# NetCDF in QGIS tutorial

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**NetCDF in QGIS**
Gregory Giuliani – 11/03/14

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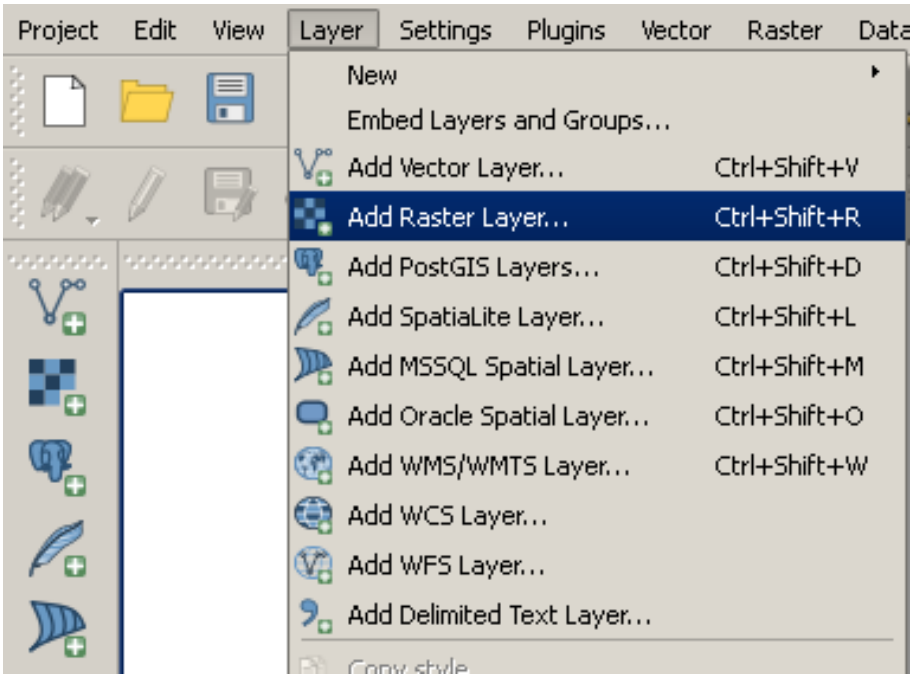
## Displaying a raster layer from a netCDF file

Download data from the NOAA ESRL portal:

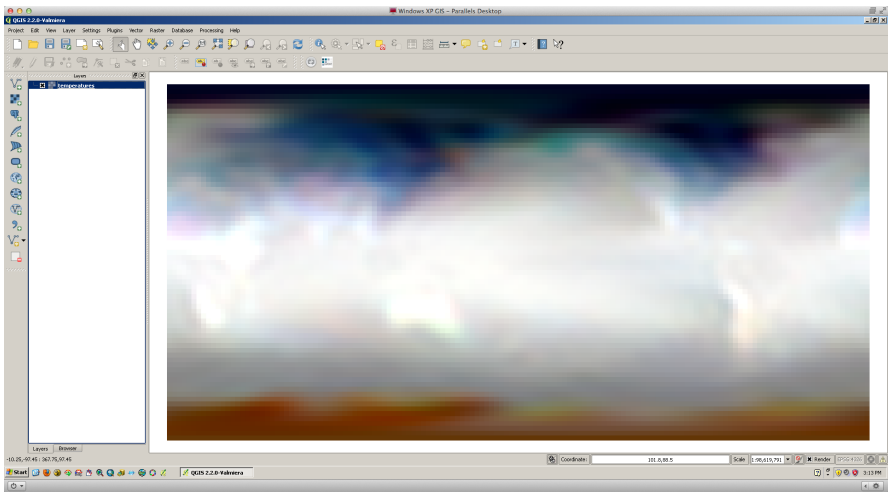
http://www.esrl.noaa.gov/psd/cgi-bin/DataAccess.pl?DB_dataset=CDC+Derived+NCEP+Reanalysis+Products+Pressure+Level&DB_variable=Air+Temperature&DB_statistic=Mean&DB_tid=40338&DB_did=37&DB_vid=989

### Opening a netCDF file in QGIS

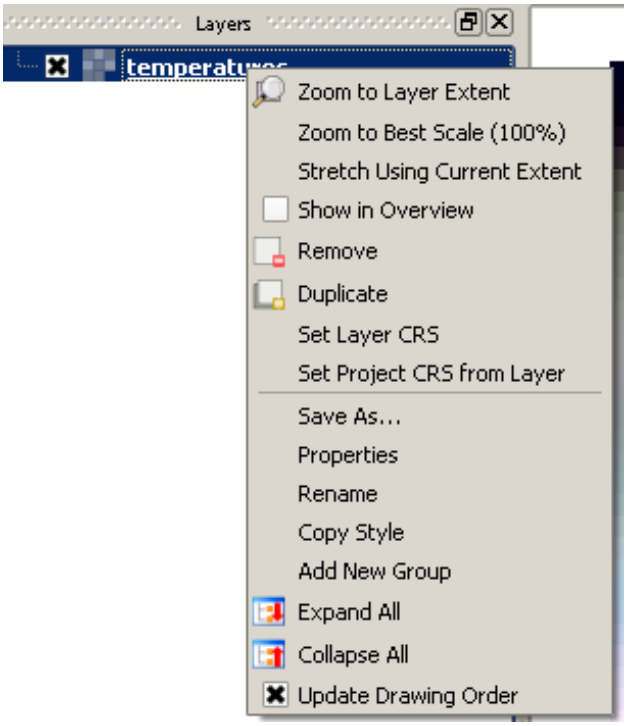
NetCDF format is natively supported in QGIS.
To open a NetCDF file, go to :
***Layer->Add Raster Layer***




You will be prompted to select which NetCDF file to open, which coordinate reference system to use (in our case WGS 84), and which variable to import.

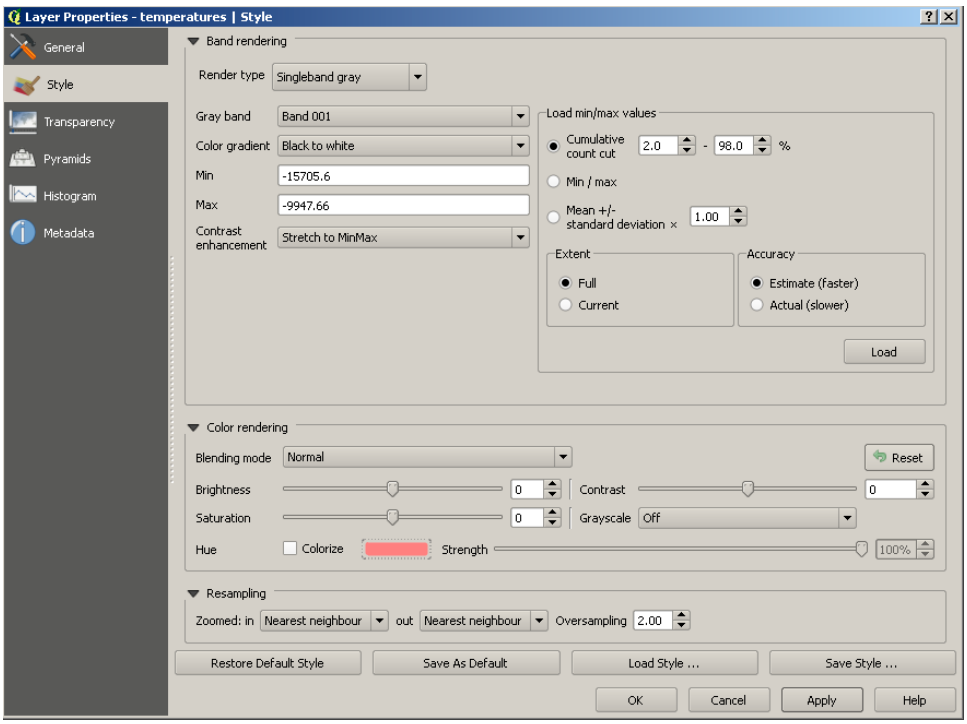


To change the rendering of your data ***Right-Click*** on the layer and select **Properties.**




You can change the rendering of your data under the ***Style*** tab.

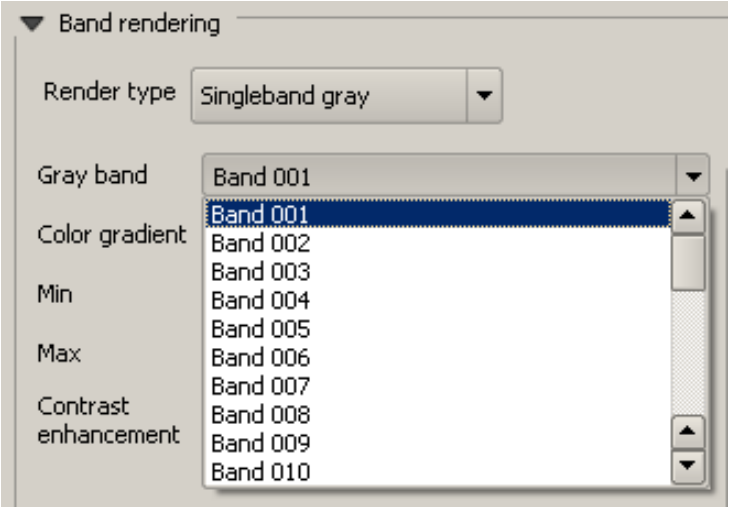
- *Render type:* Singleband gray
- *Load button* (under Load min/max values)
- *Contrast enhancement:* Strech to MinMax
- *OK*



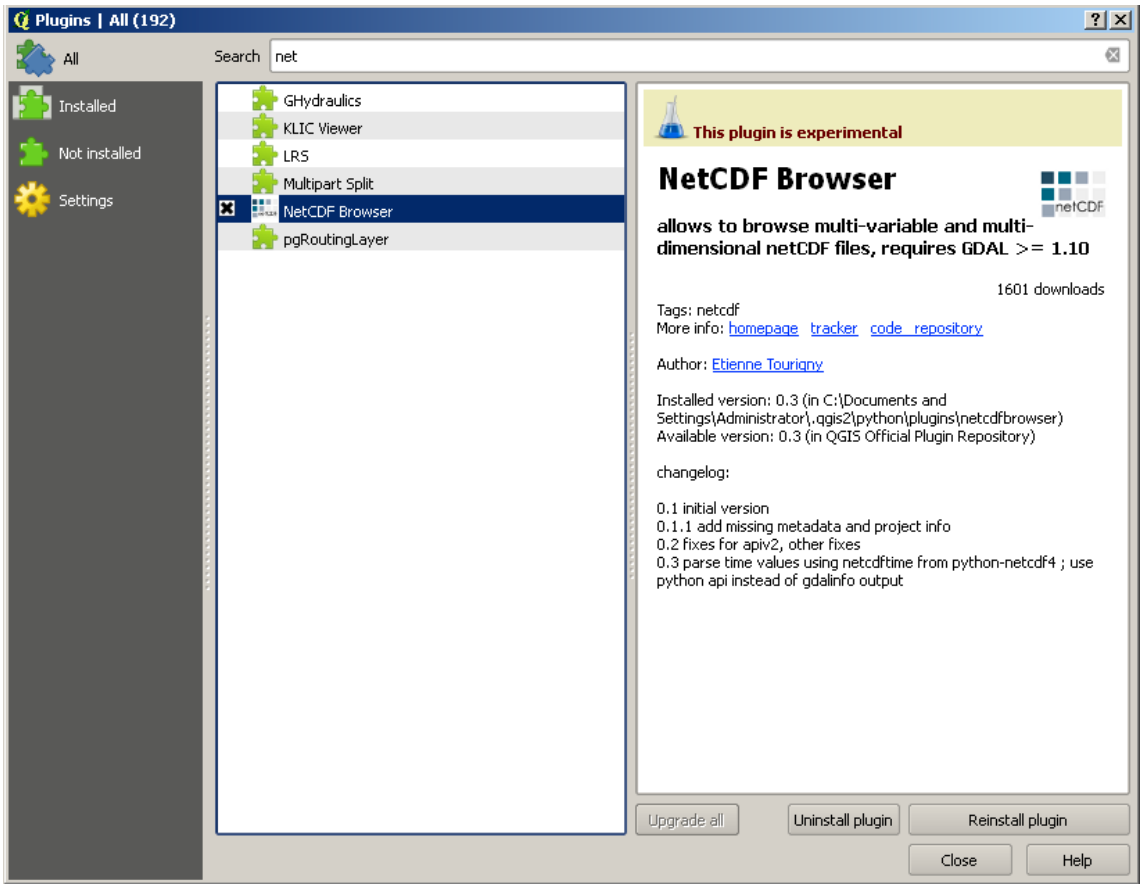

Your data is now visible in a streched gray version.

## Display a specific time step

Currently QGIS handles each time slice has a single Band. So if you wish to select a specific time step, you have to select the corresponding band under the ***Style*** tab!




Another option is to use the *NetCDF Browser* plugin.
To download and install the NetCDF Browser plugin go to:
***Plugins > Manage and Install Plugins…***
Search for « netcdf » in the *All* tab. Select and Install NetCDF Browser.



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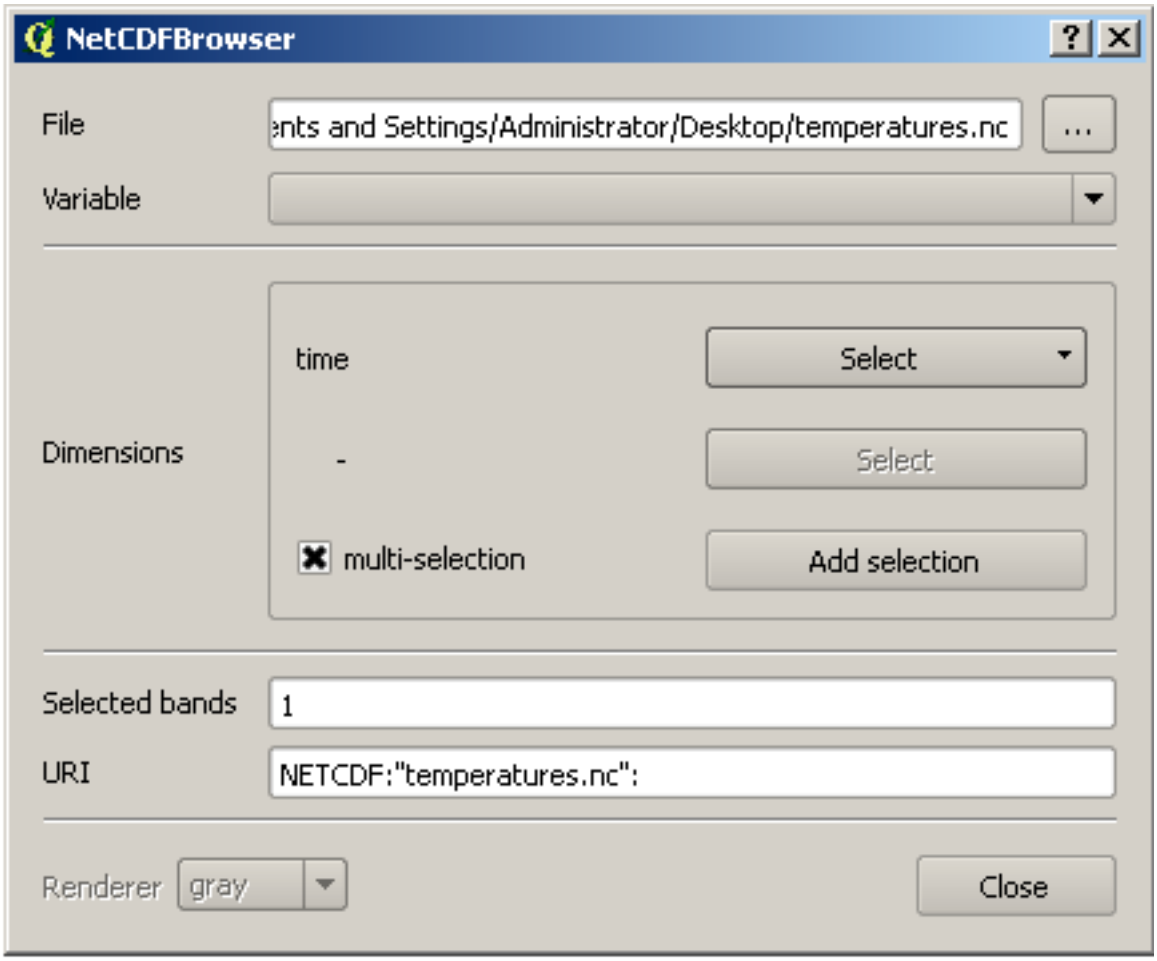
Once installed, the NetCDF Browser plugin should appear in your tool bar.

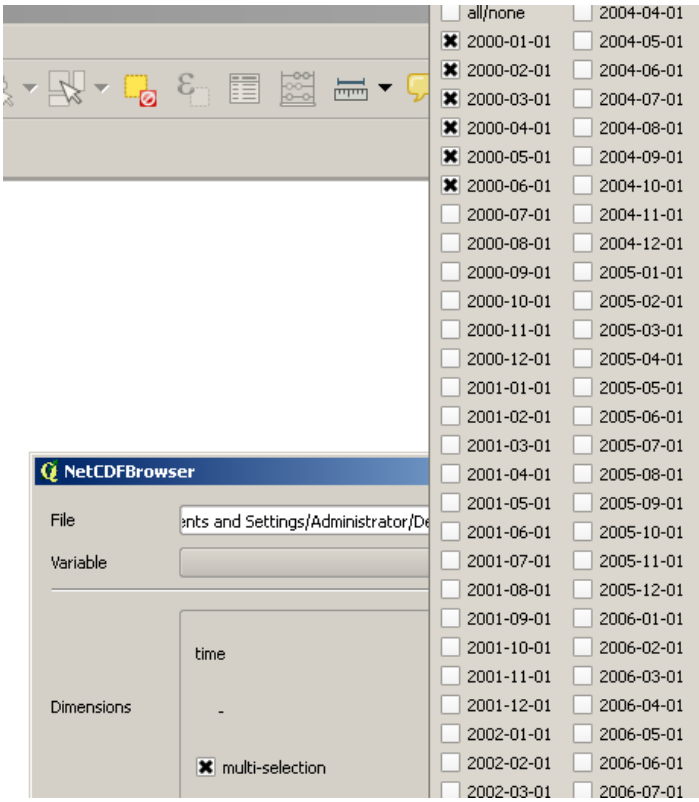
Click on the NetCDF Browser icon to launch it.

You will be asked to select your NetCDF data set.

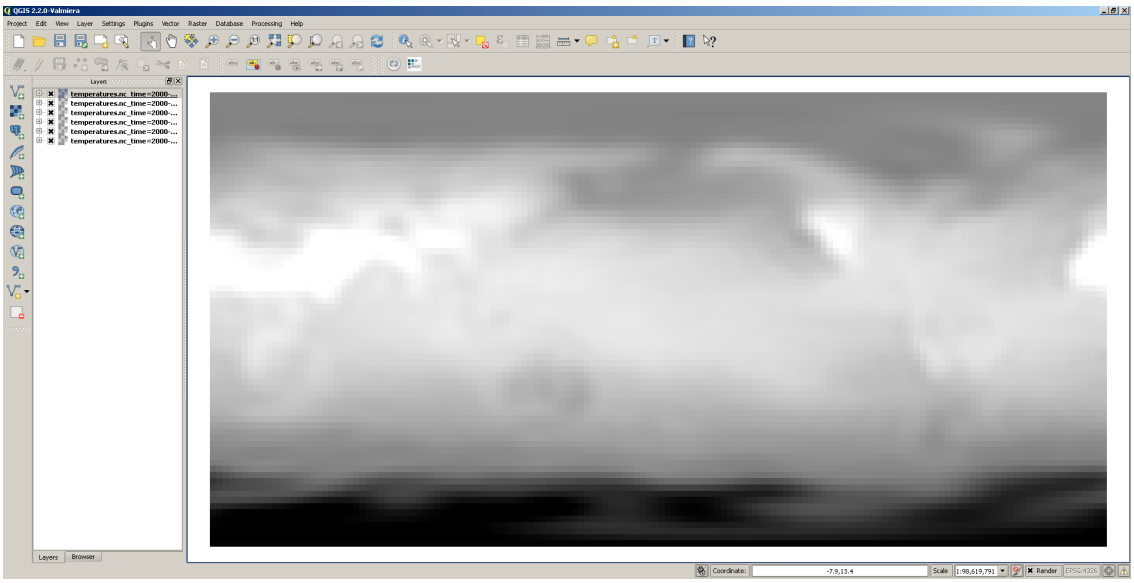
Select the time slices you wish to display by clicking on ***Select*** button next to the time variable.




and select the dates you wish to to display.



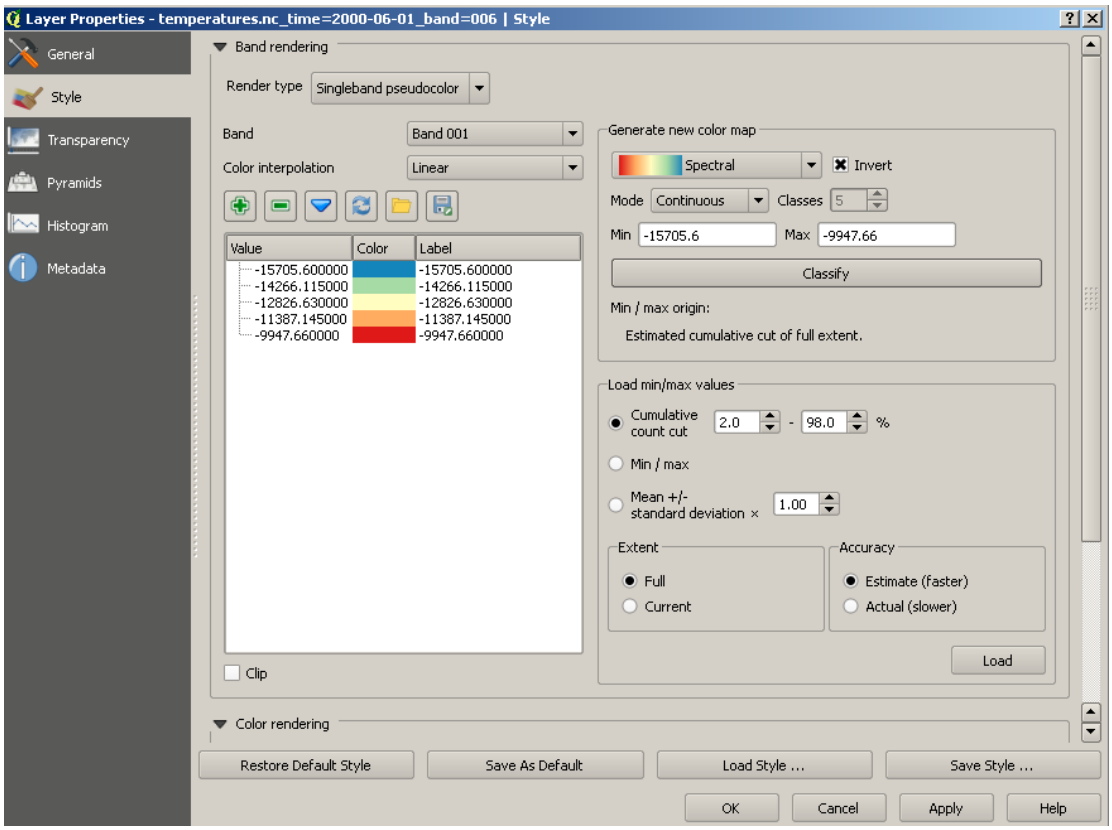

Click on ***Add Selection*** and all selected layers will be visible in your Table of Content.



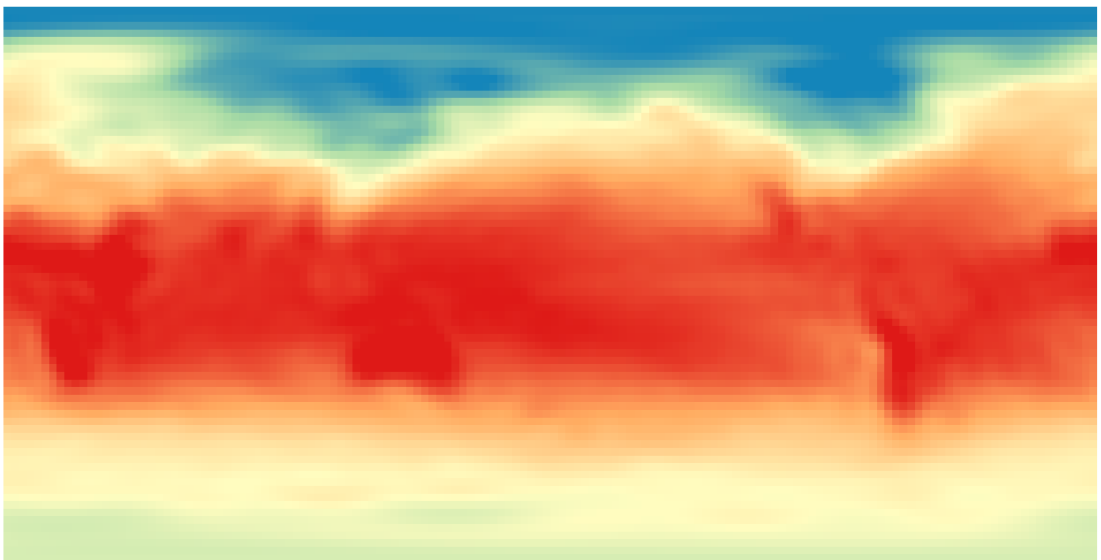
## Classifying a NetCDF layer

If you wish to classify one layer with a color ramp, you have to :

1. Right-click on the selected layer > ***Properties***
2. Under ***Style tab*** > *Render type :* select Singleband pseudocolor
3. Click on the ***Classify*** button (do not forget to invert the color ramp)
4. OK



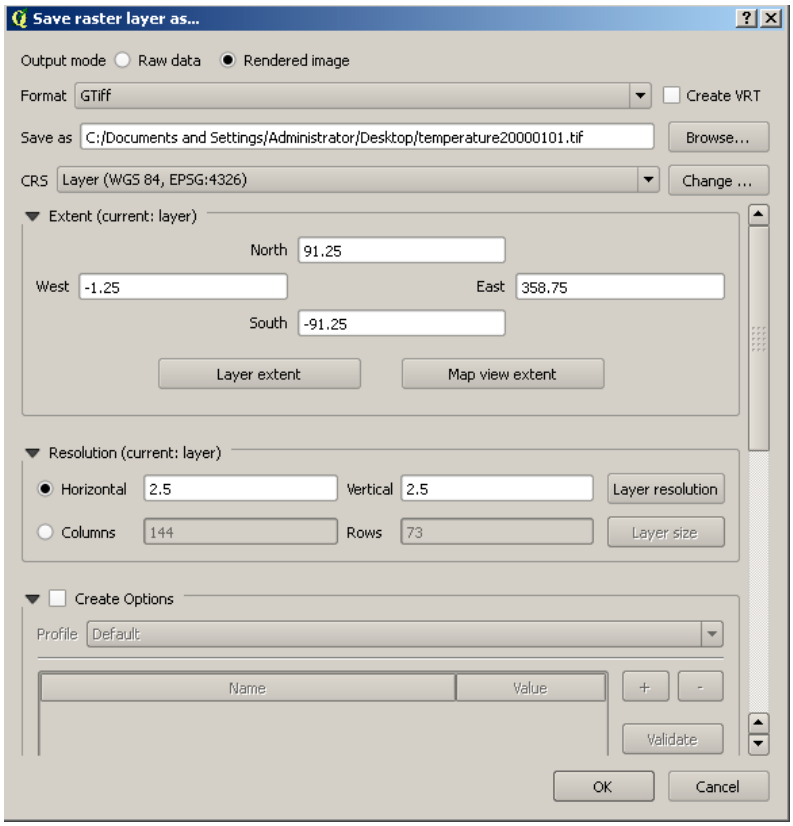

Your layer is now classified with 5 classe and a color ramp.



## Exporting a specific time step in GeoTiff

You can export in GeoTiff a specific time step.

1. Right-Click on the Selected layer
2. ***Save As…***
3. You will be prompted with the following window



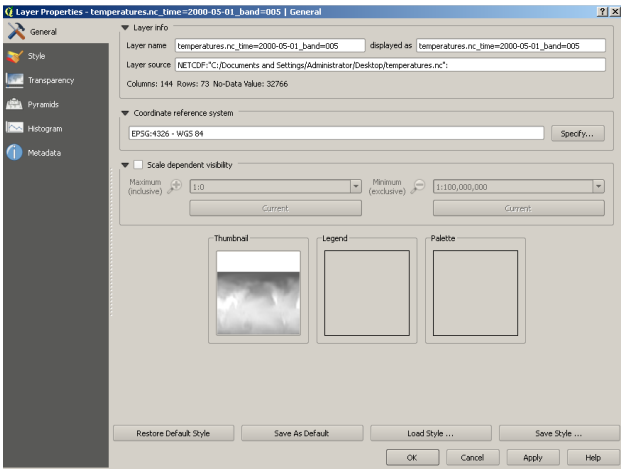

You can export either the Raw data (complete data set) or the Rendered Image (only the selected one with the desired classification). You can also, create subset by changing extent values, and change also the resolution of your data set.

4. Keep default values and select ***Rendered image***.
5. ***OK*** > your layer is now saved in GeoTiff.

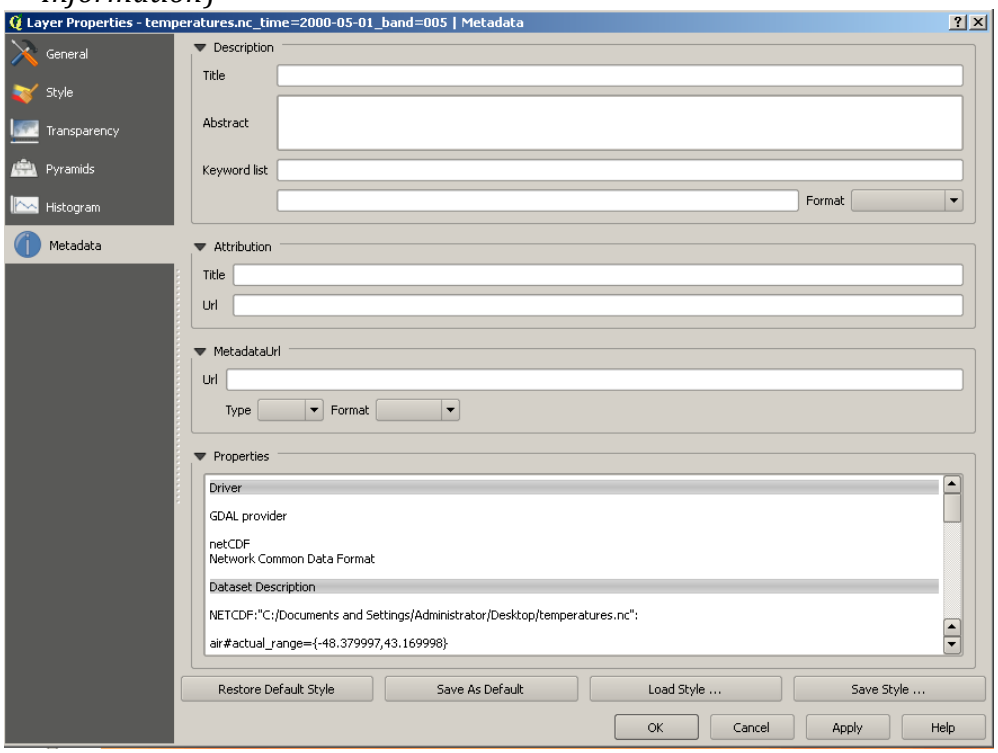
## Displaying information on the NetCDF file

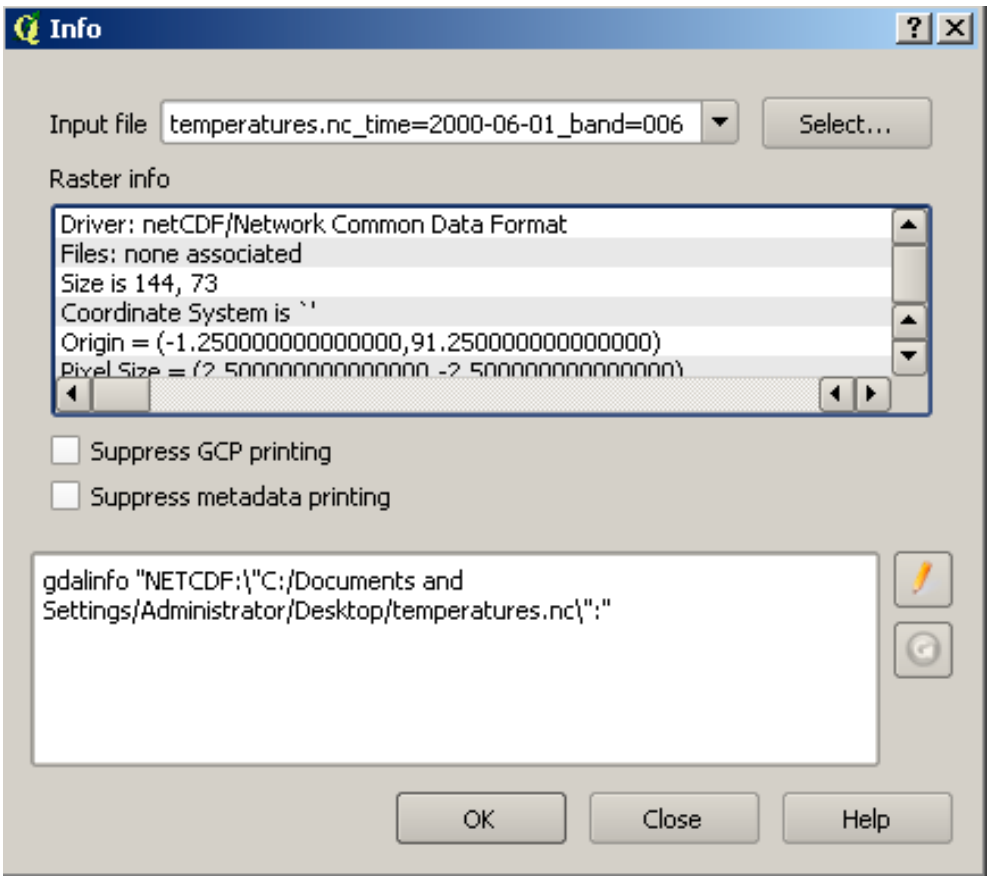
If you wish to display information on your data set you have two options.

1. Get Summary Information on your dataset :
   Right-click on the selected layer > ***Properties > General***
   You have basic information such as the name of the layer, source, CRS.



2. Under the ***Metadata tab > Properties***, you can access more detailed information (that can be also displayed using *Raster > Miscellaneous > Information*)



## Creating a temperature table at a specific location

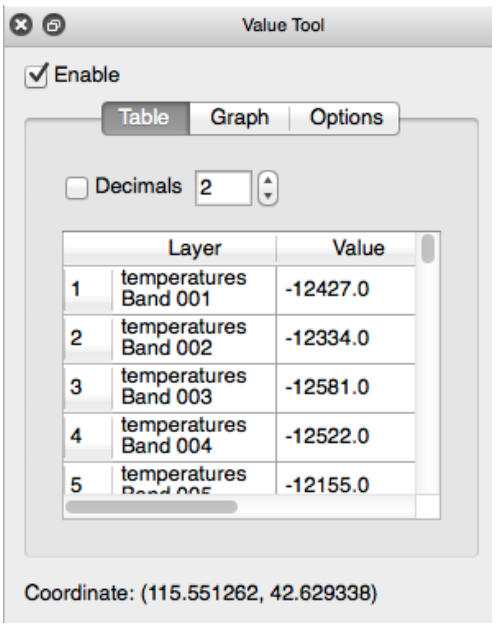
So far it is not possible to extract a temperature table at a specific location. However, there are two plugins (Value tool, gdal2xyz) that can be useful to retrieve temperatures based on location.

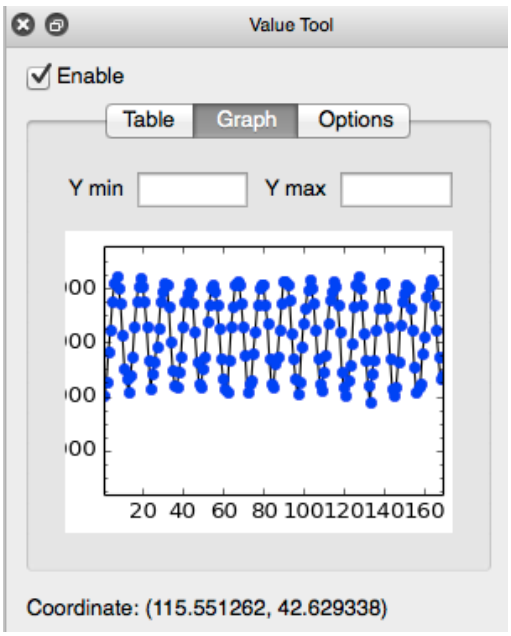
### Value tool

Load the complete NetCDF data set (***Layer > Add Raster Layer…***)

Install and launch the Value tool plugin. This is a docket widget that allows you to explore values layers as table or graphs.

Click on a specific location (you have the coordinate of the point on the bottom of the plugin window) and you can display values as a table or as a graph.

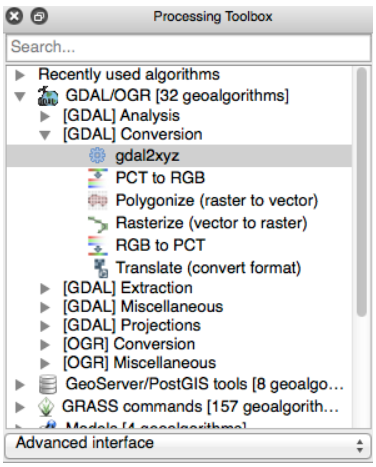


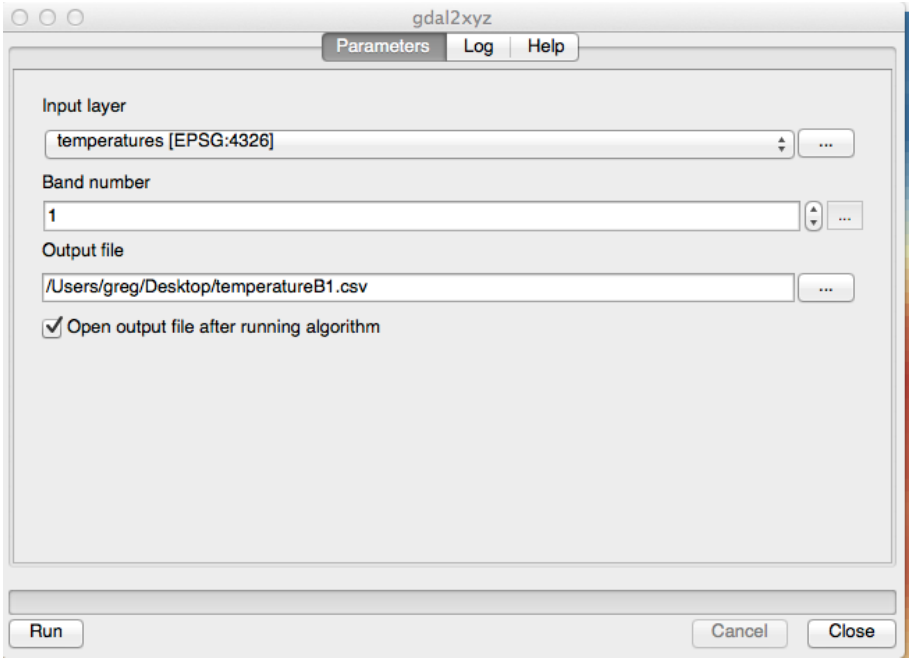

You can select the table (Ctrl + A) and copy/paste the value in an Excel table.

### gdal2xyz

The second option is to use the gdal2xyz tool that is available in ***Processing > Toolbox, under GDAL/OGR > [GDAL] Conversion***



You have to select a time slice (e.g., dand number) and give a name to the Output file (in csv format).




Click Run

Each line of the CSV file correspond to XY coordinates and the value of the pixel.

| | | |
|---|---|---|
| 0.000 | 90.000 | -15674 |
| 2.500 | 90.000 | -15674 |
| 5.000 | 90.000 | -15674 |
| 7.500 | 90.000 | -15674 |
| 10.000 | 90.000 | -15674 |
| 12.500 | 90.000 | -15674 |
| 15.000 | 90.000 | -15674 |
| 17.500 | 90.000 | -15674 |
| 20.000 | 90.000 | -15674 |
| 22.500 | 90.000 | -15674 |
| 25.000 | 90.000 | -15674 |
| 27.500 | 90.000 | -15674 |
| 30.000 | 90.000 | -15674 |
| 32.500 | 90.000 | -15674 |

## Finding temperature difference between two time steps

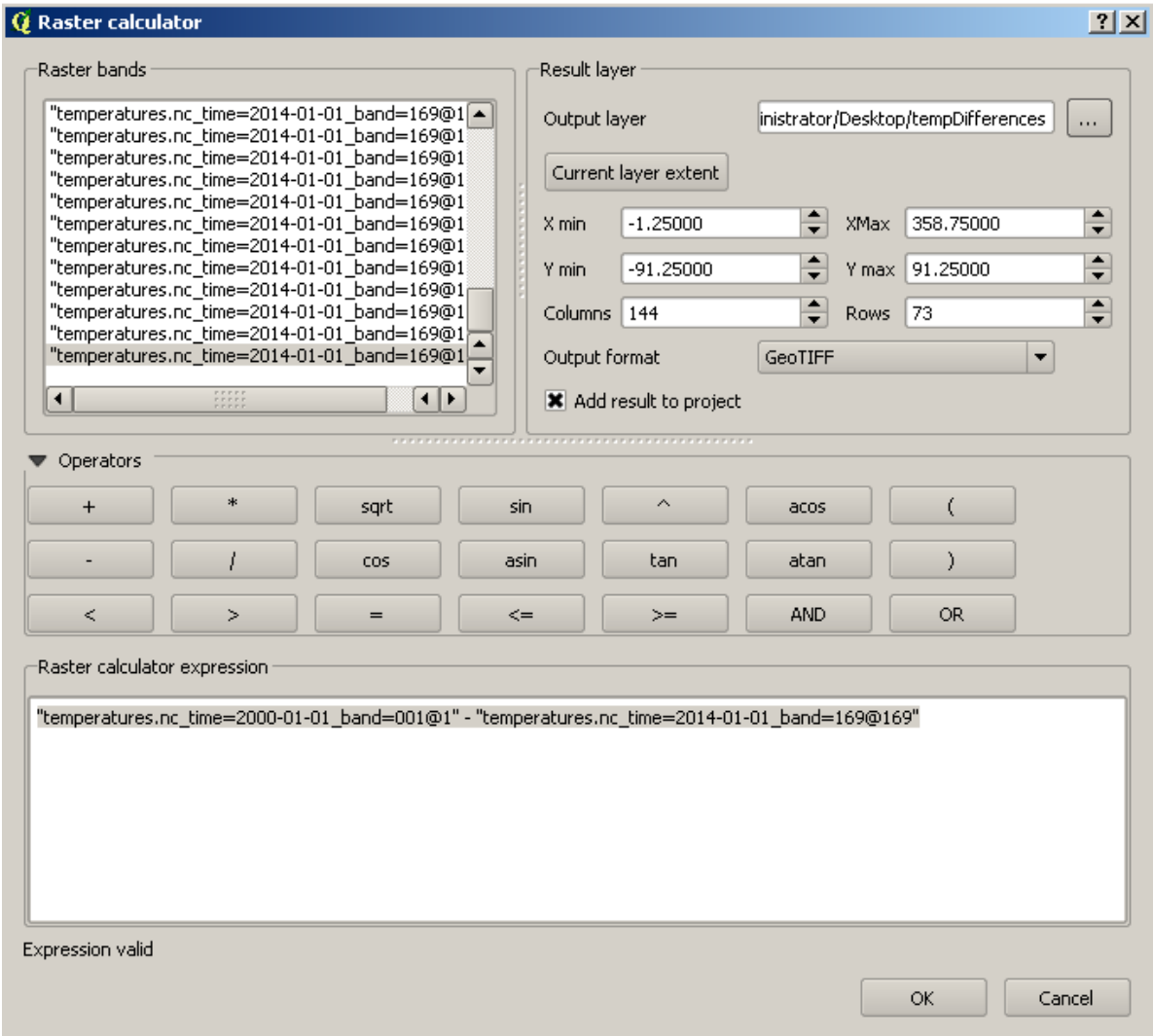
Use the NetCDF Browser to extract two layers at different date.

Then go to***: Raster > Raster Calculator***

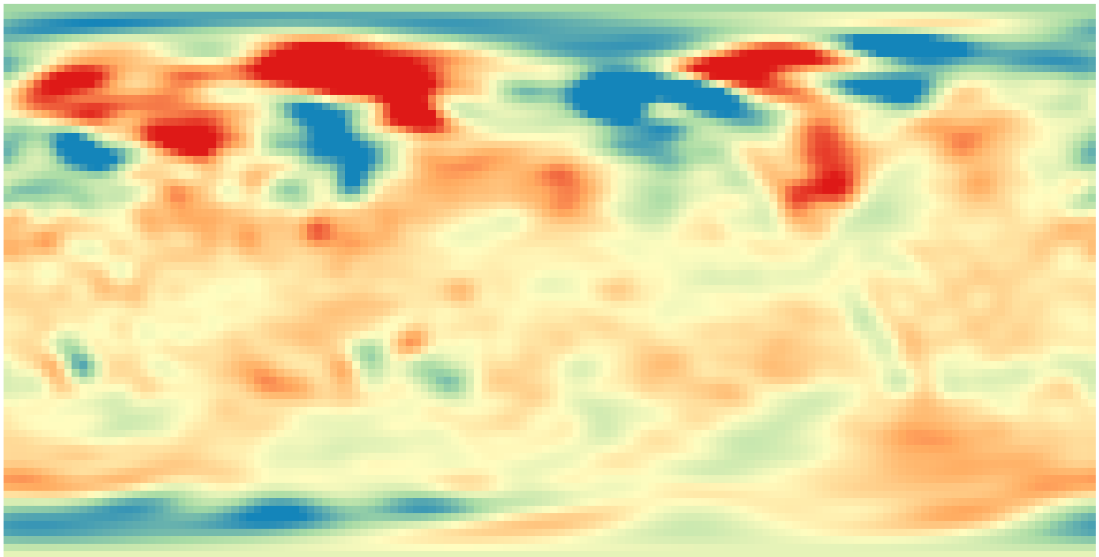
Double click on your first layer, then click on "-", and finally double-click on the second layer. The expression should look like:
"temperatures.nc_time=2000-01-01_band=001@1" - "temperatures.nc_time=2014-01-01_band=169@169"

Give an ***Output layer*** name: tempDifferences.tif

OK




With a color ramp (5 class, inverted), the result will look like:

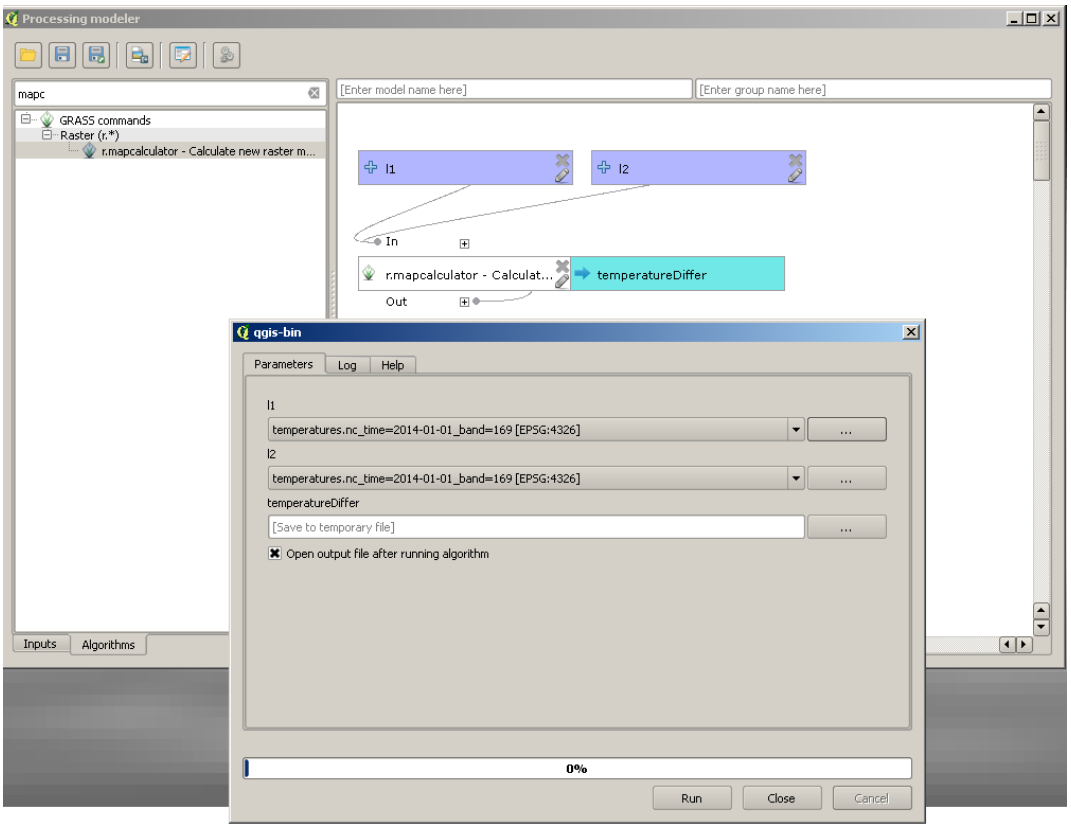


You can do the same operation using the Graphical Modeler (***Processing > Graphical modeler***).

***Inputs:*** create two Raster Layer and give them a name
***Algorithms:*** search for mapcalculator and select the GRASS command *r.mapcalculator*

Double click on it > fill correctly the information (raster layers, Formula)

Run the model



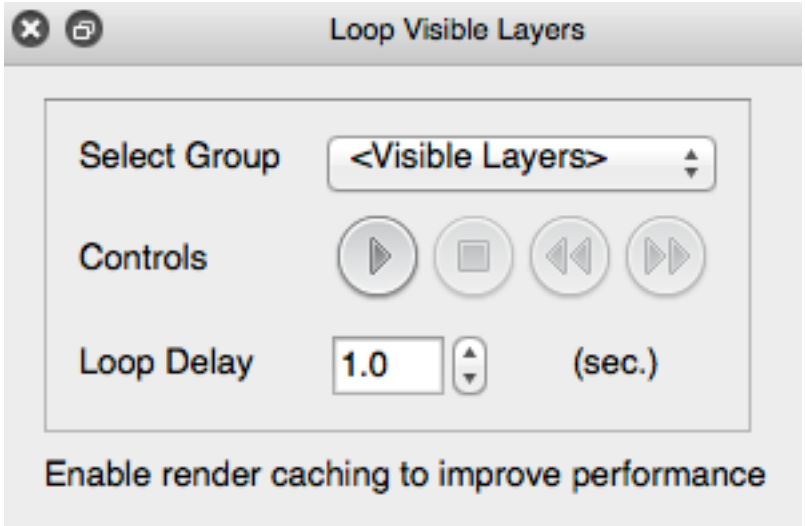
## Creating a temporal animation

You have two options to create animations
1. Using the "Loop Visible Layers" plugin
2. Using the "Time Manager plugin

Install the two plugins

### Loop Visible Layers
Use the NetCDF Browser to extract some layers.

Open the Loop Visible Layers plugin




Click on the ***Play*** control and you will see your different displayed in a loop.

Unfortunately you cannot save your animation.

### Time Manager plugin
Time Manager adds time controls to QGIS. Using these time controls, you can animate vector features based on a time attribute. There is also an experimental raster layer support. You can create animations directly in the map window and export image series.
Moreover there are several bugs related to QGIS 2.x

You can have a look to this video, to understand how Time Manager currently handles NetCDF data:
https://www.youtube.com/watch?v=QdijfgqhsPI