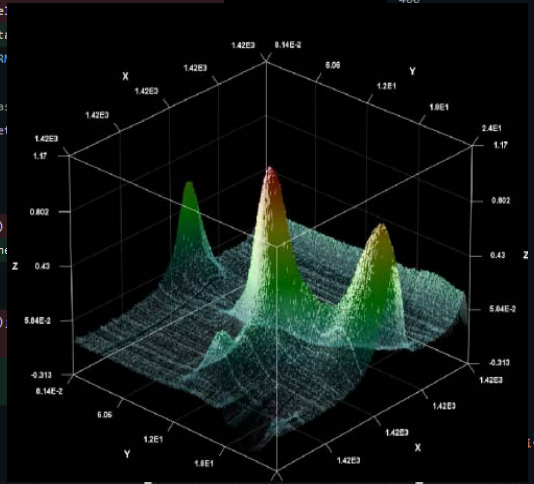
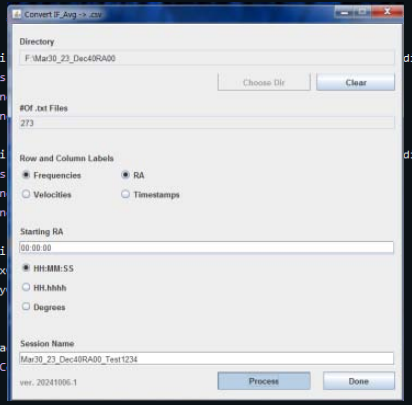
Spectral Processing , File Conversion , & Graphics Software

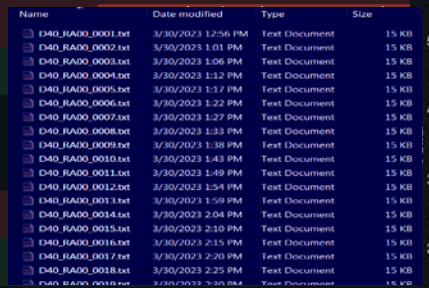
```
raDegreesRadioButton.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
-       dataCruncher.rightAscensionCalculator.setInitialRa(raStartTextFie
+       dataCruncher.rightAscensionCalculator.setInitialRaFromString(raSt
        dataCruncher.rightAscensionCalculator.setRaFormat(RaFormat.RA_FOR
        //raStartTextField.setFormatterFactory(new
DefaultFormatterFactory(dataCruncher.rightAscensionCalculator.getRaFormat().getMa
        raStartTextField.setText(dataCruncher.rightAscensionCalculator.get
    }
});

-   outfileTextField.getDocument().addDocumentListener(new DocumentListener()
+   sessionNameTextField.getDocument().addDocumentListener(new DocumentListene
    @Override
    public void removeUpdate(DocumentEvent e) {
-       System.out.println("Outfile text: " + outfileTextField.getText());
-       dataCruncher.setOutfileName(outfileTextField.getText());
+       sessionName = sessionNameTextField.getText();
+       System.out.println("Session name: " + sessionName);
    } // removeUpdate()

    @Override
    public void insertUpdate(DocumentEvent e) {
```

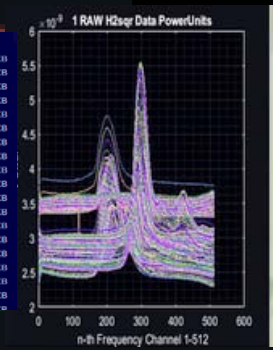
```
private static ColorGradient create2DColorGradient() {

    Color clearBlack

    ColorGradient.Axi                                    dient();
    xGradient.setAxis
    xGradient.setBoun
    xGradient.setBlen

    ColorGradient.Axi                                    dient();
    yGradient.setAxis
    yGradient.setBoun
    yGradient.setBlen

    ColorGradient.Axi
                x
                y
};

ColorGradient gra
gradient.setAxisC
return gradient;
```

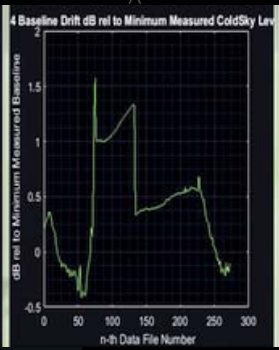


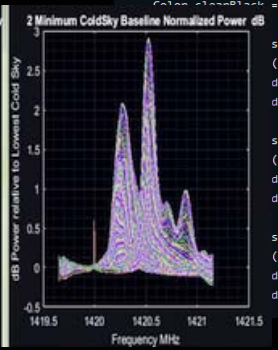



```
ivate static ColorGradient create3DColorGradient() {

    Color clearBlack = new Color(0, 0, 0, 0);

    sColorGradient xGradient = new ColorGradient.AxisColorGradient();
    (ColorGradient.Axis.X);
    daryColors(new Color[] {clearBlack, Color.RED});
    dMode(ColorGradient.BlendMode.ADDITION);

    sColorGradient yGradient = new ColorGradient.AxisColorGradient();
    (ColorGradient.Axis.Y);
    daryColors(new Color[] {clearBlack, Color.GREEN});
    dMode(ColorGradient.BlendMode.ADDITION);

    sColorGradient zGradient = new ColorGradient.AxisColorGradient();
    (ColorGradient.Axis.Z);
    daryColors(new Color[] {clearBlack, Color.BLUE});
    dMode(ColorGradient.BlendMode.ADDITION);
```









Graphics Software

Processing and Graphics Software Installation

JRE : Java Runtime Environment (Windows)

Java version(s): 8.0 Platform(s):

Windows 11, Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP,

https://www.java.com/en/download/help/windows_offline_download.html

install JRE

Jamison Adcock : JA_IFAvg2csv.jar :

Conversion of a data set of IF_Ave *.txt files to Rinearn compatible *.csv files

https://github.com/AP-HLine-3D/HLine3D

download latest Revision of JA_IFAvg2csv_.jar and drag to Desktop

Rinearn 2D & 3D Graphics Software

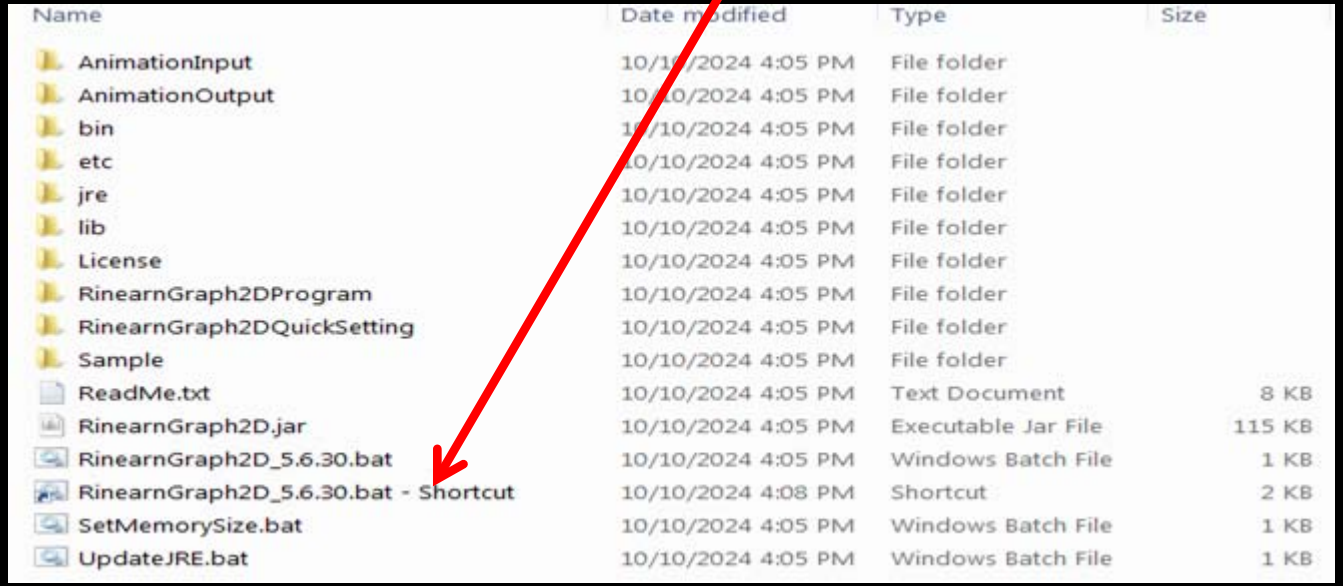
https://www.rinearn.com/en-us/graph2d/
https://www.rinearn.com/en-us/graph3d/

download and install 2D and 3D

Graphics Software

Rinearn 2D Graphics Software

From installation subdirectory , **create Shortcut** to *RinearnGraph2D_5.6.30.bat*
and Drag Shortcut to Desktop

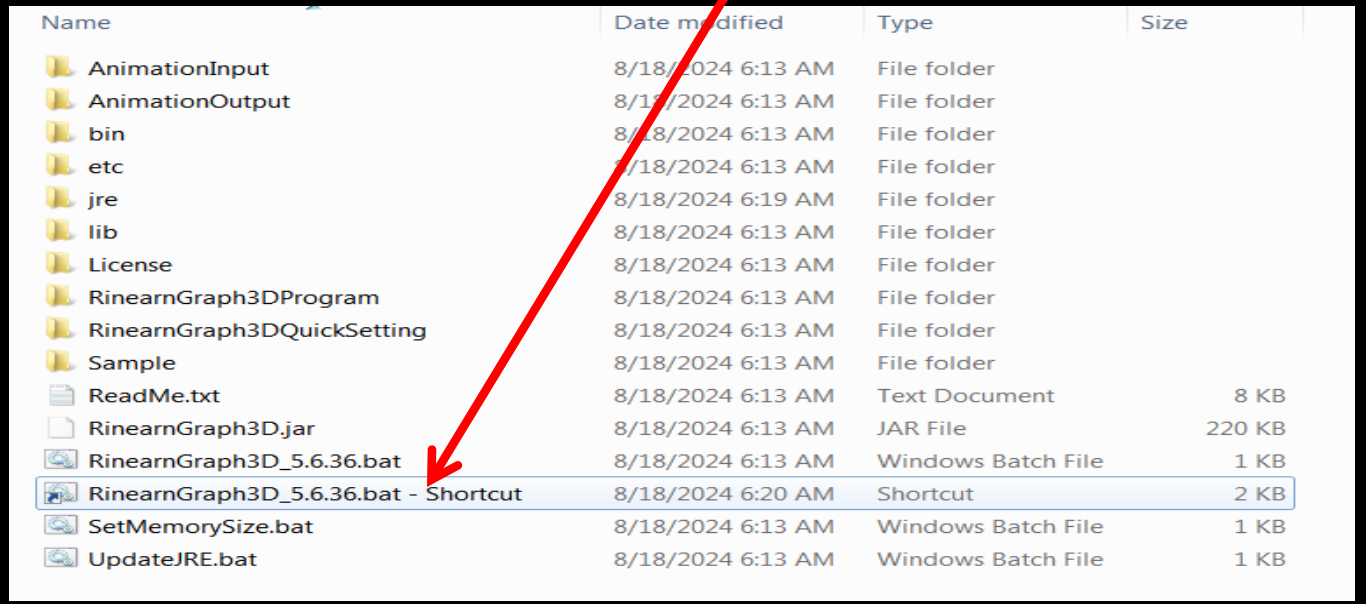


Name	Date modified	Type	Size
AnimationInput	10/10/2024 4:05 PM	File folder	
AnimationOutput	10/10/2024 4:05 PM	File folder	
bin	10/10/2024 4:05 PM	File folder	
etc	10/10/2024 4:05 PM	File folder	
jre	10/10/2024 4:05 PM	File folder	
lib	10/10/2024 4:05 PM	File folder	
License	10/10/2024 4:05 PM	File folder	
RinearnGraph2DProgram	10/10/2024 4:05 PM	File folder	
RinearnGraph2DQuickSetting	10/10/2024 4:05 PM	File folder	
Sample	10/10/2024 4:05 PM	File folder	
ReadMe.txt	10/10/2024 4:05 PM	Text Document	8 KB
RinearnGraph2D.jar	10/10/2024 4:05 PM	Executable Jar File	115 KB
RinearnGraph2D_5.6.30.bat	10/10/2024 4:05 PM	Windows Batch File	1 KB
RinearnGraph2D_5.6.30.bat - Shortcut	10/10/2024 4:08 PM	Shortcut	2 KB
SetMemorySize.bat	10/10/2024 4:05 PM	Windows Batch File	1 KB
UpdateJRE.bat	10/10/2024 4:05 PM	Windows Batch File	1 KB

Graphics Software

Rinearn 3D Graphics Software

From installation subdirectory , **create Shortcut** to *RinearnGraph3D_5.6.36.bat*
and Drag Shortcut to Desktop



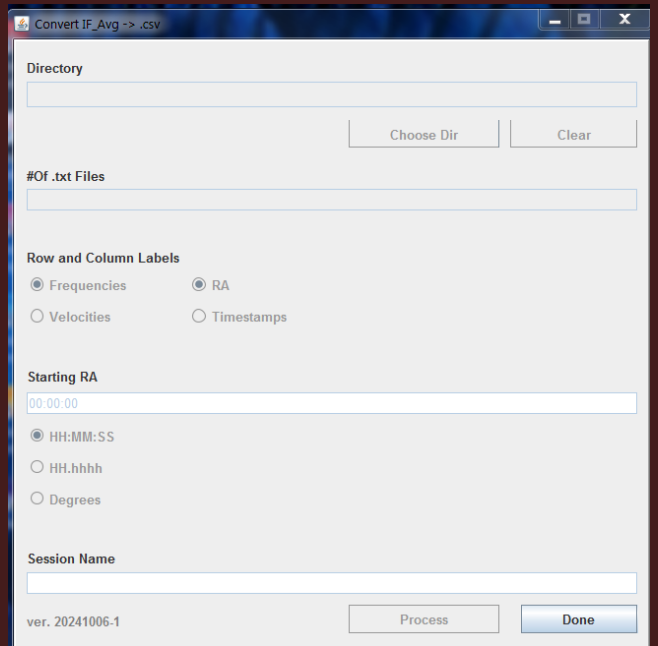
Jamison Adcock : JA_IFAvg2CSV. jar Processing Software Installation

JA_IFAvg2csv.jar :

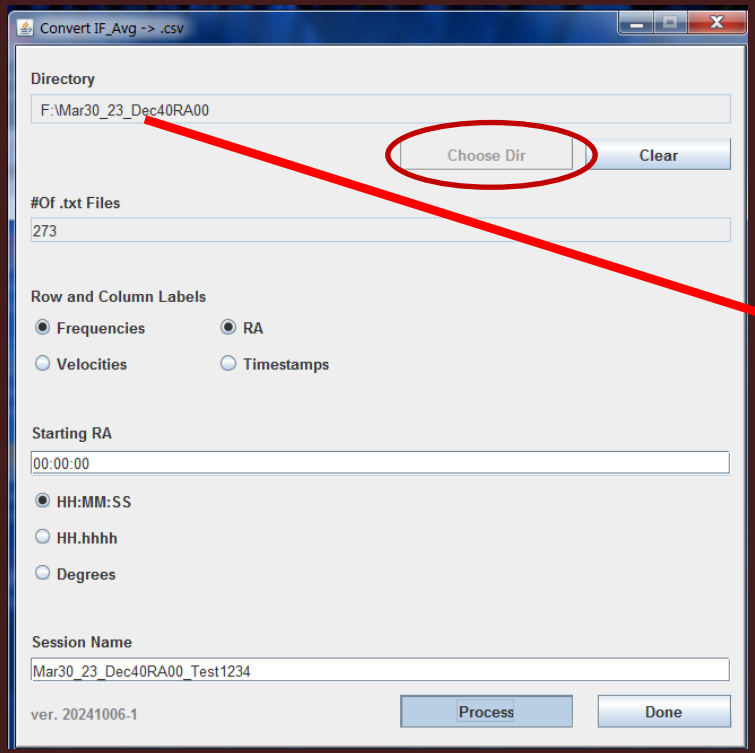
Conversion of a subdirectory data set of IF_Ave *.txt files to Rinearn compatible *.csv

https://github.com/AP-HLine-3D/HLine3D/

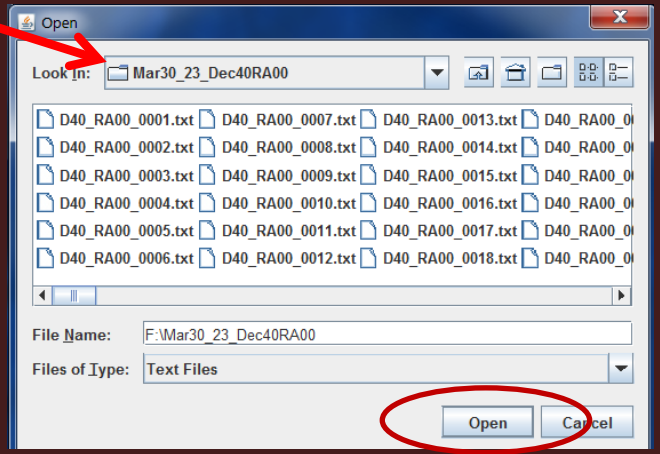
download Latest Rev of JA_IFAvg2csv_.jar and drag to Desktop



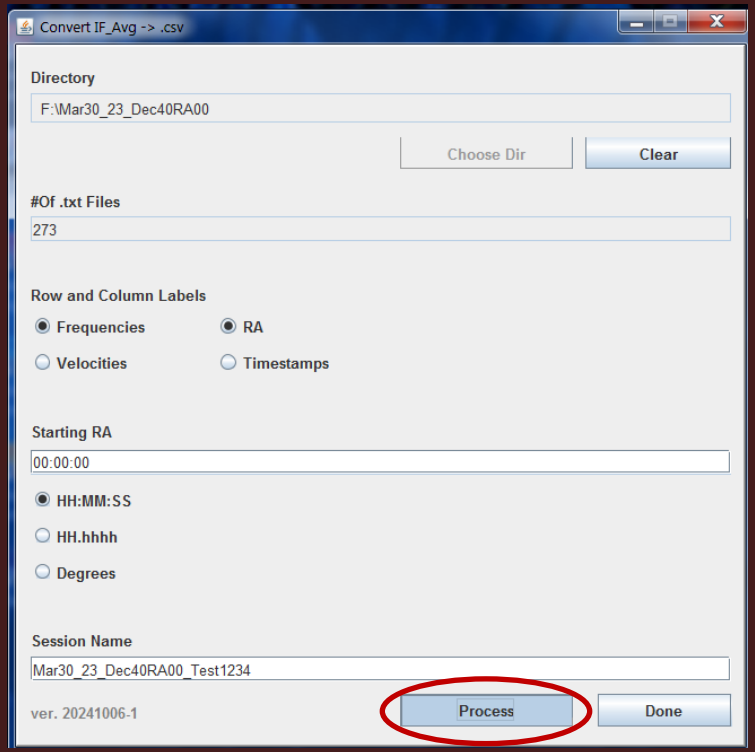
JA_IFAvg2CSV. jar Processing Software Guide



1) Select ‘Choose Dir’ , Fileset and ‘Open’

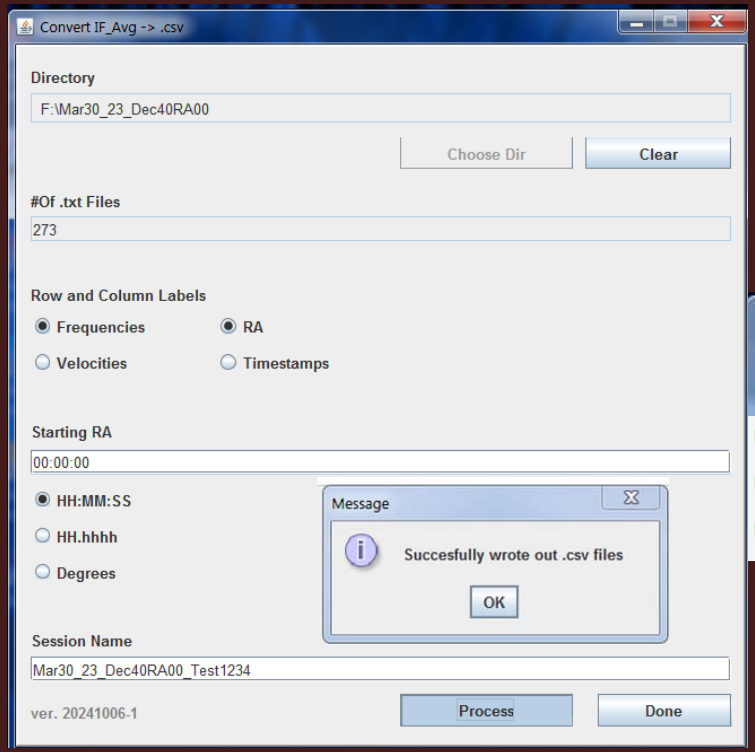


JA_IFAvg2CSV. jar Processing Software Guide

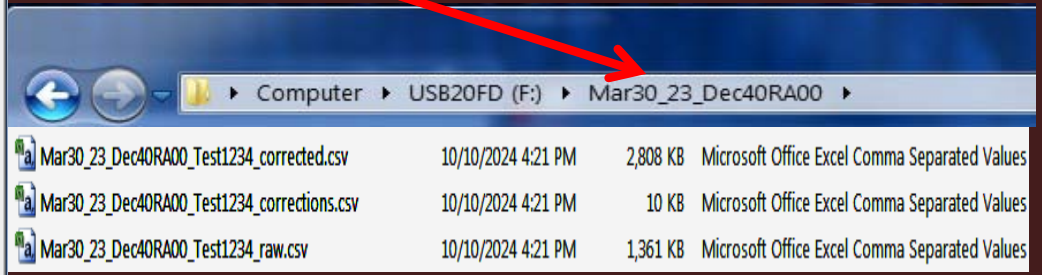


2) (optional append info to) 'Session Name' and 'Process'

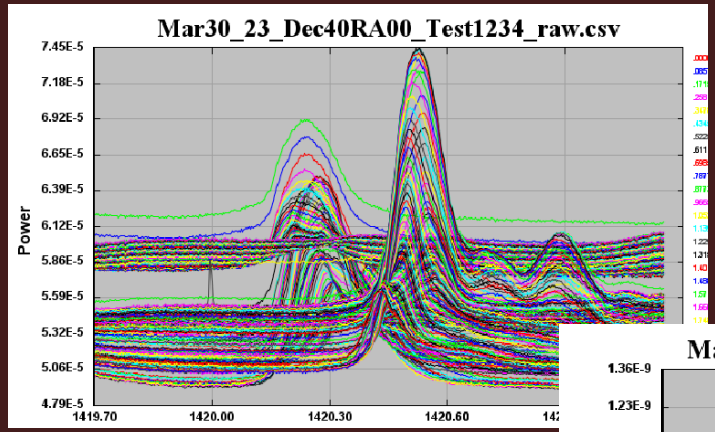
JA_IFAvg2CSV. jar Processing Software Guide

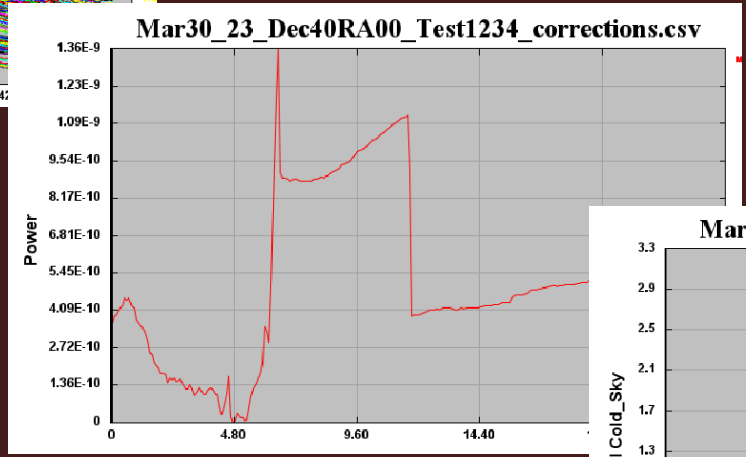


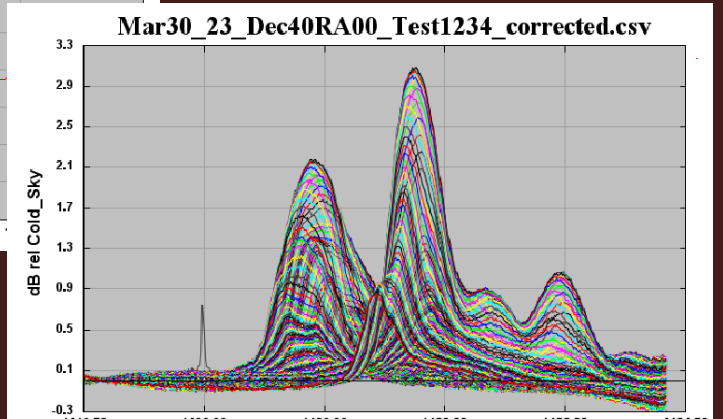
3) ***.CSV files will be written to original Fileset Directory***



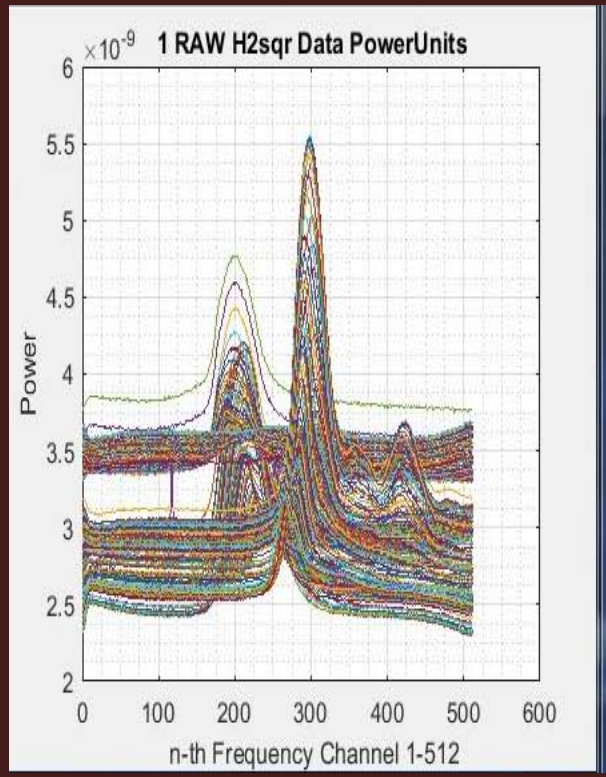
JA_IFAvg2CSV. jar Processing Software Workflow

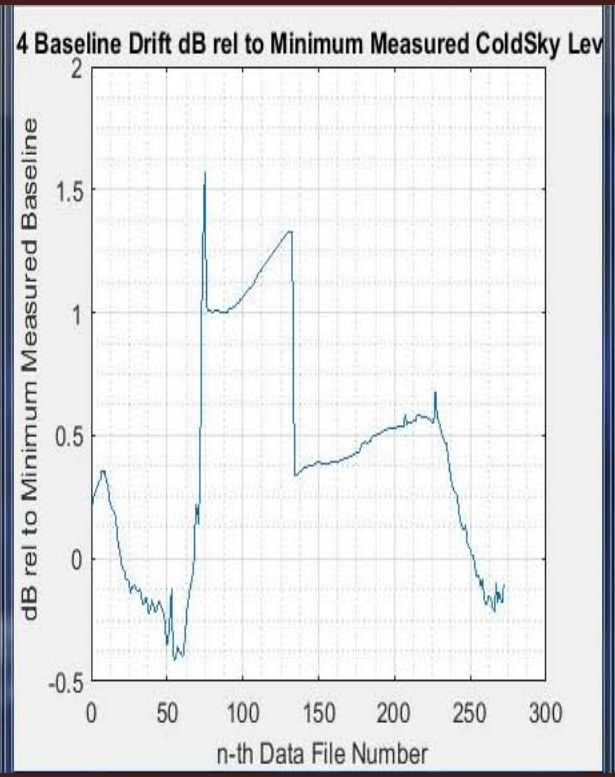


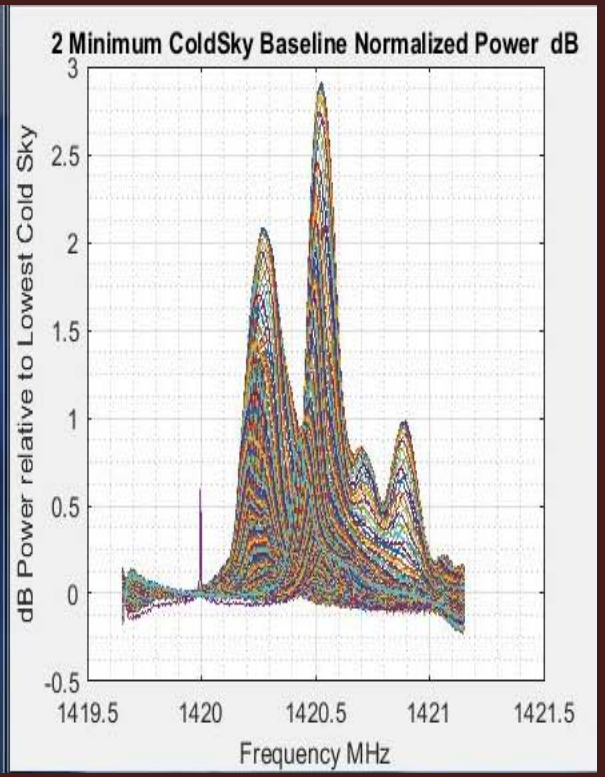




JA_IFAvg2CSV. jar Processing Workflow

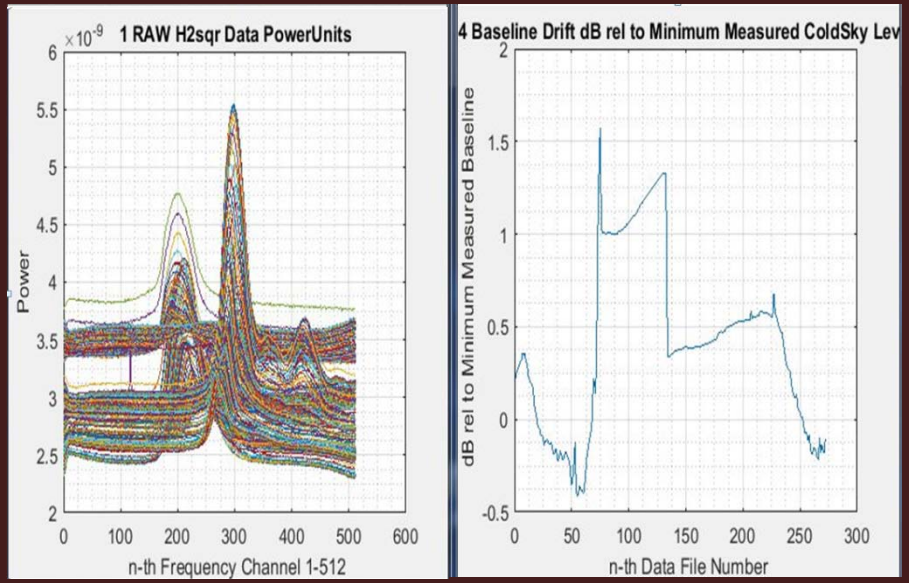






JA_IFAvg2CSV. jar Processing Workflow

" Cold Sky " Background Drift Correction

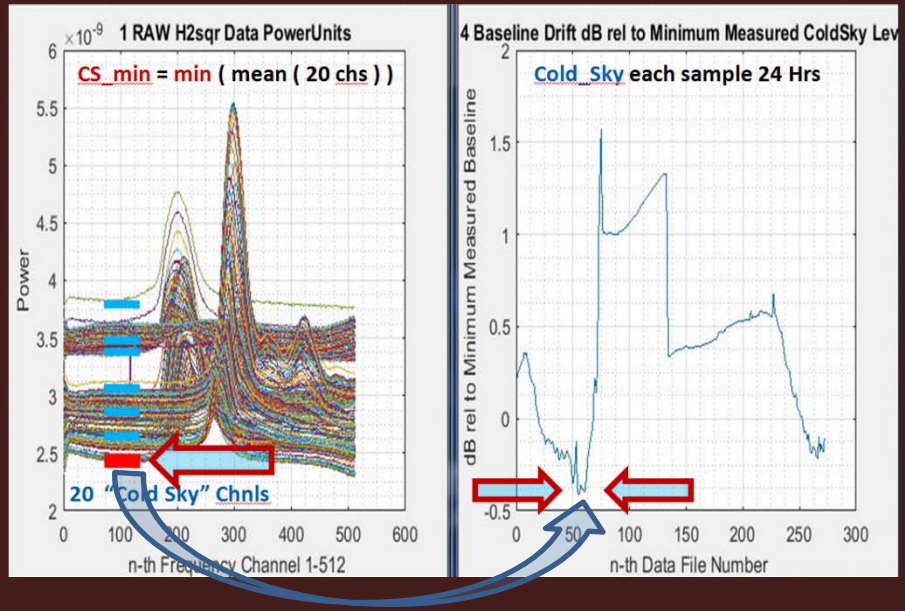


During the time period in which spectral data is being acquired, many factors may cause an overall background level shift …

1) Atmospheric Transparency
2) Sunlight
    being received in the antenna's beam side-lobe patterns
    or being reflected off nearby vegetation
    (trees, buildings, bushes)
3) Temperature Changes
    in the surrounding environment
    or heating of the antenna and electrical components

JA_IFAvg2CSV. jar Processing Workflow

" Cold Sky " Background Drift Correction



Lowest Amplitude = Drift Correction Reference

The Background Drift can be measured and plotted.

Step #1 Specify a small frequency range lower than any Hydrogen Line data with which to 'Normalize' the Drift This can be considered the " Cold Sky " Background

Step #2 Find the spectrum with the Lowest Amplitude at that range and use it as the Drift Correction Reference.

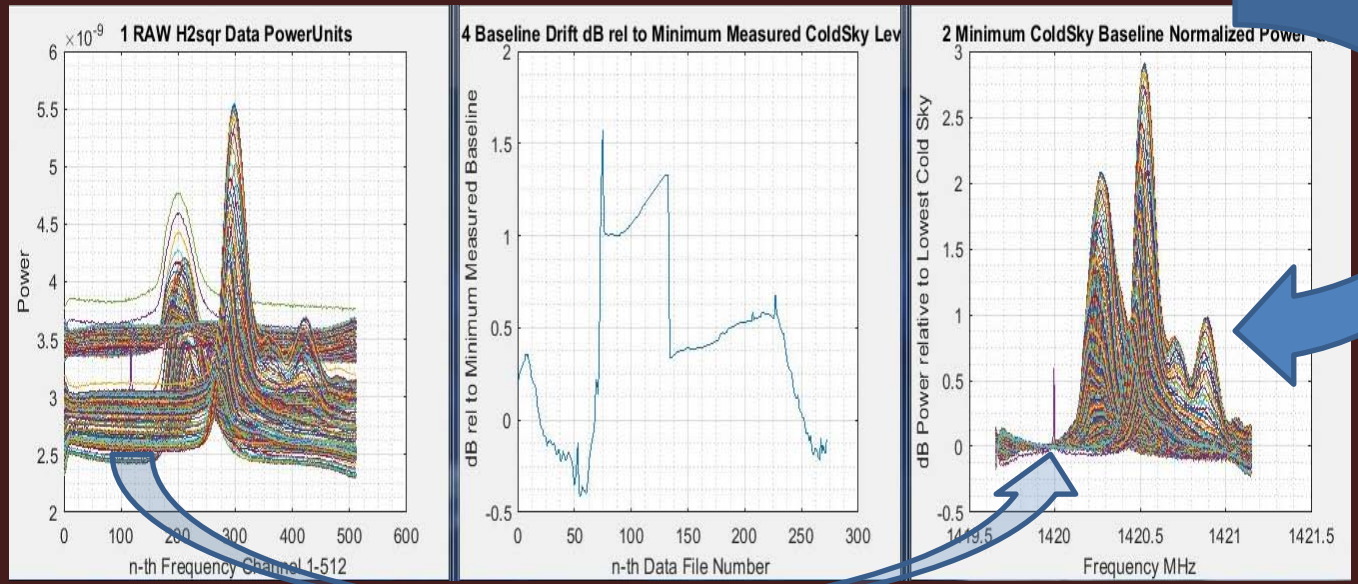
Step#3 For each spectra, calculate the difference in amplitude between its average value over the drift correction frequency range and the Reference, and subtract that from all values in that spectrum

Step#4 Repeat that for each of the spectra.

JA_IFAvg2CSV. jar Processing Workflow

" Cold Sky " Background Drift Correction

Step#4 Repeat that for each of the spectra.



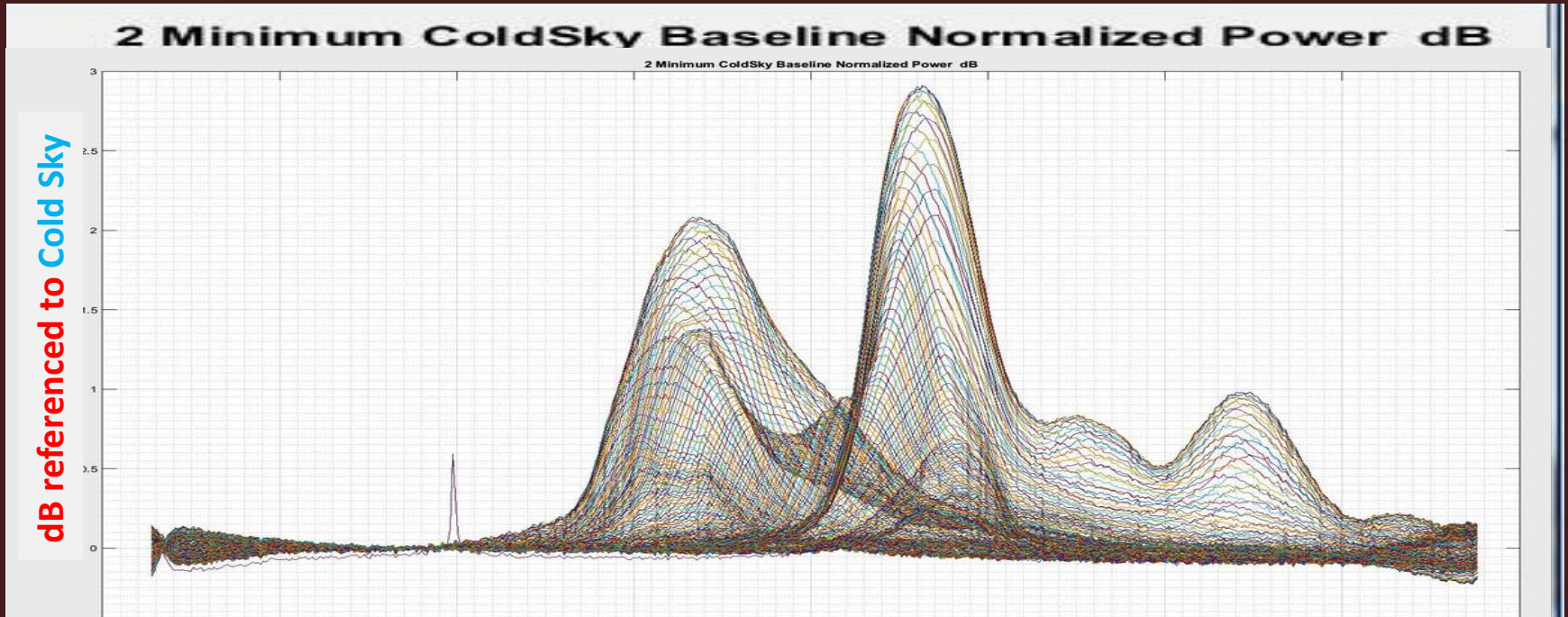
" Cold-Sky" Drift Corrected Spectrum Set

“ Cold Sky ” Background Drift Corrected Spectrum Set Scaled in dB

A Decibel Scale is a Logarithmic Scale which enables data with amplitudes
over many orders of magnitude to be displayed with ‘nearly equal’ *physical size* on a plot

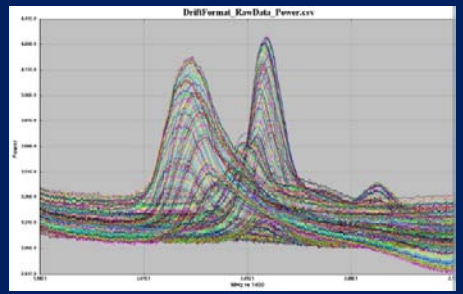
The conversion equation from Power to dB (Decibel) is **dB = 10 * Log10 (power value)**
As a reference, the normalized Cold_Sky Power Amplitude is set to equal Zero dB

The Vertical Y axis on this graph is labeled : **dB referenced to Cold Sky**

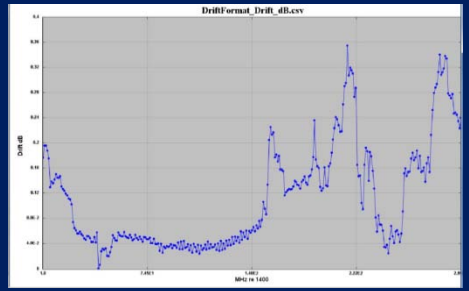


Rinearn (2D) & 3D Graphics Software Guide

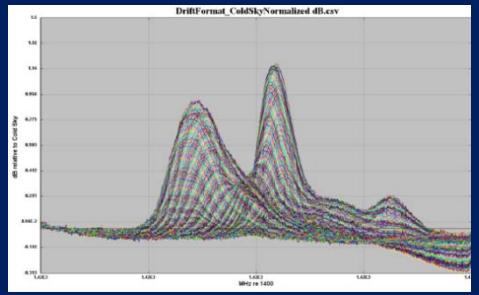
Raw Data Spectrum Set



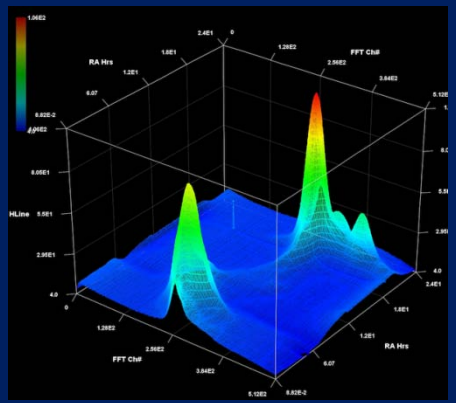
Background Drift



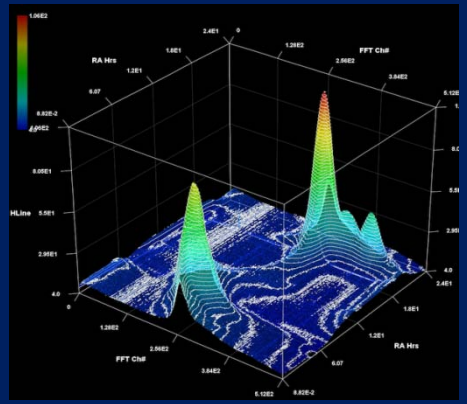
Corrected Data Normalized to Cold Sky in dB



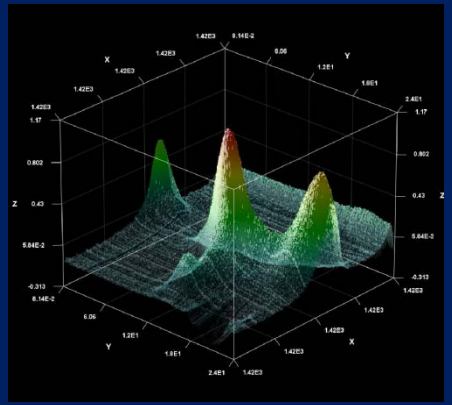
H_Line Data Set

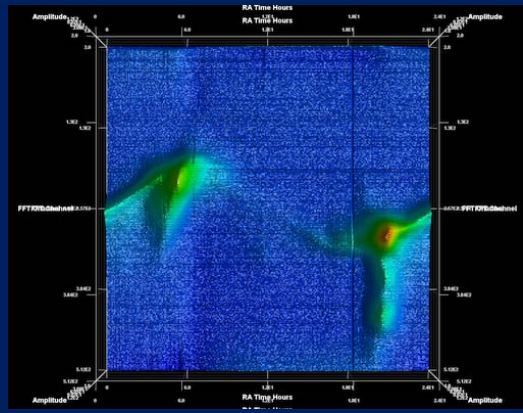


24 Hour Drift Scan

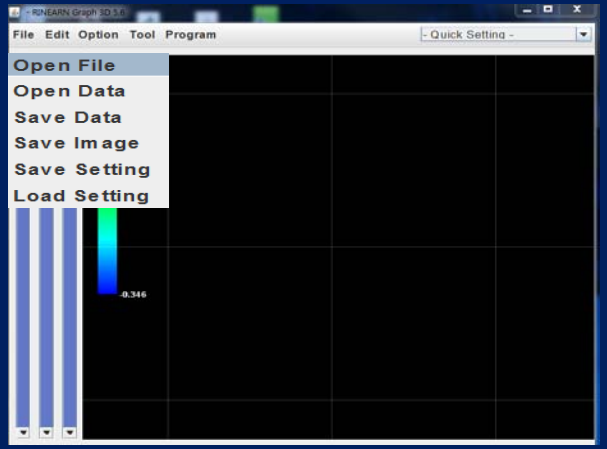


@ Declination + 40°

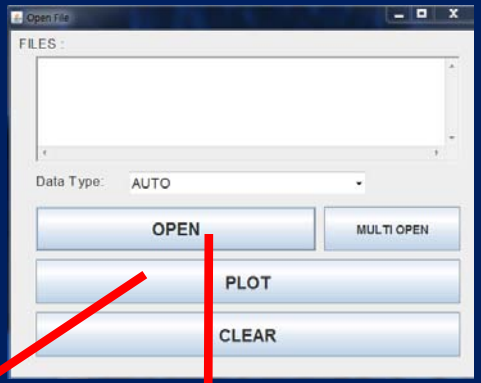


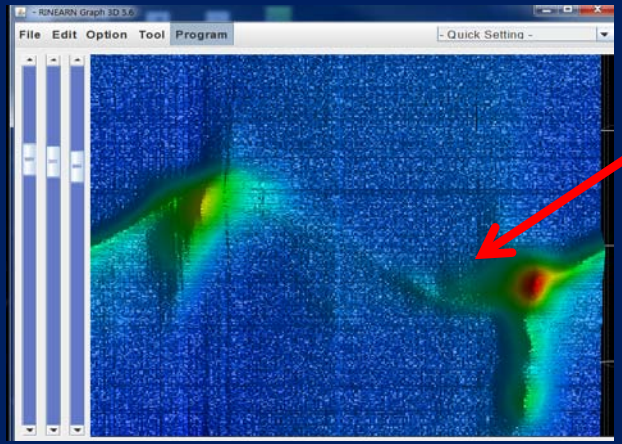


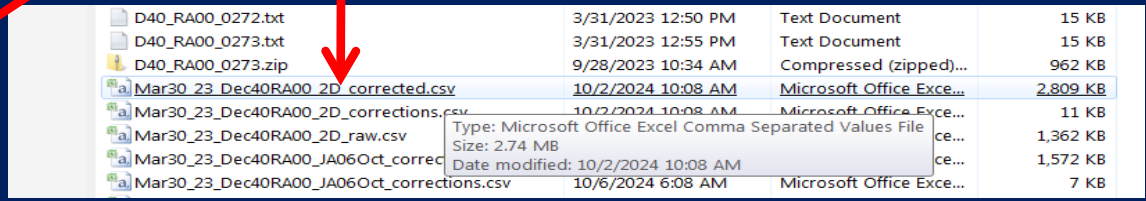
Rinearn 3D Software Guide



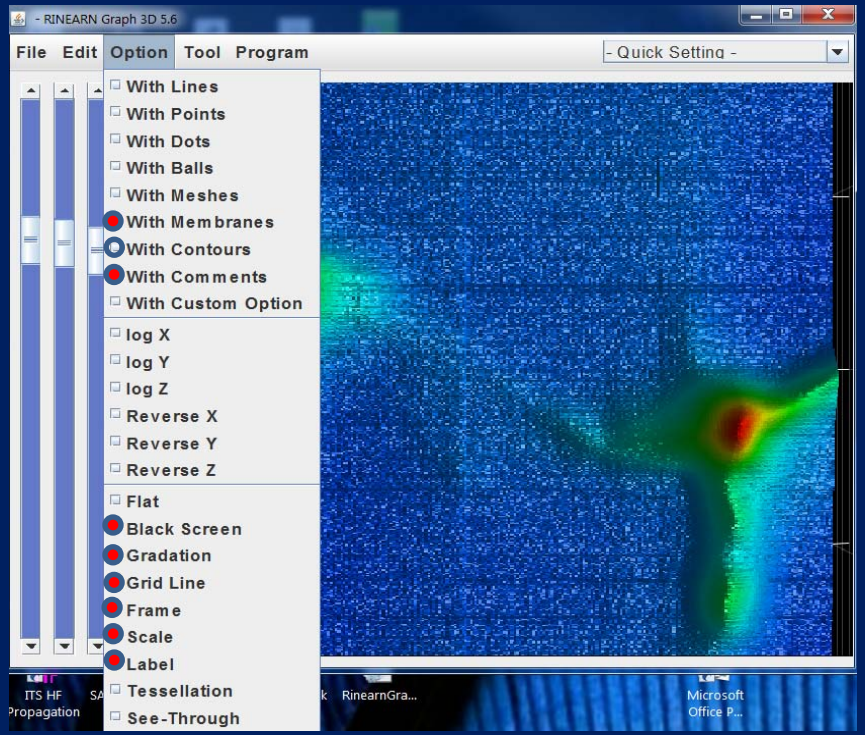
Open File : OPEN (locate *.CSV file), Select , **PLOT**

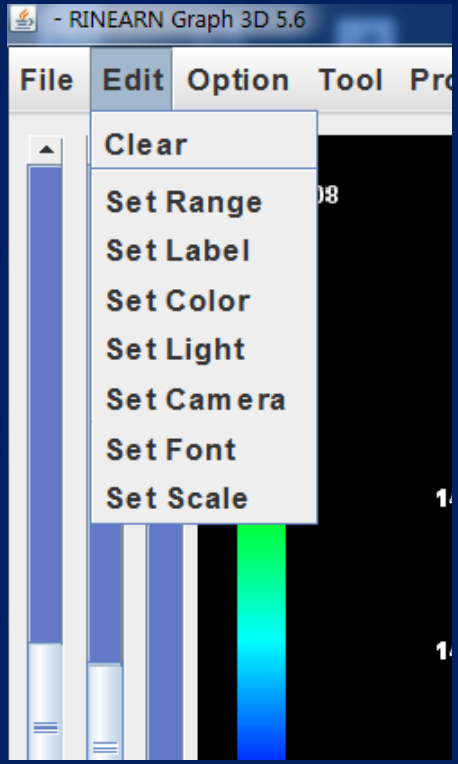




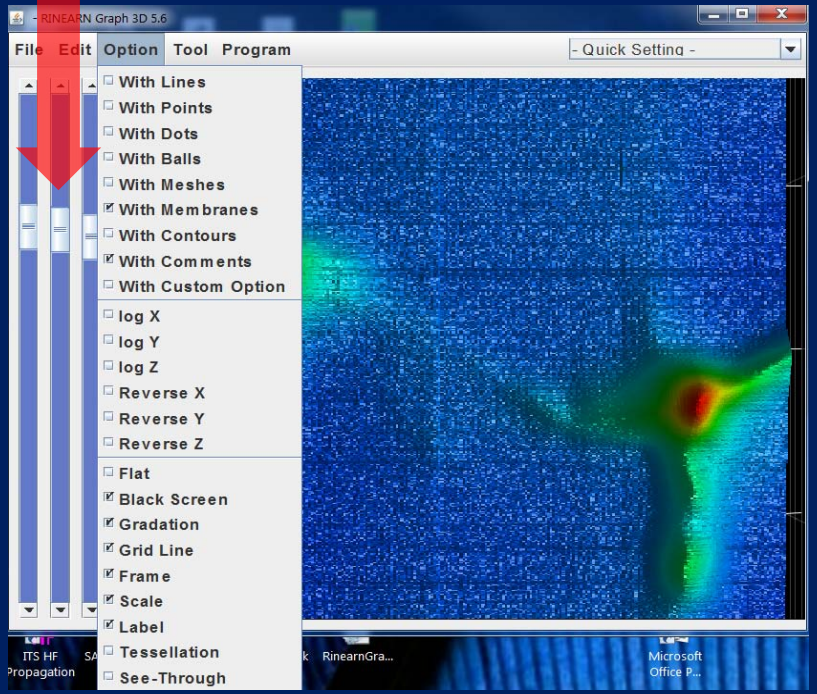


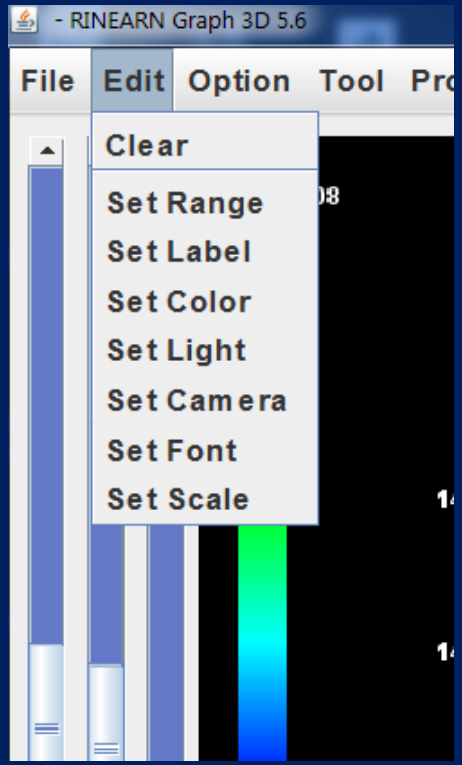
Option panel : typical selections



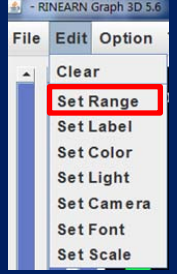


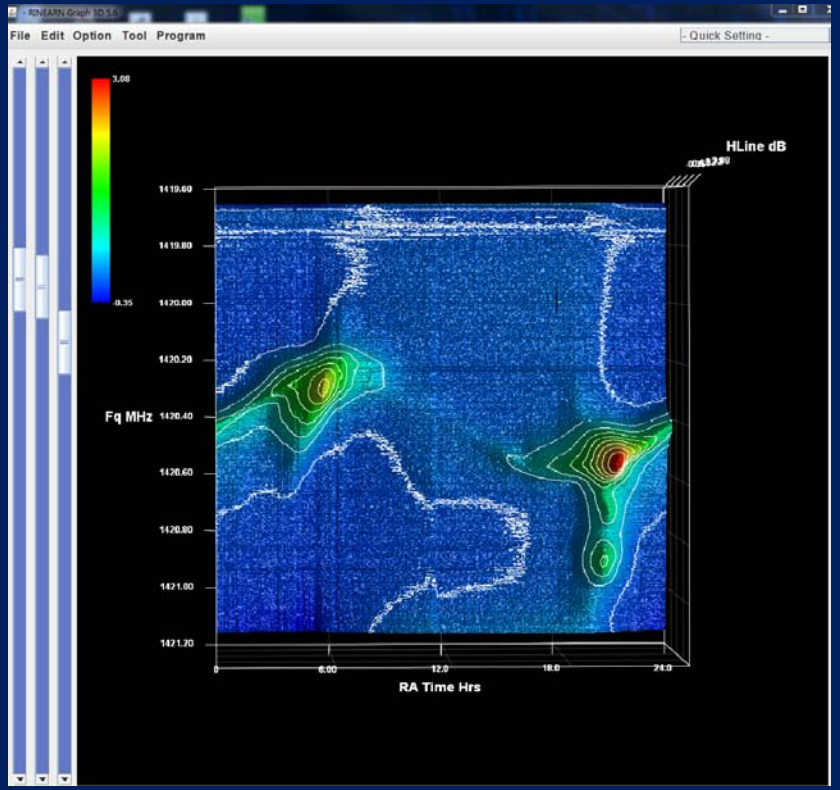
Sliders Change the Size of the Displayed Plot



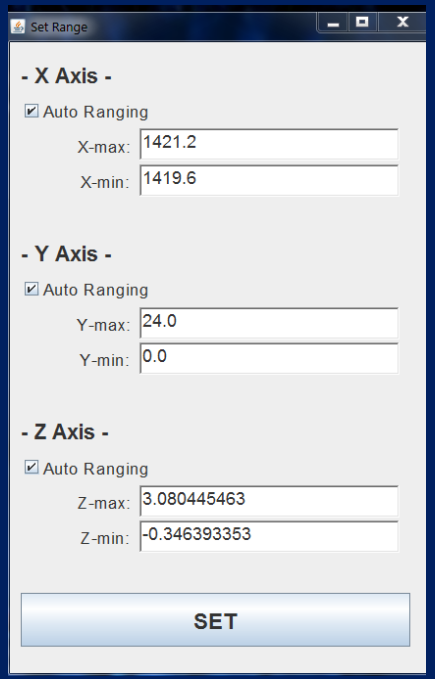


Edit / Set Range

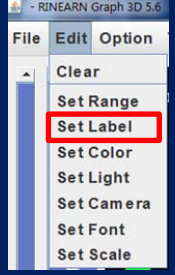




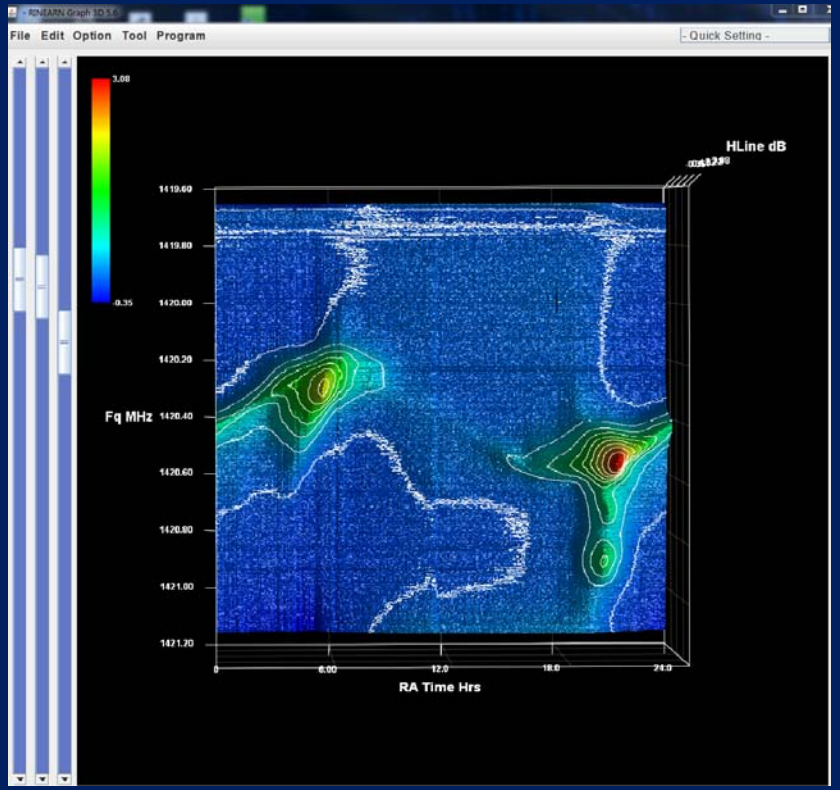
Disable all **'Auto'** options
Select **'Else'** and enter formats as shown below
to properly label frequencies & Time
Set **max min** to round numbers for better labeling

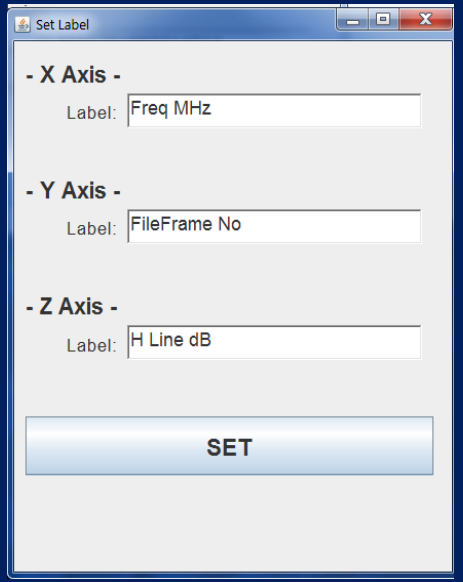


Edit / Set Label

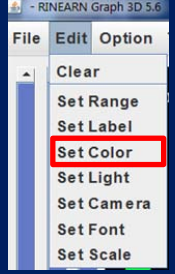


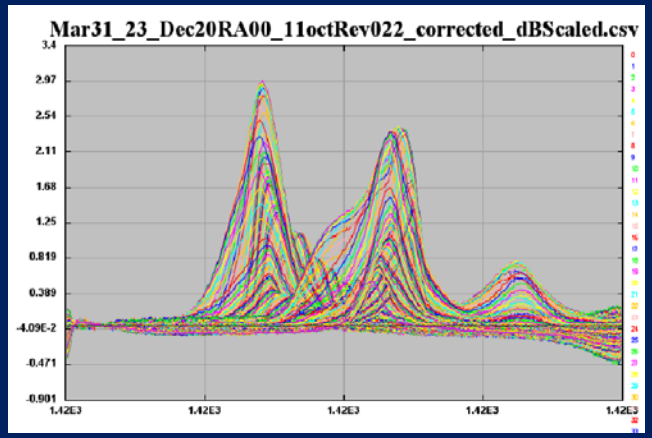
Label the X Y Z axes as appropriate

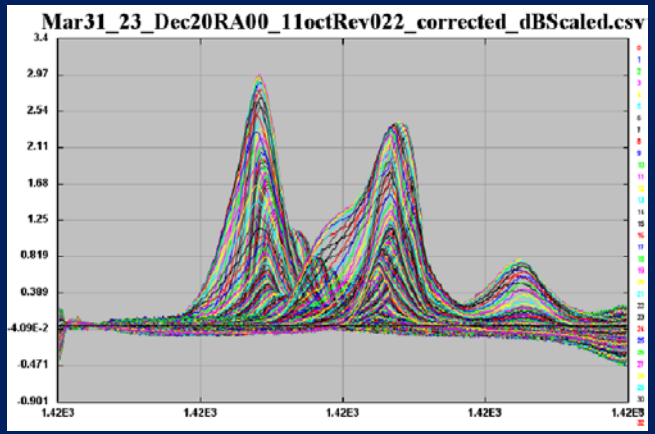




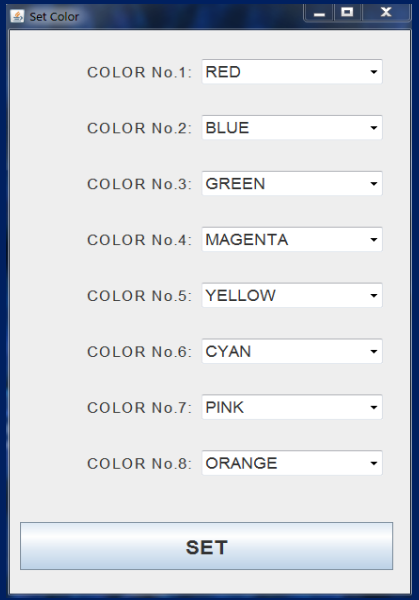
Edit / Set Color

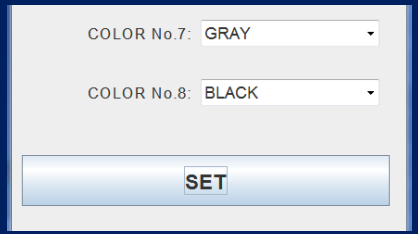




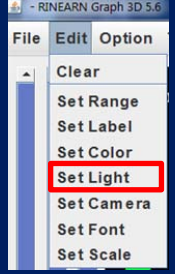


Color Settings are useful for **2D** graphics,
But seem to have no effect on the **3D** display

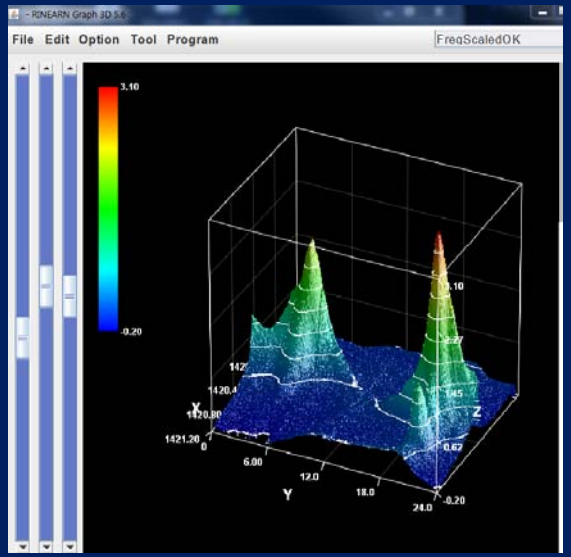


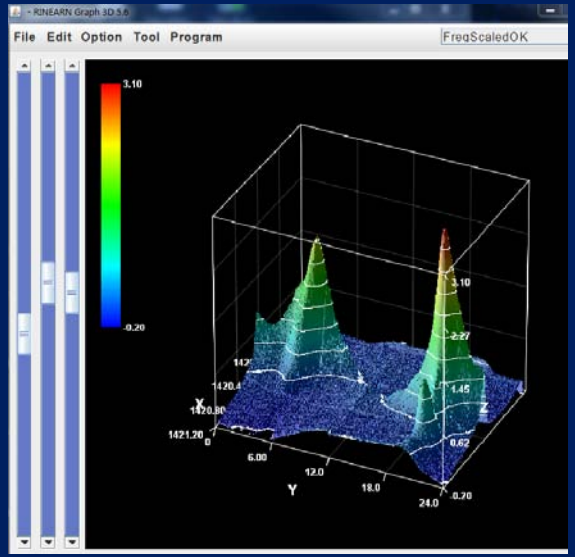


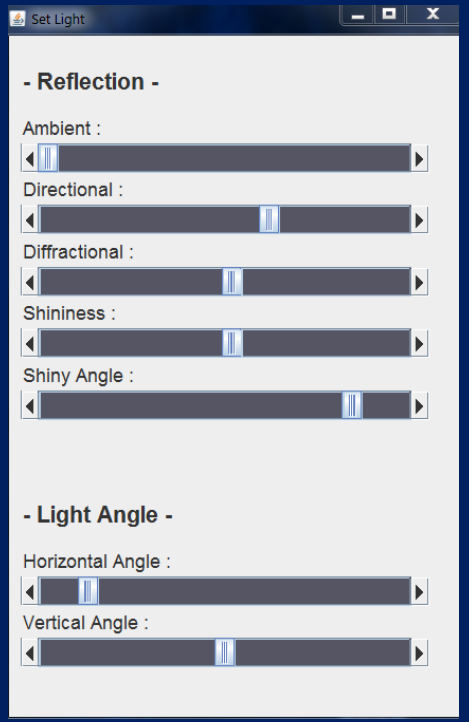
Edit / Set Light



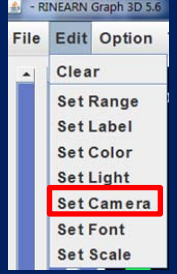
This is an interesting set of 3D display controls Experiment !



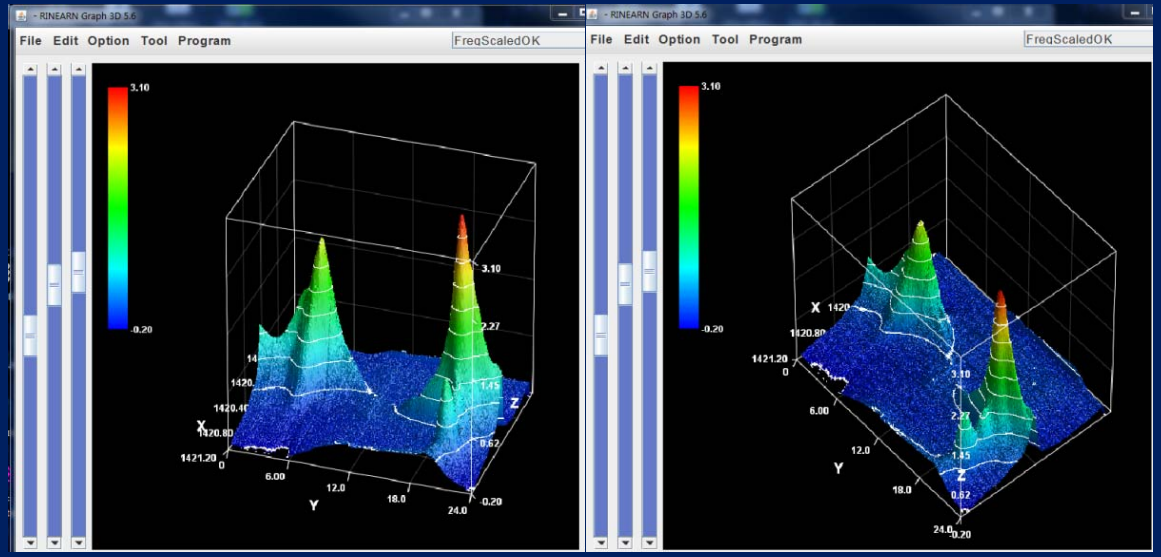


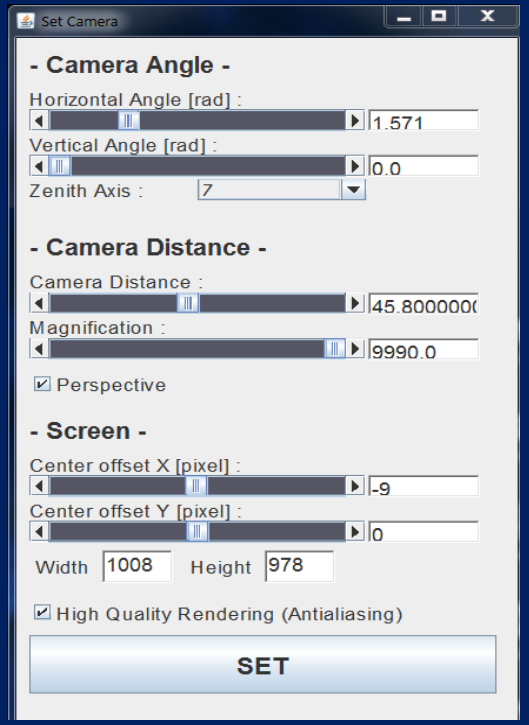


Edit / Camera

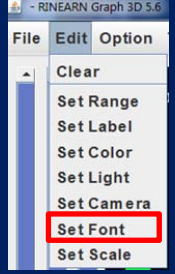


Camera set the
Viewing Position from which the 3D Graph is seen
Try different options

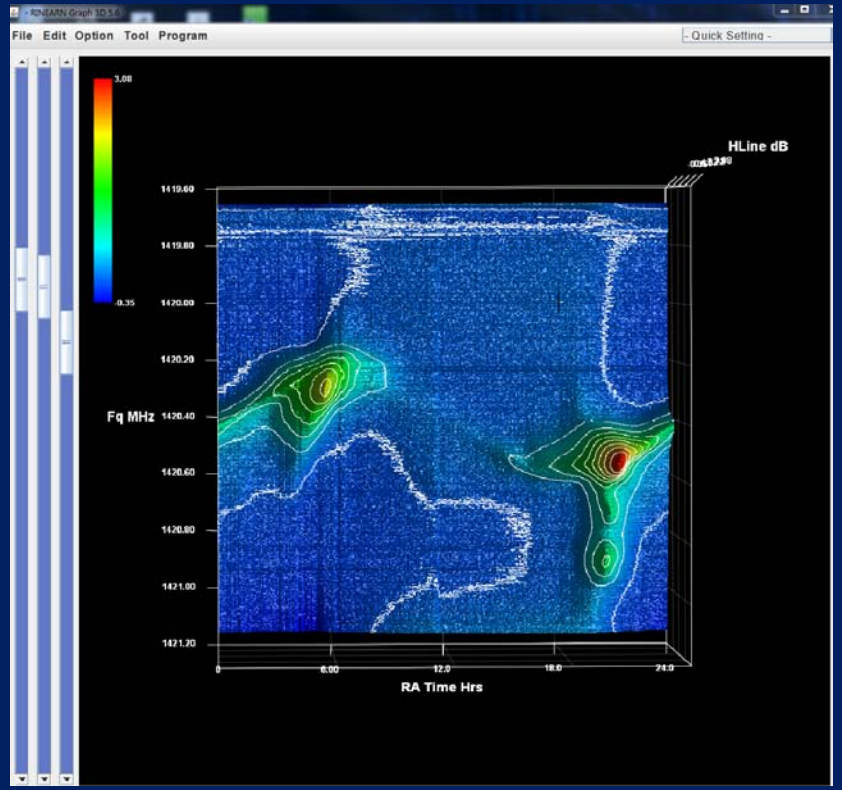




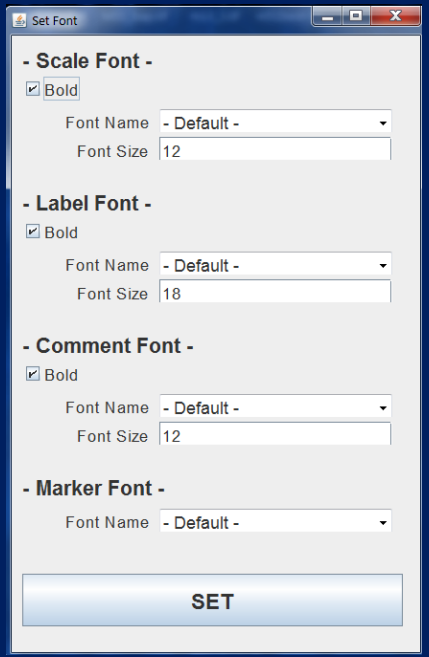
Edit / Set Font



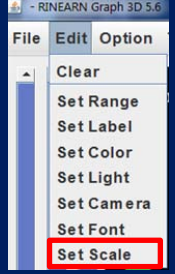
Select **Font** parameters as you wish .

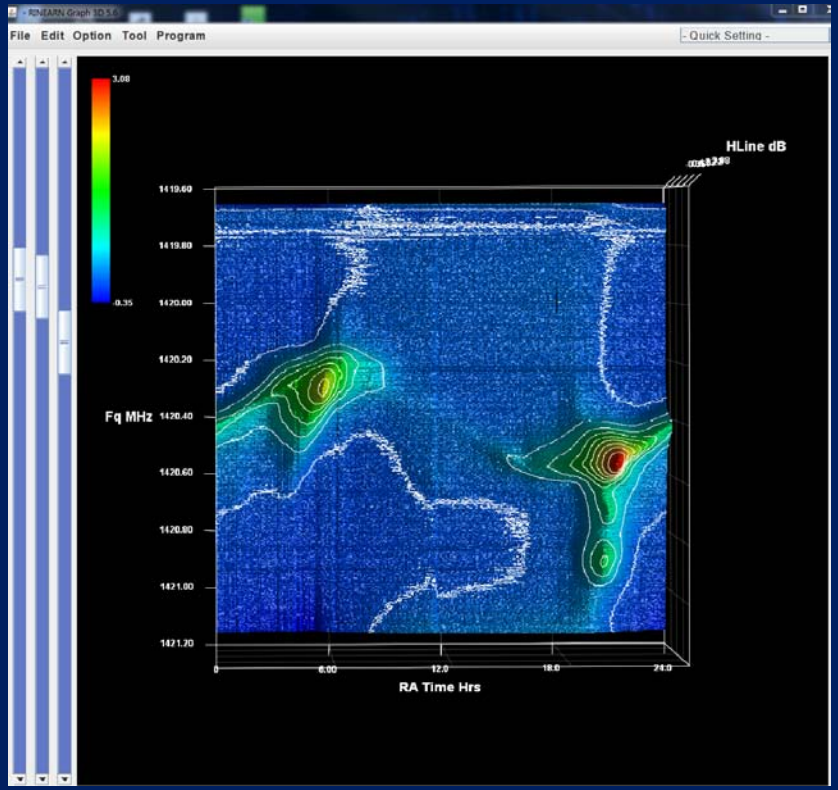


Select Fonts



Edit / Set Scale

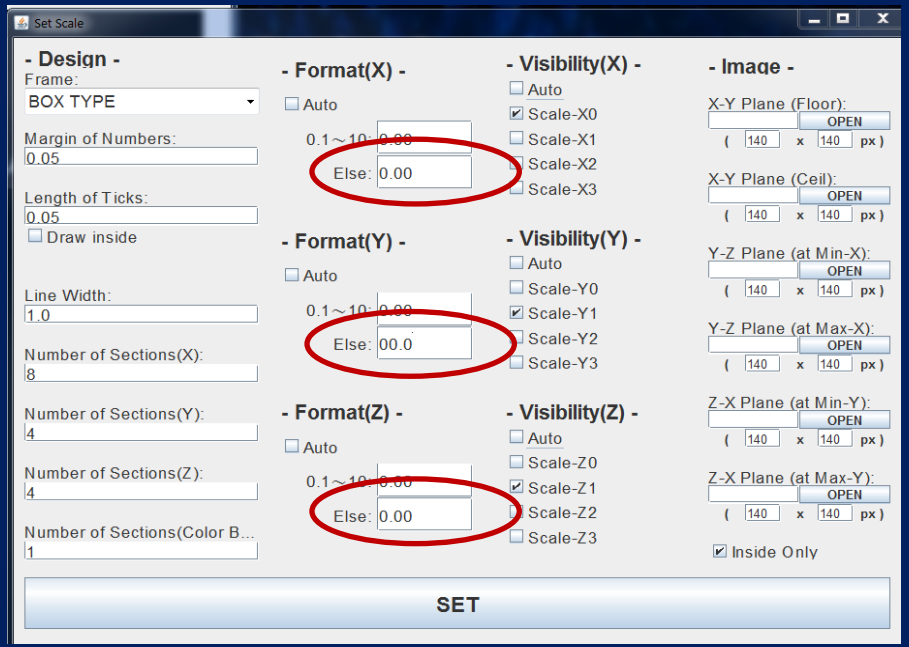




Disable all **'Auto'** options
Select **'Else'** and enter formats as shown below
to properly label frequencies & Time

Select the **Number of Sections** to make the plot increments
Show 'round' numbers.

(**Image** allow you to display a photo at a location)



Add new setting

You can save **All** graphic **Settings** to Named **Quick Settings**