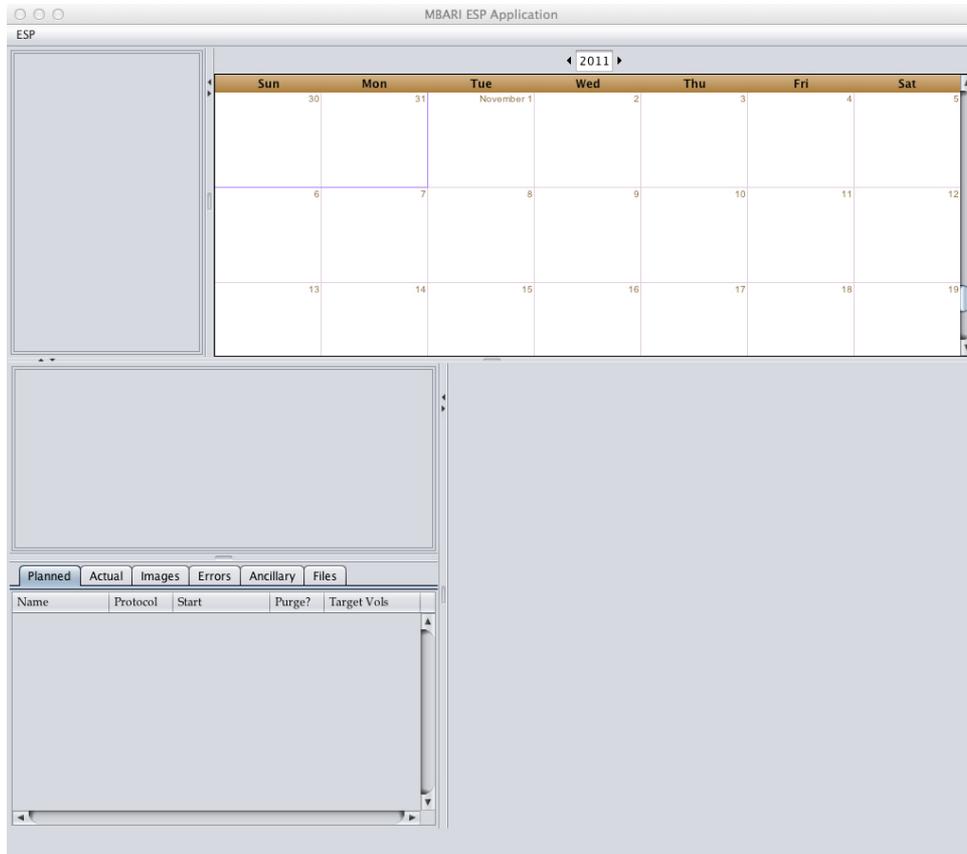


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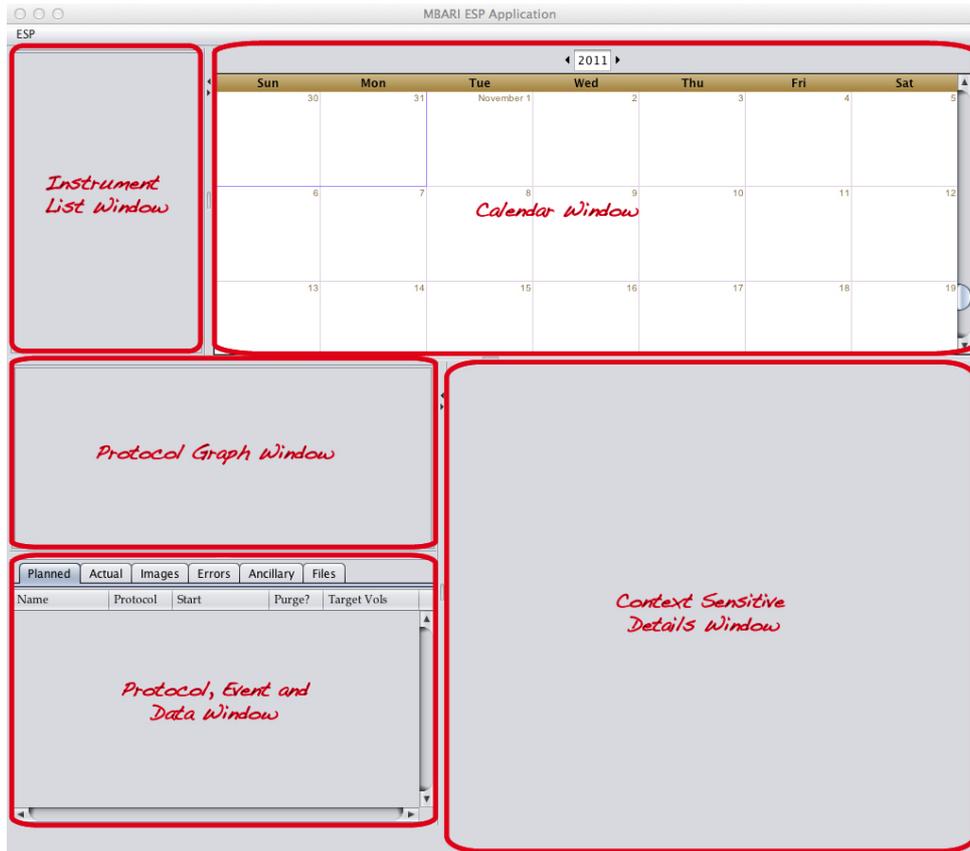
This page last changed on Oct 31, 2011 by [kgomes](#).

This is a quick sequence of steps to get the user up and running with the ESP GUI application. When you first start up the ESP GUI application, it will look quite bland (we are working on that) 😊.



There are five areas in the ESP GUI:

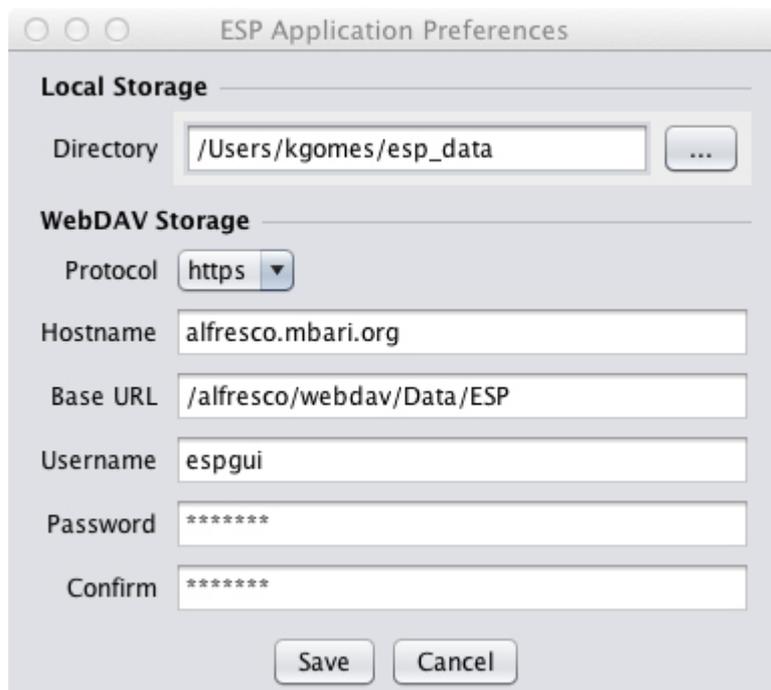
1. "Instrument List Window" (upper left corner)
2. "Calendar Window" (upper right corner)
3. "Protocol Graph Window" (middle left)
4. "Protocol, Event, and Data Window" (lower left corner).
5. "Context Sensitive Details Window" (lower right corner).



You will get the idea behind these windows as we work through these examples.

Configuration

Before getting started, it is best to take care of a couple of settings in the ESP GUI application. If you go to the **ESP** menu and select **Preferences...**, you will see some settings that are common across all instruments and missions.



The **Local Storage: Directory** field indicates the local disk path where the application will store copies of the various mission files that the GUI works with. It defaults to the user's home directory, but it can be changed. The GUI application will append a directory with the ESP's name and another directory for the mission name to divide up the local storage of mission related files. For example, in the above figure, the base local directory for data storage is `/Users/kgomes/esp_data`. If I create ESP named *Gordon* and create a mission for Gordon called *JuanDeFuca*, the files for that mission will be stored on the local disk in the directory:

```
/Users/kgomes/esp_data/Gordon/JuanDeFuca
```

In the **WebDAV Storage** section, these settings give the application the information it needs to store all the products and files for the various ESP's and their missions on a WebDAV server. This function was created to assist end users by allowing them to send their files to a central WebDAV repository where technical support could review them and offer assistance. Think of it as a way for the ESP to "call home".

1. **Protocol:** This will either be "https" or "http", but should really be https.
2. **Hostname:** This is the hostname of the WebDAV server where the files will be copied to. In MBARI's case we use an Alfresco content management server.
3. **Base URL:** This is the base URL where the files will be copied to. In this example, there is a WebDAV directory structure that looks like:

```
https://alfresco.mbari.org/alfresco/webdav/Data/ESP
```

which serves as the base for the file locations. Using the example above, if we have the ESP Gordon running a mission called "JuanDeFuca", the directory structure that will be created for the files is:

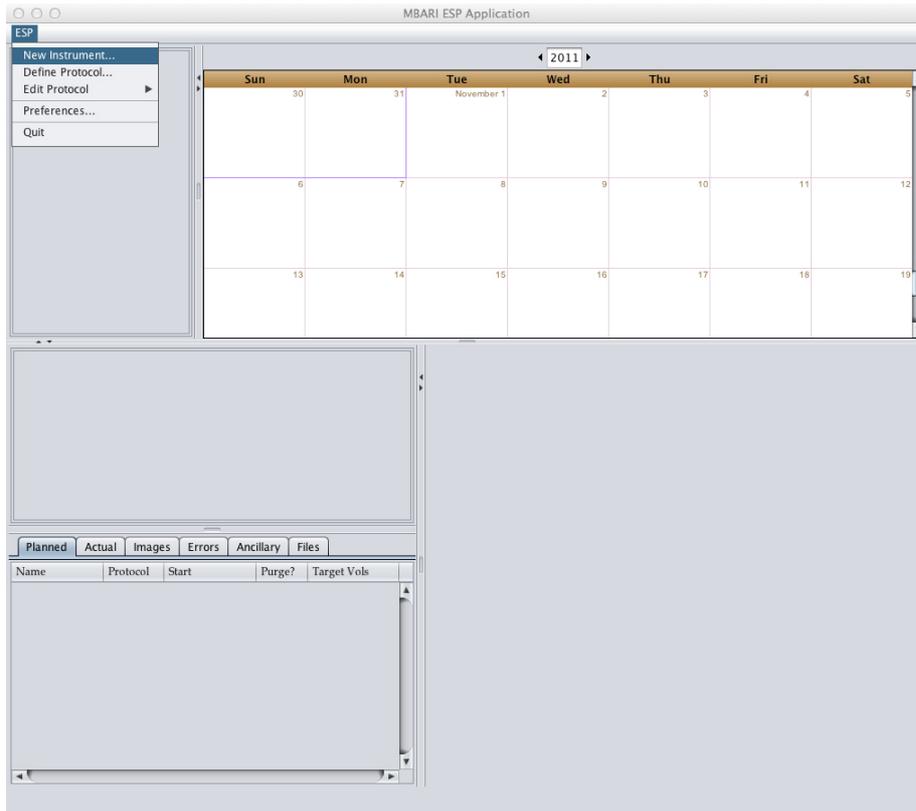
```
https://alfresco.mbari.org/alfresco/webdav/Data/ESP/Gordon/JuanDeFuca
```

4. **Username:** The login to the WebDAV server
5. **Password/Confirm:** The password to use for the WebDAV login.

Mission Planning

The first function of the GUI is to plan a mission for your ESP. In order to do this, there are a couple of steps that need to be taken as initial setup so you can generate mission plans. You must first create the instrument itself, and then you must define various protocols that can be placed in a mission plan. First let's create a new instrument.

1. In the **ESP** drop down menu, select the **New Instrument...** option.

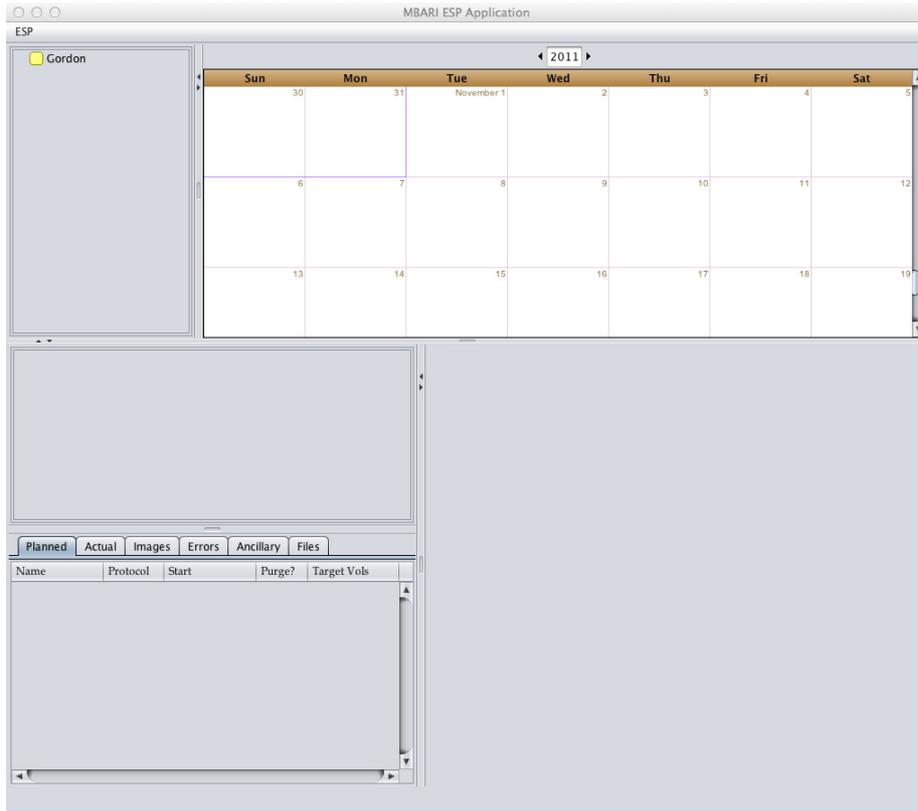


2. A dialog window will appear that prompts you for the information about the ESP that you are using. In this example, we are using the ESP named 'Gordon' with a serial number of '1' and we chose a yellow color. Click on 'Save' to save the information you entered.

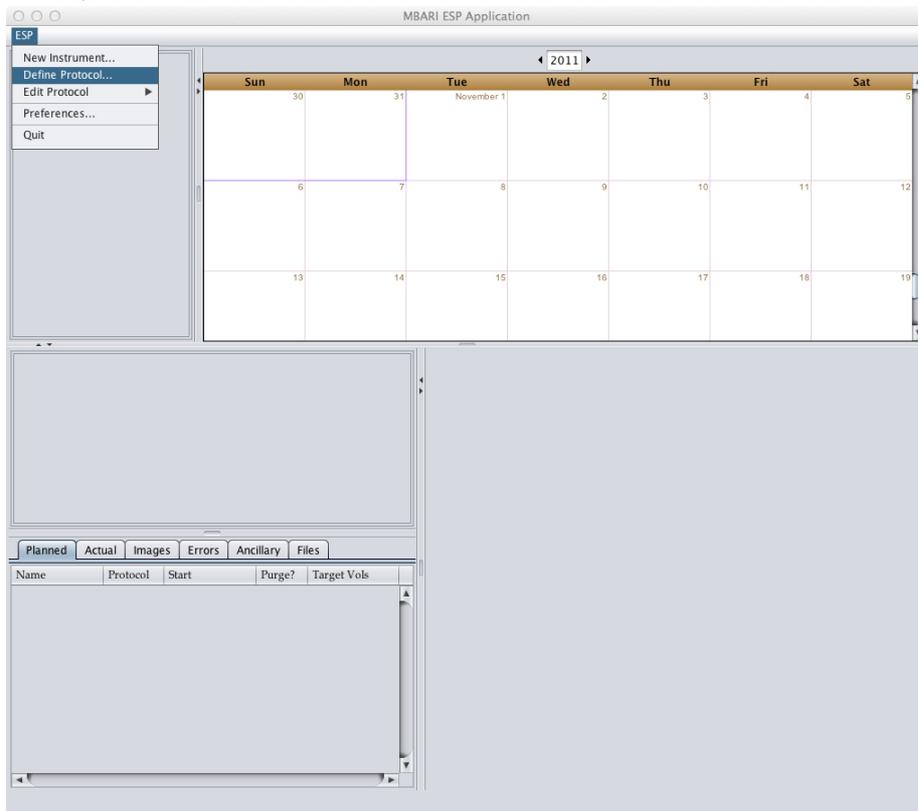
 **Instrument FTP not used yet**

Please note that while, in theory, you could use the GUI and point it to the FTP server on the instrument itself, it has not been implemented as there is some discussion about whether you would ever want to do that. We use a shore station FTP server that keeps all the files in sync with the instrument itself and then point the GUI to that FTP server (this will be shown later). For the time being, just leave all the FTP fields blank.

3. Once you save the information, you will see your new instrument definition in the GUI.



4. Now that the instrument is defined, we must define the various protocols that the instrument will be running. To do this, click on the **ESP** menu and then select **Define Protocol...**



This brings up a dialog where you can edit a new protocol that can be used in planning an ESP mission.

In the figure, we have defined a new protocol with the name 'hab'. NOTE: The color selector was used in an older version to display on the calendar but is no longer used and will be removed in the future, you can ignore the color chooser. The default sample volume was chosen as 1000ml. The checkbox next to **Archive Volume** indicates that an archive should be performed after the protocol and it will use a sample volume of 500ml. For mission planning purposes, it is good to define an approximate length (in minutes) that the protocol normally takes to run (in this case we chose 240 minutes). The **Delay to Sample** field indicates the approximate amount of time it takes between when this protocol is started by the ESP and when the sample should actually start to draw water from the environment (in this case 5 minutes). The **Initial Purge** checkbox tells the ESP to perform an initial purge when this protocol is run (selected in this case) and the **No Kill?** checkbox indicates if the kill step should be skipped (in this case the kill step is going to happen). Remember that when you are defining a protocol in this step, you are defining a *template* of the various protocols you will use to plan your mission. When you actually plan your mission, you will be given an opportunity to customize each of these settings.

 **Protocol Name is Critical**

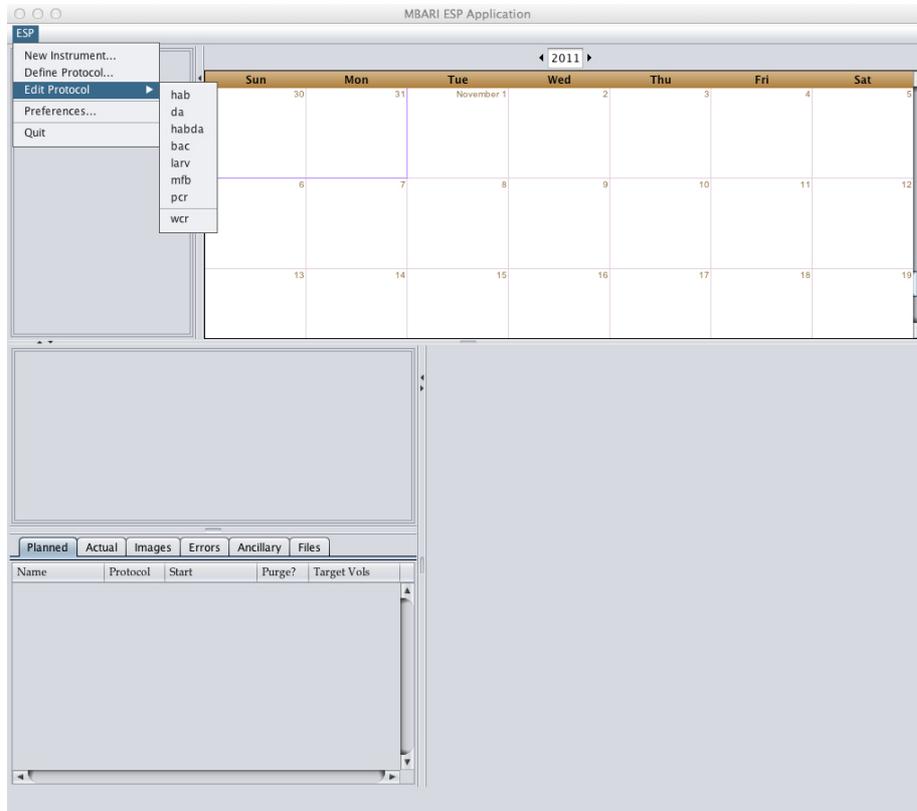
The name that you assign to the protocol is REALLY important as that is the name that will be placed in the generated missions script and should match a protocol that has been defined in a ruby script on the machine. For example, if there is a 'hab.rb' script on the ESP that you would like to use in your plans, make sure you define the protocol name as 'tab'.

5. I did not go through each step here, but using this technique, I defined the following protocols

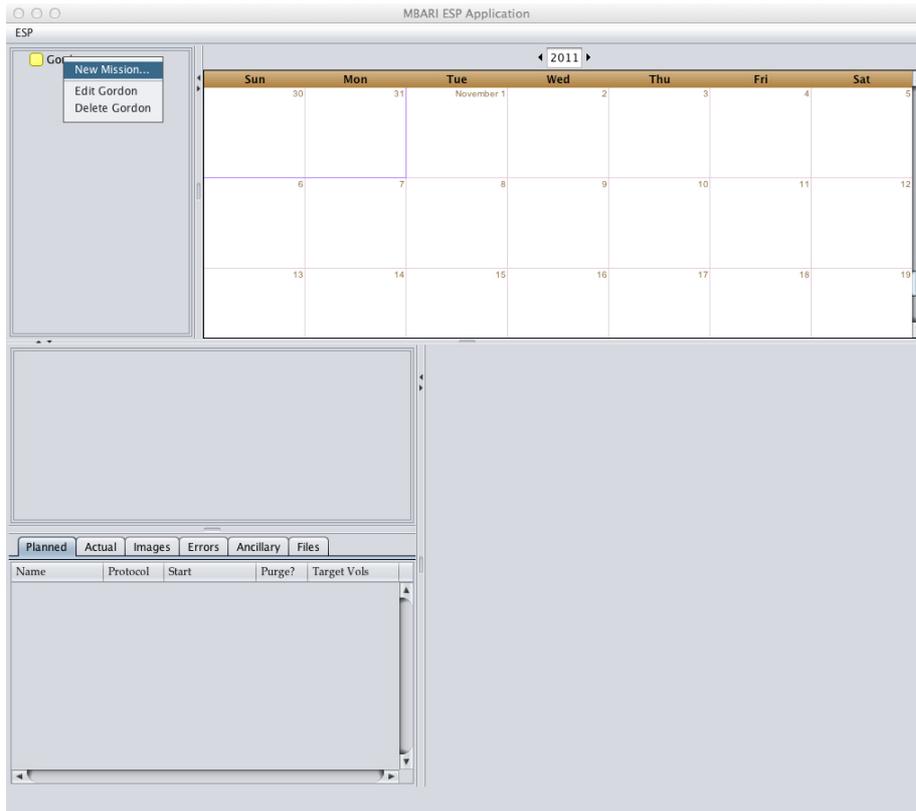
Name	Sample Volume	Archive Volume	Duration	Delay to Sample	Initial Purge	No Kill?
hab	1000	500	240	5		
da	1000	nil	300	7		
habda	1000	500	240	5		
bac	1000	500	200	3		
larv	1000	500	55	10		
mfb	500	nil	180	30		

pcr	1000	500	120	0		
-----	------	-----	-----	---	---	--

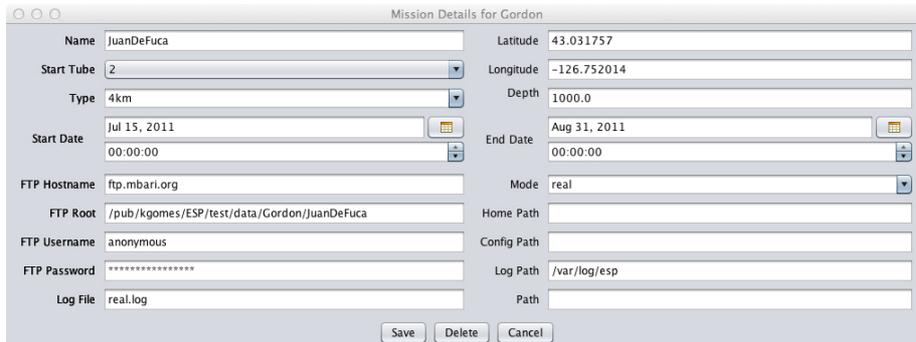
 **wcr created for you**
 The ESP GUI will automatically create the archive protocol 'wcr' for you.



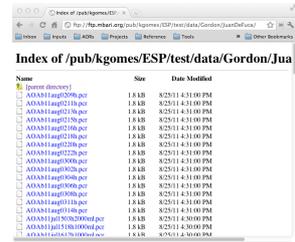
6. Now we are ready to create a mission for the Gordon ESP. Mouse over the instrument you want to create a mission for in the instrument window and right-click on it, then select **New Mission....**



7. This brings up a dialog window that allows you to fill in the information related to the mission that the ESP will be executing.



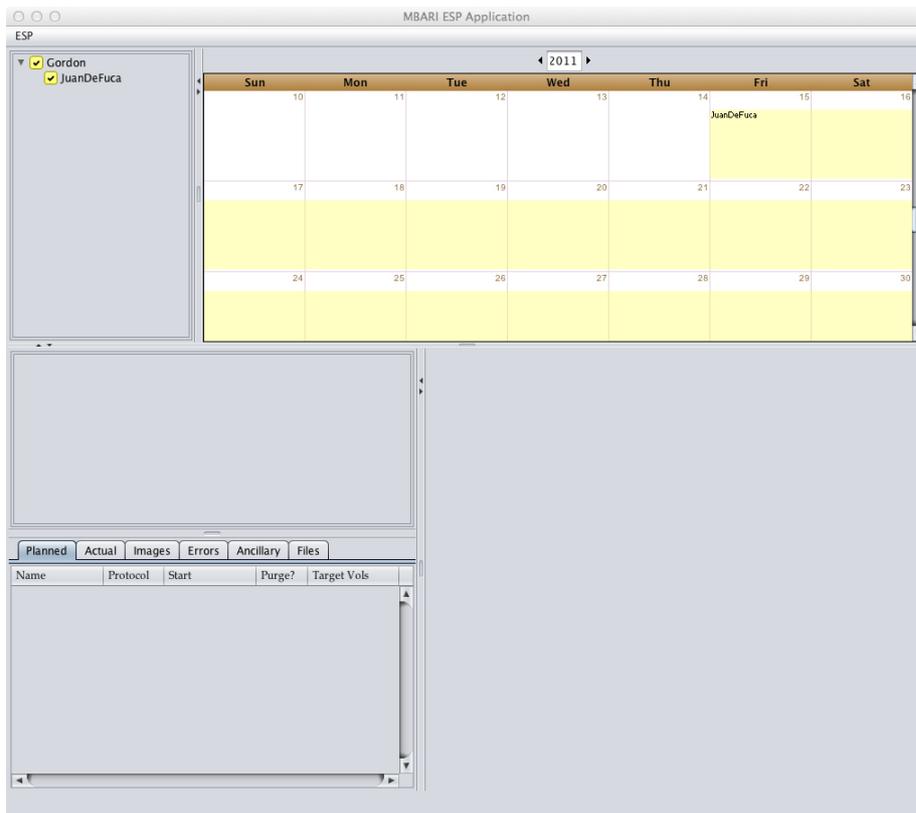
Field	Description	This Example
Name	This is a user friendly name that you want to call you mission. One thing to note with this name and the instrument name is that the GUI will use the name of the instrument and the mission as a directory structure on your local machine to store local copies of all the files that the ESP produces/uses. For this reason, we don't allow spaces in mission names.	In this example, we simply chose <i>JuanDeFuca</i>
Latitude	This is the latitude where the ESP will be deployed	43.031757

Start Tube	This is the tube that will be used when this mission is started.	2
Longitude	This is the longitude where the ESP will be deployed	-126.752014
Type	This is a drop down selection of a few available types of mission: Shallow, MFB, 1km, 4km	4km
Depth	The depth at which the ESP will be deployed	1000m
Start Date	This is the date and time of the start of the mission	7/15/2011 00:00:00
End Date	The date at which the mission will end	8/31/2011 00:00:00
FTP Hostname	This is the hostname of the FTP server which will host the files that the ESP is generating during its mission. This FTP site is used to pull down the files to your local machine for analysis	ftp.mbari.org
Mode	The mode the mission will be running in. This is most likely "real", but there are "Simfast", "Simreal", and "Quick" modes as well	real
FTP Root	This is the base directory on the FTP server where the ESP will be recording it's files. This is usually where the log file is located.	In this example, the complete FTP URL to the data is: ftp://ftp.mbari.org/pub/kgomes/ESP/test/data/Gordon/JuanDeFuca which means the host is <code>_ftp.mbari.org</code> and the FTP Root is <code>/pub/kgomes/ESP/test/data/Gordon/JuanDeFuca</code> . A sample of what the directory contents for a mission might look like, see the figure below. 
Home Path	Not used	
FTP Username	This is the username that will be used to connect to the FTP server	anonymous
Config Path	Not used	

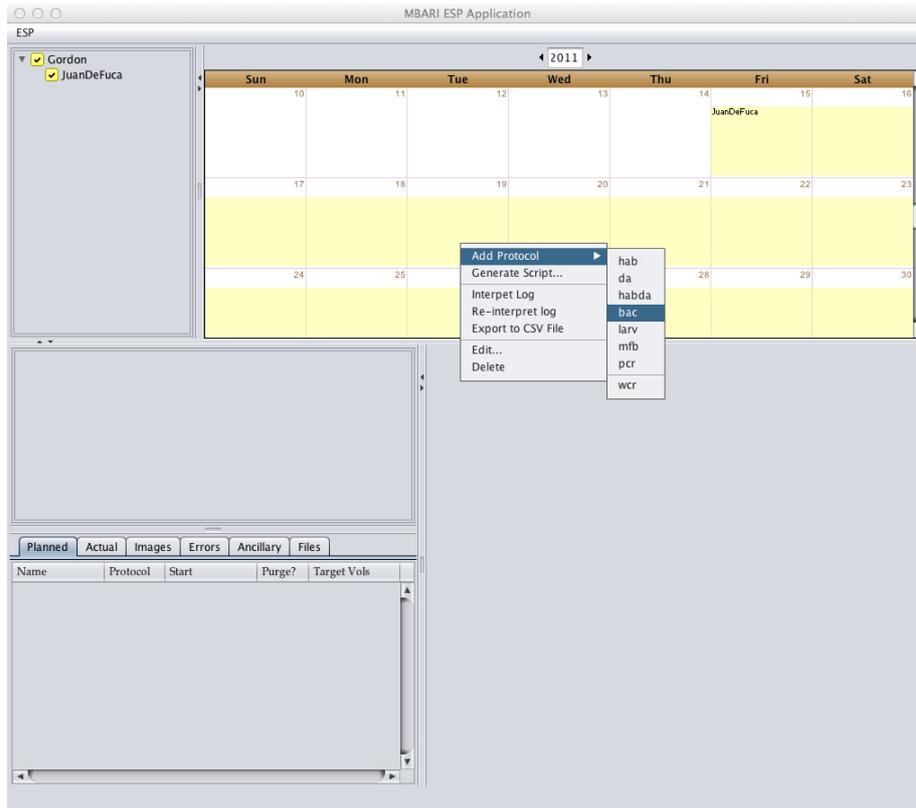
FTP Password	This is the password that will be used to connect to the FTP server	
Log Path	This is the path on the ESP itself where the files are begin written (images, real.log, .pcr, etc.). This is used by the GUI when it parses the log file looking for information as it needs to know where to find files in the FTP structure.	/var/log/esp
Log File	This is the name of the file that is being written to by the ESP during its operation	real.log
Path	Not used	

When all the information is filled out, click on "Save" to save the mission.

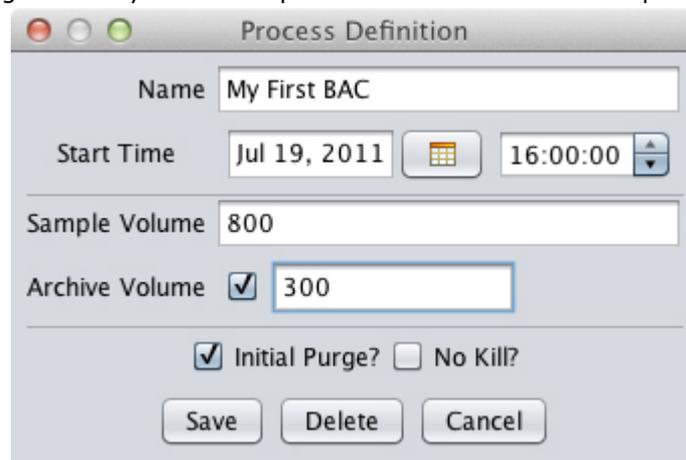
8. In the instruments window, if you now click on the arrow to the left of the instrument (Gordon) you will see a tree view with your new mission listed below.
9. Click on the check box next to the mission (JuanDeFuca) to bring the mission into view in the Calendar Window.



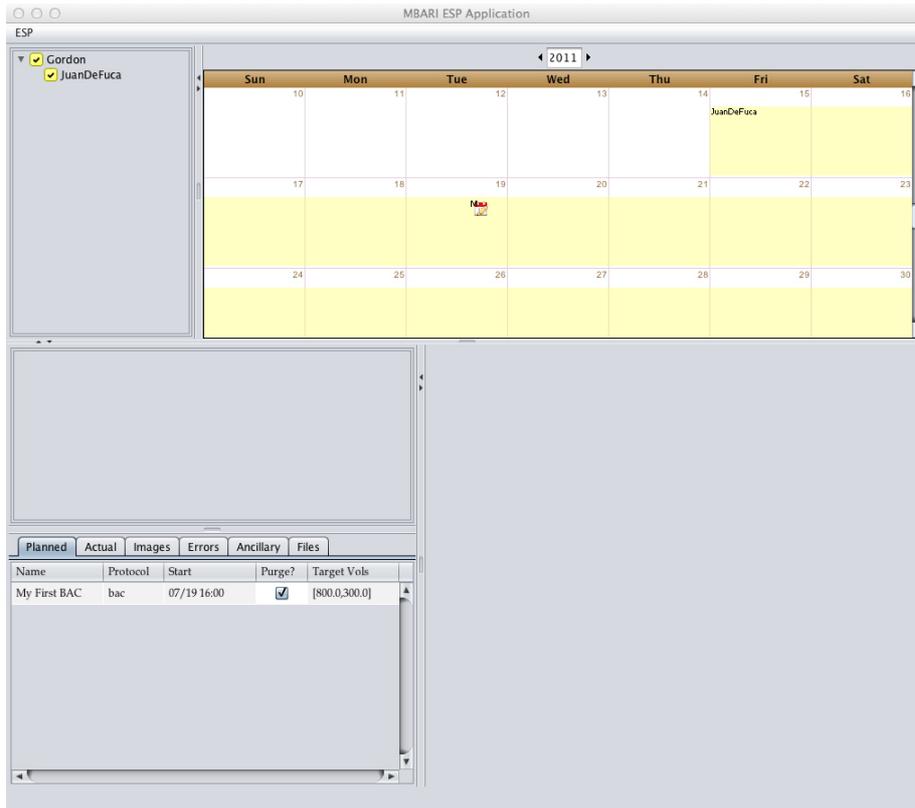
10. Now it is time to add some protocols to your mission! If you right click on the calendar at the approximate time that the protocol is to run, you will get a context menu that will allow you to select the protocol you will to insert into the mission. In the figure below, we are adding a "bac" protocol in the afternoon of the 19th of July.



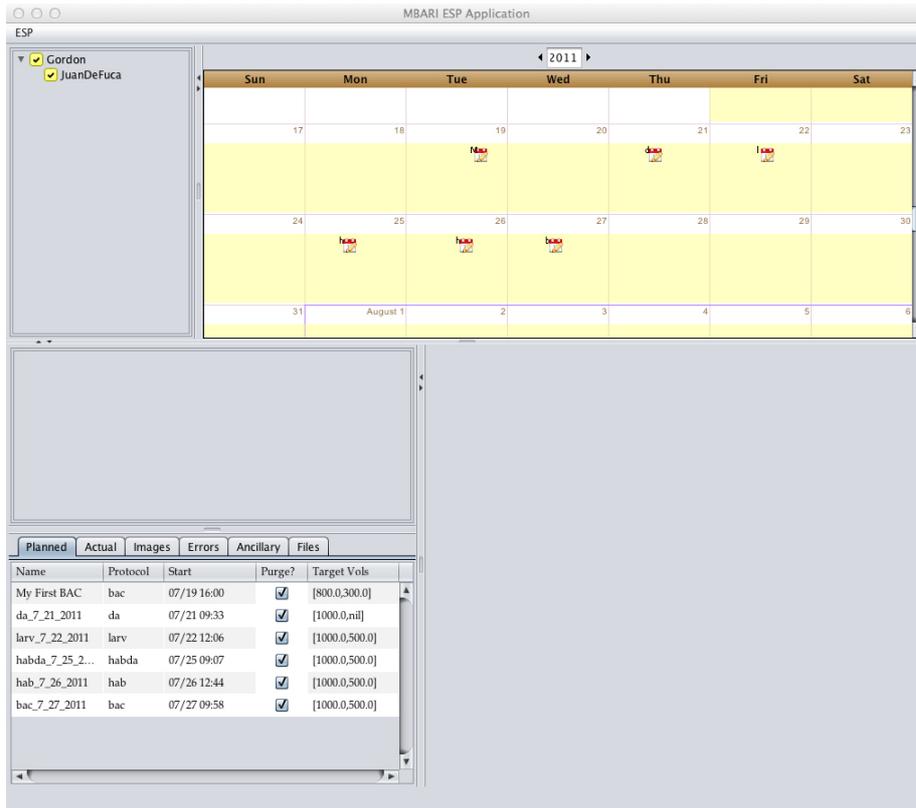
11. This brings up a dialog to allow you to edit specific information about this protocol run.



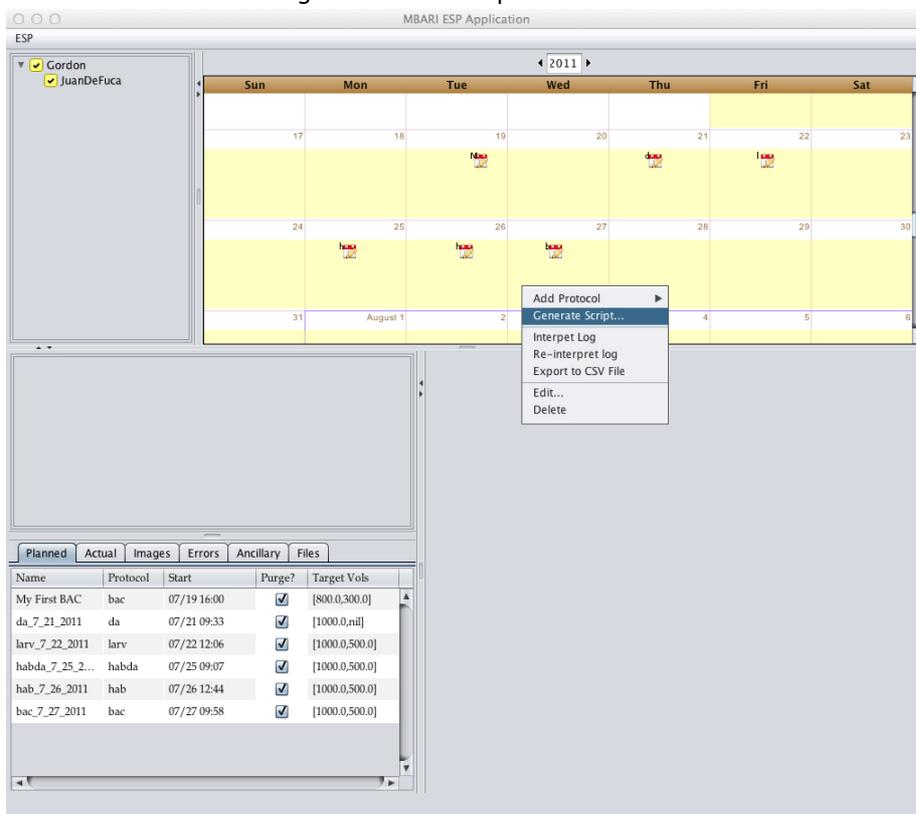
12. I changed the name to something meaningful to me and then changed the time, sample volume and archive volume to match what I wanted for this particular run of the bac protocol. Then click on "Save" to save the protocol in the mission.



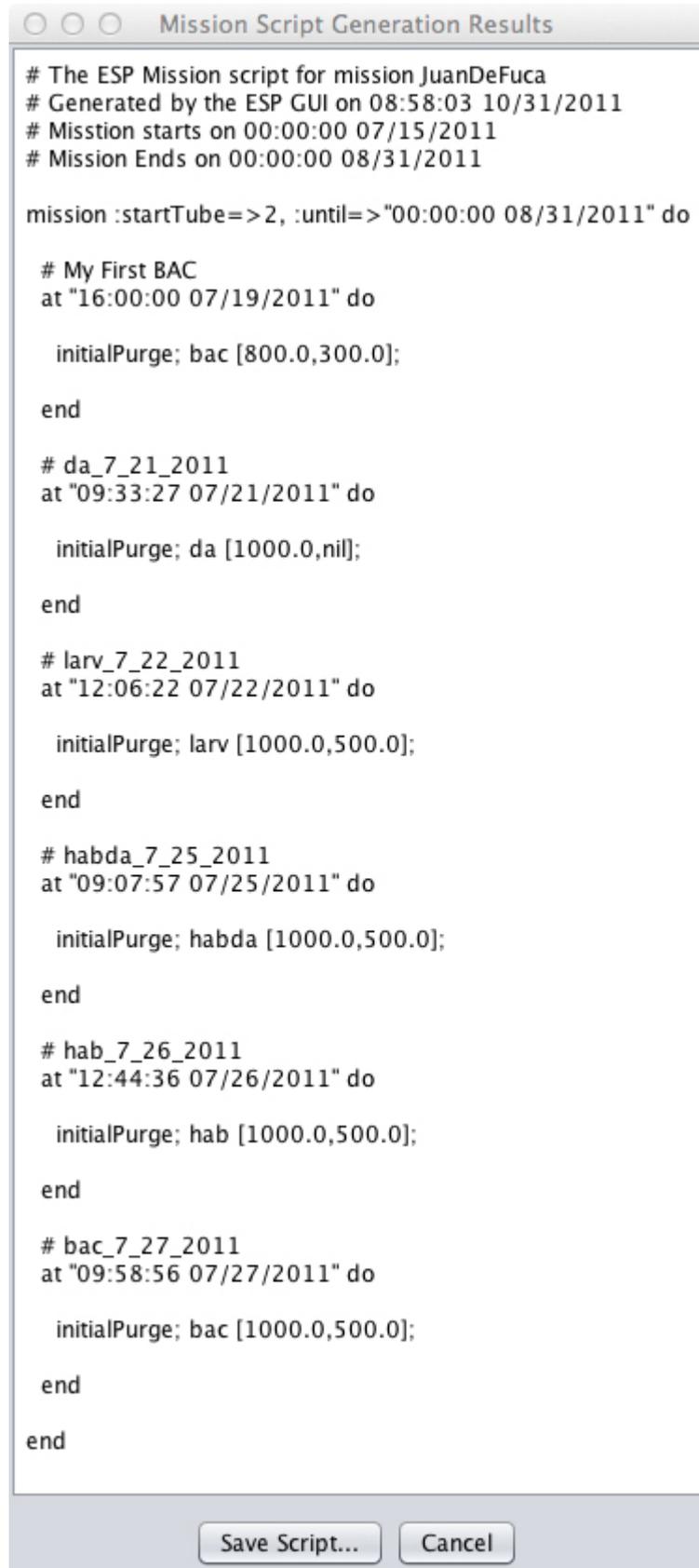
13. What you now see is a small calendar icon in the upper portion of the colored mission bar on the calendar. It is placed at the top of the mission bar to indicate that it is a planned protocol, not one that was extracted from the log file (which you will see later). Also, the small pencil on the icon means that it is a planned protocol, not an actual one. The small letter at the front of the icon is used to help distinguish which protocol this is. It is simply the first letter of the name that you gave the protocol. You will also notice the list of "Planned" protocols in the lower left pane shows the list of protocols you have planned so far. I used the same method to add 5 more protocols to the mission plan as an example.



14. Once you have the mission the way you like it, you can generate the ruby script that will execute the mission on the ESP by right-clicking on either the mission in the Calendar Window or in the Instrument List Window and selecting "Generate Script...".



15. This opens a window that displays the script and gives you an option to save it to your local disk somewhere (click on "Save Script...") to do this.



```
# The ESP Mission script for mission JuanDeFuca
# Generated by the ESP GUI on 08:58:03 10/31/2011
# Mission starts on 00:00:00 07/15/2011
# Mission Ends on 00:00:00 08/31/2011

mission :startTube=>2, :until=>"00:00:00 08/31/2011" do

  # My First BAC
  at "16:00:00 07/19/2011" do

    initialPurge; bac [800.0,300.0];

  end

  # da_7_21_2011
  at "09:33:27 07/21/2011" do

    initialPurge; da [1000.0,nil];

  end

  # larv_7_22_2011
  at "12:06:22 07/22/2011" do

    initialPurge; larv [1000.0,500.0];

  end

  # habda_7_25_2011
  at "09:07:57 07/25/2011" do

    initialPurge; habda [1000.0,500.0];

  end

  # hab_7_26_2011
  at "12:44:36 07/26/2011" do

    initialPurge; hab [1000.0,500.0];

  end

  # bac_7_27_2011
  at "09:58:56 07/27/2011" do

    initialPurge; bac [1000.0,500.0];

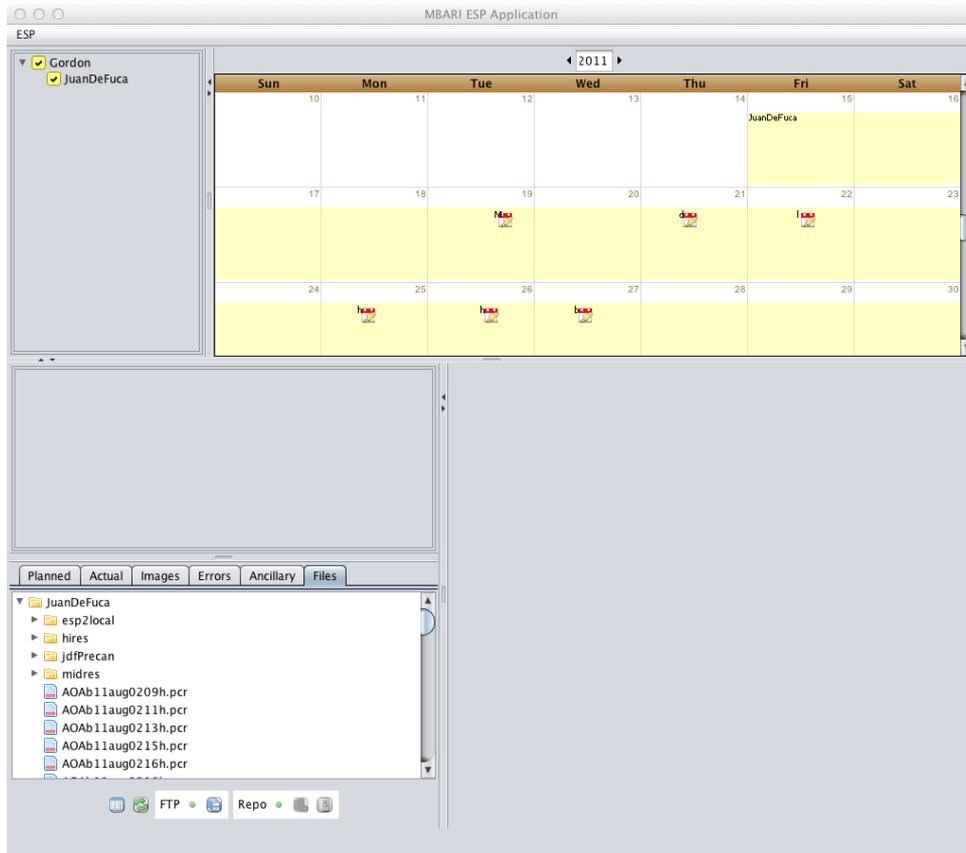
  end

end
```

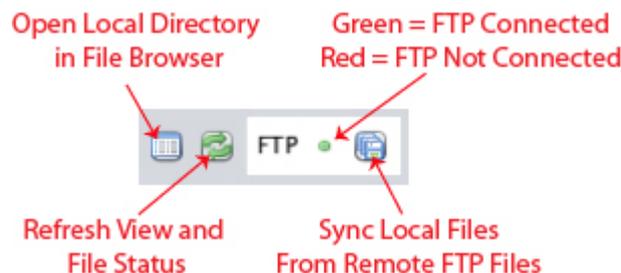
Data Management and Analysis

Once your mission is underway, the ESP GUI can be used to look at and analyze the data that the ESP is generating. Once the ESP starts generating logs, images and files, you should see them show up in

the FTP site that you defined in the mission planning portion above. Continuing with that example, if I start the GUI, expand the arrow next to "Gordon" and then select the checkbox next to the "JuanDeFuca" mission, it will appear in the calendar view. With that selected, let's look a little closer at the Protocol, Event and Data Window. As mentioned above, the first tab "Planned" shows you the protocols that have been planned for this mission (what you created earlier). You can select the "Actual" tab, but will not see anything yet as we have not parsed the log file from the ESP to see what has actually happened out there. The same goes for "Images", "Errors" and "Ancillary". Nothing will show in these tabs until the GUI has had an opportunity to parse the information out of the log file that the ESP generates (which we will do shortly). Which brings us to the "Files" tab.

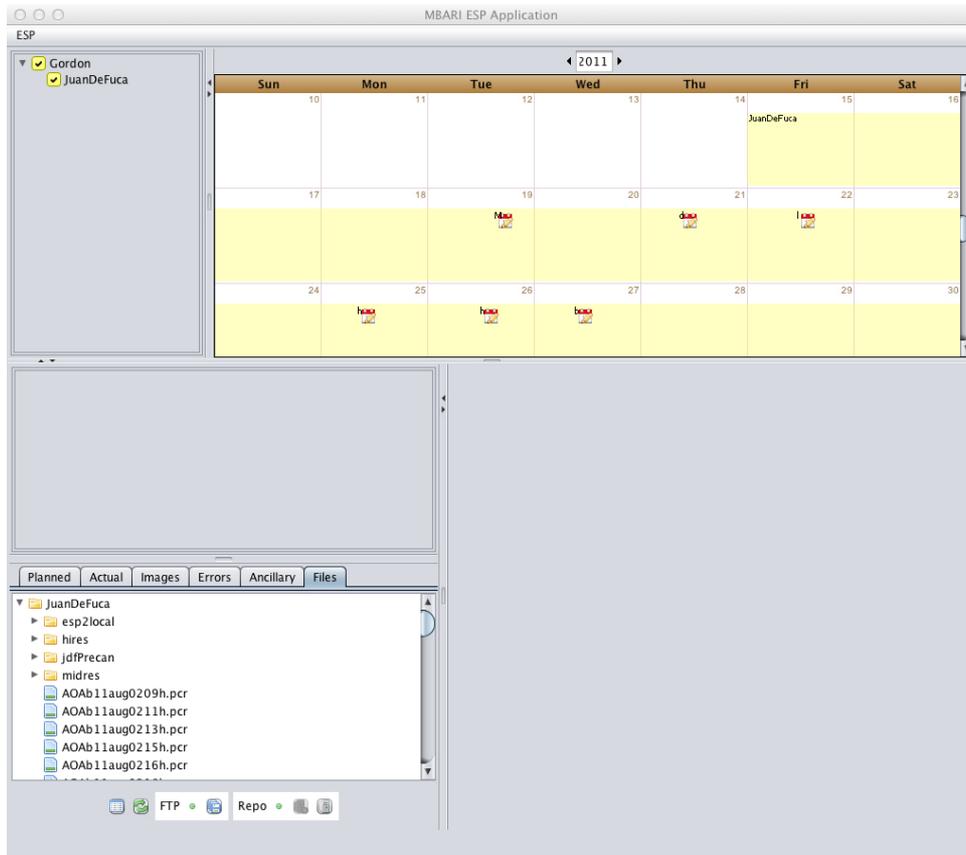


The Files tab is a tree view of the combination of the files both in your local directory and on the remote FTP server. In this case what you can see is that all of the files listed here are available on the remote server but not on your local disk drive. This is indicated by the icon having red bar on the bottom. If the icon has a green bar only it is both on the remote server and on your local disk and the two are in sync. If the icon has a green bar and two small arrows it means that the file is located both on your disk and on the remote server, but they are out of sync and in need of a re-sync. If the icon has no color on it, it is on your local disk and not on the remote server and nothing needs to be done. Let's examine what your options are at this point.

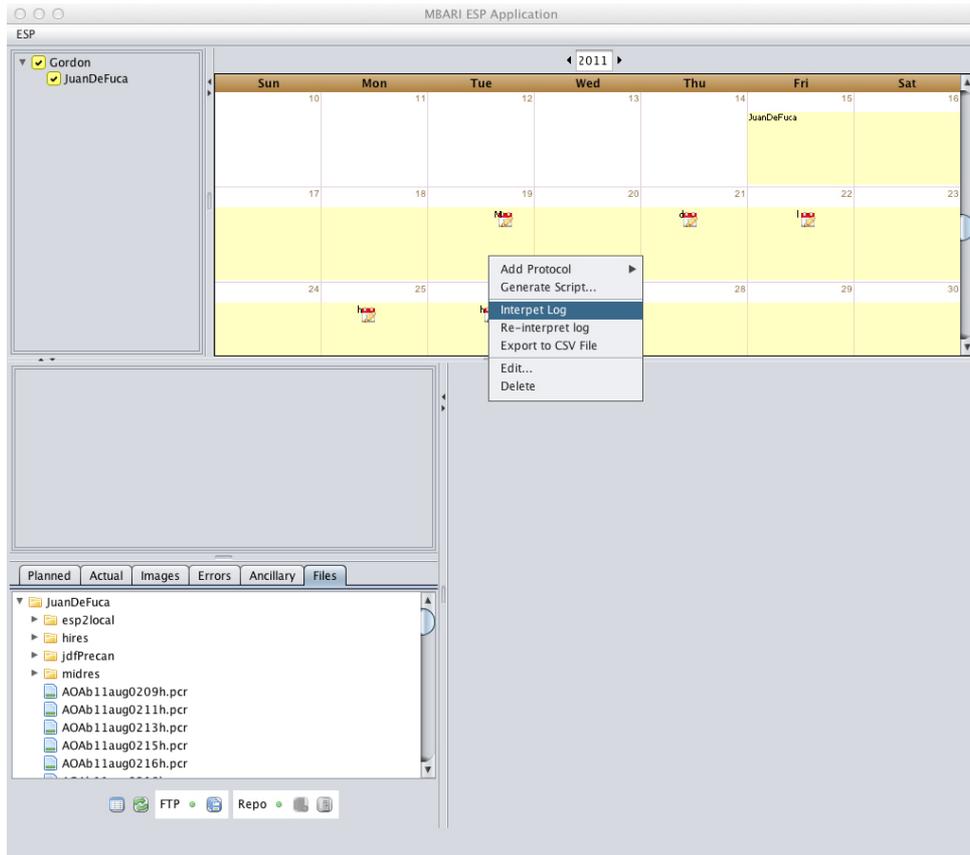


The above figure shows some the control panel for the file synchronization with the FTP server. The first button will simply open the directory on your local disk where the files are being stored so you can find them easily in your file manager. The second button simply examines the remote and local file directories and refreshes the view of their status. Assuming the light is green (and not red which would indicate that there is something incorrect with the FTP configuration in the mission and the GUI cannot connect to the FTP server), the last button will pull down the most recent version of the remote files on the FTP server and synchronize your local files to those on the remote FTP server. Depending on your connection and the

size of the files, this can sometimes take a while to perform. Once this is done, all the files should show green to indicate they are synchronized with the FTP server.



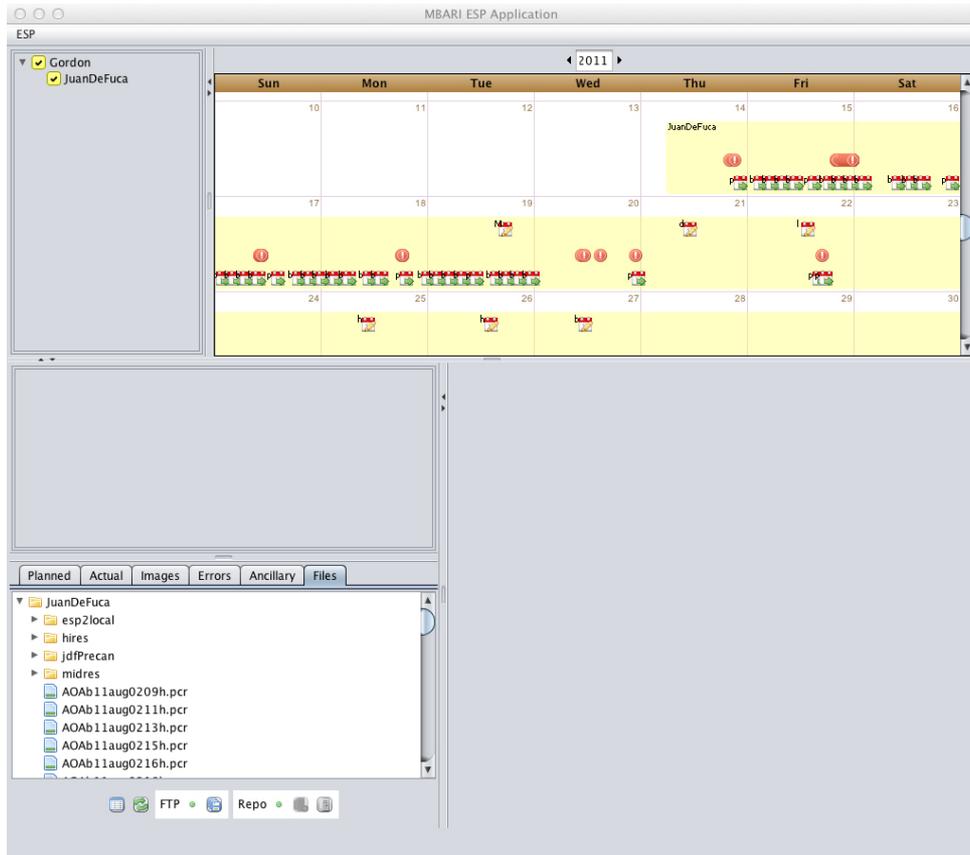
After the sync, you should see copies of the files on your local hard drive. Now with the files synchronized locally, you can tell the GUI to go ahead and parse the log file for information about protocols, samples, images, ancillary data, etc. This can be done by right-clicking on either the mission in the Instrument Window or in the Calendar Window and selecting **Interpret Log**.



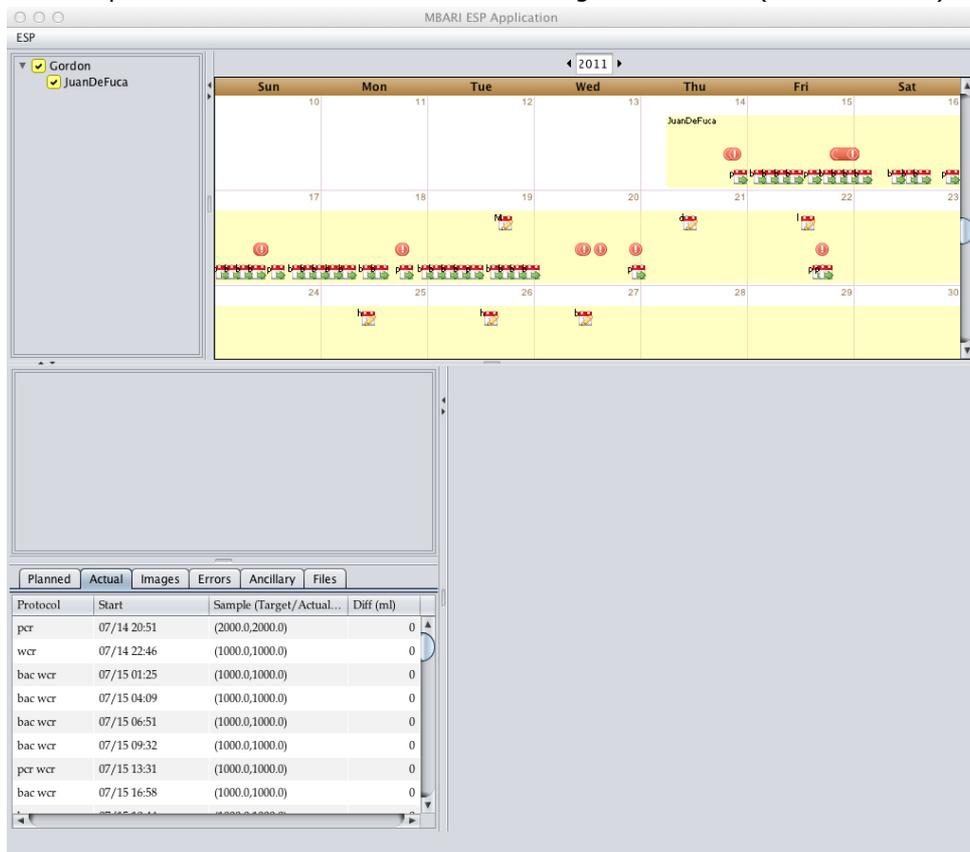
A window will open showing you the progress of the log file parsing.



Once the log interpretation is complete, you should see many more things in the calendar view. In the figure below you will notice several new things. The exclamation points in the middle of the mission bar on the calendar indicate an error during the run of the ESP and the calendar icons with green arrows at the bottom of the mission bar indicate protocols that were found in the log file.



At this point, we can begin to explore some information about the currently deployed ESP. If you select the "Actual" tab in the lower left pane, you will see the list of protocols that were interpreted from the log file. You see the name of the protocol, the start date and time, the target/actual volumes of the associated water sample and the difference between the target and actual (if there is one).



If you click on the protocol either in the calendar view or in the "Actual" table, you will see more details about the protocol in both the Protocol Graph Window and in the Context Sensitive Details Window. In the following figure, I selected the first pcr protocol.

The screenshot displays the MBARI ESP Application interface. At the top, a calendar view for 2011 shows a yellow highlighted period from Thursday, July 14, to Saturday, July 16. Below the calendar is a protocol graph window showing a flowchart of activities: 'DWSM Inhale' leads to a 'Sample (null/5000.0 ml)', which then leads to a 'Sample (2000.0/2000.0 ml)'. This sample is associated with three 'Image' nodes with durations of 160.0 s, 64.858 s, and 40.0 s. A 'wcr_7_14_2011 (wcr)' node is also shown, with an 'archive' link connecting it to the PCR sample. At the bottom, a table lists protocols with columns for 'Planned', 'Actual', 'Images', 'Errors', 'Ancillary', and 'Files'. The first row is for the 'pcr' protocol on 07/14 20:51, with a sample of (2000.0,2000.0) and a difference of 0 ml. To the right, a context-sensitive details window shows a log file entry for the PCR protocol, including timestamps and specific actions like '#pcr sampling at most 2000ml, wcr at most 1000ml' and '#Loading sh1 puck from tube 2 into Collection Clamp'.

Protocol	Start	Sample (Target/Actual...)	Diff (ml)
pcr	07/14 20:51	(2000.0,2000.0)	0
wcr	07/14 22:46	(1000.0,1000.0)	0
bac wcr	07/15 01:25	(1000.0,1000.0)	0
bac wcr	07/15 04:09	(1000.0,1000.0)	0
bac wcr	07/15 06:51	(1000.0,1000.0)	0

In the Protocol Graph Window you can see some details about the various related artifacts. In this example, since this is from the Deep ESP, you can see that the water sample associated with the PCR itself was extracted from a DWSM sample. You can also see the associated images that were taken of the analyzed sample associated with the PCR. The WCR that is shown gives you the information that there was indeed an archive performed in association with this PCR. In the context sensitive details window on the lower right side of the screen you can see the entry in the log file that the PCR protocol was extracted from. If you select one of the images in the graph or switch to the "Images" tab, you will get more information about the image you have selected.

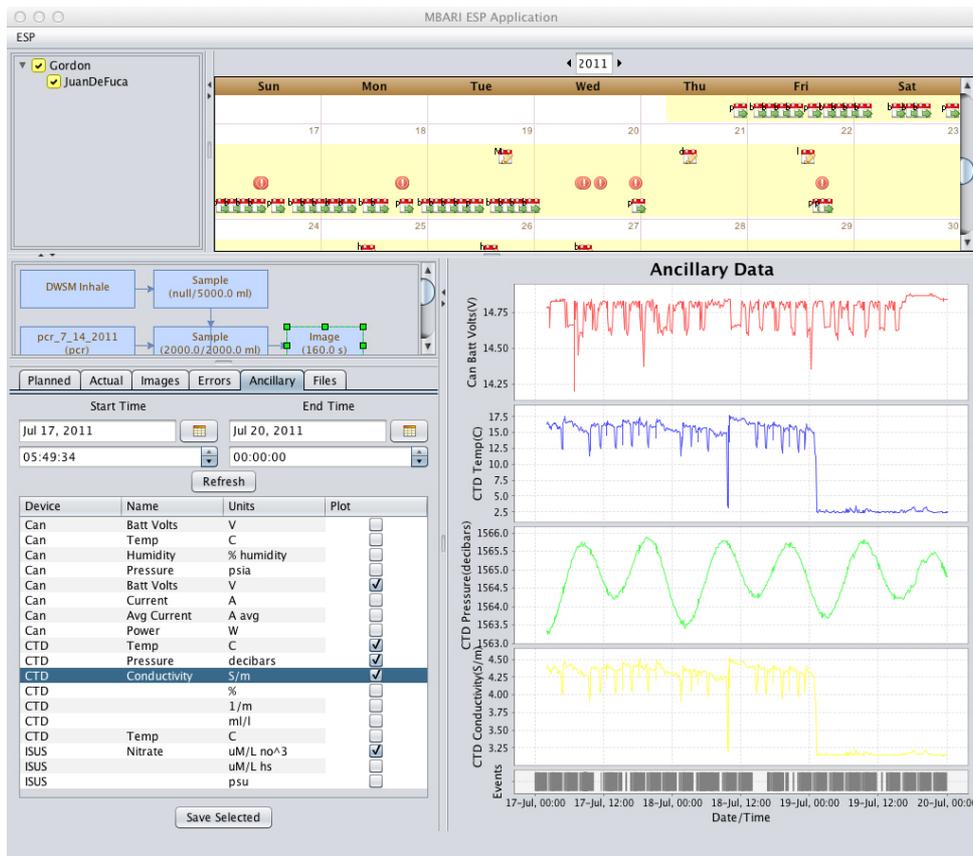
The screenshot displays the MBARI ESP Application interface. At the top, a calendar for 2011 shows a yellow background with red exclamation marks indicating errors. Below the calendar is a workflow diagram showing sample collection and imaging steps. The bottom part of the interface features a table with columns for Name, Date, and Exposure, listing image files and their respective dates and exposure times.

Name	Date	Exposure
pcr11jul1500h2000m160s.tif	07/15 00:03	160
pcr11jul1500h2000m40s.tif	07/15 00:04	40
pcr11jul1500h2000m1.tif	07/15 00:05	64.858
pcr11jul1515h1000m160s.tif	07/15 15:34	160
pcr11jul1515h1000m40s.tif	07/15 15:35	40

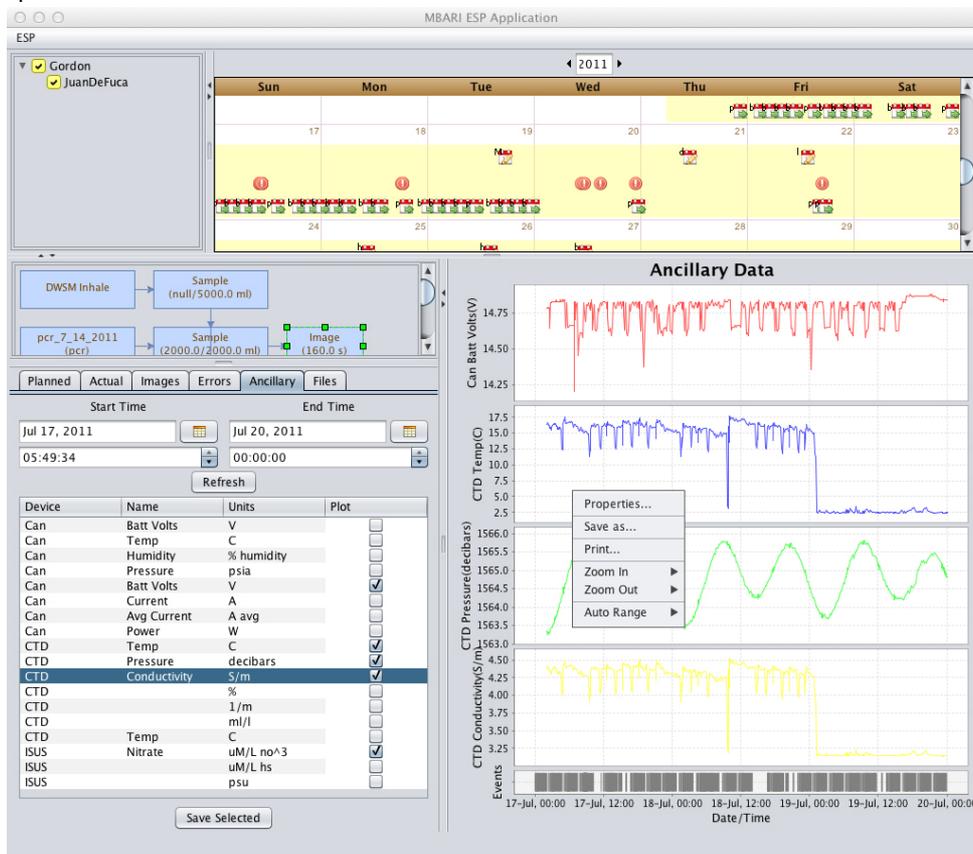
The image tab shows a table with some information about the selected image such as the date and time it was taken and the exposure that was used. In the context sensitive details panel, you can see the image itself and if you select the "Metadata" tab you will see the information extracted from the TIFF image itself. The "Log Entry" tab shows the location in the log file that this entry was extracted from. Next if you select an Error exclamation point in the calendar view, or switch to the "Error" tab, you will get more information about the errors that were discovered in the log file.

The screenshot displays the MBARI ESP Application interface. At the top, a calendar for 2011 shows a yellow highlight for the week of July 17-23. Below the calendar is a flowchart illustrating data processing steps: 'DWSM Inhale' leads to 'Sample (null/5000.0 ml)', which then leads to 'Sample (2000.0/2000.0 ml)'. This sample is processed into 'Image (160.0 s)', 'Image (64.858 s)', and 'Image (40.0 s)'. The 'Sample (2000.0/2000.0 ml)' also leads to 'wcr_7_14_2011 (wcr)', which then leads to 'Sample (1000.0/1000.0 ml)'. The bottom section contains a log viewer with tabs for 'Planned', 'Actual', 'Images', 'Errors', 'Ancillary', and 'Files'. The 'Errors' tab is selected, showing a list of error messages. The log viewer also displays a detailed log entry for the error 'ERROR:changing sampling position:11jul17JdF ABORTED!'.

In this example, you can see the error is the abort of the mission and when that error occurred. In the context details window, you can see the log entry with a window of lines on both sides of the entry so you can see the context in which the error occurred. If you select the "Ancillary" tab, you can get information about the ancillary data that was extracted from the log file. This is the data the is logged by sensors in the ESP itself in addition to other contextual sensors that are attached to the ESP and are logging their data through the ESP. In the example shown below, there is data available from the ESP Can itself as well as from an associated CTD and an ISUS. If you select an appropriate time window (for this example, I chose Jul 17 through July 20), then choose the variables you are interested in and click "Refresh", you will see a plot of the various data in the context sensitive details window.



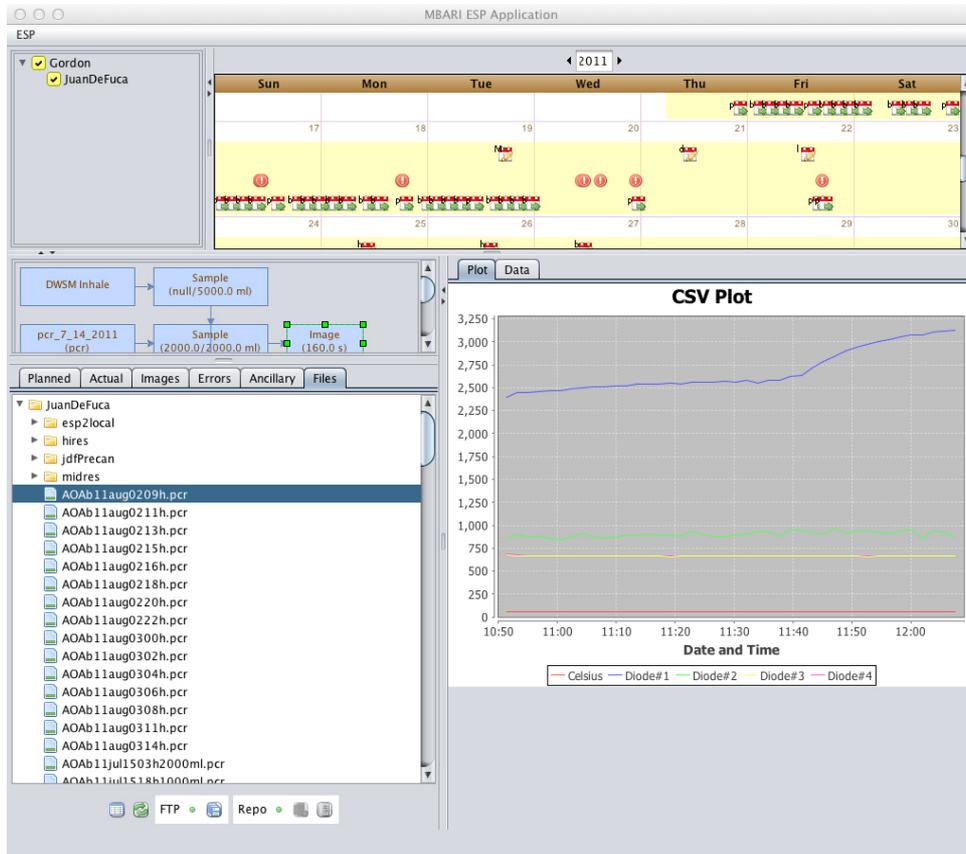
If you right-click on the plot itself, you will be presented with some options to save, print or zoom/pan the ancillary data plots.



If you want to save the data that you have plotted, in the left window, click on the "Save Selected" button and it will present you with a file dialog so you can save a comma separated list of data points to

your disk somewhere for further analysis. Note that in the resulting CSV file, the dates and times of the different data do not align and so where there is not data "N/A"s are inserted as excel understands those as no data.

Another thing that may be helpful, is that if you select on the "Files" tab again, and if there are any files that are PCR results (i.e. end in .pcr), you can select those to see plots and tables of the data in the PCR results file in the context sensitive details window.



Lastly, if you are interested in a CSV formatted file of the information from the ESP mission, you can right-click on the mission in the calendar view and select "Export to CVS File" which will give you a dialog box to save a CSV formatted file with some of the information from the mission to date to your computer.

