

# Processing air and water temperature data in HOBOWare

Pendant	Water Temp Pro v2	Tidbit v2
		

Note: you do not need HOBOWare Pro to process temperature data; you can use the free version, which can be downloaded online – <http://www.onsetcomp.com/hoboware-free-download>

8/24/2017

# Steps

- Set up your **default settings** (see 'HOBOWare\_DefaultSettings' file); you should only have to do this once
- **Open the air or water sensor file** in HOBOWare
- **Plot** the data
- Change the **Temp series name** to either 'Water Temp' or 'Air Temp'
- **Open the other sensor file – change the Temp series name** to either 'Water Temp' or 'Air Temp'; then **copy the temperature data series and paste into the first file**; both air and water temperature data are now in one file\*
- **Export as .csv**
- Save as an Onset Project File; retain original Onset HOBOWare Data files too!

\*We recommend doing this! It is easy and saves you time later on.

# File naming scheme





If you're going to use the ContDataQC R package, you need to use the following file naming scheme:

## **SiteID\_SensorType\_StartDate\_EndDate**

- Site ID (no spaces or underscores) = BB01CC
- Data Type (Water/Air/AW) (AW = Air + Water sensor data in same file)
- Date, Start (YYYYMMDD)
- Date, End (YYYYMMDD)
- Each element separated by underscore (“\_”).

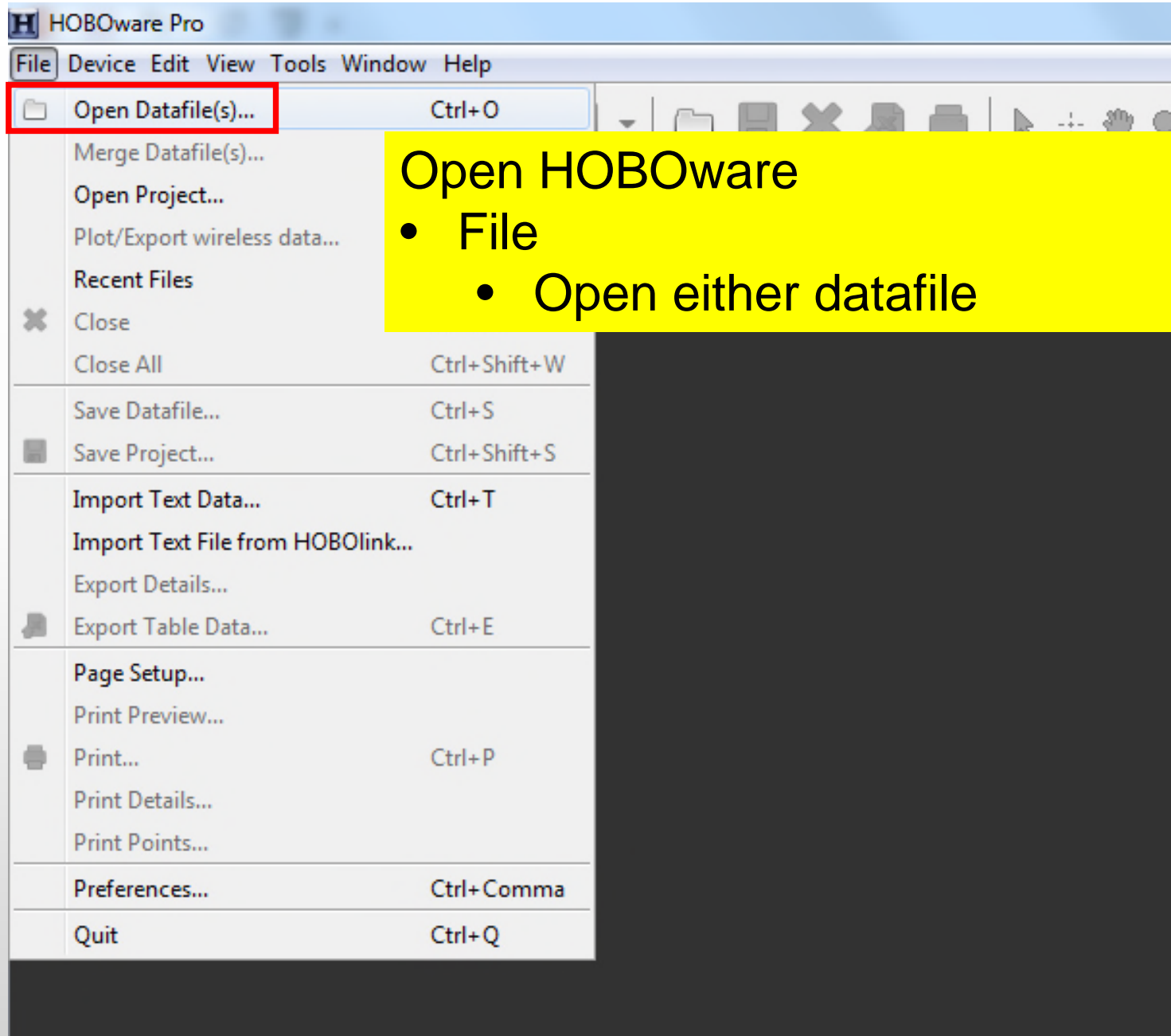
Example:

- **BB01CC\_Air\_20131022\_20140428.csv**

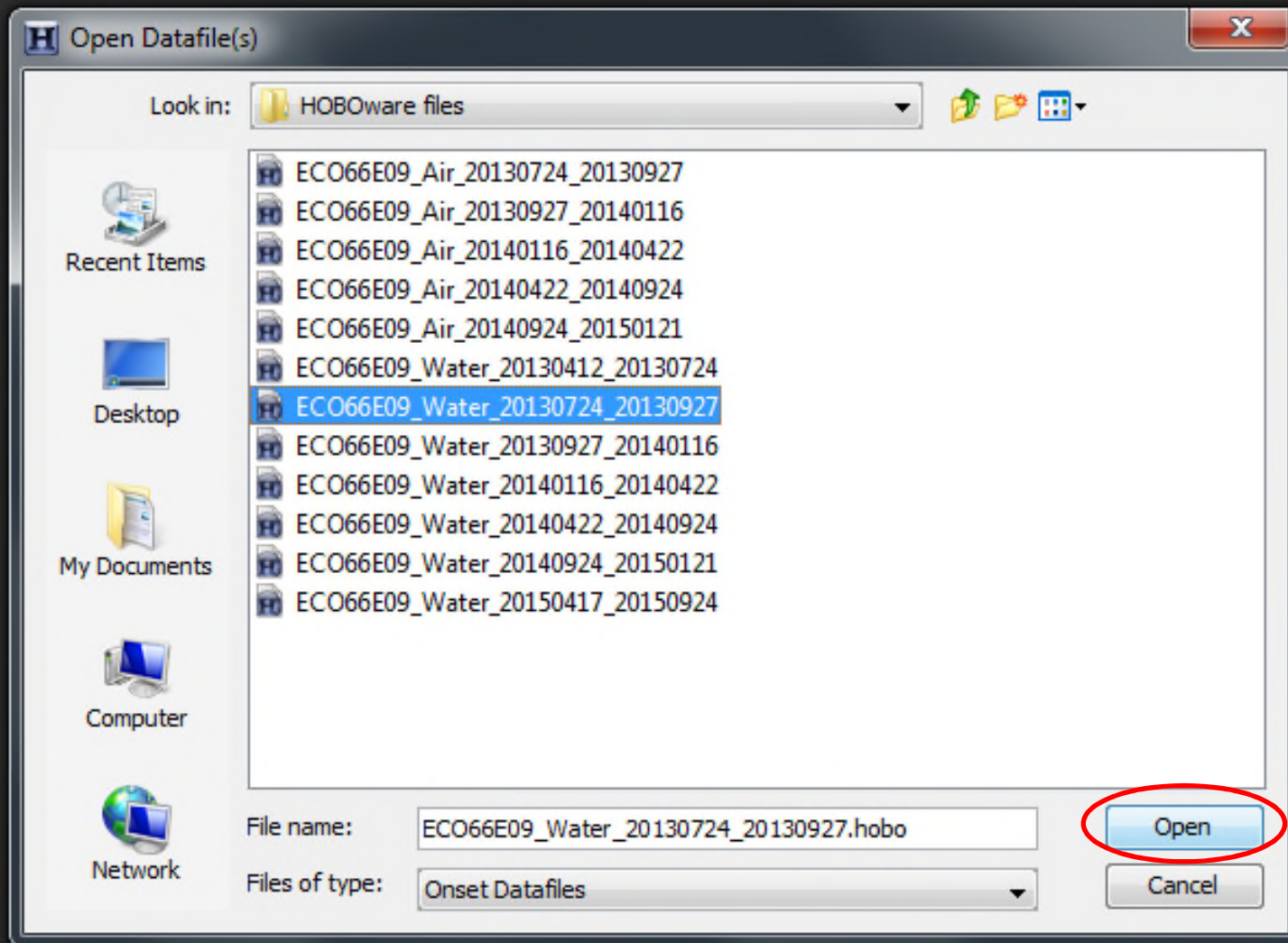
Name	Date modified	Type
 BB01CC_Air_20131022_20140428.csv	2017-08-23 20:07	Microsoft Excel Comma Separated Values File
 BB01CC_Air_20140428_20140924.csv	2017-08-23 20:12	Microsoft Excel Comma Separated Values File
 BB01CC_Water_20131022_20140428.csv	2017-08-23 20:08	Microsoft Excel Comma Separated Values File
 BB01CC_Water_20140428_20140924.csv	2017-08-23 20:15	Microsoft Excel Comma Separated Values File

# Other tips

- **StationIDs** – after you come up with a name, stick with it!
- Consider setting up a **folder for each long-term monitoring site**.
- **Within each site folder**, consider setting up the folder structure described in the '**DataManagementTips**' PowerPoint.



**1. Open the  
HOBO Datafile  
(in this example,  
we start with the  
for the **water  
sensor**)**



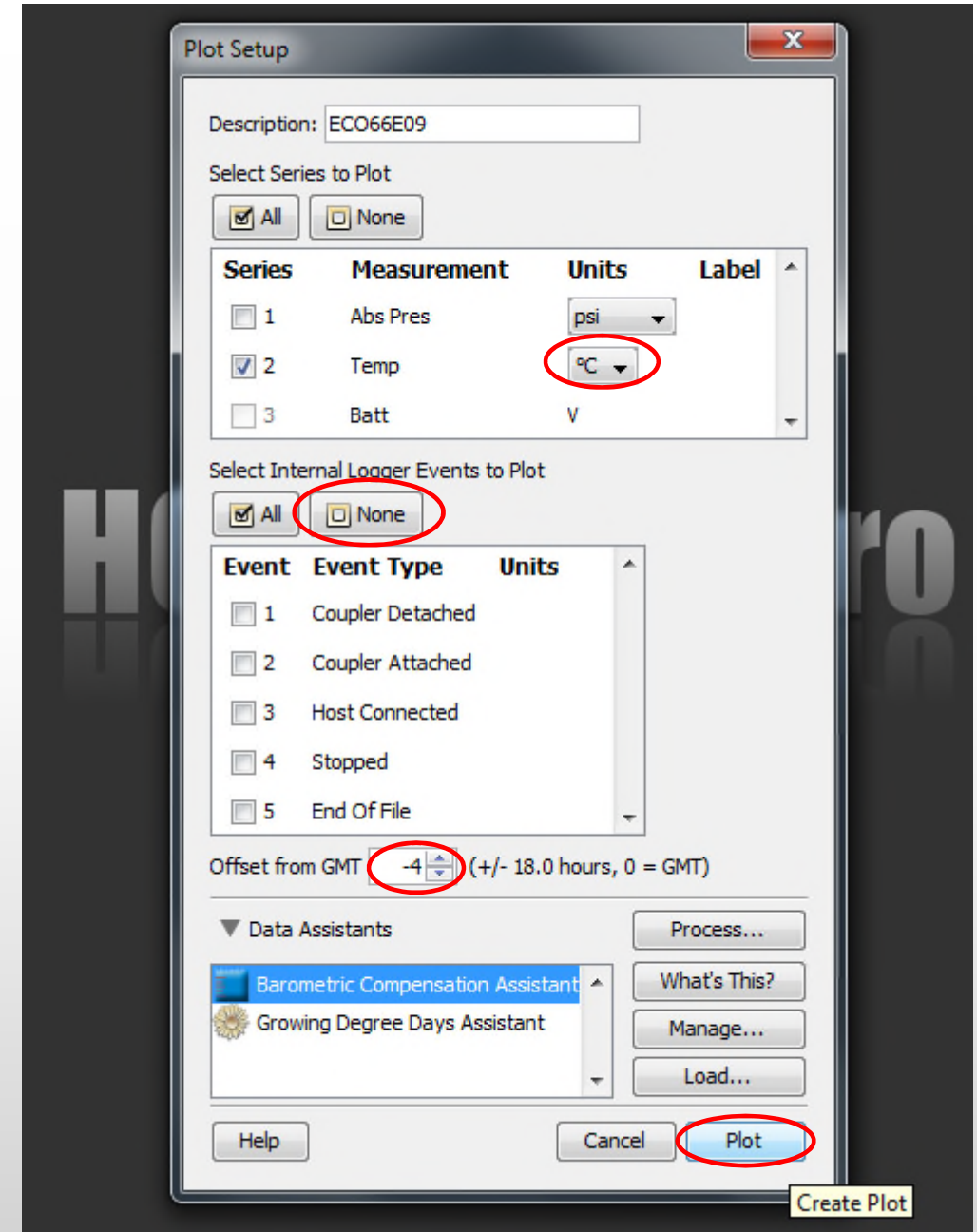
**Browse/select the appropriate water sensor file**

**Click 'Open'**

# Open the water sensor file in HOBOWare

**Tip:** if you want to use the ContDataQC R package, you can reduce the data preparation time by making the following entries –

- Description: enter **SiteID**
- Selecting **°C** for **units**
- Clicking '**None**' under Internal Logger Events to Plot
- Making sure the time offset from GMT is appropriate for the site
- Click '**Plot**'



# Plot Setup

The screenshot shows the 'Plot Setup' dialog box with several red boxes highlighting specific fields and buttons. Red arrows point from yellow text boxes to these highlighted areas. The dialog includes sections for Description, Series selection, Internal Logger Events, Time Offset, and Data Assistants.

**Description:** ECO66E09

**Select Series to Plot**

Series	Measurement	Units	Label
<input type="checkbox"/> 1	Abs Pres	psi	
<input checked="" type="checkbox"/> 2	Temp	°C	
<input type="checkbox"/> 3	Batt	V	

**Select Internal Logger Events to Plot**

Event	Event Type	Units
<input type="checkbox"/> 1	Coupler Detached	
<input type="checkbox"/> 2	Coupler Attached	
<input type="checkbox"/> 3	Host Connected	
<input type="checkbox"/> 4	Stopped	
<input type="checkbox"/> 5	End Of File	

**Offset from GMT** -4 (+/- 18.0 hours, 0 = GMT)

**Data Assistants**

- Barometric Compensation Assistant
- Growing Degree Days Assistant

**Buttons:** Help, Cancel, Plot, Process..., What's This?, Manage..., Load...

**Create Plot**

Description: **StationID** (in this example, ECO66E09)

Temperature units °C

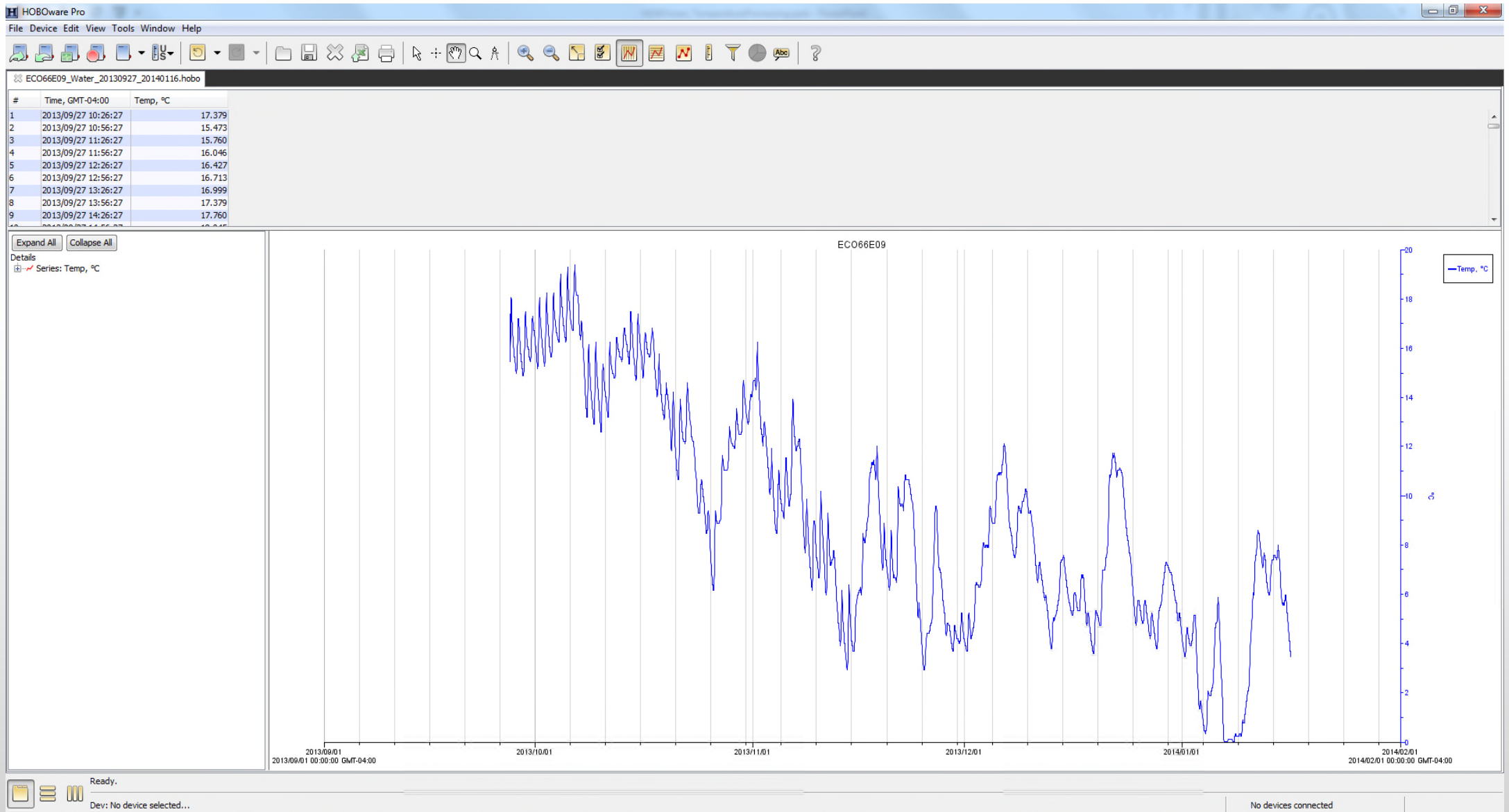
Click '**None**' (otherwise you'll get unwanted 'logged' entries in the .csv file that you'll need to delete later)

If the time zone for the site is incorrect, you can change that here (when you open the file, it goes to the default, which is the time zone of the computer that launched the sensor)

Click '**Plot**'



# A time series plot will then appear



# Change the Temp series name to 'Water Temp'

The screenshot shows the HOBOWare Pro interface. The 'Edit' menu is open, and 'Graph Properties' is selected. A red arrow points from this menu item to the 'Series Properties' dialog box. In the dialog, the 'Description' field is highlighted with a red box and contains the text 'Water Temp'. Another red arrow points from the 'Series: Temp, °C' entry in the 'Details' pane to the 'Description' field. A third red arrow points from the 'Done' button in the dialog to the 'Series: Temp, °C' entry. A yellow box contains a numbered list of steps: 1. Left click on Series: Temp, 2. Edit – Graph Properties, 3. Enter 'Water Temp', 4. Click 'Done'.

**HOBOware Pro**

File Device Edit View Tools Window Help

Filter Series: Temp...  
Copy Series: Temp Ctrl+C  
Paste Series Ctrl+V  
Add Graph Label...  
Hide Series: Temp  
Remove Series: Temp Delete  
**Graph Properties**  
Convert Units  
Undo Action: Remove Series Ctrl+Z  
Redo Action Ctrl+Y  
Copy Graph to Clipboard

#	Time	Temp
1	2013/09/27 15:26:27	17.950
2	2013/09/27 15:56:27	17.760
3	2013/09/27 16:26:27	17.570
4	2013/09/27 16:56:27	17.284
5	2013/09/27 17:26:27	17.094
6	2013/09/27 17:56:27	16.999
7	2013/09/27 18:26:27	16.903
8	2013/09/27 18:56:27	16.808
9	2013/09/27 19:26:27	16.618

Expand All Collapse All

Details

Series: Temp, °C

**Series Properties**

Description: **Water Temp**

Unit: °C

Lines

- ☒ Connect Points
- Style: Solid
- Width: 1
- ☐ Connect As Steps

Points

- ☐ Mark Points
- Marker: Rectangle
- Point Size: 3

Alarms

Max: 50.000

Min: -20.000

Enable Alarms:

- ☐ High Alarm
- ☐ Low Alarm

Misc.

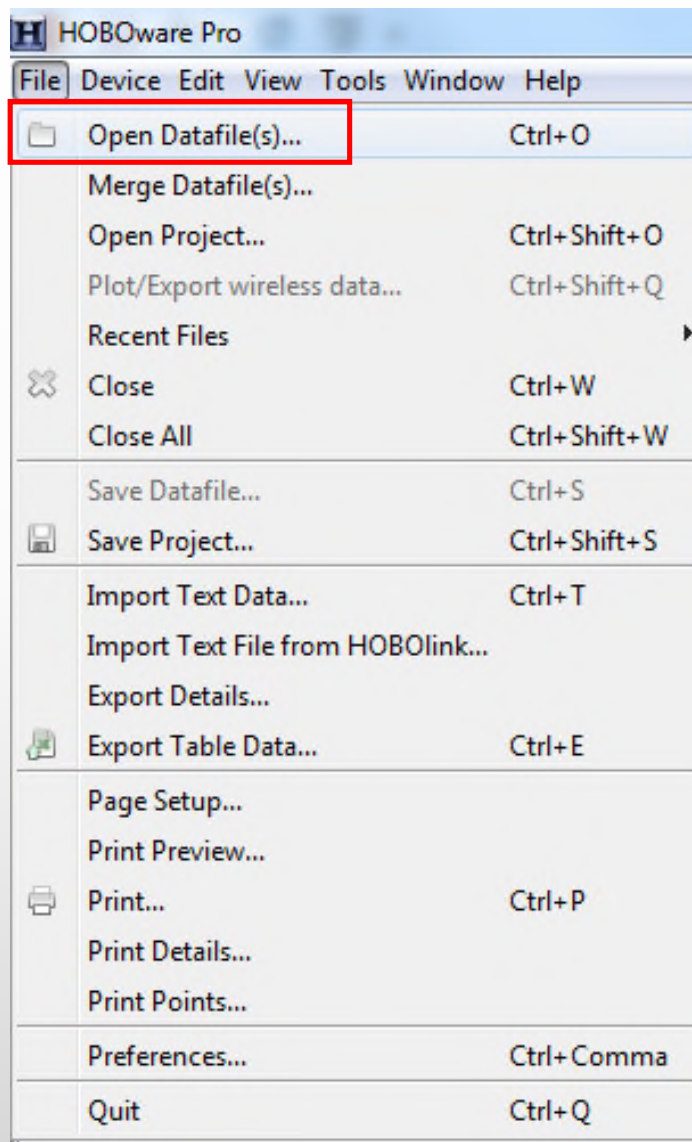
Time Axis: Time Axis

Value Axis: °C

Color: Choose...

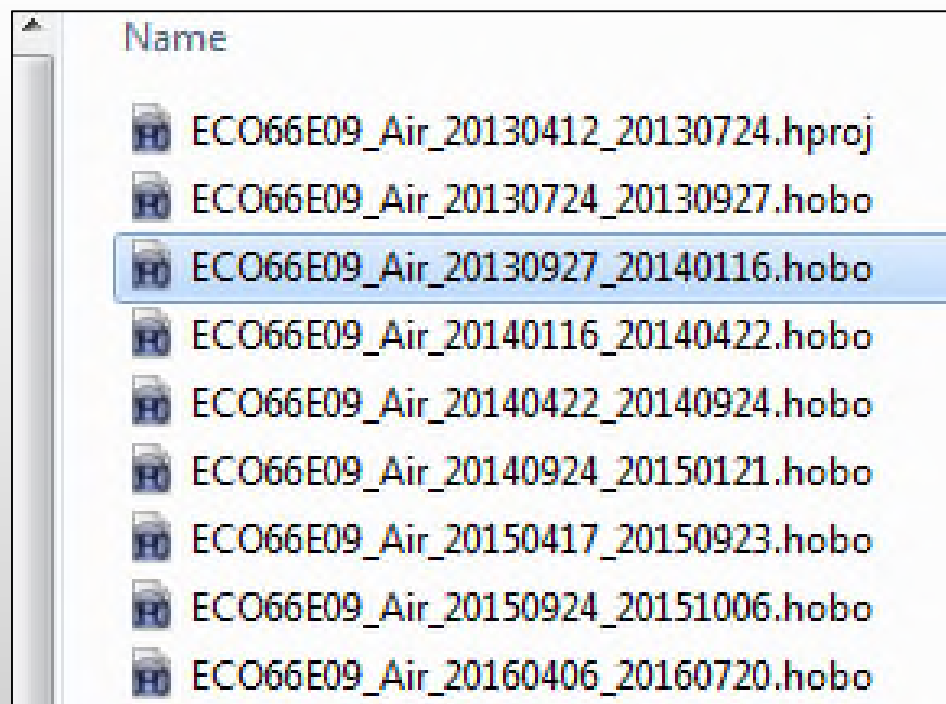
Cancel Apply **Done**

1. Left click on Series: Temp
2. Edit – Graph Properties
3. Enter 'Water Temp'
4. Click 'Done'



Now bring in the air temperature data.

While keeping the water sensor file open in HOBOWare, **open the air sensor file (File – Open Datafile).**



# Air sensor file – Plot Setup

The screenshot shows the HOBOWare Pro interface with a data table and a plot. The data table lists air temperature readings in °C for various times on 2013/09/27. The plot shows a line graph of temperature over time, with a y-axis ranging from -20 to 30 and an x-axis showing dates from 2013/09/01 to 2013/10/01.

The Plot Setup dialog is open, showing the following settings:

- Description: ECO66E09
- Select Series to Plot: ☒ All, ☐ None
- Series List:

Series	Measurement	Units	Label
<input type="checkbox"/> 1	Abs Pres	psi	
<input checked="" type="checkbox"/> 2	Temp	°C	
<input type="checkbox"/> 3	Batt	V	
- Select Internal Logger Events to Plot: ☒ All, ☐ None
- Event List:

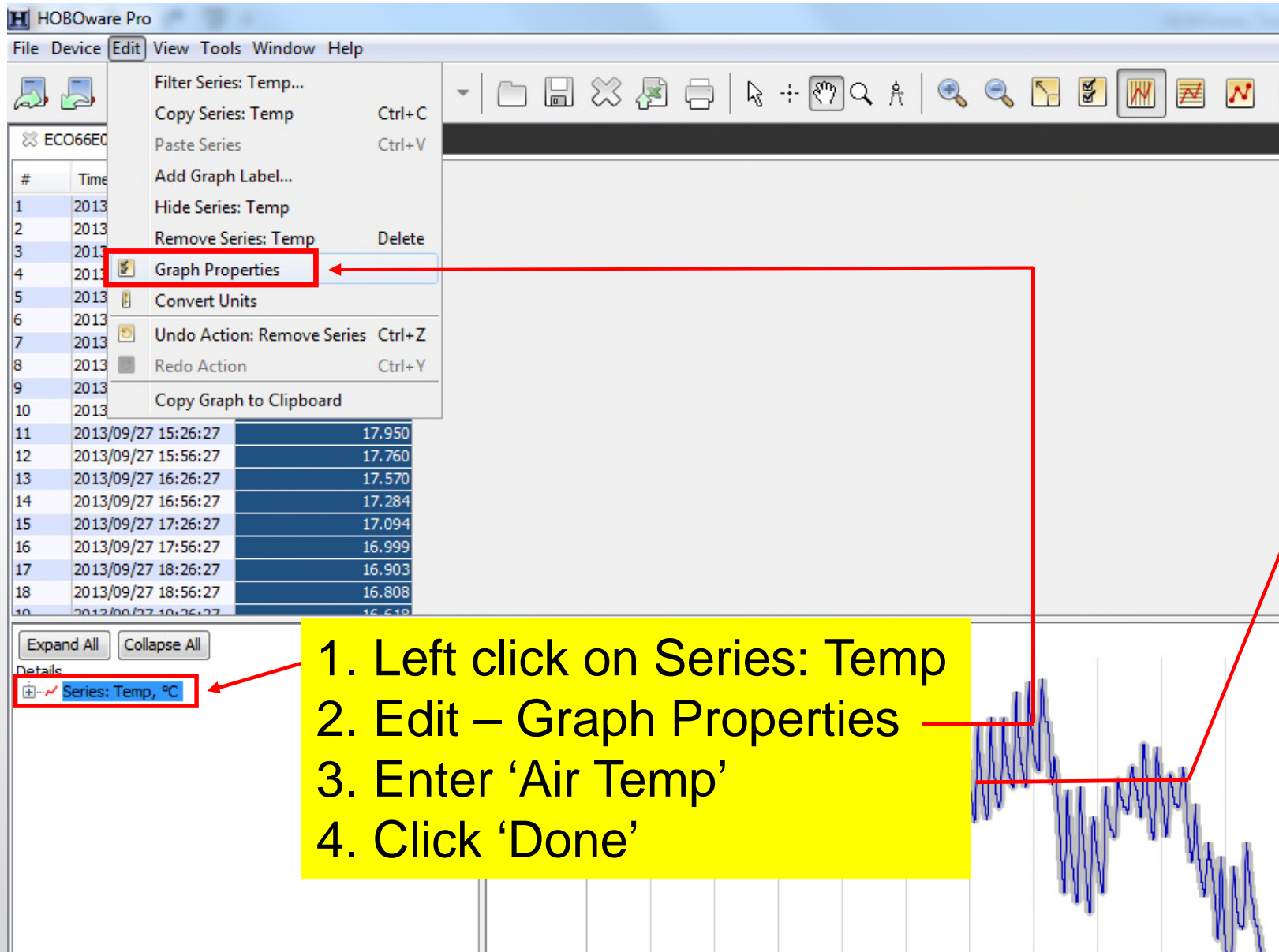
Event	Event Type	Units
<input type="checkbox"/> 1	Coupler Detached	
<input type="checkbox"/> 2	Coupler Attached	
<input type="checkbox"/> 3	Host Connected	
<input type="checkbox"/> 4	Stopped	
<input type="checkbox"/> 5	End Of File	
- Offset from GMT: -4 (GMT-18.0 hours, 0 = GMT)
- Data Assistants: Barometric Compensation Assistant, Growing Degree Days Assistant
- Buttons: Process..., What's This?, Manage..., Load..., Help, Cancel, Plot

Yellow callout boxes highlight the following settings:

- Temperature units °C (points to the units dropdown for the Temp series)
- Click 'None' (points to the 'None' button for internal logger events)
- Check time zone (should match with water temperature) (points to the Offset from GMT field)
- Click 'Plot' (points to the Plot button)



# Change the Temp series name to 'Air Temp'



The 'Series Properties' dialog box is shown. The 'Description' field is set to 'Air Temp' (highlighted with a red box). The 'Units' are set to '°C'. The 'Lines' section has 'Connect Points' checked, 'Style' set to 'Solid', 'Width' set to '1', and 'Connect As Steps' unchecked. The 'Points' section has 'Mark Points' unchecked, 'Marker' set to 'Oval', and 'Point Size' set to '3'. The 'Alarms' section has 'Enable Alarms' checked, with 'High Alarm' and 'Low Alarm' fields. The 'Misc.' section has 'Time Axis' set to 'Time Axis', 'Value Axis' set to '°C', and 'Color' set to black. The 'Done' button is highlighted with a red box.

# Copy the air temperature series

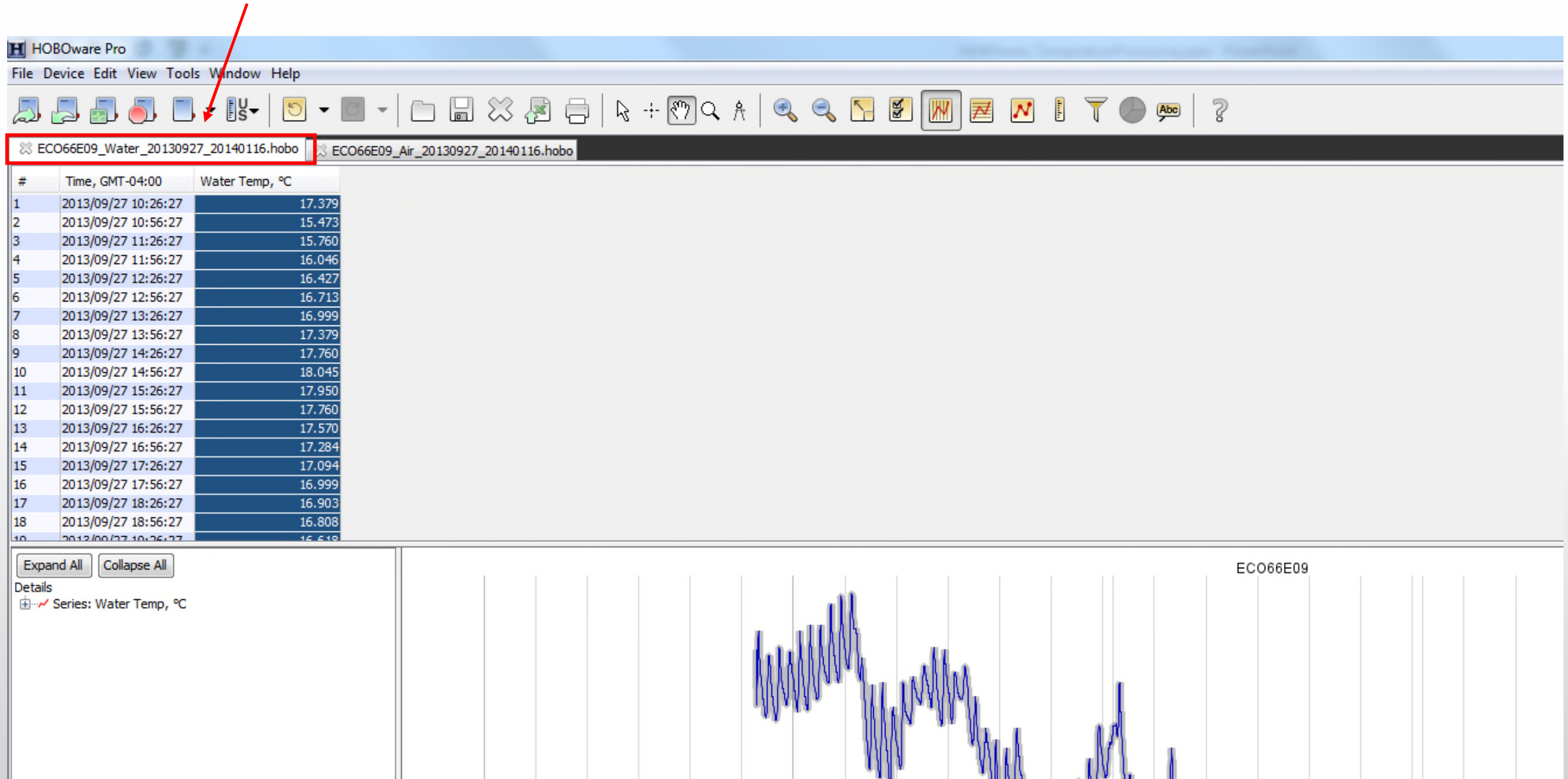
The screenshot shows the HOBOWare Pro interface. The 'Edit' menu is open, displaying options such as 'Filter Series: Air Temp...', 'Copy Series: Air Temp' (with a Ctrl+C shortcut), 'Paste Series' (with a Ctrl+V shortcut), 'Add Graph Label...', 'Hide Series: Air Temp', 'Remove Series: Air Temp' (with a Delete shortcut), 'Graph Properties', 'Convert Units', 'Undo Action: Edit Series Properties' (with a Ctrl+Z shortcut), 'Redo Action' (with a Ctrl+Y shortcut), and 'Copy Graph to Clipboard'. A yellow box in the center of the screen contains the following instructions:

- Edit
  - Copy Series: Temp

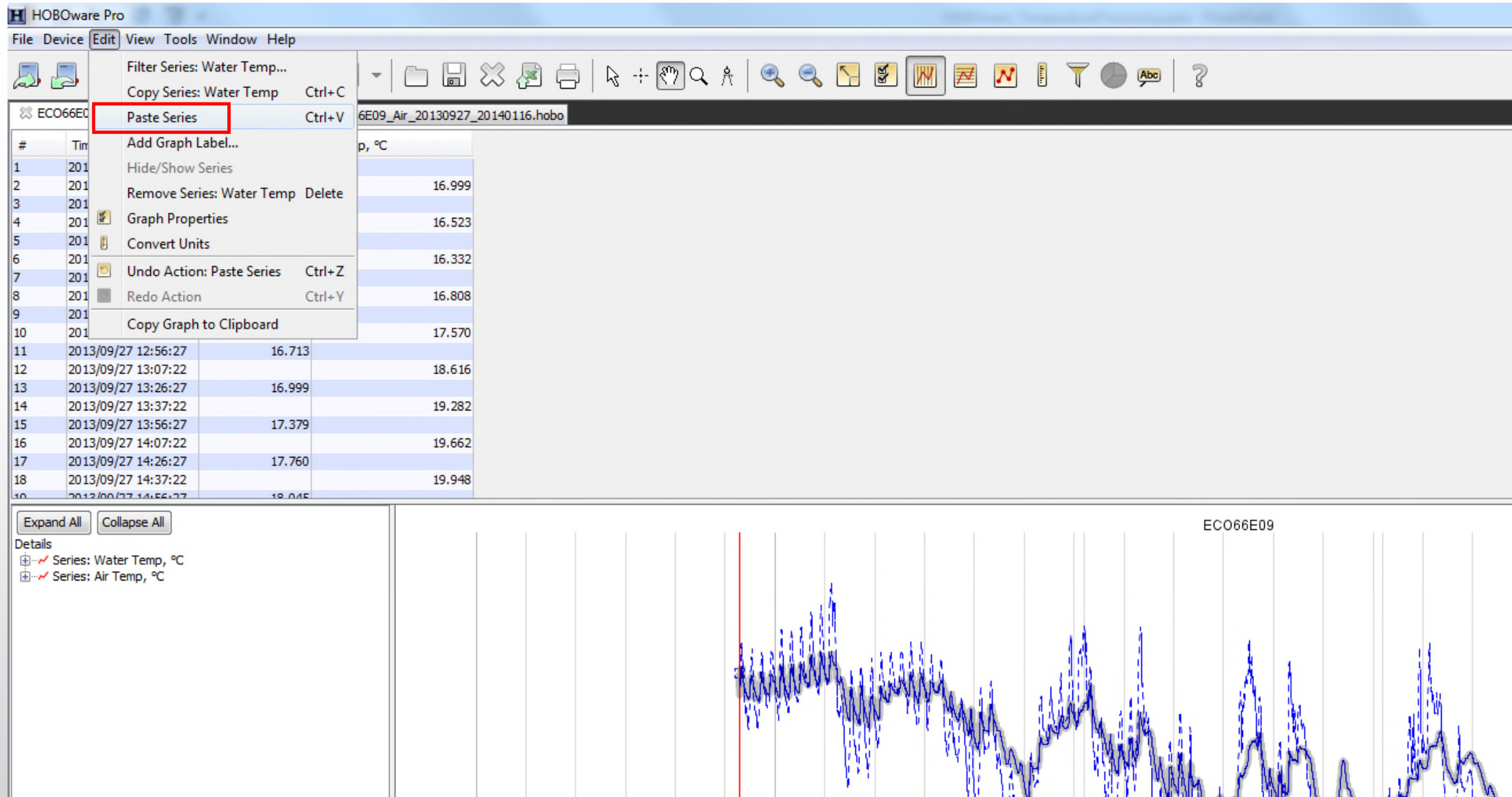
In the bottom-left 'Details' pane, the entry 'Series: Air Temp, °C' is highlighted in blue. A red arrow points from the bottom note to this entry.

Note: the Temp Series needs to be highlighted in order for this to work

# While keeping the air sensor file open, reopen the water sensor file

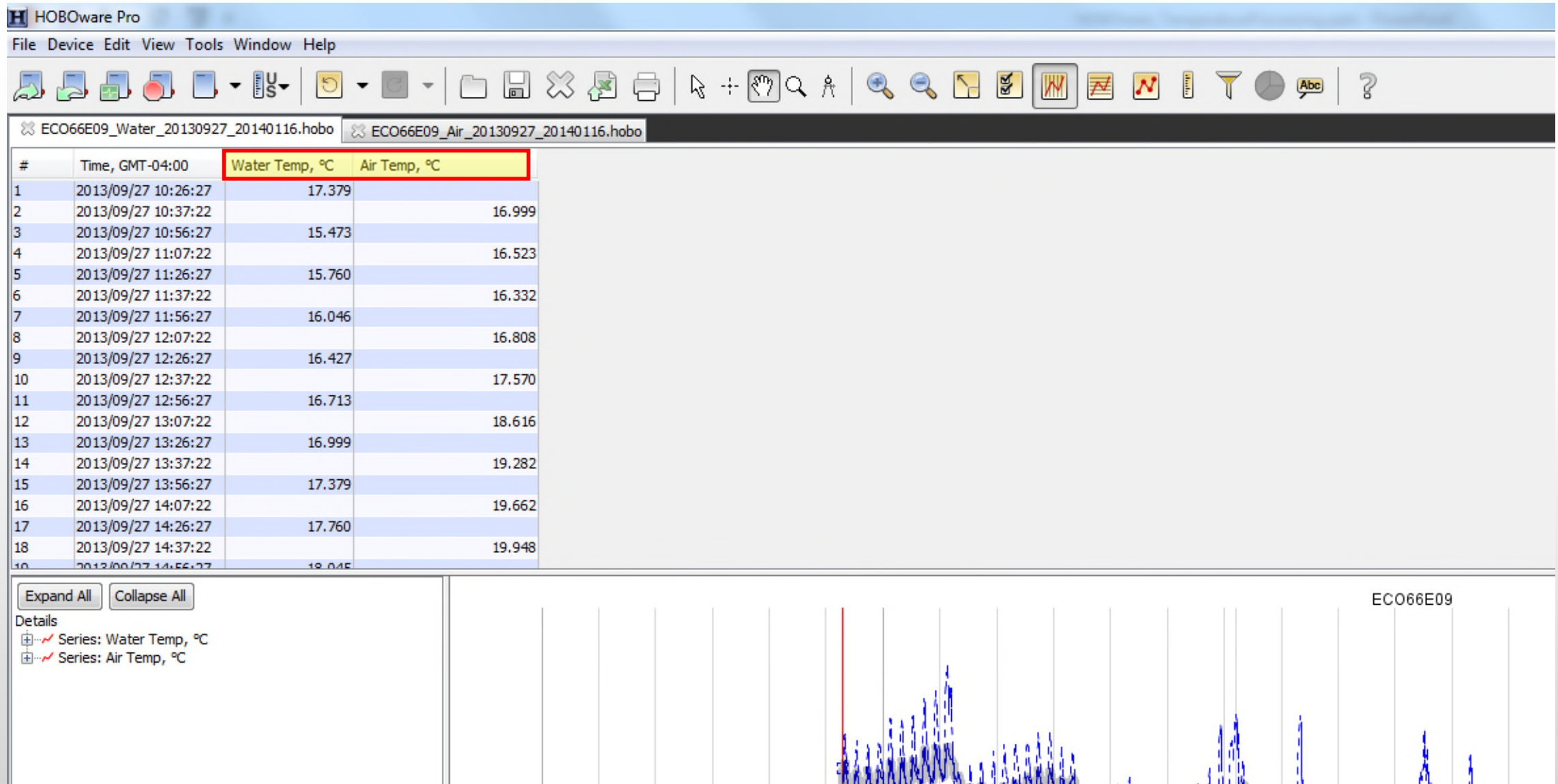


# Paste the air temperature series into the water sensor file





# Both air + water temperature data are now in one file, ready for export!



# Export the .csv file

The screenshot shows the HOBOWare Pro software interface. The 'File' menu is open, and the 'Export Table Data...' option is highlighted with a red rectangle. A yellow box with a list of steps is overlaid on the menu. In the background, a data table is visible with columns for 'Select', 'Measurement', 'Units', 'S/N', and 'Label'. The 'Export' dialog box is also open, showing the same table with 'All' selected and the 'Export...' button highlighted with a red circle. A yellow box with instructions is overlaid on the dialog box.

- File
- Export Table Data

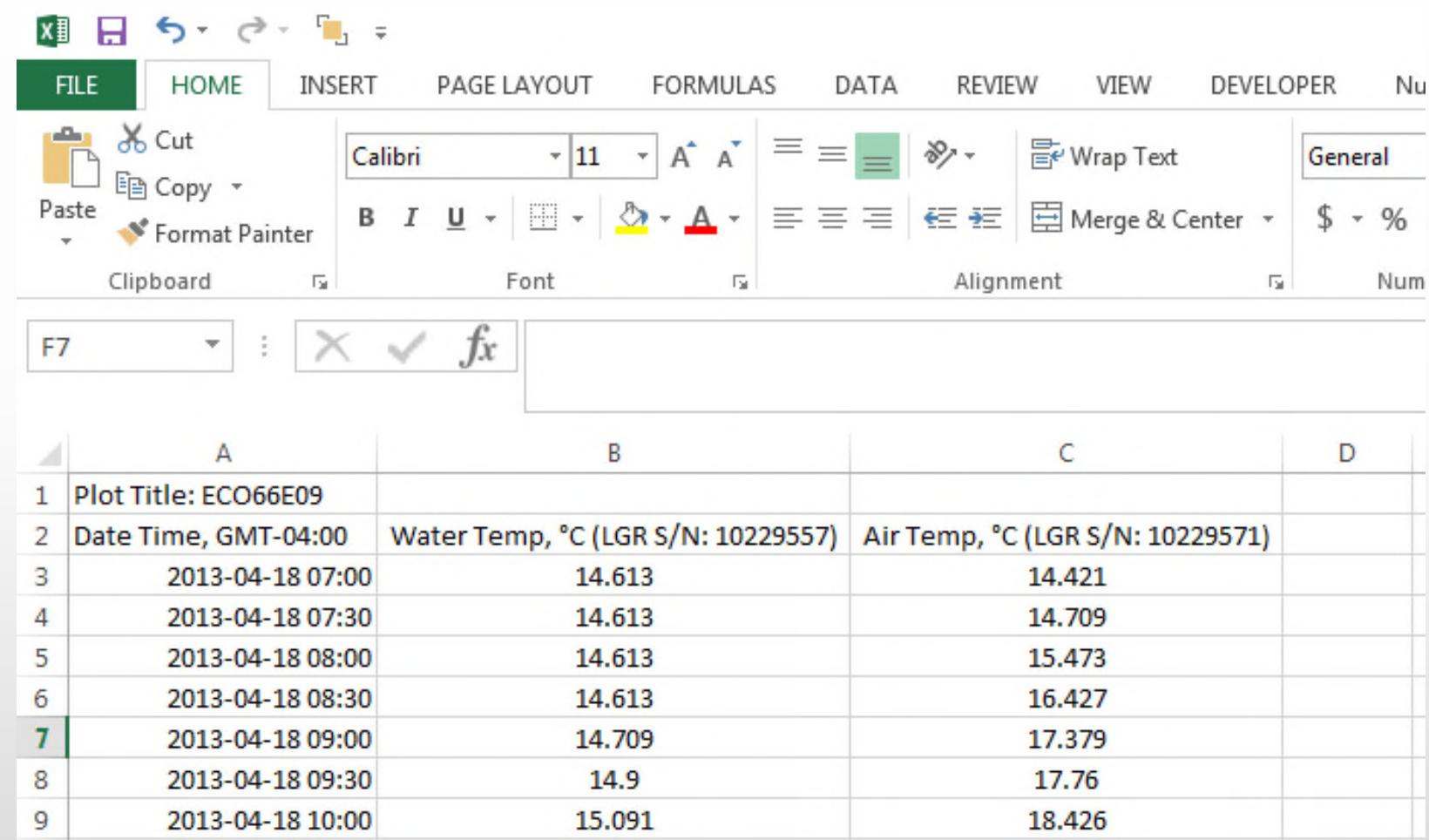
Select	Measurement	Units	S/N	Label
<input checked="" type="checkbox"/>	Water Temp	°C	10229558	
<input checked="" type="checkbox"/>	Air Temp	°C	10229565	

Select Both Parameters  
Click 'Export'

This is a close-up of the 'Export' dialog box. It features a table with the same data as the previous image. The 'All' button is selected, and the 'Export...' button at the bottom right is circled in red. A yellow box with instructions is overlaid on the dialog box.

Select Both Parameters  
Click 'Export'

Save the .csv file in the appropriate site folder.  
If you followed these instructions, the file should look like this.

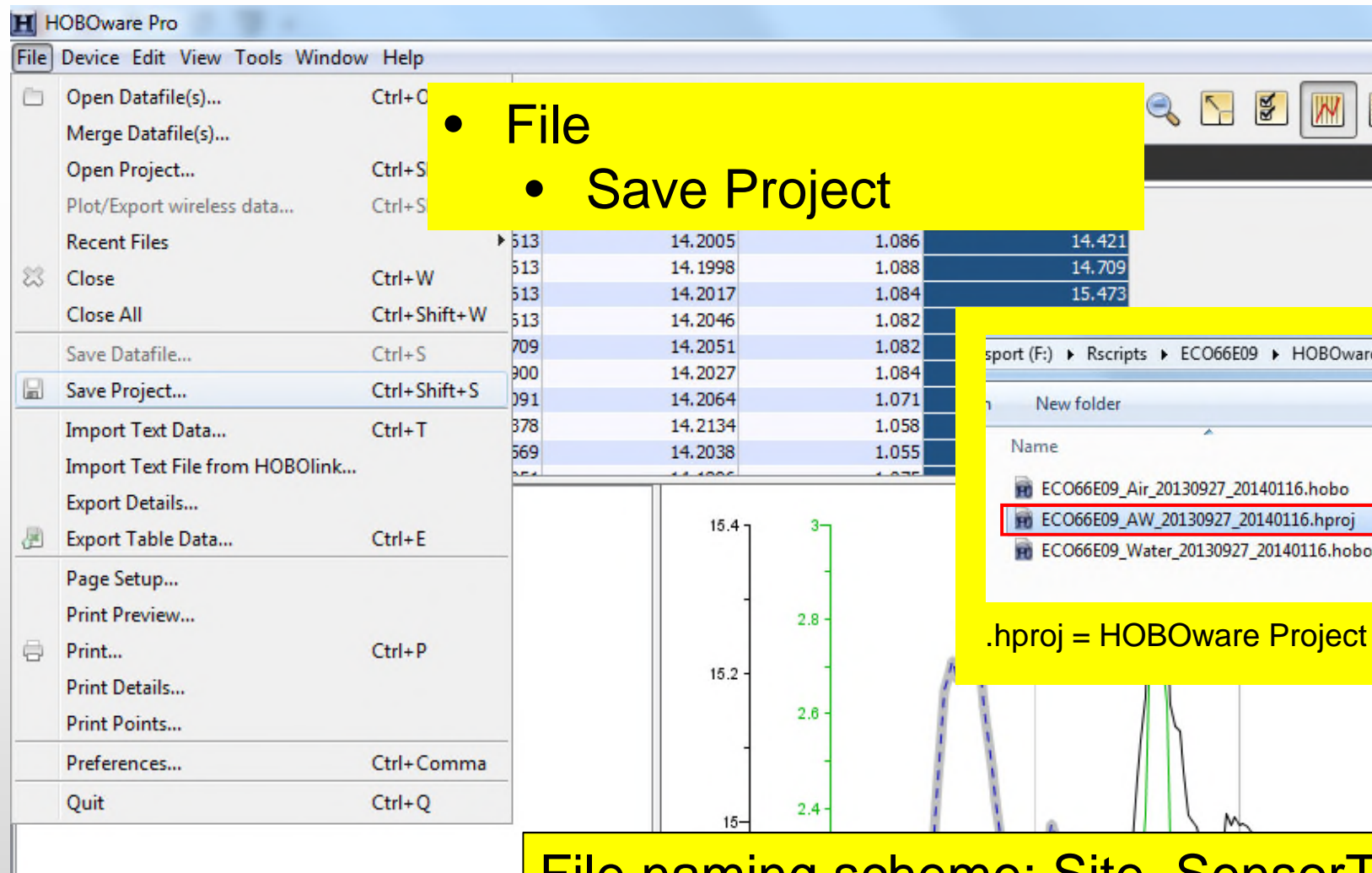


The screenshot shows the Microsoft Excel interface with the HOME tab selected. The ribbon includes options for Clipboard (Cut, Copy, Paste, Format Painter), Font (Calibri, 11, Bold, Italic, Underline, Color, Background Color), Alignment (Left, Center, Right, Indent, Decrease Indent, Increase Indent, Merge & Center, Wrap Text), and Number (General, Currency, Percentage, etc.). The active cell is F7. The data table below has columns A, B, and C, with row 7 highlighted.

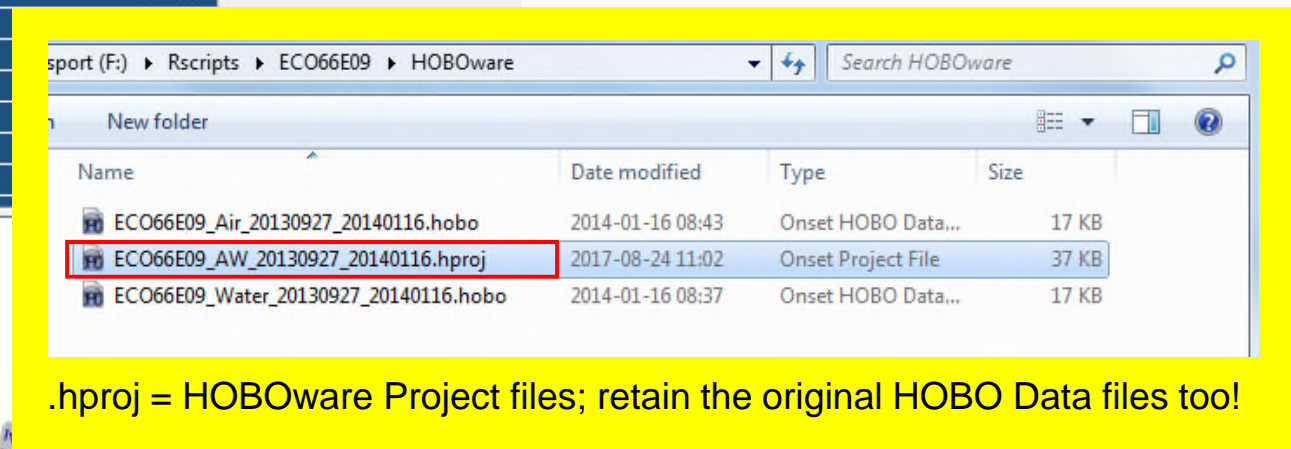
	A	B	C	D
1	Plot Title: ECO66E09			
2	Date Time, GMT-04:00	Water Temp, °C (LGR S/N: 10229557)	Air Temp, °C (LGR S/N: 10229571)	
3	2013-04-18 07:00	14.613	14.421	
4	2013-04-18 07:30	14.613	14.709	
5	2013-04-18 08:00	14.613	15.473	
6	2013-04-18 08:30	14.613	16.427	
7	2013-04-18 09:00	14.709	17.379	
8	2013-04-18 09:30	14.9	17.76	
9	2013-04-18 10:00	15.091	18.426	

For instructions on how to format the file for the ContDataQC R package, see the ‘Formatting\_ContDataQCR’ file.

Before you close HOBOWare, save the file with the combined air and water sensor data as a HOBOWare Project File.



- File
- Save Project

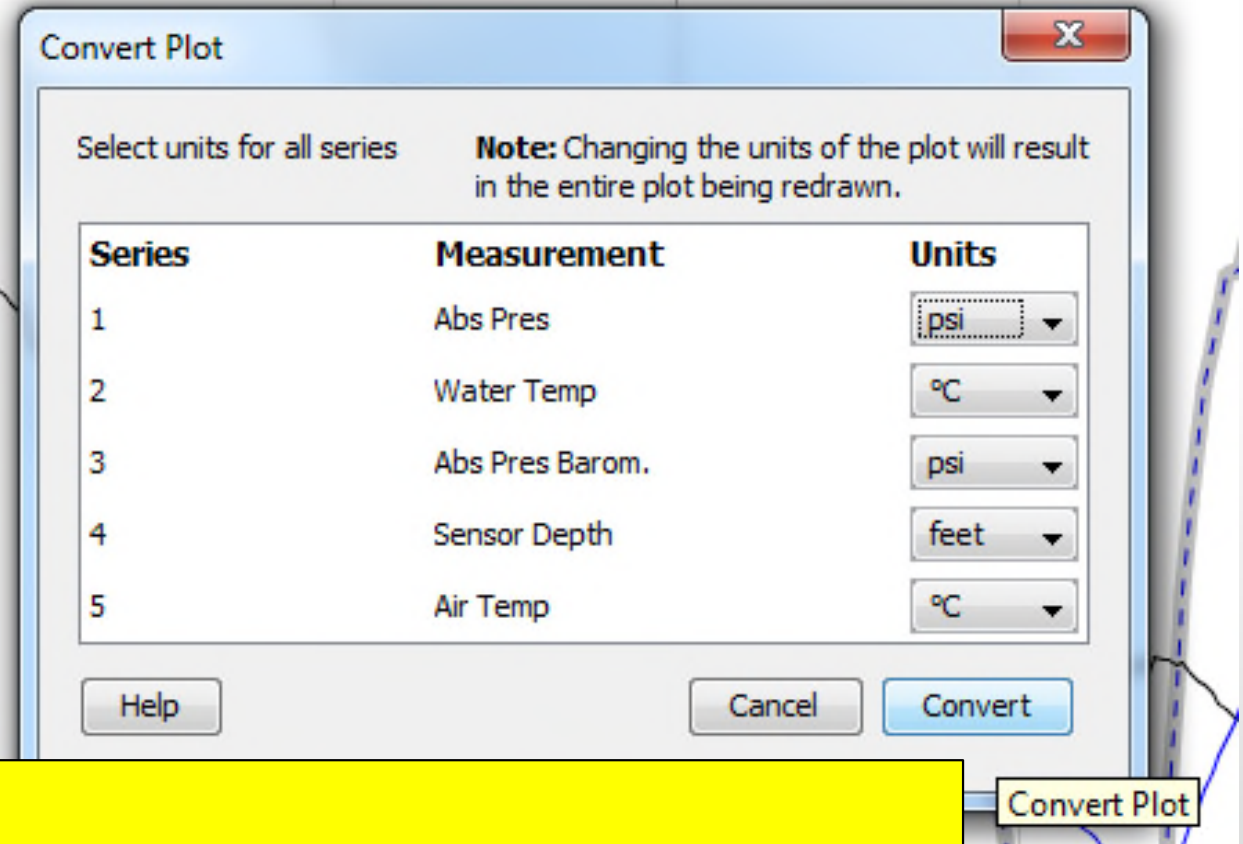
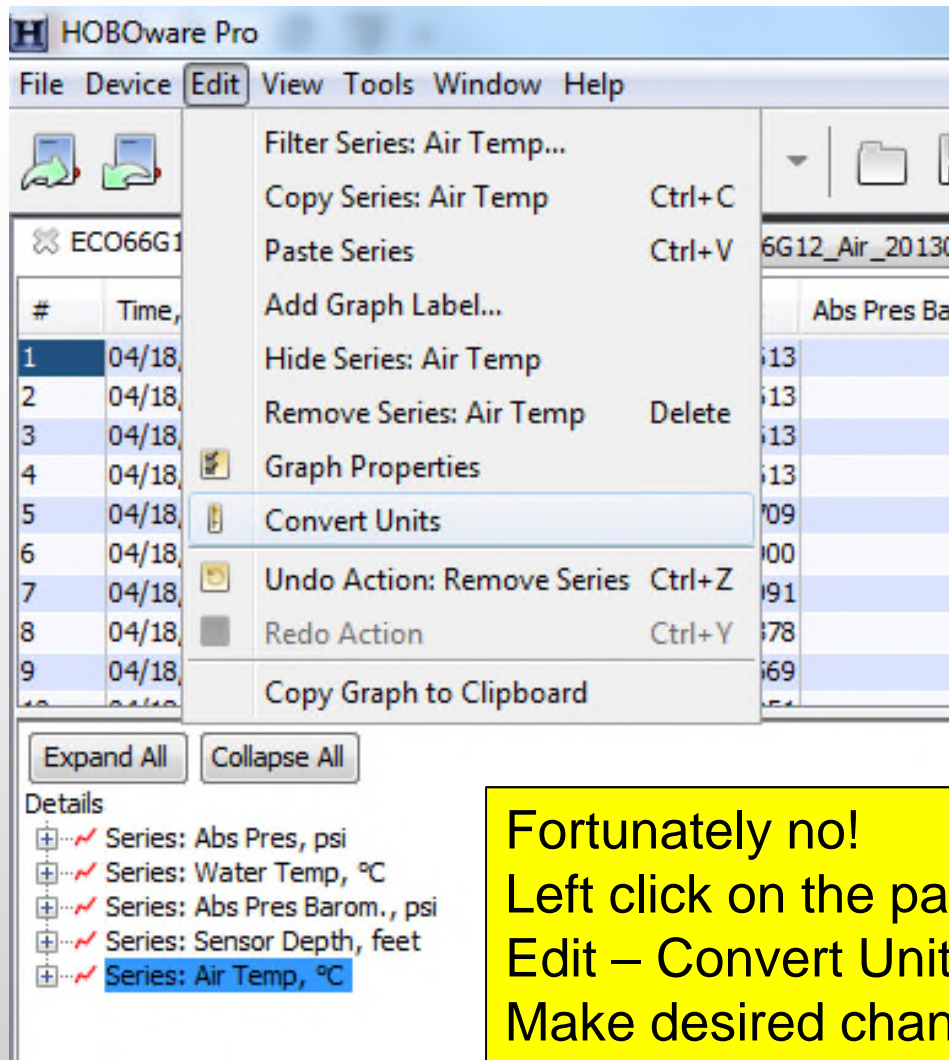


File naming scheme: Site\_SensorType\_StartDate\_EndDate  
Example – ECO66E09\_AW\_20130927\_20140116

Extra tips



What if you forget to convert temperature to °C during the initial upload? Do you have to go back and do this all over again?



Fortunately no!  
Left click on the parameter you want to change the units on  
Edit – Convert Units  
Make desired changes

What if I forgot to remove sensor type (air/water) from the Plot Title?  
(e.g., 'ECO66G12\_Water' instead of 'ECO66G12')  
You can change it by doing this...

Click this arrow

The screenshot shows the HOBOWare Pro interface. The main window displays a data table with columns: #, Time, GMT-04:00, Abs Pres, psi, Water Temp, °C, Abs Pres Barom., psi, Sensor Depth, feet, and Air Temp, °C. The data is for station ECO66G12. A 'Title Properties' dialog box is open, showing the 'Name' field set to 'ECO66G12'. The 'Location' is set to 'Top'. The 'Font' is set to 'Dialog', size '12', and style 'Plain'. The 'Done' button is highlighted. Annotations include a yellow box pointing to a mouse icon in the toolbar, a yellow box pointing to the 'Name' field in the dialog, and a yellow box pointing to the plot title 'ECO66G12'.

#	Time, GMT-04:00	Abs Pres, psi	Water Temp, °C	Abs Pres Barom., psi	Sensor Depth, feet	Air Temp, °C
1	04/18/13 08:00:00	14.6710	14.613	14.2005	1.086	14.421
2	04/18/13 08:30:00	14.6710	14.613	14.1998	1.088	14.709
3	04/18/13 09:00:00	14.6710	14.613	14.2017	1.084	15.473
4	04/18/13 09:30:00	14.6733	14.613	14.2046	1.082	16.427
5	04/18/13 10:00:00	14.6736	14.709	14.2051	1.082	17.379
6	04/18/13 10:30:00	14.6720	14.900	14.2027	1.084	17.760
7	04/18/13 11:00:00	14.6704	15.091			
8	04/18/13 11:30:00	14.6714	15.378			
9	04/18/13 12:00:00	14.6607	15.569			

Details

- Series: Abs Pres, psi
- Series: Water Temp, °C
- Series: Abs Pres Barom., psi
- Series: Sensor Depth, feet
- Series: Air Temp, °C

Title Properties

Name: ECO66G12

Location

☒ Top

☐ Bottom

Font: Dialog 12 Plain

Cancel Apply Done

ECO66G12

# Acknowledgements

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Tetra Tech developed the materials with assistance from David Gibbs (EPA ORISE fellow: [gibbs.david@epa.gov](mailto:gibbs.david@epa.gov)), Paul Gannett (Onset: [Paul\\_Gannett@onsetcomp.com](mailto:Paul_Gannett@onsetcomp.com)), Michelle Craddock (MA RIFLS), Nick Murray (WV DEP) and other RMN partners.

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Additional materials are available on the RMN Sharepoint site and the Tetra Tech FTP site.