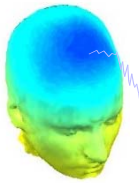
Evaluate ICA decomposition and artifacts



1) Evaluate IC Decomposition

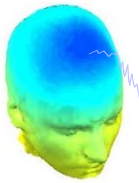
2) IC Properties

3) Identify Artifacts

4) IC Selection

5) Intro to ICLabel Website

Evaluate ICA decomposition and artifacts



1) **Evaluate IC Decomposition**

2) IC Properties

3) Identify Artifacts

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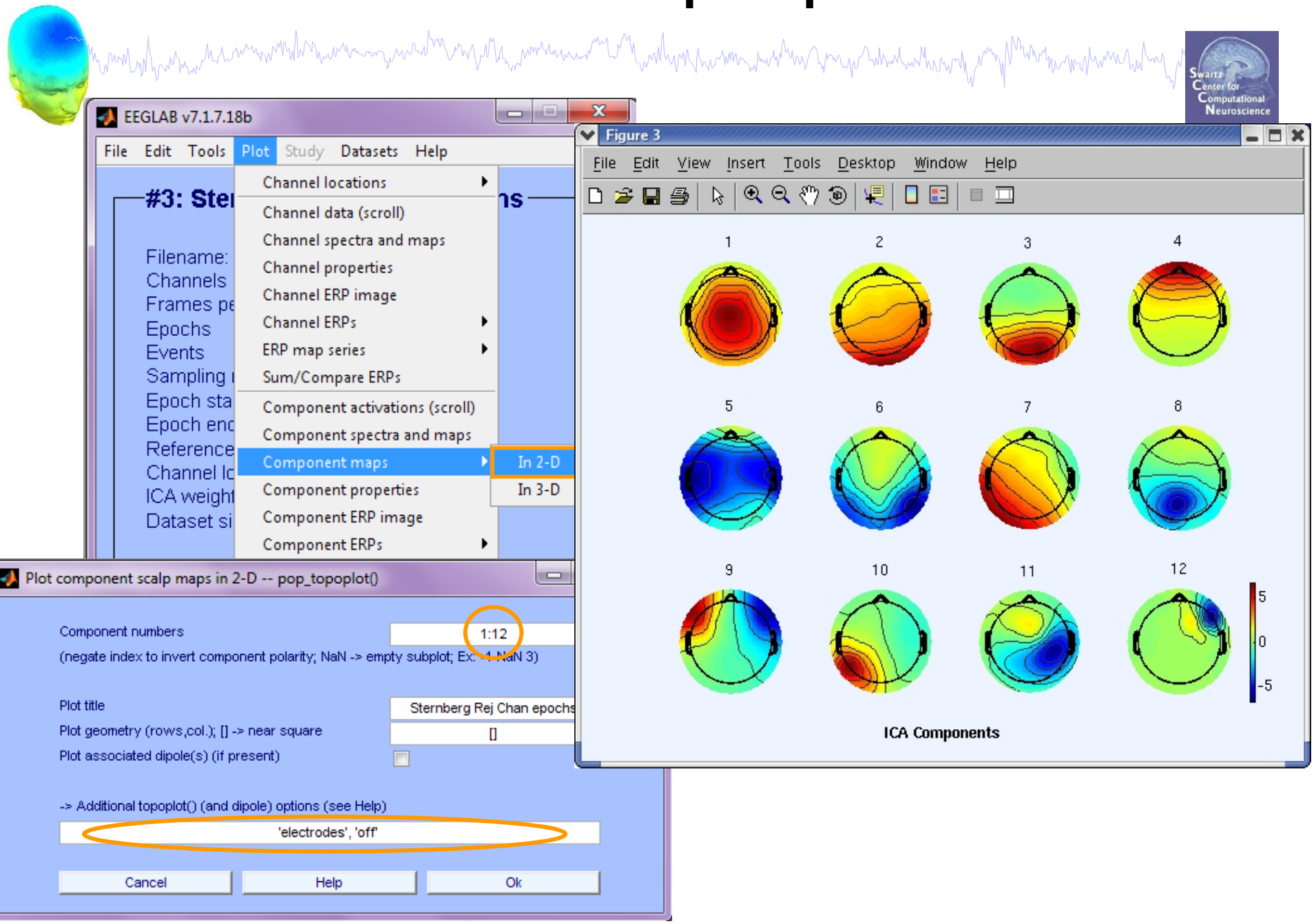
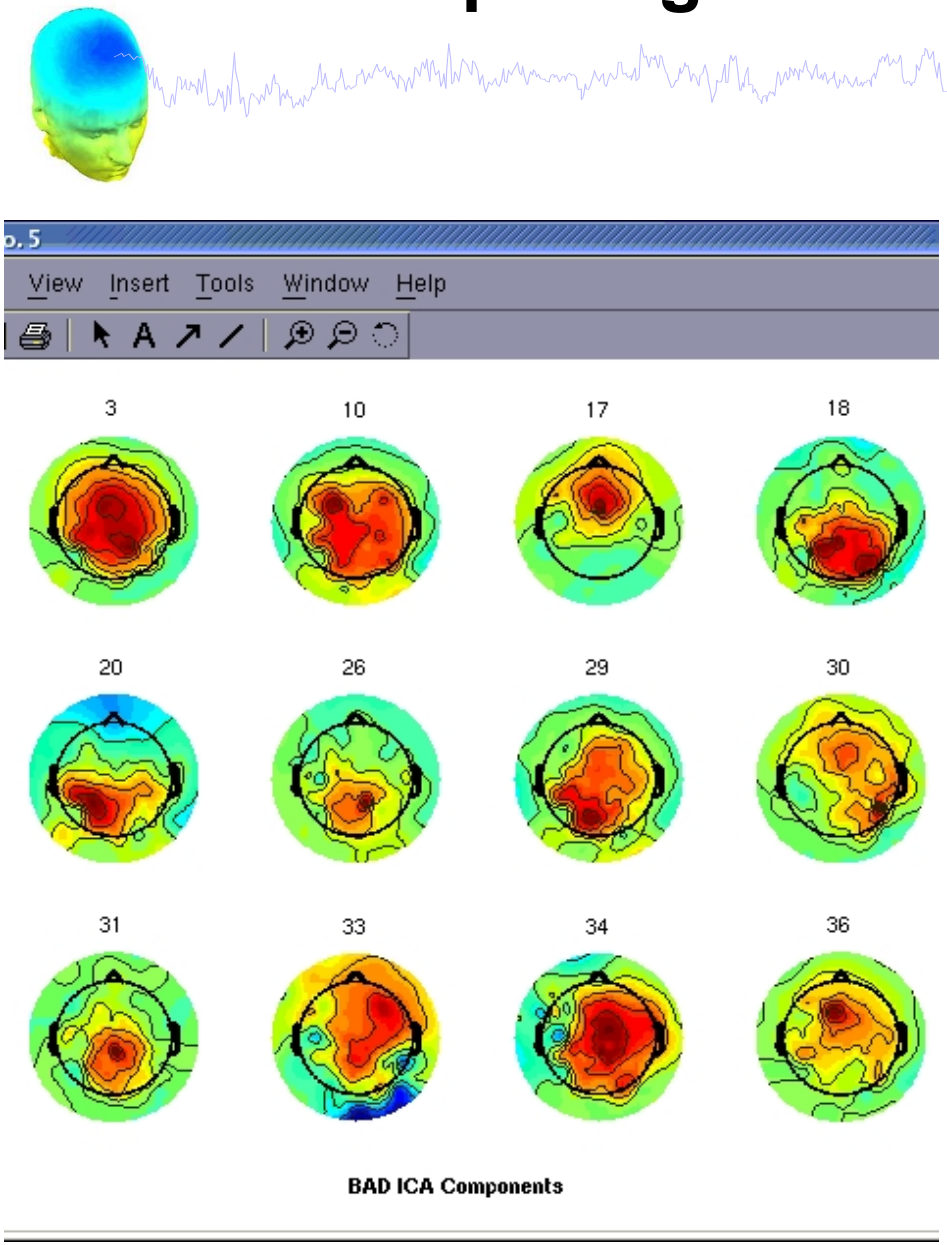
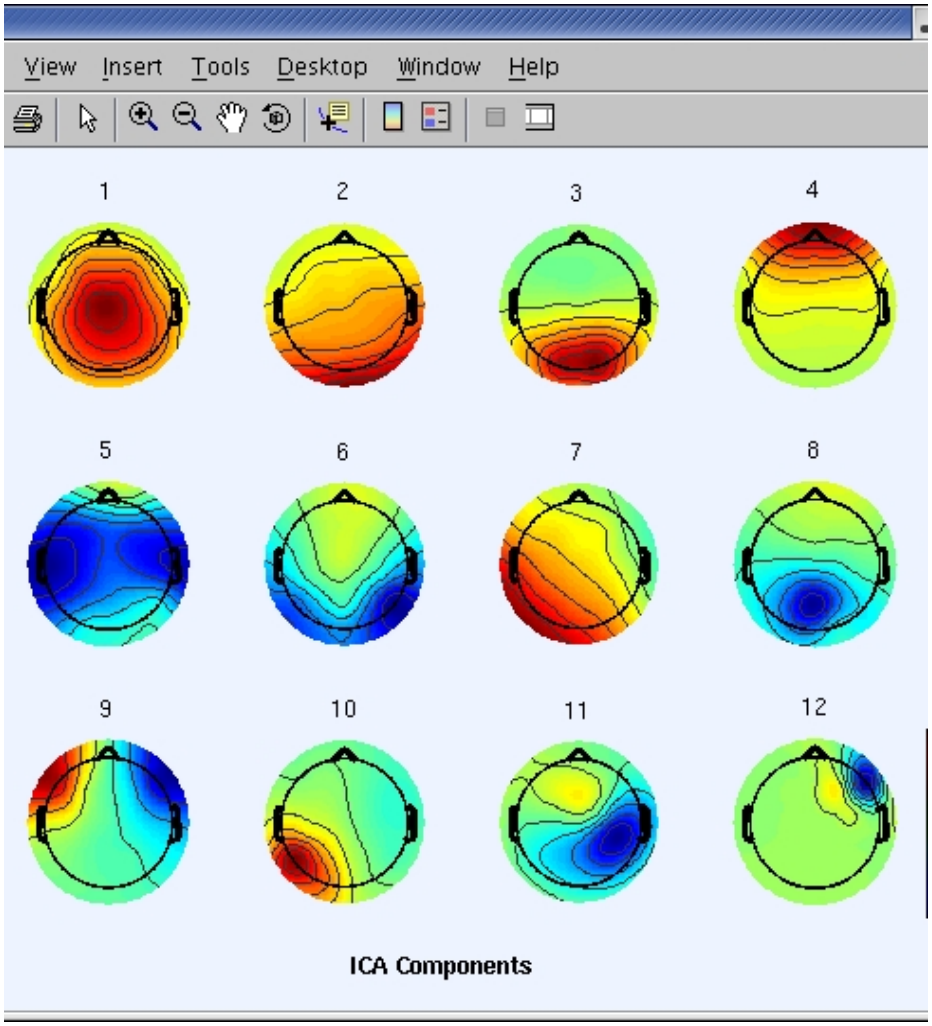
5) Intro to ICLabel Website

Plot ICA scalp maps

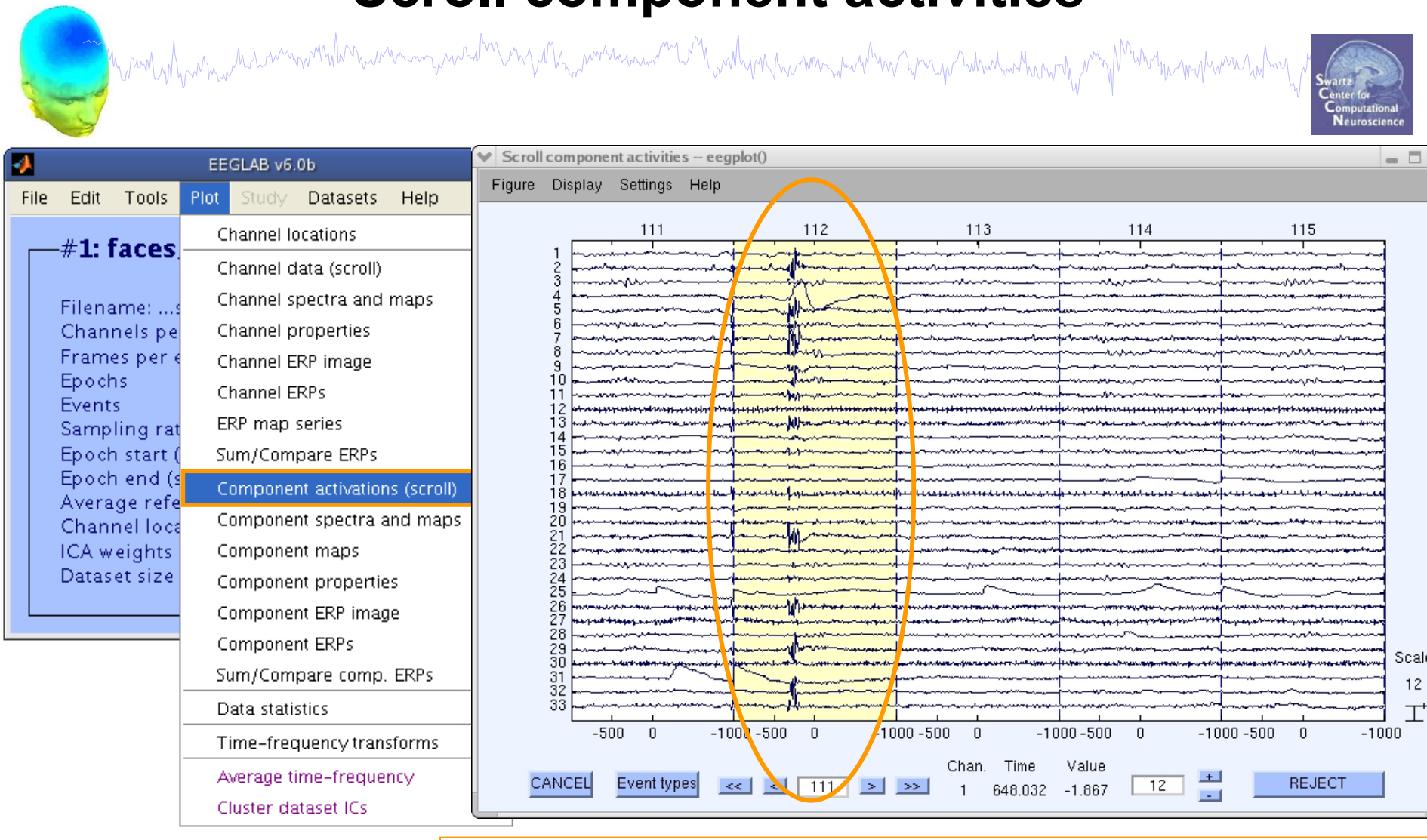


Compare 'good' and 'bad' scalp maps



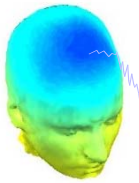


Scroll component activities



Time periods that are not independent across ICs should be removed and ICA run again for better decomposition

Evaluate ICA decomposition and artifacts



1) Evaluate IC Decomposition

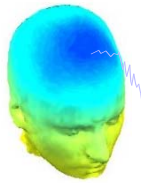
2) **IC Properties**

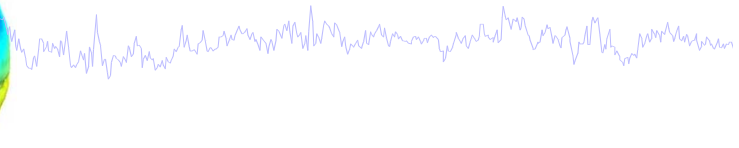
3) Identify Artifacts

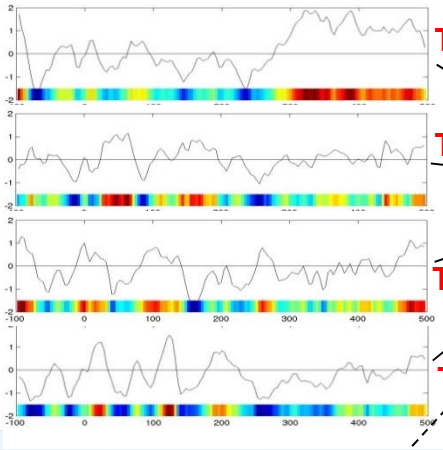
4) IC Selection

5) Intro to ICLabel Website

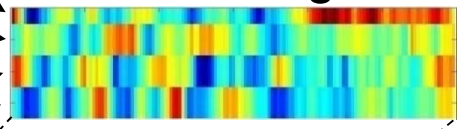
Plot ICA component properties

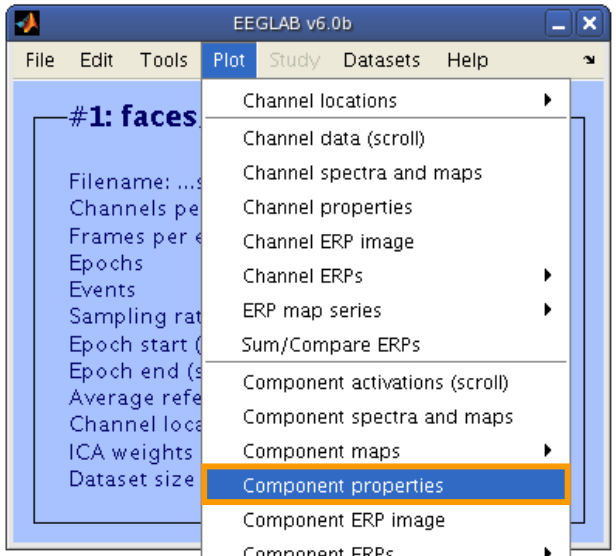


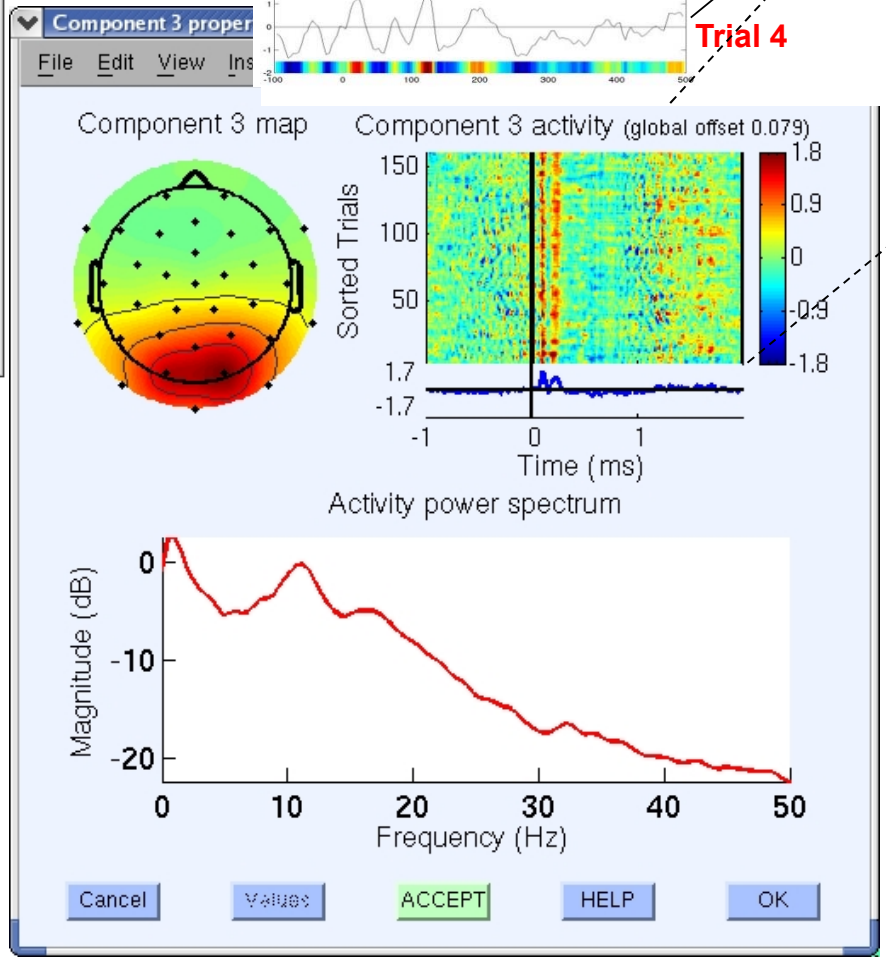




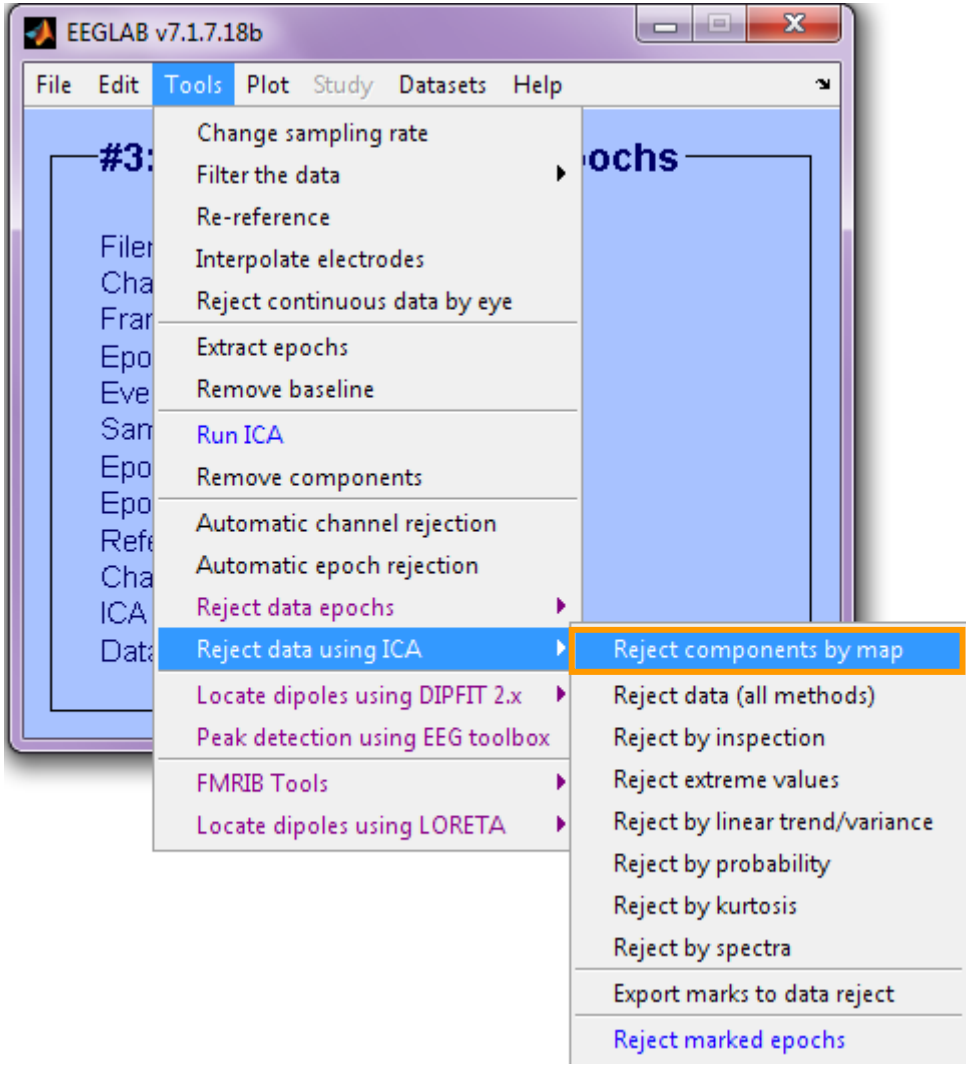
ERP Image



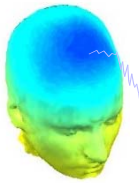


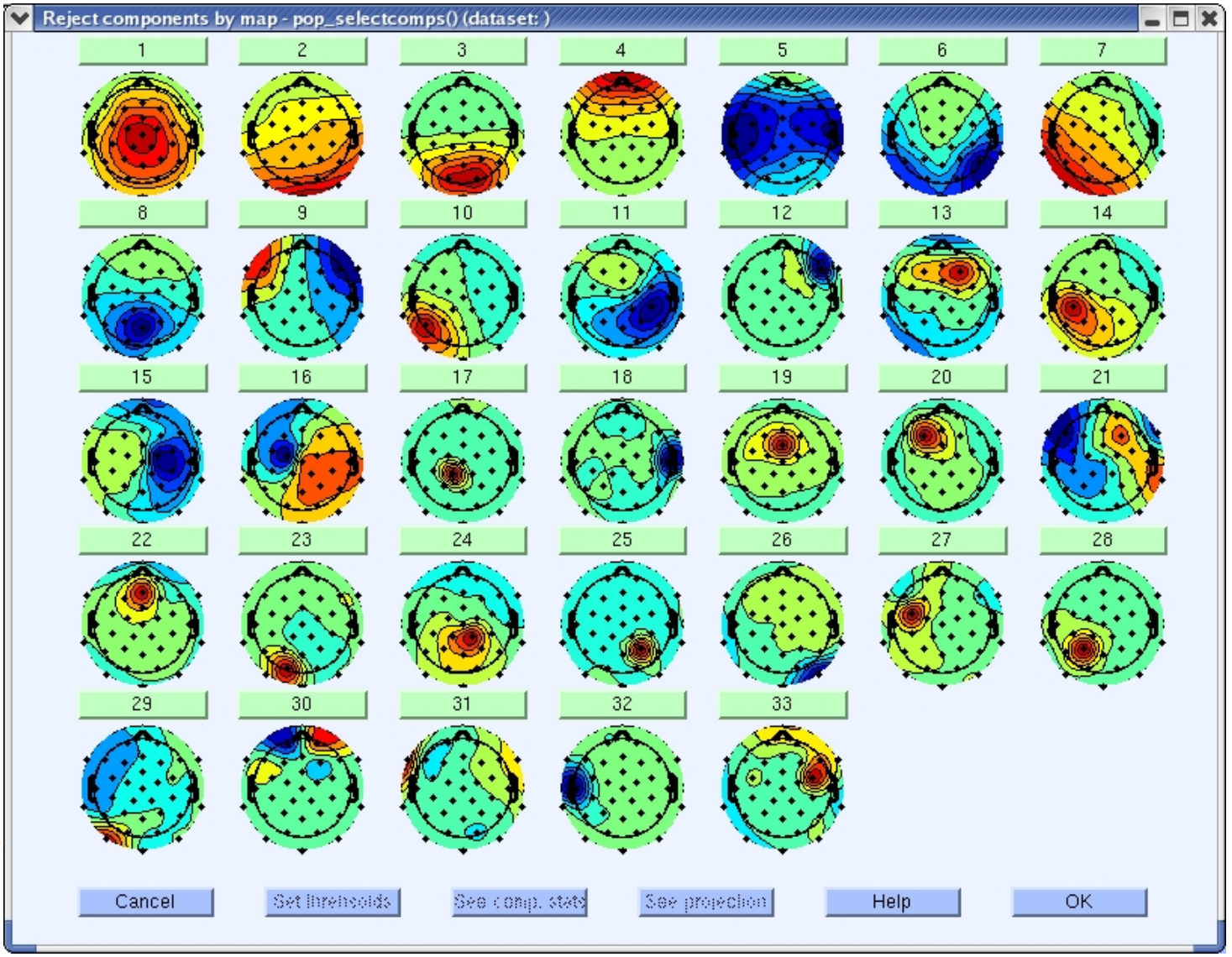


Reviewing component properties

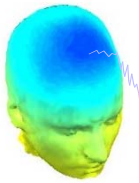


Component scalp maps/properties





Evaluate ICA decomposition and artifacts



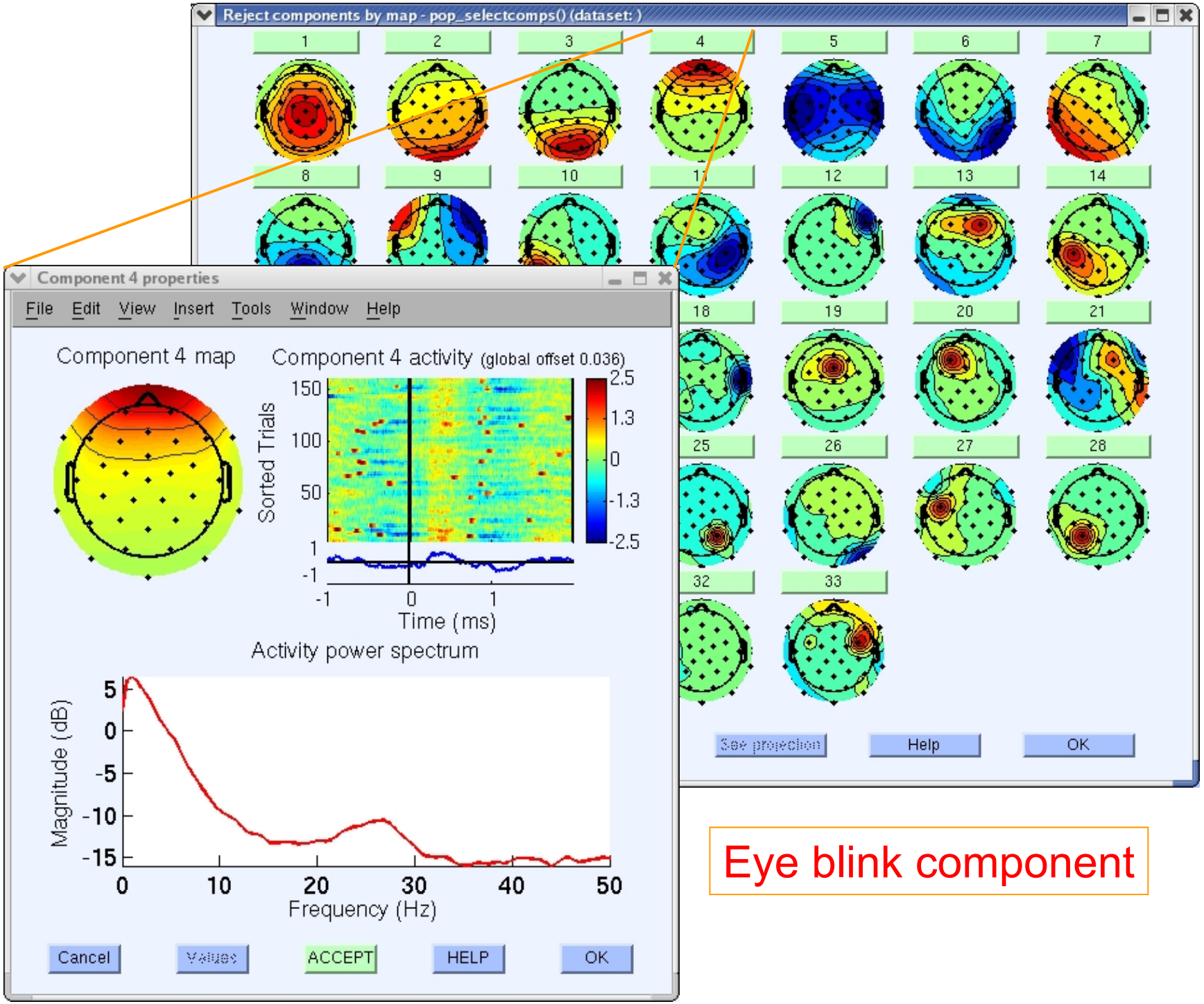
1) Evaluate IC Decomposition

2) IC Properties

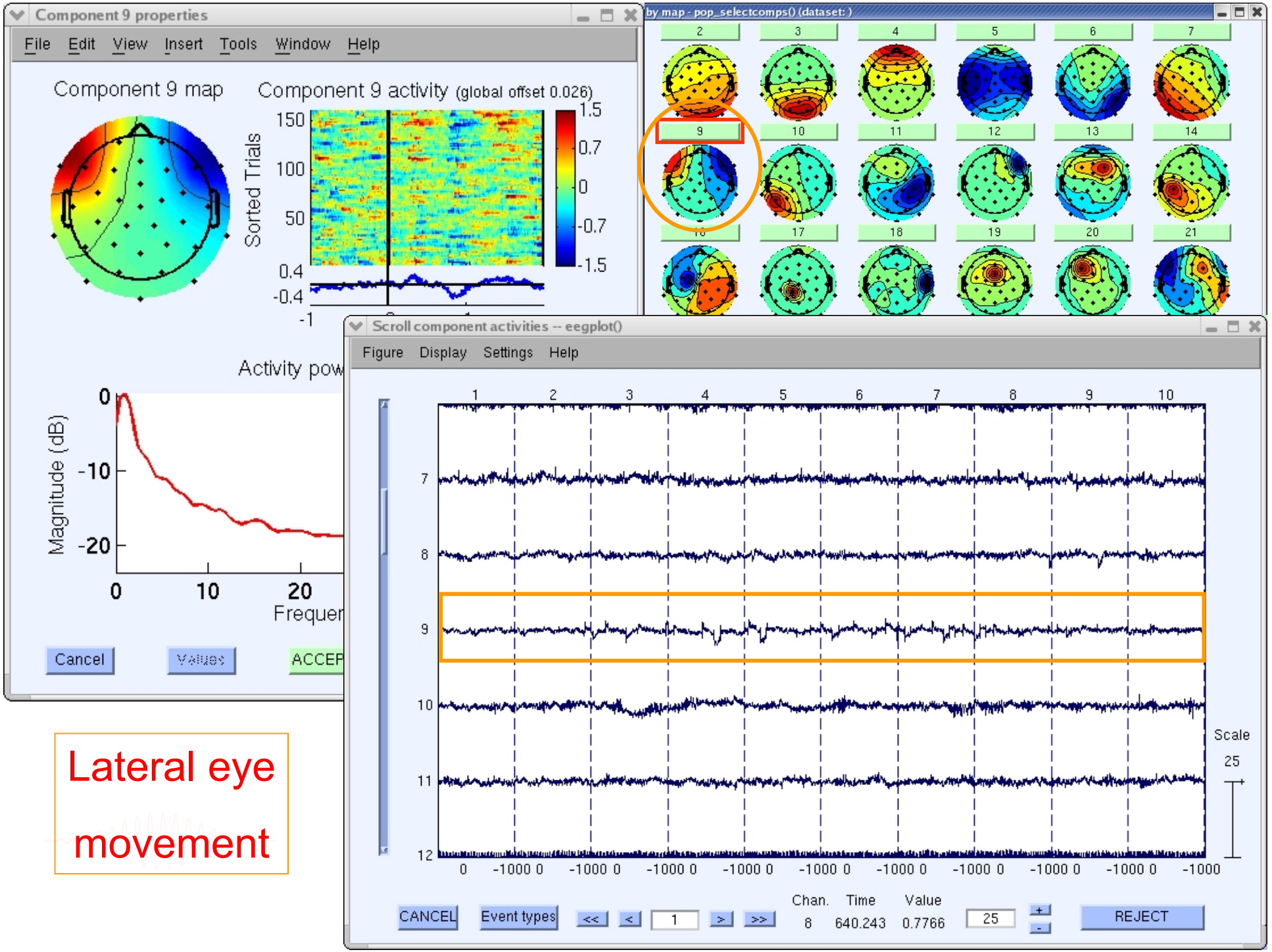
3) **Identify Artifacts**

4) IC Selection

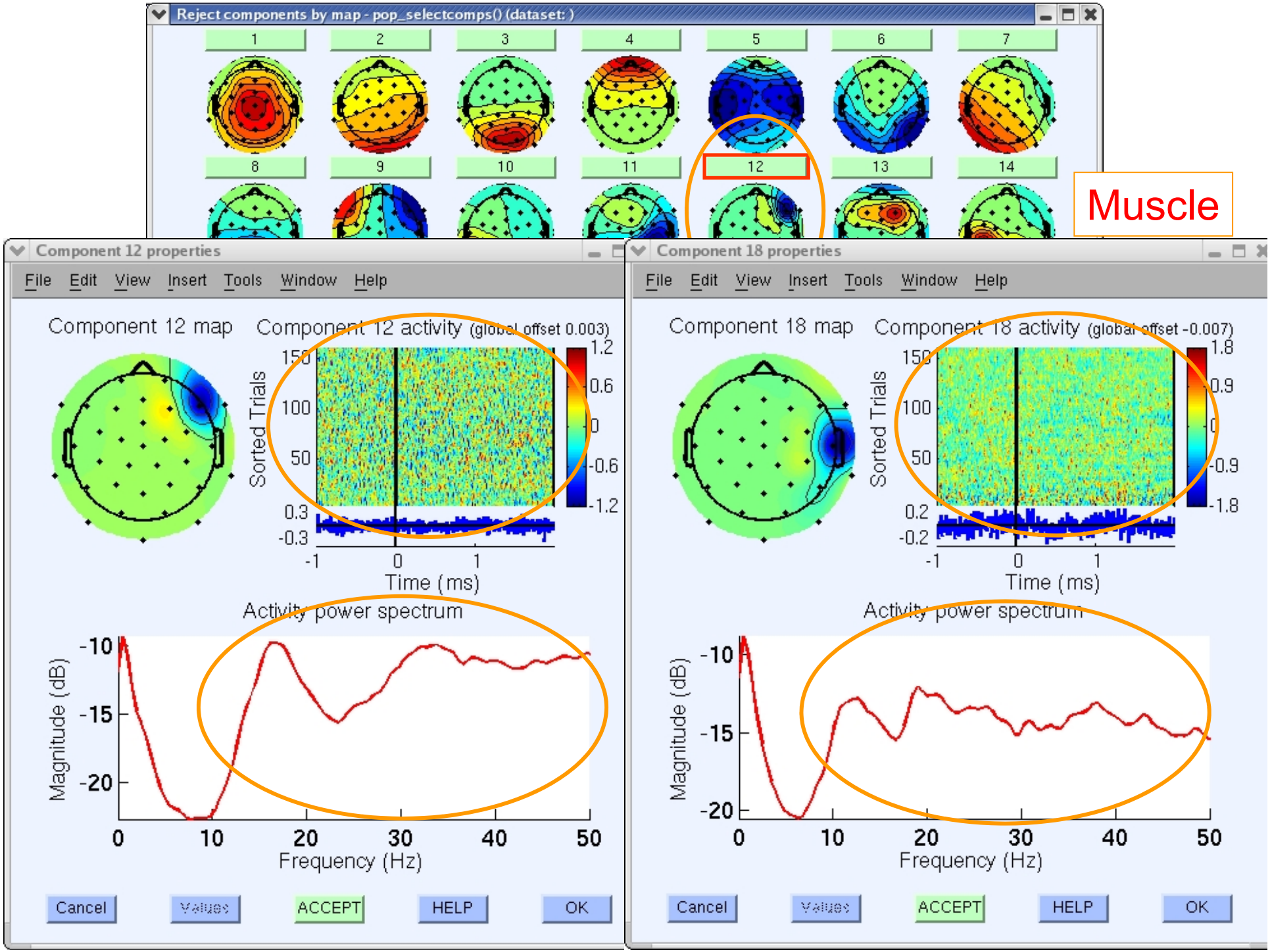
5) Intro to ICLabel Website

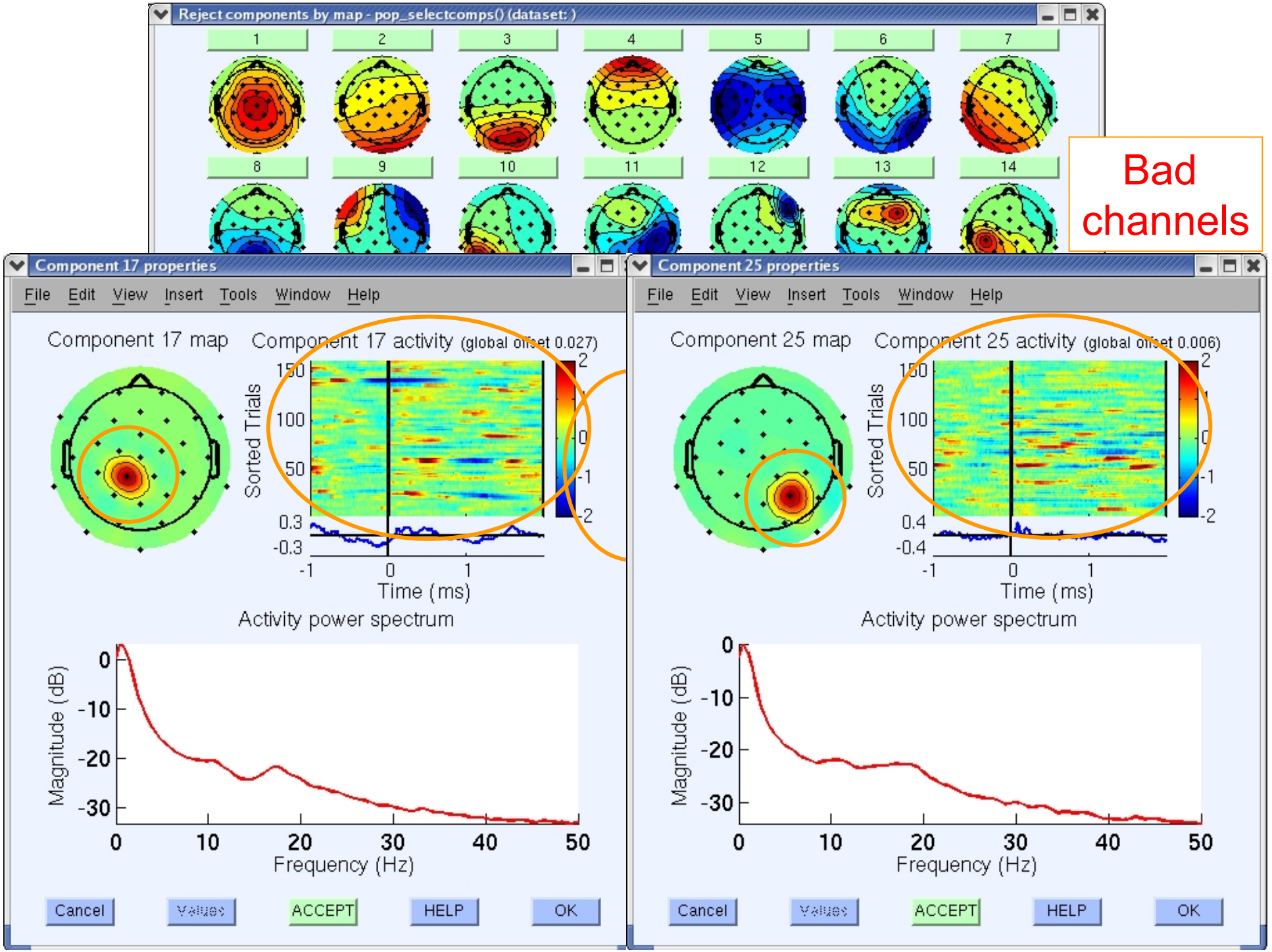


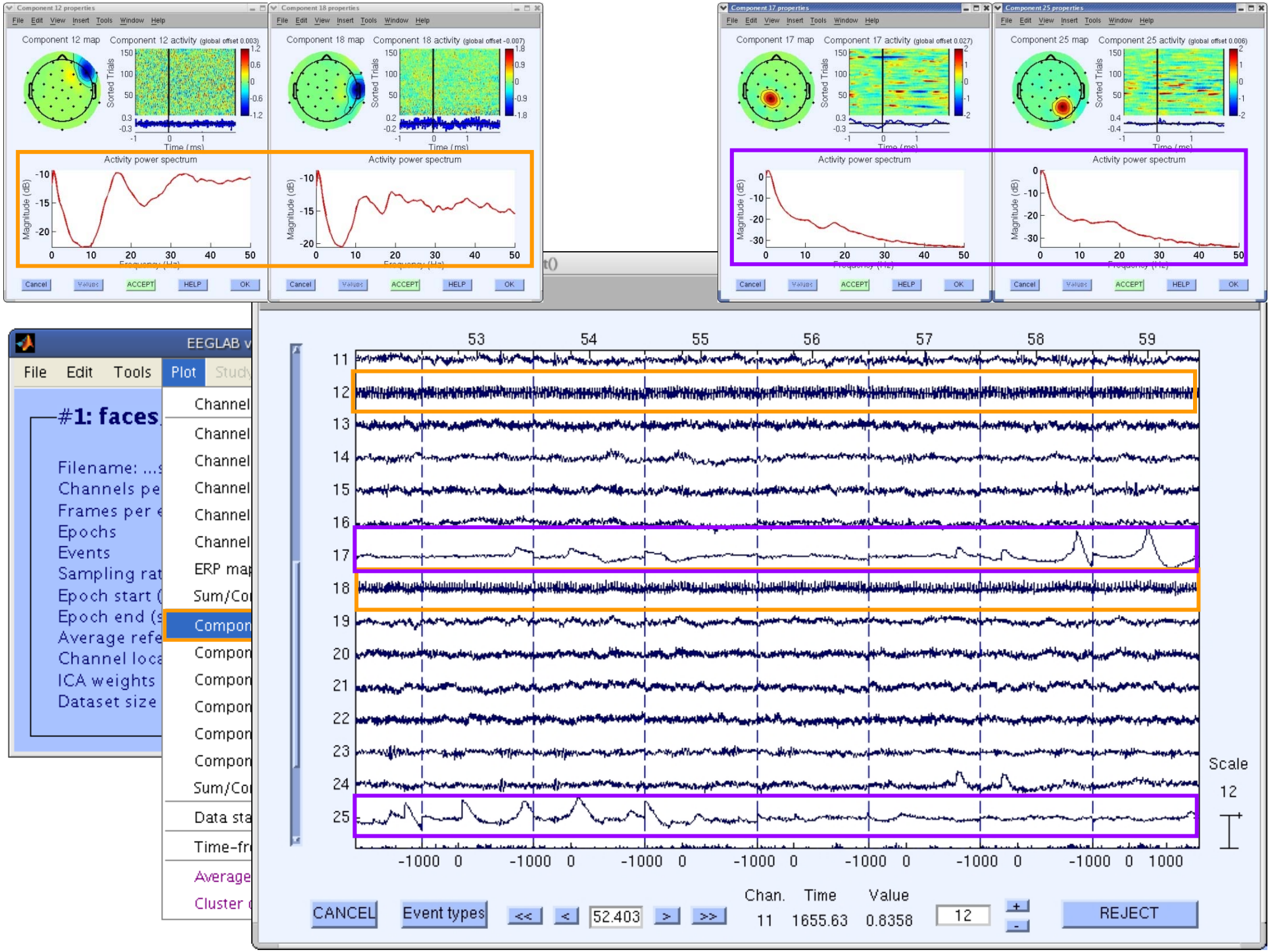
Eye blink component

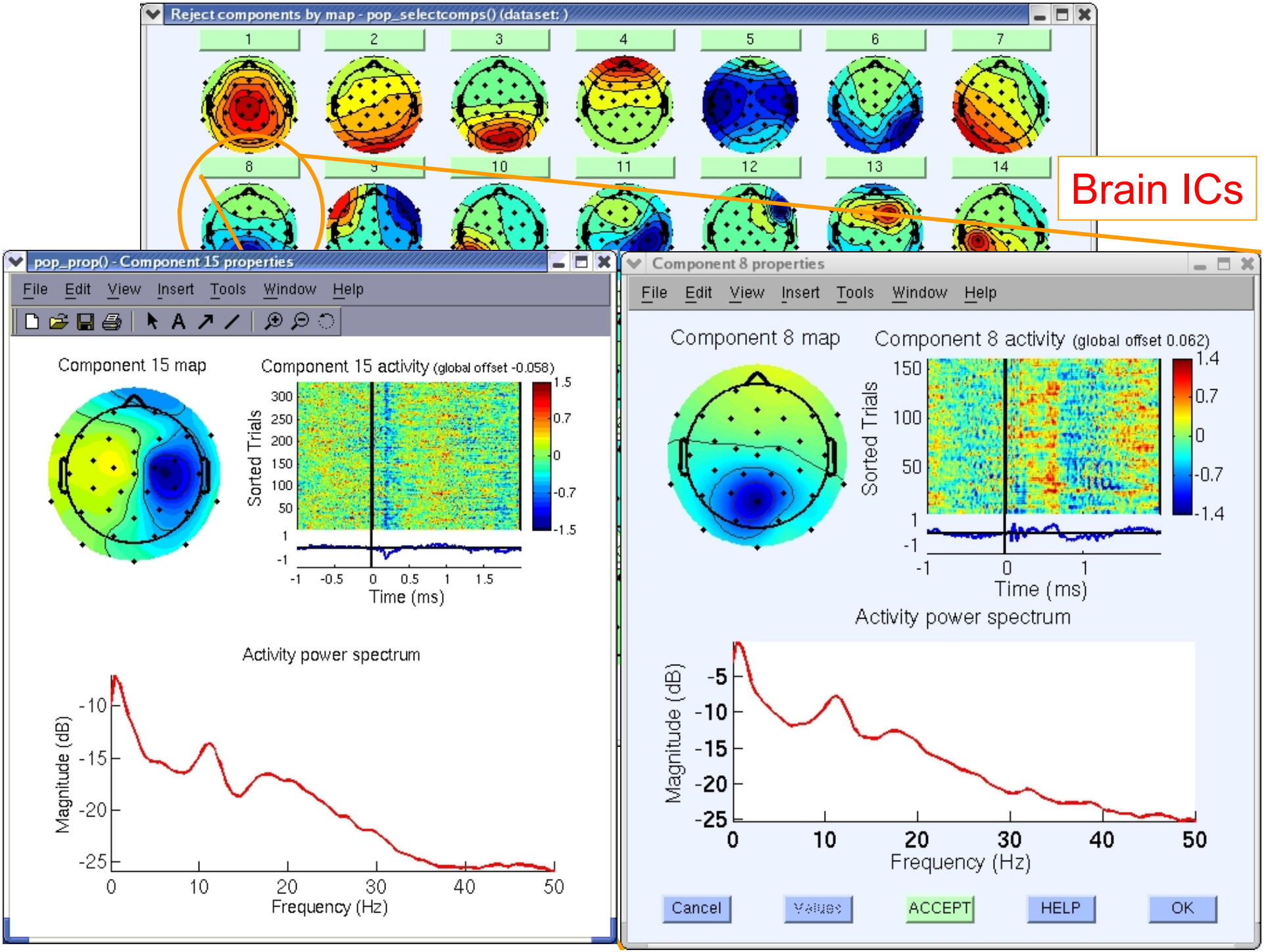


Lateral eye movement

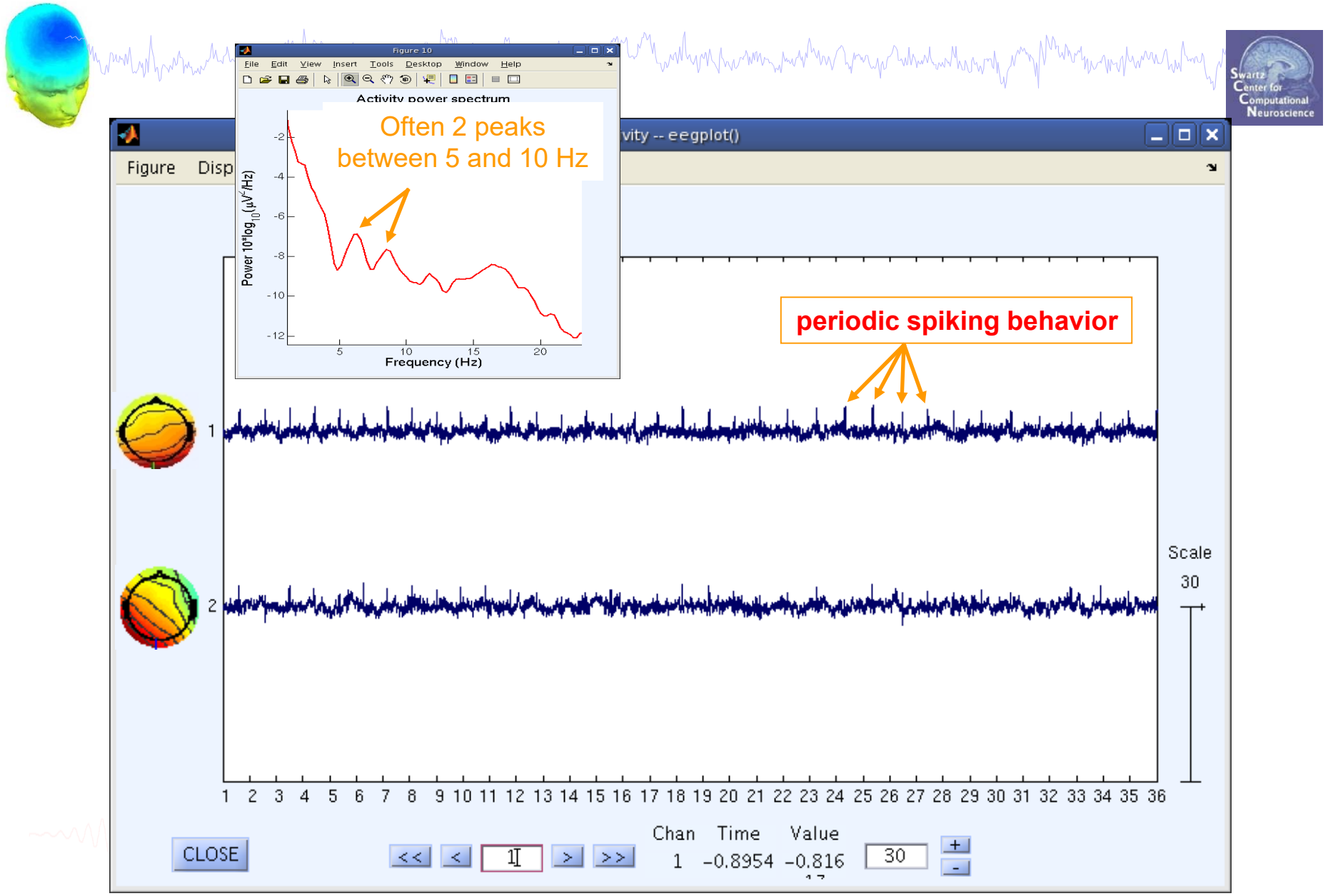

Reject components by map - pop_selectcomps() (dataset:)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Muscle
Component 12 properties
File Edit View Insert Tools Window Help
Component 12 map
Component 12 activity (global offset 0.003)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Cancel
Values
ACCEPT
HELP
OK
Component 18 properties
File Edit View Insert Tools Window Help
Component 18 map
Component 18 activity (global offset -0.007)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Cancel
Values
ACCEPT
HELP
OK


Reject components by map - pop_selectcomps() (dataset:)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Bad channels
Component 17 properties
File Edit View Insert Tools Window Help
Component 17 map
Component 17 activity (global offset 0.027)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Cancel
Values
ACCEPT
HELP
OK
Component 25 properties
File Edit View Insert Tools Window Help
Component 25 map
Component 25 activity (global offset 0.006)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Cancel
Values
ACCEPT
HELP
OK

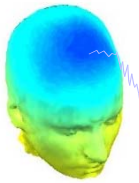

Component 12 properties
Component 12 map
Component 12 activity (global offset 0.003)
Activity power spectrum
Component 18 properties
Component 18 map
Component 18 activity (global offset -0.007)
Activity power spectrum
Component 17 properties
Component 17 map
Component 17 activity (global offset 0.027)
Activity power spectrum
Component 25 properties
Component 25 map
Component 25 activity (global offset 0.006)
Activity power spectrum
Cancel
Values
ACCEPT
HELP
OK
EEGLAB
File
Edit
Tools
Plot
#1: faces
Filename:
Channels
Frames per
Epochs
Events
Sampling rat
Epoch start
Epoch end
Average refe
Channel loca
ICA weights
Dataset size
Channel
ERP map
Sum/Co
Compon
Data sta
Time-fr
Average
Cluster
Scale
12
CANCEL
Event types
52.403
Chan.
Time
Value
11
1655.63
0.8358
REJECT


Reject components by map - pop_selectcomps() (dataset:)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Brain ICs
pop_prop() - Component 15 properties
File Edit View Insert Tools Window Help
Component 15 map
Component 15 activity (global offset -0.058)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Component 8 properties
File Edit View Insert Tools Window Help
Component 8 map
Component 8 activity (global offset 0.062)
Sorted Trials
Time (ms)
Activity power spectrum
Magnitude (dB)
Frequency (Hz)
Cancel
Values
ACCEPT
HELP
OK

Pulse artifacts



Evaluate ICA decomposition and artifacts



1) Evaluate IC Decomposition

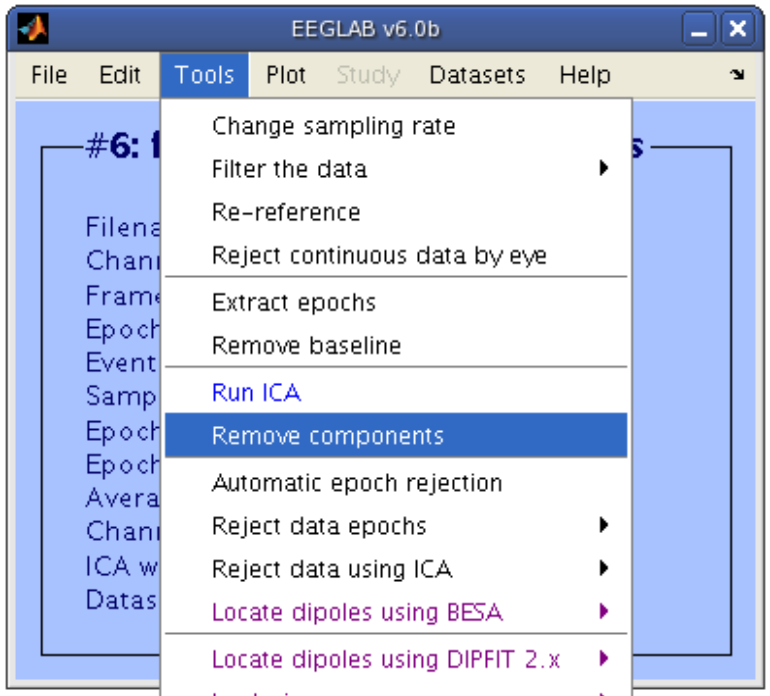
2) IC Properties

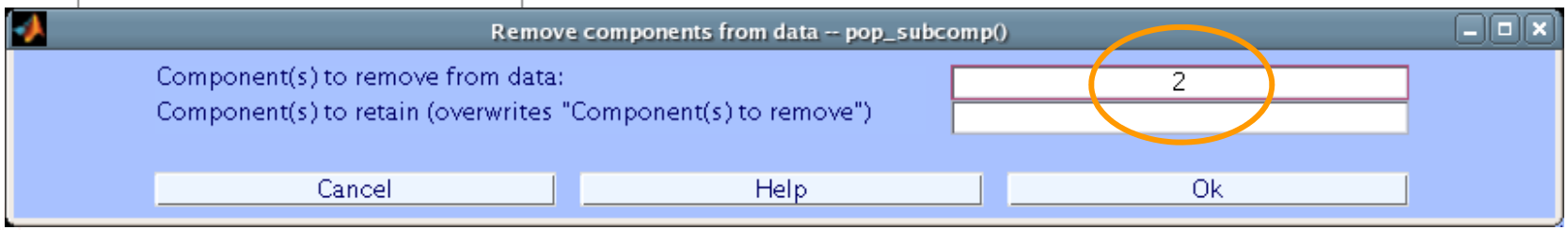
3) Identify Artifacts

4) **IC Selection**

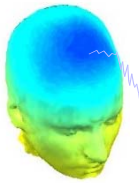
5) Intro to ICLabel Website

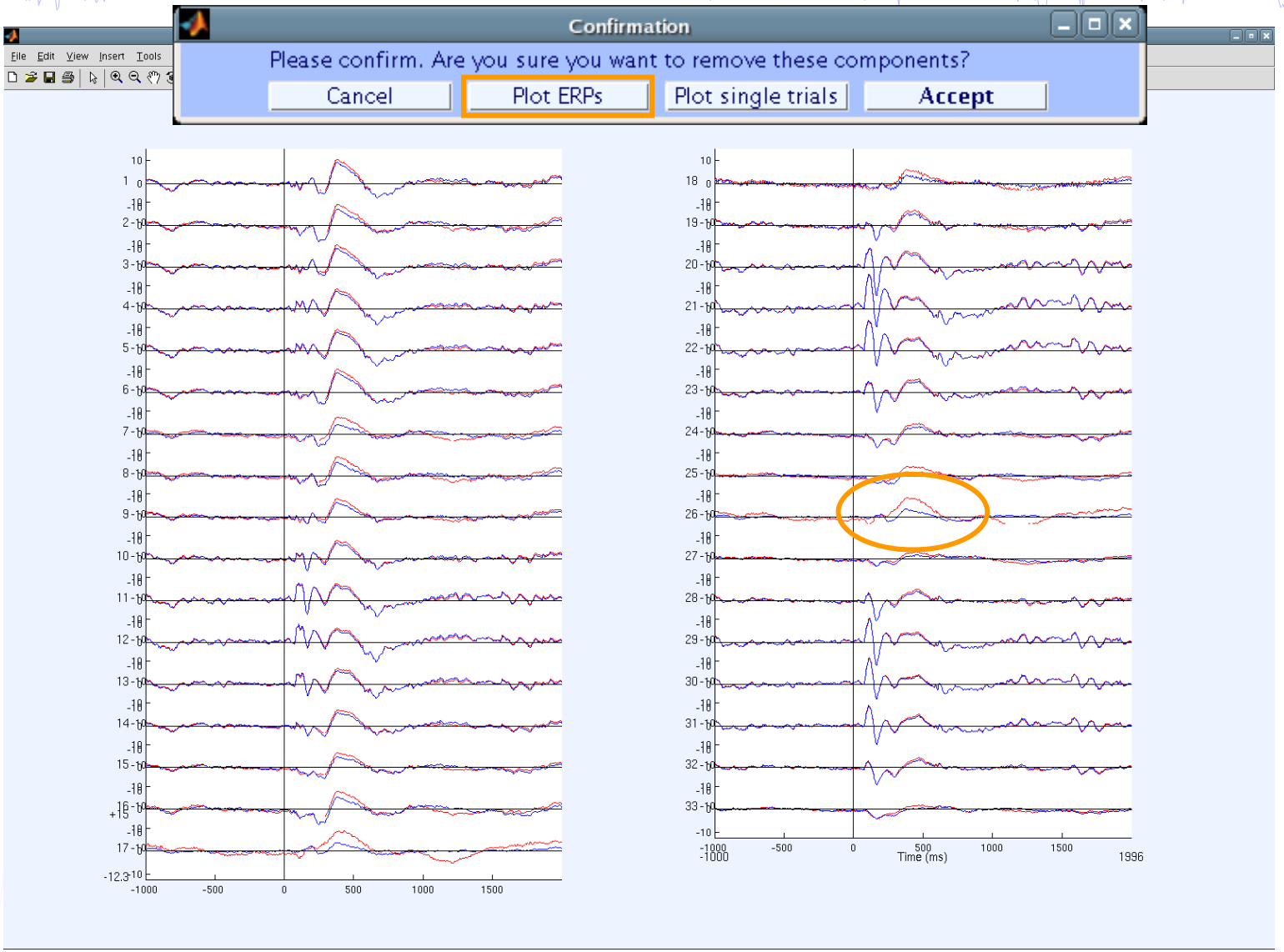
Indepent Component Rejection



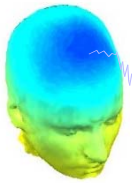


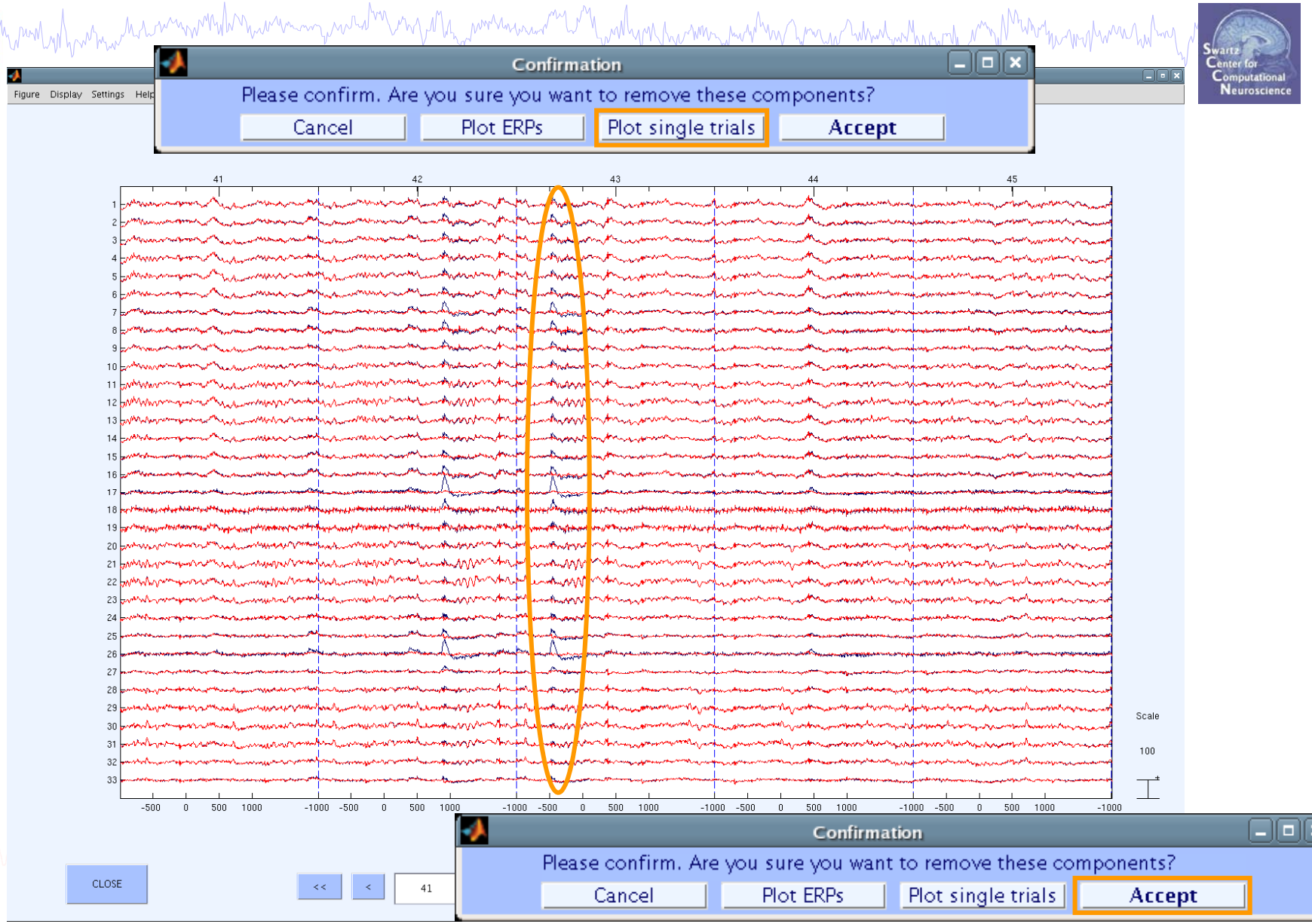
Eye blink correction



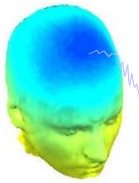


Eye blink correction





Evaluate ICA decomposition and artifacts



1) Evaluate IC Decomposition

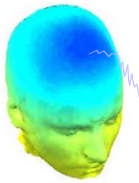
2) IC Properties

3) Identify Artifacts

4) IC Selection

5) **Intro to ICLabel Website**

ICLabel website

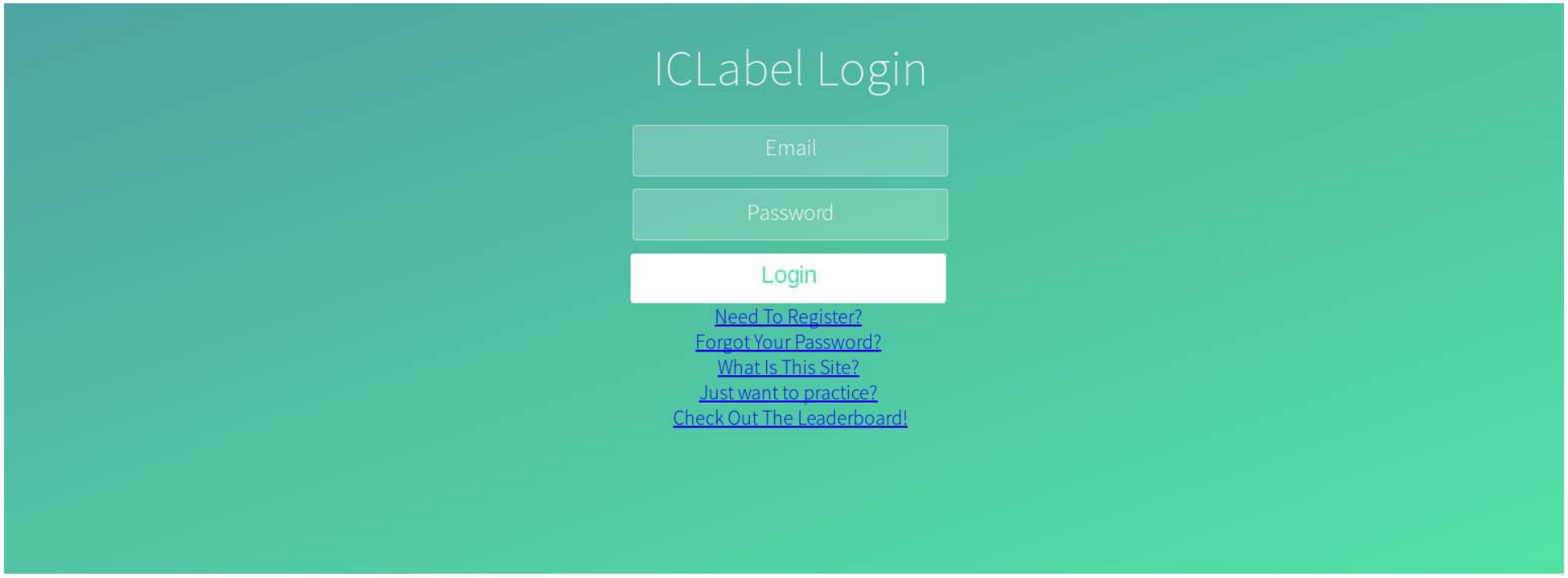


ICLabel project: create automated EEG IC classifier (labeler)

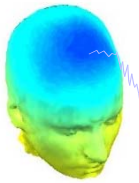
Purpose of the website:

Gather IC labels to accompany our vast collection of datasets.

Reaching.ucsd.edu:8000/tutorial

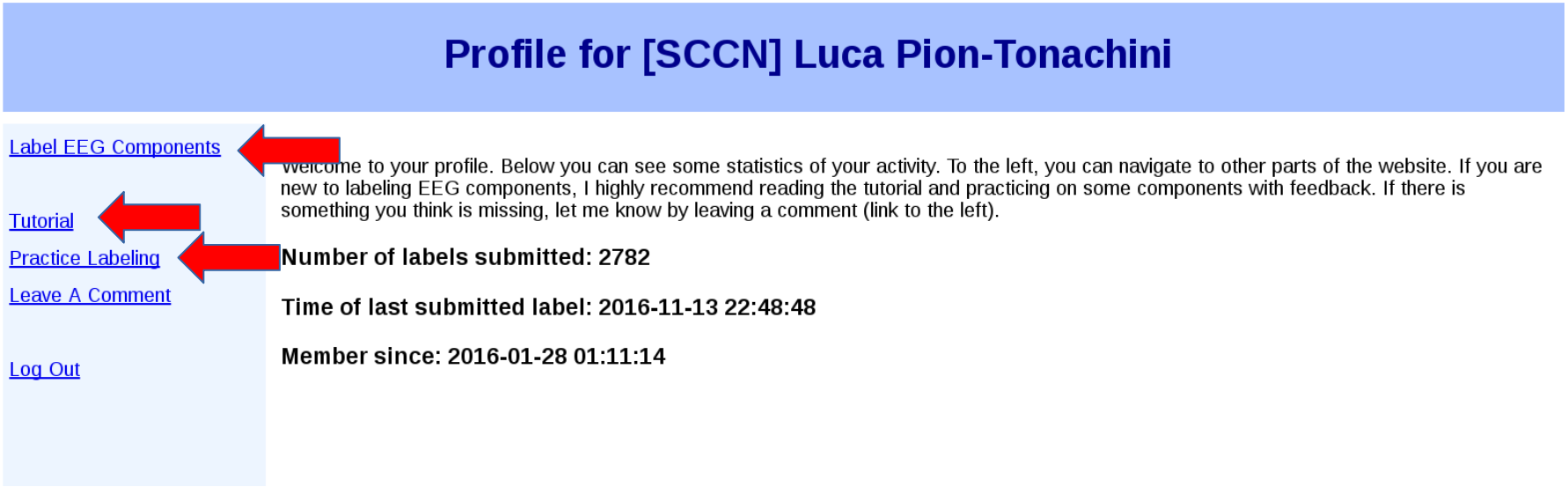


ICLabel website - Profile

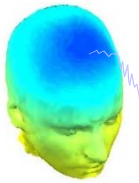


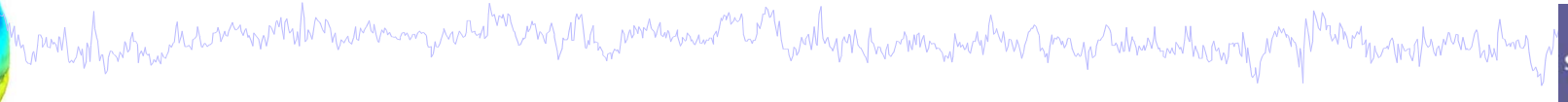
Features:

1. Label collection
2. Tutorial on IC classification
3. Labeling practice



ICLabel website - Label





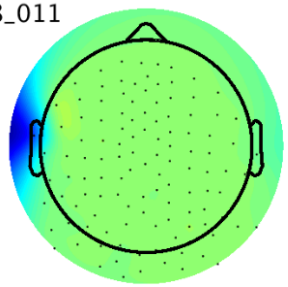
Swartz Center for Computational Neuroscience

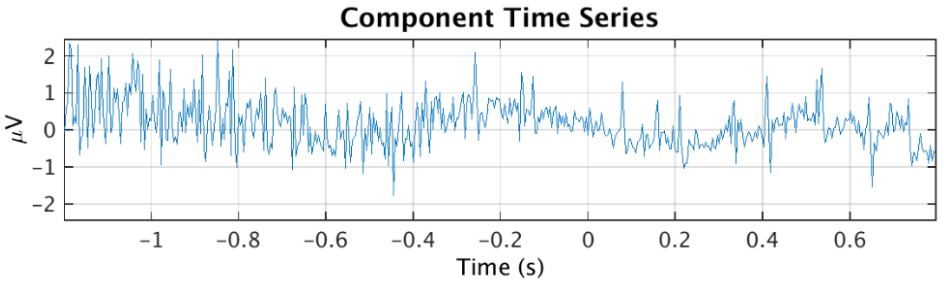
Newest IC | Back 1 | Log Out

User: [SCCN] Luca Pion-Tonachini
Labels: 2782

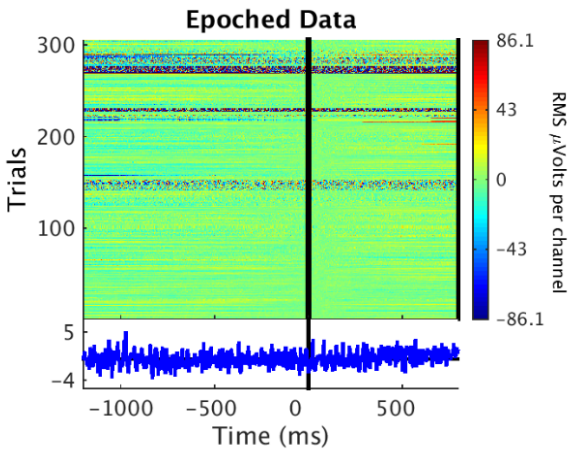
Leaderboard | Tutorial | Profile

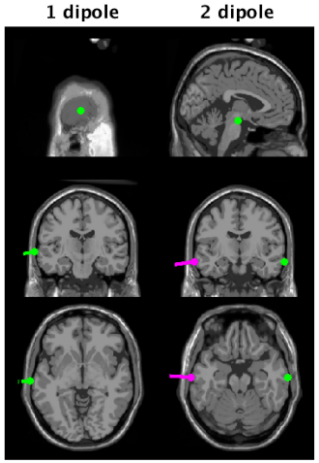
072188_011

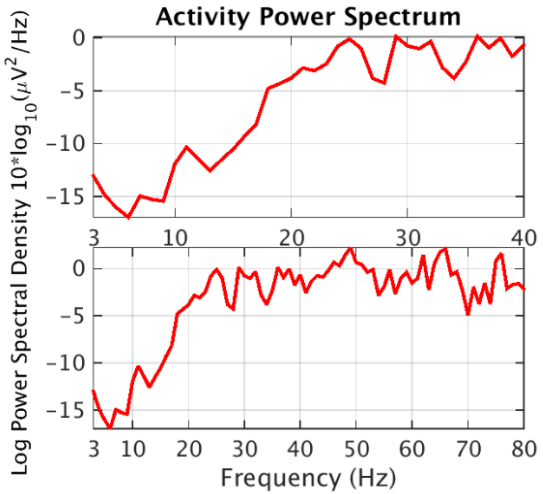




IC 11 of 30
Data Var. Accounted For: 15.96%

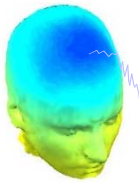






Brain | Muscle | Eye | Heart | Next | Line Noise | Chan Noise | Other | ?

ICLabel website – Label feedback



Leaderboard Tutorial Profile

012599_001

Component Time Series

20
0
μV
4
4.5
5

Labeler	Brain	Muscle	Eye	Heart	Line Noise	Chan Noise	Other	?
Expert			✔					
Expert			✔					
Expert			✔					
User			✔					
User			✔					
User			✔					

No Login Required

Click and drag to move this window. Next Comment

Spectrum

30
40

200
100
Data
-59
-118
0
0.1
0.2
0.3
0.4
Time (ms)

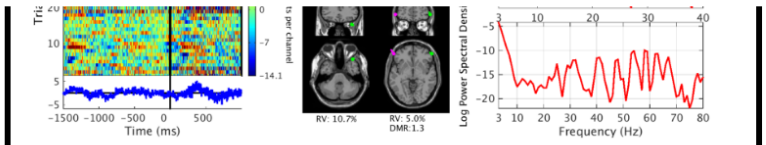
RV: 21.1%
RV: 10.5%
DMR:1.5

0
-10
Log Power Spectral
3
10
20
30
40
50
60
70
80
Frequency (Hz)

Brain Muscle Eye Heart Submit Line Noise Chan Noise Other ?

ICLabel website - Tutorial

Tutorial: EEG Independent Component Labeling



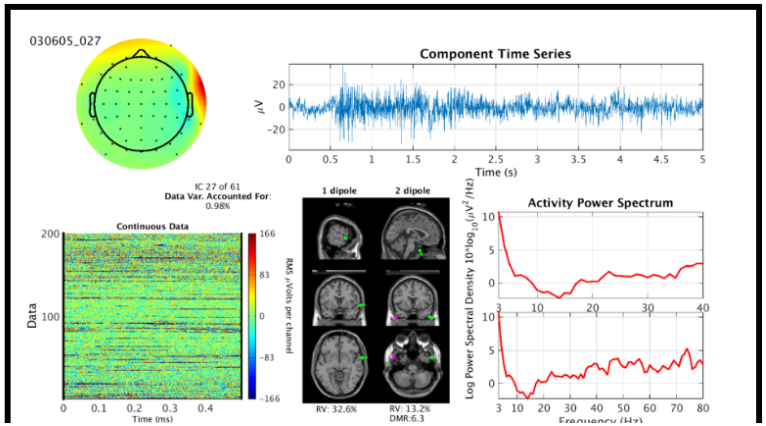
This components captures the effects of horizontal eye movement, although some high frequency power in included from some other source.

Muscle Component

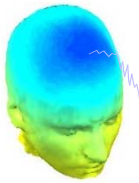
Muscle components describe the electrical fields generated by muscle activity, known as electromyography (EMG).Their activations are powerful relative to EEG but motor unit action potentials (the underlying source of EMG) do not synchronize causing most of the power of EMG to be spread out among higher frequencies. Nonetheless, these components can still look dipolar, although they will seem very shallow as they are not localized within the brain. You can tell a shallow dipole by how concentrated its scalp topography is. The more concentrated, the shallower. That isn't to say that all muscle components will be dipolar.

Summary

- Power concentrated in higher frequencies (20 Hz and above)
- Can still be dipolar, but will be located outside the skull



Exercises



Now and later:

- Practice on the ICLabel website:

  reaching.ucsd.edu:8000/labelfeedback

- Extra Credit: Submit labels once you feel proficient

Alternatively:

- Load stern_125Hz.set
- Epoch the data on **memorize** (ie B, C,…) letters -1 to 2s
- Find and identify “brain” ICs
- Can you distinguish some of the non-brain ICs as well?