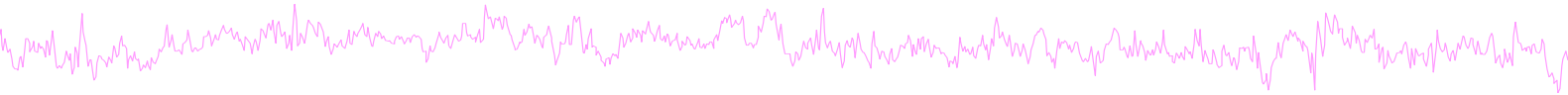
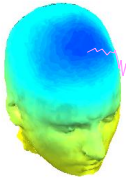
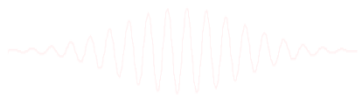


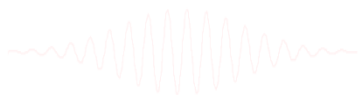
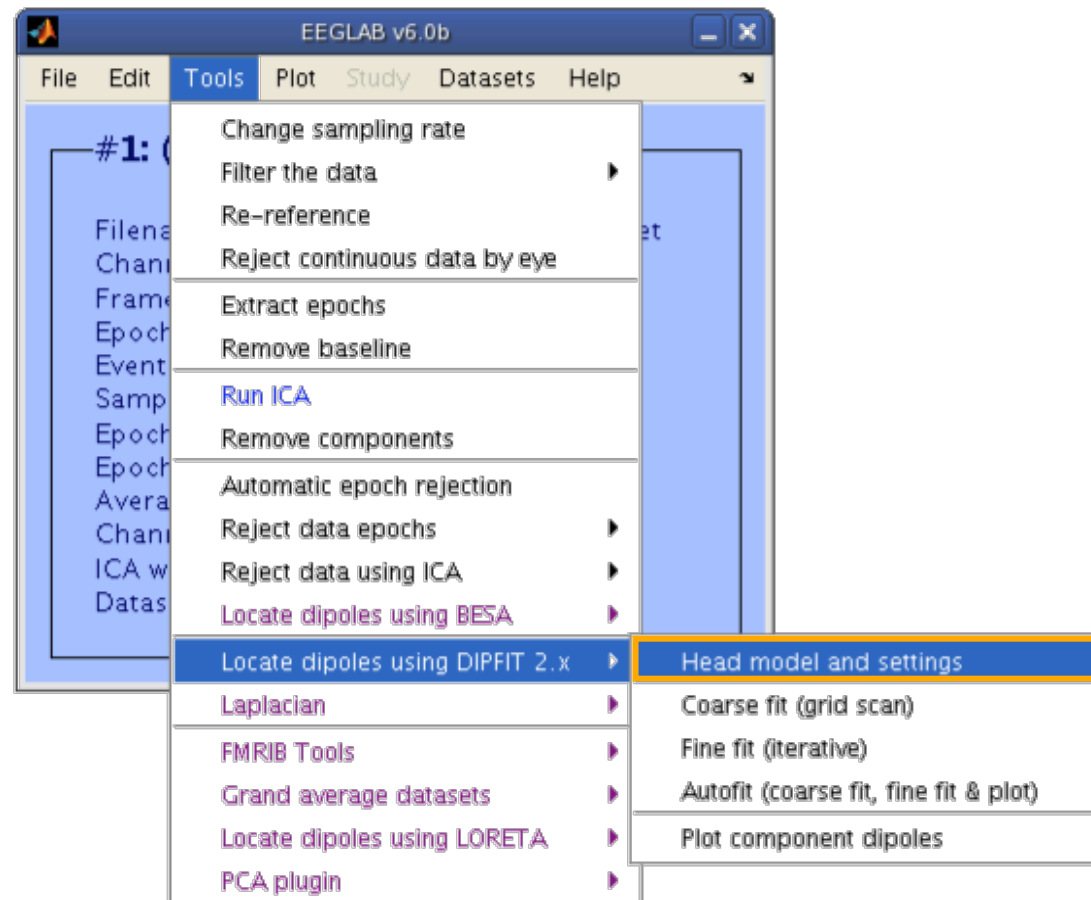
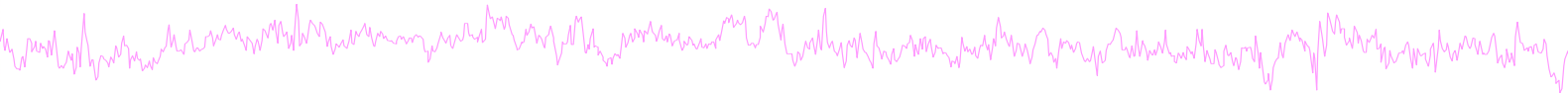
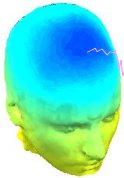
DIPFIT and model co-registration



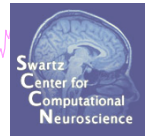
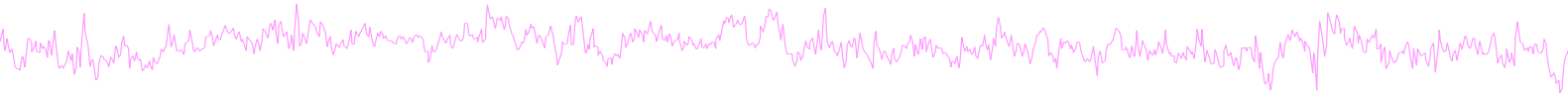
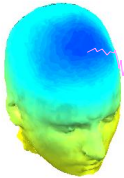
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration



Finding dipole locations using DIPFIT in EEGLAB



Co-register to model



Dipole fit settings - pop_dipfit_settings()

Head model (click to select)

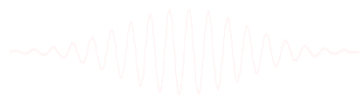
Spherical Four-Shell (BESA)
Boundary Element Model (MNI)
CTF MEG
Custom model files

Head model file: g:\lab\plugins\dipfit2.2\standard_BEM\standard_vol.mat
Output coordinates: MNI
MRI file: g:\lab\plugins\dipfit2.2\standard_BEM\standard_mri.mat
Model template channel locations file: g:\lab\plugins\dipfit2.2\standard_BEM\elec\standard_1005.elc
Co-register chan. locs. with head model: ☐
Channels to omit from dipole fitting:

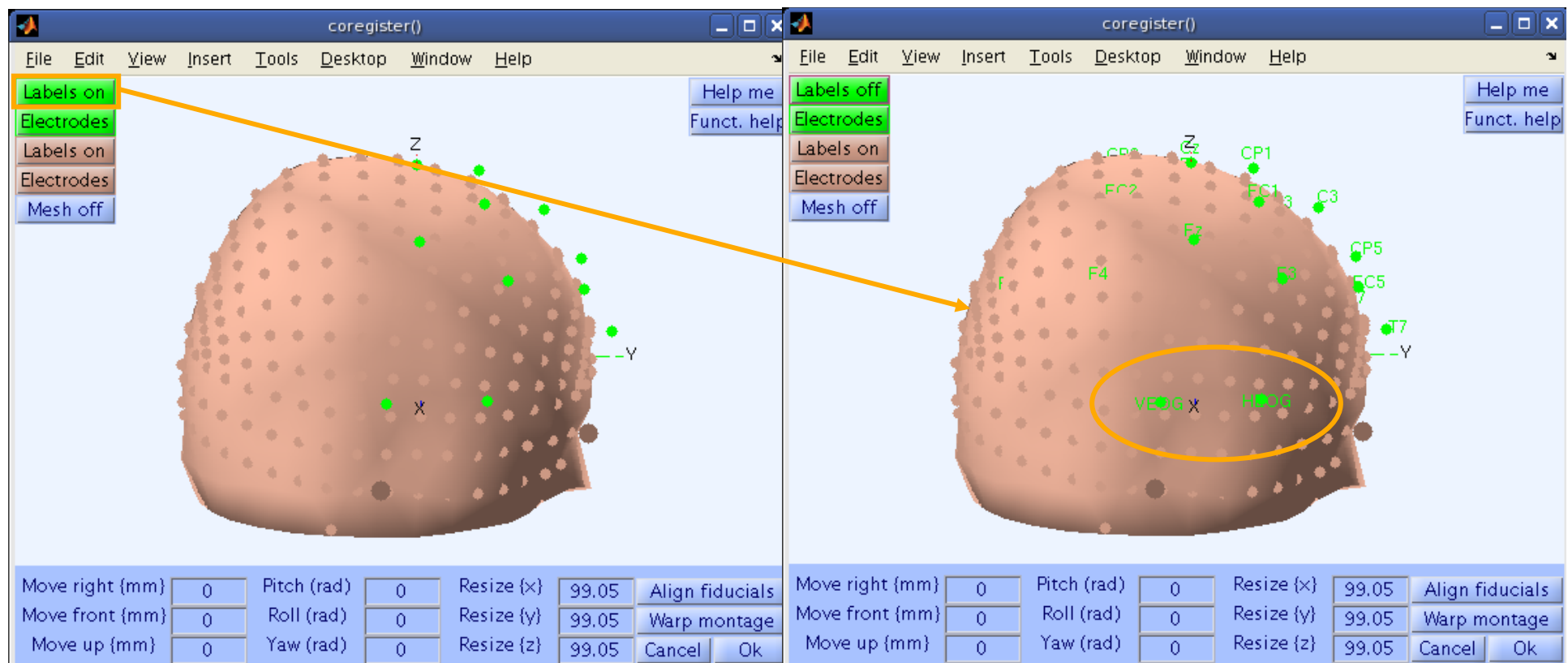
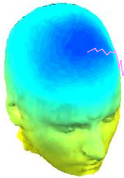
Browse Help
Click to select
Browse Help
Browse Help
Manual Co-Reg.
List

Note: For EEG, check that the channel locations are on the surface of the head model
(To do this: 'Set head radius' to about 85 in the channel editor).

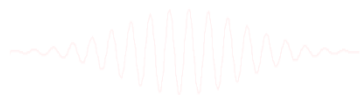
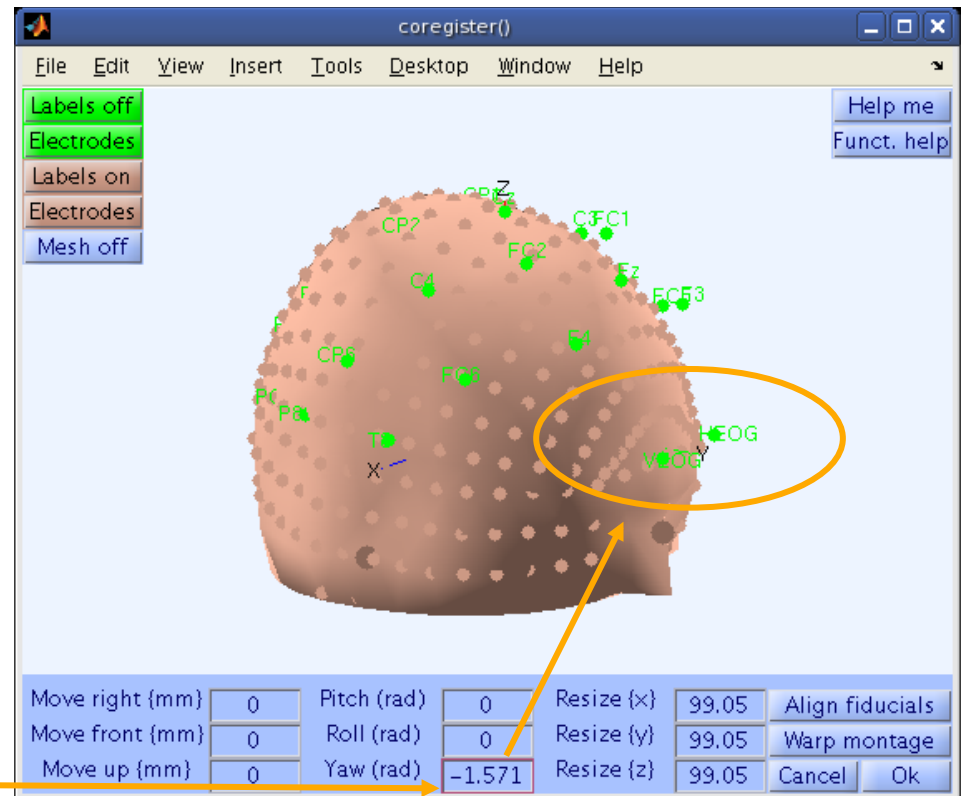
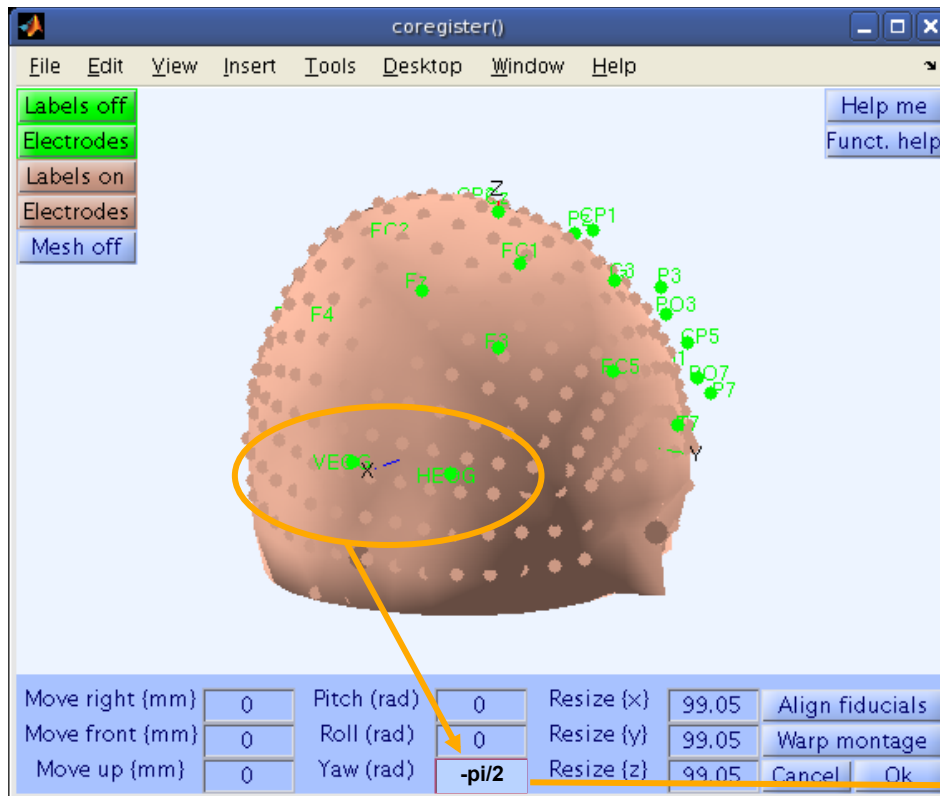
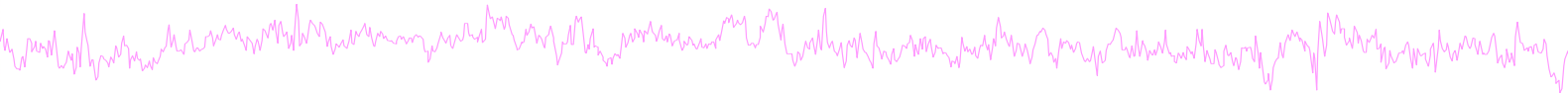
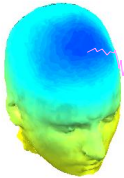
Cancel Help Ok



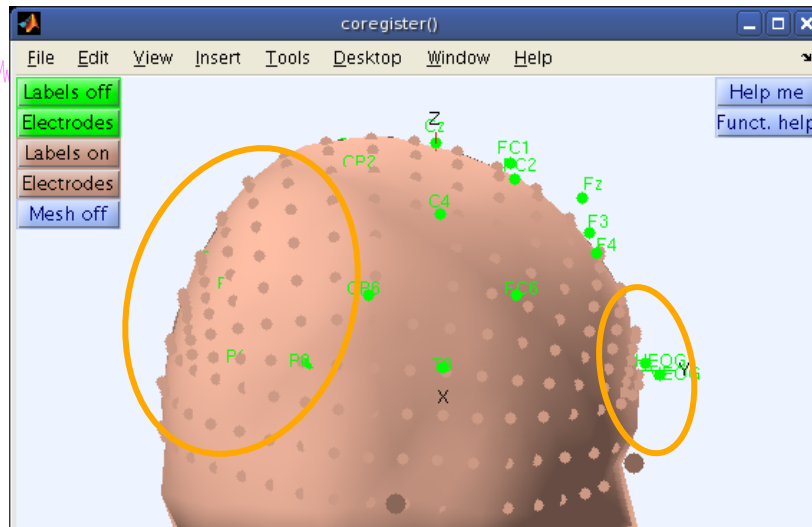
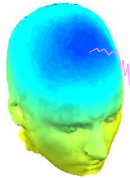
Co-register to model, cont'd



Perform translation of electrode positions



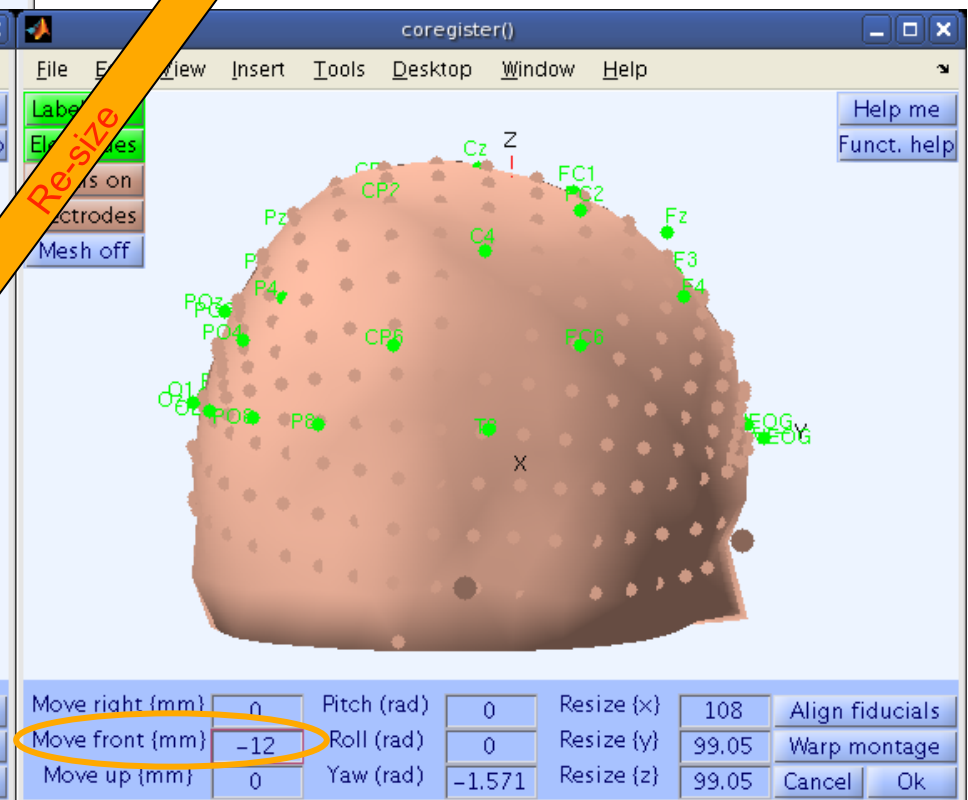
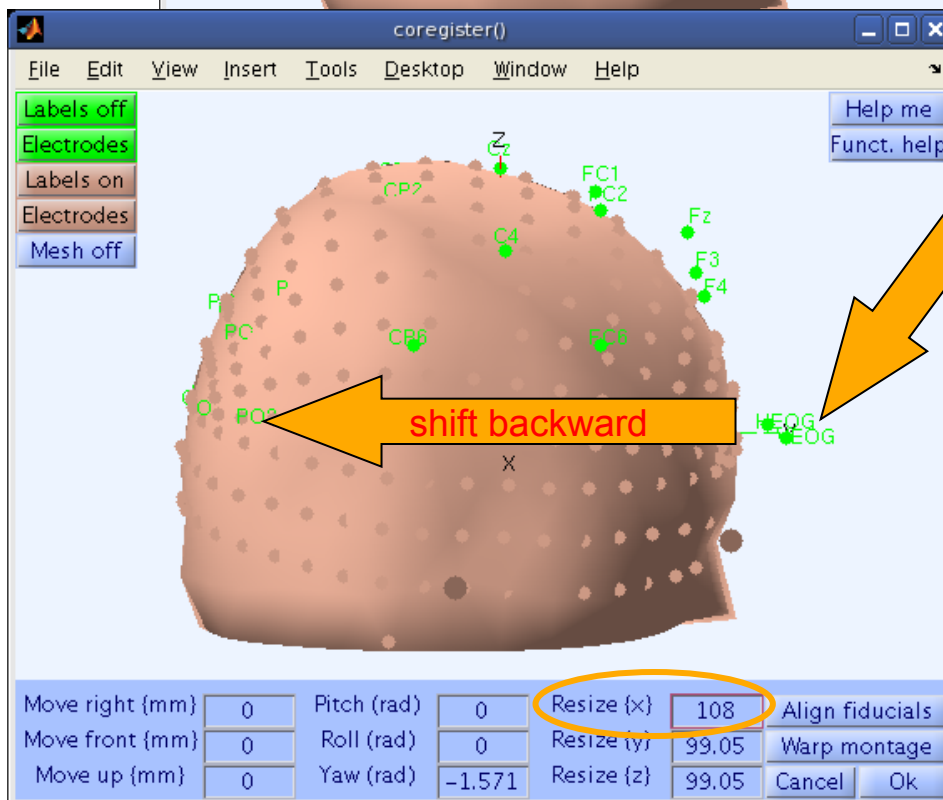
Perform translation of electrode positions



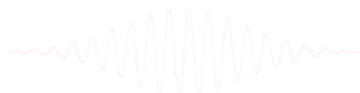
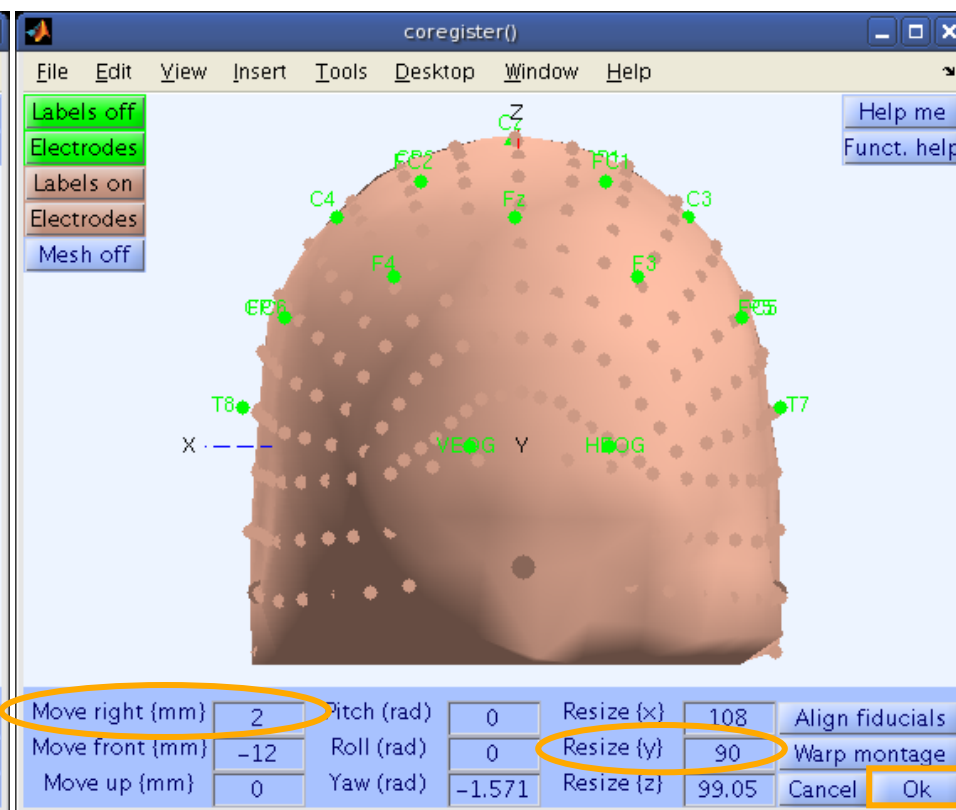
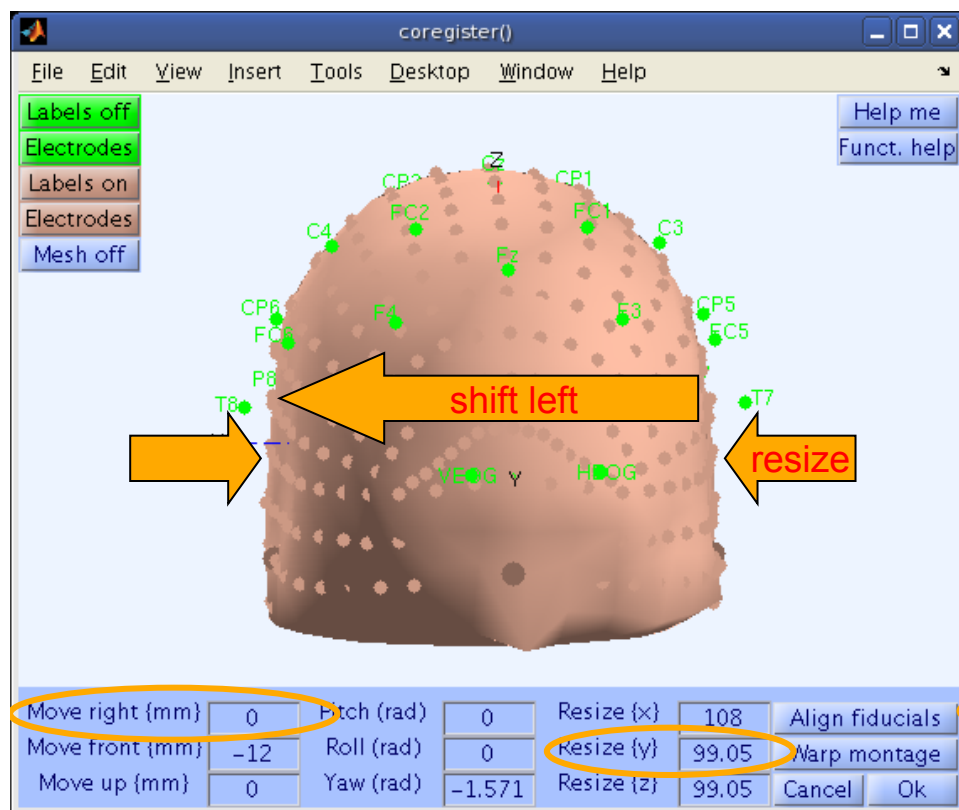
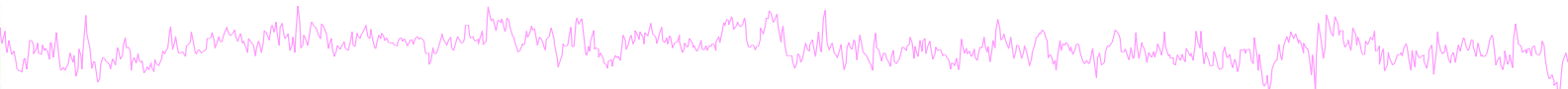
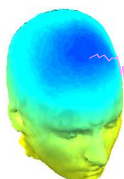
Requires a shift toward back of the head

AND

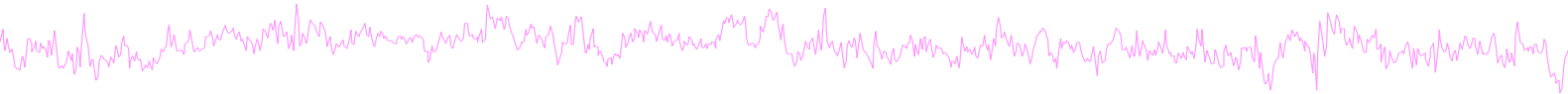
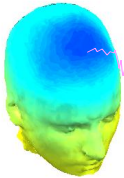
an expansion along the X-axis



Perform translation of electrode positions



Confirm electrode transformation



Dipole fit settings - pop_dipfit_settings()

Head model (click to select)

Spherical Four-Shell (BESA)
Boundary Element Model (MNI)
CTF MEG
Custom model files

Head model file
Output coordinates
MRI file
Model template channel locations file
Co-register chan. locs. with head model
Channels to omit from dipole fitting

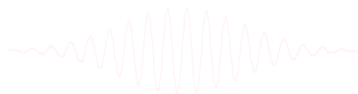
g:\lab\plugins\dipfit2.2\standard_BEM\standard_vol.mat
MNI
g:\lab\plugins\dipfit2.2\standard_BEM\standard_mri.mat
g:\lab\plugins\dipfit2.2\standard_BEM\elec\standard_1005.elc

0 -1.570796 108 90 99.05485

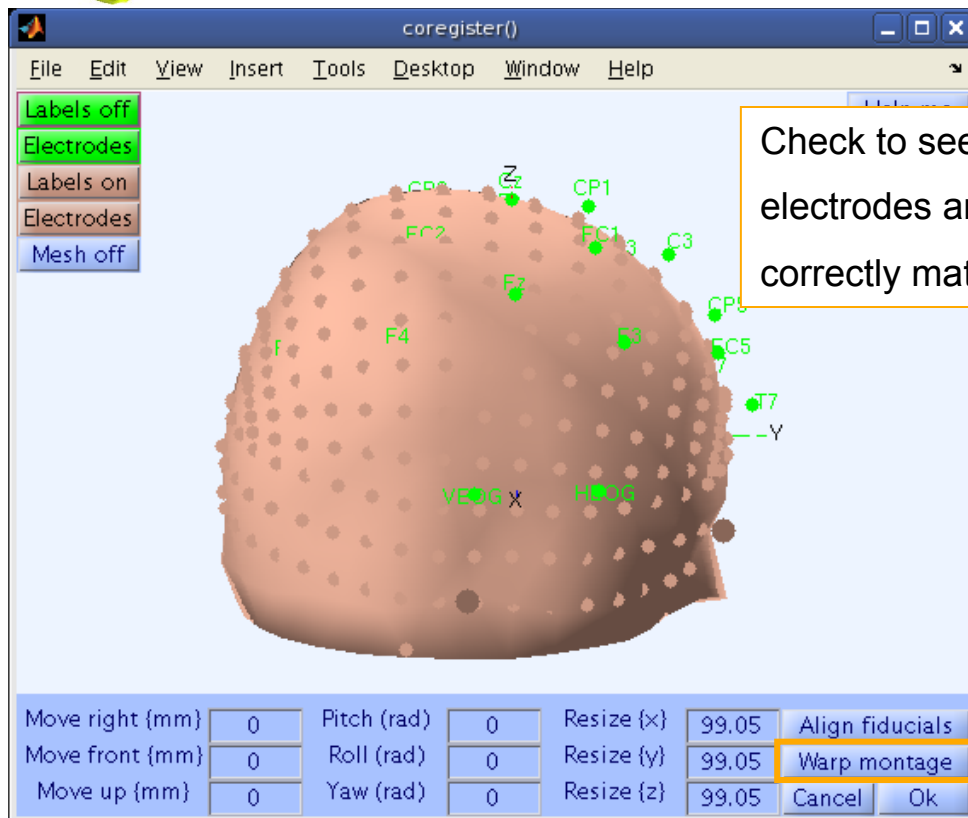
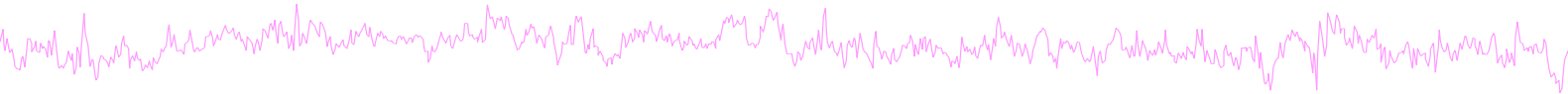
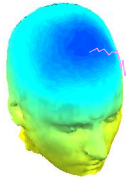
Browse Click to select
Browse Browse
Manual Co-Reg. No Co-Reg.
List

Note: For EEG, check that the channel locations are on the surface of the head model
(To do this: 'Set head radius' to about 85 in the channel editor).

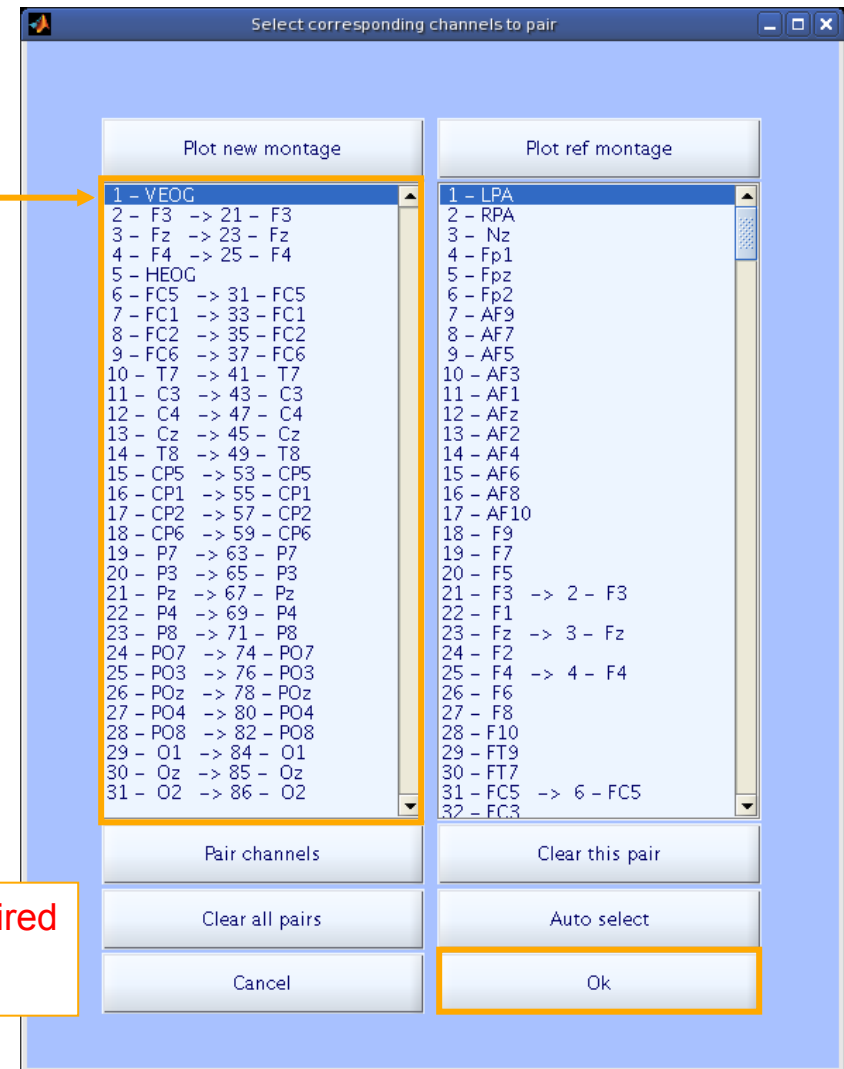
Cancel Help Ok



Alternatively, warp to standard montage

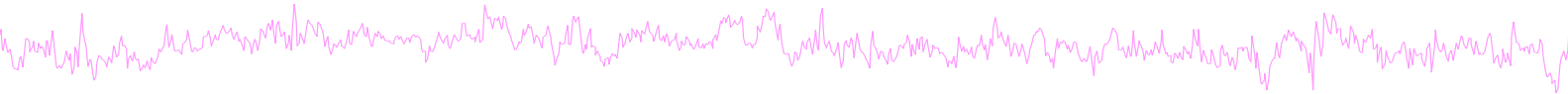
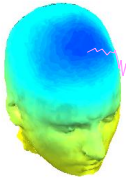


Check to see that electrodes are correctly matched



stats toolbox required for warping

EEG.dipfit structure



```
>> EEG.dipfit
```

```
ans =
```

```
hdmfile: [1x76 char]
```

```
mrifile: [1x71 char]
```

```
chanfile: [1x83 char]
```

```
chansel: [1x33 double]
```

```
coordformat: 'spherical'
```

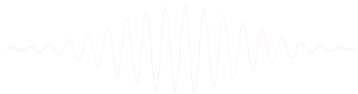
```
model: [1x33 struct]
```

```
current: 32
```

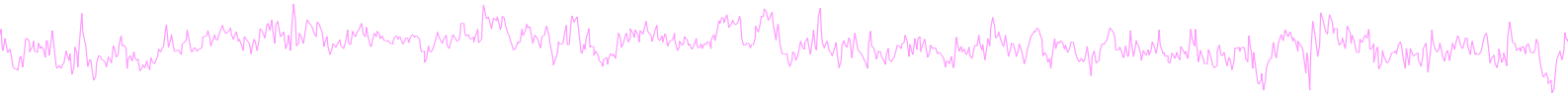
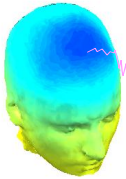
```
vol: [1x1 struct]
```

```
coord_transform: [0 0 -1.570796 100 76 90.87264 1 1 1]
```

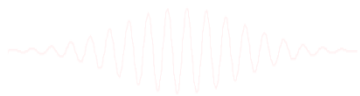
From head model transformations



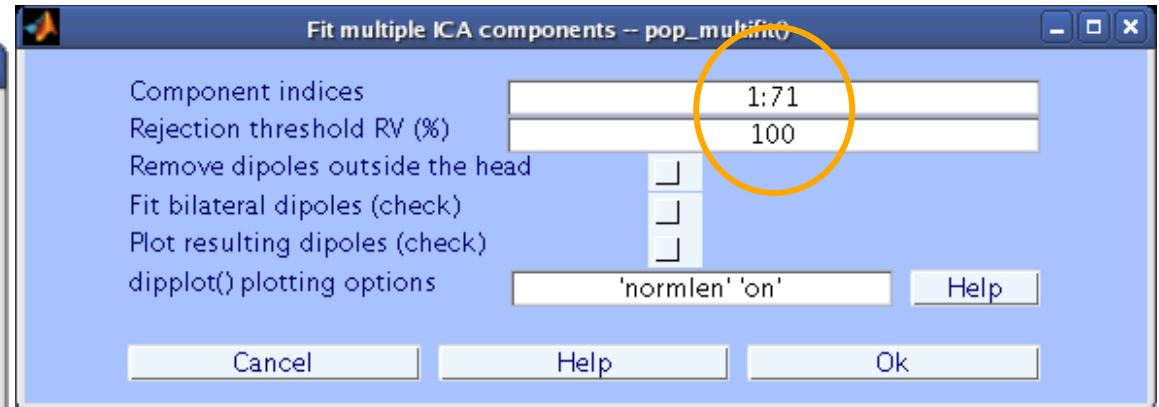
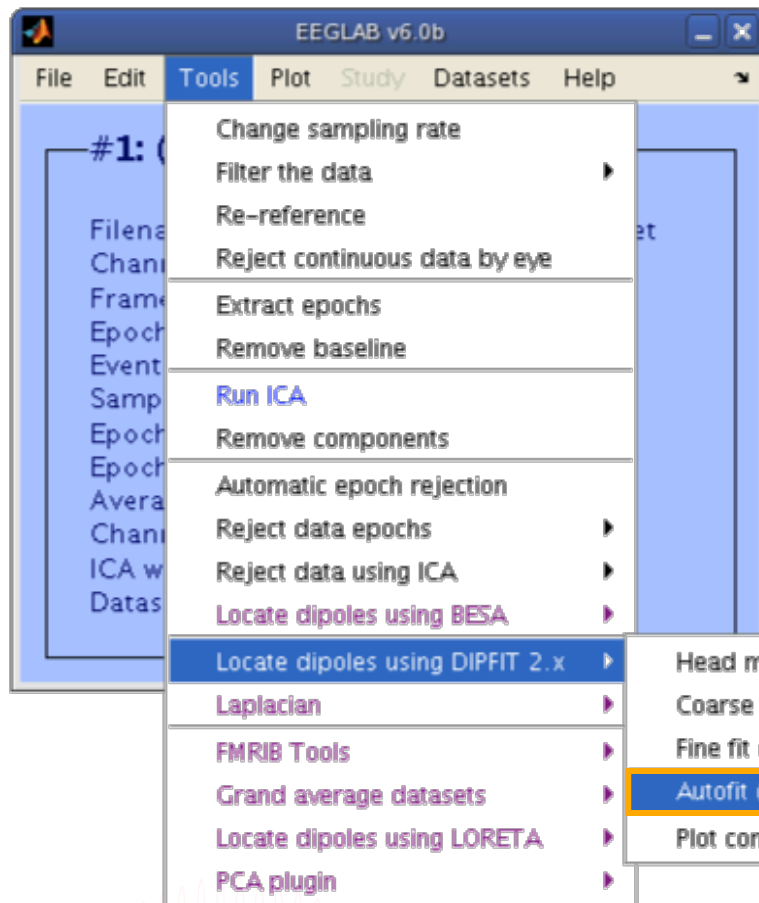
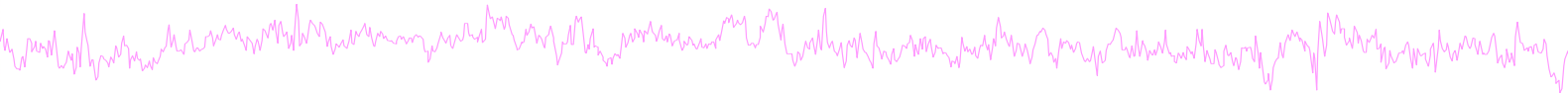
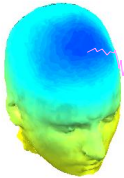
DIPFIT and model co-registration



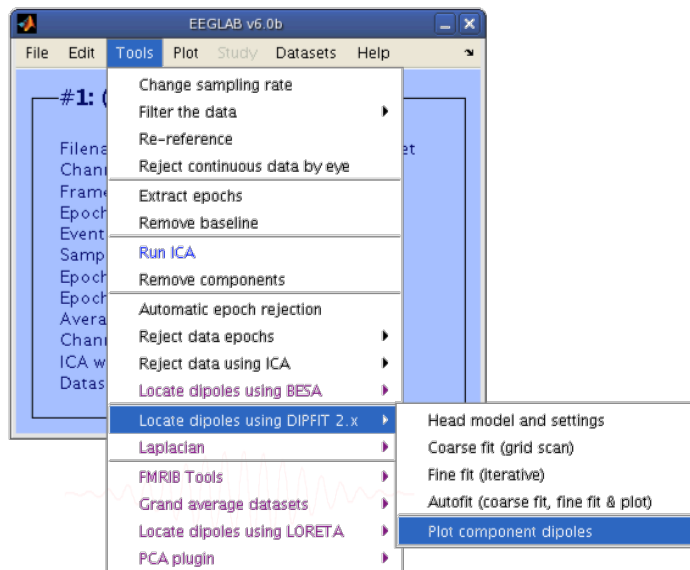
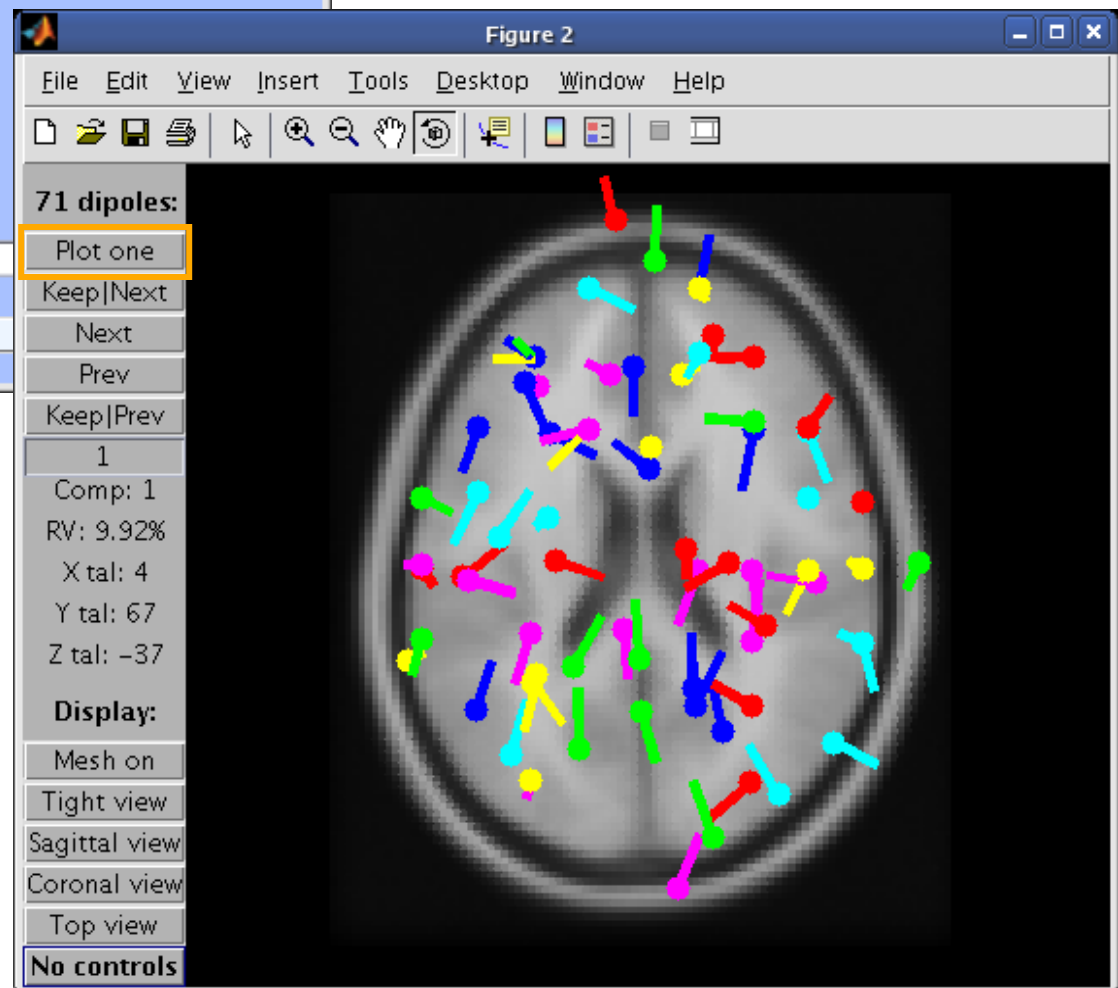
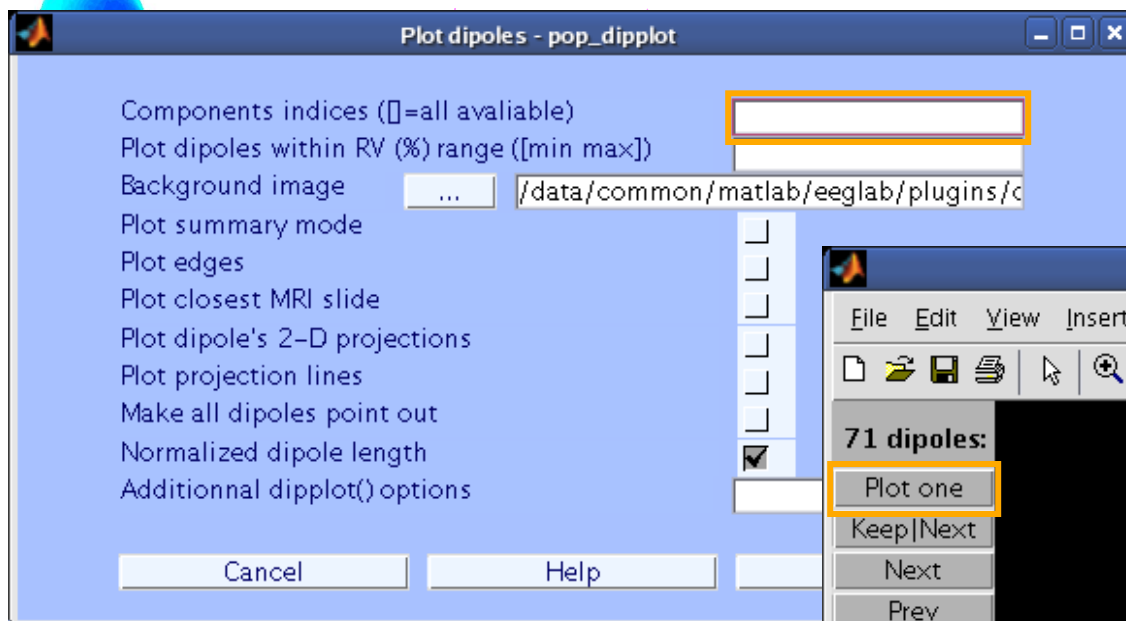
1. Co-register electrodes with model
2. Autofit, plot dipoles, fine fit
3. 3D headplot co-registration



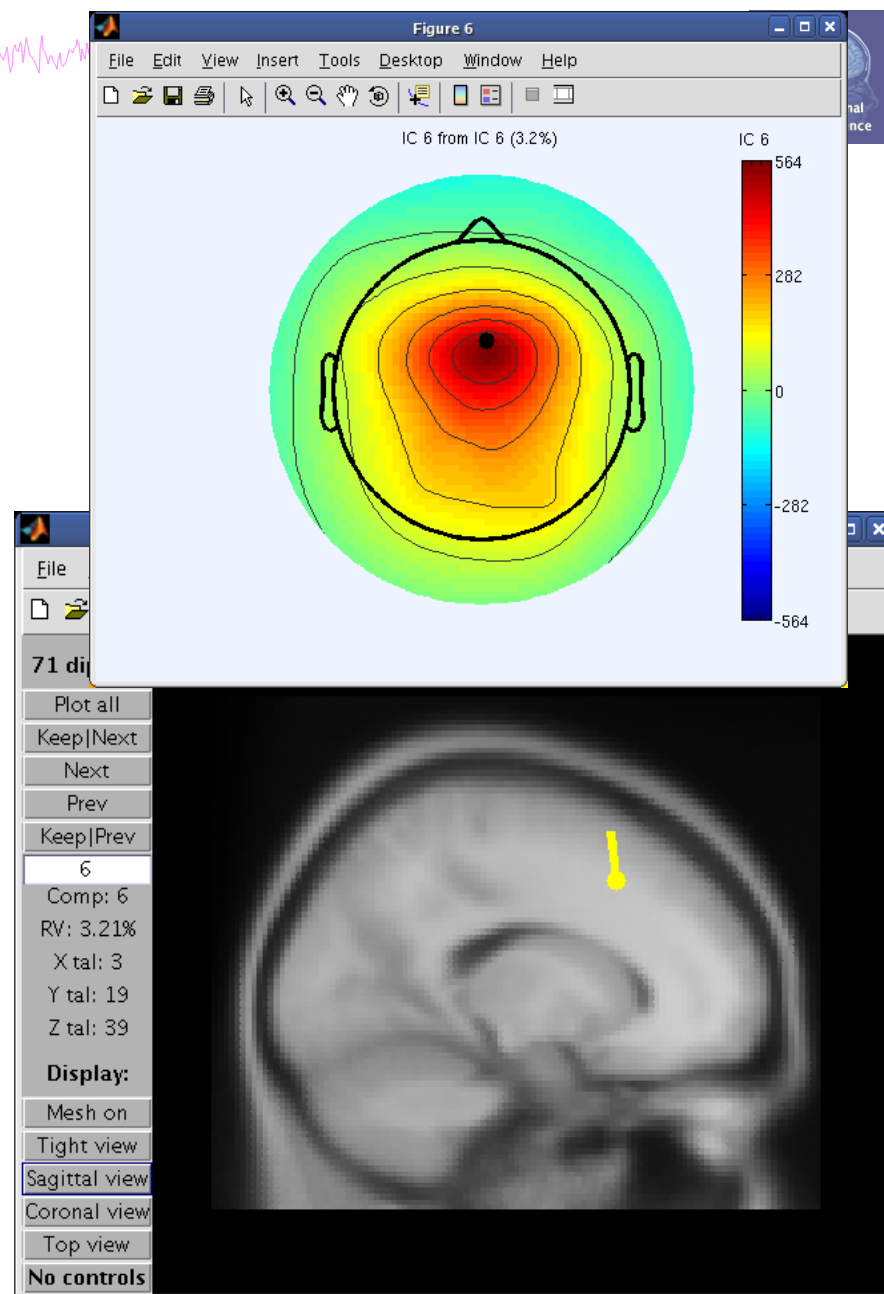
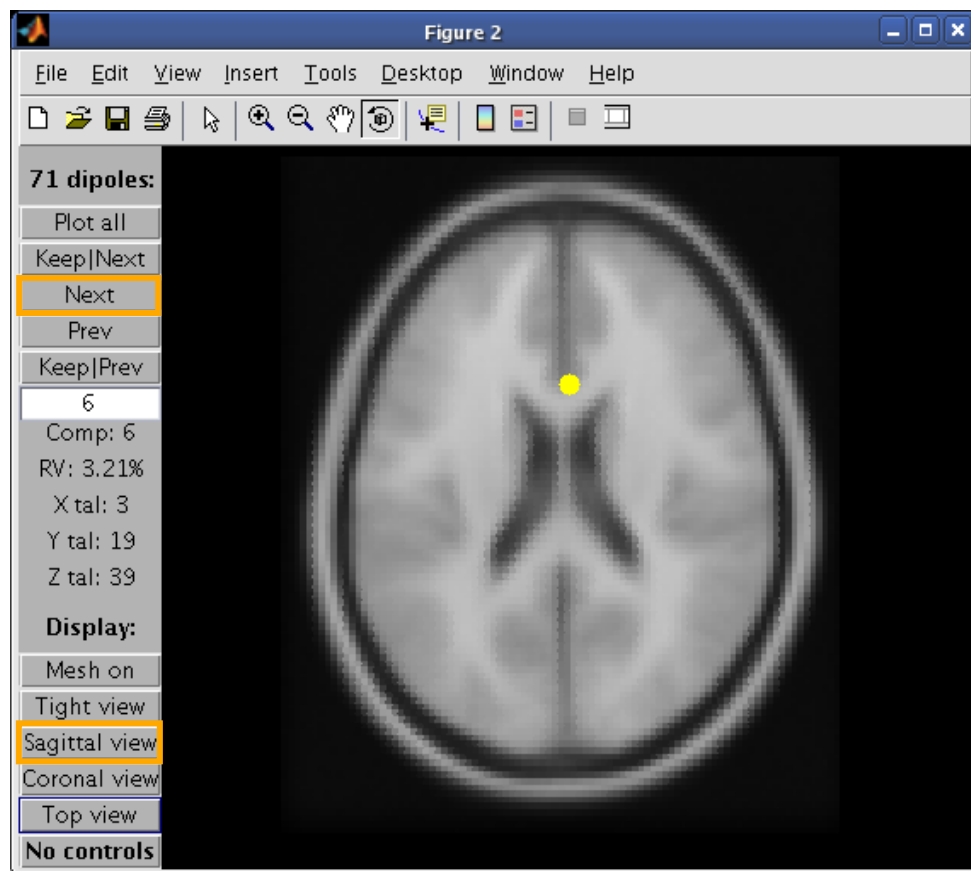
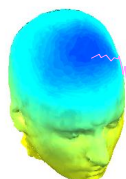
Autofit equivalent dipoles



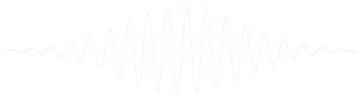
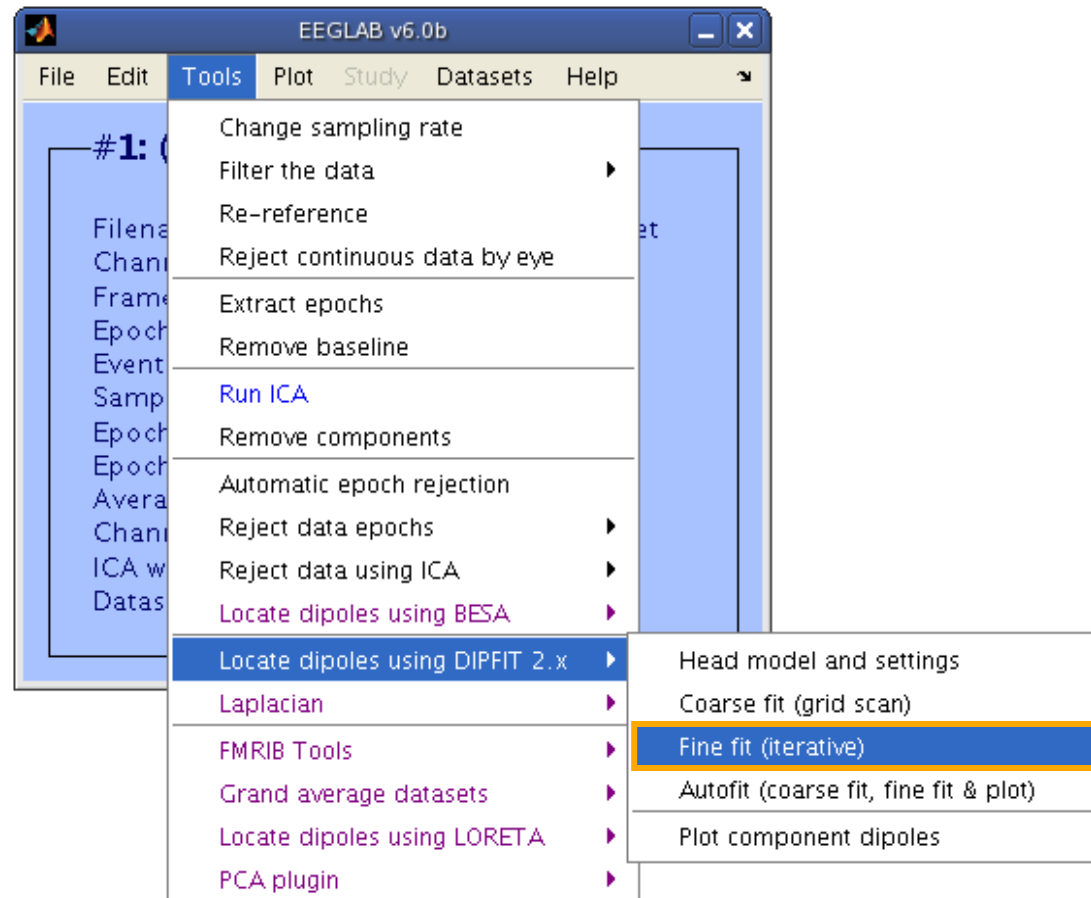
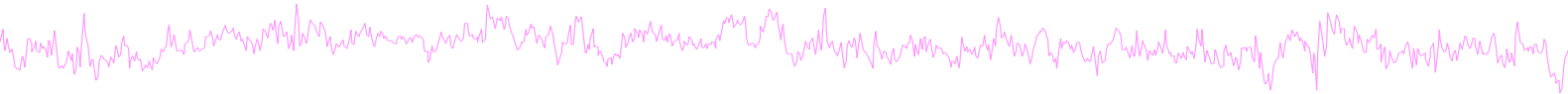
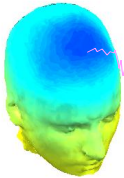
Plot dipoles



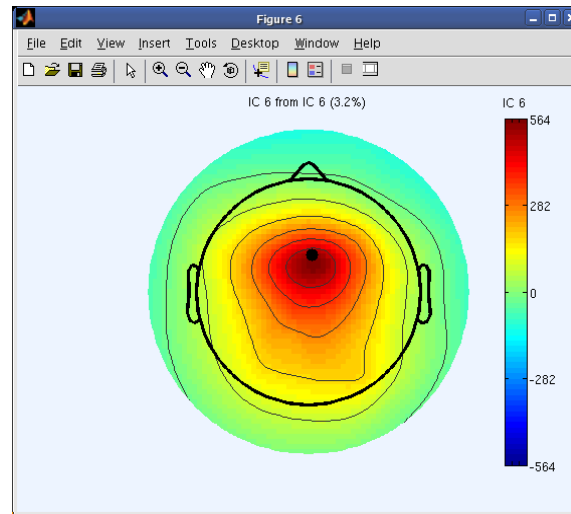
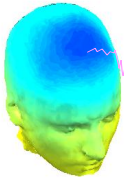
Scroll through dipoles



Fine fit options in DIPFIT



Fine fit menu



Manual dipole fit -- pop_dipfit_nonlinear()

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

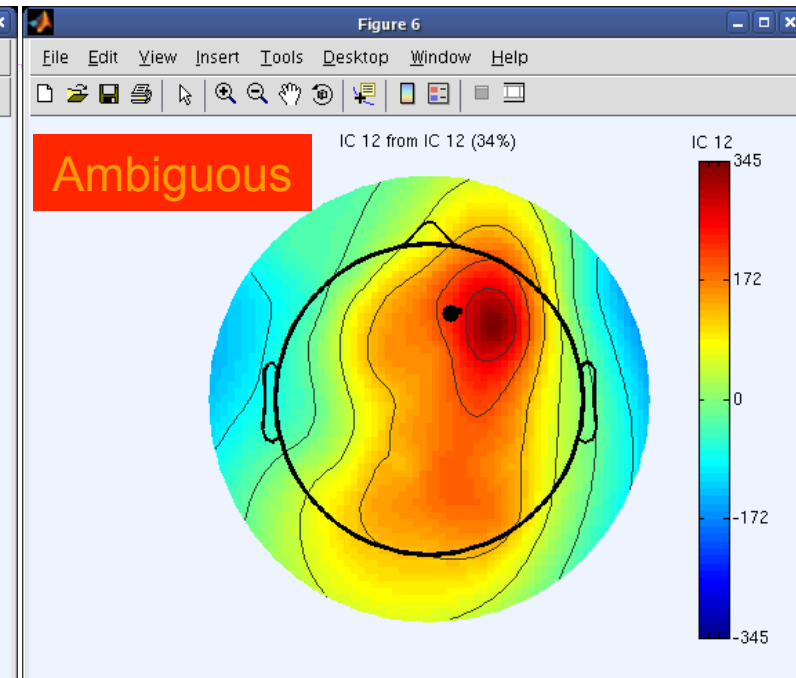
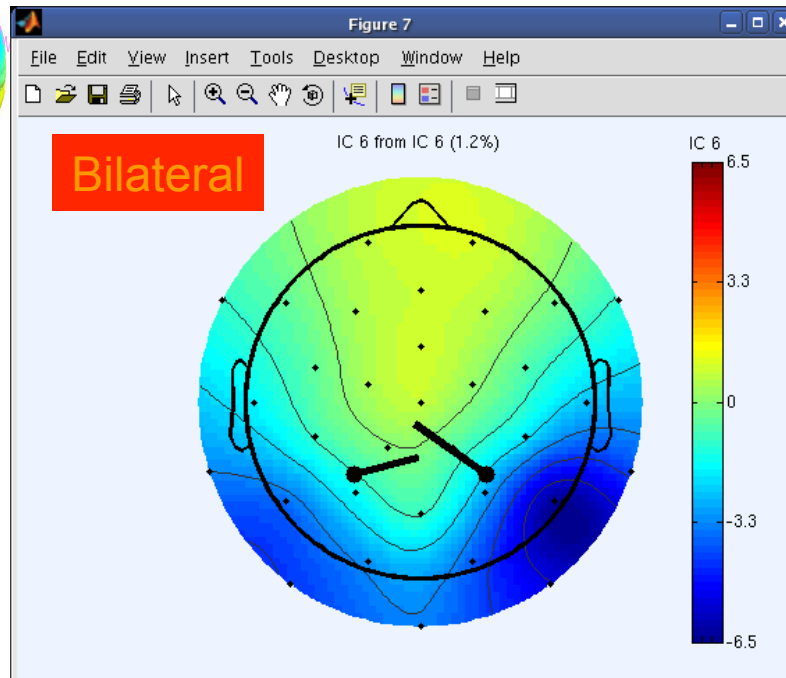
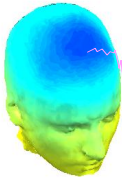
dipole	fit	position	moment	
#1	<input checked="" type="checkbox"/>	28.222 -2.401 37.331	2.380 475942.653 3819304.288	Flip (in out)
#2	<input type="checkbox"/>	0.000 0.000 0.000	0.000 0.000 0.000	Flip (in out)

☒ Symmetry constrain for dipole ...

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

Cancel Help Ok

Bilateral dipoles



Manual dipole fit -- pop_dipfit_nonlinear()

Component to fit: 6 Plot map Residual variance = 1.23%

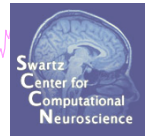
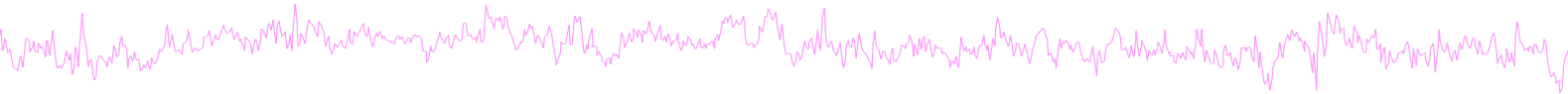
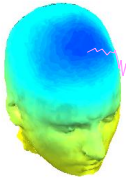
dipole	fit	position	moment	
#1	<input checked="" type="checkbox"/>	-35.066 -32.492 -4.684	32271.382 46141.284 5880.224	Flip (in out)
#2	<input checked="" type="checkbox"/>	-35.066 32.492 -4.684	1005.419 -38050.427 14094.824	Flip (in out)

☒ Symmetry constrain for dipole ...

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

Cancel Help Ok

EEG.dipfit structure



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

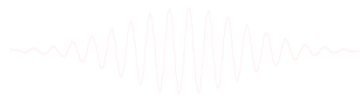
```
1x33 struct array with fields:
```

```
posxyz  
momxyz  
rv  
active  
select
```

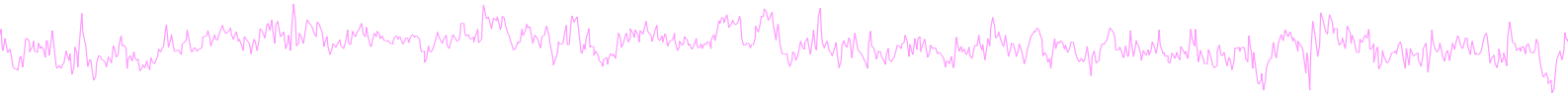
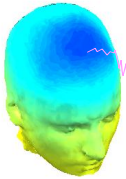
```
>> EEG.dipfit.model(1)  
ans =
```

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

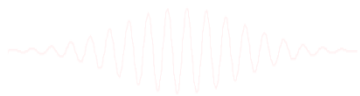
X	Y	Z
[14.9791	-86.0094	47.9448]



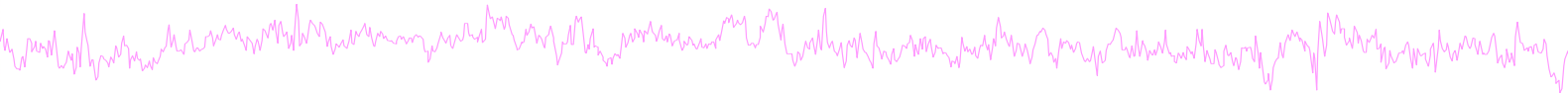
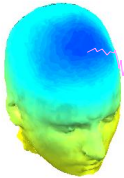
DIPFIT and model co-registration



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



Plot scalp maps in 3D



EEGLAB v6.0b

File Edit Tools **Plot** Study Datasets Help

#1: (no d...
Filename: ...
Channels pe...
Frames per e...
Epochs
Events
Sampling rat...
Epoch start (...
Epoch end (s...
Average refe...
Channel loca...
ICA weights
Dataset size

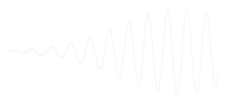
- Channel locations
- Channel data (scroll)
- Channel spectra and maps
- Channel properties
- Channel ERP image
- Channel ERPs
- ERP map series
- Sum/Compare ERPs
- Component activations (scroll)
- Component spectra and maps
- Component maps**
- Component properties
- Component ERP image
- Component ERPs
- Sum/Compare comp. ERPs
- Data statistics
- Time-frequency transforms
- Average time-frequency
- Cluster dataset ICs

Headplot() warning

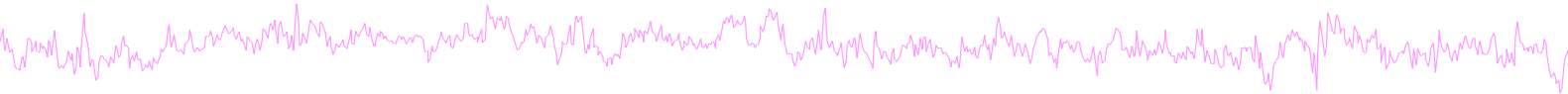
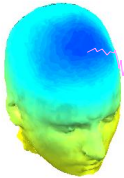
headplot() must generate a spline file the first time it is called or after changes in the channel location file. You must also co-register your channel locations with the head template.

Ok

In 2-D
In 3-D



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:

3-D head mesh file

Mesh associated channel file

Talairach-model transformation matrix

/home/julie/S01_attend1_pos1.spl

mheadnew.mat

mheadnew.xyz

Browse

Browse

Browse

Browse

Manual coreg.

Help

Help

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

Func. help

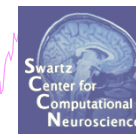
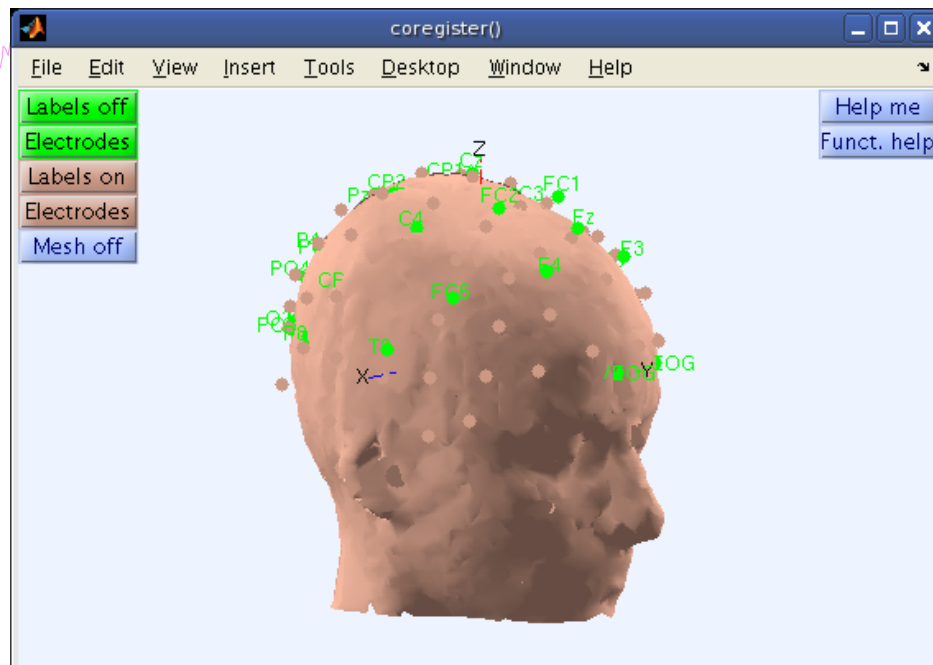
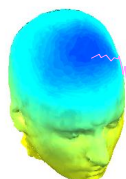
Go through co-registration in the same way as with dipfit co-registration

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

Confirm 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:

3-D head mesh file

Mesh associated channel file

Talairach-model transformation matrix

/home/julie/S01_attend1_pos1.spl					
mheadnew.mat					
mheadnew.xyz					
0	0	-1.570796	100	76	90.87264

Browse Help

Browse Help

Browse

Browse

Manual coreg.

Plot interpolated activity onto 3-D head

Component numbers to plot (negative numbers invert comp. polarities):

Plot title:

Plot geometry (rows,columns): (Default [] = near square)

-> headplot() options (See >> help headplot):

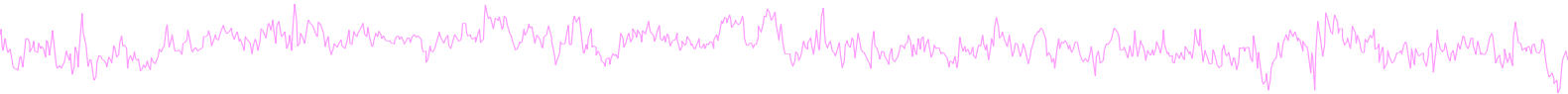
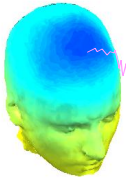
1:31

Components of dataset:

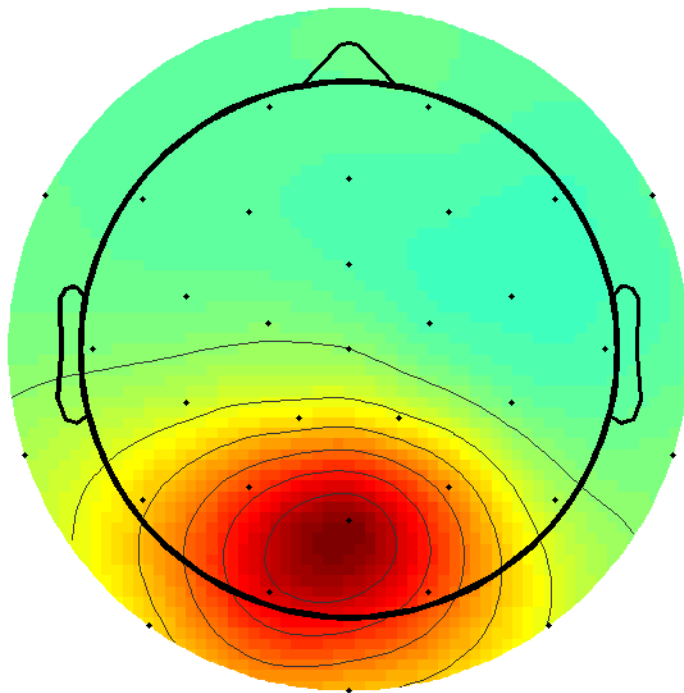
Cancel

Ok

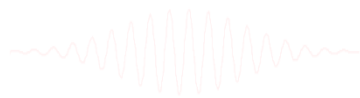
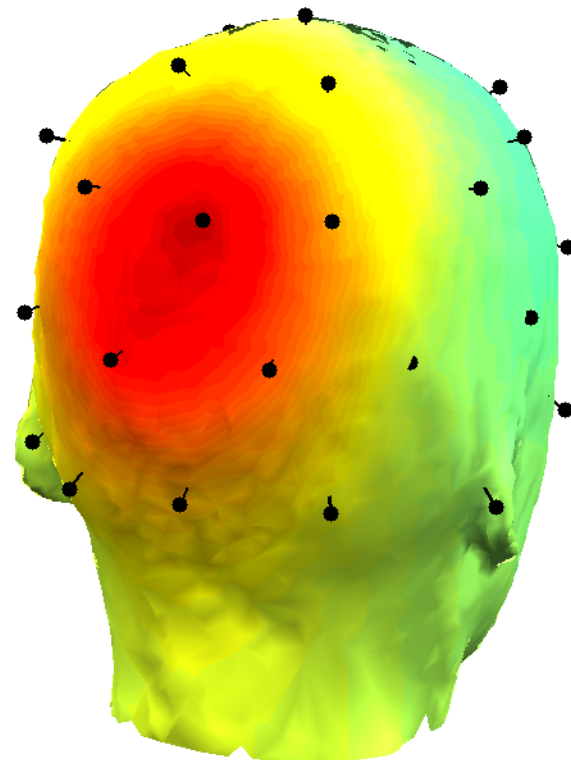
Spline file in EEG structure



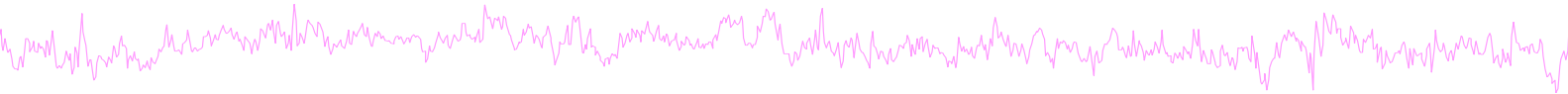
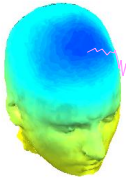
2D scalp map for IC 12



3D scalp map for IC 12



Exercise



- **Novice / Intermediate**

- Load 'stern125.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'
- Try purposely misaligning electrodes with model, how far off are the resulting dipoles from the original locations?

