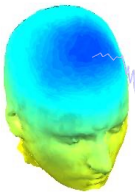
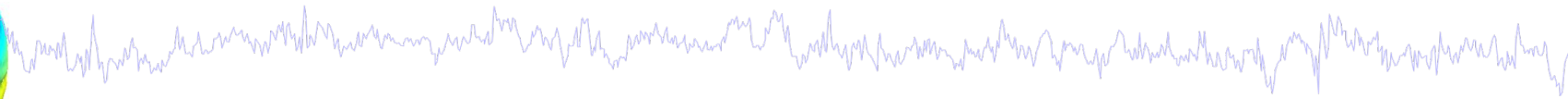
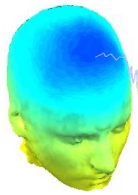




DIPFIT and model co-registration

1. Co-register electrodes with model
2. Fit components



Edit channel info -- pop_chanedit()

Channel information ("field_name"):

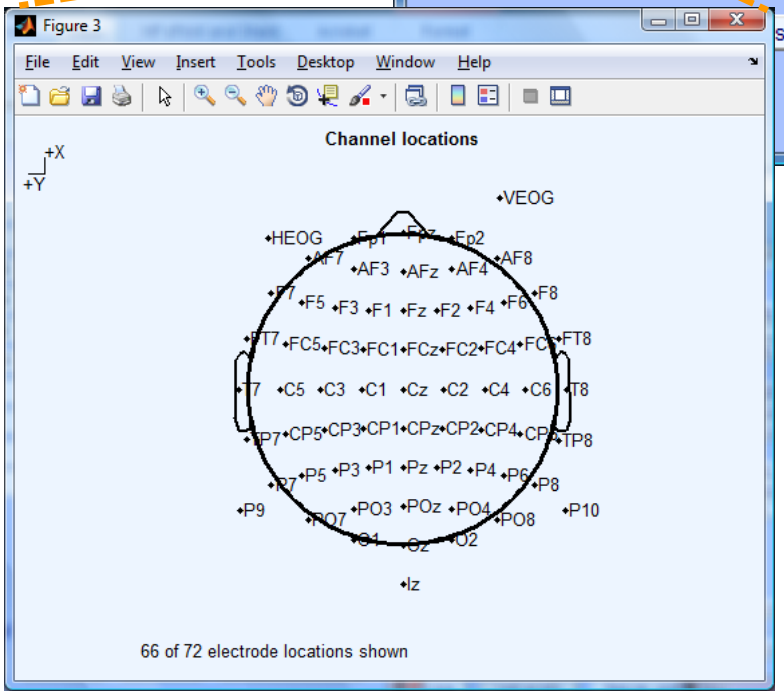
Channel label ("label")	HEOG	Opt. head center
Polar angle ("theta")	-42	Rotate axis
Polar radius ("radius")	0.65556	Transform axes
Cartesian X ("X")	55.7734	
Cartesian Y ("Y")	50.2186	Xyz -> polar & sph.
Cartesian Z ("Z")	-39.9051	Sph. -> polar & xyz
Spherical horiz. angle ("sph_theta")	42	Polar -> sph. & xyz
Spherical azimuth angle ("sph_phi")	-28	
Spherical radius ("sph_radius")	85	Set head radius
Channel type		Set channel types
Reference		Set reference
Index in backup 'urchanlocs' structure	68	
Channel in data array (set=yes)	☑	

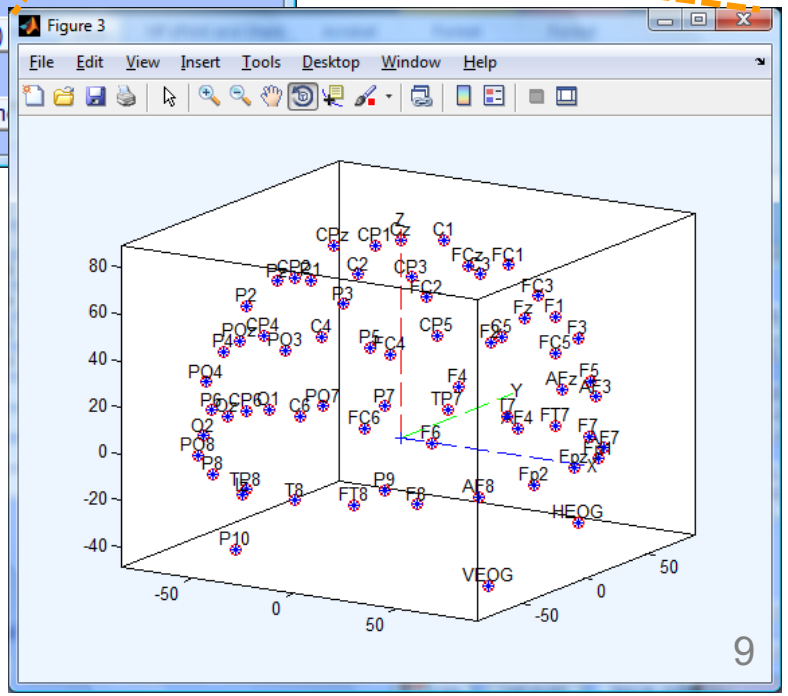
Delete chan | Insert chan | **Channel number (of 72)** | << | < | 68 | > | >> | Append chan

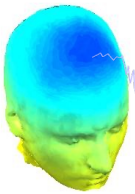
Plot 2-D | Plot radius (0.2-1, []=auto) | | Nose along +X | Plot 3-D (xyz)

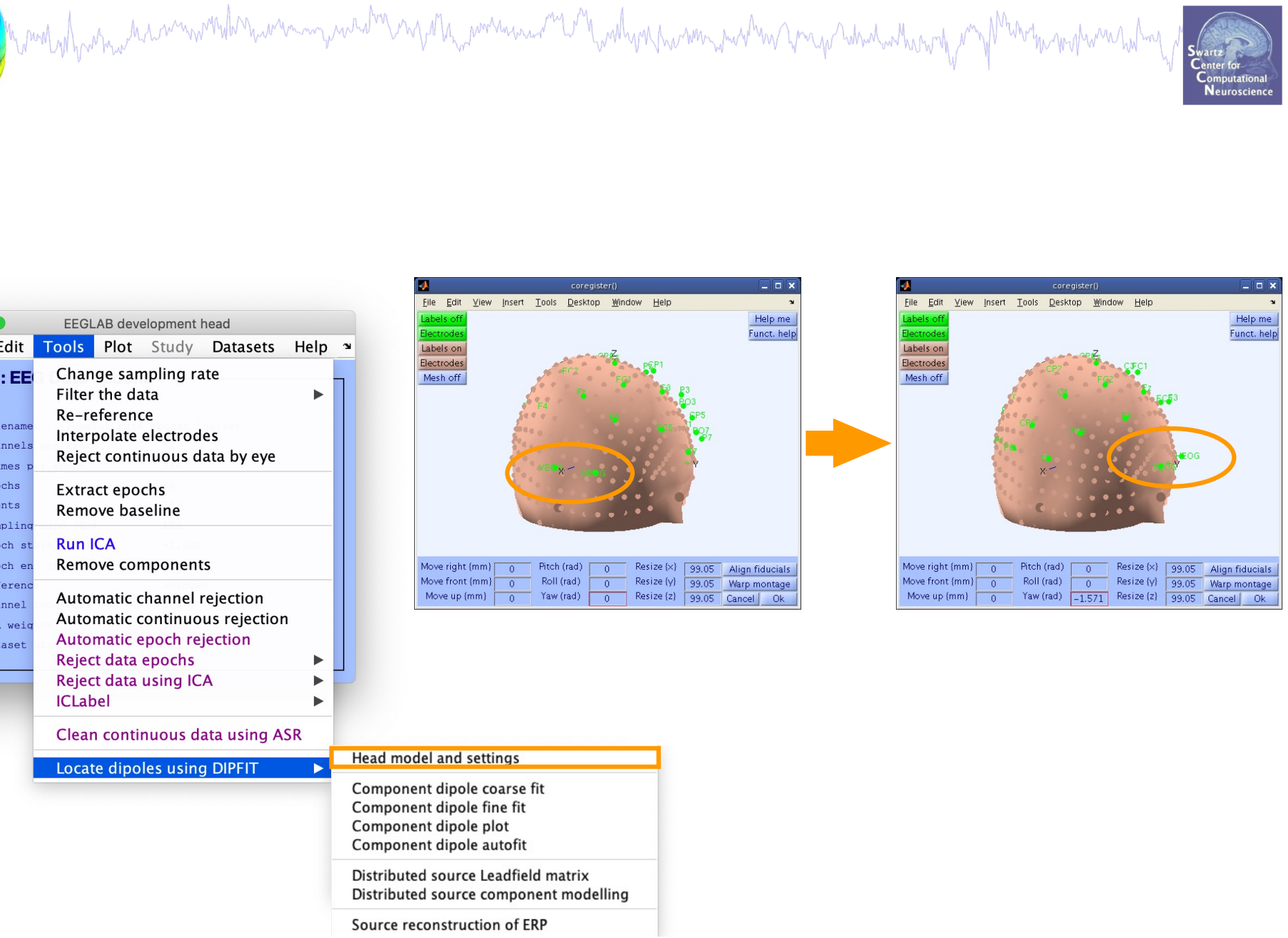
s help | Look up locs | Save (as .ced)

Can

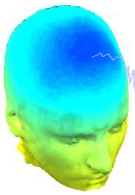







EEGLAB development head
File Edit Tools Plot Study Datasets Help
#1: EE
Filename
Channels
Frames p
Epochs
Events
Sampling
Epoch st
Epoch en
Referenc
Channel
ICA weig
Dataset
Change sampling rate
Filter the data
Re-reference
Interpolate electrodes
Reject continuous data by eye
Extract epochs
Remove baseline
Run ICA
Remove components
Automatic channel rejection
Automatic continuous rejection
Automatic epoch rejection
Reject data epochs
Reject data using ICA
ICLabel
Clean continuous data using ASR
Locate dipoles using DIPFIT
Head model and settings
Component dipole coarse fit
Component dipole fine fit
Component dipole plot
Component dipole autofit
Distributed source Leadfield matrix
Distributed source component modelling
Source reconstruction of ERP
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
Move front (mm) 0
Move up (mm) 0
Pitch (rad) 0
Roll (rad) 0
Yaw (rad) 0
Resize (x) 99.05
Resize (y) 99.05
Resize (z) 99.05
Align fiducials
Warp montage
Cancel
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
Move front (mm) 0
Move up (mm) 0
Pitch (rad) 0
Roll (rad) 0
Yaw (rad) -1.571
Resize (x) 99.05
Resize (y) 99.05
Resize (z) 99.05
Align fiducials
Warp montage
Cancel
Ok

EEG.dipfit structure



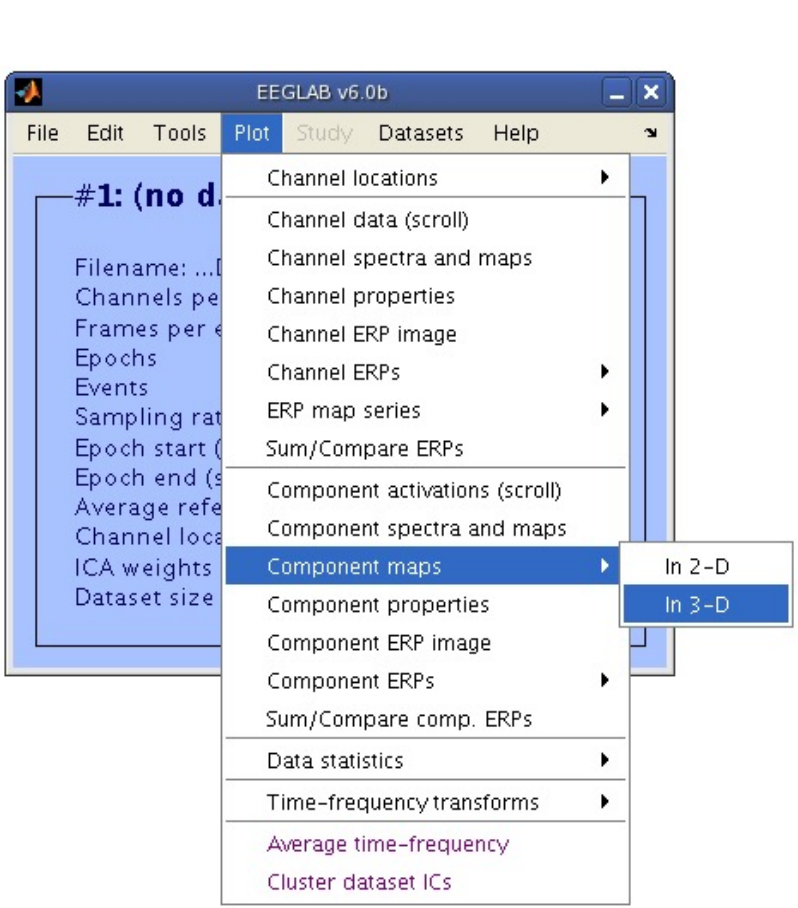
```
>> EEG.dipfit
ans =
            hdmfile: [1x76 char]
            mrifile: [1x71 char]
           chanfile: [1x83 char]
            chansel: [1x33 double]
         coordformat: 'spherical'
              model: [1x33 struct]
            current: 32
                vol: [1x1 struct]
          leadfield: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

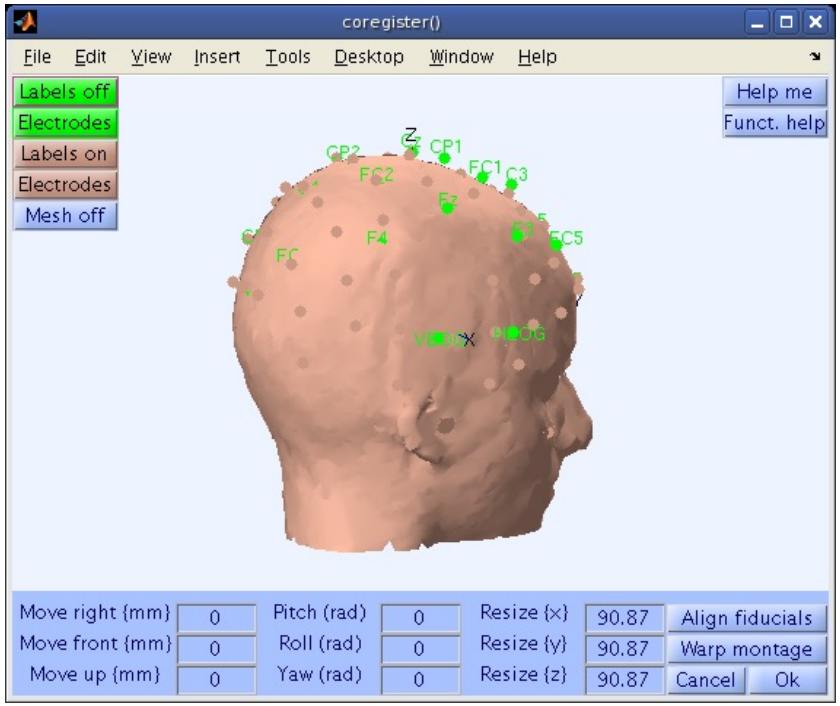
Rotation

Translation

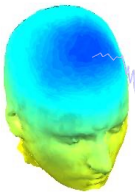
Scaling

Plot scalp maps in 3D





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



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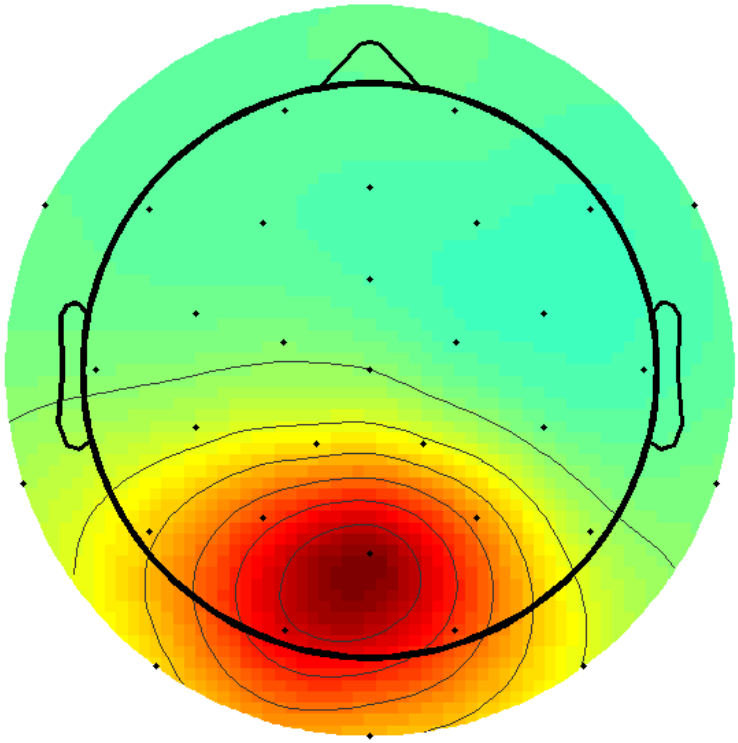
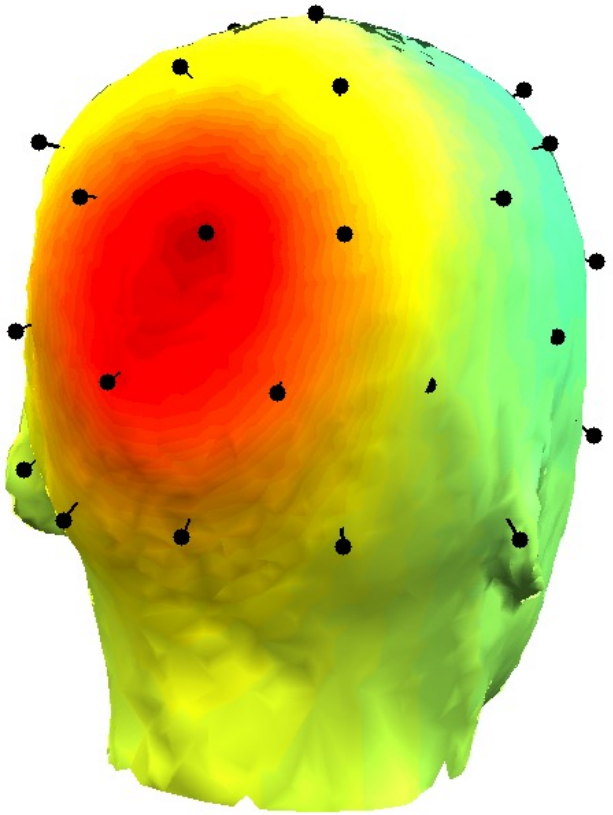
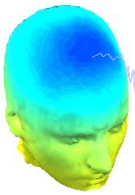
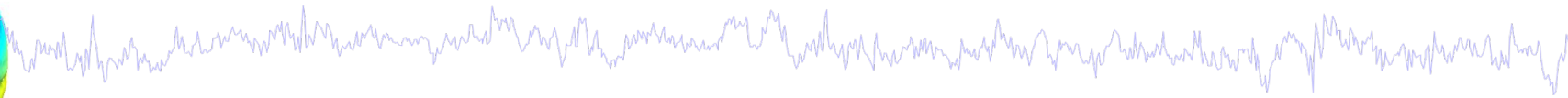
2D scalp map for IC 12



3D scalp map for IC 12

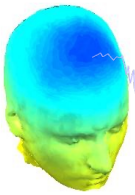




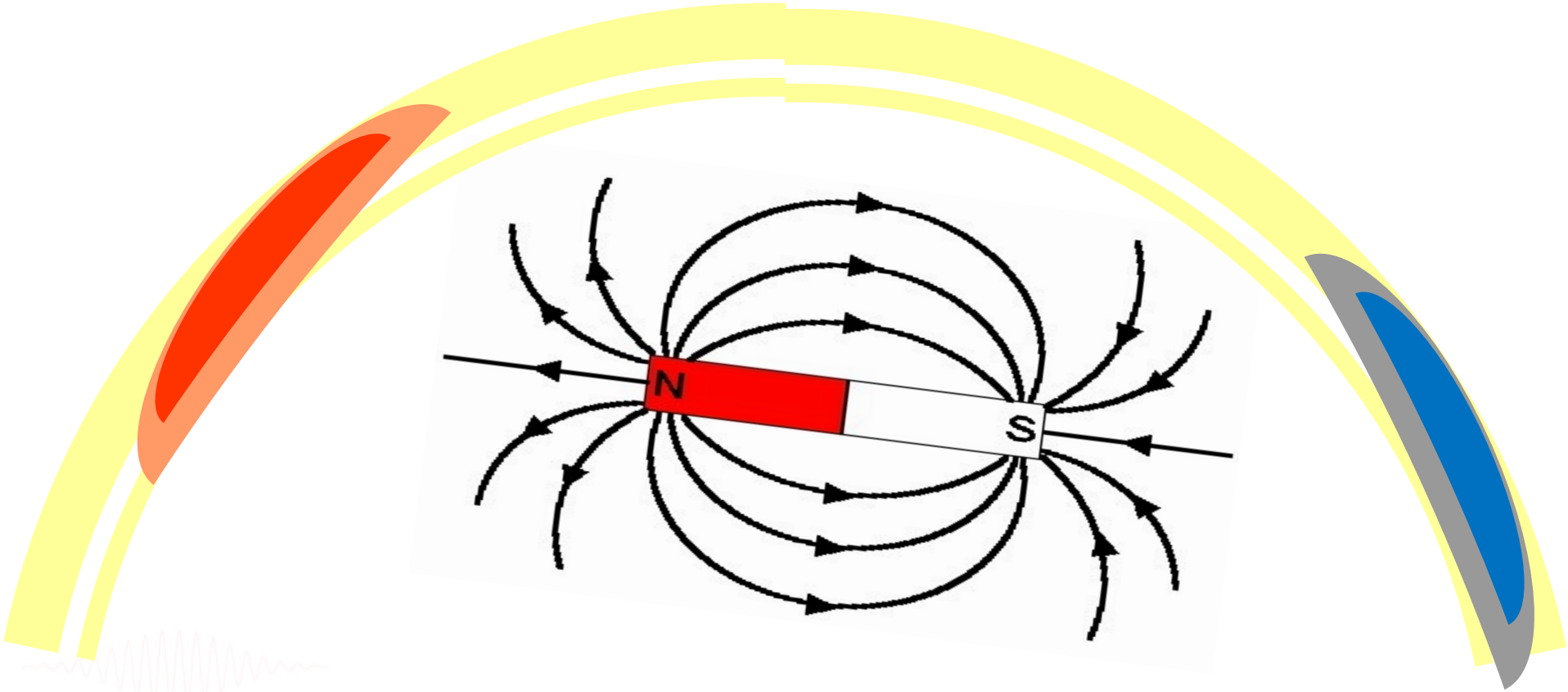


DIPFIT and model co-registration

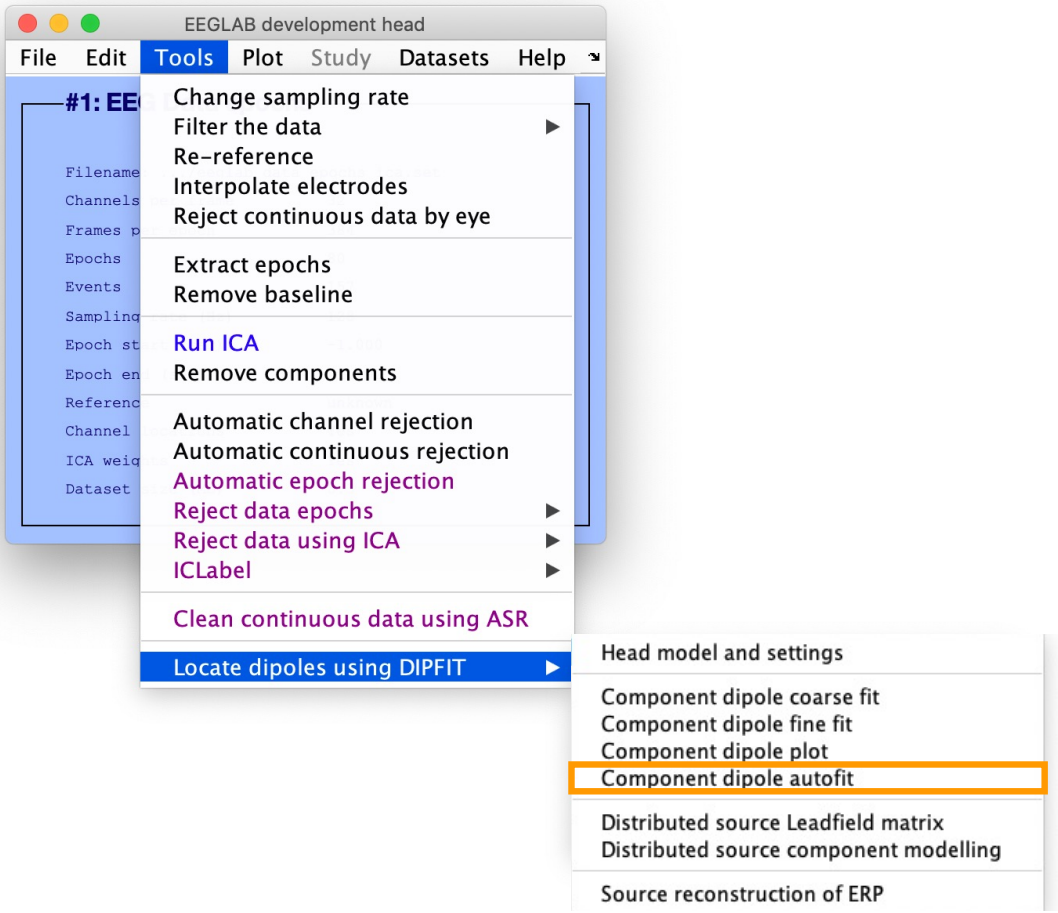
1. Co-register electrodes with model
2. Fit components

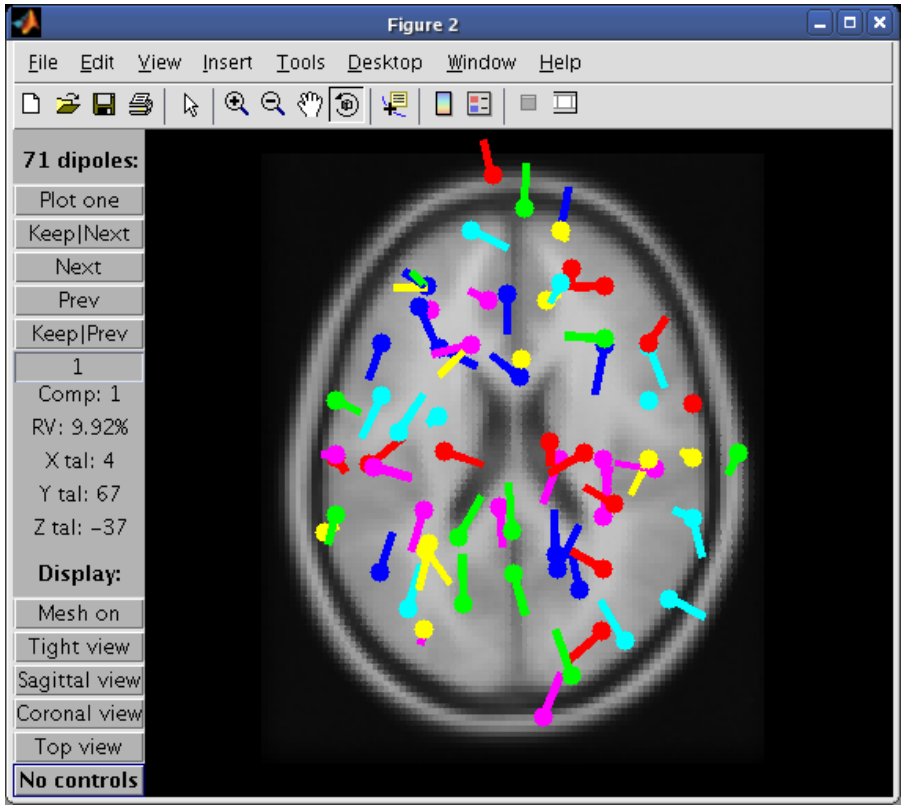


Patch of Cortex Acting as a Dipole

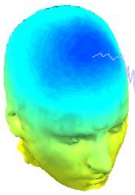


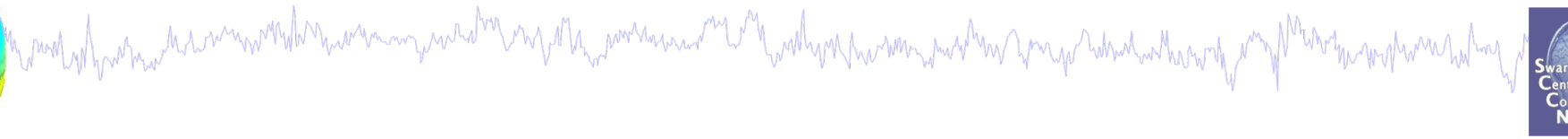
Fit equivalent dipoles

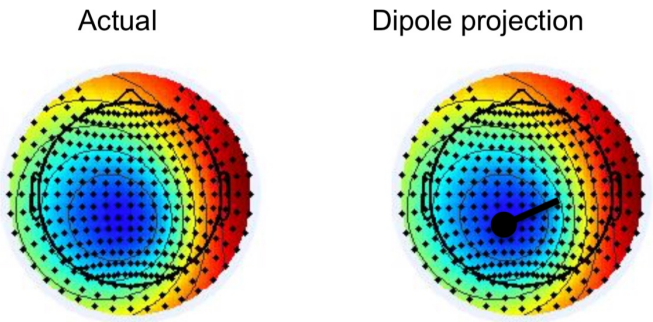




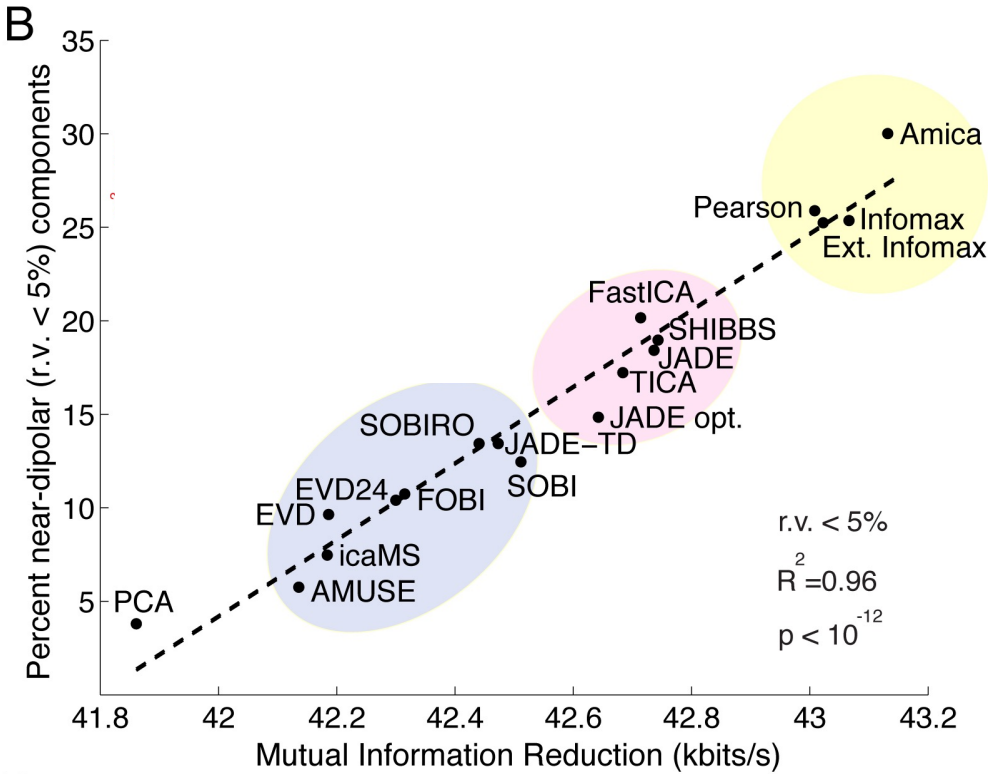
Computing residual variance





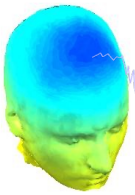


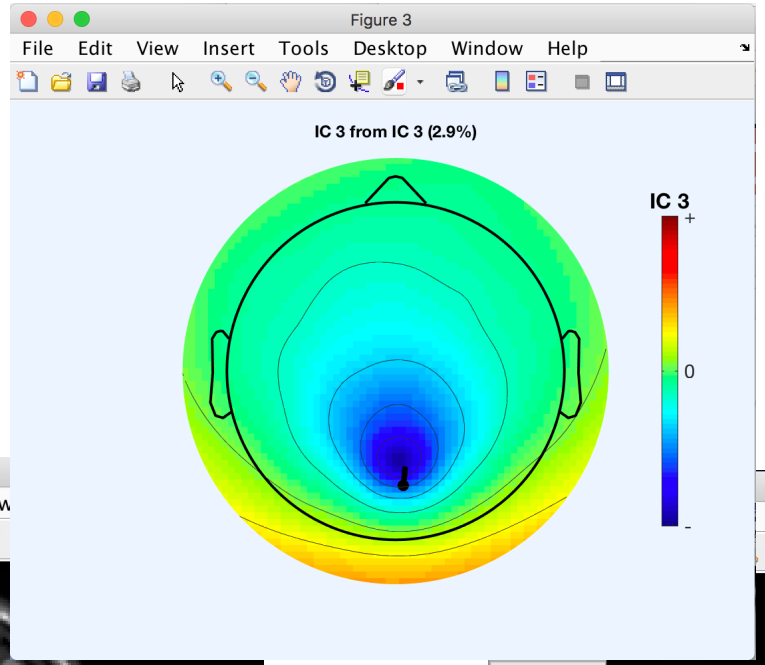
$$r = \Sigma(x_i - \tilde{x}_i)^2 / \Sigma x_i^2$$

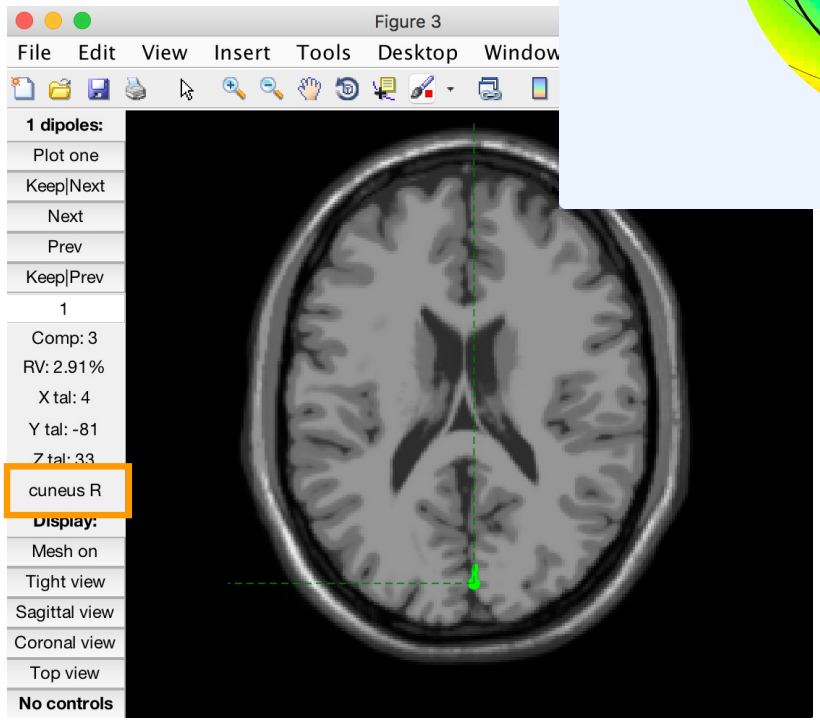


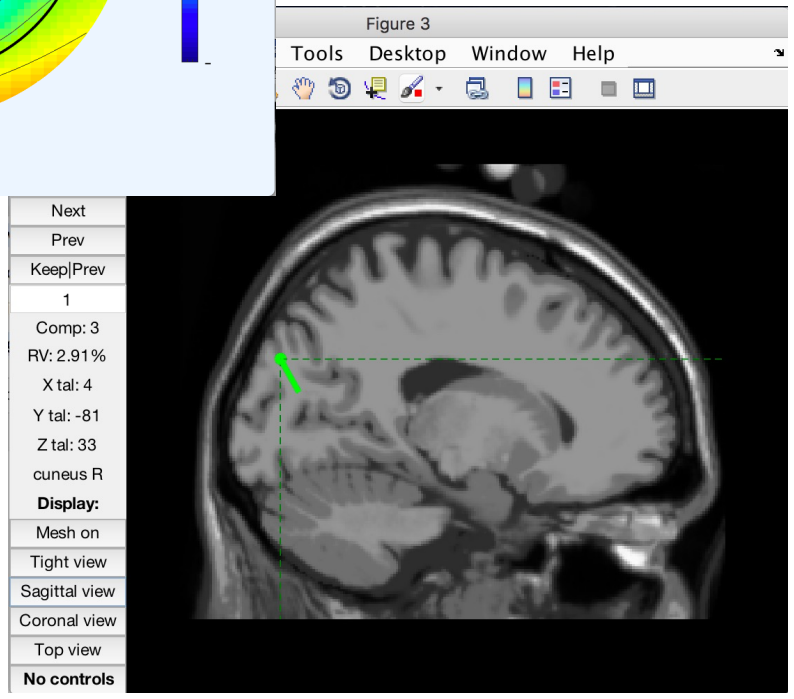
Delorme A, Palmer J, Onton J, Oostenveld R, Makeig S. Independent EEG sources are dipolar. PLoS One. 2012;7(2):e30135. doi: 10.1371/journal.pone.0030135. Epub 2012 Feb 15. PMID: 22355308; PMCID: PMC3280242.

Scroll through dipoles

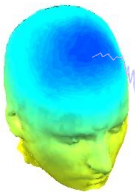


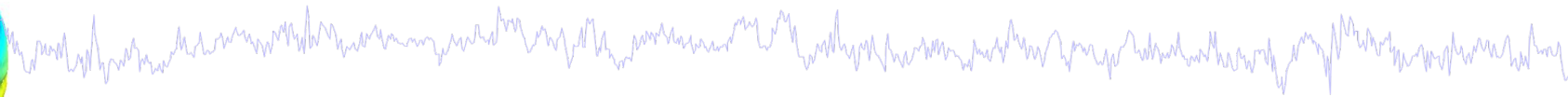






Desikan-Killiany Atlas





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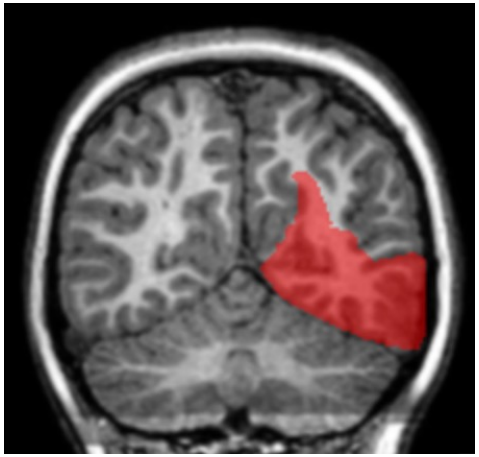
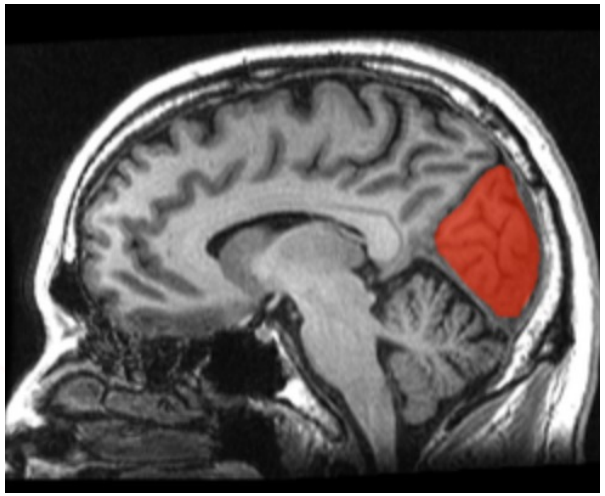
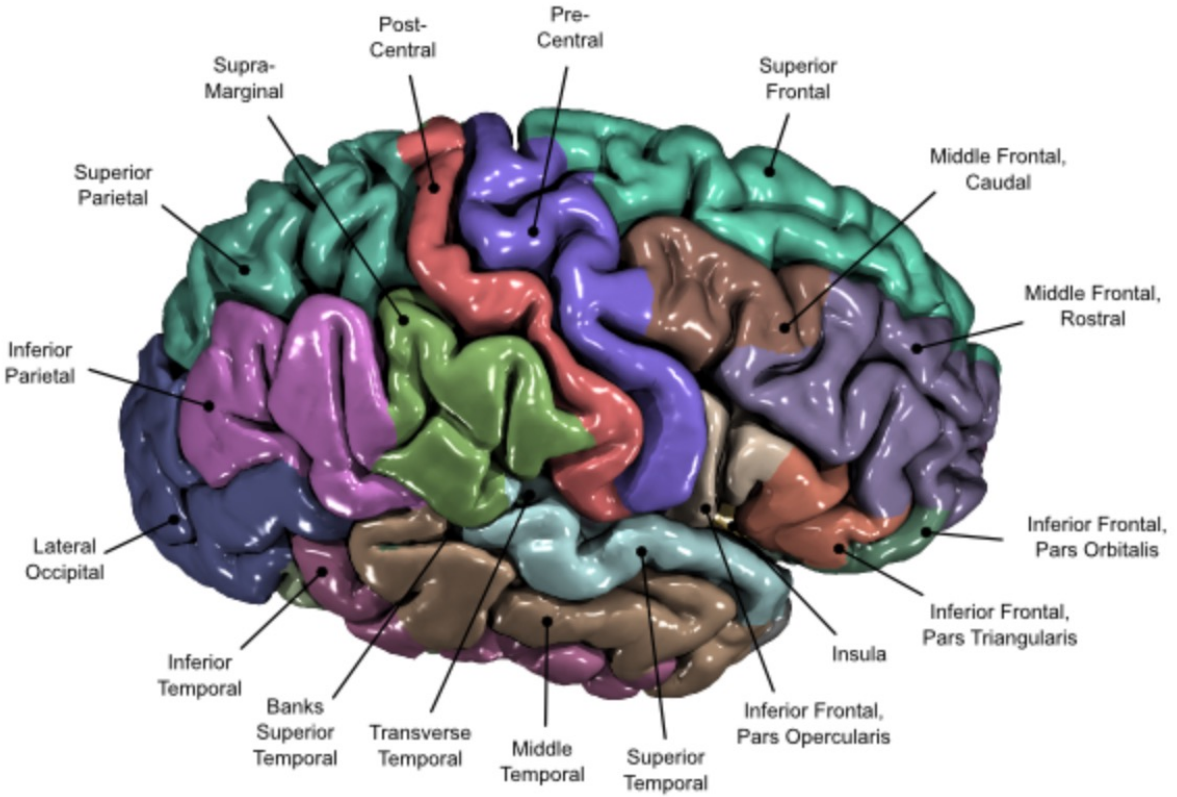
Right Cuneus

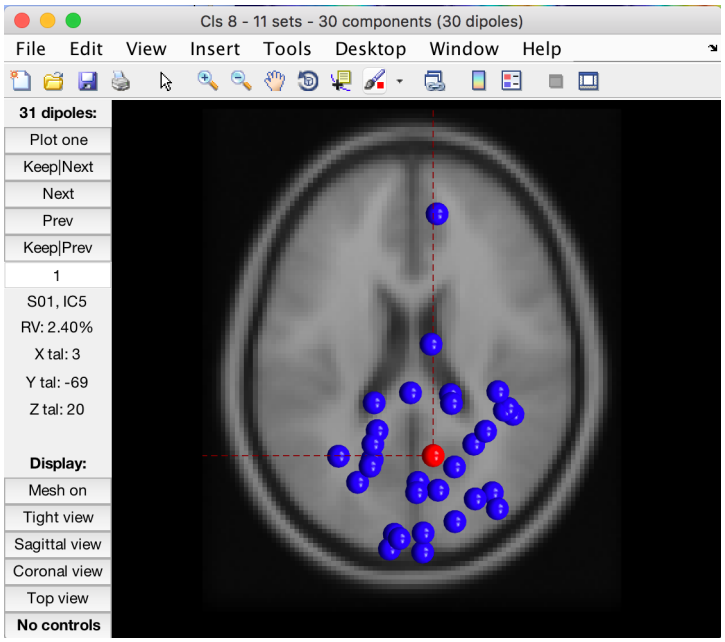


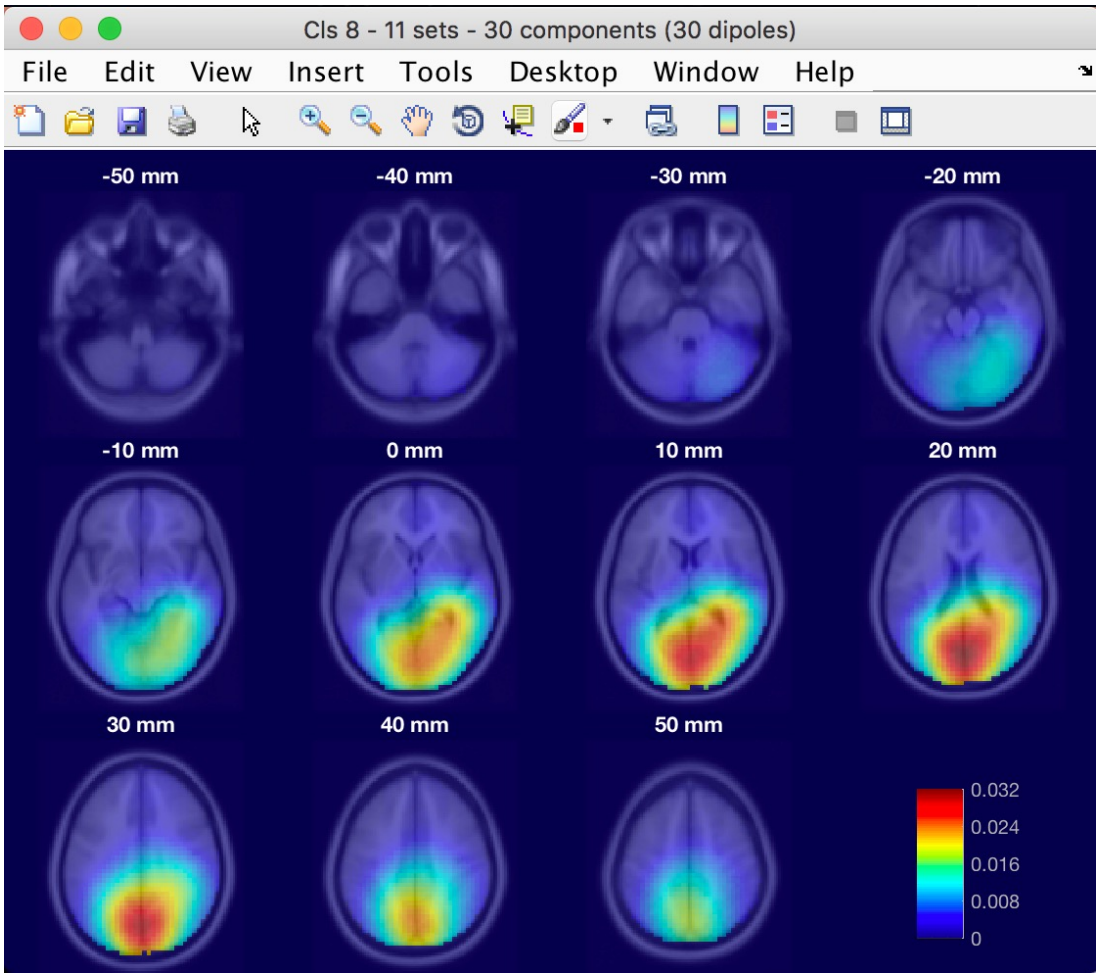


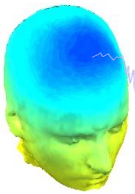
68 brain areas



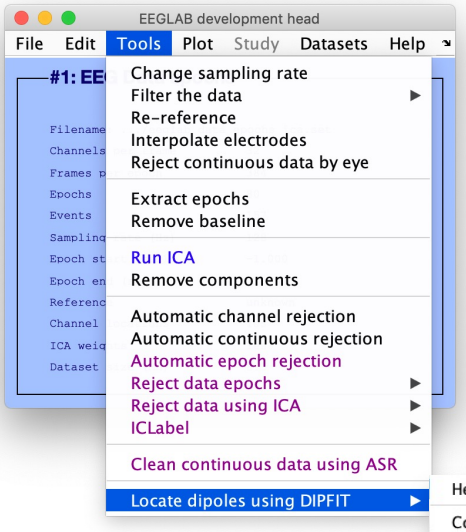
Visualizing ICA component clusters



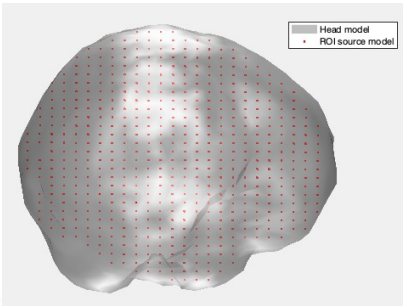




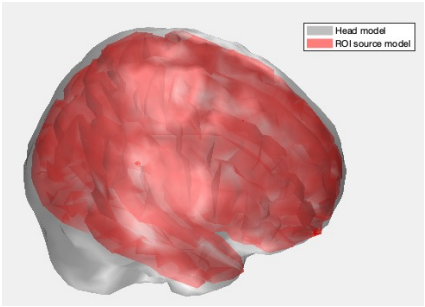
Distributed source localization in DIPFIT

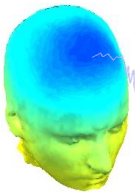


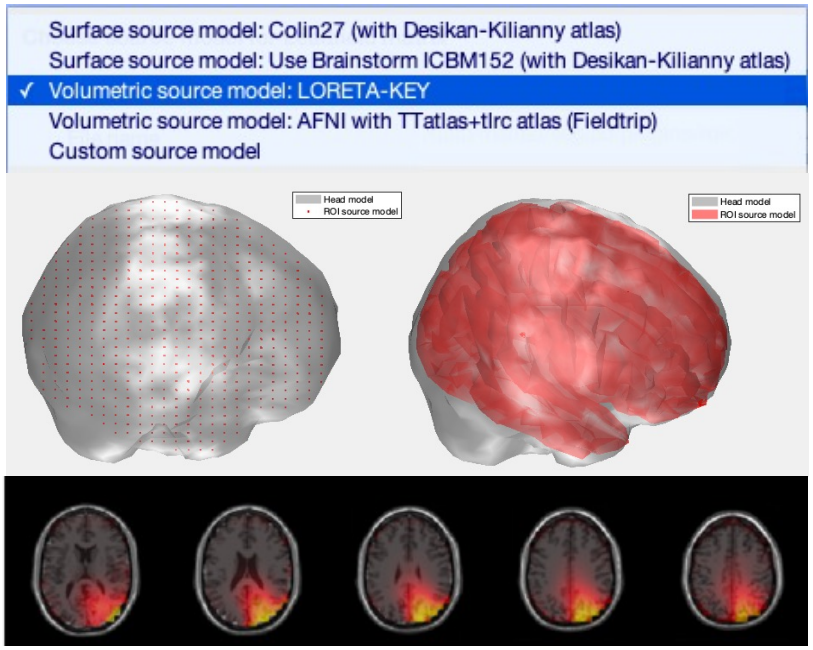
Volume



Surface

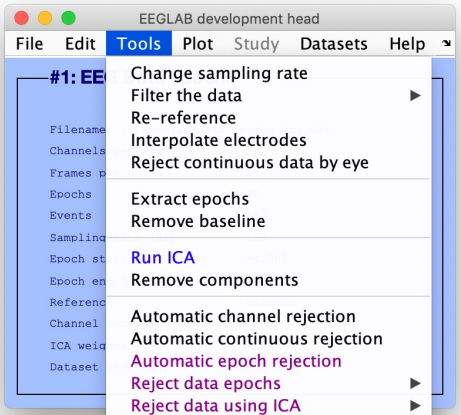




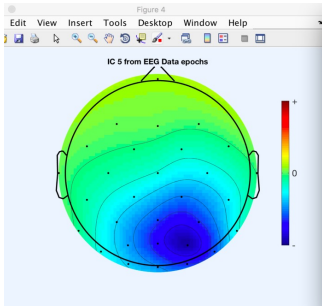

Surface source model: Colin27 (with Desikan-Kilianny atlas)
Surface source model: Use Brainstorm ICBM152 (with Desikan-Kilianny atlas)
✓ Volumetric source model: LORETA-KEY
Volumetric source model: AFNI with TTatlas+tlrc atlas (Fieldtrip)
Custom source model
Head model
ROI source model
Head model
ROI source model

Distributed source localization

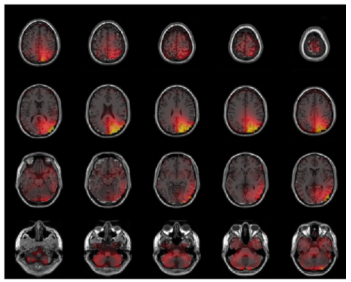
(eloreta or LCMV beamforming)



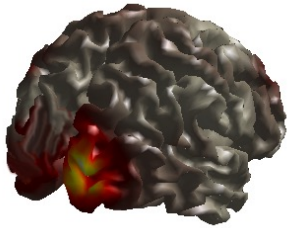
IC scalp topo



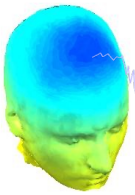
Volume



Surface



Exercise



- Load ***eeglab_data_epochs_ica.set*** from the ***sample_data*** folder of EEGLAB

- Remove EOG channels
- In Dipfit menu, select BEM model
- Coarse fit all dipoles
- Fine fit dipole number 5

- Compute Leadfield matrix
- Compute distributed source for component 3