# How to Use EEGArtifactEditor

On starting EEGArtifactEditor (EAE), select the Header file describing the dataset to be edited. This informational

dialog box opens. Selecting Cancel will bring you back to the file selection dialog, while OK will continue into the editing program. If you decide to edit a dataset which has already had some artifacts marked, you will see a warning like this on the first line. Note that the file name listed on the title of the dialog is actually the name of the Header file that refers to the BDF/EDF file, not the actual name of the data file.

EAE then finds the channels that are EEG channels by assuming that the first channel in the BDF file is EEG and comparing its transducer type (in the BDF header record) to that of the other channels in the file. It then opens the editing window with these channels displayed.
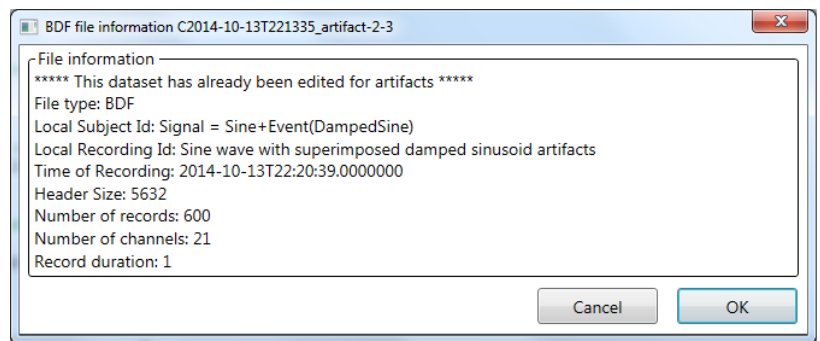

This window is similar to the main window that DatasetReviewer (DR) uses, and the controls generally function in a similar fashion (for instance, the main channel display may be scrolled by "drag and drop" technique).
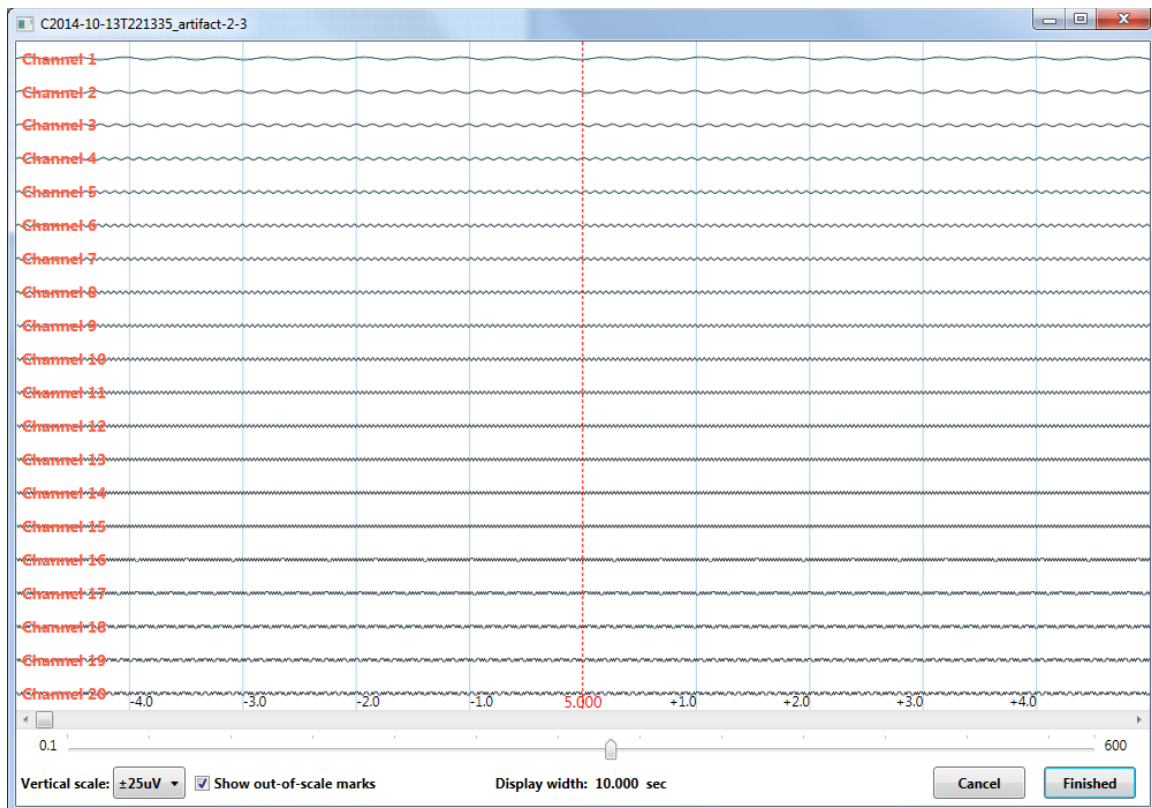
The main panel displays the portion of the EEG channels centered on the time indicated at the mid-bottom of the panel with a total width indicated in the lower panel (control panel). Every channel is displayed at the same Vertical scale, which is selected to the left of the control panel. This is different from DR, which scales each channel separately to avoid overlap of the channel graphs. EAE also removes linear trends for each channel across the displayed data, in contradistinction to DR which scales to the minimum and maximum values displayed. Display width is controlled by the slider and may also be changed by right (or context) clicking the current display width and entering a value (both similar to DR). Note also that some of the display controls available in DR have been removed and that there is no display of the Events present in the dataset (other than the created artifact regions).

Here we have changed the vertical scale and scrolled into the dataset, to find an "artifact" to mark.
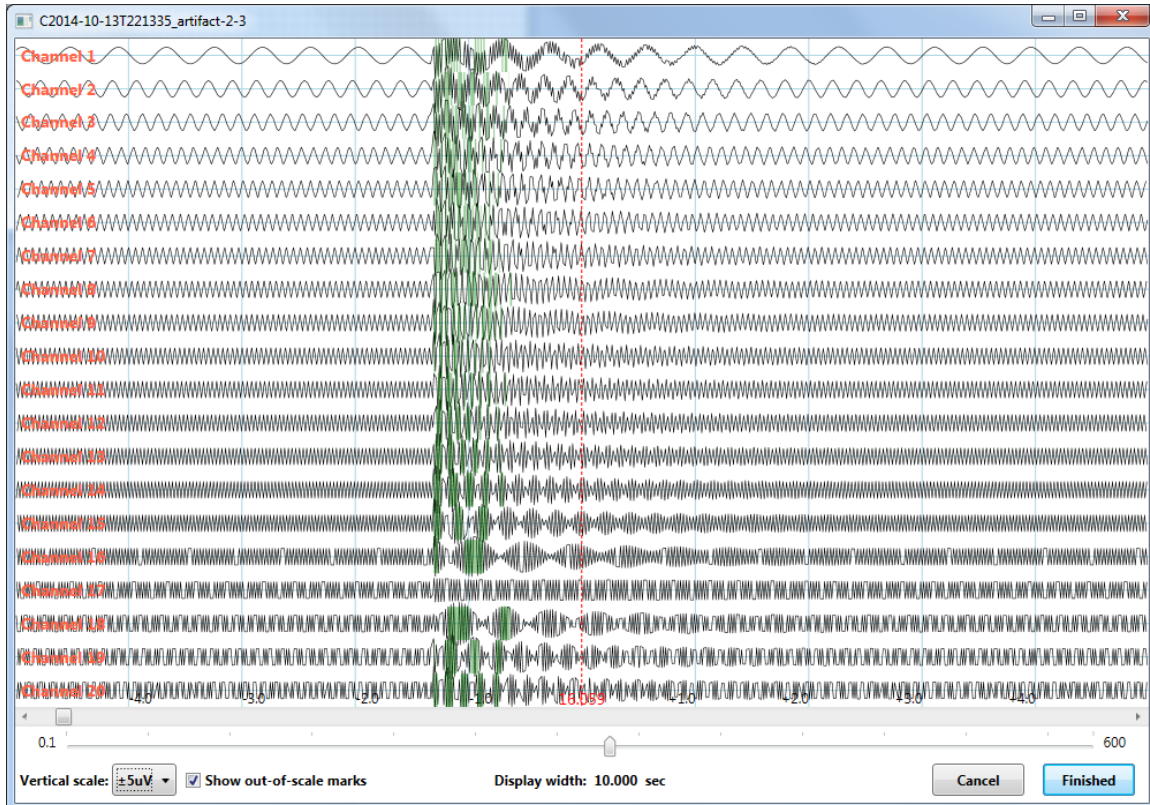

Note that the display shows transparent green marks on the channels, showing where the channels are "off-scale". This may be helpful in quickly identifying artifact regions.
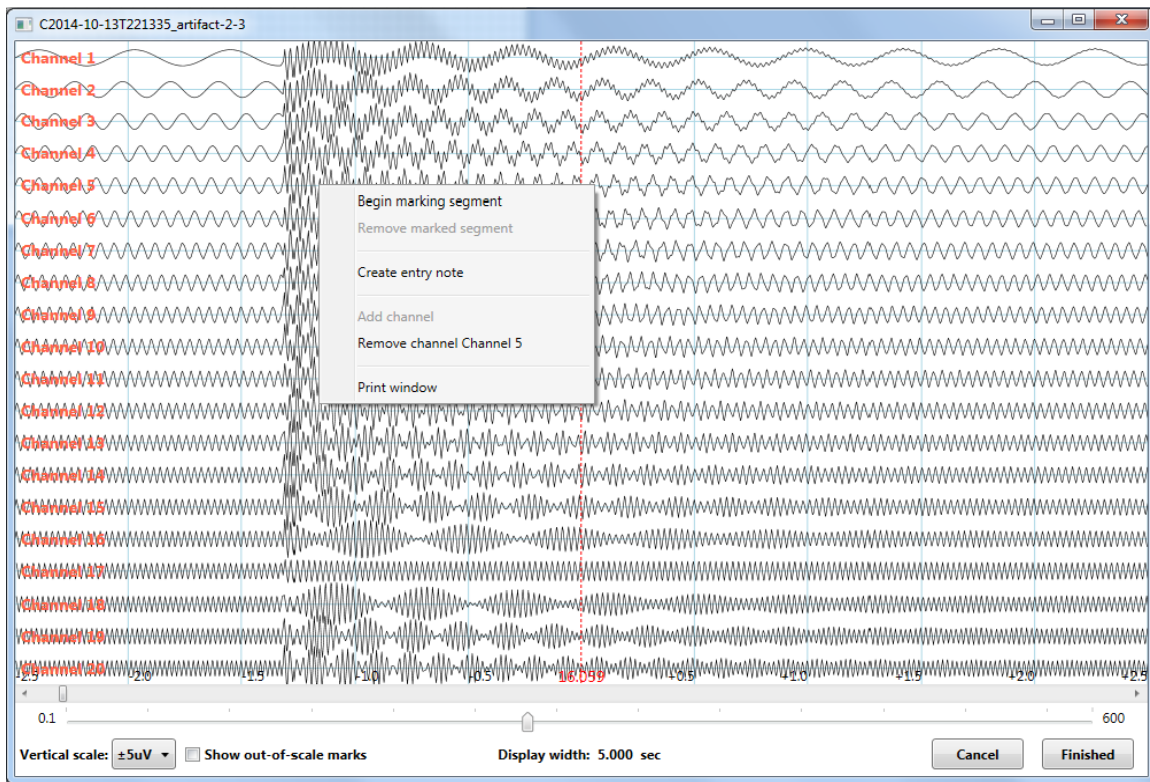
We can turn off these marks using the checkbox to the right of the vertical scale control.
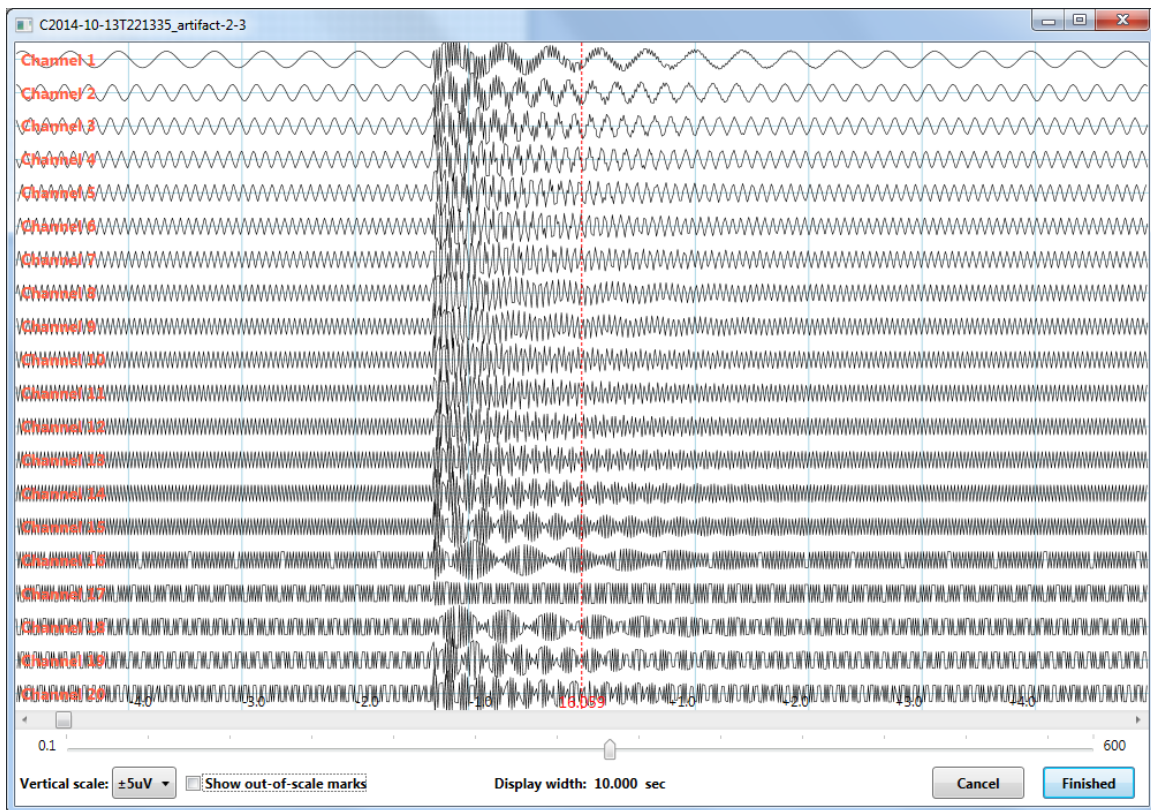
By narrowing the display width from 10 to 5 seconds (click the Display width control to the left of the slider), we can magnify this region to better delineate the "artifact" as shown below.
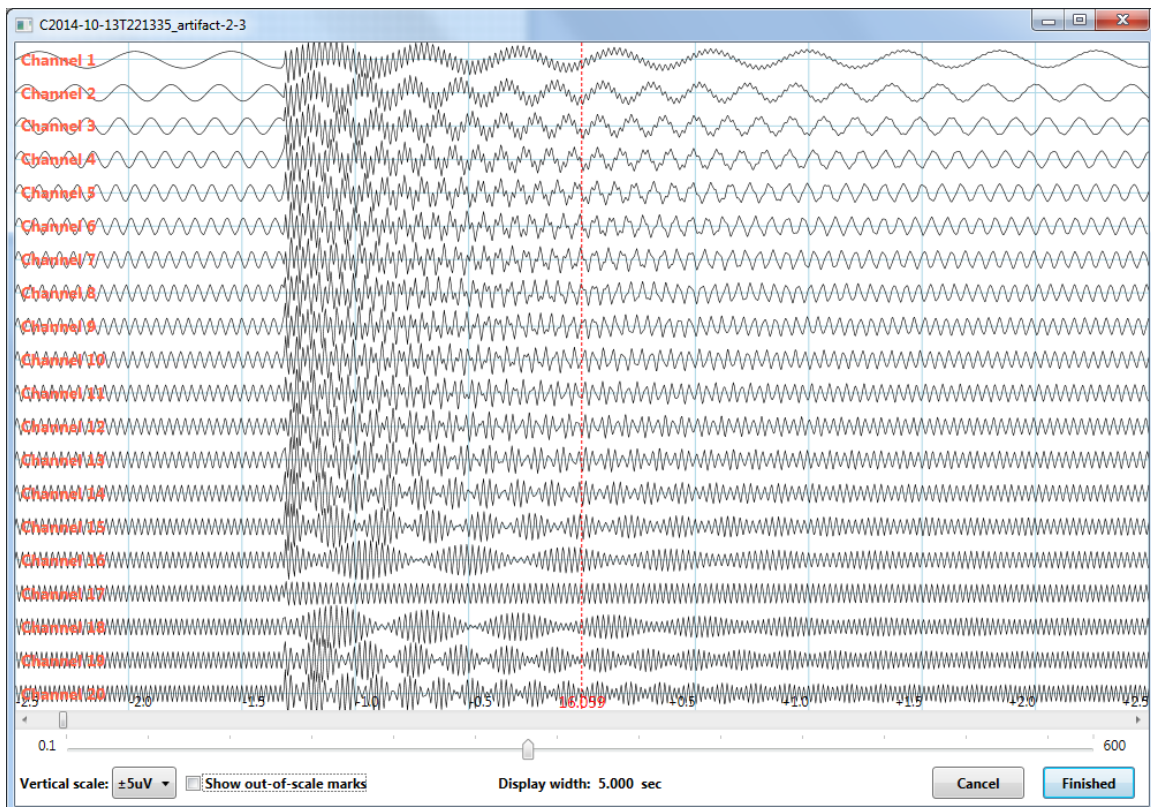
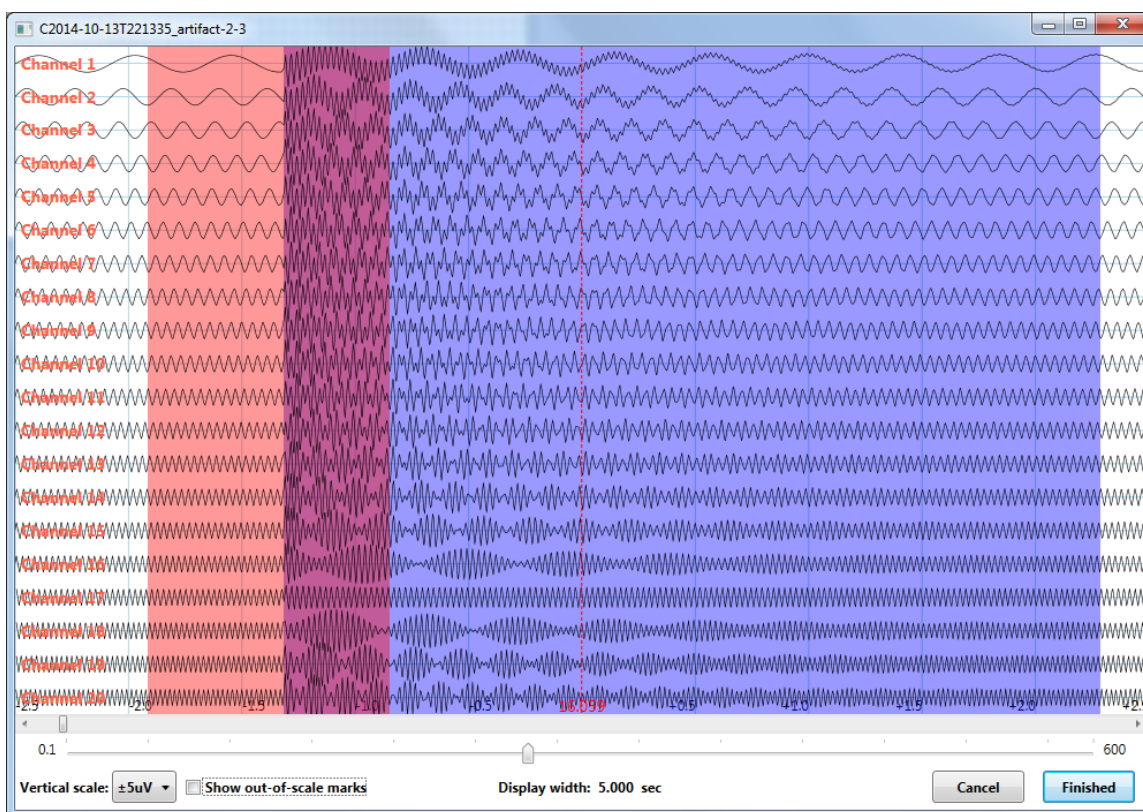By right clicking on the display, a "context" menu is displayed.

Choose "Begin marking segment" and the display looks like this, with one side of the reddish region fixed at the location of the initial "click".
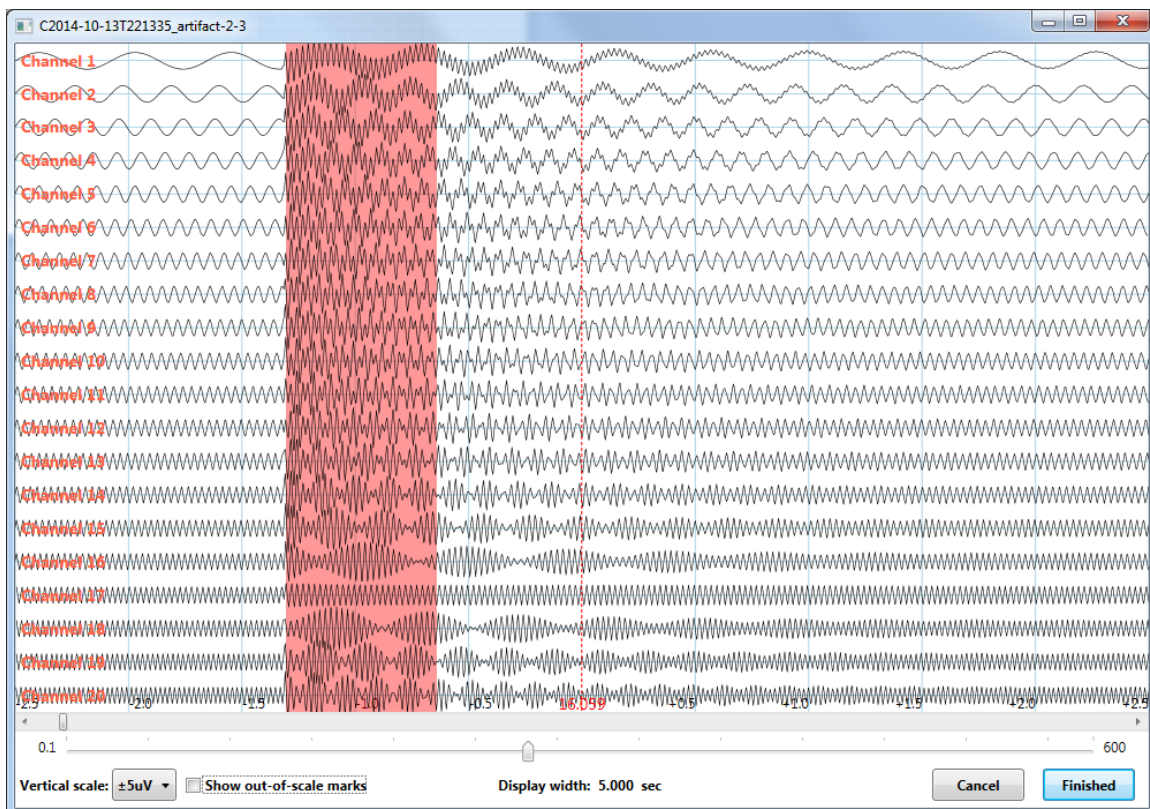
By moving the mouse, the size of the selected region changes. A second right click closes the region fixing its size. Thus we can mark regions of artifact, which are indicated by the bluish transparency overlying the display.
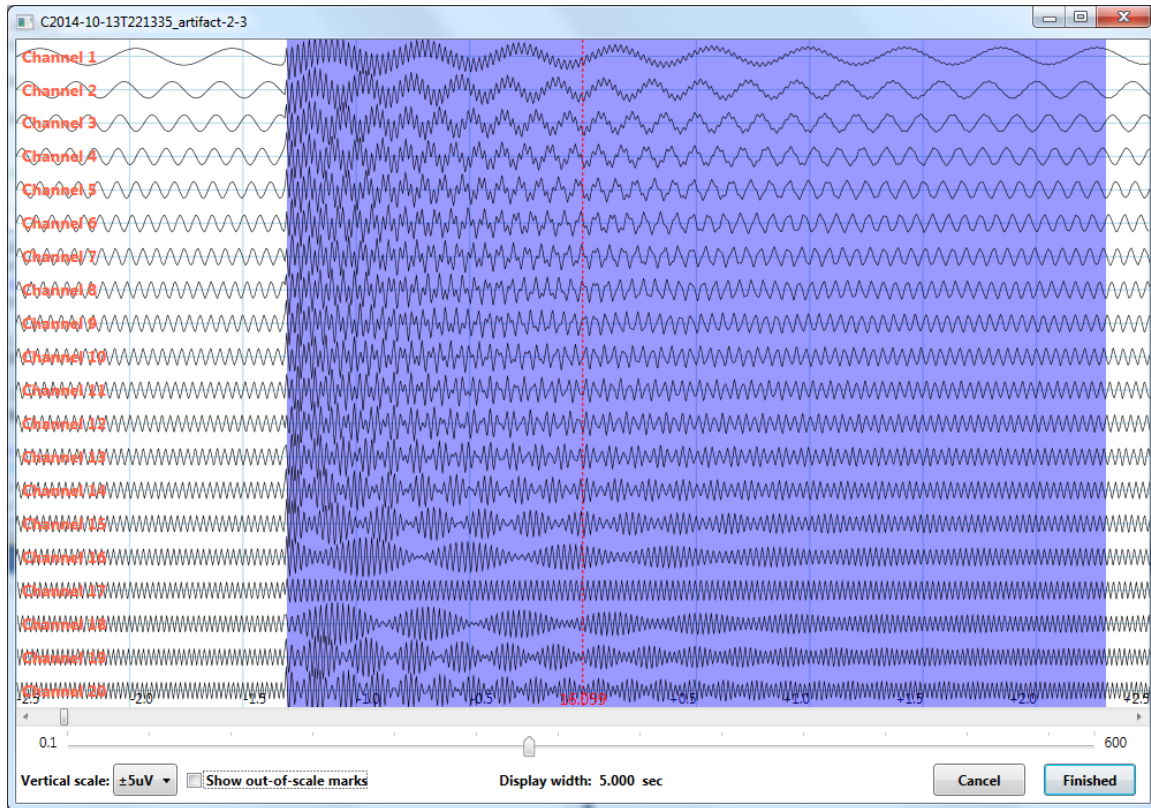

Once an artifact region has been created, it can be edited. To remove a region, right click over it and select "Remove marked segment". Regions can be increased by right clicking on the selected region to increase, selecting "Begin marking segment and marking the new edge; or by clicking outside the region and extending into it as below:

A new, unified region is created with the new size.
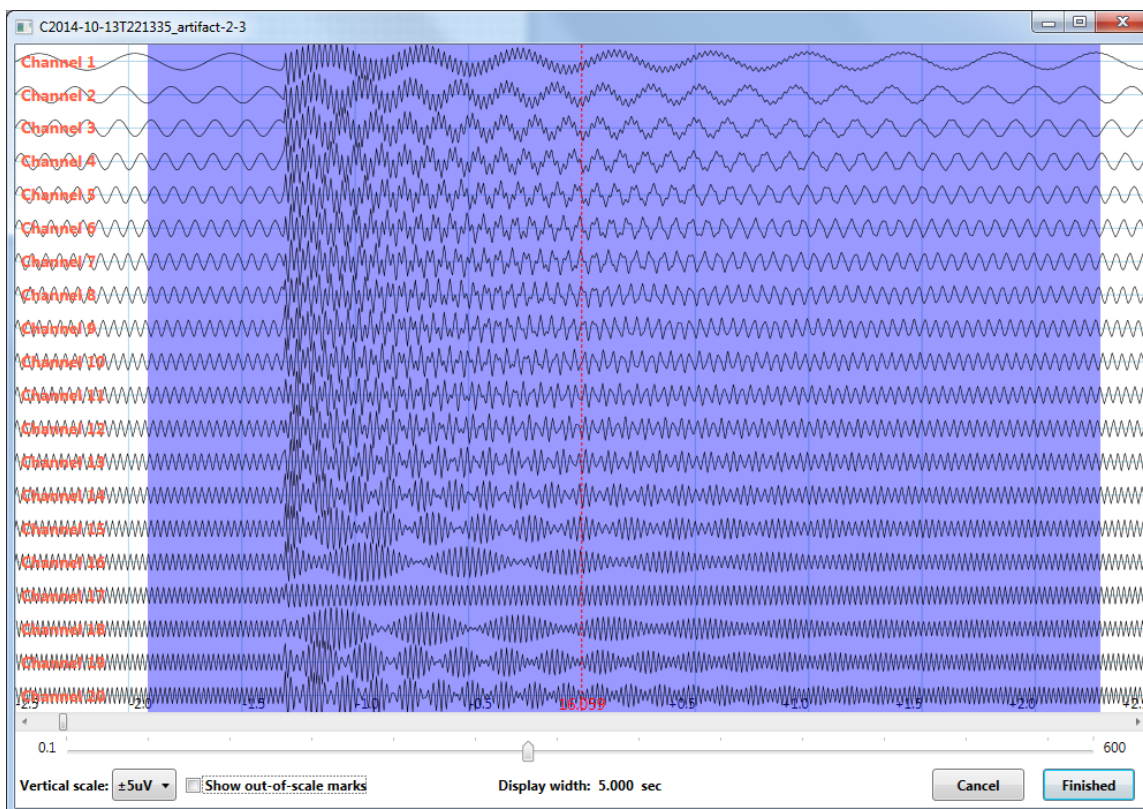
Channels can be removed from the display by choosing the "Remove channel channel-name" menu item after right clicking on the channel to be removed.
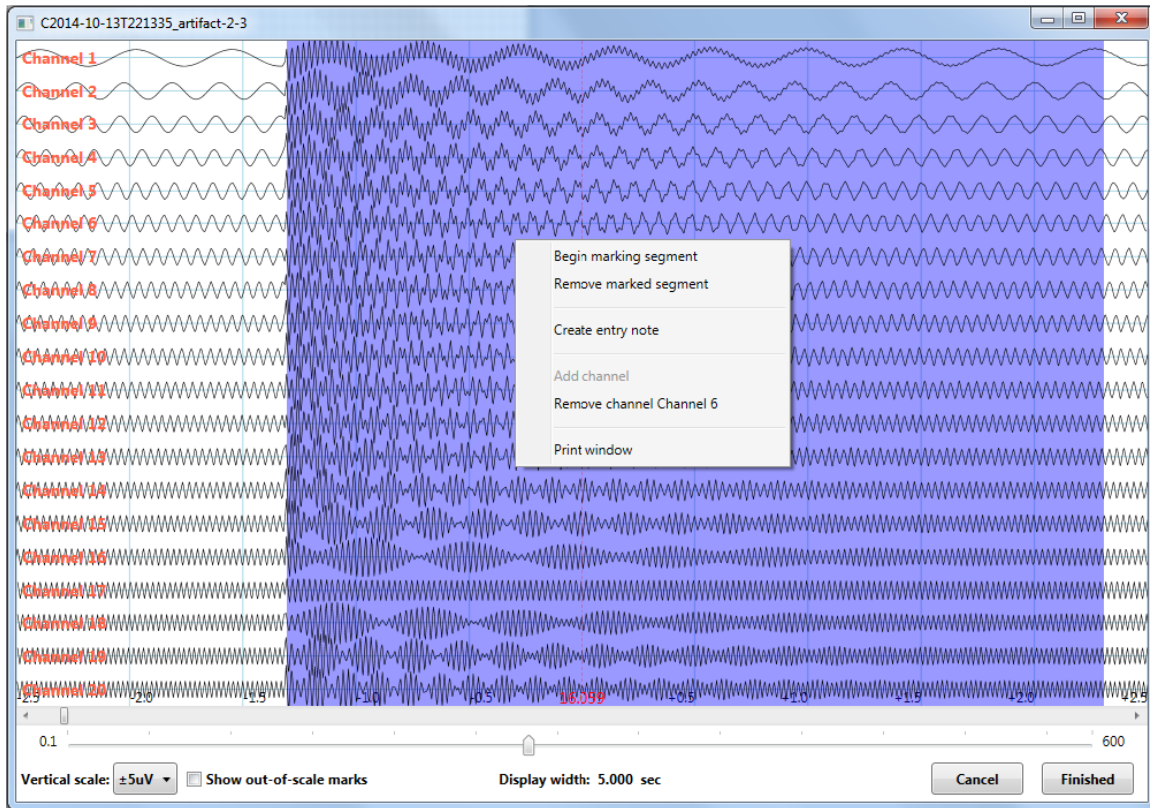
This <u>only</u> removes the channel from the display, not from the BDF file itself. Ultimate removal of channels should occur at the time of conversion of the dataset. However, one might use the <u>Note</u> facility at any time to make a reminder of problem channels (see below).

Here we have removed all the even numbered channels to make the display clearer and to improve the scrolling function.
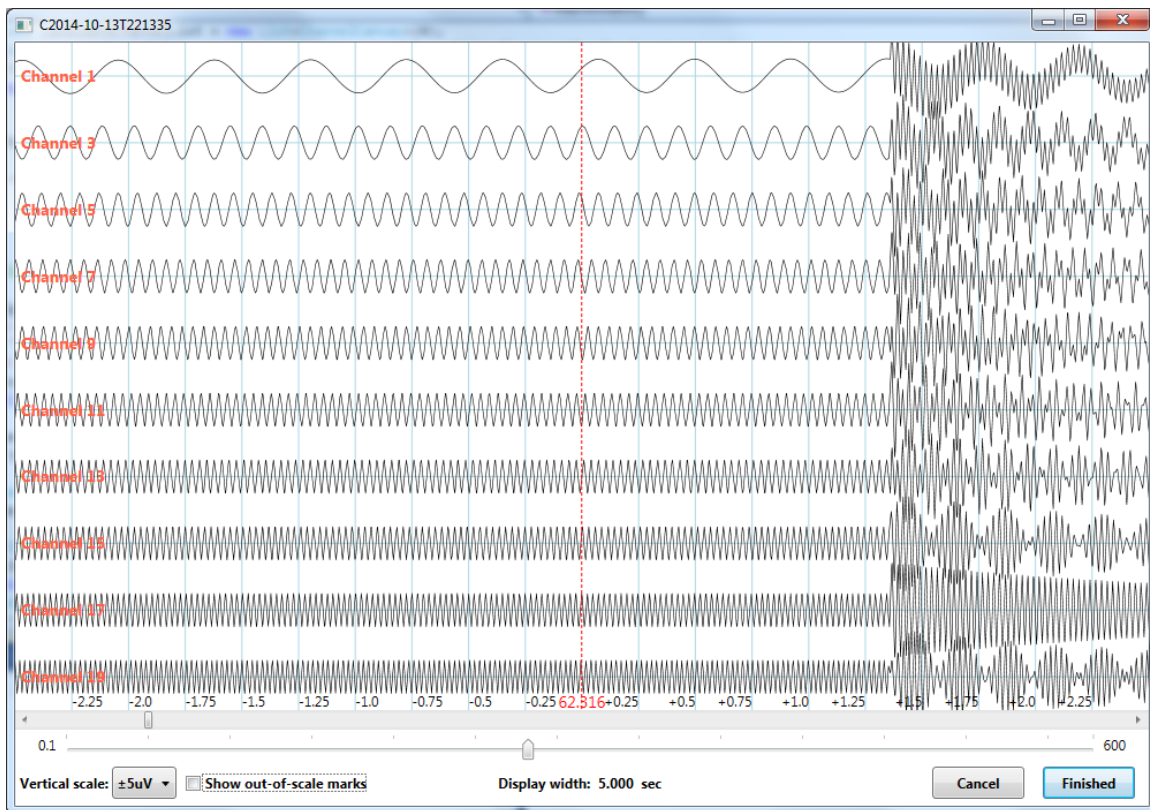
A channel can be returned to the display by choosing it in the context menu. It will be returned to its former location.
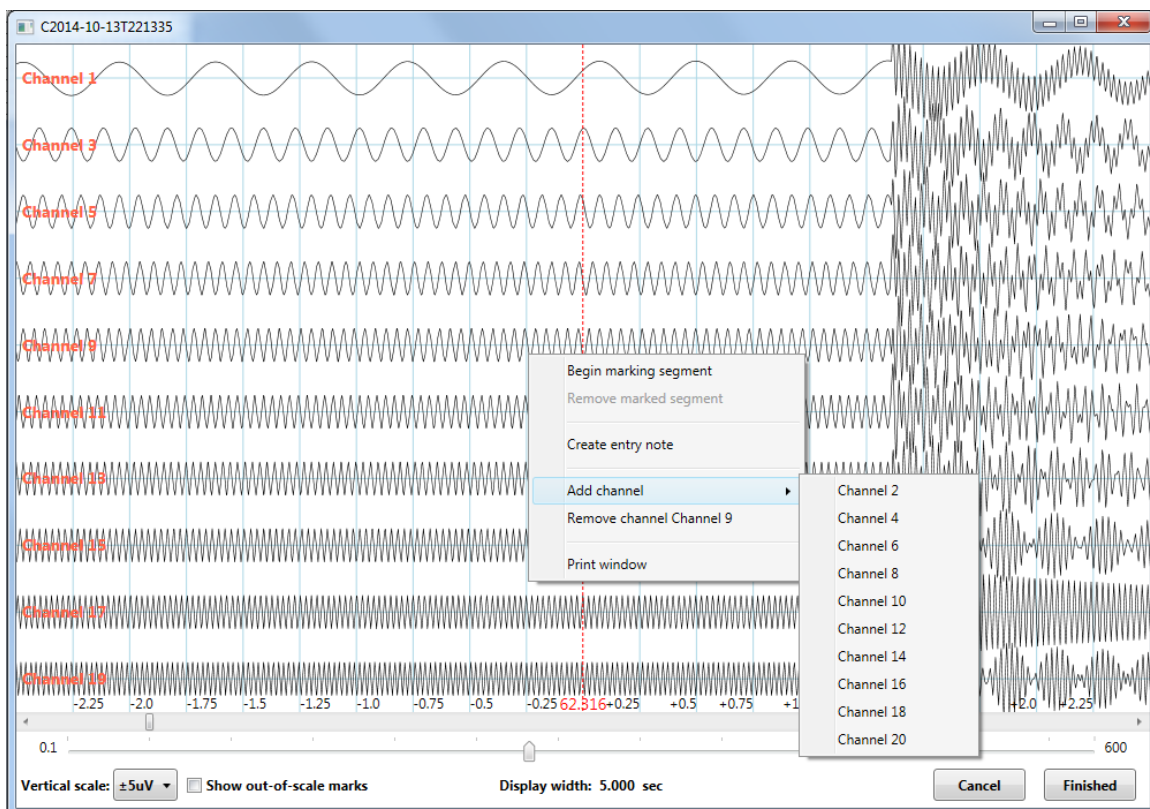
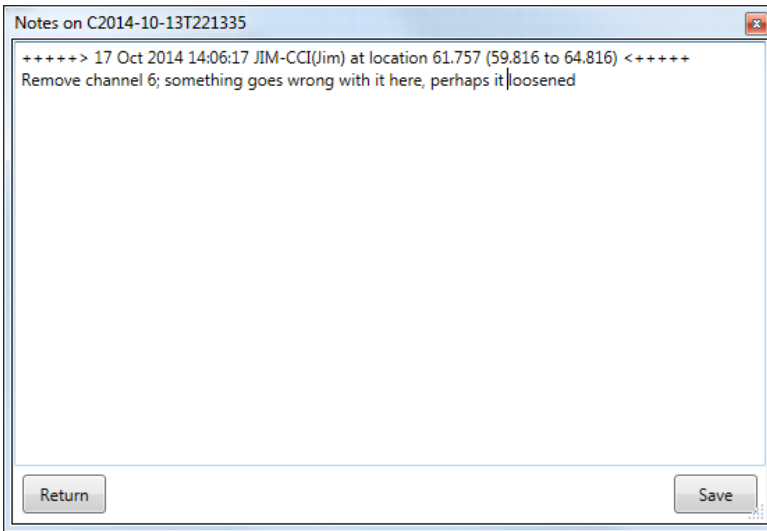As in DR, EAE has a note-taking capability. This permits easy creation of text notes to remind one of particular features of a dataset. After right clicking on a displayed channel and selecting "Create entry note", the dialog at left will be displayed. Type in an entry after the header supplied. It indicates when and who is making the entry and the location in the dataset that was clicked to make the entry. The channel name that was clicked may be pasted into the note as desired. Clicking "Save" will write all the notes to the dataset. "Return" remembers the note, but doesn't write to disk until the program exits. Notes are saved in a file named after the BDF file (not an individual header file) with a ".notes.txt" extension, thus ensuring a single set of notes for all levels of dataset processing. Of course, since this is a simple ".txt" file it may be read and/or edited in any text program.

The context menu also has a "Print window" selection, which resulting in the currently shown display panel being printed.

After a given artifact editing session is over, click on "Finish" in the lower right corner of the window to save the results in a new dataset. This dataset will have its own Header and Event files. The new Header will make reference to the original BDF and Electrode files and the a newly created Event file, which will include all the old Events plus new Events marking the beginning and end of each artifact region. The new Events are named "**ArtifactBegin" and "**ArtifactEnd" and have no associated Group Variables. These Event names should be considered special and not used for naming Events other than those to be processed as artifacts.

"**ArtifactBegin" and "**ArtifactEnd" are a new type of Event described as "naked" because there is no associated mark in the Status channel of the BDF file. Intrinsic and extrinsic Events are called "covered" and should have an associated Status channel mark. For a dataset to be valid for artifact processing, it must have at least one covered Event recorded, which EAE uses to synchronize the clocking of the BDF and EVT files.

The newly created dataset will be named with a "_artifact-0" appended to the BDF file name (both HDR and EVT files) to indicate that they have been processed for artifacts. The new dataset thus consists of the original BDF and ETR files and new HDR and EVT files which have the new name. One should think of the BDF file as "carrying" the name of the original dataset (since it should never be changed), while the HDR file names any derivative datasets.

To ensure a unique name, EAE searches through the folder containing the datasets and finds the highest number appended after all the files carrying the "_artifact" appendage and increases it by one. Thus, if a second artifact-processing session is performed on the original dataset, it will be named with "_artifact-1" appended.
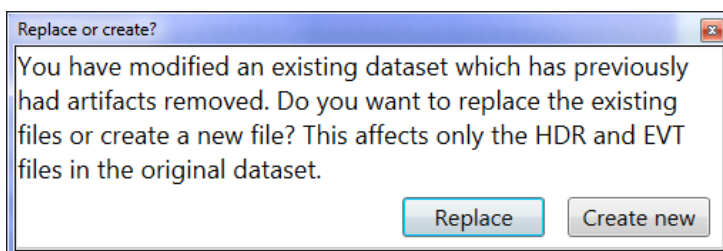
Datasets which have already been processed for artifacts can be edited in EAE, to add new artifact regions or to remove or edit old regions. When this occurs, EAE will ask the user how to handle the new file: to replace the original file or to create a new file. If a new file is created, it will be named for

the parent file with an additional "-n" appended to indicate its lineage and the original dataset will remain unchanged. Thus if a new file is created based on a dataset named "_artifact-1", the new dataset (HDR and EVT) files might be named "_artifact-1-2".