# MySETIviewer

# User's guide

# V1..0.0

# December 19, 2023

MySETIviewer is an application that was written to help visualize the bit stream message from the 'A Sign in Space' project.  This is a user driven effort and has no official affiliation with Daniela de Paulis, the SETI Institute, or the European Space Agency or any other collaborating agency or institute.

# Background

'A Sign in Space'
website, https://asignin.space/

A Sign in Space is an interdisciplinary project by media artist Daniela de Paulis, in collaboration with the SETI Institute, the European Space Agency,  the Green Bank Observatory and INAF, the Italian National Institute for Astrophysics. The project consists in transmitting a simulated extraterrestrial message as part of a live performance, using an ESA spacecraft as celestial source. The objective of the project is to involve the world - wide Search for Extraterrestrial Intelligence community, professionals from different fields and the broader public in the reception, decoding and interpretation of the message. This process will require global cooperation, bridging a conversation around the topics of SETI, space research and society, across multiple cultures and fields of expertise, https://www.seti.org/event/sign-space

The message was transmitted from the ESA's ExoMars Trace Gas Orbiter (TGO) on May 24 at 19:16 UTC/12:15 pm PDT.

It was received by three radio telescopes on earth May 24,2023. A group of individuals in the Discord 'A Sign in Space' channel unscrambled the message from the radio telemetry. The message published as Data17.bin is identified as the correctly transcribed bitstream of the message payload given to ESA.

The next step in the problem is the decoding of the payload bitstream into the next level of the message, the sign in space. After that the interpretation of the sign(s) in the embedded messages can commence.

There is a Discord Interpretation Chat.  The group is large and has a wide array of talent.  The tools that the group is using is quite varied which includes Excel, Photoshop, GIMP, Java, Python and c/c++.

Several people are also using online tools that use file uploads, typically text based. Importing data into Excel is also generally text based.

Photoshop and GIMP can use raw binary files typically 8 bit, 16 bit or 32 bit per element.

None of these tools use bit packed binary input.  The first step has been  to translate the bitstream message into a format that can be used by the various tools. The next  steps involve examination of the bitstream data to solve how to decode it.

# About MySETIviewer

This program is a viewer that I am using in the examination of the message. It allows the user to create layers from images of the bitstream, overlay the layers, change the alignment of the layers relative to each other, assign colors to a layer, and a ruler with major and minor grids  Hopefully this may make it easier for others people to explore the message.

# Limitations

This is a 64 bit Windows Desktop application. It uses .raw and .bmp files for the layers. It also has some functions to convert space delimited text files to .bin files along with conversion of .bin files to .raw image files. PNG files can not used as input for a layer. The PNG file type typically has too much data loss to accurately import.

# Release Notes

## V1.0.0 Release

This is the first release. It includes the Visual Studio project files along with some of the  A Sign in Space data files.  An application installer can also be used just for the executable application and data files.

# Installation

**Any installer and/or executable should be scanned for viruses when being downloaded.  A verification that the checksum for the installation matches the download can also be done as an additional precaution.**

The installer will add a desktop shortcut to run the application along with a Window Start menu entry named MySETIviewer

The installer is a very simple one.  **The default install location is the windows volume drive \MySETIviewer.  This typically c:\MySETIviewer.**   This is used because the application needs to be able to have read/write access of the folder it is installed.  The 'Programs folder' requires administrative privileges to write to it.  I use 'C:\MySETIapp' as the installation location. You can change the folder installation of the application using the browse button during the install.

The project source is also available on GitHub.  The source code,  project, and solution use Visual Studio 2019 or later.  It has not been tested against earlier versions.

file, MySETIviewer.ini, that will be created when you run the software that keeps track of what files, parameters, window size and positions are used so that you do not have to start from scratch every time you run the application.  This is stored in the same folder as the executable.  The application does not need to access, record, or transmit information to the Internet.

## LAYERS and DISPLAY

There are 2 basic part of the viewer; the Layers, and the Display (Image window).

A layer is an image loaded from a .BMP or .RAW file.  A layer is treated as a binary image. If a pixel is 0 then it is assigned the Layer background color. If it is not 0 then it is assigned the Layer color.  Up to 8 layers can be added to the overlay.  This viewer works by creating an overlay of the layers.  Each layer can be moved within the overlay.  This allows the layer alignment to be set for each layer.  The overlay image without the rulers can be also saved as a .BMP file.  The layers are controlled from the Settings->Layers dialog.

The Display takes the overlay image and applies the ruler as defined in the Display Settings dialog. The Display is shown as a separate Image window which can be resized, panned, and zoomed.  The overlay image with the rulers can be saved as a .BMP file.

# First time running the application

A temporary working directory needs to be specified.  This should be the first thing done when you run the application. Go to Settings->Global in the menus. Browse to the folder to be used as the Temp folder. I use c:\MySETIviewer\Temp which is created by when the program is installed.
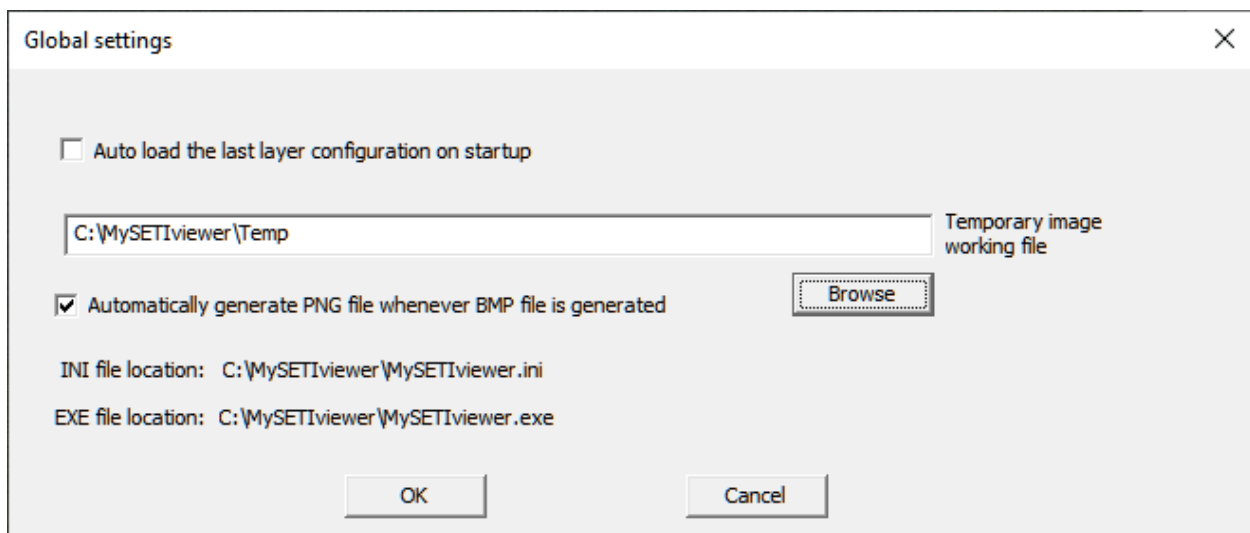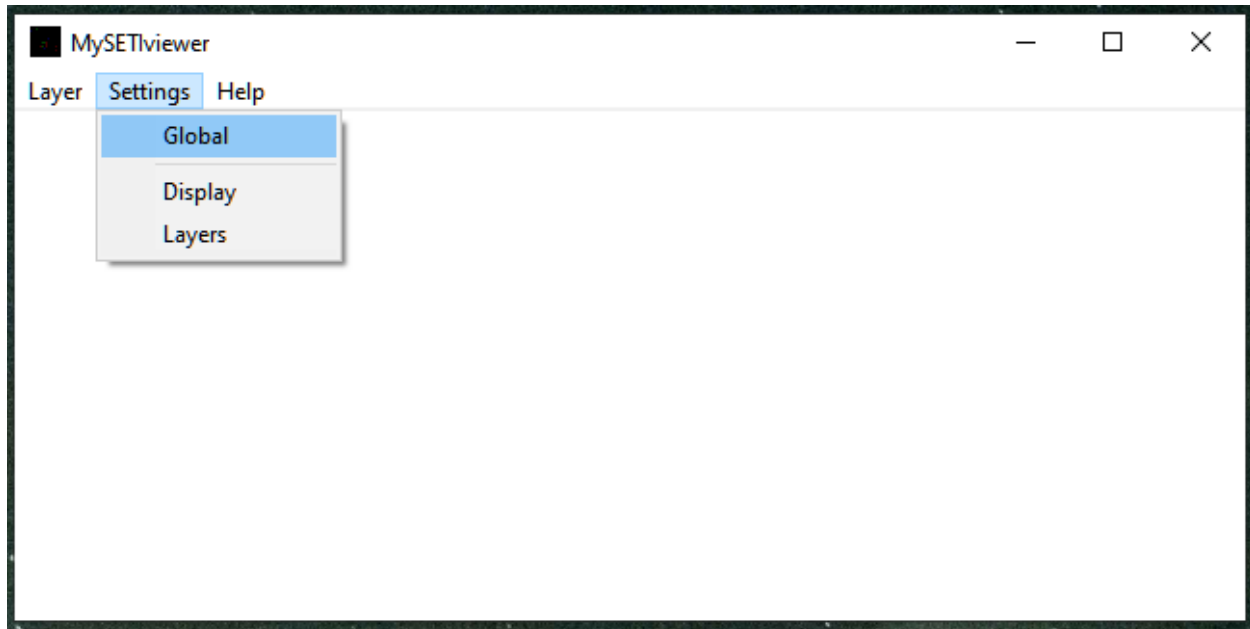




The next step is to resize the application window.  The size and position of the application on the screen when the application exits will be used the next time the application runs.  You only need the application to be large enough to see and use the menus.  No data is displayed in the main application screen.  Go ahead exit and restart the application.

# Display

When you open the application again it will also show the Display settings dialog.  This dialog does not need to be closed.  The menus are is fully accessible while the Display settings dialog is visible.  The dialog will also remember it screen position for the next time it is shown.
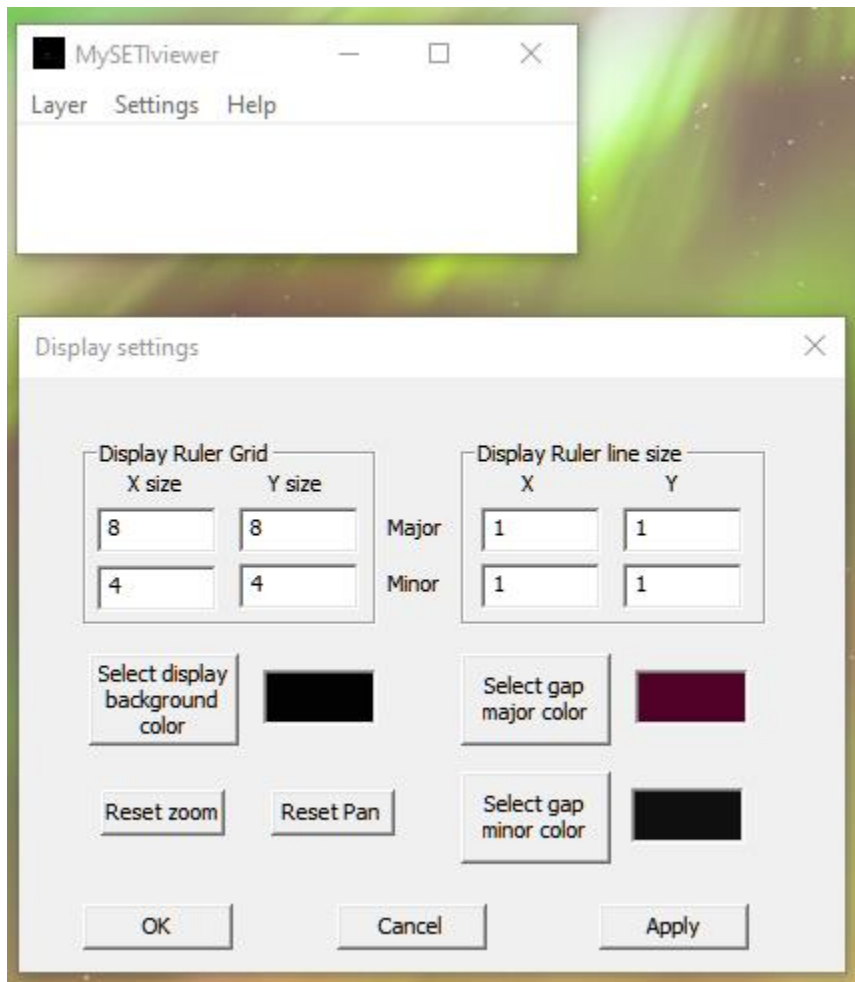


I would recommend using the default colors initially.  In case you change them and want ot change them back they are; background RGB = 2,2,2, Major Gap RGB = 81,0,40, and Minor Gap RGB = 15,15,15.

If you accidentally close the Display dialog you can always open it again from the menus; Setting->Display.
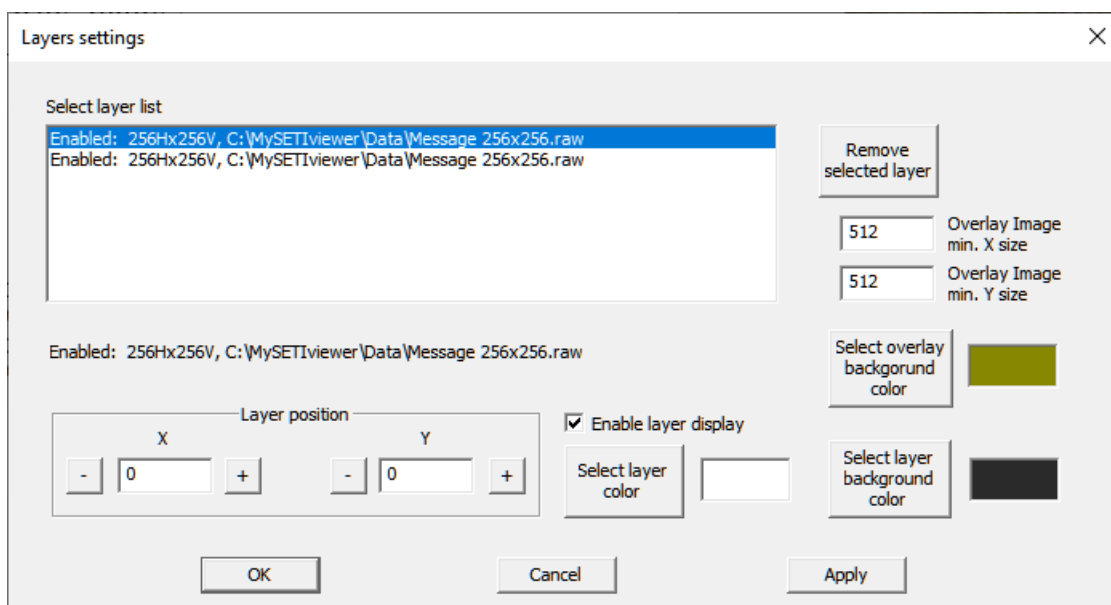
The next step is to add some layers.  We will start by just adding 2 layers.  In the menus select Layers->Add Layer from RAW or BMP file.
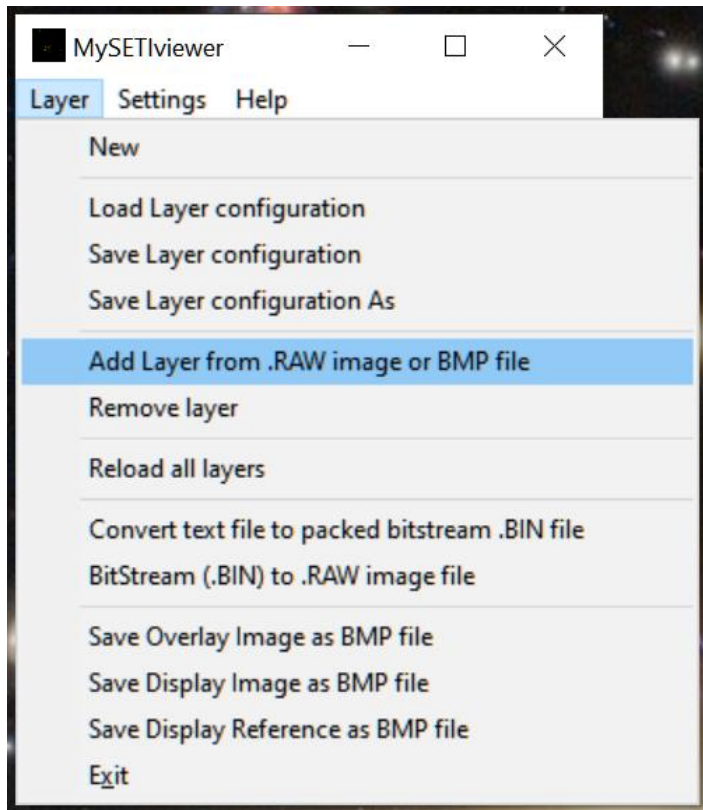


Go to the c:\MySETIviewer\Data directory and select the 'Message 256x256.raw'.

Do this a second time using the same 'Message 256x256.raw'.

Now go to the menu selection Settings->Layers.  You should have the following dialog:

Click Apply



The Image window should appear and look like this.  The overlay image where there is no image is dull yellow.  If the initial aspect is not square just resize the window by dragging a window edge. It will snap to the correct aspect ratio.

Try changing the selected Layer position in both x and y. Try changing the color using the Select layer color button to see the effect.  The initial colors for layers when the program is first run is white.  If you loose track and want to set the colors back to their original values they are: layer background RGB = 136,136,0,

Try enabling and disabling a layer to see the effect.

Click Okay in the Layers setting dialog. From the menu select Layer->Save Layer Configuration and save it.  This allows you to quickly load different layer configurations you are trying.
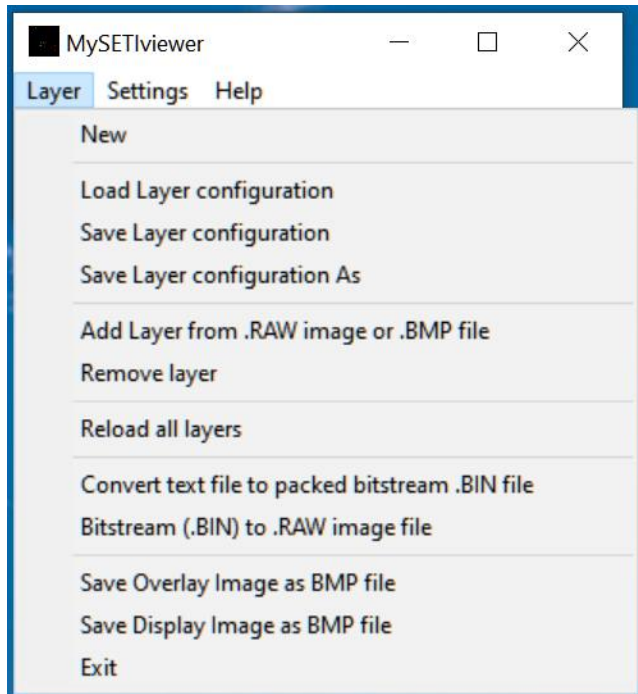
Have fun.

# Menus

The menus are simple. There are only 3 headings:
Layer    Settings         Help

## Layer menu



The Layer menu has of the overhead operations involved with loading layers, saving configurations and results, clearing, or reloading layers,  adding layers, or converting image files of different types.

### New
This clears all current layers.  You must either add new layers or load a layer configuration file.

### Load Layer configuration
This loads a layer configuration file.  It removes all currently loaded layers first.  All colors definitions including display and display rulers are reloaded as part of the layer configuration file.

### Save Layer configuration
This saves the current configuration.  If the configuration was loaded from a file, it is saved back to that file.

### Save Layer configuration As
This saves the current configuration as a new file.

### Add Layer from .RAW image or .BMP file

This adds a layer to the current configuration.  Only 2 type of files are supported; .RAW and .BMP.  The .raw file was generated either by this application or the MySETIapp application.  The BMP file can be any 1 bit, 8 bit, or 24 bit BMP file.

NOTE: Layer images do not have to be the same size.  All images are centered in the overlay image plus any offset specified for that layer.  Initially an image is loaded without any offset.  You can change this in the Layers settings dialog.

### Remove Layer

This opens the Layers dialog.  You should use the Remove layer button after selecting which layer is to be removed.

### Reload all layers

This rereads all layers from their files.  This allows layers to be modified by an external application(s) including the size and then visualize the results.

### Convert text file to packed bitstream .BIN file

Many online users have been using text based files or generating text based files.
This operation imports a binary input text based input file with whitespace delimiters.  Values >0 are set to 1.  The input is packed into bytes.  If not enough bits are in the input file to complete the last byte, then that byte is 0 padded to complete it.

### Bitstream (.BIN) to .RAW image file

This viewer application uses .raw or .bmp files as input.  The 'A Sign in Space' message is a packed bitstream .bin file.  This operation can convert the message into a .raw file that can be used by this application.

### Save Overlay Image as BMP file

This saves the current Overlay image being displayed as a 24 bit BMP file.  This does not include the ruler.  Use the 'Save Display Image as BMP file' if you wan to include the ruler in the image.

### Save Display Image as BMP file

This saves the current Image window being displayed including the ruler as a 24 bit BMP file.  If you do not want to include the ruler, then use the 'Save Overlay as BMP file'.
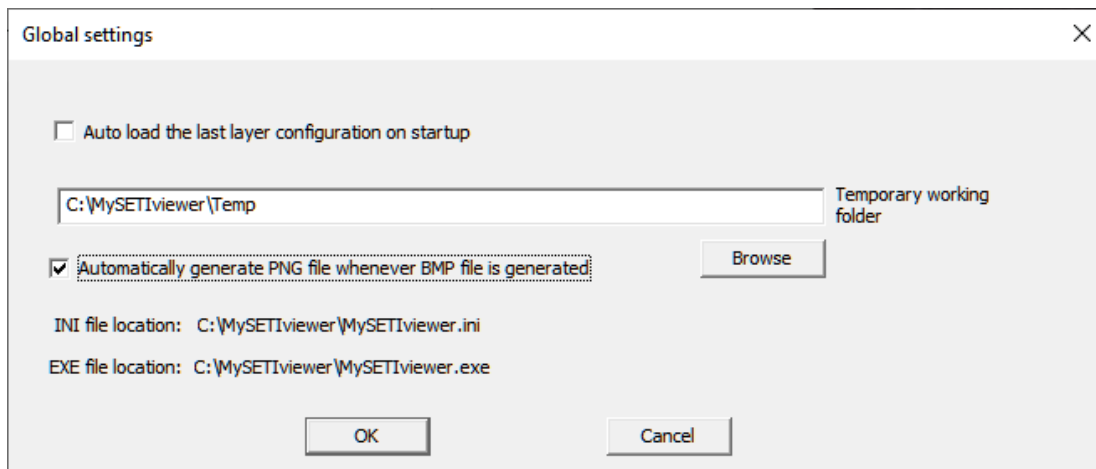
### Exit

This exits the program.  You DOES NOT automatically save your current configuration.  You should save your current configuration if you want to save it before exiting.
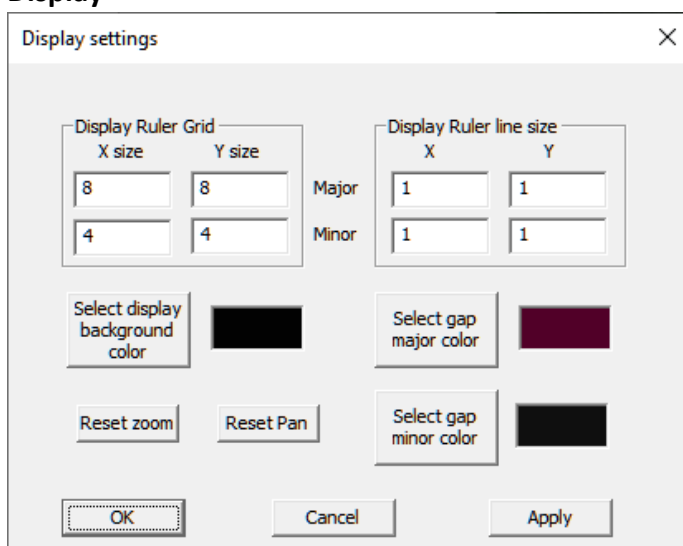

## Settings menu
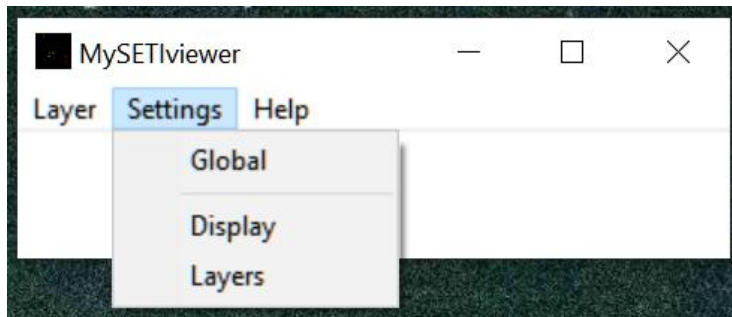
The Settings menu allows the user to set the global parameters, Display parameters and Layers parameters.

## Global



There are only a few global settings. The temporary working folder must be defined at the initial application execution.
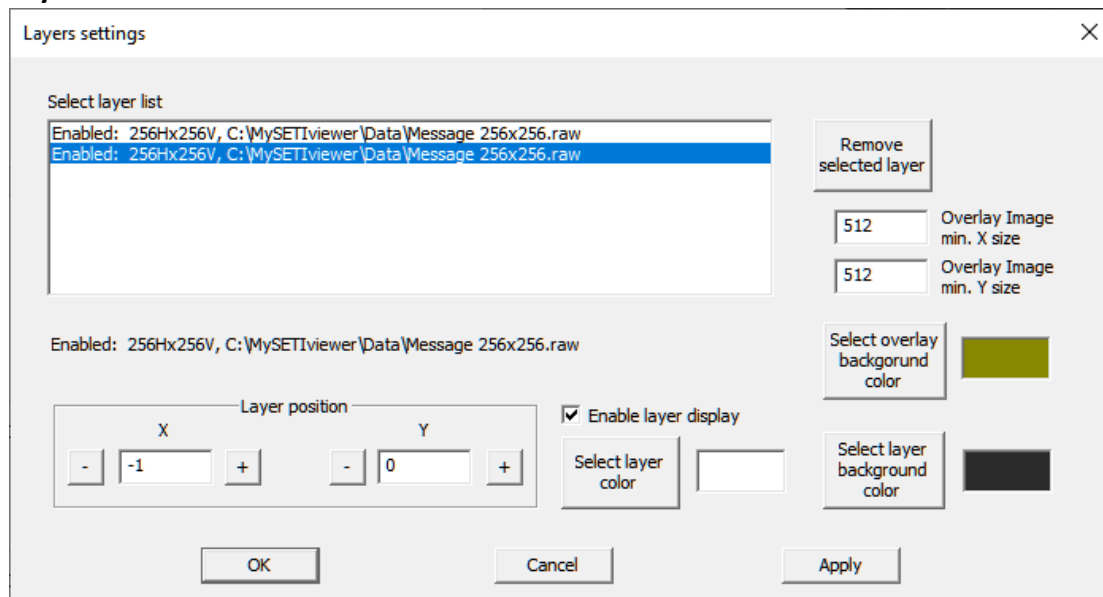
## Display

This dialog sets all the display parameters that control the rulers for the display. The x,y ruler sizes must be greater than or equal to 1. The minor ruler size is in image pixels. The major ruler size is the number of minor ruler division per major ruler division. If you do not want to use major or a minor ruler then set the line size for that ruler to 0.

The displayed image can be panned and/or zoomed. The Reset buttons allow the pan and zoom of the displayed image to be quickly reset.

## Layers



This allows full control the layer parameters. This includes optionally enabling or display any layer in the currently displayed image. The Layer position allows a layer to be offset in the overlay image. This allows layers to be aligned differently with respect to each other.

The overly image min. size sets the minimum overlay size. If the moving a layer plus the size of the layer is larger than the minimum overlay size the overlay will be enlarged to accommodate it. It is much easier to move layers relative to each other if the minimum overlay image is large enough to accommodate any layer positioning. You should also make the minimum overlay size a modulo of the 'major ruler size times the minor ruler size.' It does not have to be the same in both dimensions.

**Help->About**
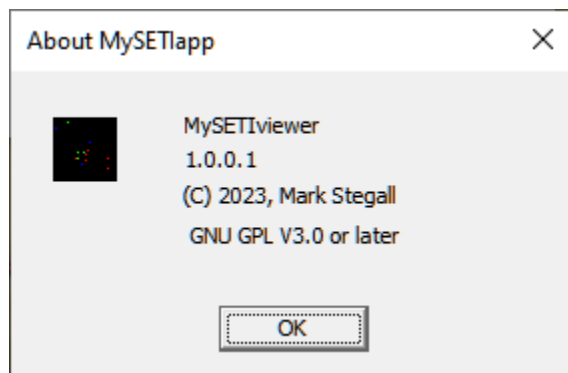


This displays the application's current version.

# Image window

The Image window displays the overlayed image along with any ruler grids. This window's aspect ratio is constrained to match the Image window. If the Image window to not appear to have correct aspect ratio just resize the Image window. It will snap to the correct aspect ratio.



### Zooming the image

If you mouse cursor is on the Image windows using the mouse wheel will increase or decrease the zoom of the image depending on the direction you move the wheel.

### Panning the image

The mouse will pan the image when the cursor is initially on the Image window and the left mouse button is held down while the mouse is moved.

### Reset of the zoom and pan

This is done in the Displays dialog.

# Version information

V1.0.0.1   Dec. 19,2023          Initial release