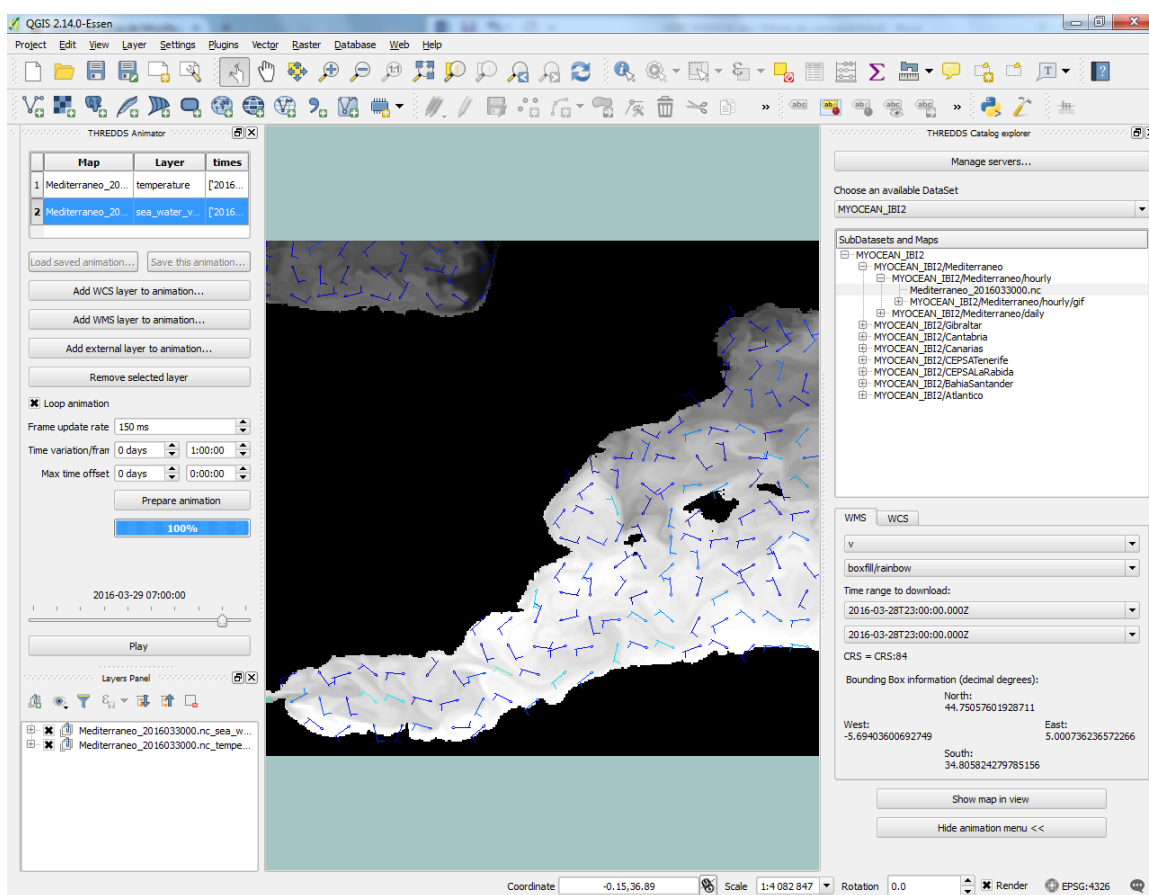


THREDDS EXPLORER

THREDDS data visualization tool for QGIS



USER MANUAL

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Introduction

THREDDS Explorer is a QGIS-based plug-in designed to make it easy for users to access georeferenced data accessible through any THREDDS based server. Data catalogues and maps are exposed to the user through a simple user interface, which allows him to choose any map or explore through all the server contents without resorting to exploring the default web based THREDDS interface.

This plug-in should work with most THREDDS servers, and will be able to retrieve any layer provided through WMS, WMS-T and/or WCS services published by the server.

Installing:

To install this plug-in, first download the zip file and uncompress its contents. Copy the resulting folder to your QGIS plug-in directory, which for windows users and if QGIS was installed using OSGEO, is usually:

C:\OSGeo4W64\apps\qgis\python\plugins

* (Advanced users) You can also define additional paths for QGIS to look for your plug-ins, by defining the QGIS_PLUGINPATH environment variable with a full path to the new desired plug-in folder.

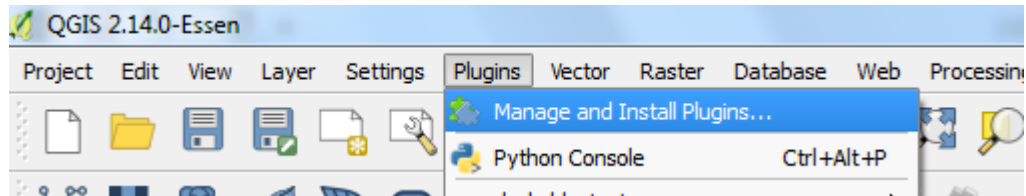
Linux users will usually find this folder in:

~/qgis2/python/plugins

Once this step is ready, you can launch QGIS. You may notice the new plug-in icon in your toolbar, like this:



If you do not see it, it will be necessary to enable the plug-in from within QGIS. First, click on “Plugins” menu, and then in “Manage and Install Plugins...”



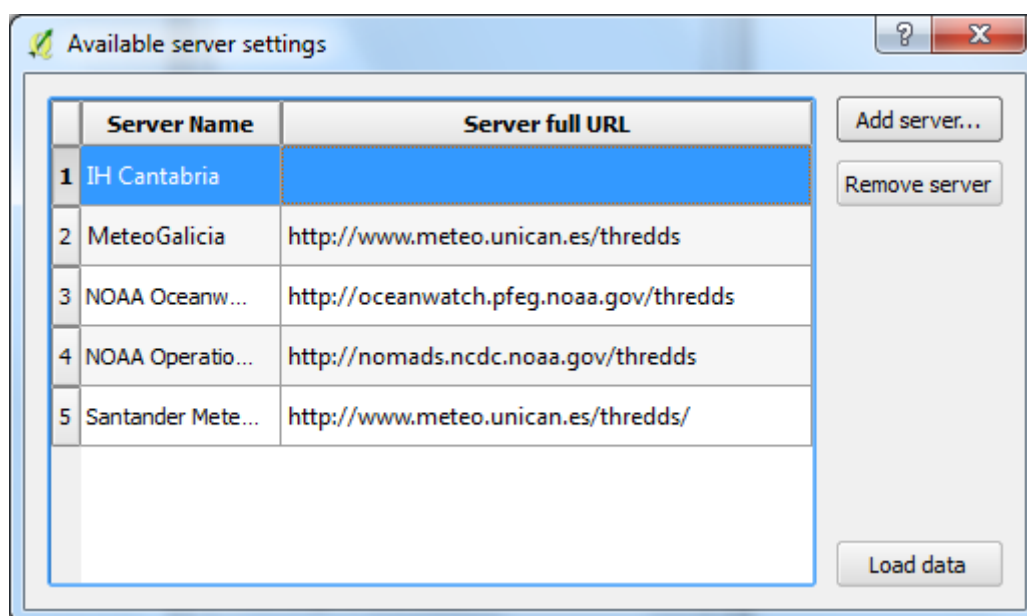
A new window will appear showing the list of plug-ins, which can be enabled or installed by the user. By scrolling down the list, you will find THREDDS Explorer. Just click its checkbox and the icon will now appear in your QGIS interface as shown before.

Browsing THREDDS server folders and maps

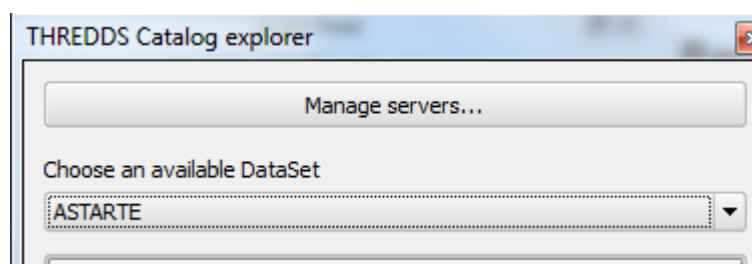
Once the plug-in is opened for first time during a session, you will be prompted to choose a server to load data from. This can be either one of the several preloaded servers available by default, or any you decide to add at any point through the “Add server...” button.

* Note: Despite the fact the server name and URL fields are editable for your convenience, changes in these fields will not be saved nor used by the program. Please, use the buttons on the right to manage the server list.

In the following examples, we will be using IH THREDDS servers’ data to show you how to use this plug-in.

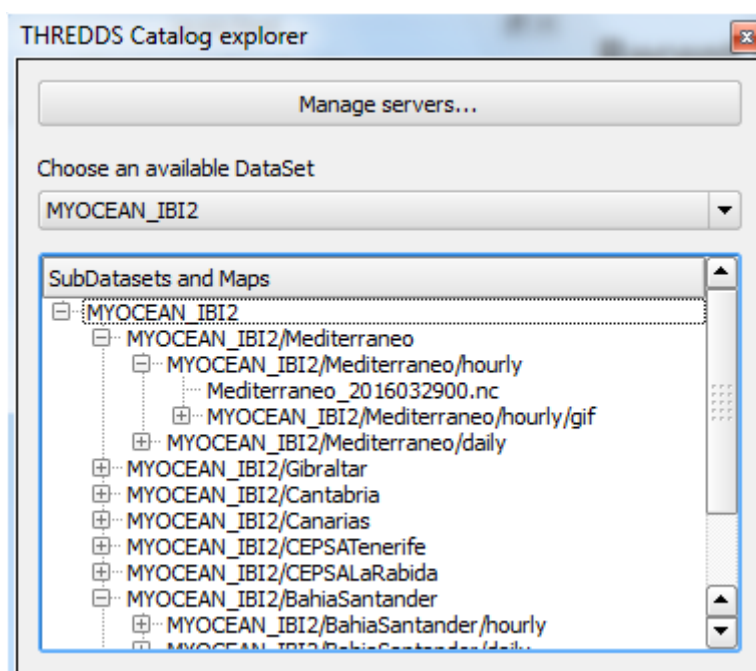


After clicking in “Load data”, this server manager window will close and the plug-in will attempt to fetch any main data sets (or catalogues) available from the server to be shown in ‘*THREDDS Catalog Explorer*’ panel. Be advised this operation may take a while in servers with many sets or through slow networks. Once finished, the list of base sets/catalogues will be populated in the main window, as shown in the following example:



After choosing one of these “DataSets” from the list, you will see how the tree view under it is populated by it’s contents, either more data sets or maps. Clicking in the ‘+’ buttons next to each set will open it’s contents.

* Be advised: The contents of this view are updated dynamically as you open each set or map. This means it can take a few seconds to update it’s contents. If an error occurs during this operation, an error message pop up. You can then close and open the set again, which may help in the case of temporal errors, as this forces a reload.

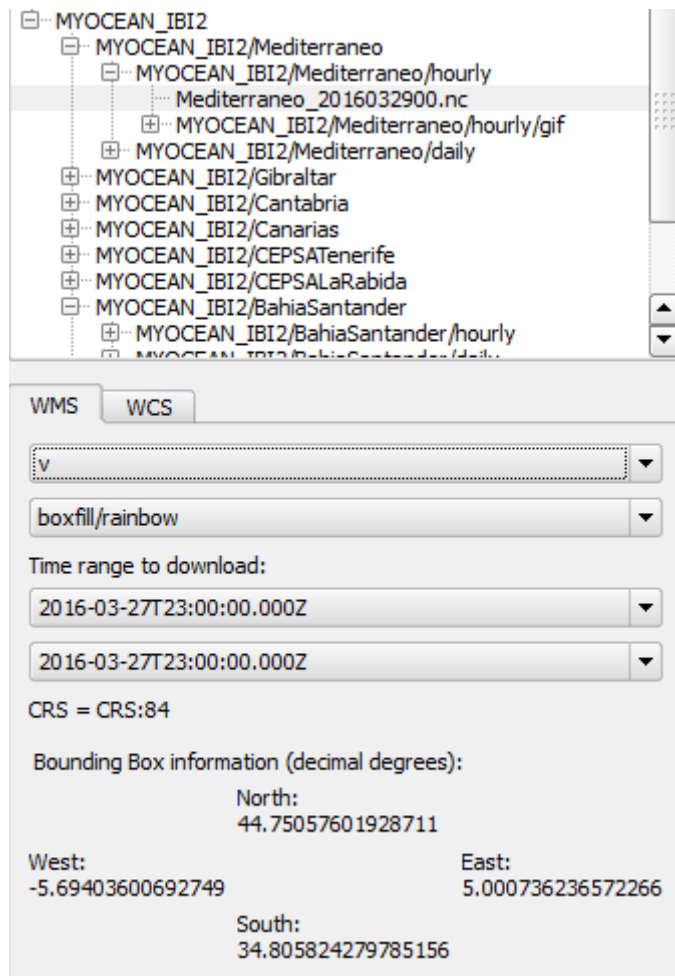


You can now navigate through all the contents in the server. As was the case when loading data from a server in the server management window, some folders may take a while to load if they have a lot of contents (either maps or sets), so patience is required.

Accessing map data

THREDDS servers allow their users to access layer data through several distribution protocols. THREDDS Explorer can currently access them through WMS and WCS services, both with and without time dimensions.

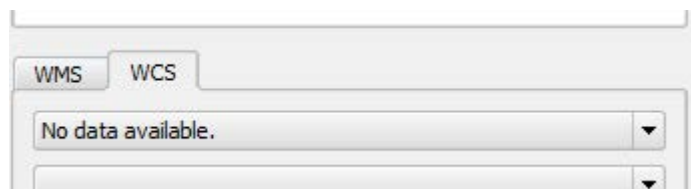
When a map is selected in the tree view (as shown in section: “Browsing THREDDS server folders and maps”), the combo boxes below will load that map data. This includes layers, styles, and available times for the chosen map. The map CRS and coordinates information will also appear in the information area below, as shown in the following image:



The screenshot shows the THREDDS Explorer interface. The tree view on the left displays a hierarchy of map data under the root 'MYOCEAN_IBI2'. The selected item is 'MYOCEAN_IBI2/Mediterraneo/hourly/Mediterraneo_2016032900.nc'. Below the tree view, the 'WMS' tab is active. The configuration panel includes a dropdown menu for the service (set to 'v'), a dropdown for the style (set to 'boxfill/rainbow'), and two dropdown menus for the time range to download (both set to '2016-03-27T23:00:00.000Z'). The CRS is set to 'CRS:84'. The bounding box information (decimal degrees) is displayed as follows:

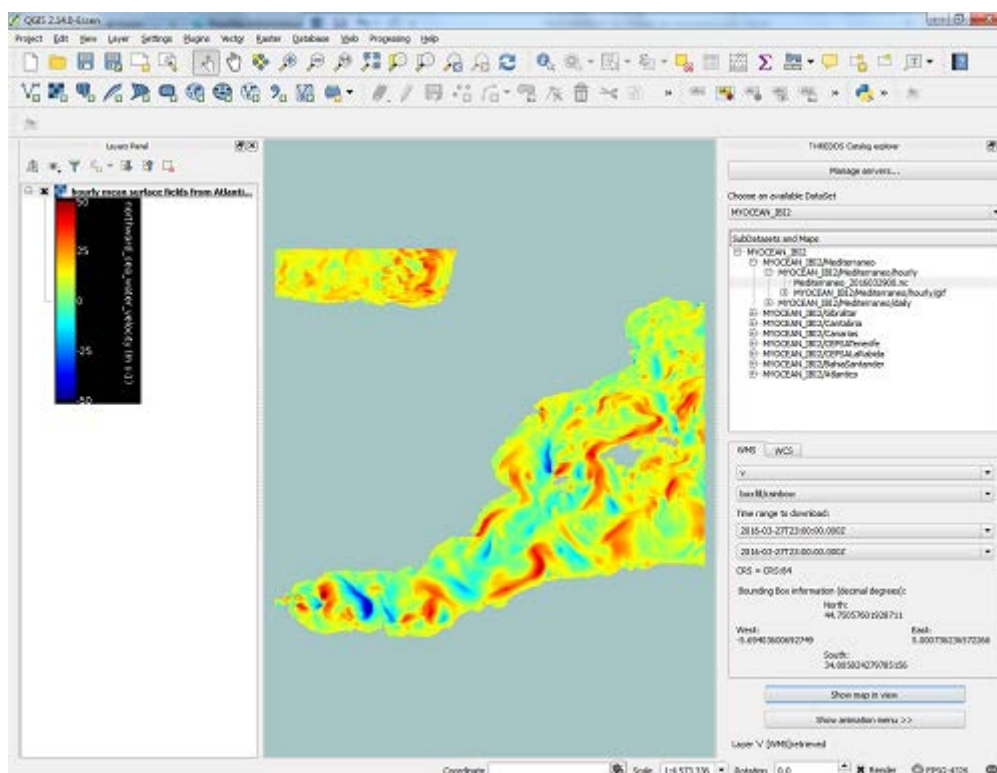
Bounding Box information (decimal degrees):	
North:	44.75057601928711
West:	-5.69403600692749
East:	5.000736236572266
South:	34.805824279785156

As you can see, the tabs define which protocol will be used to download the map. If the map is not available for that protocol, a message will report it to the user in the first box of that tab:

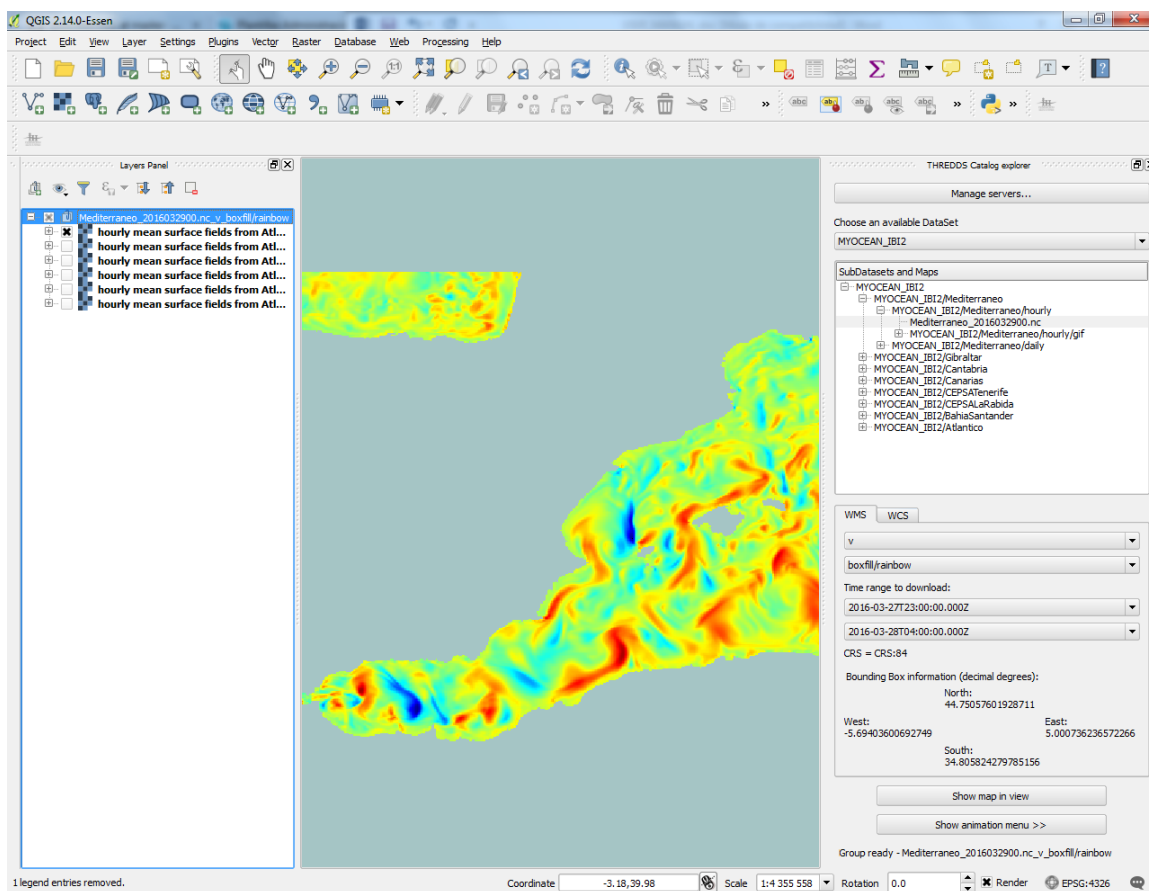


* Be advised: If a map is published through THREDDS, but it is not available through any supported protocols, it will appear in the tree view, but will show “No data available” in all the tabs.

If the map is available through our chosen protocol (i.e. WMS) we can select the layer we want to download, the style we want it drawn with (if applicable), and the time range to download. If you choose the same first and last time, only the image of that moment will be downloaded. If, on the other hand, you choose a different first and last times to download, all the layers between that first and last time (inclusive) will be downloaded and grouped in the QGIS interface. The following examples show both results:



1 - Single layer download

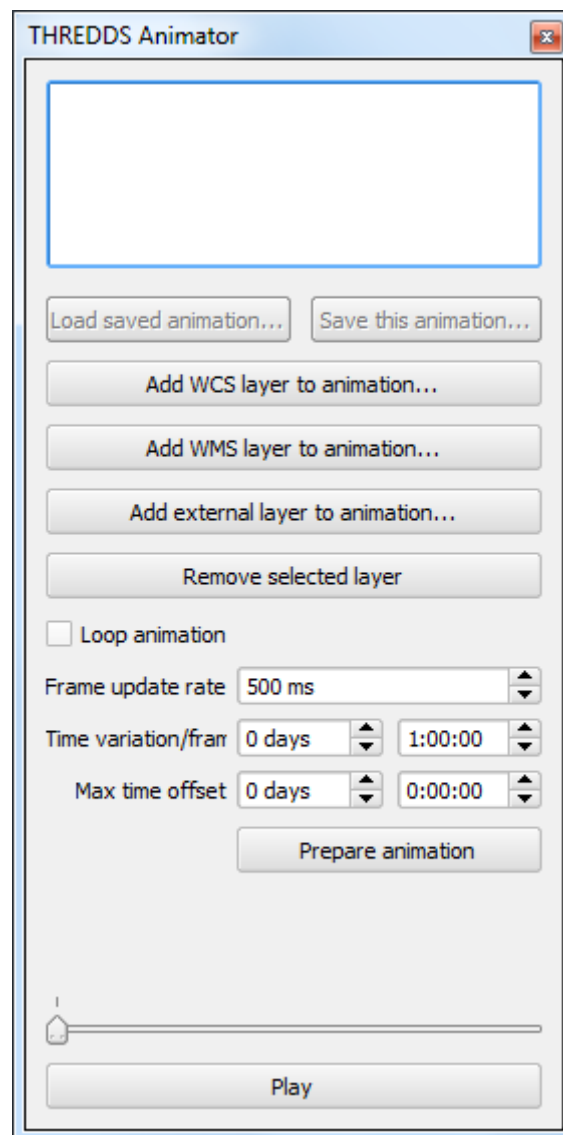


2 - Multiple layer download

Animating maps with time dimension

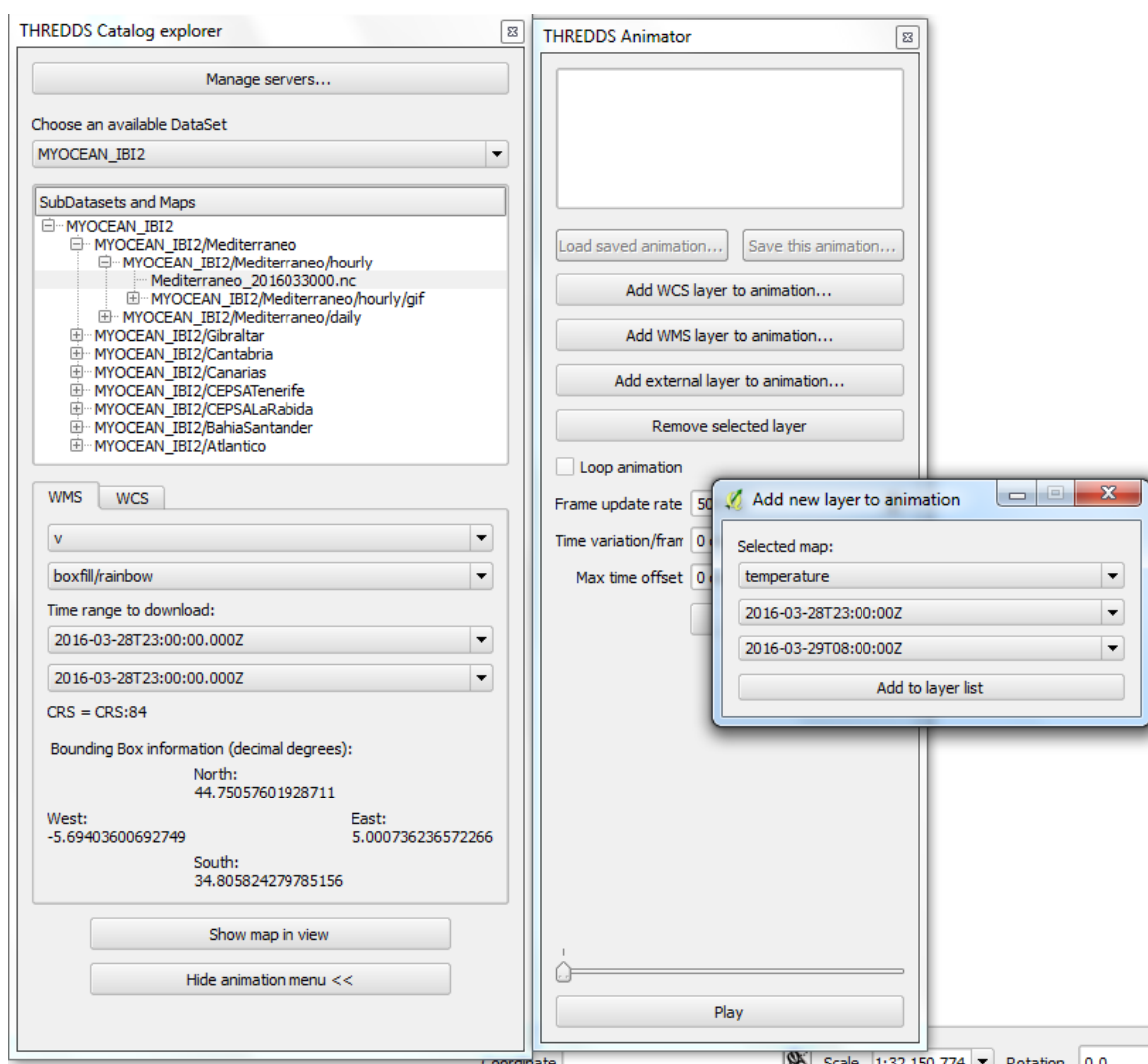
Through this plug-in, you can create animations composed of one or several layers, both from WMS and WCS THREDDS providers, and from other supported services provided by other installed plug-ins.

By clicking the “Show/Hide animation menu” button in the bottom of the ‘*THREDDS Catalog Explorer*’ panel, a new one will show up with tools to both manage animated layers and play them:



Adding layers to an animation

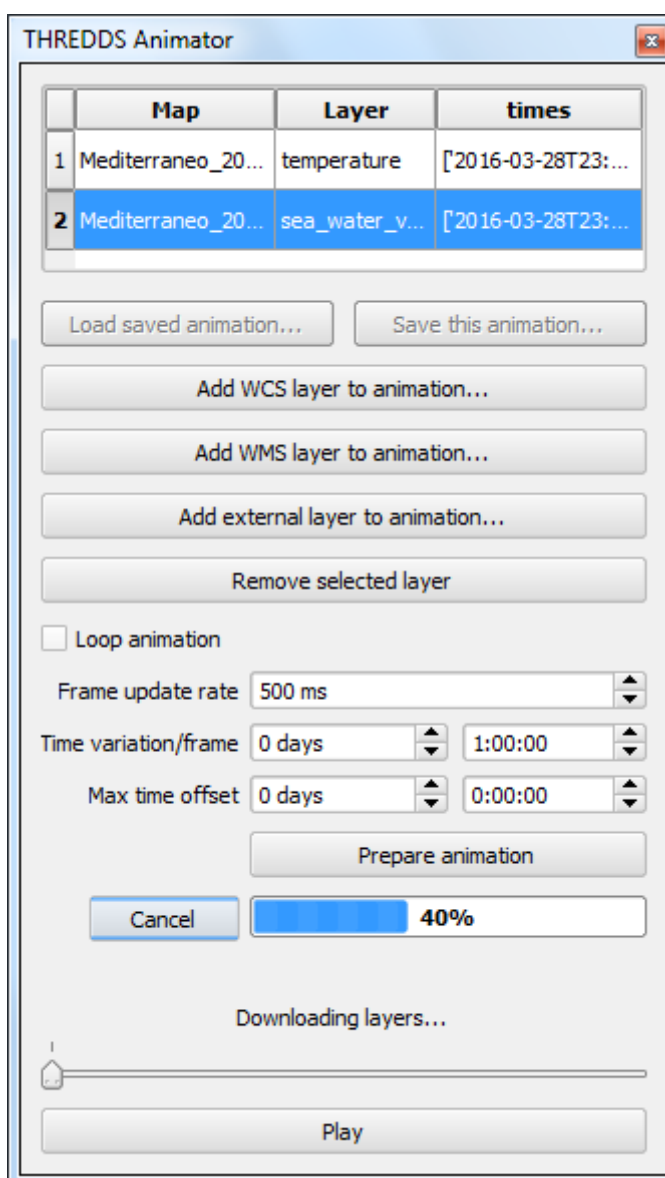
By clicking “Add WCS layer to animation...” or “Add WMS layer to animation...” you will be able to select the features for a layer from a THREDDS resource to be animated. Just remember to select beforehand the map you want to load layers from in the ‘*THREDDS Catalog Explorer*’ window as in our example below:



As you add new layers through these buttons, you will see how they appear in the list above them. For every layer you add, the “Map” name, layer name, and selected time

values will be shown. You can also remove a previously added layer by selecting it in the list, and clicking 'Remove Selected Layer'.

Once you have all the required layers and times added to the list, the button 'Prepare animation' must be clicked. This will begin the download for all the layers. In the case of WMS providers, the maximum and minimum values for each layer will be calculated for the whole range of times requested, which may take a while. You can check the operation progress through the progress bar, and cancel the operation if you require it.

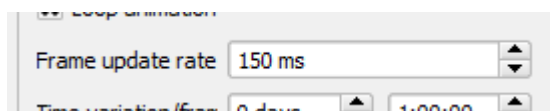


For each requested layer, the plug-in will create a layer group with all the times requested in it. You are free to use it as you would any other group. This includes changing their order in the legend so, for example, vector layers which are obscured behind rasters are shown without obscuring each other, adjusting transparency, or performing calculations.

Animation playback tools

There are several elements in the interface you can use to configure how the animation is played. All of them modify the playback “on the fly”, which means you will see the changes they produce right away.

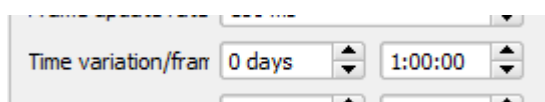
Frame update rate:



This defines the maximum time between time steps. This includes the time it takes for QGIS to render a layer, so it can be noticeable lower in the case of very big or detailed layers. If it the time it takes to render the layer is too high, some frames may be skipped or the animation may show no progress. If this happens, please increase this value until the animation plays normally.

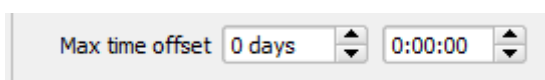
Tip: Due to the way QGIS handles layer rendering, the first time you play each frame will be the slowest. QGIS will ‘cache’ each layer after that first render, which will noticeably increase performance after the first full playback. This can be very annoying the first time you play an animation composed of one or several WMS layers. In this case, you can let the animation run in “slow motion” once (with a high enough frame update rate that every frame is actually shown in screen) and you will be able to run it and load individual frames much faster later. Another solution is to right click a layer group in QGIS interface, disable the “Mutually exclusive” option, load them all at the same time by clicking on the group checkbox, and enable the “mutually exclusive” option back after they have all loaded. This will force QGIS to cache all the images and should improve playback speed.

Time variation/frame:



As shown before, layers will be downloaded with a time-dimension associated. These fields control how much of that “layer time” is progressed at each step of the animation. This way, animations can be run relative to real time even if values for some times are missing, or the time difference between images is not constant.

Max time offset:



As you can see in the paragraph above, the animation will perform “steps” based on time progress. Depending on what you expect to achieve through the animation, and what kind of layers you load into it, you may want to ignore minor differences in times for layers. You might consider a 10 seconds (or 10 hours!) delay acceptable for two *different* map layers to be shown together.

This value defines the maximum time difference you will allow between the expected time to be played (i.e. the play step is at “05:00:00”) and the actual loaded layer. In our previous example, if our next frame will be at “2016-04-05 11:00:00” and our offset is 00:00:00, the only layers which will be shown are those which exactly match that time value. If our offset is 00:15:00, the closest layer to our next frame date (“2016-04-05 11:00:00”) but no further than 00:15:00 before or after that time will be shown.

This allows you to combine layers from different sources, with wildly different times, and get a more accurate (by the standard you define through this value) representation of your data than plainly skipping intermediate values between frames.