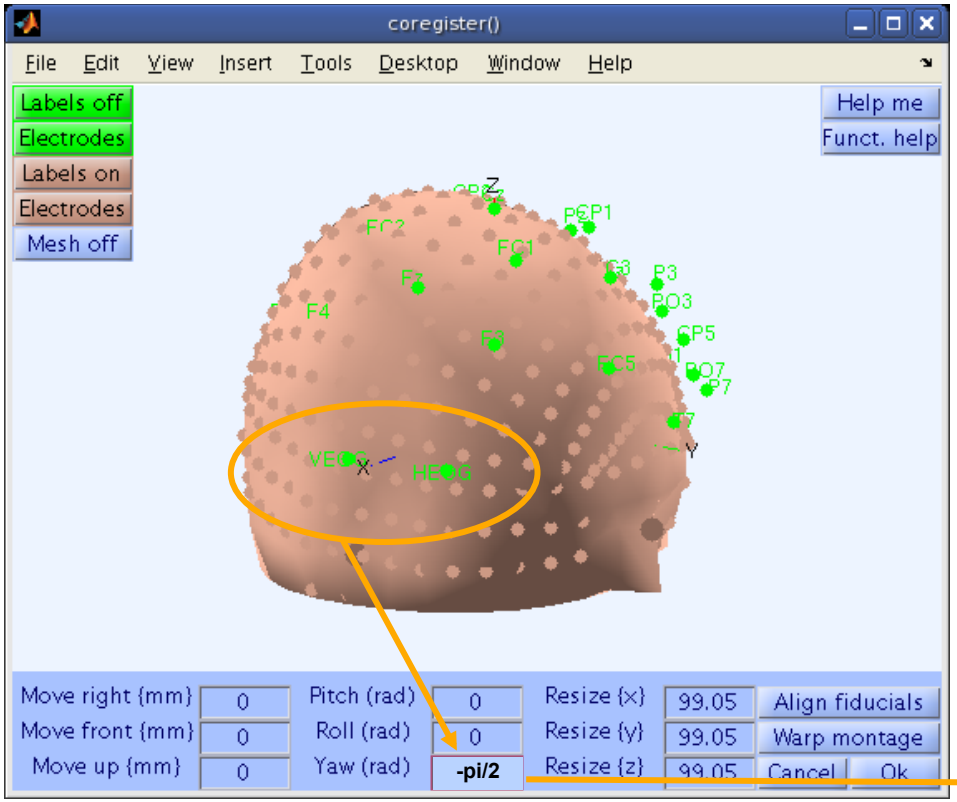
Co-register to model, cont'd

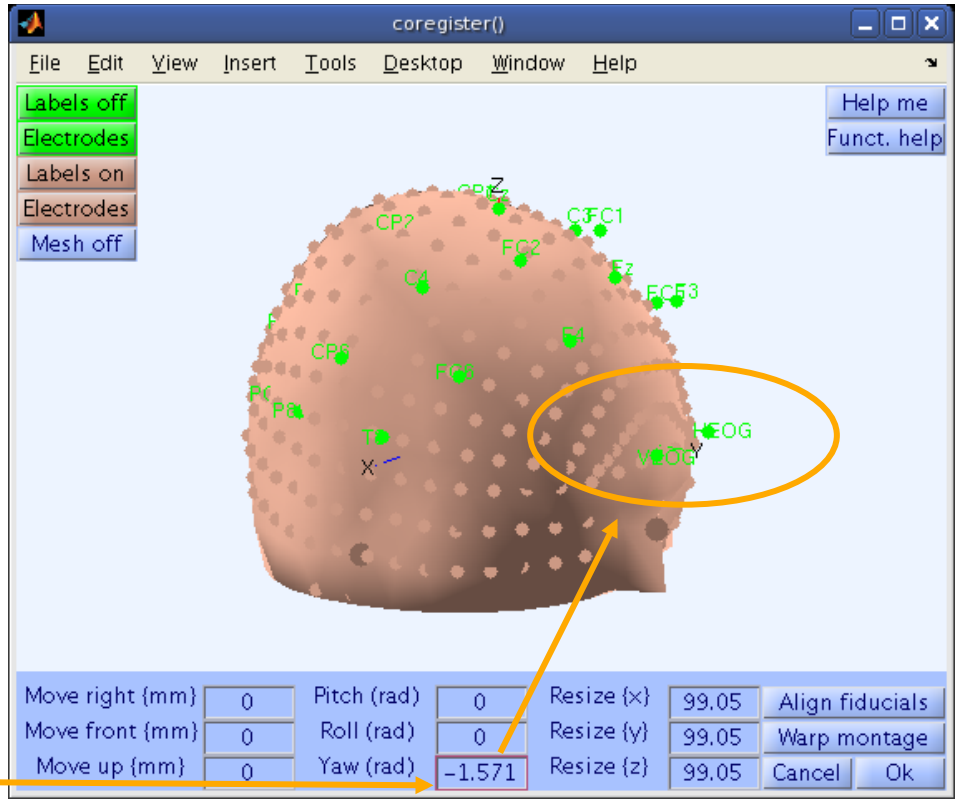




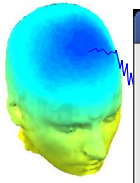
Perform translation of electrode positions

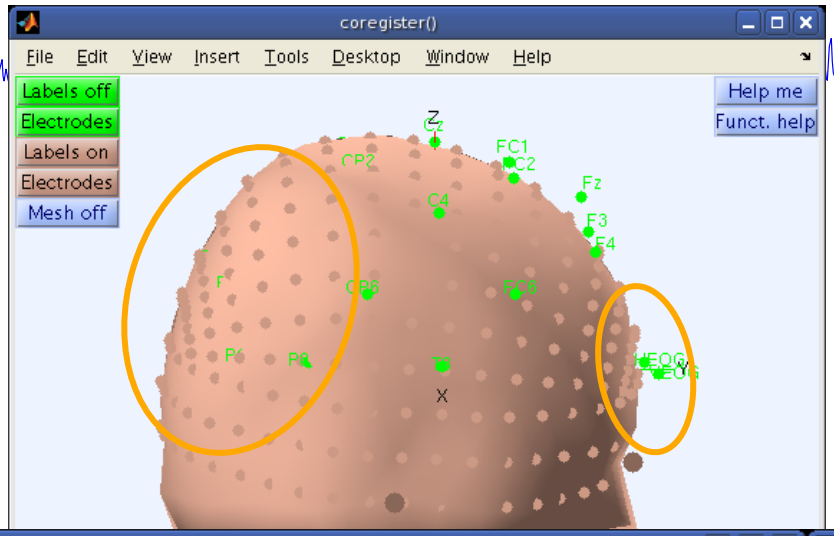


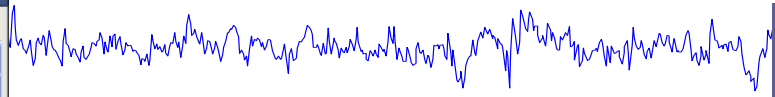




Perform translation of electrode positions



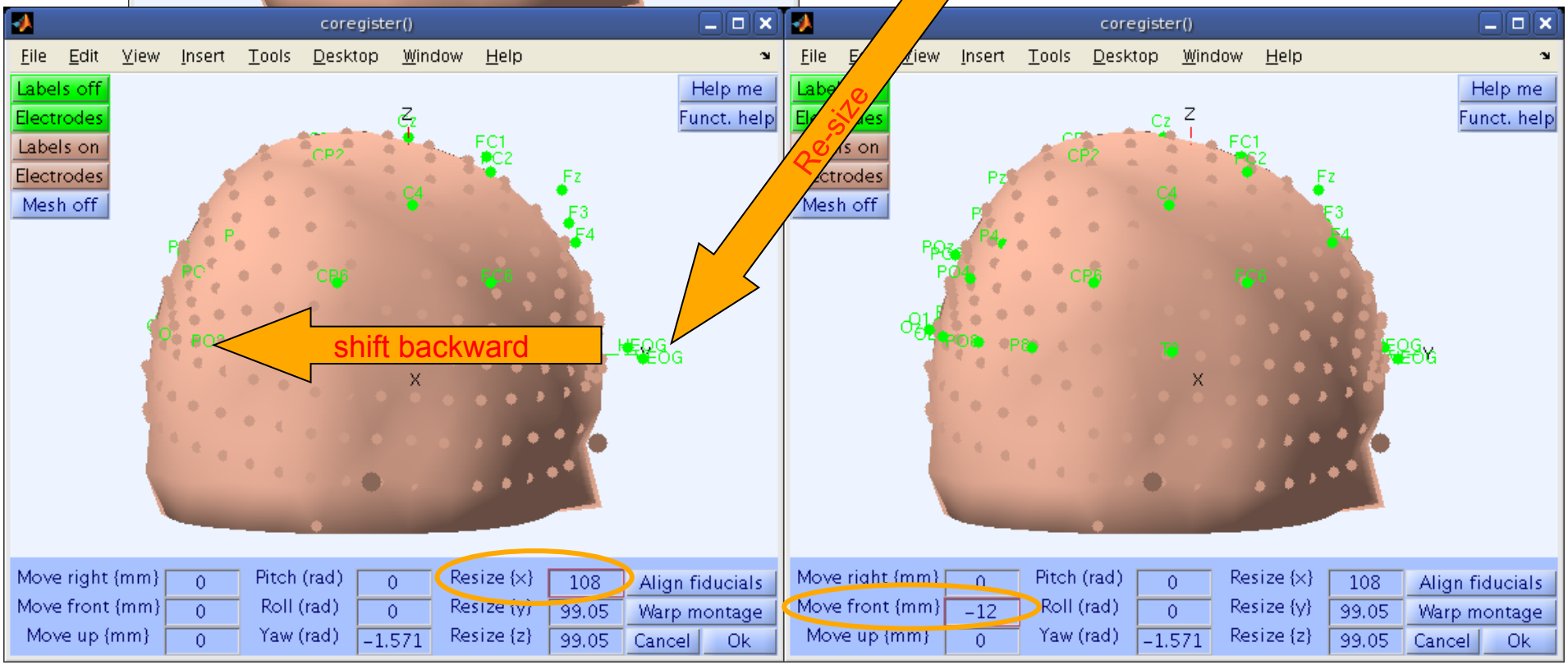




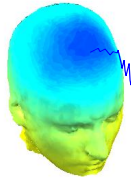
Requires a shift toward back of the head

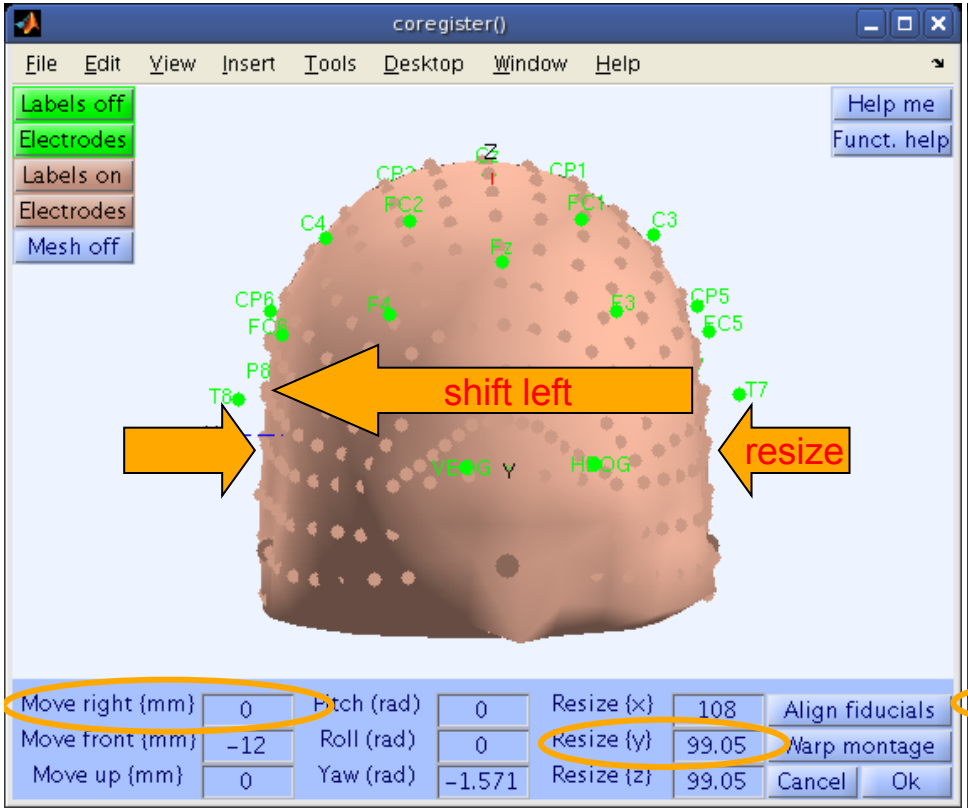
AND

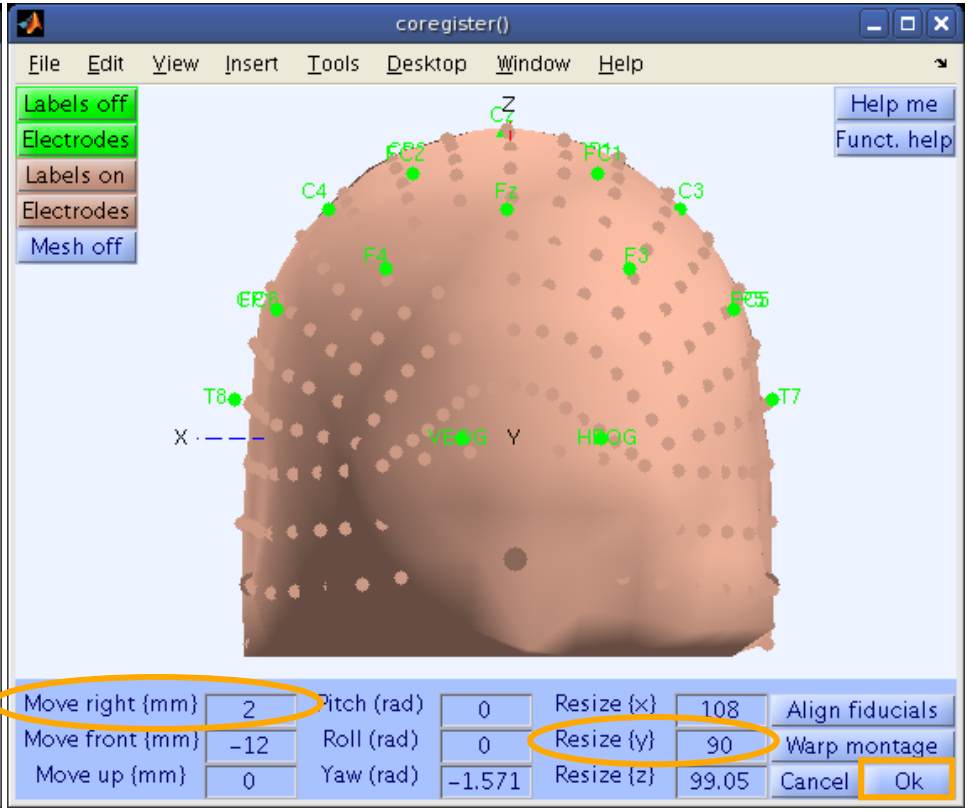
an expansion along the X-axis



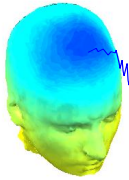
Perform translation of electrode positions

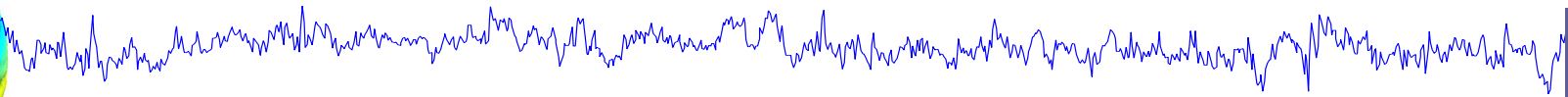






EEG.dipfit structure

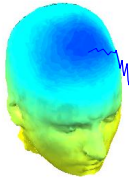




```
>> EEG.dipfit
ans =
            hdmfile: [1x76 char]
            mrifile: [1x71 char]
           chanfile: [1x83 char]
            chansel: [1x33 double]
         coordformat: 'spherical'
              model: [1x33 struct]
            current: 32
                vol: [1x1 struct]
      coord_transform: [0 0 -1.570796 100 76 90.87264 1 1 1]
```

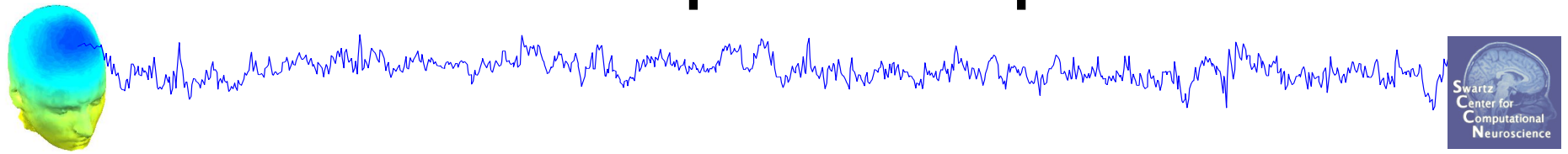
From head model transformations

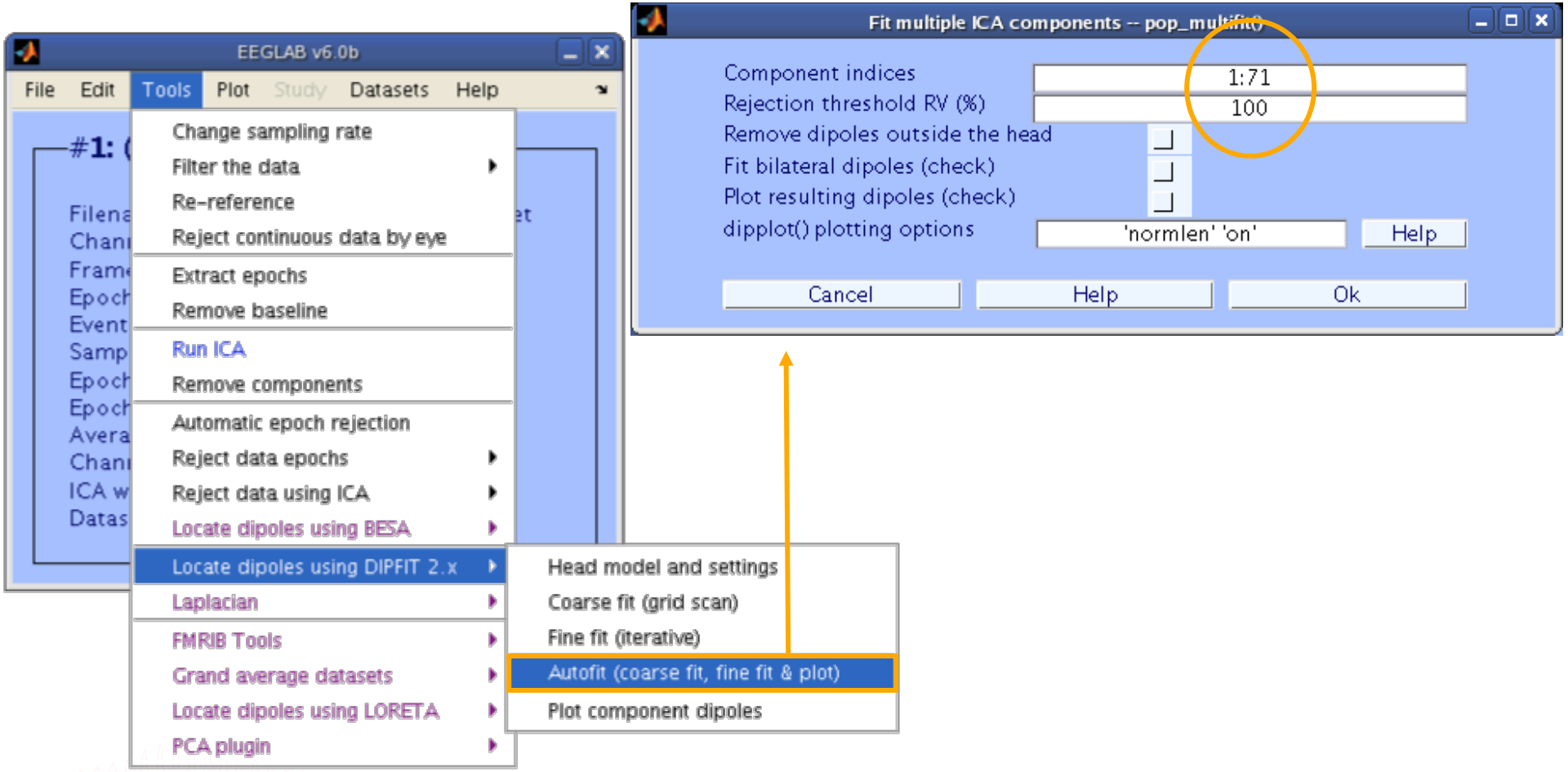
DIPFIT and model co-registration



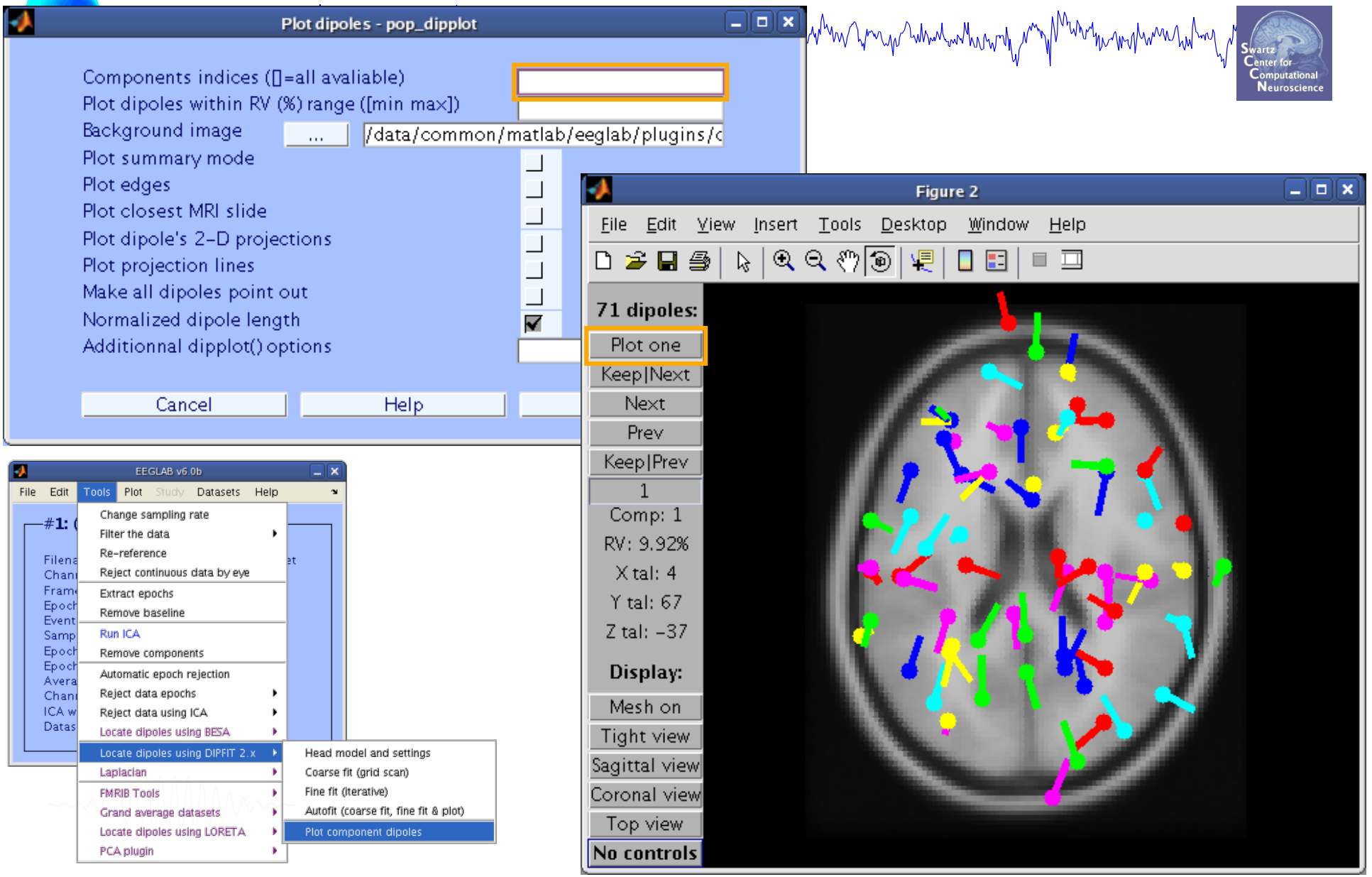
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration

Autofit equivalent dipoles

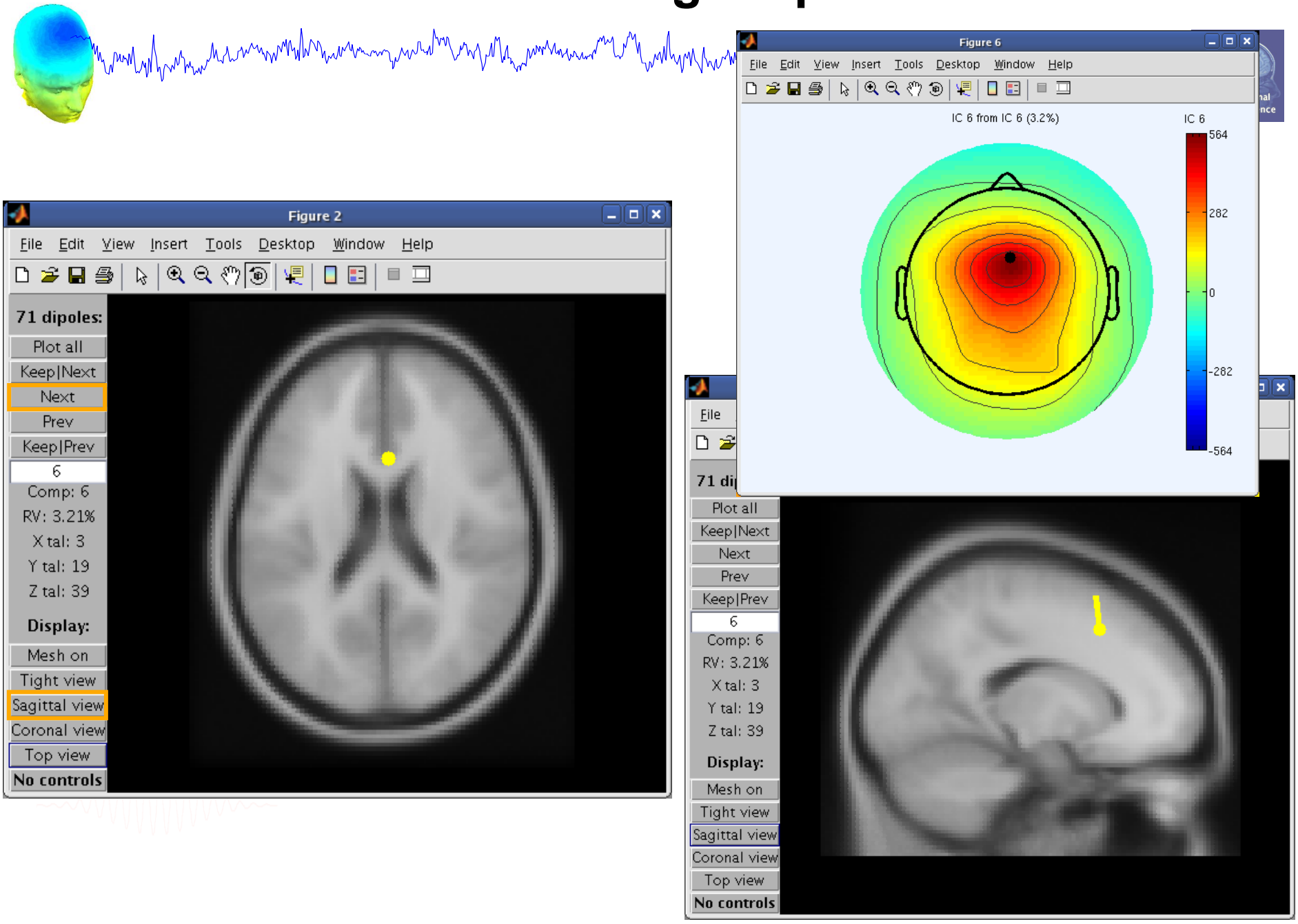




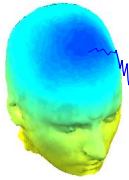
Plot dipoles

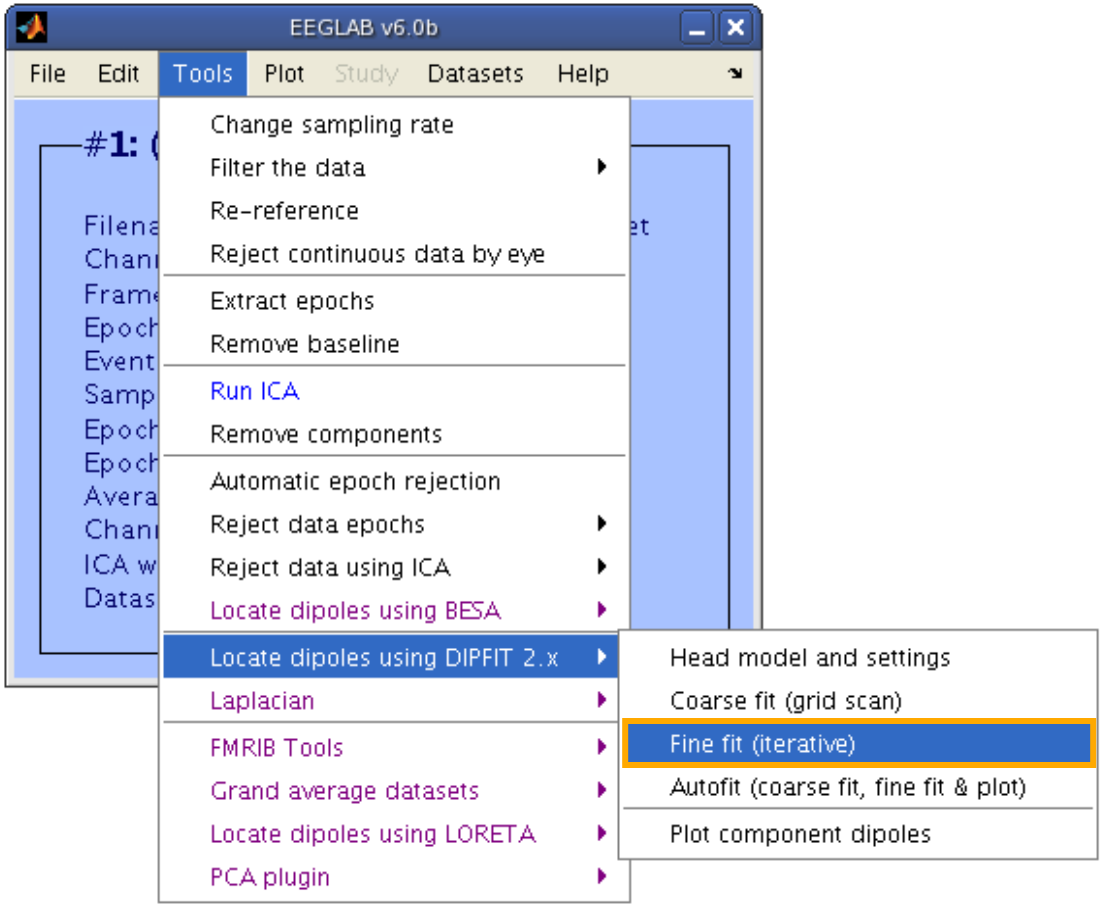


Scroll through dipoles

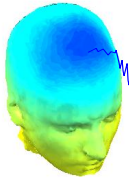


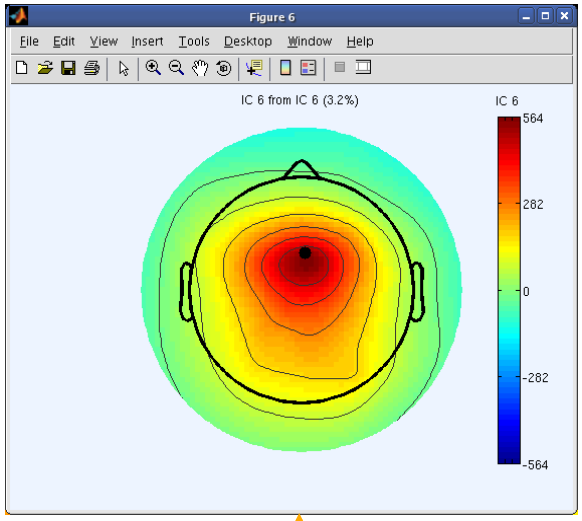
Fine fit options in DIPFIT





Fine fit menu





Manual dipole fit -- pop_dipfit_nonlinear()

Component to fit 6 | Plot map | Residual variance = 3.21%

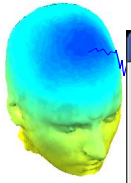
dipole	fit	position	moment	
#1	☑	28.222 -2.401 37.331	2.380 475942.653 3819304.288	Flip (in|out)
#2	☐	0.000 0.000 0.000	0.000 0.000 0.000	Flip (in|out)

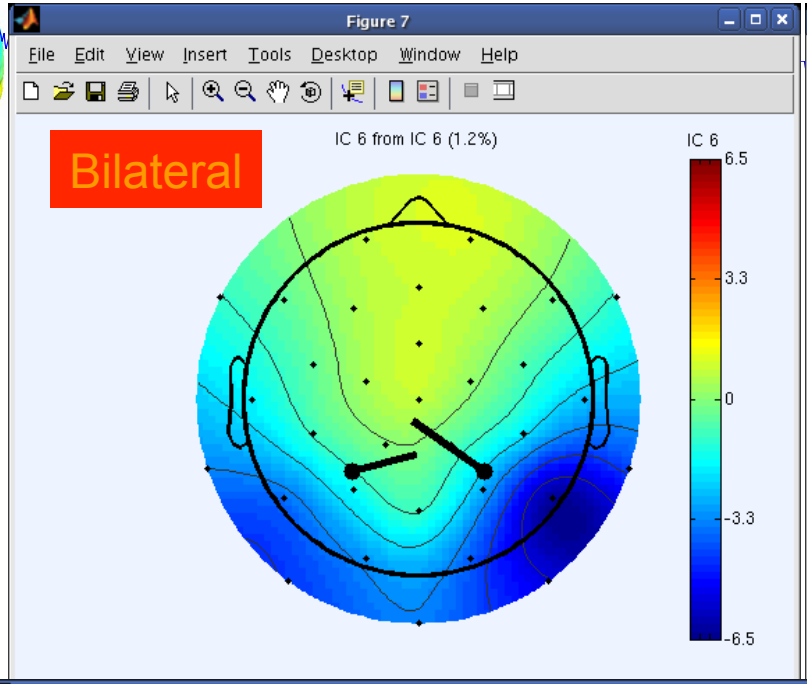
☑ Symmetry constrain for dipole ...

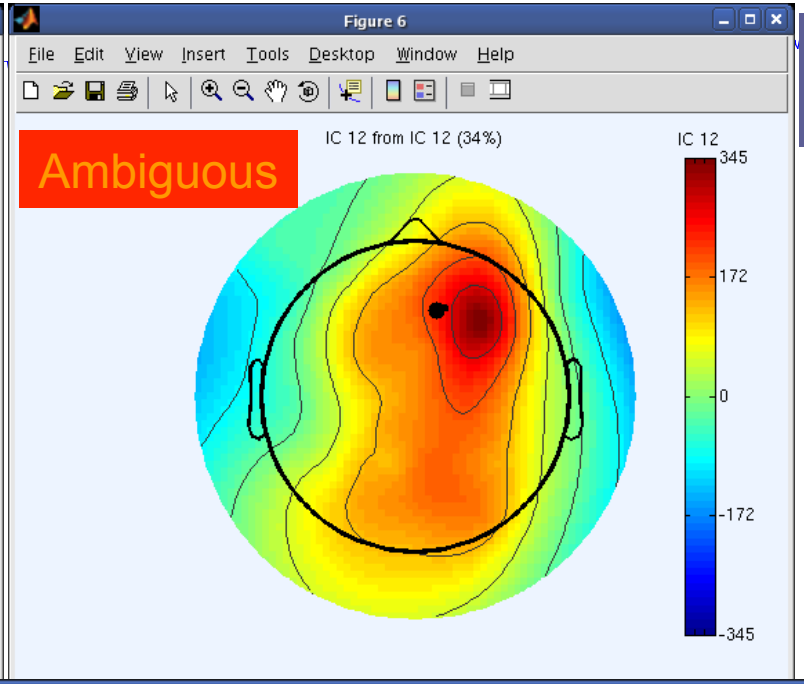
Fit dipole(s)' position & moment | Or fit only dipole(s)' moment | Plot dipole(s)

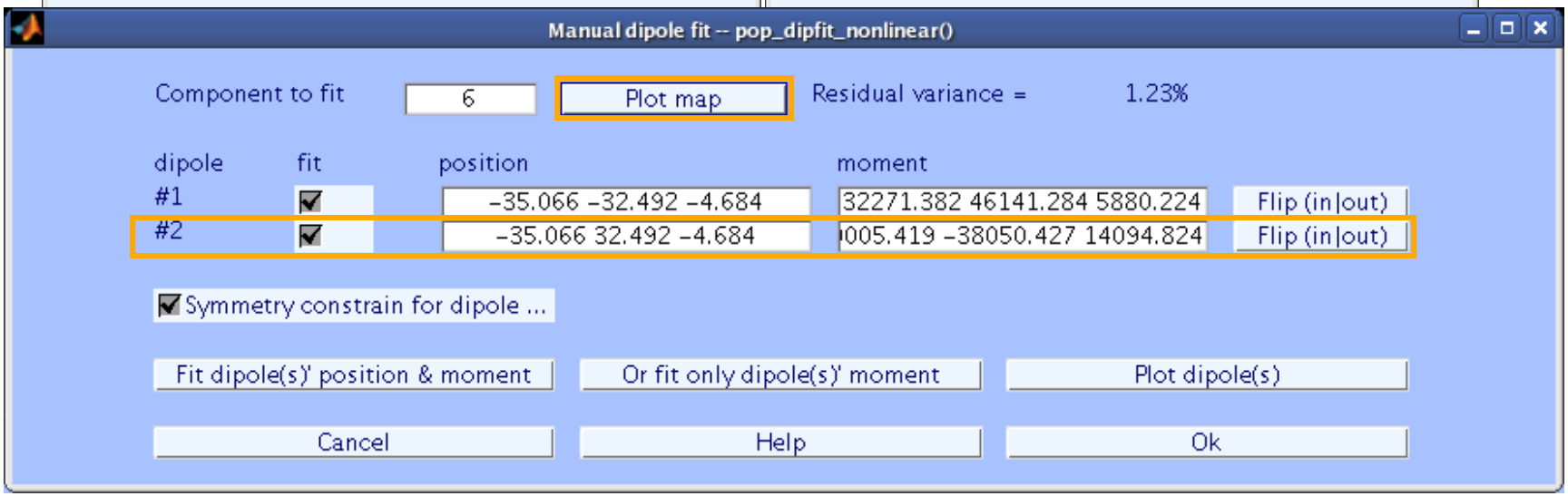
Cancel | Help | Ok

Bilateral dipoles









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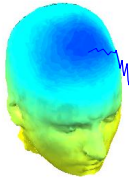
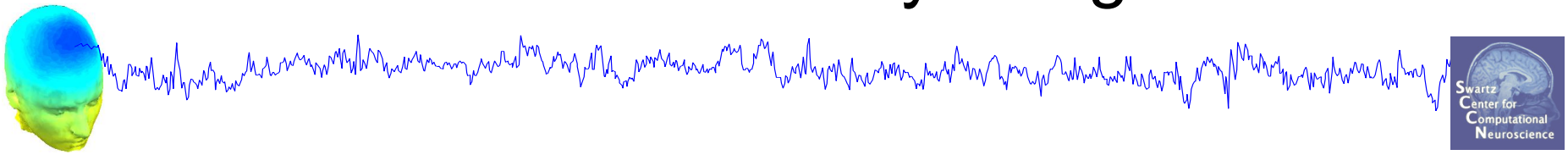
EEG.dipfit structure

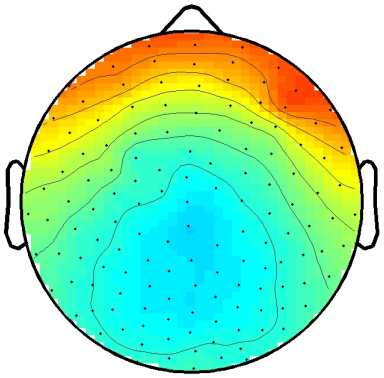


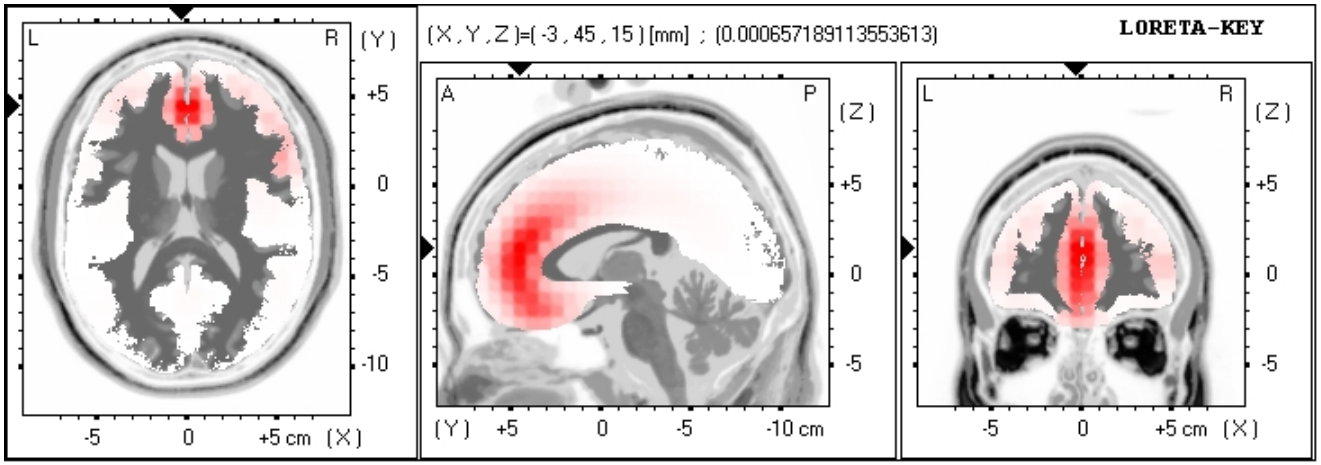
```
>> EEG.dipfit.model
ans =

1x33 struct array with fields:
    posxyz
    momxyz
    rv
    active
    select

>> EEG.dipfit.model(1)
ans =

    posxyz: [1x3 double]
    momxyz: [1x3 double]
        rv: 0.0288
    active: 1
    select: 1
```

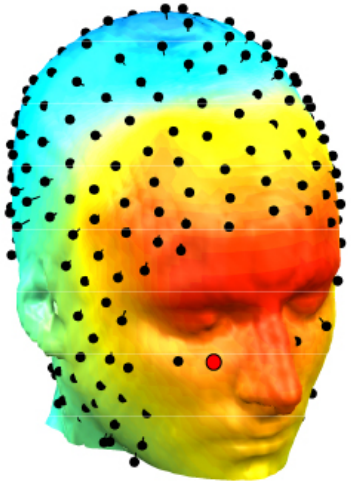
```
                X           Y           Z
[14.9791   -86.0094   47.9448]
```

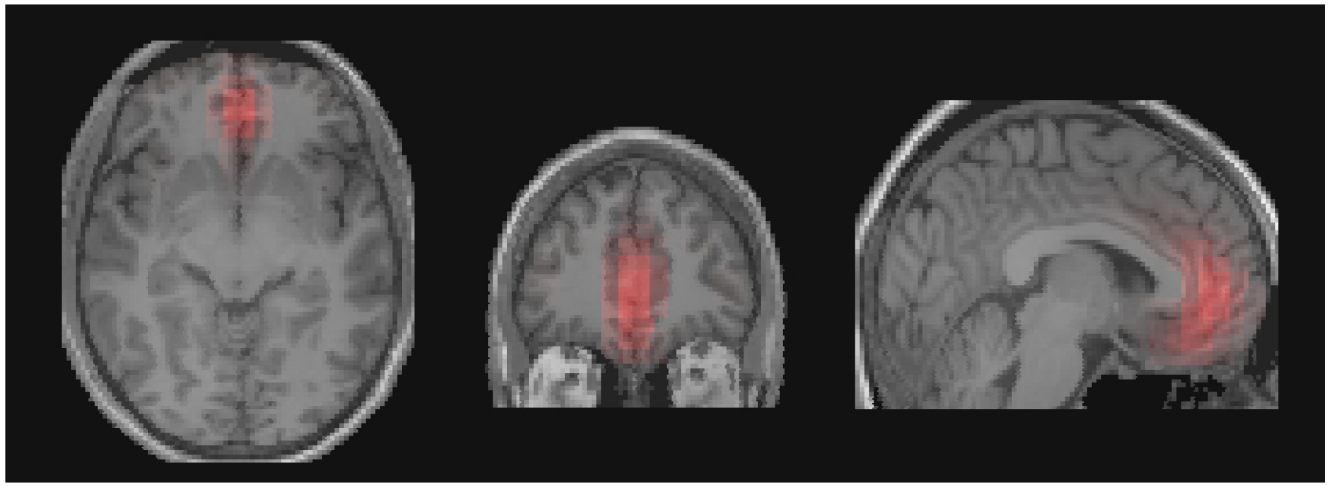
Localization of activity using Loreta

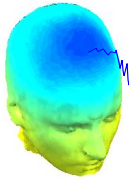


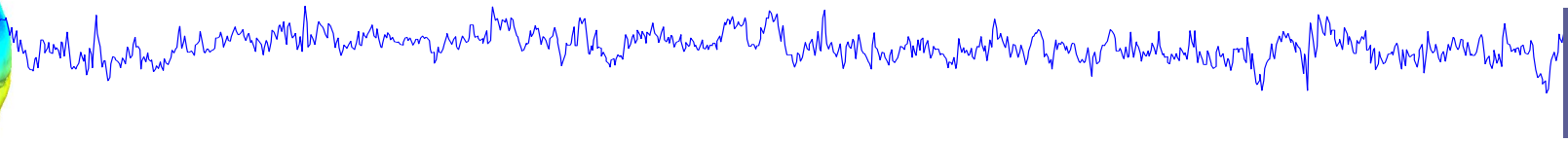












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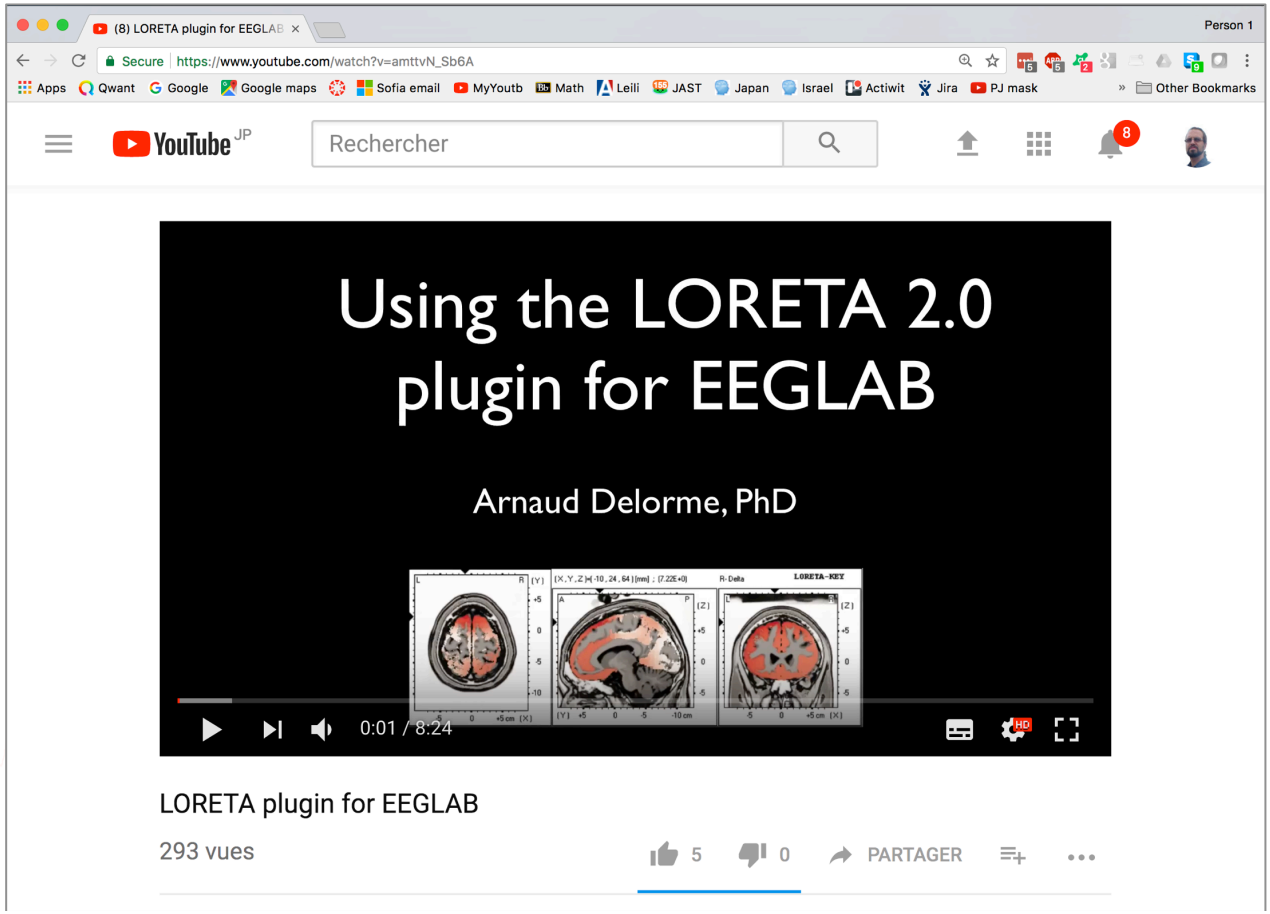
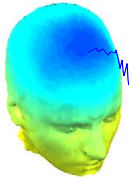
https://sccn.ucsd.edu/wiki/LORETA_for_EEGLAB

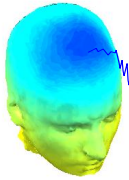


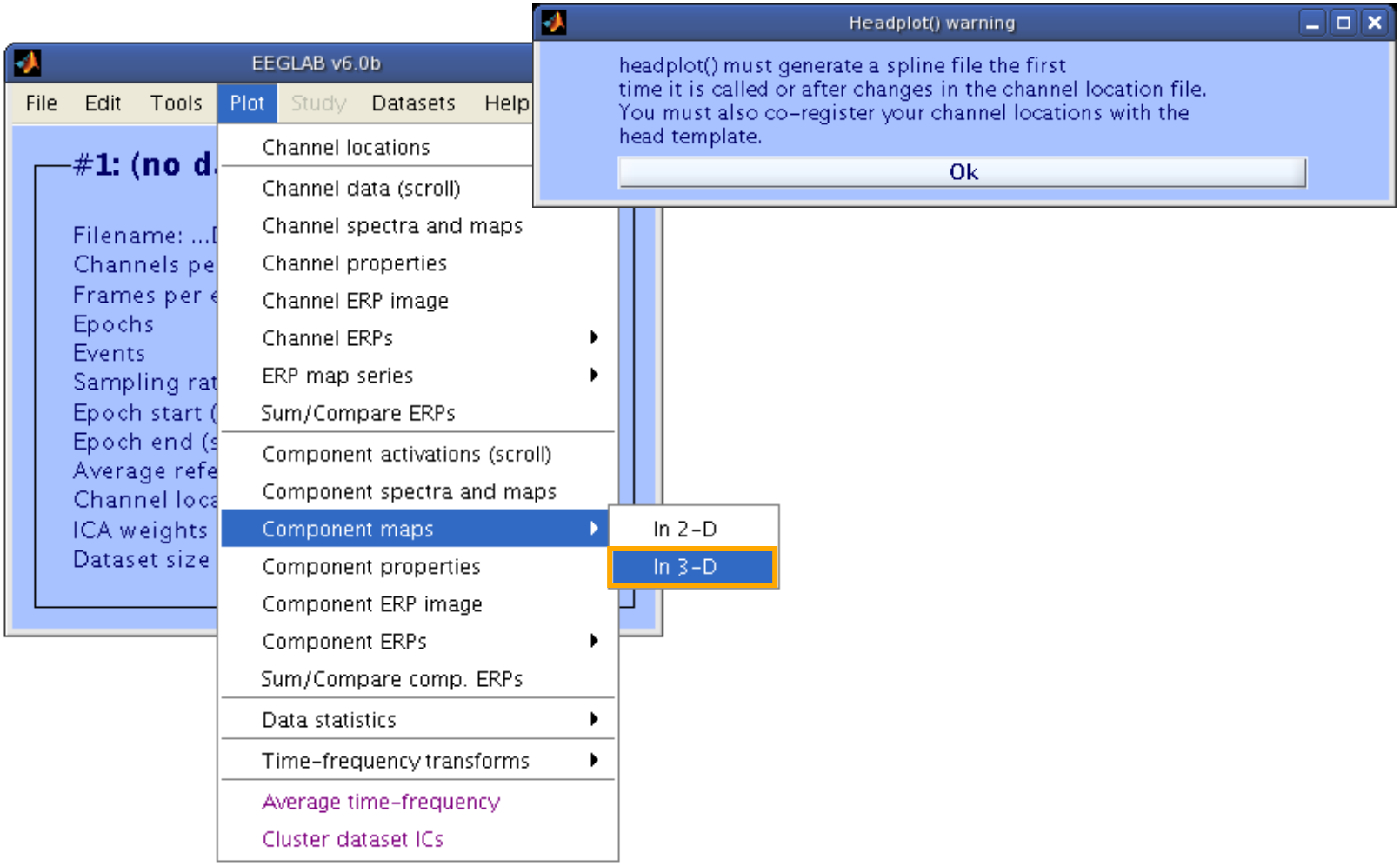
DIPFIT and model co-registration



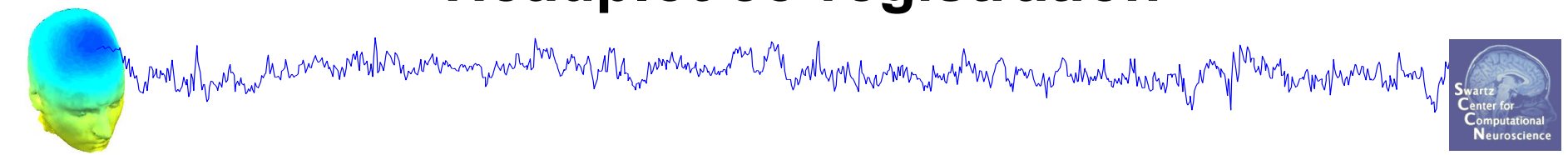
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration

Plot scalp maps in 3D





Headplot co-registration



Component head plot(s) -- pop_headplot()

Co-register channel locations with head mesh and compute a mesh spline file (done only once)

Use the following spline file or structure
Or (re)compute a new spline file named: /home/julie/S01_attend1_pos1.spl
3-D head mesh file: mheadnew.mat
Mesh associated channel file: mheadnew.xyz
Talairach-model transformation matrix

Browse | Help | Browse | Help | Browse | Browse | Manual coreg.

1:31
Components of dataset:
Ok

coregister()

File Edit View Insert Tools Desktop Window Help

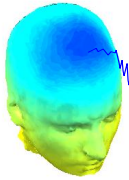
Labels off | Electrodes | Labels on | Electrodes | Mesh off

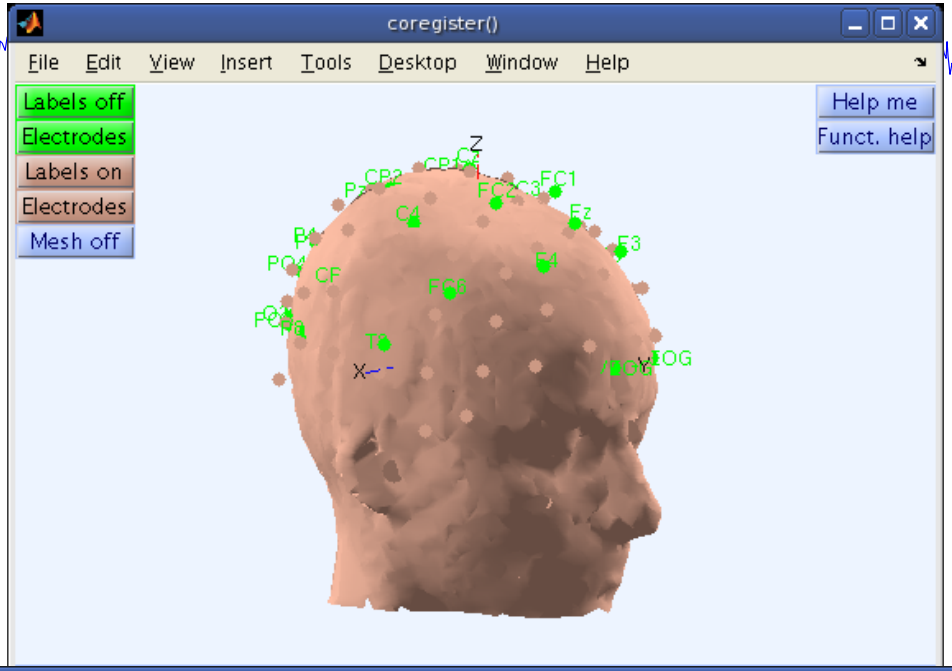
Help me | Funct. help

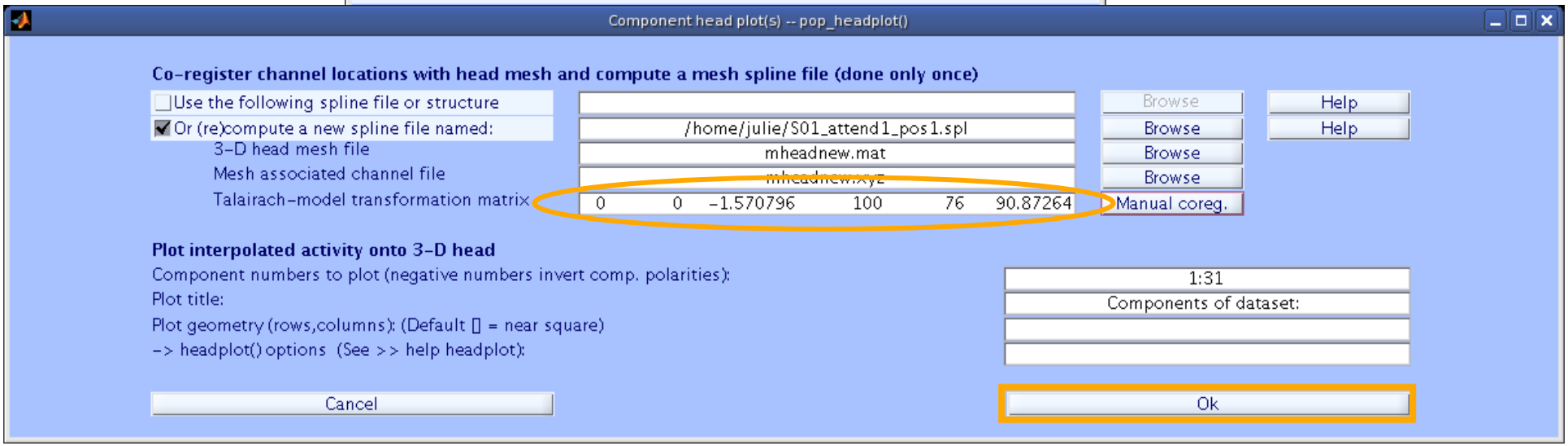
Move right (mm) 0 | Pitch (rad) 0 | Resize (x) 90.87 | Align fiducials
Move front (mm) 0 | Roll (rad) 0 | Resize (y) 90.87 | Warp montage
Move up (mm) 0 | Yaw (rad) 0 | Resize (z) 90.87 | Cancel | Ok

Go through co-registration in the same way as with dipfit co-registration

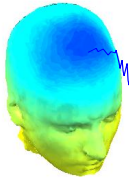
Confirm headplot co-registration

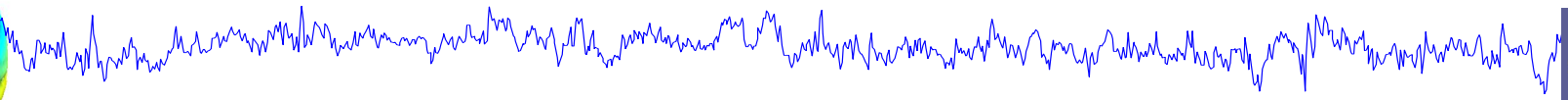






Spline file in EEG structure





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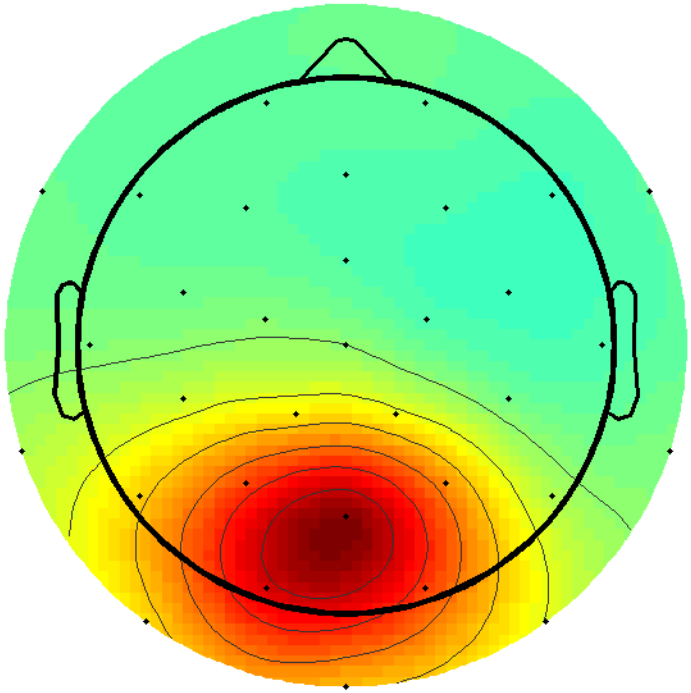
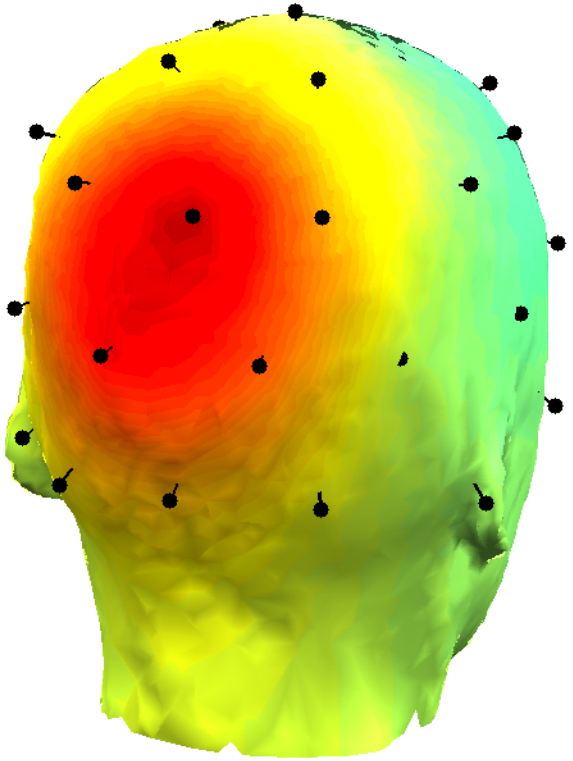
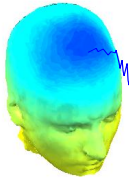
2D scalp map for IC 12



3D scalp map for IC 12



Exercise



- **Novice / Intermediate**
  - Load ‘stern_125.set’
  - Practice co-registering electrodes with **BEM** model (choose 'Erase' because this dataset has co-registration done already)
  - Autofit IC dipoles
  - Fine fit dipoles
  - Plot dipoles from the GUI; scroll through components individually
  - Co-register the head model for 3D scalp map plotting. Then plot some ICs in 3D
- **Advanced**

  - In the Finefit menu, try fitting a bilateral dipole, what happens to the residual variance?

  - Try plotting a subset of dipoles in 'summary mode’