

AUSTRALIAN NATIONAL FACILITY FOR OCEAN GLIDERS (ANFOG)



v1.0

Users' Manual

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1 Introduction

NetCDF (Network Common Data Form) data files typically contain information that include not only various kinds of scientific data, but also a wealth of useful information about the data (e.g. unit of measurement, valid limits), instrumentation, quality control flags and their meanings, etc. However, because of the level of coding required to access the information, NetCDF files can be quite time consuming to use and tricky to handle for most researchers and lay people alike. *NetCDF Ninja* serves to eliminate the complexity completely.

NetCDF Ninja is a graphical user interface that allows users to browse all the metadata contained in NetCDF files, scrutinise the data using an interactive graphical plot and even stealthily make small alterations or export the data in text format without using any knowledge of coding.

2 Downloads

NetCDF Ninja is compatible with Macintosh as well as Windows computers and is available as standalone software or a handy Matlab App installed on the app toolbar if users already have Matlab installed.

Software is freely available from the IMOS (Integrated Marine Observing System) website at <http://imos.org.au/facilities/oceangliders/glider-data/>

Specifically, the download links are as follows:

Standalone Software Installation Package:

For Windows computer:

http://anfog.ecm.uwa.edu.au/software/NetCDFNinja/Win/NetCDFNinja_Installer.zip

For Macintosh computer:

http://anfog.ecm.uwa.edu.au/software/NetCDFNinja/Mac/NetCDFNinja_Installer.app.zip

Matlab App:

For Windows computer:

<http://anfog.ecm.uwa.edu.au/software/NetCDFNinja/Win/NetCDFNinja.mlappinstall>

For Macintosh computer:

<http://anfog.ecm.uwa.edu.au/software/NetCDFNinja/Mac/NetCDFNinja.mlappinstall>

Feedback for *NetCDF Ninja* or this instruction manual may be directed back to the author, Dr Lai Mun Woo of the Australia Facility for Ocean Gliders (ANFOG): anfog-ecm@uwa.edu.au

3 Installation

Standalone:

To install *NetCDF Ninja* to be run on a computer without pre-installed Matlab software, download the *NetCDF Ninja* standalone software installation package for your computer system (Mac or Win). Unzip and run the package, following the on-screen instructions. To start the software, double click on the executable icon (Fig. 1) named NetCDFNinja. The default location of this will be on the desktop (Win) or the ANFOG folder in the Launchpad (Mac).



Figure 1. NetCDF Ninja executable icon on Windows desktop.

Matlab App:

To install *NetCDF Ninja* onto the app toolstrip in Matlab, simply run Matlab and navigate to *NetCDFNinja.mlappinstall* in the current folder, double click to install.

Alternatively, simply double click on the file *NetCDFNinja.mlappinstall* wherever it has been saved to, and Matlab will slowly start up and install it. You may choose to star the installed app as a favourite so that it appears conveniently in your first row of visible apps.

To start the app, just press on the NetCDF Ninja icon on the Apps toolstrip (Fig. 2).

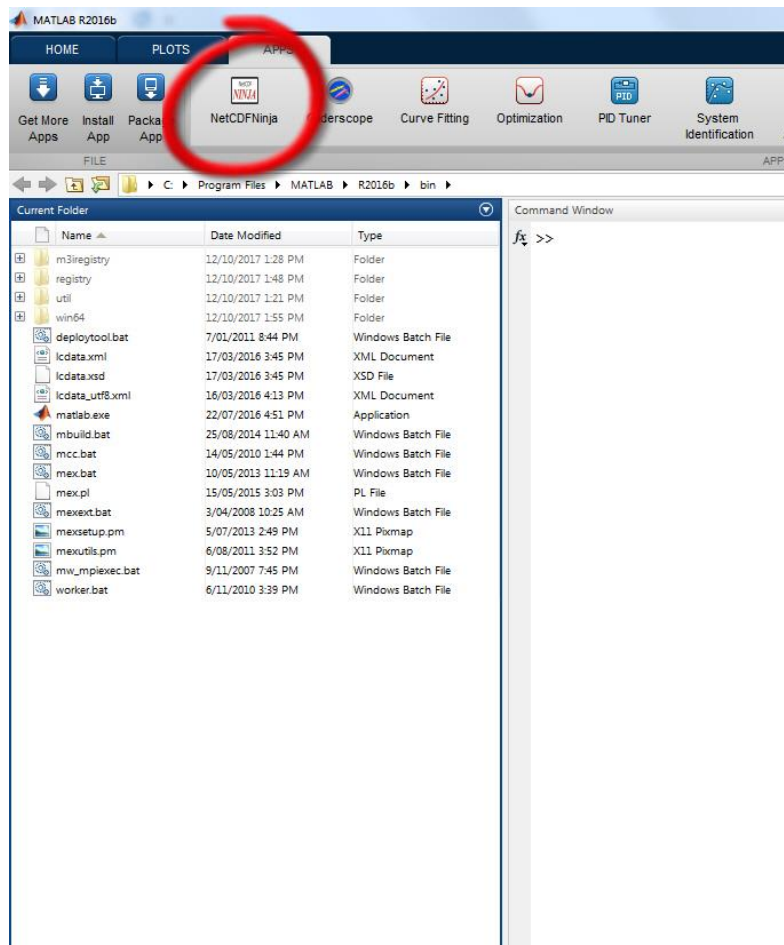


Figure 1. *NetCDF Ninja* app icon on the Matlab Apps toolstrip.

4 Using NetCDF Ninja

The *NetCDF Ninja* dashboard (Fig. 3) is your tool to spy into the contents of any NetCDF file. It has a black talkscreen on the left where you will get helpful instructions every step of the way.

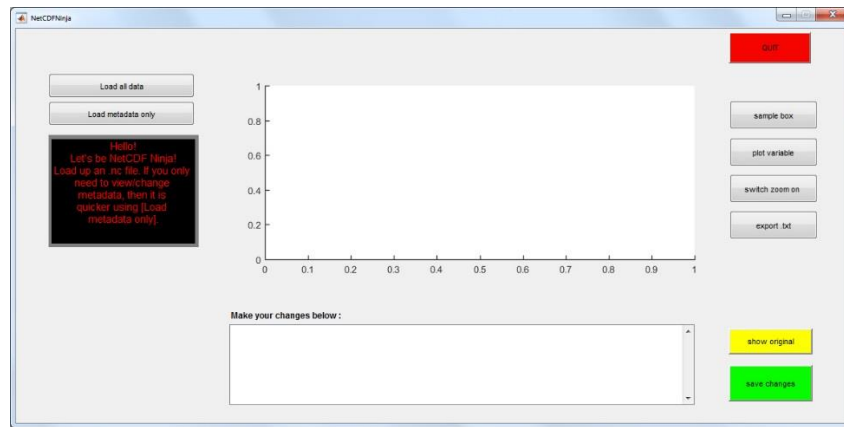


Figure 3. *NetCDF Ninja* dashboard.

4.1 Load File

- Firstly, load up your NetCDF data file. If you are interested only in the descriptive information contained in the metadata, then press [**Load metadata only**], because then you save time by skipping past loading up the volume of scientific datasets contained in the variables.
- But if you are interested in seeing/changing the actual numbers stored in the variables, then press [**Load all data**].
- The name of the file and the numbers of global attributes and variables found

4.2 Global Attributes

- To view/make changes to Global attributes/constants, first click on the **Global Att** radio button (Fig. 4).

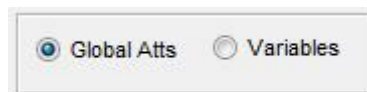


Figure 4. Radio buttons to select either Global attributes or Variables.

- Use the dropdown menu to choose an attribute (Fig. 5).
- The information contained at the chosen attribute is displayed (Fig. 6). You can make changes to it by altering the text in the box and then pressing the [**save changes**] button. If you change your mind and want to revert to the original metadata, press on [**show original**] and then [**save changes**] again (Fig. 6). You will then be able to choose whether to save over your original NetCDF file, or to save the change in a new file.

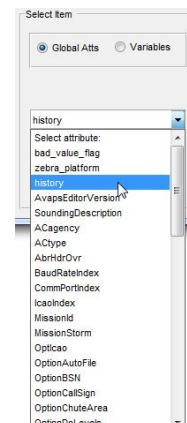


Figure 5. Dropdown menu to choose individual Global attributes.

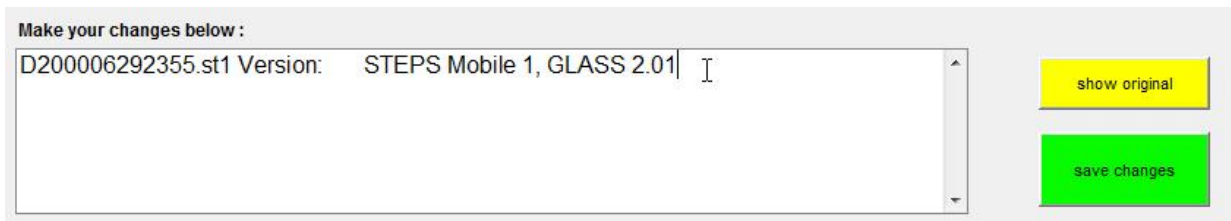


Figure 6. Selected information is displayed in the typing box where users can edit; buttons allow users to save or reverse any changes made.

4.3 Variables

- To view/make changes to Variables' values or their attributes, first click on the **Variables** radio button (Fig. 4).
- Then, select the variable of interest from the **select variable** dropdown menu (Fig. 7).

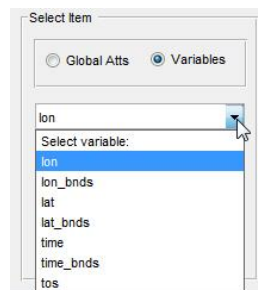


Figure 7. Variable dropdown menu shows the available variables users can select.

4.3.1 Variable attributes

- To view/change metadata of the chosen variable, select the relevant attribute from the **select attribute** dropdown menu.
- The information contained at the chosen attribute is displayed (Fig. 6). You can make changes to it by altering the text in the box, and then pressing the [**save changes**] button. If you change your mind and want to revert to the original information, press on [**show original**] and then [**save changes**] again (Fig. 6).

4.3.2 Variable values

- To view the dataset graphically, press on the [**plot variable**] button. All the values will plot up into the on-screen chart, including fill values (Fig. 8).

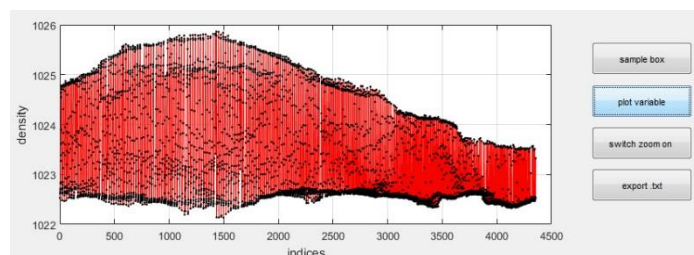


Figure 8. Density values are plotted with the press of the [**plot variable**] button.

- To have a closer look at the data, use the [**switch zoom on**] button and then using the mouse, drag a box to indicate the area to zoom into. Press [**switch zoom off**] button to stop zooming. (*Handy tips:

double click to quickly zoom back out to initial state; shift-click to zoom out; use the scroll on the mouse to zoom in or out.)

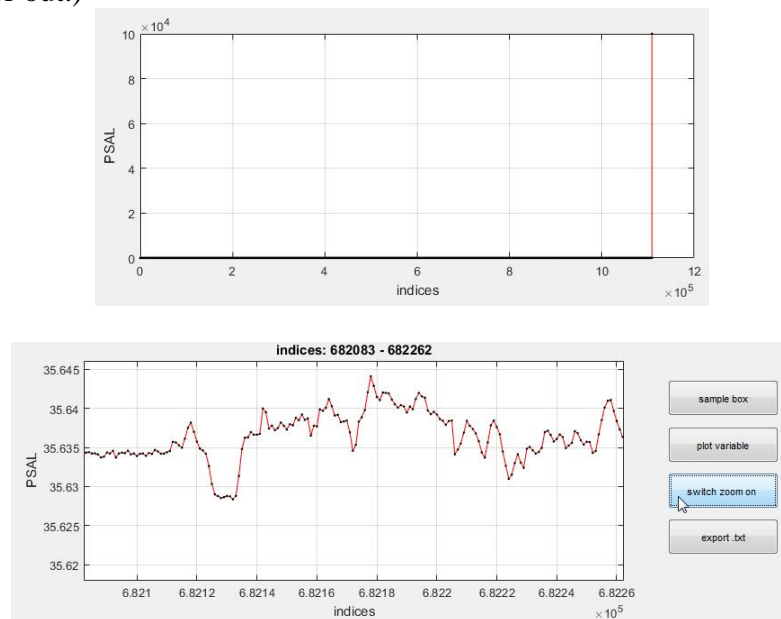


Figure 9. (Top) Salinity plot shows fill values of 99999 at the end of the dataset. (Bottom) Detailed patterns in the Salinity measurements become more obvious using the zoom toggle button.

- To quickly determine the range of data anywhere on the plot, press on the **[sample box]** button, then drag a box over the area of interest using the mouse. The data range and the corresponding indices in the dataset are shown in the talk screen (Fig. 10).



- To manually adjust a value stored in a dataset, type its index position in the index box and hit **Enter**. The corresponding data is displayed in the window where it can be altered (Fig. 11). Press **[save changes]** to record the change.

Figure 10. *NetCDF Ninja* tells you the data and index range in any part of the plotted dataset.

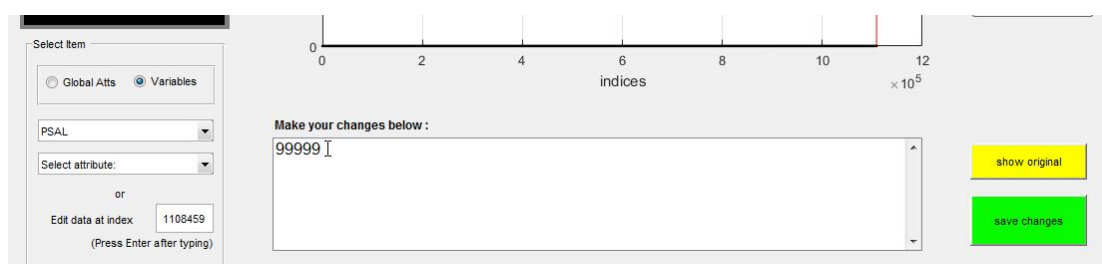


Figure 11. 99999 stored as the 1108459th number in the PSAL variable can now be edited by the user.

- To export the values of the chosen variable dataset (e.g. salinity) as a text file, press on the **[export .txt]** button.

5 Finish

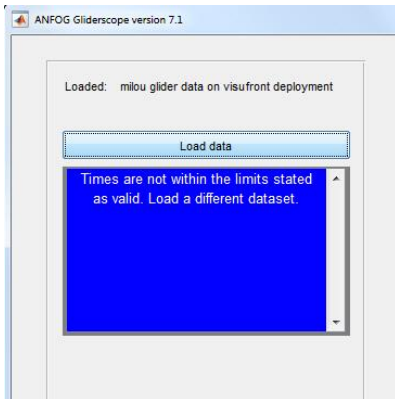
When you are done, quit by pressing the red [QUIT] button or the [x] on the top right (Fig. 12).



Figure 12. To end the program, hit the red [QUIT] or just close the window with [x].

6 Example

NetCDF Ninja is especially useful for effortlessly correcting mistakes in poorly written NetCDF files. Here is a quick example:



A scientist tries to load up some ocean glider data downloaded from EGO (Everyone's Gliding Observatories) into the very excellent *Gliderscope* software. But something is not right...

It appears that none of the data can be used because the time stamps are all bad (Fig. 13). No problem for *NetCDF Ninja*!

Figure 13. *Gliderscope* says that there is a problem with the time variable in the NetCDF file loaded

- Using the [plot variable] function of *NetCDF Ninja*, the data is displayed (Fig. 14).

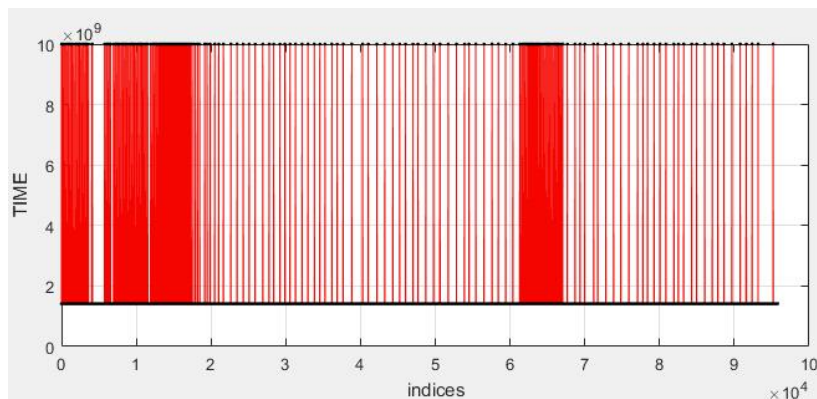


Figure 14. *NetCDF Ninja* shows that the values of time are either close to 10×10^9 or 1.5×10^9 .

- The high values are ignored because the scientist can easily see that these coincide with the `_FillValue` attribute of the time variable (Fig. 15).



Figure 15. The `_FillValue` attribute of the time variable is easily seen.

- Using **[sample box]** allows the scientist to box the bottom line of data and immediately know that the time data ranges from 1.413×10^9 to 1.416×10^9 , which is far more than what has been recorded as the `valid_max` of time (Fig. 16).

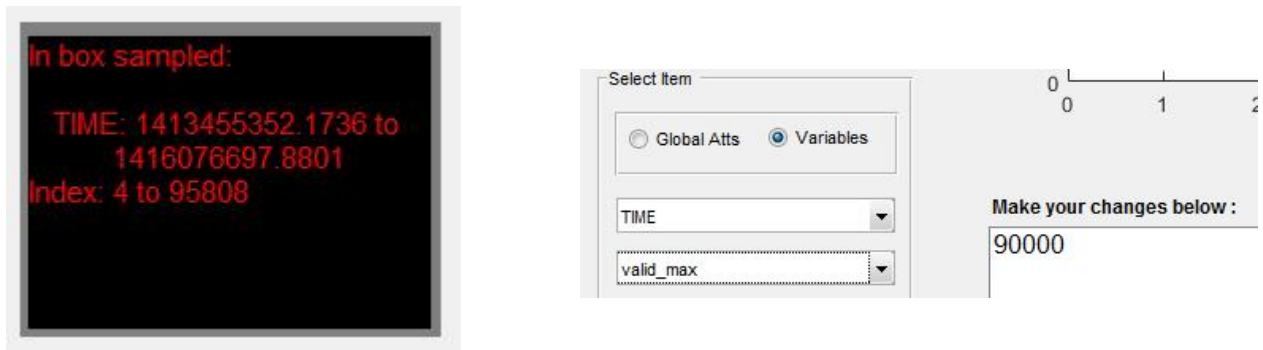


Figure 16. (Left) The range of the time data shown using the **[sample box]** function, far exceeds the (Right) `valid_max` value of 90000.

- Very simply, the number is changed to $2E9$ with a couple of quick key strokes, and the file saved with the press of the **[save changes]** button.
- Now there is no problem with the file and elegant plots can be made from the data (Fig. 17).

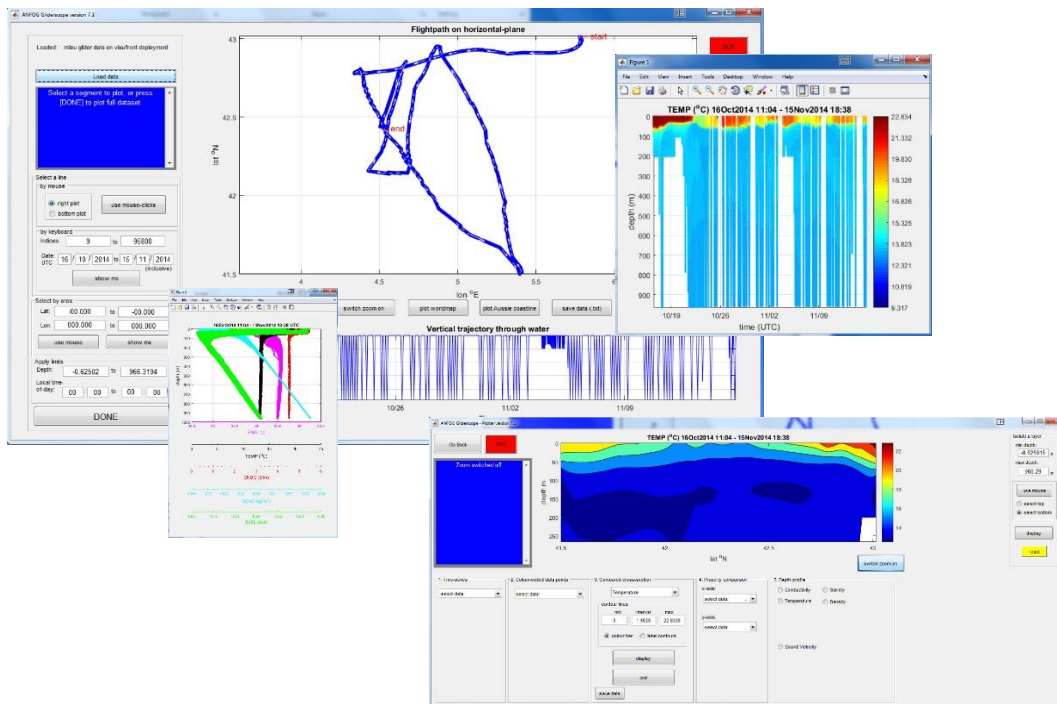


Figure 17. Successful outputs from *Gliderscope**

*Note: *Gliderscope* is freely available from <http://imos.org.au/facilities/oceanglidern/glider-data/gliderscope/>