

RUSKIN

USER GUIDE

RBR $_{solo\sigma^3}$

RBR $_{duet\tilde{t}^3}$



rbr-global.com

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1 Ruskin software

Ruskin is the only tool you need to manage all your RBR instruments and measurement data. It is available for Mac and Windows PC.

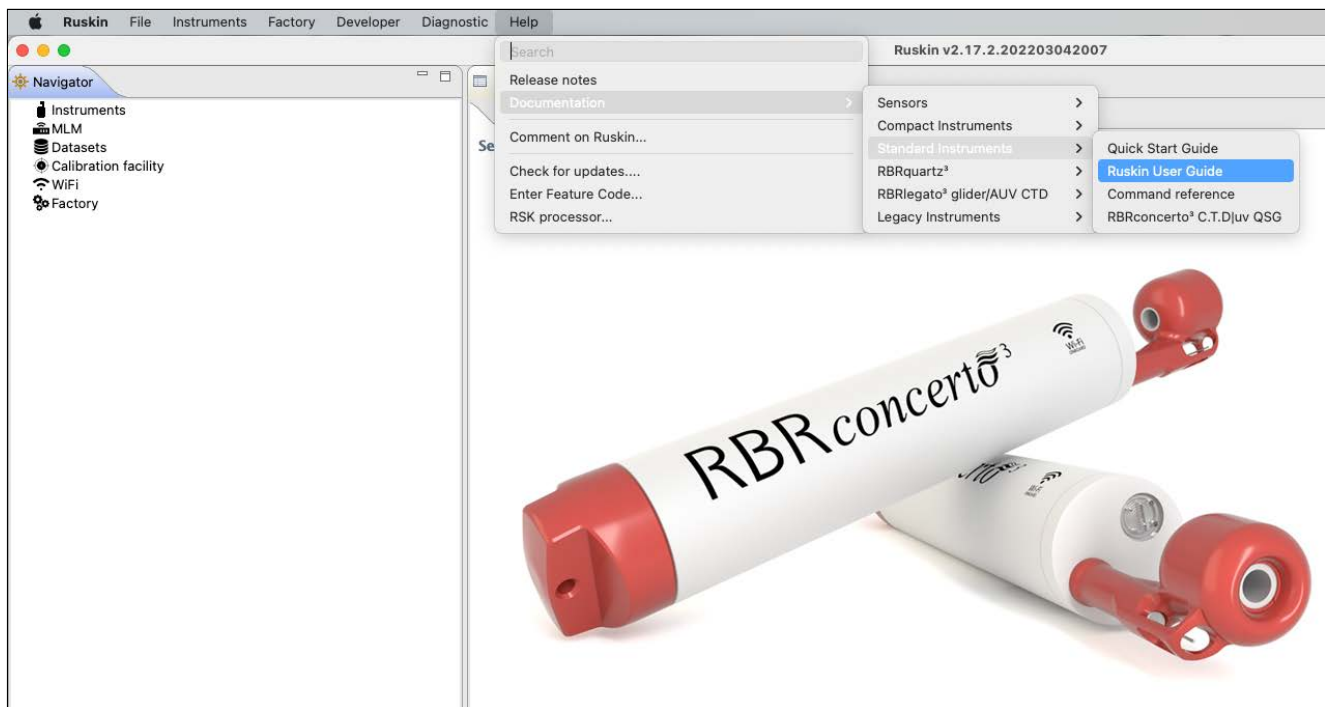
Use the Ruskin software to do the following:

- Configure, schedule, and enable multiple instruments
- Estimate your deployment times
- Download your data after logging
- View your datasets graphically
- Export your data in various formats
- Analyse your data
- Change the calibration coefficients for your instrument
- Perform user calibration
- Contact RBR

RSK files generated by Ruskin contain raw measurement data, firmware and software versions, dates and times, sampling settings, power settings, measured and derived parameters, errors and events, other diagnostic information. They can be read directly in Matlab, or exported to Excel, OceanDataView®, or text files.

Find Ruskin software for Mac and PC on the USB stick included with your instrument, or visit the [RBR website](#) to download the latest version.

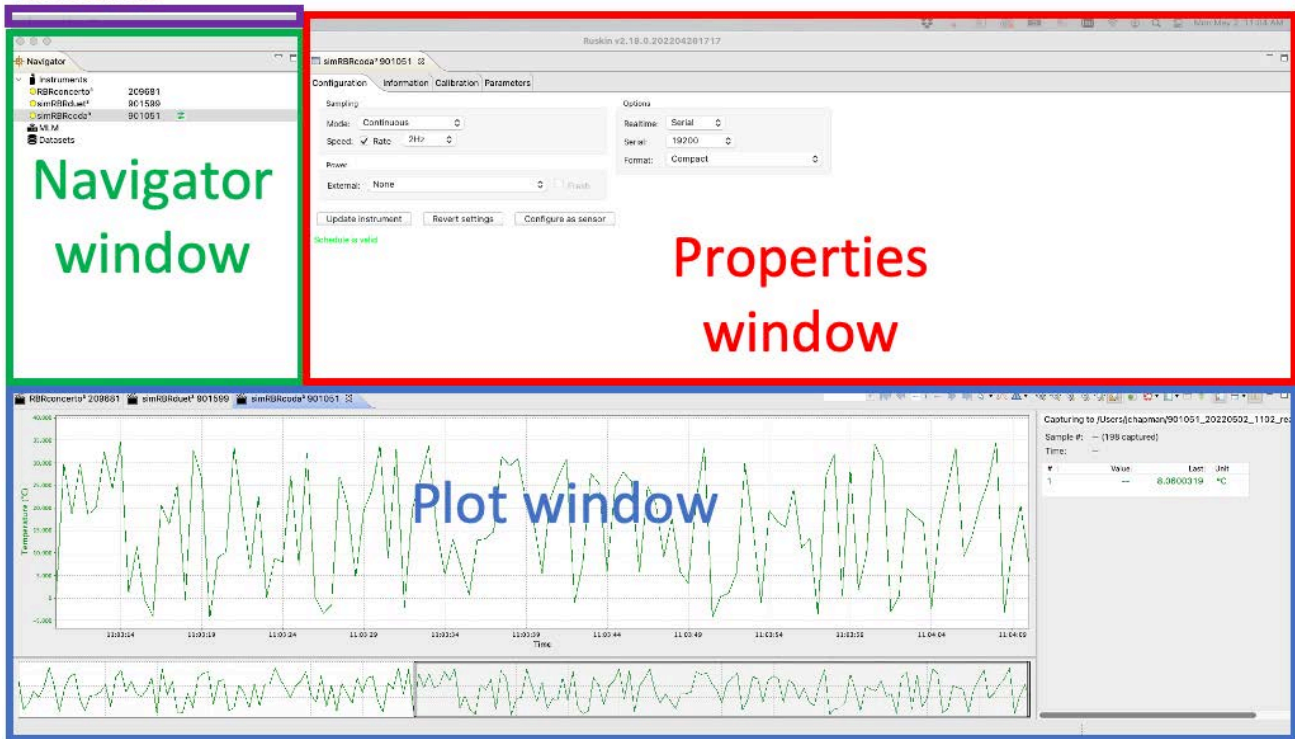
The most recent software updates, release notes, Ruskin user guides, instrument guides, and quick start guides are available from the **Help** menu in Ruskin.



2 Ruskin interface


Ruskin software has a user-friendly interface which consists of a **Toolbar** and three main windows: **Navigator**, **Properties**, and **Plot**.


Toolbar

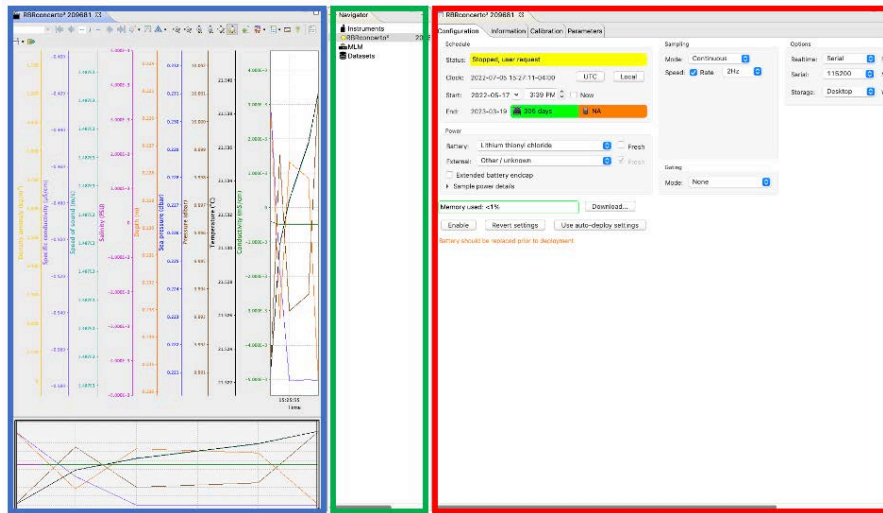





In the **Navigator** window, you will find the list of instruments connected to Ruskin, as well as MLM (if applicable) and [datasets](#).

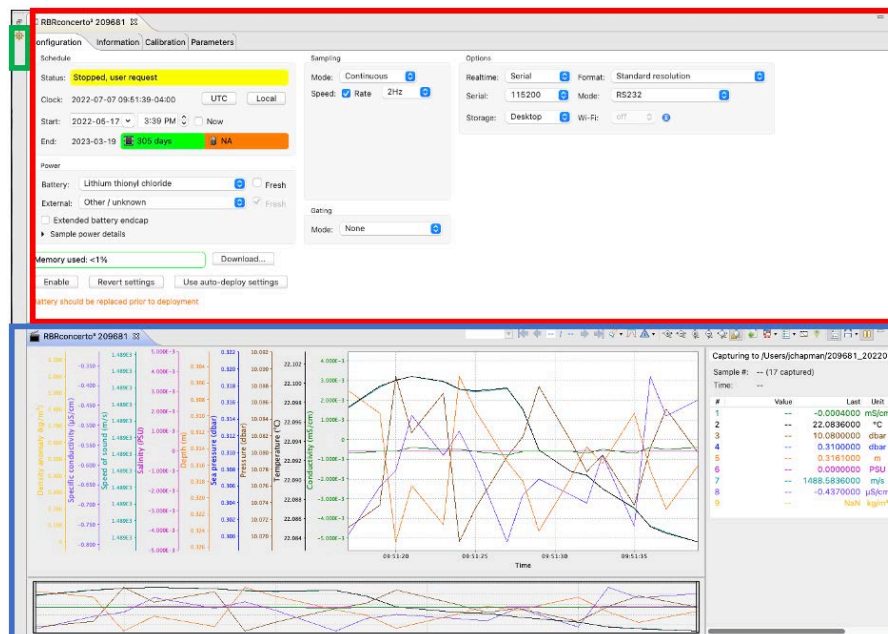
When an instrument on the list is selected, the **Properties** window displays four tabs with information related to this instrument: [Configuration](#), [Information](#), [Calibration](#), and [Parameters](#). Use these tabs to configure your deployment, check the calibration certificates, and verify your parameters.

The data plot will appear in the [Plot window](#) below if the realtime option is available and selected for this instrument, or if you click the **Fetch** button  on the far right of the toolbar.

Click-and-drag window tabs to rearrange the windows within Ruskin, or move a window outside of Ruskin. Hover over a side of a window, and when the cursor becomes a two-way arrow , move it to adjust the window size.




Click the **Close**  button in the top right corner to close a window. For example, you can close the **Navigator** window to have a better view of the **Properties**. The closed window icon will appear on the sidebar (in this case, **Navigator** ). Click the **Multiple windows**  button above the closed window icon to re-open it.

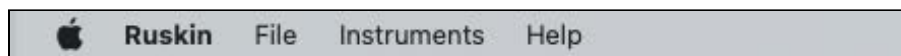


Double-click a window tab to maximise that window, and double-click the tab again to return it to the original size.

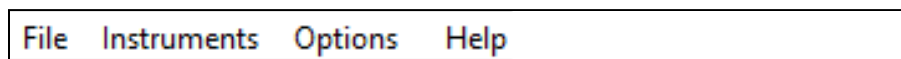
Alternatively, use the **Single window**  and **Multiple windows**  buttons.

 When you restart Ruskin, it returns to its original layout.

The **Toolbar** at the top left above the **Navigator** window has four dropdown menus. If you are using a Mac computer, it appears as follows:



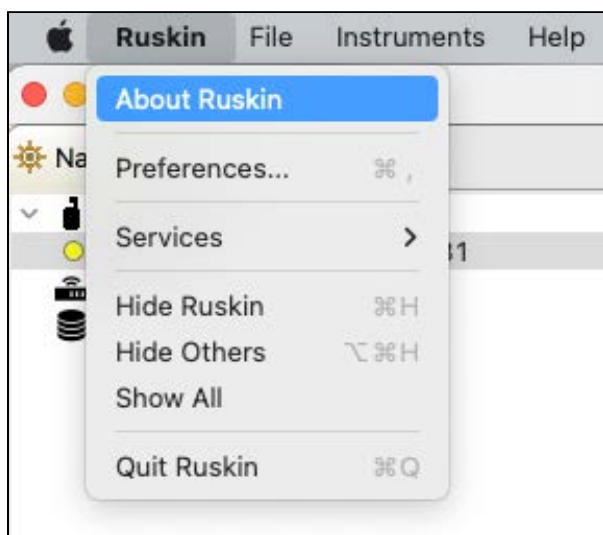
On a Windows PC, the **Toolbar** looks slightly differently:



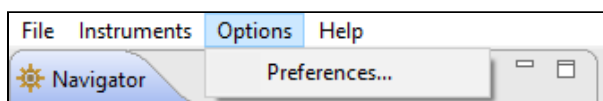
The rest of the interface is the same between the two systems.

2.1 Ruskin / Options

On your Mac, go to the **Ruskin** dropdown menu to access information on current software version, set up your [preferences](#), or quit Ruskin. Note that the rest of the options on this dropdown menu depend on your operating system and are external to Ruskin.

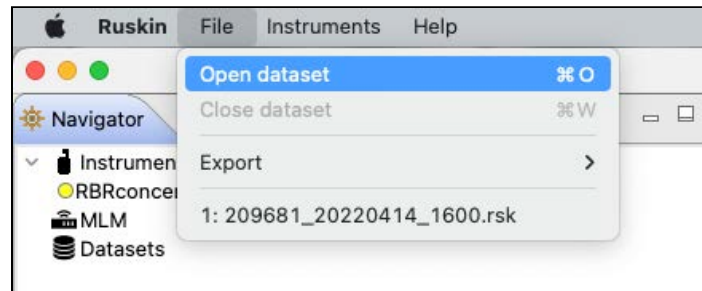


On your Windows PC, use the **Options** dropdown menu to set up your [preferences](#).




2.2 File

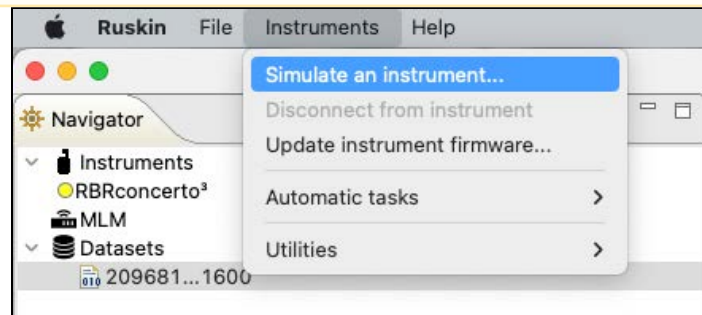
Go to the **File** dropdown menu to open or close a dataset, export your data, and see the list of available datasets. The **Datasets** menu in the **Navigator** windows duplicates some of these options for convenience.



2.3 Instruments

Go to the **Instruments** dropdown menu to [simulate an instrument](#), [update your firmware](#), set up [automatic tasks](#), or take advantage of the utilities.

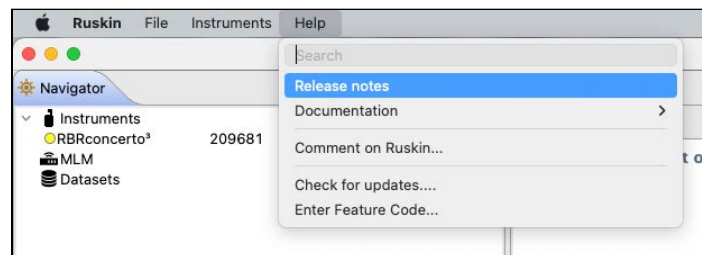
 The **Utilities** option is a support tool. Do not use unless instructed by RBR.



The **Instruments** menu in the **Navigator** windows duplicates some of these options for convenience.

2.4 Help

Go to the **Help** dropdown menu to access the latest [release notes](#) and technical [documentation](#), [provide your feedback](#), [check for updates](#), or to add a beta [feature](#). On Mac, you can also use the [Search](#) option.



3 Installation

Ruskin is the only piece of software you need to operate your RBR instruments. RBR releases Ruskin software versions compatible with Mac and PC (Ruskin Desktop), as well as with iOS® and Android™ (Ruskin Mobile).

Install the Ruskin Mobile app on your mobile device by going to the Apple App store or Google Play.

Follow the steps below to install Ruskin Desktop on your computer.

3.1 Install Ruskin on a PC

You can install Ruskin on a PC that runs the Windows 7, 8, 8.1, or 10 operating system.


The minimum requirements for Ruskin are:

- OS = Windows 7
- Processor speed = 1.4GHz
- RAM required = 2GB
- Display resolution = 1024x768 recommended
- HDD space for installation = 500MB


The instruments use a USB interface to communicate with Ruskin.

Steps

1. Connect the USB stick included with your instrument to a port on your computer.
2. Navigate to the "Ruskin Installation" folder and doubleclick on the file `RuskinSetup.exe`.
3. Follow the installation wizard. By default, Ruskin will be installed to `C:\RBR`.
4. At the end of the installation, you will see a prompt asking, "Would you like to install the logger driver at this time?"
5. Click **Yes** to install the drivers.

 You may need to run the setup application as an administrator to install the driver correctly.

A shortcut to Ruskin will appear on the desktop and in a **Start** menu folder.

 The most recent version of Ruskin software can be found at <https://rbr-global.com/products/software>.

3.2 Install Ruskin on a Mac

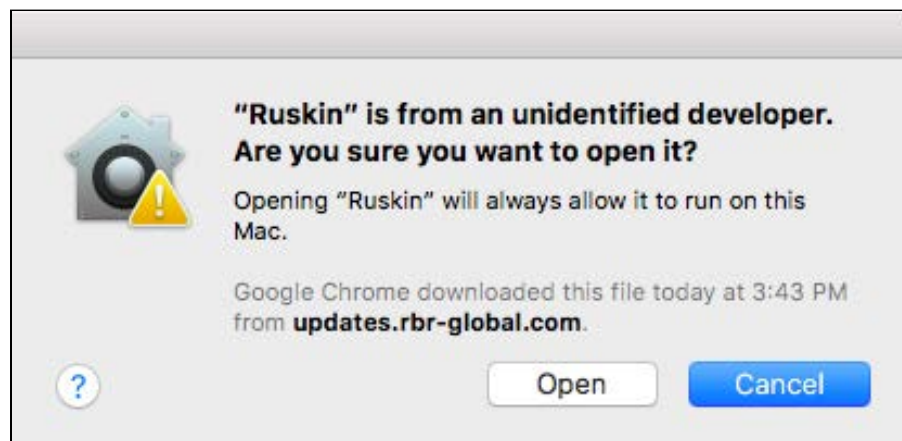
You can install Ruskin on a Mac running OS X 10.12 (Sierra) or later.


Steps

1. Connect the USB stick included with your instrument to a port on your adaptor.
2. Navigate to the "OSX" folder and double-click on the file `Ruskin.dmg`.
3. When the disk image window opens, drag the Ruskin icon into the **Applications** directory and wait for the copy to complete. An application named "Ruskin" will appear in the **Applications** folder.

 Always use the default **Applications** folder as the working directory.

4. Right-click on the icon, and select **Open**.
5. The dialogue box shown below will prompt you to authorise the opening of Ruskin.



 You may need to navigate to **System Preferences > Security & privacy** to allow the apps downloaded from "**Anywhere**" to complete the installation.


6. Drag the `Ruskin.app` application to the **Dock**.

3.3 Update Ruskin

To take advantage of new features and bug fixes, ensure that you are using the most recent version of Ruskin.

- Find the most recent version of Ruskin at <https://rbr-global.com/products/software>.
- Receive an automatic notification about a new release when you start the application.
- Check from within Ruskin by navigating to **Help > Check for updates**.
- Send an email to support@rbr-global.com, subject: "Ruskin update request", and ask us to add you to the mailing list. You will receive an email as soon as the new version is released.


If you have a broadband connection, simply follow the installation instructions on your computer. Otherwise, request a USB stick from RBR.

 It is not necessary to uninstall the older version of Ruskin before installing the newer version. The installation program deletes the older files before installing the newer ones. It does not delete any Ruskin data files or log files.

3.4 Uninstall Ruskin

Uninstall Ruskin only if you no longer need to manage RBR instruments from your computer.

It is not necessary to uninstall the older version of Ruskin before installing the newer version. The installation program deletes the older files before installing the newer ones. For more information, see [Update Ruskin](#).

 Removing Ruskin will not delete your data files or your diagnostic logs.

Uninstall Ruskin on a PC, Windows 7, 8, 8.1, or 10

1. Go to **Start > Control Panel > Programs**.
2. Under **Programs and Features**, click **Uninstall a program**.
3. Find **Ruskin** on the list.
4. Click **Ruskin** to highlight it.
5. Click **Uninstall**.


Uninstall Ruskin on a Mac, OS X 10.12 or later

Move the Ruskin application from **Applications** to the **Trash**.

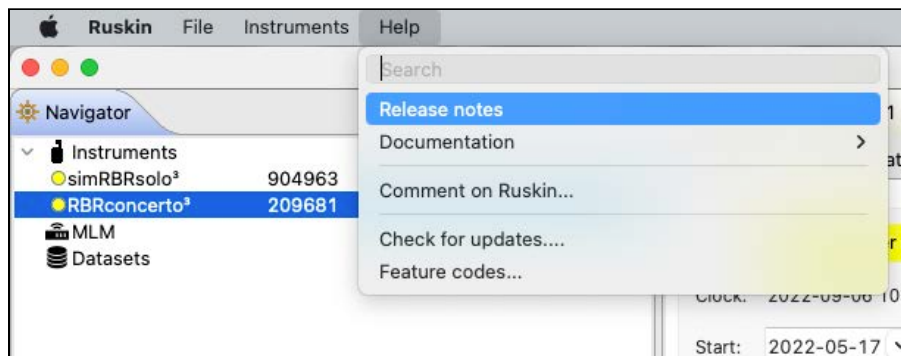
4 Support

You can get in touch with RBR in several different ways:

- Send us an email. For technical questions, use support@rbr-global.com, and for general inquiries, info@rbr-global.com.
- Contact us via the website at <https://rbr-global.com/about-rbr/contact-rbr>.
- Call us at +1 (613) 599-8900.
- Send us a bug report from within Ruskin itself.

 When experiencing an issue, look for a solution under the **Help** menu before contacting RBR.

The **Help** menu on Ruskin offers access to technical documentation, feedback forms, and software updates. On Mac, you can also search for Ruskin menu options.

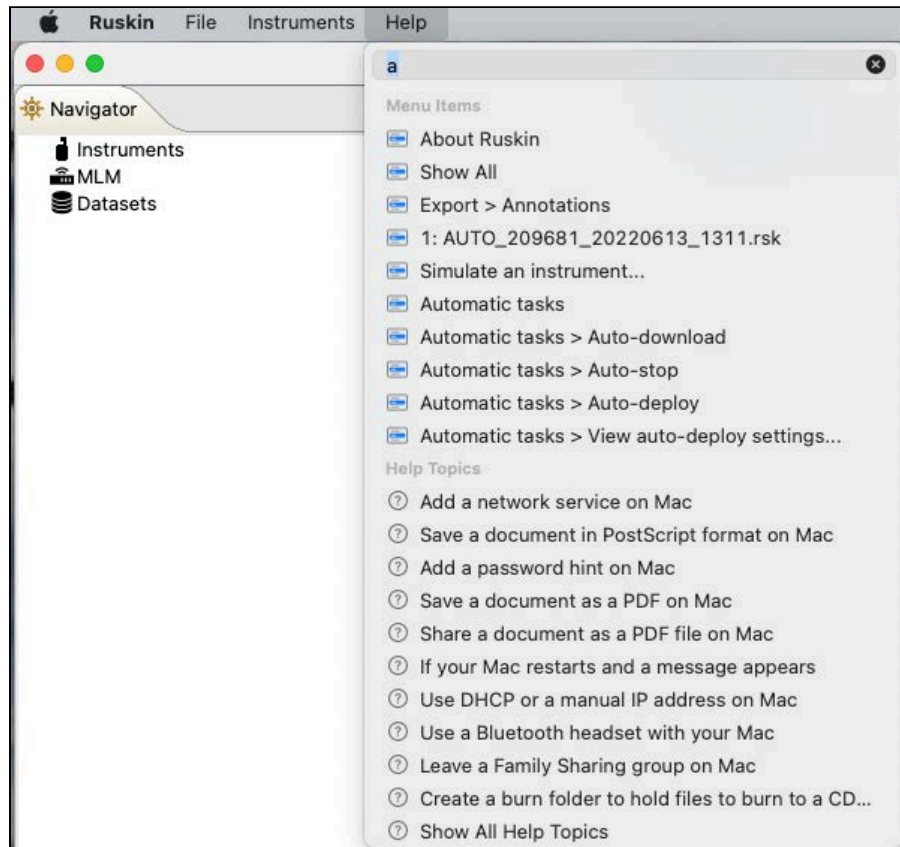


4.1 Search on Mac

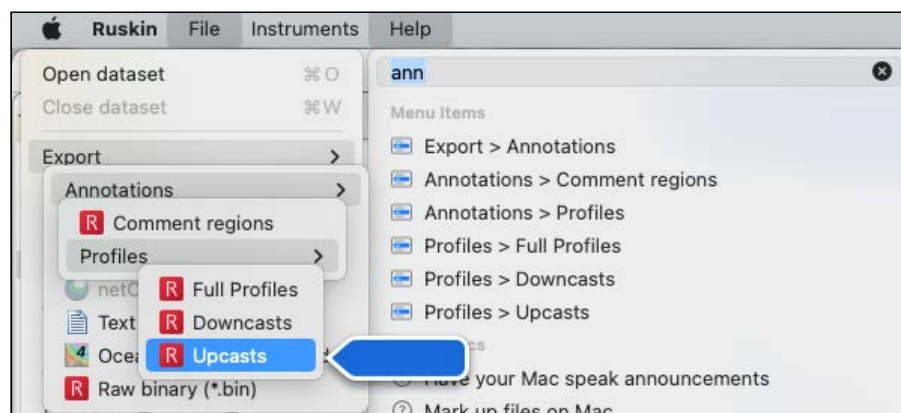
If using a Mac computer, you can take advantage of the **Search** option.

In the **Search** field under **Help**, type in a word, part of the word, or even a single letter to open a list of matching items.

The top half of the list pertains to Ruskin, while the bottom part comes from the Mac environment.



Scroll down the Ruskin list and select an item to locate. Ruskin will open the toolbar menu and point to the option in the dropdown menu.



You can execute the located option right away.

4.2 Release notes

Click on **Help > Release notes** to open the **Welcome** window. It will outline new features, improvements, and bug fixes associated with each release version.

Release Notes

2.19.1

Release date: October 21 2022

Bug fixes

- RSK-9274 - Unable to enable instrument in local time when the clock has a positive UTC offset

2.19.0

Release date: October 04 2022

New Features

RBRtridente

RBR's new RBRtridente multi-channel optical sensor is now fully integrated into Ruskin. Connect your sensor to change its sampling speed and record data in real-time.

Did you know?

You can simulate a sensor even if you don't yet have one. Ruskin lets you simulate the RBRtridente as a standalone sensor or as part of a larger integration. We've updated Ruskin's autonomy engine to let you easily plan deployments using this tool too.

Other notable additions

- Added RBR Instrument Guide (RIG) for RBRquartz³ APT and Standard instruments
- Added Quick Start Guide (QSG) for RBRquartz³ APT
- Updated Quick Start Guide (QSG) for RBRfermata
- Updated Ruskin User Guide (RUG) for RBRcoda³, Compact instruments, and Standard instruments

Improvements

- RSK-6356 - Added link to release notes to get full history
- RSK-7886 - Added copy/paste functionality to RBRquartz³ calibration coefficient tables
- RSK-8672 - Added channel indices to RSK analysis data table
- RSK-8703 - Removed column auto-sizing on Excel exports
- RSK-8756 - Release notes window was renamed from 'Welcome' to 'Release notes'
- RSK-8762 - Added dialog to view all user activated feature codes

[Click here to see all Release Notes](#)

Did you know...

Ruskin Updates

Ruskin can automatically notify you that a newer version is available.

If you do not have a broadband connection and/or are unable to install the Ruskin updates, update notifications are available via email. To receive these notifications, send an email to: support@rbr-global.com subject: "Ruskin update request".

Let us know!

If you have problems or praise, please let us know. Either use the "Help/Comment on Ruskin" menu item or write to support@rbr-global.com.

Previous Next

THREE OR FREE

Calibration in three weeks or less. Guaranteed.

Click the calibration tab and select "request a calibration quote" to get started.

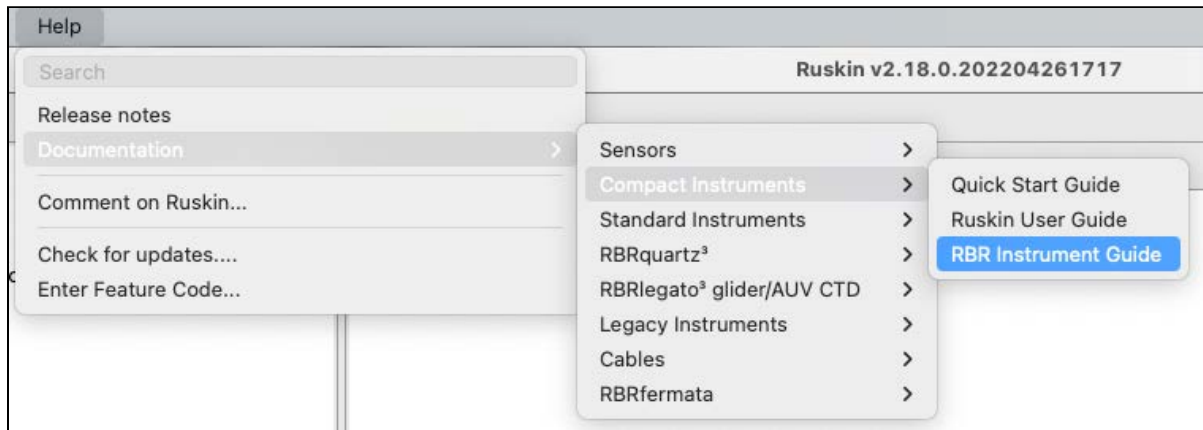
Click the link at the bottom left to see the full history of the release notes. The link will take you to the [RBR support](#) page.

Alternatively, scroll down to see brief recaps of the release notes from all previous versions.

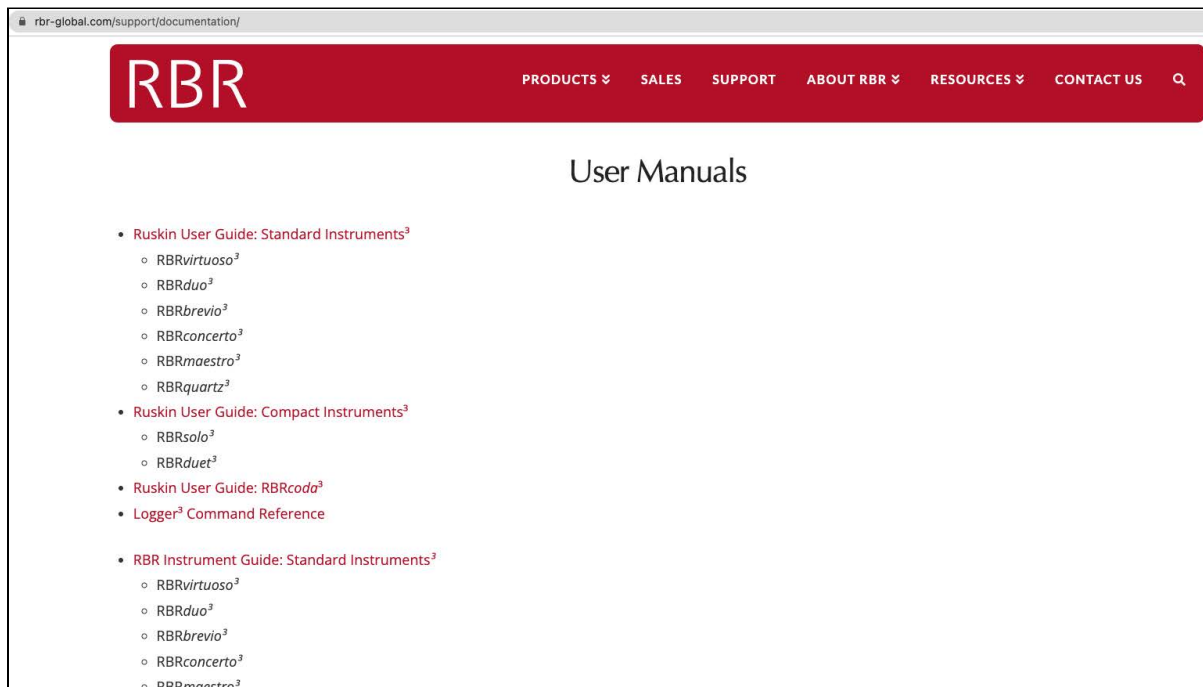
Click the **x** to close the **Release notes** window and return to the **Navigator** mode.

4.3 Documentation

Click on **Help > Documentation** to open the menu tree. Browse through a variety of guides available for instruments and accessories.



Please note that you can always access the most current revisions of RBR documents on the [RBR website](#).

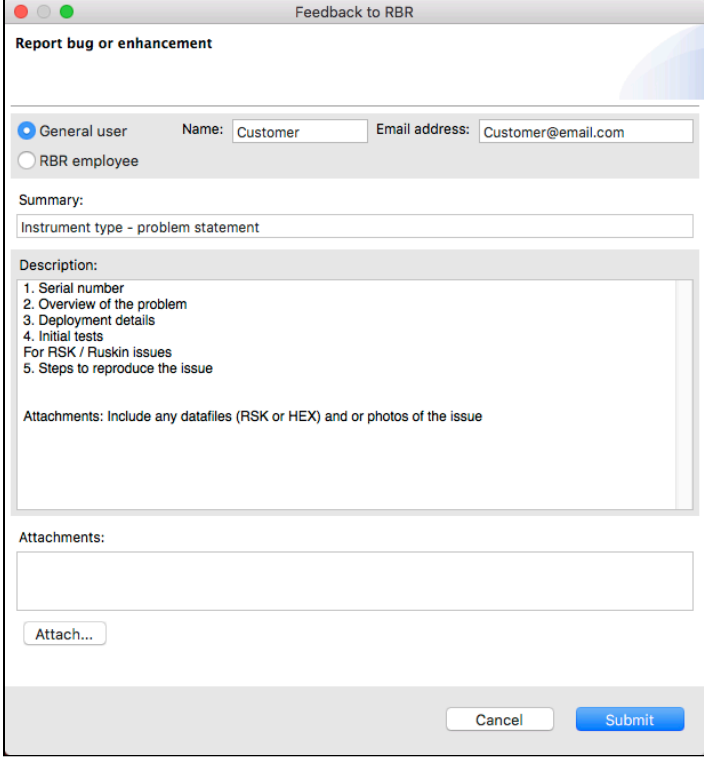


4.4 Comment on Ruskin

There is an advantage to sending a bug report from within Ruskin because this allows you to include the diagnostic logs, RSK datasets, screenshots, and any other files that could help us reproduce the problem and find the solution as quickly as possible. Follow the steps below.

Steps

1. Click on **Help > Comment on Ruskin...** . The **Feedback to RBR** form will appear.
2. Enter your identification information.
3. Enter a brief summary of the problem.
4. Provide a detailed description (serial number for the instrument, overview of the problem, deployment details, initial tests, and, for software bugs, steps to reproduce the issue)
5. Include any attachments, if required.
6. Verify all the information entered and click **Submit**.

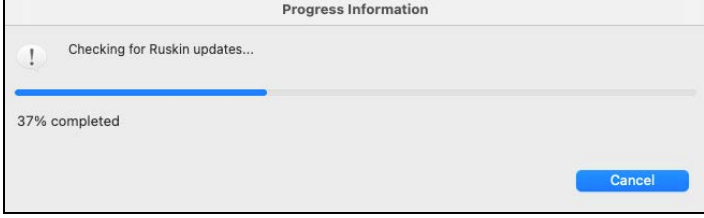


The screenshot shows a window titled "Feedback to RBR" with a subtitle "Report bug or enhancement". It contains a form with the following fields and sections:

- User Selection:** Two radio buttons. "General user" is selected. Next to it are input fields for "Name:" (containing "Customer") and "Email address:" (containing "Customer@email.com"). Below is an unselected "RBR employee" option.
- Summary:** A text input field containing "Instrument type - problem statement".
- Description:** A larger text area containing a numbered list:
 1. Serial number
 2. Overview of the problem
 3. Deployment details
 4. Initial tests
 5. Steps to reproduce the issueBelow the list is a note: "Attachments: Include any datafiles (RSK or HEX) and or photos of the issue".
- Attachments:** A text input field and an "Attach..." button.
- Buttons:** "Cancel" and "Submit" buttons at the bottom right.

4.5 Check for updates

Click on **Help > Check for updates** to search for the latest software version.



The screenshot shows a window titled "Progress Information". It contains a progress bar and the following text:

- A small icon of a person with an exclamation mark.
- The text "Checking for Ruskin updates..."
- A blue progress bar that is approximately 37% full.
- The text "37% completed" below the bar.
- A "Cancel" button at the bottom right.

If your software is up-to-date, no further action will be required.

If an update is found, Ruskin will offer to install it. Follow the prompts. Restart Ruskin for the updates to take effect.

4.6 Feature codes

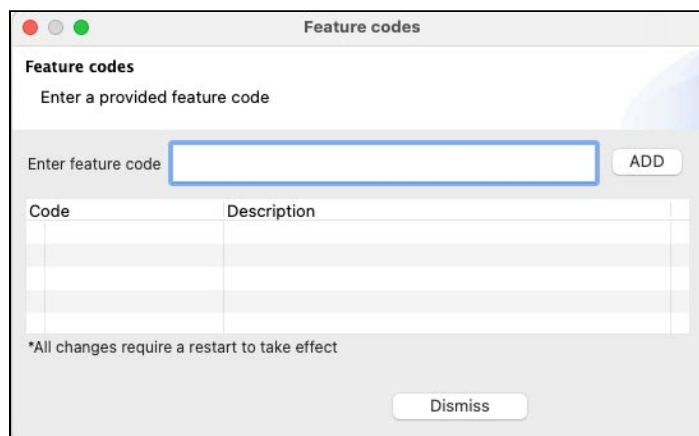
Sometimes, RBR may release new features to certain users only, as a beta trial. This includes:

- Features in early development
- Features supporting a new product, in preparation for the product launch
- Features requested by a specific customer

Usually, the goal is to get feedback and improve the feature before its official release. Contact your sales representative or RBR support team at support@rbr-global.com if you have questions about your feature code.

Steps

1. Click on **Help > Feature codes...**
The **Feature codes** window will appear.



Code	Description

2. Enter the feature code provided by RBR.
3. Click **ADD**.

If the code is correct, Ruskin will save the feature in the local database and enable it. In most cases, you will have access to the new feature immediately, without restarting Ruskin. Otherwise, you will receive any additional instructions at the time when you receive the feature code.

Errors


1. The feature code is not valid.
This error may indicate the code was entered incorrectly or it is not compatible with the current version of Ruskin.
2. The feature code is already enabled.
This error may occur when another user has already activated this code.

5 Quick start

Ruskin Desktop version is designed for computers and laptops. It generates dataset files which include raw measurement data, firmware and software versions, dates and times, sampling settings, power settings, measured and derived parameters, errors and events, calibration coefficients, and diagnostic information, offering the fullest Ruskin experience.

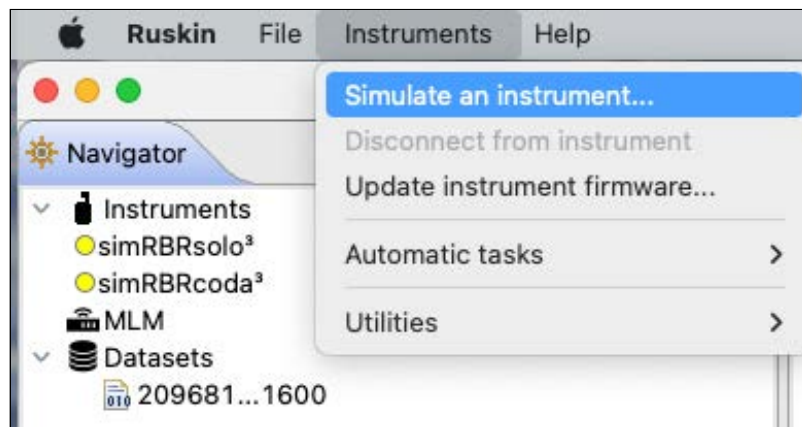
5.1 Simulate an instrument

Ruskin can simulate most instruments and sensors that RBR produces. We recommend that you experiment with different simulated options before enabling a schedule for your actual deployment. This practice will also help you become more familiar with how an RBR instrument interacts with Ruskin and how to configure its settings and features. Work with simulated instruments the same way as you work with a real RBR instrument, configuring, calibrating, and fetching data.

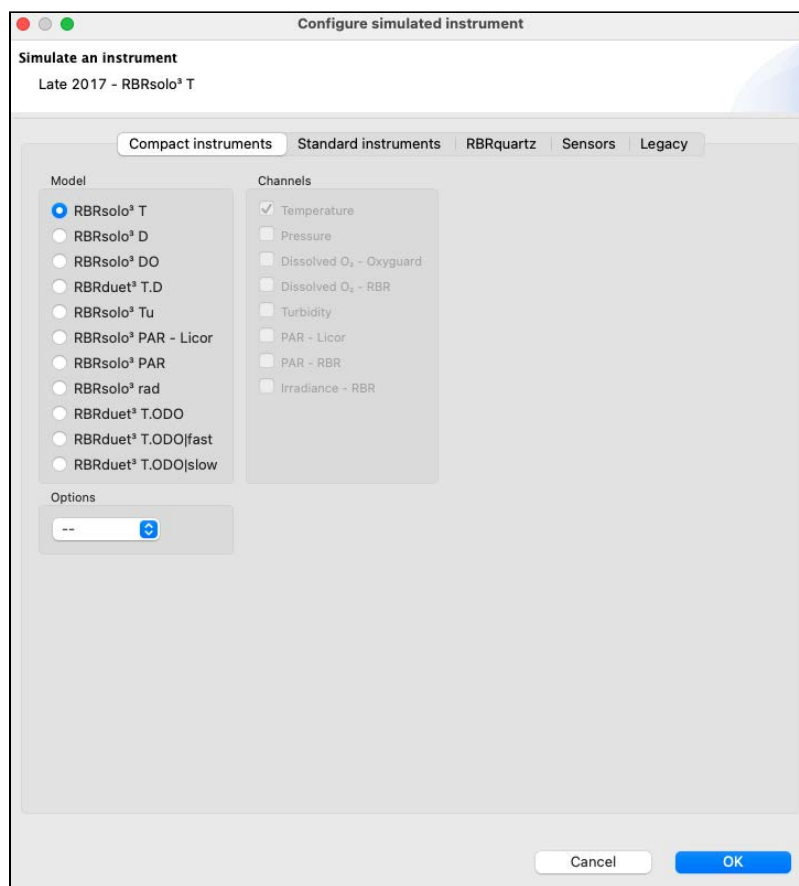
 Currently, simulated instruments cannot be enabled or downloaded. For more information, see [Deploy your instrument](#).

Steps

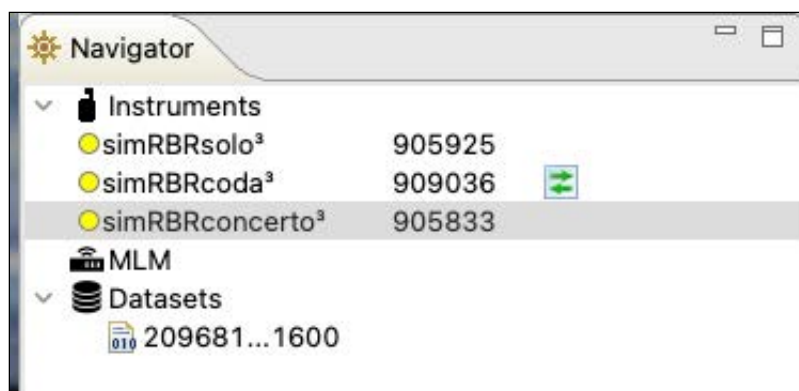
1. From the **Instruments** menu, click **Simulate an instrument**.



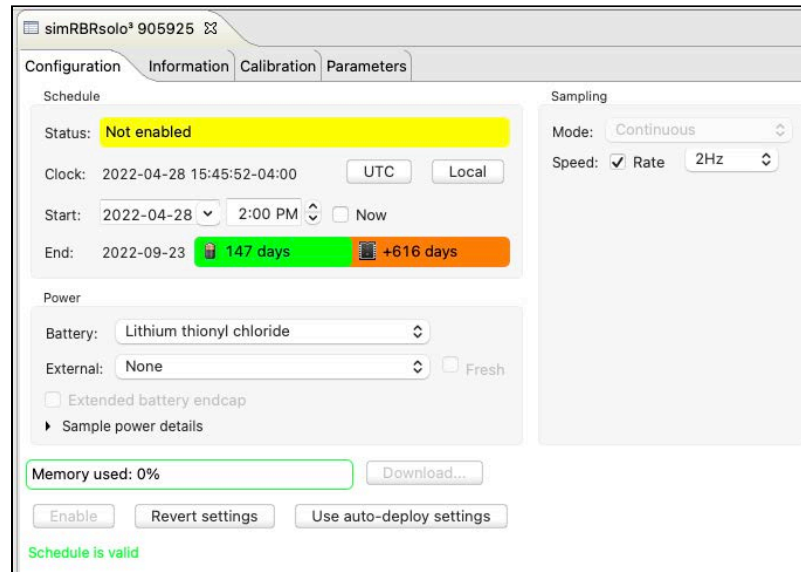
The **Configure simulated instrument** dialog box will appear.




2. Click your instrument family and make your selections.
3. Click **OK** to proceed.
4. Your instrument will appear under **Instruments** in the **Navigator** view. Simulated instruments will have a prefix "sim" in the front of their name.



The instrument properties will be displayed on the right, under four tabs.



- The **Configuration** tab displays status, clock, sampling mode and speed, power options, and deployment estimates based on these parameters
 - The **Information** tab includes general details, such as the instrument model, generation, serial number, firmware version, power source, battery status, and the channels
 - The **Calibration** tab allows access to the current calibrations for each channel in the instrument
 - The **Parameters** tab outlines default values used by the sensor when performing computations and derivations
5. Familiarise yourself with the instrument by changing configuration options and comparing deployment estimates. Select the desired configuration using the dropdown options or entering the values manually in the fields provided. For simulated instruments, the **Plot** window will remain empty unless you click the **Fetch** button .
 6. Manage multiple instruments by switching between them in the **Navigator** window.

- ✓ To remove a simulated instrument from Ruskin, right-click it in the **Navigator** window, and select **Disconnect from instrument**. You can also use the **Instruments** menu. Alternatively, simply close its **Plot** tab by clicking the **X**. The instrument will disappear from the list.

5.2 Deploy your instrument

Before using your RBR instruments, you may want to experiment with different options by [simulating your instrument](#) on Ruskin.

When you are ready to use your physical RBR instrument, follow the steps below to ensure that you measure exactly what you want on the first attempt.

Steps

1. Open the instrument and remove the housing. See "Opening and closing a compact instrument" section in the RBR Compact Instrument Guide for more details. The Guide is available on Ruskin under **Help > Documentation**.
2. Locate a USB-C port inside of the instrument.
3. Plug one end of the USB cable (USB-C to USB-C, provided with your instrument) into this port and the other, in the USB port on your computer.
The instrument will appear in the **Navigator** view after a few seconds. The properties for the instrument will be displayed in the **Properties** window, grouped under four tabs: **Configuration**, **Information**, **Calibration**, and **Parameters**.
4. If you are using the instrument for the first time, you can use either the default preferences or specify your own. For more information, see **Preferences > General**. You can change them at any time.
5. Click the instrument you want to use. Verify that it contains the expected sensors under the **Information** tab.
6. Click the **Calibration** tab to view or modify calibration coefficients.
7. Click the **Configuration** tab and go to the **Sampling** section to select the mode and speed of measurements.

✓ Ruskin will allow a deployment to run until the instrument can no longer sample. This could be due to a full memory or due to power supplies being exhausted. It will display the estimated battery usage and storage capacity based on the parameters you enter. The green widget next to **End** will indicate the number of days your instrument would be sampling, along with the icon representing the limiting factor, battery or memory.
Carefully consider this information before you enable a deployment schedule. For more information, see [Schedule](#).

8. Click the **Enable** button at the bottom of the **Configuration** tab to take samples according to the schedule that you specified.
Your deployment will continue until the battery runs out, the memory is full, or you stop your schedule manually.
9. When your deployment stops, click the **Download...** button at the bottom of the **Configuration** tab to transfer all the sampled data from the instrument to your computer. For more information, see [Download](#).
As soon as you download a new dataset, it will appear in the **Navigator** window. Refer to [Datasets](#) for details on managing and analysing your data.

✓ To restore a closed connection to an instrument on Ruskin, click **Instruments** in the **Navigator** window. A list of all instruments physically connected to your computer will appear in the **Properties** window.
Find your instrument and deselect its checkbox, and then select it again.
Your instrument will re-appear in the **Navigator** window.

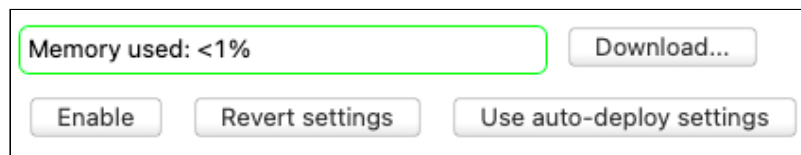
5.3 Recover your instrument and download data

When deployment is complete, recover your instrument and follow these steps to download your data.

⚠ Flooded instruments may be under pressure and opening them may be dangerous. Take precautions when opening an instrument after deployment.

Steps

1. Start Ruskin.
2. Carefully open the instrument and remove the housing. See "Opening and closing a compact instrument" section in the RBR Compact Instrument Guide for more details. The Guide is available on Ruskin under **Help** > [Documentation](#).
3. Locate a USB-C port inside of the instrument.
4. Plug one end of the USB cable (USB-C to USB-C, provided with your instrument) into this port and the other, in the USB port on your computer.
5. The instrument will appear in the **Navigator** view after a few seconds.
6. Navigate to the **Configuration** tab and click **Download...** . See [Download](#) for details.



7. Save the file to your local drive. See **Preferences** > [General](#) on steps to set up your default location.
8. Evaluate your data. See [Analysis](#) for details.

Disconnect from your instrument

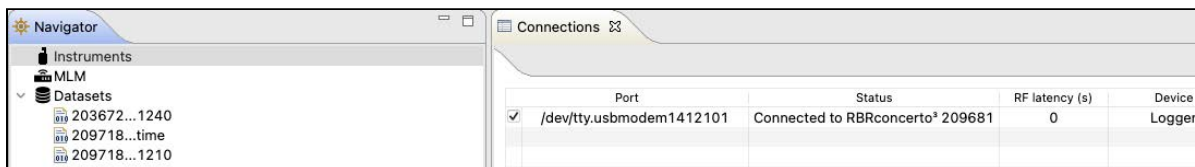
To disconnect an instrument from Ruskin, right-click it in the **Navigator** window, and select **Disconnect from instrument**. You can also use the **Instruments** menu.

Alternatively, simply close its **Plot** tab by clicking the **X**. The instrument will disappear from the list. Please note that you will be able to reconnect to it at any time because Ruskin remembers the port of a plugged instrument.

Reconnect to your instrument

To restore a closed connection to an instrument on Ruskin, click **Instruments** in the **Navigator** window. A list of all instruments physically connected to your computer will appear in the **Properties** window.

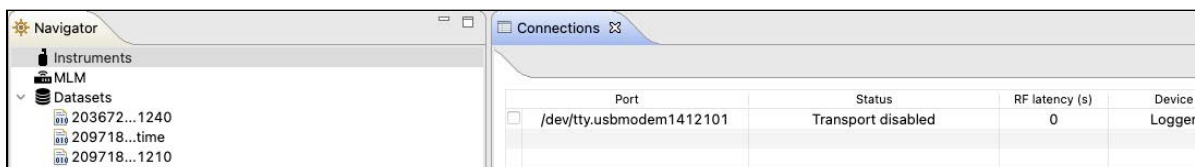
Find your instrument and deselect its checkbox, then reselect it again. Your instrument will re-appear in the **Navigator** window.



Remove your instrument

To completely remove your instrument from Ruskin, unplug it from your computer.

Alternatively, deselect the checkbox next to your instrument, and Ruskin will disable transport to its port.

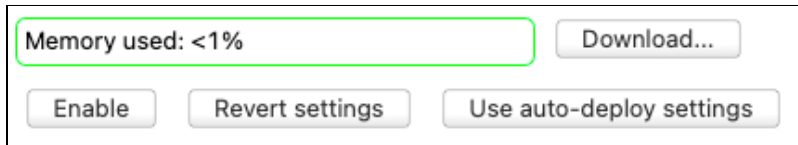


6 Configuration

Use the **Configuration** tab to set up your deployment parameters.

After setting up a desired schedule, click **Enable**. New values will replace all previously stored schedule parameters. To return to previous settings, click **Revert settings**.

To apply the same schedule to multiple instruments, set up the first instrument and click **Enable**. Connect all other instruments to Ruskin and click **Use auto-deploy settings**. Now all instrument will run on the same schedule, including logging times, power options, and sampling parameters. To return to previous settings, click **Revert settings**.



Memory used: <1%

Download...

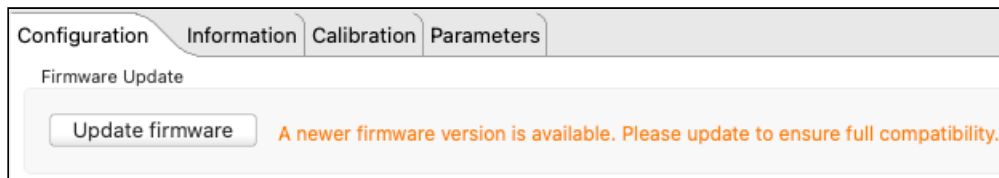
Enable Revert settings Use auto-deploy settings

- ✓ To change a schedule already enabled, stop the instrument. If the data acquired up to this point and stored on the instrument has value, download it to a file and save at your preferred location. After that, make your changes and click **Enable**.

6.1 Update firmware

Ruskin automatically checks if your instrument firmware is up-to-date. Updates may be critical, routine, or customised.

If a newer version is available and this update is critical, the **Update firmware** button and a warning message will appear at the top of the **Configuration** tab.



Configuration Information Calibration Parameters

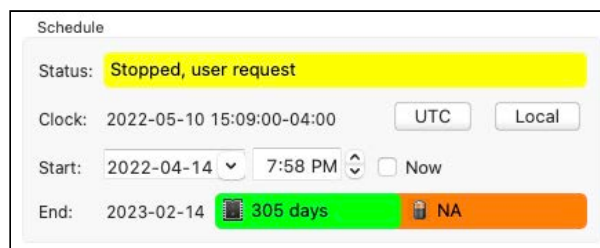
Firmware Update

Update firmware A newer firmware version is available. Please update to ensure full compatibility.

See [Critical firmware updates](#) for details.

6.2 Schedule

The **Schedule** section includes four fields: **Status**, **Clock**, **Start**, and **End**.



Schedule

Status: Stopped, user request

Clock: 2022-05-10 15:09:00-04:00 UTC Local

Start: 2022-04-14 7:58 PM Now

End: 2023-02-14 305 days NA

Status

The **Status** field displays the current state of your instrument.

Status	Description
Not enabled	A deployment has not been enabled.
Configuring instrument	Ruskin is writing the deployment configuration to the instrument.
Schedule enabled	A deployment has been enabled, but the start time has not yet been reached.
Paused	A deployment has been enabled, but a gating condition has not been met.
Logging in progress	A deployment has been enabled and the instrument is currently obtaining samples and recording them to memory.
Logging, memory full	A deployment has been enabled and the instrument is currently obtaining samples, but they are not being recorded to memory as there is no available space. Data continues to be transmitted over the chosen realtime link.
Stopped, schedule complete	A deployment has reached the end time and so has been stopped.
Stopped, memory full	The memory has been completely filled with samples and so logging has been stopped.
Stopped, user request	An enabled deployment has been stopped by user intervention.
Failed	An internal error has occurred during a deployment.
Battery failed	An internal error with regarding the batteries has occurred.

Clock

When you start a deployment, you can automatically set the instrument time from your computer. Select **UTC** or **Local** time, depending on your preferences.

Start

Specify the **Start** date using the dropdown calendar, and the **Start** time using the up and down arrows. Alternatively, check **Now** to start logging as soon as the **Enable** button is clicked.


✔ To manually edit the originally set date and time values, select and then clear the **Now** checkbox.

End


The **End** date is calculated by Ruskin autonomy engine and indicates when your deployment is likely to stop. This is based on sampling schedule, mode, and power selections. Ruskin autonomy engine provides feedback on which parameter (power or memory) will be exhausted first.

End: 2019-09-23  115 days  +496 days

The parameter in the **green** bar is the true deployment estimate. In the example shown, your deployment will last 115 days, until the battery is exhausted.

 Deployment estimates on Ruskin assume new batteries. Your real deployment times may be shorter if the batteries are not fully charged.

The parameter in the **orange** bar indicates how much longer the deployment could last if the preceding parameter were not a factor. In the example shown, if your instrument were still powered after 115 days, it could continue logging for 496 days more, until the memory becomes full.

 If the **End** logging date is power dependent and you know that the instrument will be operating under very cold conditions, you may want to lower the demands on the battery by [lengthening your sampling period](#) or opting for different [battery chemistry](#).

Ruskin autonomy engine

Ruskin autonomy engine relies on several parameters to estimate the deployment end date: sampling rate, power options, and memory. One of the key factors is battery life.

Battery life prediction is a complicated issue. In RBR instruments, it is a strong function of the type of instrument, type and number of sensors attached, sampling mode (sampling rate, gating conditions, realtime data collection), and water temperature during the deployment. Manufacturer's data for the batteries may not reflect the way batteries are used in RBR instruments, and thus, are not always informative.

Autonomy figures depend on the power draw of the instrument, as well as the derated capacity of the battery pack. Batteries are derated to 4°C. These values differ for different [battery chemistries](#). For the most accurate deployment estimates, select the same batteries from the dropdown menu as installed in your instrument.

Ruskin calculates the expected battery usage for the instrument during setup. The nominal capacity of each type of battery is described in the [Power](#) section and is given in mAh at room temperature. Battery voltage does not decrease linearly and is therefore not an accurate indicator of battery capacity.

RBR tested batteries of various brands at 6°C; all of them were able to provide the threshold capacity defined in the [Power](#) section. View these predictions and further de-rate the batteries if the expected deployment is in cold water.

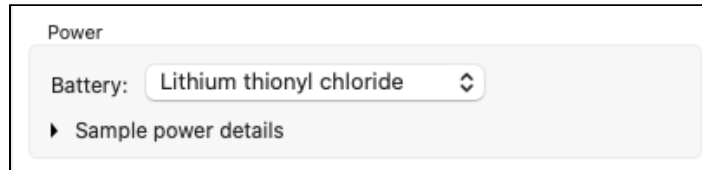
The software will warn you if the expected battery usage for a particular deployment scenario is approaching the theoretical potential mAh.



The software will not prevent your instrument from being started even if a warning is given. However, adjusting deployment parameters or replacing the batteries may help extend deployment times.

6.3 Power

The **Power** section includes battery chemistry options and information on sampling power. Ruskin autonomy engine uses these parameters to estimate deployment life.



Battery

The **Battery** dropdown menu shows available chemistry options for internal batteries. The list depends on your instrument.

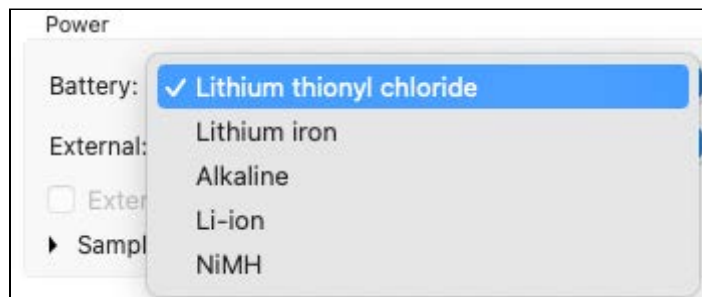
RBR ships all new instruments with batteries of the highest capacity for the instrument type already installed.

⚠ Mixing batteries of different chemistries, brands, and age will reduce performance and potentially damage the instrument. Improperly matched batteries may become overheated, leak, or even explode.

RBR instruments can use most chemistries of AA batteries.

⚠ Lithium thionyl chloride batteries are only recommended for T, D, and T.D instruments. Other sensors will not work correctly on this type of battery.

Typically, RBR instruments are shipped with EVE ER14505 lithium thionyl chloride or Energizer L91AA lithium iron. Select your battery chemistry from the dropdown list.




Battery chemistries


Name	Chemistry	Voltage (V)	mAh*
Lithium thionyl chloride	Li-SOCl ₂	3.6	2700
Lithium iron	Li-FeS ₂	1.5	3500
Alkaline	Zn-MnO ₂	1.5	2500
Li-ion	Li-NiMnCo	3.6	750
Nickel metal hydride	Ni-MH	1.2	2400

*The nominal capacity of each type of battery is given at room temperature.

Deployment estimates

Ruskin estimates autonomy figures based on the power draw of the instrument, as well as the derated capacity of the batteries. Batteries are derated to 4°C. These values differ for different chemistries (see above). For the most accurate deployment estimates, select the same batteries from the dropdown menu as installed in your instrument. Alternatively, use Ruskin to simulate your instrument with different batteries and find which chemistry works best for your deployment.

 Battery cells of the same chemistry but from different manufacturers may have different performance. If the nominal capacity of the battery model you are using is lower than outlined above, your actual deployment may be shorter than the estimate.

 Replace batteries before each deployment to maximise the operational time and prevent data loss.

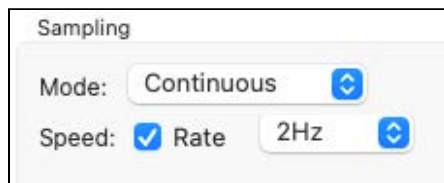
Sample power details

Click on the arrow to open the information drawer with sample power details, such as energy per sample, sample duration (if applicable), and sleep power.

▼	Sample power details
Energy per sample:	10 mJ
Sample duration:	250 ms
Sleep power:	86 µW

6.4 Sampling

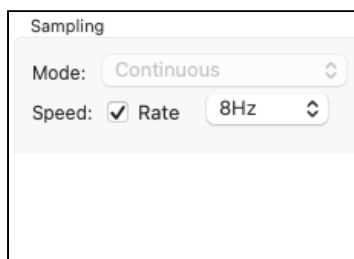
The **Sampling** section includes three fields: **Mode**, **Speed**, and **Rate**, as well as several optional fields available with certain sampling modes.



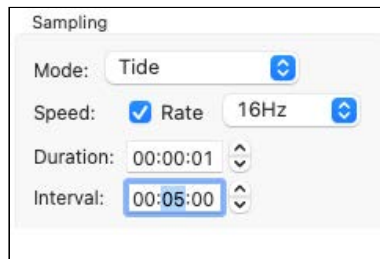
Mode

Depending on your instrument, different dropdown options may be available. See [Tide](#) and [Wave](#) for information on how to configure these modes.

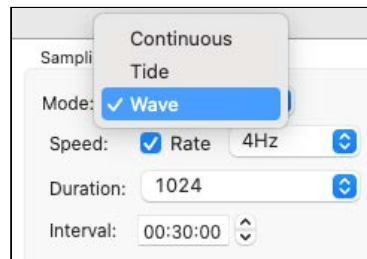
RBRsolo³ T | fast8:



RBRsolo³ D | tide:



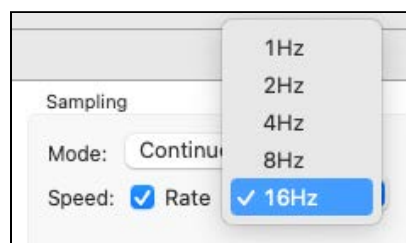
RBRduet³ T.D | wave:



Speed and Rate

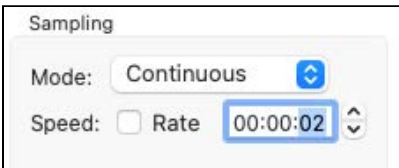
These are the only two parameters you need to configure **Continuous** sampling mode.

Check **Speed** to select the sampling **Rate** in Hz from the dropdown menu. The default option is always the highest instrument rating; for example, | fast16 will default to 16Hz.




i All | tide and | wave instruments can sample at rates of 2, 4, 8, or 16Hz.

Uncheck **Speed** to enter the sampling **Rate** manually in hours, minutes, and seconds (HH:mm:ss format). The fastest rate to enter manually is 1s. Type the numbers in, or use the up and down arrows.



6.4.1 Tide

Tide sampling mode is similar to **Average**, as the instrument will also collect data at a certain rate, and then average those samples to produce a single value to store on the instrument. However, when set to **Tide**, the instrument uses averaging to remove wave noise data from pressure measurements.

 Only instruments with the | tide16 feature support **Tide** sampling mode.

In addition to **Speed** and **Rate**, there are two more parameters required for **Tide** mode: **Duration** and **Interval**.

Duration specifies the time range over which to average. It must always be longer than **Speed**.

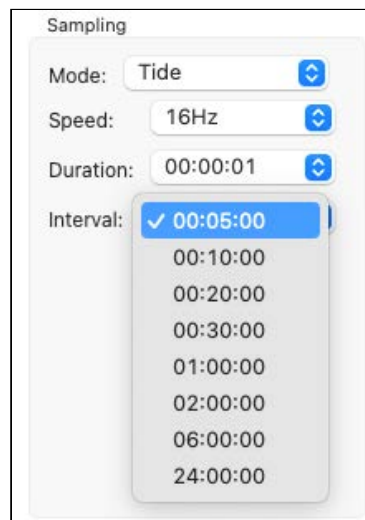
Interval is the repetition period for performing the averaging. It must always be longer than **Duration**.

There are two versions of sampling controls for **Tide** sampling mode: simple and advanced. Make your selections in **Preferences > General**.

Simple sampling controls

When using the simple version, select **Speed**, **Duration**, and **Interval** from pre-defined options in three dropdown menus.

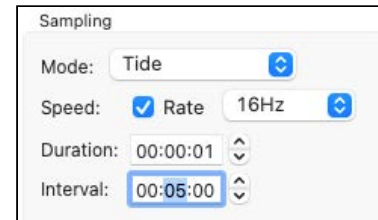
In the example shown, the sampling rate selected is 16Hz (16 samples per second). The instrument will be logging for a duration of one second, then pause and average the sixteen samples collected. After an interval of five minutes, it will start logging again, repeating the same cycle.



Advanced sampling controls

When using the advanced version, select two or all three parameters manually.

All parameters are the same as in the previous example.



Sampling

Mode: Tide

Speed: ☒ Rate 16Hz

Duration: 00:00:01

Interval: 00:05:00

i At every **Interval**, the instrument records only one sample, averaged over all samples collected during the period of **Duration**. The rest of the samples are discarded after averaging is performed.

6.4.2 Wave

Wave sampling mode is similar to **Burst**, as the instrument will also collect a specified number of samples at a specified rate, and repeat this operation at a specified interval. When in **Wave** mode, the instrument takes multiple pressure readings in a burst and reconstructs the surface wave time series. This mode records both tide and wave information.

i Only instruments with the | wave16 feature support **Wave** sampling mode.

Speed or **Rate** are parameters defining individual pressure readings.

- The highest possible frequency visible in the data is limited to $\frac{1}{2}$ the sampling rate. However, this mathematical limit cannot be achieved because of wave attenuation, and real data are actually lower.
- The sampling rate defines the resolution of the frequency spectrum which can be calculated from the wave data.
- The sampling rate, together with the burst duration, defines the lowest frequency which can be assessed in a wave burst.

In addition to **Speed** and **Rate**, there are two more parameters required for **Wave** mode: **Duration** and **Interval**.

Duration specifies the number of samples to record.

Interval is the repetition period for performing the burst. It must always be longer than the time it takes to obtain the number of samples indicated in **Duration**.

⚠ Consider unique aspects of deployment environment when setting up **Wave** sampling mode. For example, while a 30-minute interval tends to work in most cases, shorter intervals may suit better when encountering ocean swells which have longer wavelengths than noise but shorter than tide.

Furthermore, you may enter **Instrument altitude** and **Mean depth of water** to estimate possible wave periods for your deployment. These parameters are not mandatory for the instrument to work, but allow you to get an idea of what to expect.

Instrument altitude is the actual height of the instrument in metres above the seabed. This is defined by deployment requirements, and the instrument must be physically affixed at this height during the installation.

- This parameter is stored on the instrument and used to compute wave statistics for pre-deployment analysis.

Mean depth of water is an estimate of the average water depth in metres, used for the initial prediction of wave frequency. It must always be greater than **Instrument altitude**.

- This parameter is not stored in the logger and only used to compute wave statistics. It is adjusted post-deployment through the RSK file.
- Ruskin will calculate the actual mean depth of water from the instrument altitude and its depth measured during the deployment.

There are two versions of sampling controls for **Wave** sampling mode: simple and advanced. Make your selections in **Preferences > General**.

Simple sampling controls

When using the simple version, select **Speed**, **Duration**, and **Interval** from pre-defined options in three dropdown menus.

A common configuration is 4Hz sampling for 4096 samples every 30 minutes.

The image shows three sequential screenshots of the 'Sampling' dropdown menu in the 'Wave' mode. In the first screenshot, the 'Speed' dropdown is open, showing options: 16Hz, 8Hz, 4Hz (selected), 2Hz, 00:00:01, 00:00:02, 00:00:05, 00:00:10, 00:00:30, 00:01:00, 00:10:00, 00:30:00, and 01:00:00. In the second screenshot, the 'Duration' dropdown is open, showing options: 512, 1024, 2048, 4096 (selected), 8192, 16384, and 32768. In the third screenshot, the 'Interval' dropdown is open, showing options: 00:05:00, 00:10:00, 00:20:00, 00:30:00 (selected), 01:00:00, 02:00:00, 06:00:00, and 24:00:00.

Enter **Instrument altitude** and **Mean depth of water** manually. Estimates for wave statistics will be immediately displayed: maximum wave frequency and minimum wave period (essentially, they reflect the same concept because $\text{period} = 1/\text{frequency}$). These values can be adjusted post-deployment through the RSK file.

The image shows the 'Sampling' section in the 'Wave' mode. It includes dropdown menus for 'Mode' (set to Wave), 'Speed' (set to 4Hz), 'Duration' (set to 4096), and 'Interval' (set to 00:30:00). Below these are two input fields: 'Instrument altitude (m)' with a value of 1.0, and 'Mean depth of water (m)' with a value of 10.0. At the bottom, two calculated values are displayed: 'Maximum wave frequency 0.2252 Hz' and 'Minimum wave period 4.44 secs'.

Advanced sampling controls

When using the advanced version, enter all or some parameters manually.

This option allows more flexibility with your values. For example, with a rate of 4Hz and a duration of 4096 samples, the instrument will be sampling 17 minutes 4 seconds. You can set up near continuous sampling by setting the interval to 17:05. Logging will be on every second except the one remaining second of the interval, and then start again.



- ✓ The timestamp of the burst for both **Tide** and **Wave** datasets is the beginning of the burst.

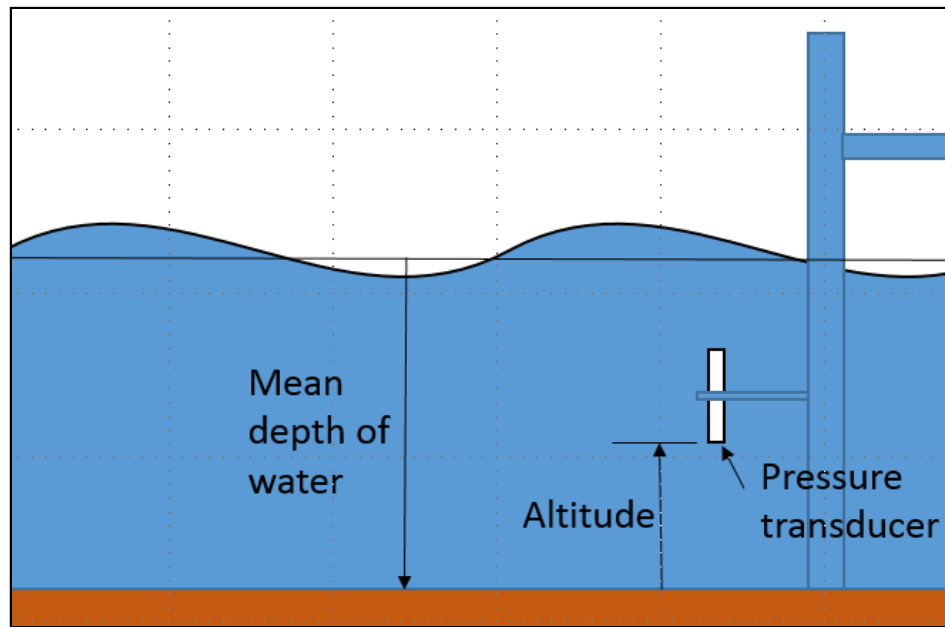
Deployment depth of | wave16 instruments

- ✓ The basic rule is to place the instrument as close to the surface as possible without it emerging from the water due to large waves or low tides.

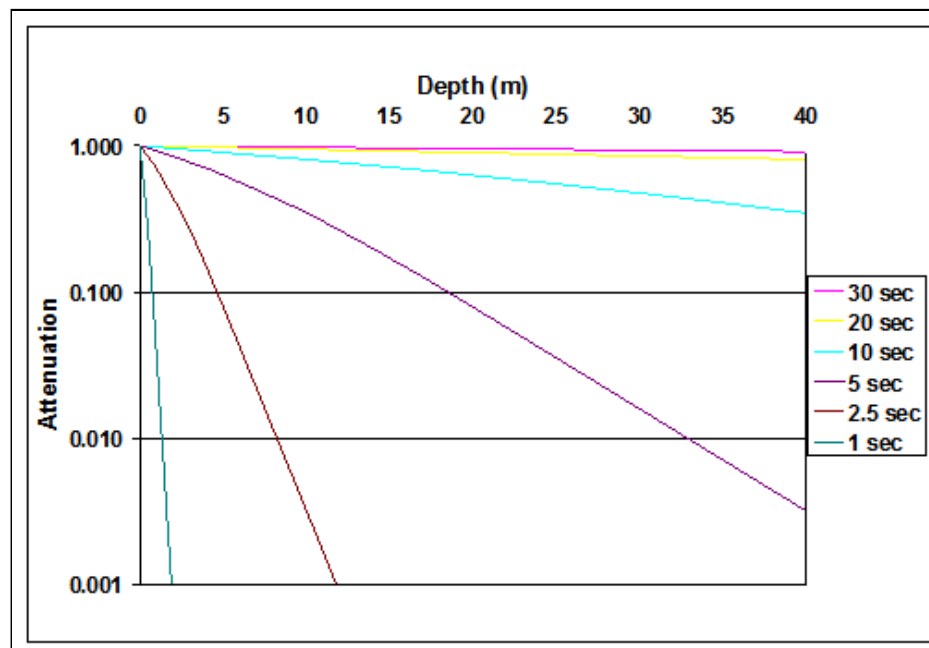
Attach your | wave16 instrument to a suitable support below the surface of the water, such as a dock or other rigid mooring, to completely immobilise it.

Enter the expected mean depth of water and the known instrument altitude (height above the seabed). From these values, Ruskin will estimate wave frequencies and wave periods that your instrument could measure (period = 1/frequency). On data retrieval, Ruskin will calculate the actual mean depth of water from the instrument altitude entered and its depth measured using the pressure transducer, and then use this actual depth for computing all wave statistics during deployment.

The physics of what a pressure transducer can measure depends on the height of water above as well as the depth of water below it. High frequencies attenuate very quickly with depth. The depth of the deployment is critical in determining frequencies/periods of the wave data the instrument will be able to capture. It is the depth, not orientation of the pressure transducer that affects these measurements.



Instrument fixed to a dock below the water surface

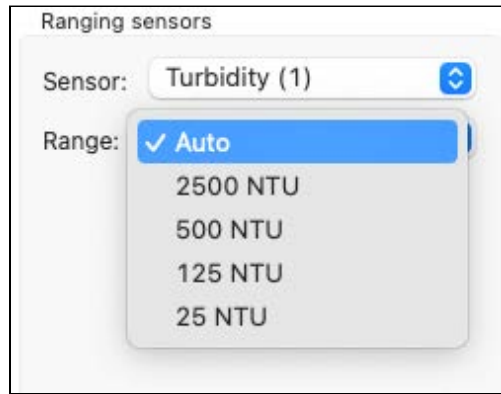


Wave attenuation as a function of depth for various wave periods

6.5 Ranging sensors

The **Ranging sensors** section has two dropdown menus, **Sensor** and **Range**.

The former displays the name and index of the channel, which for the RBRcoda³ Tu is always **Turbidity (1)**. The latter specifies the gain level used for the deployment. The units of measurement are NTU (Nephelometric Turbidity Units).



Set **Range** to **Auto** to enable auto-ranging setting. Your instrument will change the gain setting on the front-end amplifiers to the range most appropriate for its environment. To display the range change events, select **Diagnostic**

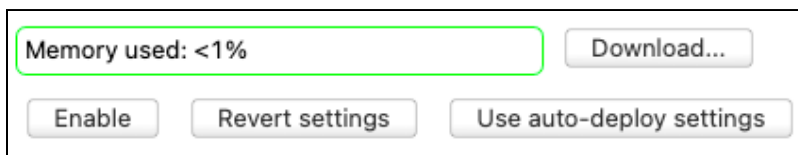
from the dropdown under the **Events** button  in the **Plot** window toolbar.

Range change events are displayed as "RANGE XX Units" where XX indicates the current range and units are the units of measurement, for example: RANGE 500 NTU. For fast sampling, where the change may be occurring over a number of samples, the label will read, "RANGE CHG", followed by the final range change event.

Alternatively, select a fixed gain setting to maintain the same setting throughout your deployment.

6.6 Download

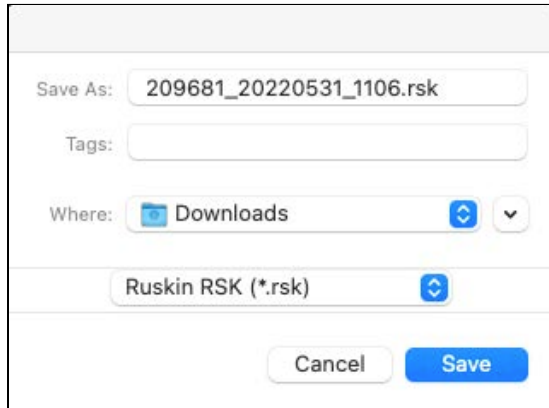
The **Download...** button is located next to the **Memory used** bar, at the bottom of the **Configuration** tab.



You can download data from your instrument at any time. However, it is especially important to do so when you stop a schedule. All the data on the instrument will be erased as soon as you enable a new deployment.

Steps

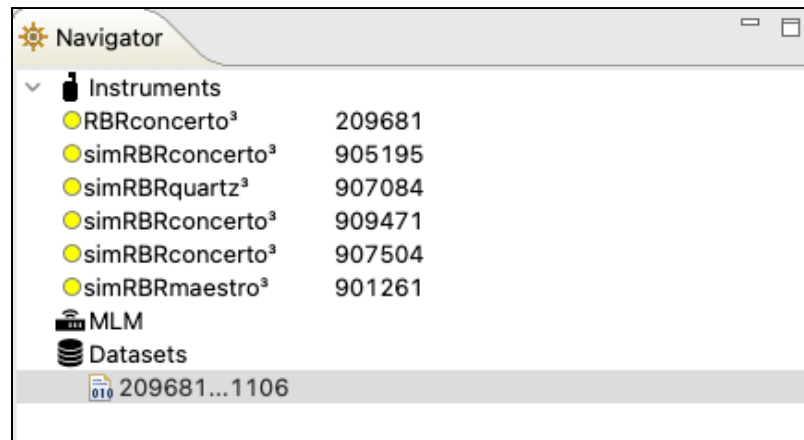
1. Click the **Download...** button.
A dialog box will appear.



2. Enter a name for the data file in the **Save As** field, or accept the default name.
By default, the RSK file name uses the Ruskin file naming convention (see [RSK files](#)).
3. Select the download location from the **Where** dropdown menu, or accept the default location.

⚠ RBR recommends storing your data on a local drive rather than a network storage drive. Cloud storage options such as GoogleDrive and Dropbox may extend download times.

4. The new dataset will appear automatically in **Navigator** window under **Datasets**.



The **Properties** view will change to the new dataset, with the following tabs: **Analysis**, **Overview**, **Channels**, and **File info**.

Analysis
Overview
Channels
File info

Sample
143

Time
2018-02-02 10:53:33.231 (UTC-5:00)

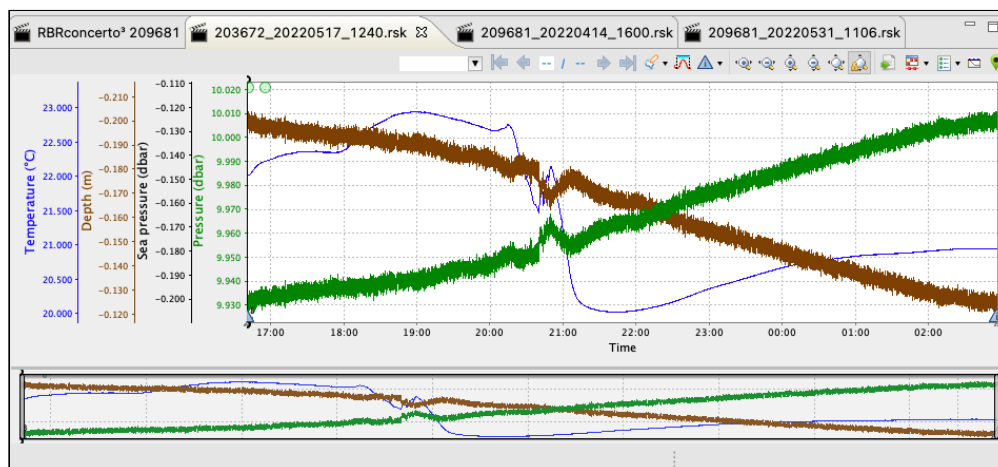
☐ Display statistics

Number of samples
100

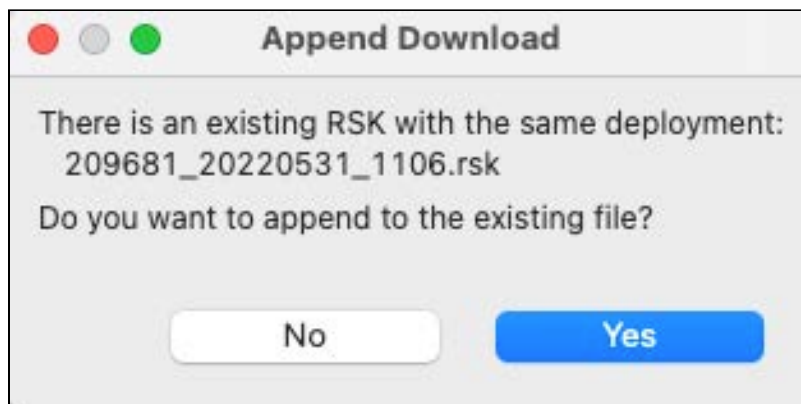
Channel	Value	Unit
Temperature	14.5291477	°C
Pressure	15.1366514	dbar
Sea pressure	5.0041514	dbar
Depth	4.9633444	m

Copy selection

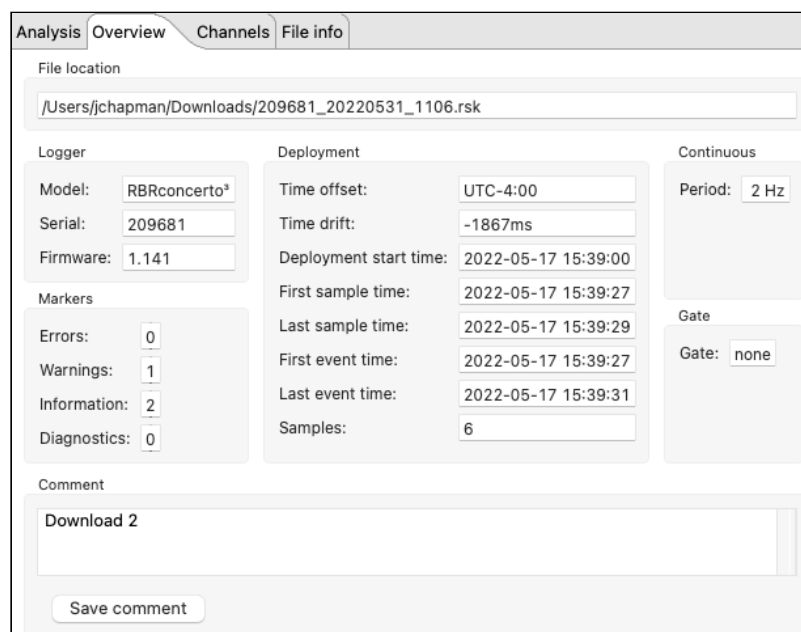
All the data stored on the instrument at the time of the download will be automatically plotted in the **Plot** window.



- When you download data again while on the same schedule, the RSK file will pick the same data and append it with any new data stored since the last download.



- Go to the **Overview** tab to add a comment for the download. Enter your message and click **Save comment**.

The "Overview" tab of a software interface. It features a "File location" field with the path "/Users/jchapman/Downloads/209681_20220531_1106.rsk". Below this are three main sections: "Logger" (Model: RBRconcerto³, Serial: 209681, Firmware: 1.141), "Deployment" (Time offset: UTC-4:00, Time drift: -1867ms, Deployment start time: 2022-05-17 15:39:00, First sample time: 2022-05-17 15:39:27, Last sample time: 2022-05-17 15:39:29, First event time: 2022-05-17 15:39:27, Last event time: 2022-05-17 15:39:31, Samples: 6), and "Continuous" (Period: 2 Hz). There is also a "Markers" section (Errors: 0, Warnings: 1, Information: 2, Diagnostics: 0) and a "Gate" section (Gate: none). At the bottom, there is a "Comment" field containing the text "Download 2" and a "Save comment" button.

6.7 Use auto-deploy settings

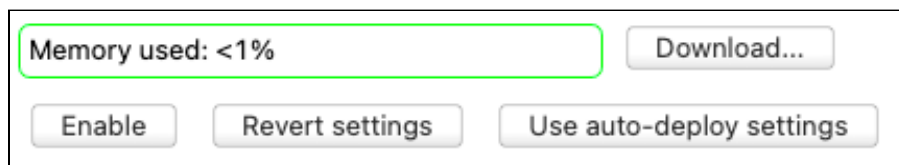
When working with a large number of similar instruments, Ruskin offers various **automatic tasks**, which can be set up from the **Instruments** menu on the top toolbar.

This feature may be convenient when you need to deploy several instruments with the same sampling capabilities. Select an instrument to use as the model and **configure** it. This will be your model schedule. Verify that these settings meet your requirements and all values are entered correctly.

- ✓ To confirm which auto-deploy parameters are set on Ruskin, go to **Instruments > View auto-deploy settings...**. The **Auto-deploy settings** box will open, with saved parameters outlined.

When you connect to an instrument with same sampling capabilities as the model instrument, Ruskin will configure it to match the the model schedule.

If your were connected to an instrument before setting up your model schedule, you can click **Use auto-deploy settings** to apply them to that previously connected instrument.



Memory used: <1%

Download...

Enable Revert settings Use auto-deploy settings

Click **Revert settings** when you wish to return to a previously configured schedule.

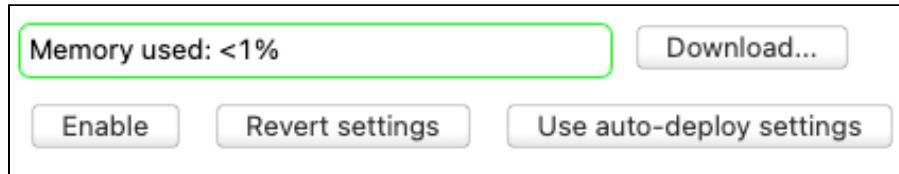
- ⚠ You cannot use **Revert settings** after clicking **Enable**. To change a schedule already enabled, stop the instrument, restore old values manually, and click **Enable** again.

Enable each instrument individually to start deployments.

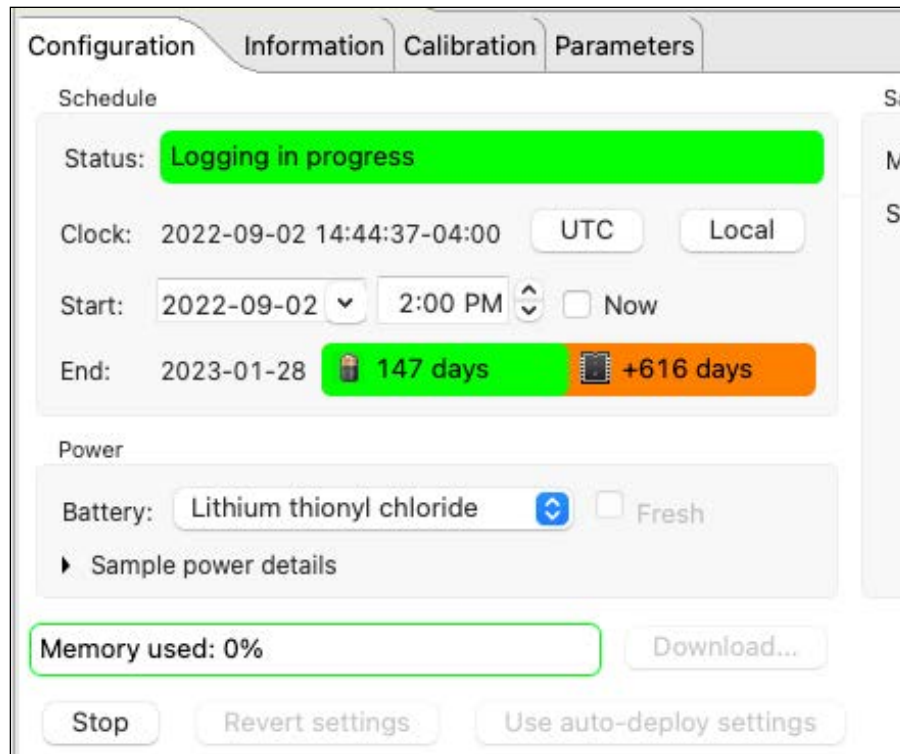
6.8 Enable / Stop

Ensure that your instrument is ready to be deployed before enabling a schedule. See [Deploy your instrument](#).

To allow the instrument to start logging, click **Enable**. This button is at the bottom left of the **Configuration** tab.



The **Enable** button will now read **Stop**. The status will become "Schedule enabled" or "Logging in progress", depending on the configuration.



Logging will start when one of the following occurs:

- The **Now** button is checked
- The **Start** time arrives

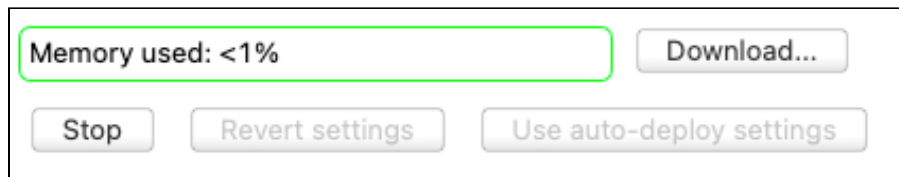
If you click **Enable**, and the instrument memory is not empty, you will see a warning.



Before proceeding, download the data from your instrument (see [Download](#)). If you are sure that the information is saved or not needed, click **Erase and enable logging**.

⚠ All editable fields become greyed out after you enable a schedule. To change any deployment parameters, stop your instrument, adjust the settings, and start a new deployment.

To manually stop the instrument, click **Stop**.



Logging will stop on its own when one of the following occurs:

- The **End** logging time is reached
- The power source is removed or depleted
- The memory is filled

7 Information

Use the **Information** tab to view general information for each of your instruments, such as as model, generation, serial number, firmware version, power source, and the channels.

Configuration

Information

Calibration

Parameters

Instrument details

Model: RBRsolo³

Generation: Mid 2020

Serial: 901522


Firmware: 1.059

Link: USB

Power

Source: USB

Internal: 3.60V



Channels

#	Parameter	Units	Sensor	Ranging	
1	Temperature	°C	Marine	None	

Most recent RBR calibration certificates

Download

In the **Instrument details** section, find the model, generation, and serial number for your instrument, as well as the firmware version installed and link used.

Refer to the **Power** section for the power source, power type, and voltage.

Under **Channels**, confirm measured and derived parameters for your instrument.

8 Calibration

The **Calibration** tab displays calibration coefficients for each parameter, and the date and time of the last calibration. Select a sensor from the **Parameter** dropdown menu to display its calibrations.

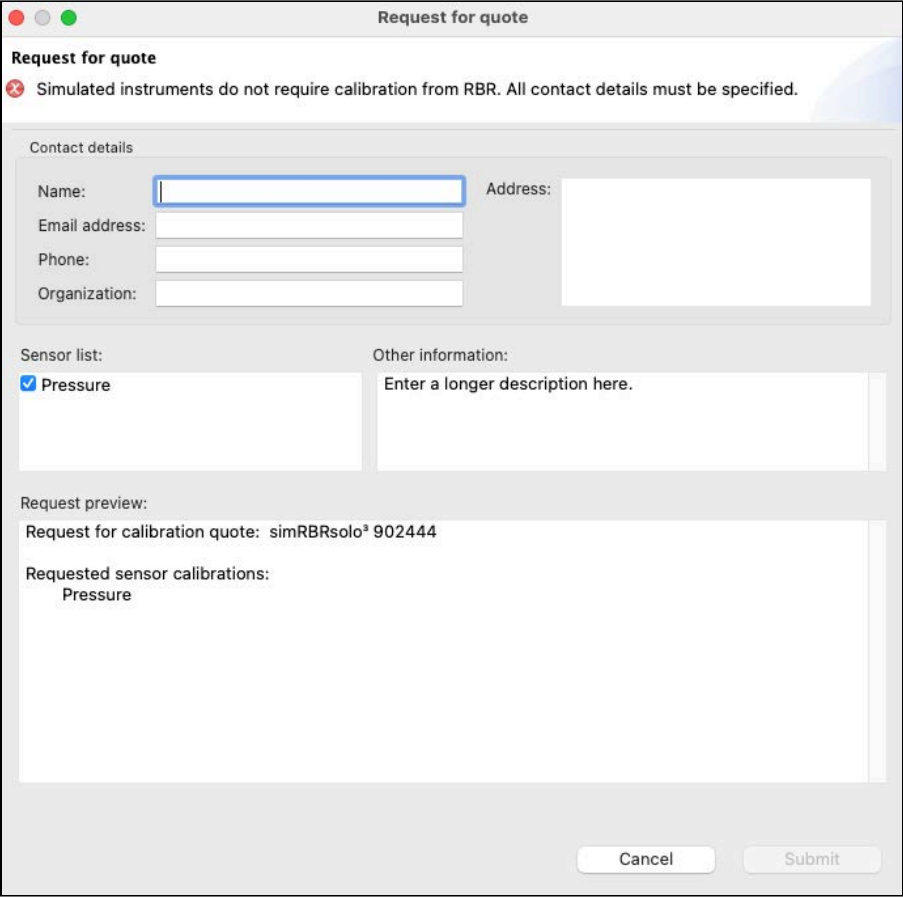
Label	Value
C0	3.5000000 E-3
C1	-250.0000000 E-6
C2	2.7000000 E-6
C3	23.0000000 E-9

RBR calibration certificates contain calibration equations, coefficients, and residuals for each sensor.

RBR recommends calibrating your instrument before any critical deployment, periodically once a year, or if you suspect the readings to be out of specifications.

Discuss your calibration requirements with RBR. In some cases, the instrument may need to be returned to RBR to have it checked and re-calibrated.

To contact [RBR](#) for our current calibration fees, click **Request calibration quote**. A **Request for quote** dialog box will appear.



Request for quote

⚠ Simulated instruments do not require calibration from RBR. All contact details must be specified.

Contact details

Name: Address:

Email address:

Phone:

Organization:

Sensor list: ☒ Pressure

Other information: Enter a longer description here.

Request preview:

Request for calibration quote: simRBRsolo³ 902444

Requested sensor calibrations:

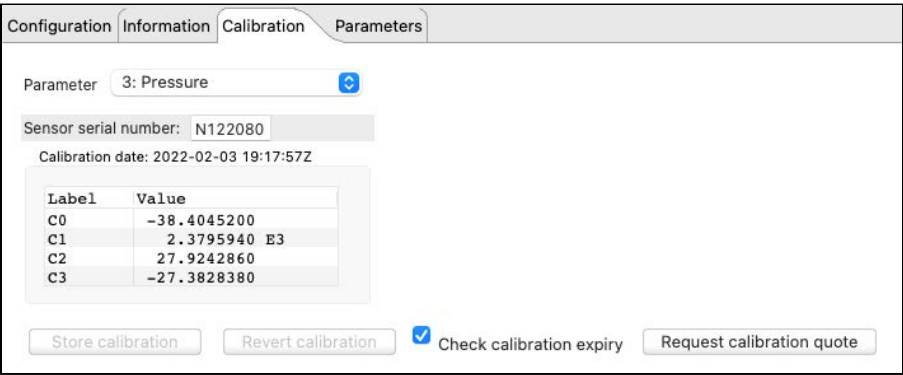
Pressure

Cancel Submit

Verify that all information is correct and click **Submit**.

Simple calibration controls

When using the simple version, you will be able to view and edit only the main calibration coefficients, displayed as "C" values: C0, C1, C2, C3.



Configuration Information **Calibration** Parameters

Parameter: 3: Pressure

Sensor serial number: N122080

Calibration date: 2022-02-03 19:17:57Z

Label	Value
C0	-38.4045200
C1	2.3795940 E3
C2	27.9242860
C3	-27.3828380

Store calibration Revert calibration ☒ Check calibration expiry Request calibration quote

Advanced calibration controls

When advanced calibration controls are enabled in **Preferences > General**, you will be able to view and edit both main and dependent coefficients. Dependent coefficients are displayed as "X" values: X0, X1, X2, etc.

Label	Value
C0	-38.4045200
C1	2.3795940 E3
C2	27.9242860
C3	-27.3828380

Label	Value
X0	10.1991000
X1	74.3307120 E-3
X2	25.4226000 E-6
X3	-2.1752340 E-6
X4	-71.7971840 E-6
X5	20.1043360

You can edit the coefficients. As soon as you make a change and move to another cell, a new calibration date will be displayed. Also, **Store calibration** and **Revert calibration** buttons will become active.

Label	Value
C0	-38.4045000
C1	2.3795940 E3
C2	27.9242860
C3	-27.3828380

Label	Value
X0	10.1991000
X1	74.3307120 E-3
X2	25.4226000 E-6
X3	-2.1752340 E-6
X4	-71.7971840 E-6
X5	20.1043360

Use **Store calibration** to save the new values.

! Always click **Store calibration** to save new coefficients on the instrument. Otherwise, all changes will be lost once your session is closed.

Use **Revert calibration** to recover to the original coefficients if you have not already saved your changes to the instrument.

! You cannot use **Revert calibration** after clicking **Store calibration**. Once the coefficients are saved to the instrument, you will need to restore old values manually and save them again.

9 Parameters

The **Parameters** tab displays all the parameters the RBR instrument may need for calculating derived channels.

If your instrument can measure a parameter, it will use the measured value. Otherwise, you can enter the necessary values manually, and they will take effect immediately.

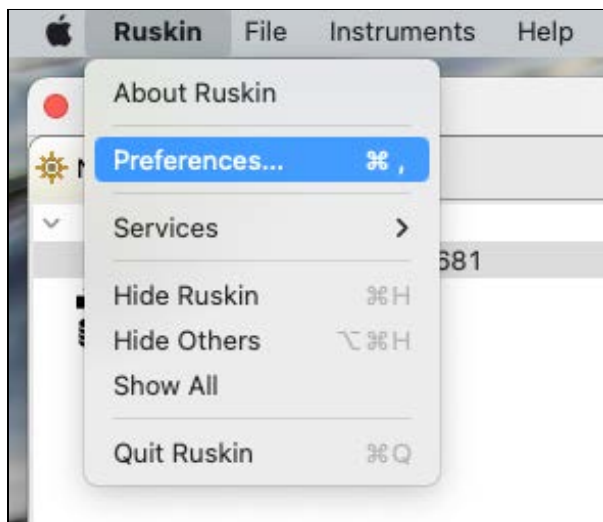
For example, you always need atmospheric pressure and water density for derivation of depth. Default values in Ruskin correspond to sea level and sea water. Therefore, it is especially important to adjust these parameters when working at high altitudes in fresh water.

Enter atmospheric pressure (in dbar) and water density (in g/cm^3) manually in the table under the **Parameter** tab. If not entered, default values of 10.1325dbar and 1.0281g/cm^3 will be used.

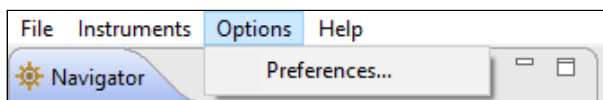
Configuration	Information	Calibration	Parameters
Temperature (°C)			<input type="text" value="0.0"/>
Pressure (dbar)			<input type="text" value="10.1325"/>
Atmospheric pressure (dbar)			<input type="text" value="9.7700"/>
Density (g/cm^3)			<input type="text" value="1.0000"/>
*Parameters take effect immediately			

10 Preferences

On your Mac, access **Preferences** from the **Ruskin** dropdown menu in the top toolbar.



On your Windows PC, use the **Options** dropdown menu to set up your [preferences](#).



Factory-set global defaults require no changes in most situations. However, as you learn more about what Ruskin can do, you may want to change some of these settings to better suit your requirements. The global preferences include:

- Derived channels (applies to some legacy instruments)
- Facility (authorised users only, requires login)
- General (download locations and options, sampling and calibration controls, export options)
- Plotting (channel visibility and channel colours)

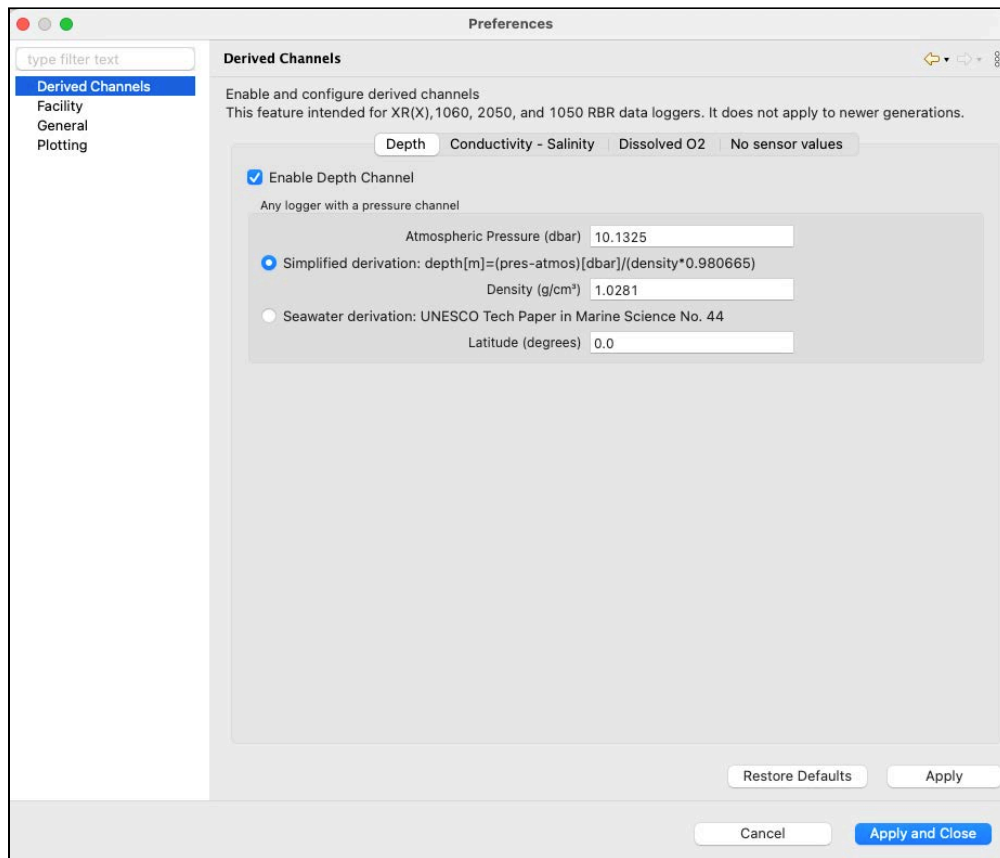
10.1 Derived channels

⚠ The **Derived channels** settings are intended for XR(X),1060, 2050, and 1050 RBR legacy data loggers. They do not apply to newer generations. They do not apply to any RBR`coda` or RBR`coda`³ instruments. Newer generations calculate all possible derived channels for that specific instrument. Use the [Parameters](#) tab in the instrument **Properties** window to set up initial parameters for calculating derived channels. For downloaded files, use the [Parameters](#) tab in the dataset **Properties** window.


The **Derived Channels** section of the **Preferences** dialog box has four tabs: **Depth**, **Conductivity - Salinity**, **Dissolved O₂**, and **No sensor values**, where you can choose additional channels derived from measured channels. Derived channels calculated by the instrument as well as those calculated by Ruskin are automatically added to the default channel list in both the live **Plot** view and the static dataset.

Depth


If your instrument has a pressure channel, you can use its measurements to derive a depth channel. The data calculated for this derived channel appear along with measured channels in the **Plot** view and in datasets.




1. Select the **Enable Depth Channel** checkbox.

 For newer generation instruments, all derived channels are calculated regardless of the checkbox status.

2. In the **Atmospheric Pressure** box, type the value in dbar or use the default value. This value corrects the pressure measurements during the depth calculation.

 The default **Atmospheric Pressure** value is 10.1325. Adjust this value manually to represent a different altitude.

3. Select either the **Simplified calculation** or **Seawater calculation**.

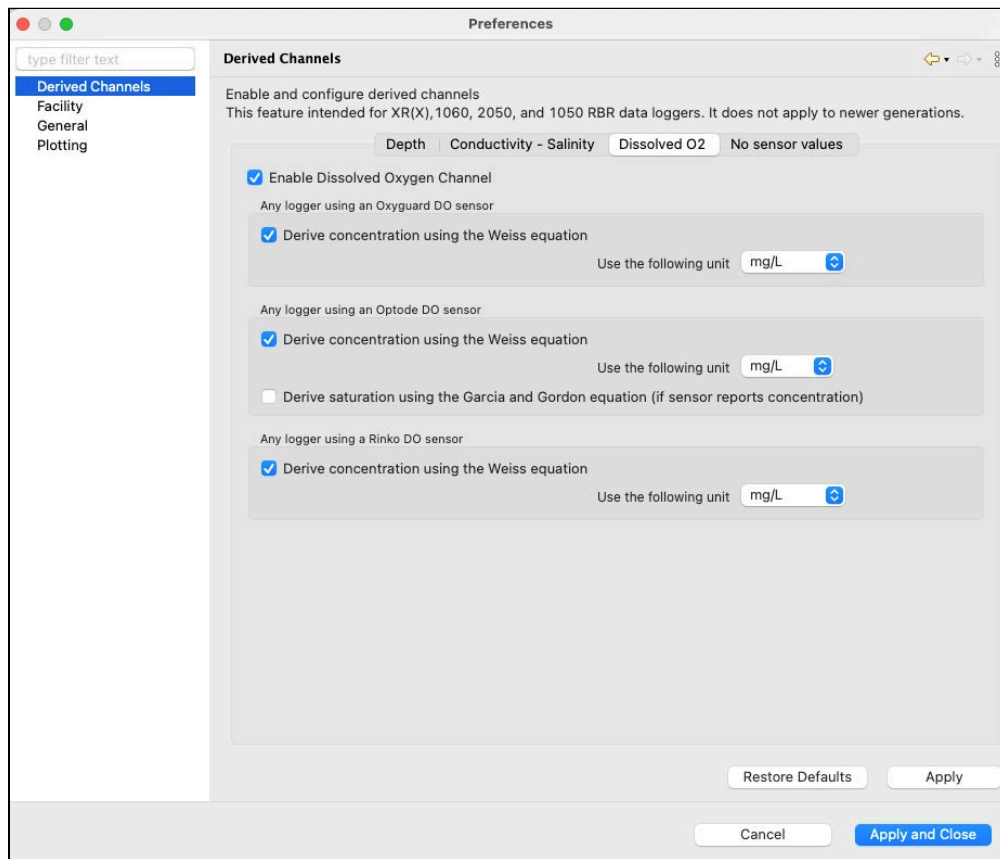
 Ruskin can calculate depth based on the simplified calculation or the UNESCO seawater calculation. The instrument always calculates depth using the simplified calculation.

- To use the simplified calculation, type the actual water density, or use the default value. Note that for freshwater, the density should be set to 1.0.
- To use the UNESCO seawater calculation, specify the latitude of the data collection in degrees and minutes.

⚠ The **Conductivity - Salinity** tab is only relevant for legacy standard instruments with a conductivity sensor. It does not apply to legacy compact instruments.

Dissolved O₂

You can derive a dissolved oxygen channel that measures oxygen saturation as a percentage.



- Click the **Dissolved O₂** tab and select the **Enable Dissolved Oxygen Channel** checkbox.

⚠ For newer generation instruments, all derived channels are calculated regardless of the checkbox status.

- If your instruments use the Oxyguard DO or RINKO DO sensor, select the **Derive concentration using the Weiss equation** checkbox and the output unit: $\mu\text{Mol/L}$, mg/L, or mL/L.

! The Weiss equation requires values for temperature and salinity. If your instrument does not measure them, you can specify standard values on the **No sensor values** tab.

3. If your instruments use the Aanderaa Optode DO sensor to measure oxygen saturation, select the **Derive concentration using the Weiss equation** checkbox and the output unit: mg/L or mL/L.
4. If any of your instruments use the Aanderaa Optode DO sensor to measure oxygen concentration, select the **Calculate saturation using the Garcia and Gordon equation** checkbox.

! The Garcia and Gordon equation requires values for temperature and salinity. If your instrument does not measure them, you can specify standard values on the **No sensor values** tab.

No sensor values

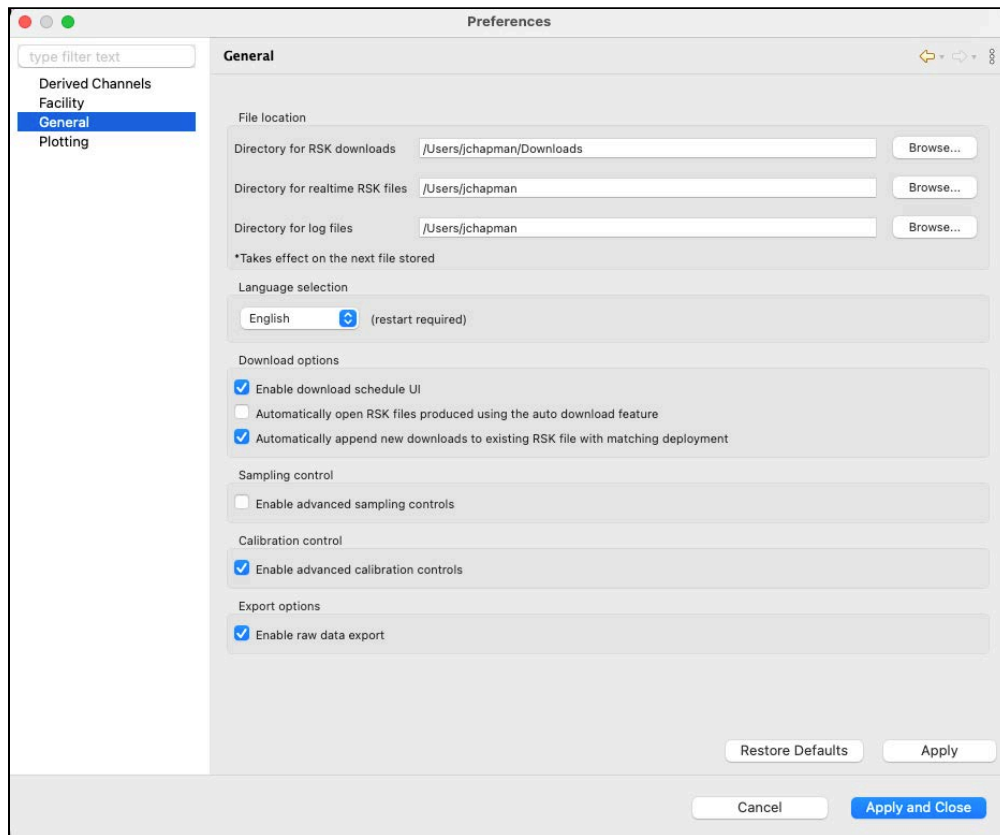
Enter salinity, pressure, and temperature values used to calculate the derived channels when a sensor is not available.

The screenshot shows a software window titled 'Preferences' with a sidebar on the left containing 'Derived Channels', 'Facility', 'General', and 'Plotting'. The 'Derived Channels' section is active. It features a 'type filter text' input at the top. Below, a section titled 'Derived Channels' contains the text: 'Enable and configure derived channels. This feature intended for XR(X), 1060, 2050, and 1050 RBR data loggers. It does not apply to newer generations.' There are four tabs: 'Depth', 'Conductivity - Salinity', 'Dissolved O2', and 'No sensor values' (which is selected). Under the 'No sensor values' tab, there are three sections: 'Derivations of Dissolved Oxygen and Density' with a 'Salinity (PSU) to be used when no conductivity sensor is present' field set to 35.0; 'Derivations of Salinity and Conductivity Correction' with a 'Hydrostatic pressure (dbar) to be used when no pressure sensor is present' field set to 0.0; and 'Derivations of Dissolved Oxygen' with a 'Temperature (°C) to be used when no temperature sensor is present' field set to 0.0. At the bottom right are buttons for 'Restore Defaults', 'Apply', 'Cancel', and 'Apply and Close'.

! If you suspect that the derived channel value is incorrect, check to make sure that the **No sensor values** entries match the deployment environment. For example, if a dissolved oxygen saturation measurement is made in a lake at 8°C but the **No sensor values** salinity is 35 and the temperature is 15°C, concentration reported will be incorrect. Adjust the **No sensor values** entries and recompute.

10.2 General

Use the **General** preference page to set up file locations, language, download options, sampling and calibration controls, and export options.

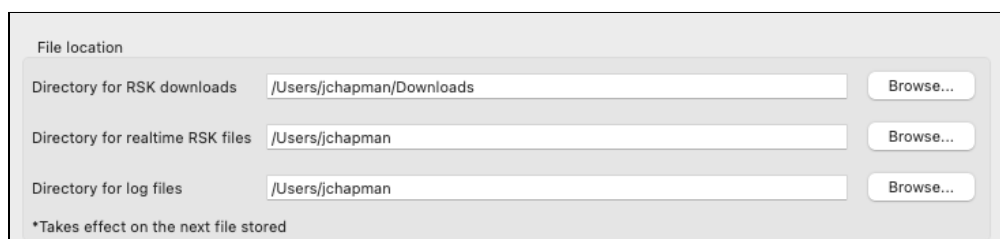


✓ You can click **Apply** to save your changes without closing the dialogue box.

File location

You can control where RSK files, realtime RSK file, and log files are stored by default.

Specify these locations before downloading any data by typing in a directory name or by browsing.



RSK files are the datasets obtained from your instrument.

Realtime RSK files are generated when a connected instrument is streaming or when you enable fetching mode on the instrument.

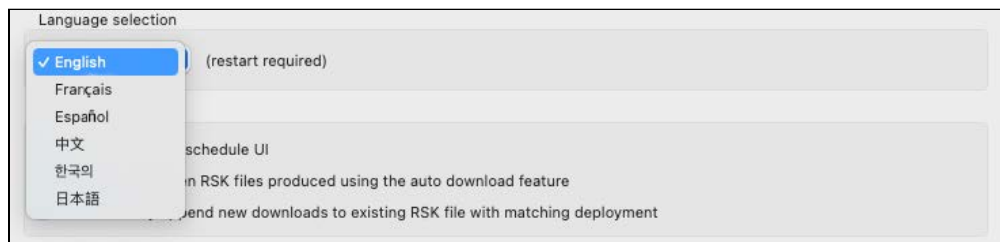
Log files are generated by Ruskin and help when diagnosing issues. These files are automatically attached to issues generated using the **Comment on Ruskin** feature.

⚠ RBR recommends storing your datasets on a local drive rather than a network storage drive. Cloud storage options such as GoogleDrive and Dropbox may extend download times.

You can change where future files are stored by default at any time. When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

Language selection

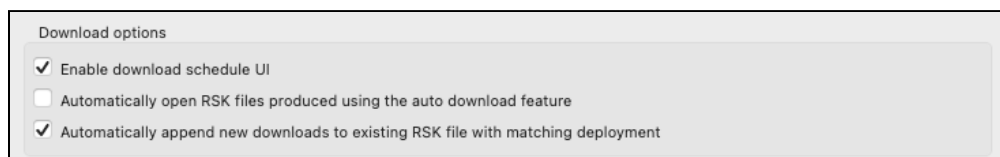
Ruskin is available in six languages: English, French, Spanish, Simplified Chinese, Korean, and Japanese.



Select your language from the dropdown menu and click **Apply** or **Apply and close**. Ruskin will need to restart for the changes to take effect.

Download options

Select the appropriate checkboxes to change your download preferences.

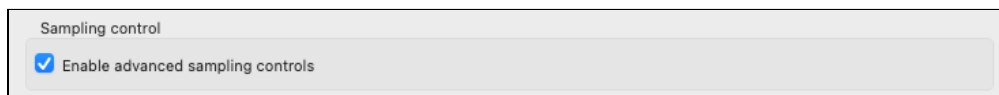


⚠ The **Enable download schedule UI** checkbox is only for legacy instruments.

When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

Sampling control

Select the checkbox to enable advanced controls when setting up your sampling options.

A dialog box titled "Sampling control" with a checkbox labeled "Enable advanced sampling controls" which is checked.

With simple controls, you will select **Speed**, **Duration**, and **Interval** from pre-defined options in three dropdown menus. When advanced controls are enabled, you will be able to enter these parameters manually and achieve a more precise setting.

When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

Calibration control

Select the checkbox to enable advanced controls when setting up your calibration options.

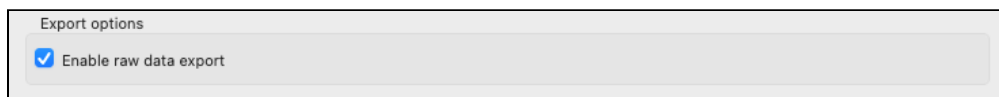
A dialog box titled "Calibration control" with a checkbox labeled "Enable advanced calibration controls" which is checked.

With simple controls, you will be able to view and edit only the main coefficients (C). When advanced controls are enabled, you will be able to view and edit all main and dependent calibration coefficients (C, X) for any channel.

When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

Export options

Select the checkbox to enable raw data export. Use this option for downloading your RSK file when storage space is limited or expensive. The dataset will be exported in the most compact raw binary format.

A dialog box titled "Export options" with a checkbox labeled "Enable raw data export" which is checked.

When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

10.3 Plotting

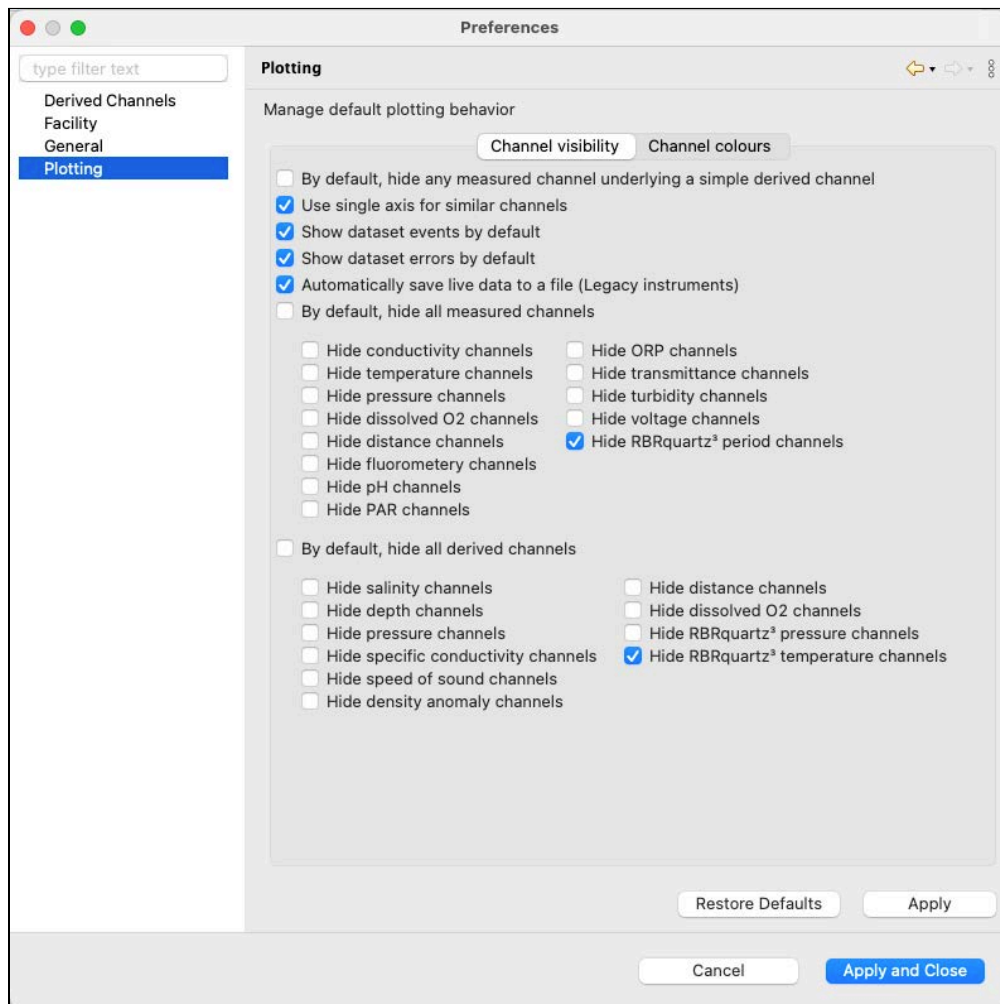
Adjust default settings for the graphical display in the **Plot** view. Manage selections in **Channel visibility** and **Channel colours**, and apply them globally.



You can click **Apply** to save your changes without closing the dialogue box.

Channel visibility

The **Channel visibility** tab displays many options to hide or show specific information.




Opt for displaying errors and events for a more informative graph, or hide them for a cleaner view.

Select the **By default, hide all measured channels** checkbox to display only derived channels.

Select the **By default, hide all derived channels** checkbox to display only measured channels.

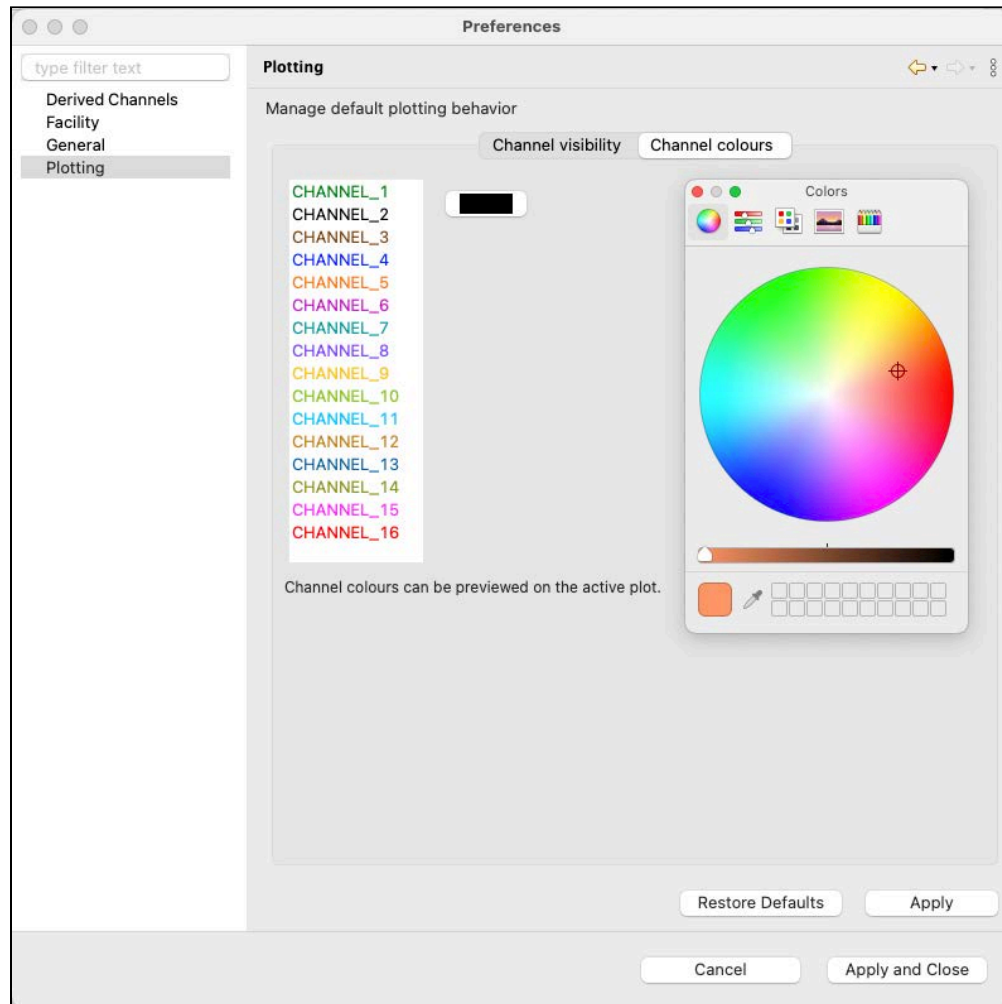
Otherwise, pick and choose channels to display or hide.

When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

 You can override visibility preferences in the **Plot** view for any particular graphical display.

Channel colours

The **Channel colours** tab allows you to choose a different colour for each channel that is shown for information currently running in **Plot** view, or from an opened dataset. Select from the list of pre-defined options or create your own colour.



When done, click **Apply** or **Apply and close**. The changes will take effect immediately.

11 RSK files

The RSK file is a single file database based on SQLite that allows us to have large files with high-speed access to any part of the dataset. RSK files have different types and versions, which reflect historical changes to the underlying dataset structure. To upgrade the version of an older RSK file, go to [File info](#) tab.

RBR provides open-source [RSKtools](#) toolboxes for both Matlab (RSKtools) and Python (pyRSKtools) to read, post-process, visualise, and export RSK files.

RSK files can be exported to Excel, OceanDataView®, or text files.

RSK files contain raw measurement data, firmware and software versions, dates and times, sampling settings, power settings, measured and derived parameters, errors and events, other diagnostic information.

- Datasets in the **Desktop** storage format allow changes to calibration coefficients. GPS mapping for full RSK files relies on manually added location points.
This file format is available for RBR standard and compact instruments.
- Datasets in the **Mobile** storage format support charting and GPS tracking. They do not allow changes to calibration coefficients.
This file format is only available for RBR standard instruments.
- For datasets obtained via streaming or fetching, the RSK format is **Realtime**. Their names contain the "realtime" label.
This file format is available for RBR standard instruments and RBR*coda*³ when in streaming mode, and for all instruments when fetching.

To identify the type of the RSK file, go to the [File info](#) tab.


File naming convention for datasets obtained during deployments

By default, RSK file names are composed of the following information:

- The instrument serial number: six digits
- The date of the download (YYYY-MM-DD): eight digits
- The time of the download (HH-MM in the 24-hour format): four digits

For example, the file named 209681_20220531_1306.rsk contains the dataset for an instrument with a serial number of 209681; the data was downloaded on May 31, 2022 at 13:06 (01:06pm), local time.

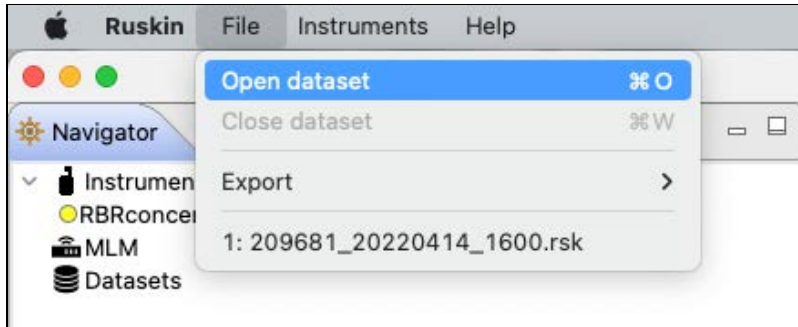
The RSK files obtained during a deployment are saved on your instrument. [Download](#) them to your computer before starting a new deployment. Go to **Preferences > General** to change your default location for RSK downloads.

 The file extension is .rsk; it indicates the Ruskin file format and must not be edited. If you change it, your new file extension will become part of the dataset name, and the .rsk extension will be appended.

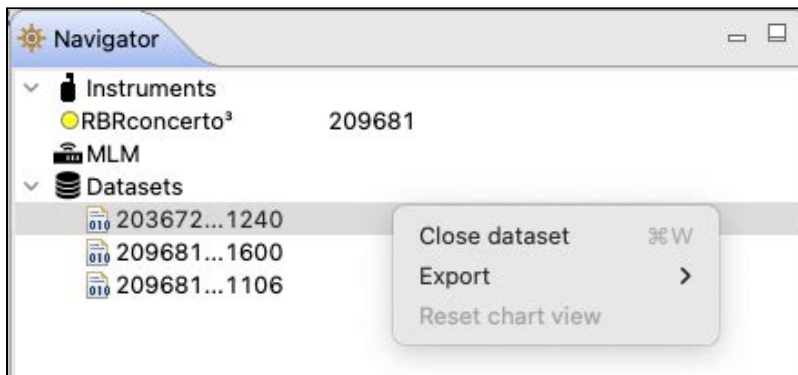
12 Datasets

Datasets are [RSK files](#) generated by Ruskin and have an .rsk extension. After [downloading](#) your datasets, you can view and analyse your data using the options below.

Go to the **File** dropdown menu to open or close a dataset, export your data, and see the list of available datasets.



The **Datasets** context menu in the **Navigator** windows duplicates some of these options for convenience.



Explore the contents of your datasets in the **Properties** window.

When a dataset on the list is selected, the **Properties** window displays four tabs with information related to this dataset.



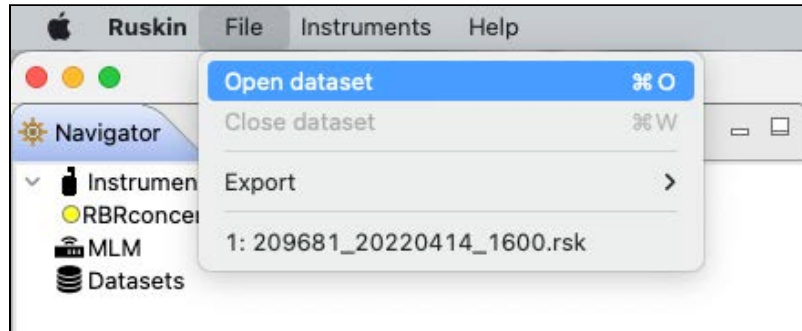
Use these tabs to analyse your data, check the calibration certificates, and verify your parameters.

12.1 Open dataset

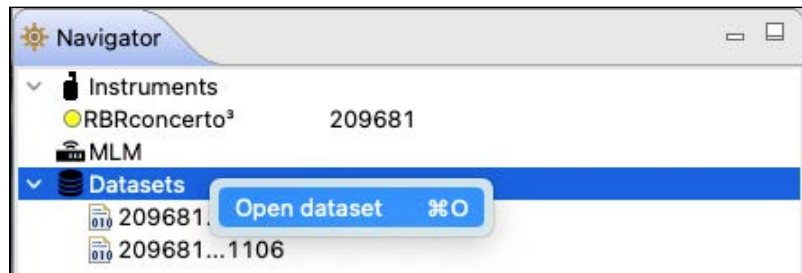
Open any stored dataset from the **File** menu in the top toolbar or from the **Datasets** menu in the **Navigator** view.

Steps

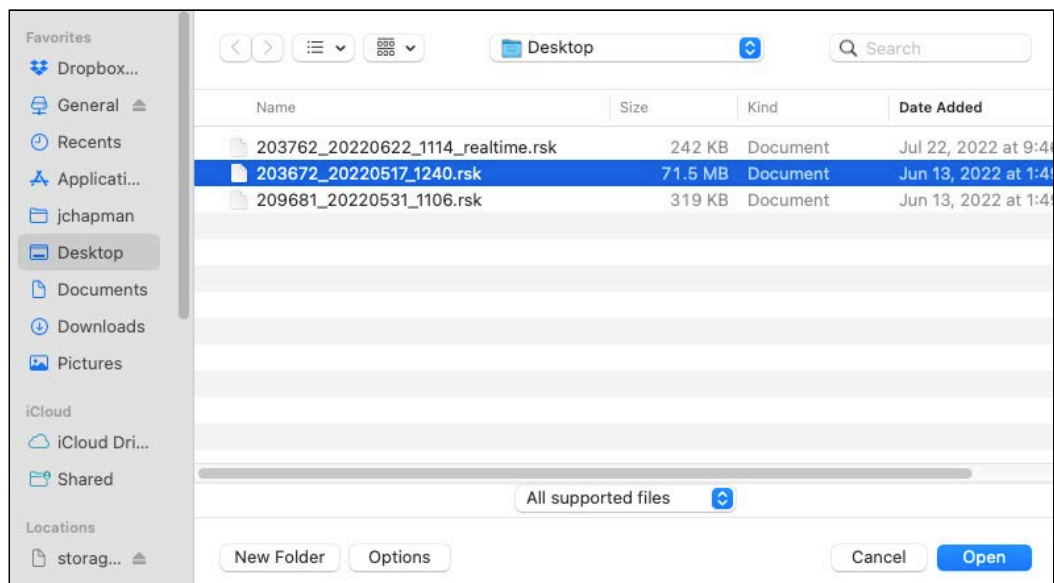
1. Click **File > Open dataset**.



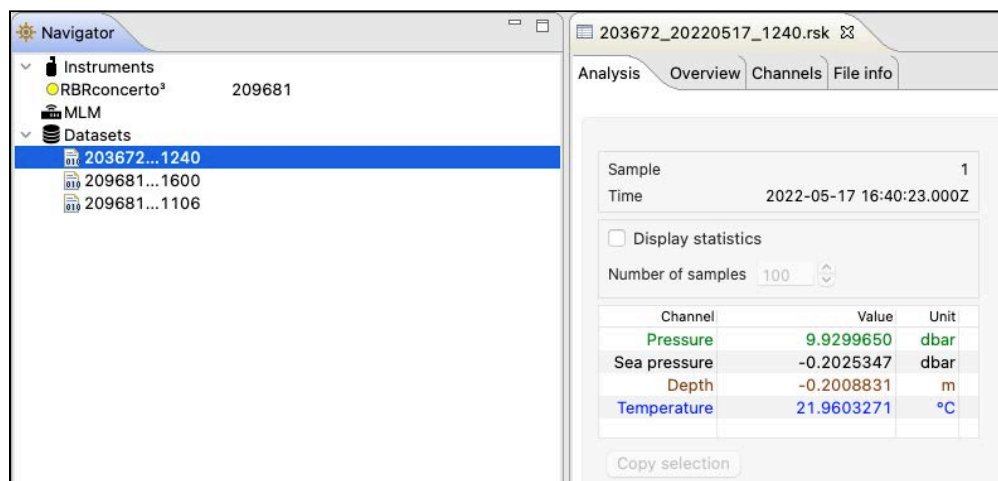
Alternatively, right-click **Datasets** in the **Navigator** view and select **Open dataset**.



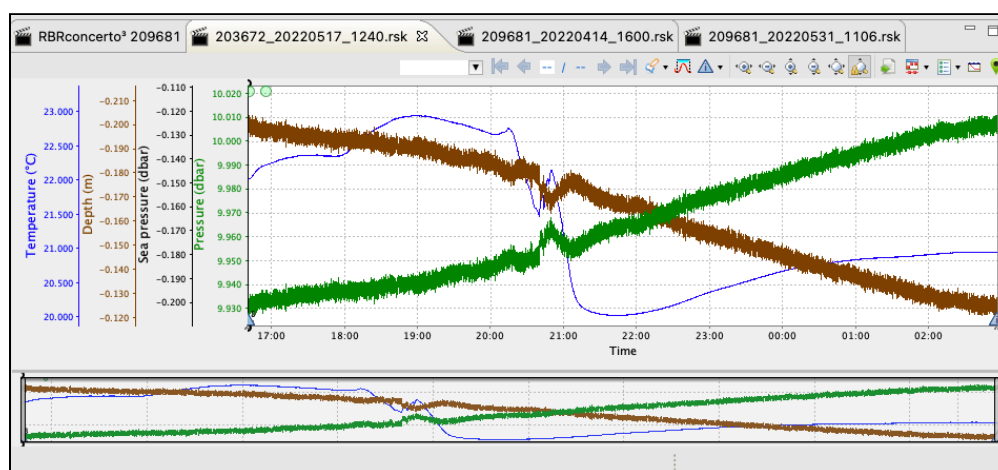
2. A browsing window will appear. Double-click the .rsk file you want to view, or select the file and click **Open**.



3. The name of the dataset appears and is highlighted automatically in the **Navigator** view. The **Properties** view changes to the dataset, with four tabs: **Analysis**, **Overview**, **Channels**, and **File info**.



4. The data in the file will automatically appear in the **Plot** view.



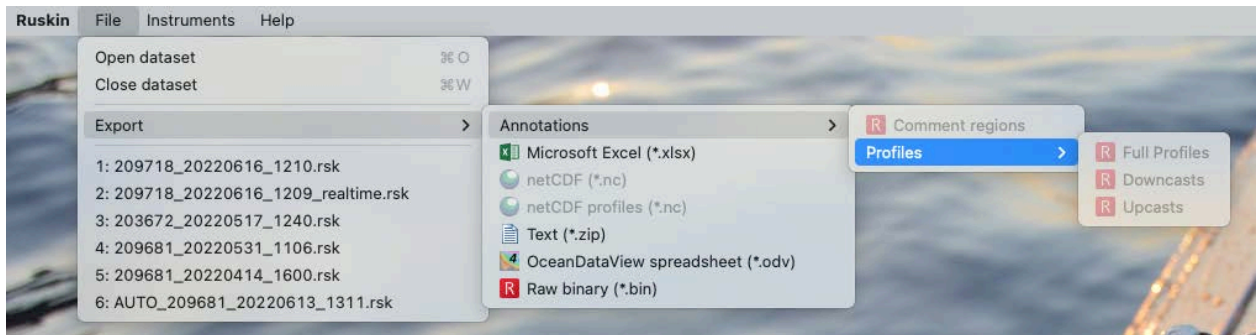
- ✓ To close a dataset, go to **File > Close dataset**. Alternatively, right-click the dataset name in the **Navigator** view and select **Close dataset**.
Alternatively, simply close its **Plot** tab by clicking the **X**. The dataset will disappear from the list.

12.2 Export

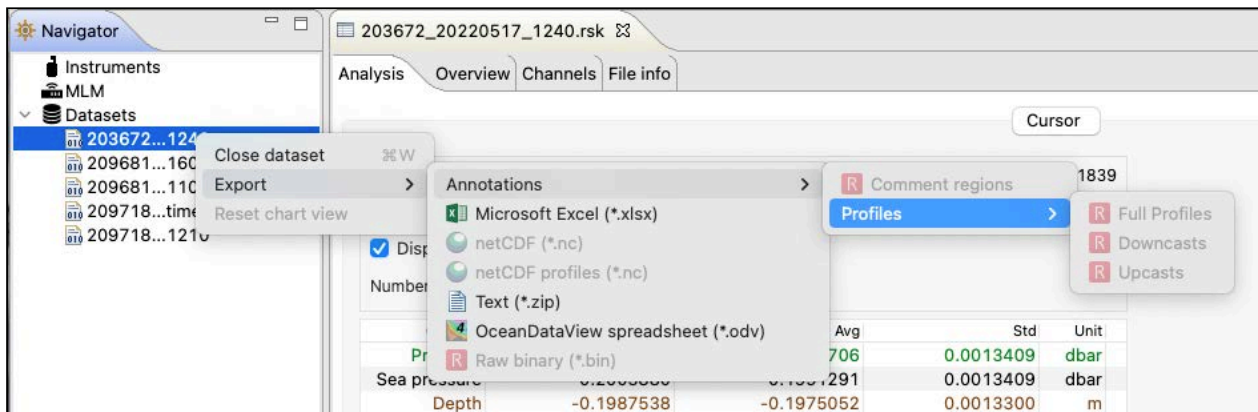
Use the **Export** option to share your data with others or analyse your data using other software. Datasets can be read directly in Matlab with our toolkit [RSKtools](#), or exported to Excel, OceanDataView®, or text files.

Steps

1. **File** menu > **Export**, then hover to open a set of submenus.



or right-click the dataset in the **Navigator** window, then hover to open a set of submenus.

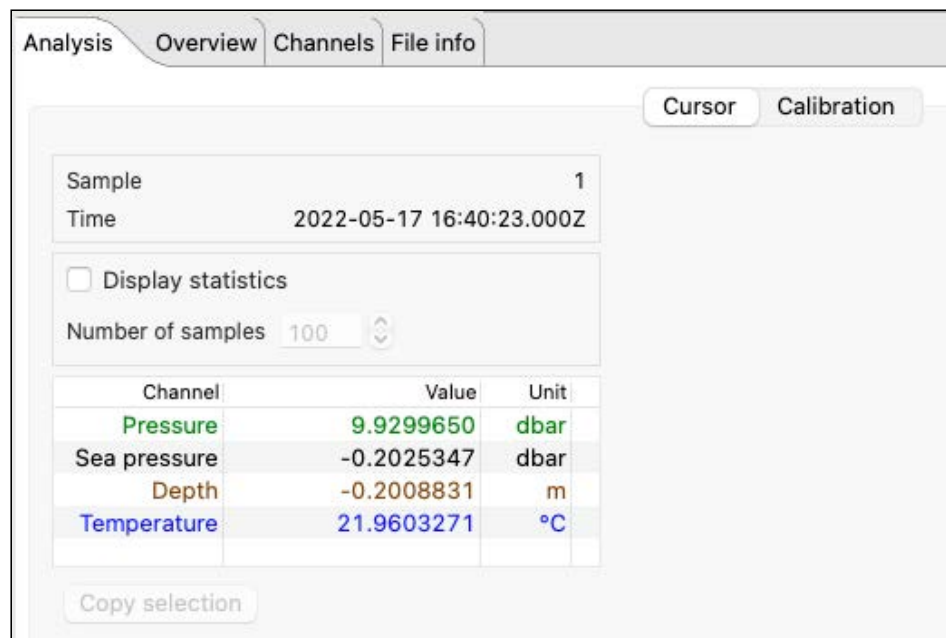


2. Select the appropriate export format (**Microsoft Excel**, **netCDF/netCDF profiles**, **Text**, **OceanDataView spreadsheet**, or **Raw binary**).
3. If exporting annotations, select the category: **Full profiles**, **Downcasts**, or **Upcasts**.
4. Specify a location and a name for the data file.
5. Click **Save**.

12.3 Analysis

Select a dataset in the **Navigator** view. The **Properties** view will change to dataset properties, with four tabs: **Analysis**, **Overview**, **Channels**, and **File Info**.

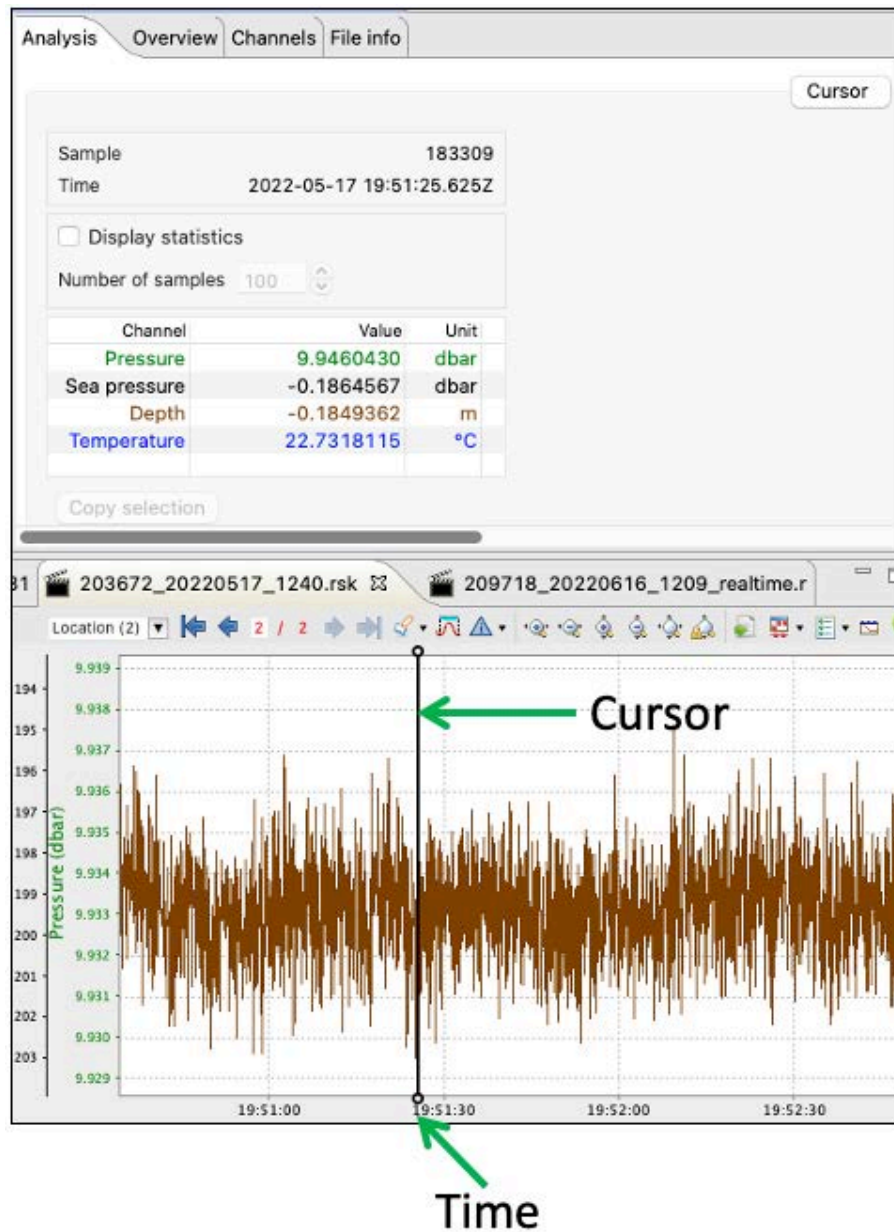
The **Analysis** tab has two options: **Cursor** and **Calibration**.



The **Cursor** view contains statistical information about deployment, as well as information about the dataset channels and their values.

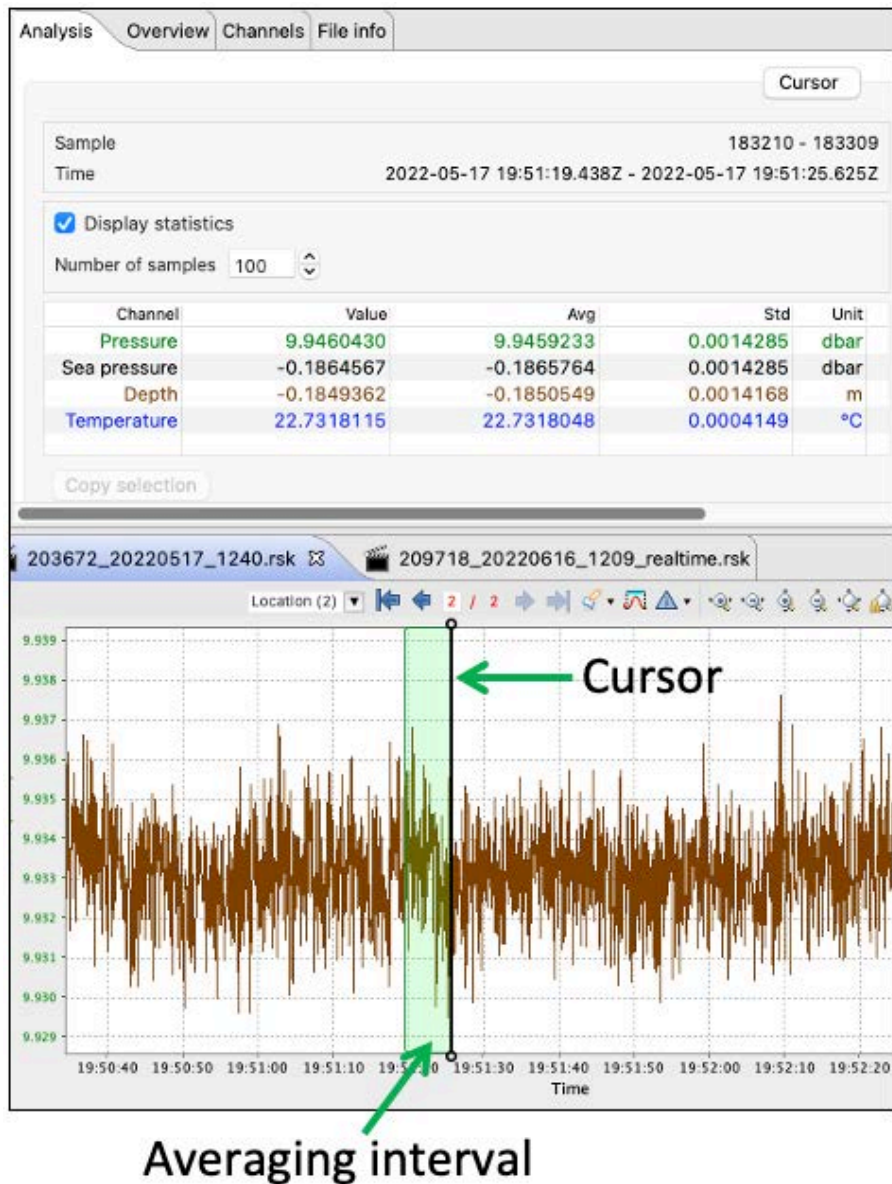
Move the black cursor ("double lollipop") in the **Plot** window to display parameter values for each sample selected.

Every time you move the black cursor, going from sample to sample, the table above the plot will display the information for this particular sample.



Select **Display statistics** checkbox to determine the average value and standard deviation over a range of samples. Change the number of samples to average using the up and down arrows.

The table will display the averaging data. The averaging interval will be highlighted in the plot.



On the **Calibration** page, you can recalculate your coefficients for the DO and Tu channels. See [User calibration](#).

12.4 Overview

Use the **Overview** tab to view general information for each dataset, such as instrument details and deployment events.

The screenshot shows the 'Overview' tab of a software interface. At the top, there are four tabs: 'Analysis', 'Overview' (selected), 'Channels', and 'File info'. Below the tabs, the 'File location' is displayed as '/Users/jchapman/Downloads/209718_20220616_1209_realtime.rsk'. The interface is divided into several sections: 'Logger' with fields for Model (RBRduet³), Serial (209718), and Firmware (1.058); 'Markers' with counts for Errors (0), Warnings (0), Information (0), and Diagnostics (0); 'Deployment' with fields for Mode (fetching), Time offset (UTC-4:00), Time drift (0ms), Deployment start time (2000-01-01 00:00:00), First sample time (1999-12-30 20:00:00), Last sample time (1999-12-30 20:00:00), First event time (1999-12-31 20:00:00), Last event time (1999-12-31 20:00:00), and Samples (0); 'Continuous' with a Period (NA); and 'Gate' with a value of none. At the bottom, there is a 'Comment' text area and a 'Save comment' button.

To make a note about this dataset, enter your comment in the field provided and click **Save comment**.

12.5 Channels

The **Channels** tab has three options: **Information**, **Calibration**, and **Parameters**.

The screenshot shows the 'Channels' tab of the software interface. At the top, there are four tabs: 'Analysis', 'Overview', 'Channels' (selected), and 'File info'. Below the tabs, there are three sub-tabs: 'Information' (selected), 'Calibration', and 'Parameters'. The 'Information' sub-tab displays two tables. The first table, 'Measured channels', has four columns: '#', 'Parameter', 'Sensor', and 'Range'. It contains two rows: Row 1 shows '1' for '#', 'Pressure (dbar)' for 'Parameter', 'RBR' for 'Sensor', and 'n/a' for 'Range'; Row 2 shows '4' for '#', 'Temperature (°C)' for 'Parameter', 'Pressure correction' for 'Sensor', and 'n/a' for 'Range'. The second table, 'Derived channels', has three columns: '#', 'Parameter', and 'Notes'. It contains two rows: Row 1 shows '2' for '#', 'Sea pressure (dbar)' for 'Parameter', and 'Removes atmospheric pressure' for 'Notes'; Row 2 shows '3' for '#', 'Depth (m)' for 'Parameter', and 'Simplified, using density parameter' for 'Notes'.

Information

The **Information** page displays two tables: **Measured channels** and **Derived channels**.

Measured channels include measured parameters with their units of measurement, the sensor manufacturer, and the range setting (if applicable).

Measured channels			
#	Parameter	Sensor	Range
1	Pressure (dbar)	RBR	n/a
4	Temperature (°C)	Pressure correction	n/a

Derived channels include all available derived parameters with their units of measurement and the methodology used to calculate them.

Derived channels		
#	Parameter	Notes
2	Sea pressure (dbar)	Removes atmospheric pressure
3	Depth (m)	Simplified, using density parameter

Calibration

The **Calibration** page displays the calibration coefficients and correction coefficients (as applicable) for each channel, as well as the date and time of the last calibration. Select a sensor from the **Parameter** dropdown menu to display its calibrations.

AnalysisOverviewChannelsFile info

InformationCalibrationParameters

Parameter

✓ 1: Temperature
2: Pressure
4: Sea pressure
5: Depth

Calibration

9Z

Label	
C0	
C1	-254.7562800 E-6
C2	2.4126525 E-6
C3	-96.1401840 E-9

Store and recompute data

Revert calibration

☒ Use deployment calibrations

The main calibration coefficients are displayed as "C" values: C0, C1, C2(K). Dependent coefficients are displayed as "X" values: X0, X1, X2, etc.

You can edit any of the coefficients in your dataset, regardless of the advanced calibration controls settings in **Preferences**.

As soon as you make a change and move to another cell, a new calibration date will be displayed. Also, all three buttons at the bottom of the page will become active.

Analysis Overview Channels File info

Information Calibration Parameters

Parameter 1: Pressure

Sensor serial number: N12208

Calibration date: 2022-06-16 15:31:33Z

Label	Value	Label	Value
C0	-38.4045200	X0	10.1991000
C1	2.3795942 E3	X1	74.3307100 E-3
C2	27.9242800	X2	25.4226000 E-6
C3	-27.3828370	X3	-2.1752342 E-6
		X4	-71.7971850 E-6
		X5	20.1043360

Store and recompute data Revert calibration ☐ Use deployment calibrations

Use **Store and recompute data** to recalculate the dataset. Use **Revert calibration** to recover the previous coefficients and data if you have not already selected **Store and recompute data**.

To revert calibration and recalculation after it was stored, check the **Use deployment calibrations** checkbox. Click **Store and recompute data** to save the reverted coefficients.

Store and recompute data Revert calibration ☒ Use deployment calibrations

Parameters

The **Parameters** tab displays parameters necessary to calculate derived channels and the method used for calculation. You can edit these parameters to change the derived channel calculation. As soon as you make a change, the two buttons at the bottom of the page will become active.

Analysis Overview Channels File info

Information Calibration Parameters

☒ Simplified depth derivation
☐ Seawater depth derivation

Atmospheric pressure (dbar) 9.7700

Density (g/cm³) 1.0000

Latitude (degrees) 0.0

Speed of sound type UNESCO

Specific conductivity coefficient 0.0191

Oxygen concentration units mg/L

Salinity 35.0

Absolute pressure (dbar) 10.1325

Temperature (°C) 0.0

Average sound speed (m/s) 1550.744

Update and recompute Revert settings

Click **Update and recompute** to recalculate the data and display new values.

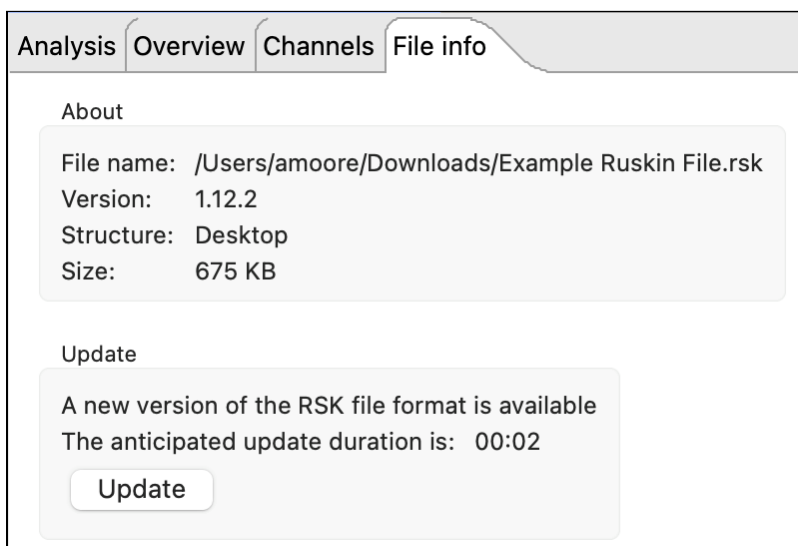
Use **Revert settings** to recover the previous coefficients and data if you have not already selected **Update and recompute**.

12.6 File info

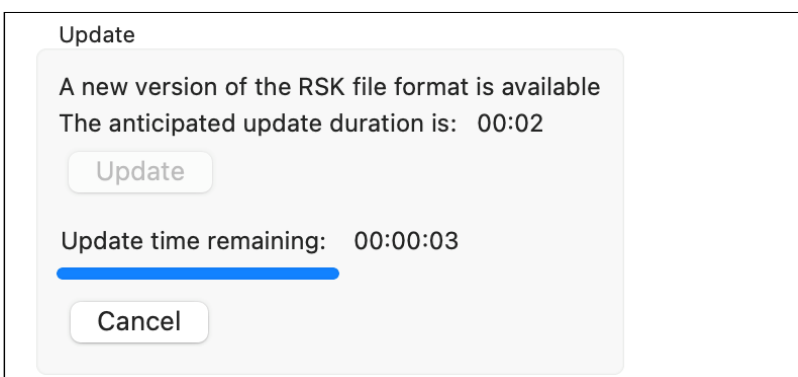
The **File info** page displays the dataset name and download location, Ruskin version used when it was obtained, file structure, and size.

The **Structure** label reflects the **RSK file format**, which can be **Desktop**, **Mobile**, or **Realtime**.

Ruskin checks the dataset for compatibility with the newest version of Ruskin software. If the file requires updating, a warning message and an **Update** button will be displayed.



Click **Update**. It may take several minutes for it to complete. RBR strongly recommends that all datasets are updated and meet compatibility requirements.

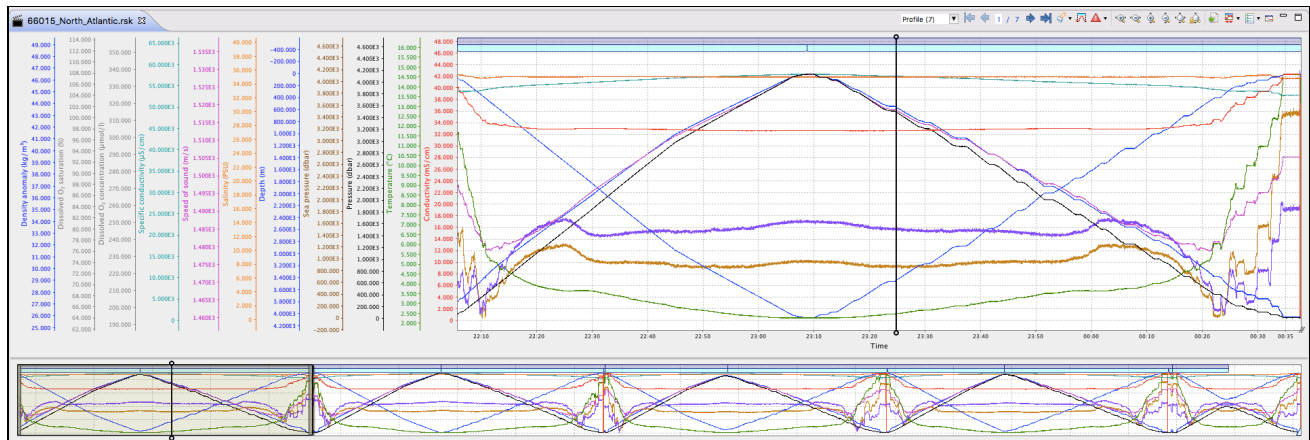


Failing to update your dataset may result in odd graphical displays and incorrect reporting of the sample values.

13 Plot window

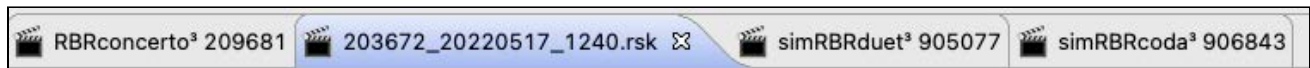
Use the **Plot** window to view graphical displays of your datasets or live data. When viewing live data, the instrument must be attached.

Each channel appears as a different colour in the plot. These colours are specified under **Preferences > Plotting** and can be changed only there.

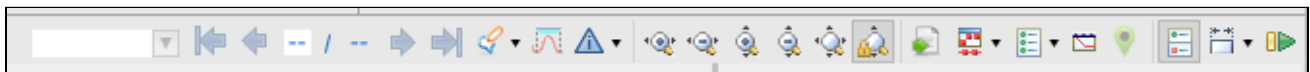


Move the black "double lollipop" cursor from one sample to the next to display parameter values for each sample selected. For the datasets, these values will appear in the **Properties** window above (see [Analysis](#)). For live data, they will be on the side of the plot.

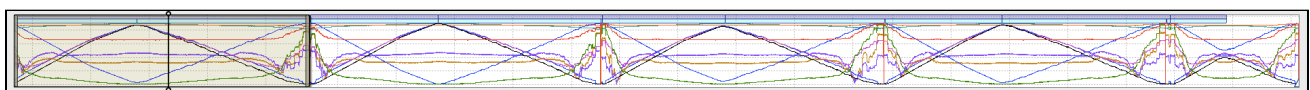
The graphical display for each dataset or instrument will be in its own tab. The dataset file name or the instrument model and serial number will appear at the top of the tab. Simulated instruments will have "sim" in front of their name.



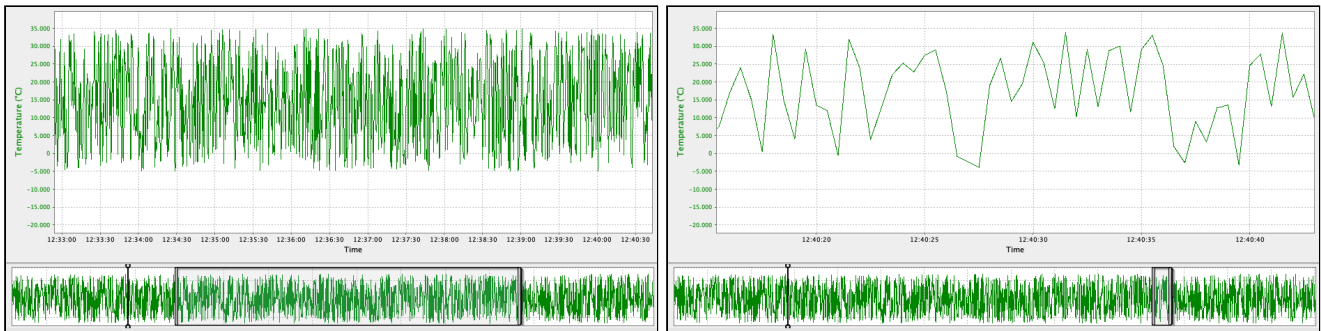
A toolbar at the top right of the **Plot** window contains various buttons to help you customise, explore, and export the graphical display. The buttons selection changes depending on what is displayed in the tab. Hover over a button to display its name and function.



A downsampled representation of the dataset appears in the thumbnail view, along with an indicator of the current plotted time range.



Position the indicator by clicking on the thumbnail view and dragging the indicator. Resize the indicator by dragging the edges left and right. It will zoom the main plot along the time domain to match the new indicator size.



⚠ The thumbnail view always shows the plot-by-time data, even if the plot is switched to the plot-by-depth mode.

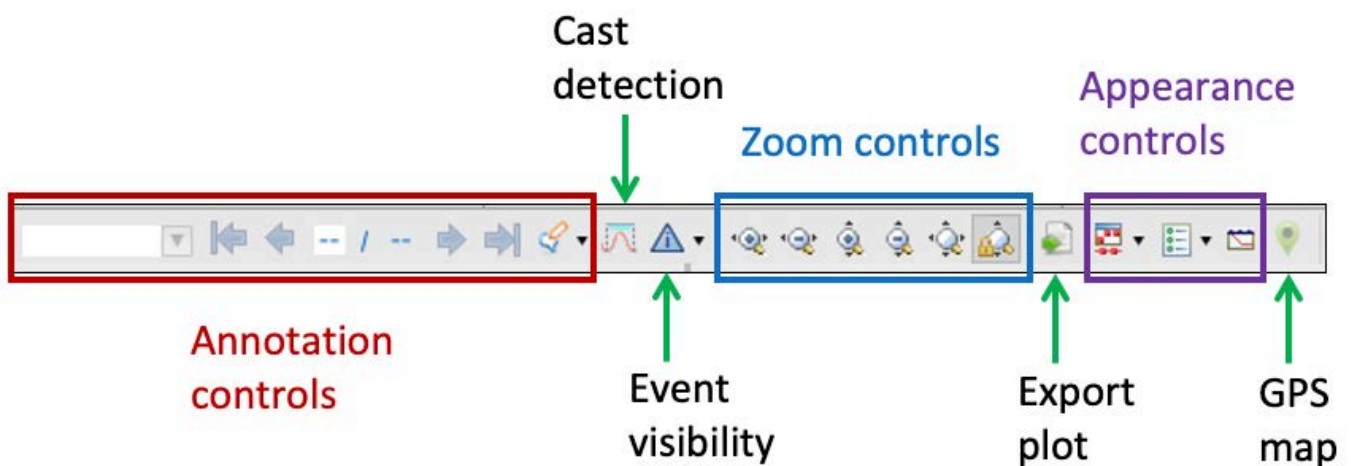
When you close and re-open a dataset, it will retain your latest settings (channel visibility, zoom, plot style (plot-by-time or plot-by-depth), annotation selection, and display style (lines or markers).

Double-click anywhere on the main plot to return to the full-chart view.

Go to [Appearance controls](#) to change your selection of lines and markers.

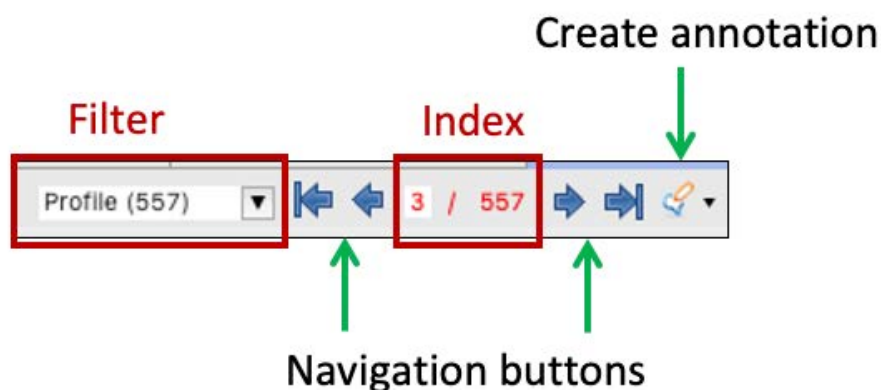
13.1 Dataset plot toolbar

Use the plot toolbar to adjust the display of an open dataset.



13.1.1 Annotation controls

Annotations are information messages added either by users or by the instrument.

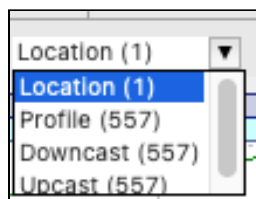


Annotation types

Annotation types are divided in two categories: profiling (**Profile**, **Downcast**, or **Upcast**) or non-profiling (**Comment**, **Exclusion**, **Location**, or **Calibration**). Use annotation controls to manage this information and to navigate the plot.

Type	Function
Profile, Downcast, Upcast	Identify profiling
Comment	Add a note to your data
Exclusion	Remove a non-representative interval from analysis
Location	Add in latitude/longitude coordinates for RSK files to track locations of data logging
Calibration	Calibrate the ODO sensor (available only for RBR standard instruments using the RBR <i>coda</i> ³ T.ODO as an integrated sensor)


Open the **Filter** dropdown menu to select the annotation type to display. The number of annotations for each type will be indicated.



Select an annotation type. The plot will centre on the first item in the selected category. For example, when you select **Profile**, the plot will move to the first profile.

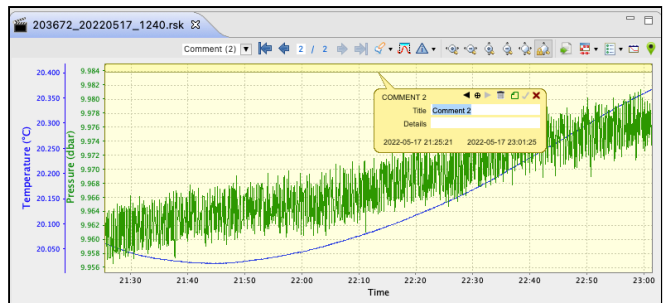
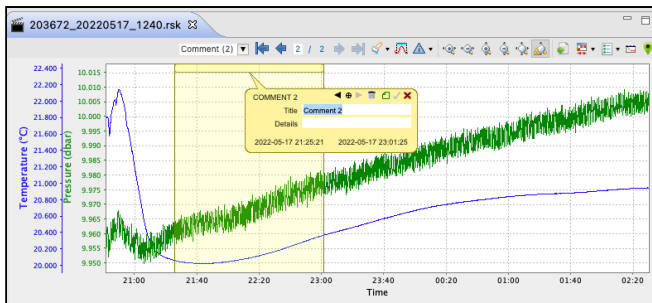
If you switch the filter to another annotation type within the same category (for example, **Profile** to **Upcast**), the plot will not change. If you switch to a type from another category (for example, from **Profile** to **Comment**), the plot will move to the first annotation in the new category (for example, to the first comment).


Use the **Navigation** buttons  to navigate between items within the selected category.


 The navigation buttons will be activated if there is more than one item in the selected annotation type. Otherwise, the plot will centre on the only item available.

Navigation controls

- Move from one annotation to another by clicking the **left** and **right** arrows.
- Jump all the way to the beginning or end of the list by using the **end-left** and **end-right** arrows.
- Alternatively, manually enter the number in the **Index** field to go to that particular annotation.
- Double-click an annotation to centre and zoom in the plot at that particular area.

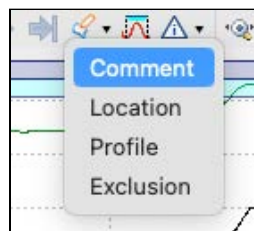



 Double-click anywhere on the main plot to return to the full-chart view.

Click the **Create annotation** button  to enter a new comment, location, profile, or exclusion.

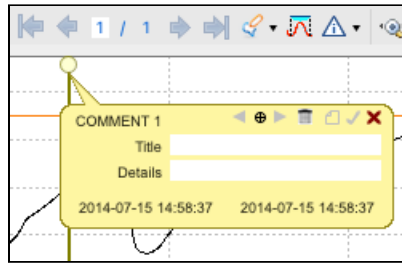
Steps to create an annotation

1. Select the type of annotation to create, for example, **Comment**.




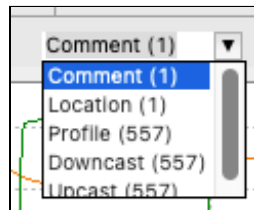
The cursor in the **Plot** window will become a two-way arrow .


- Click on the main plot to identify a single point to comment, or click and drag the cursor left or right to select an interval. When you release the click, an editable tooltip will open.





The tooltip controls include left and right **arrows** , **Delete** , **Save** , and **Close** .


- Enter the necessary information into the fields and save by pressing **Enter** on your keyboard or by clicking **Save**  on the tooltip. Your new comment will appear in the dropdown list.

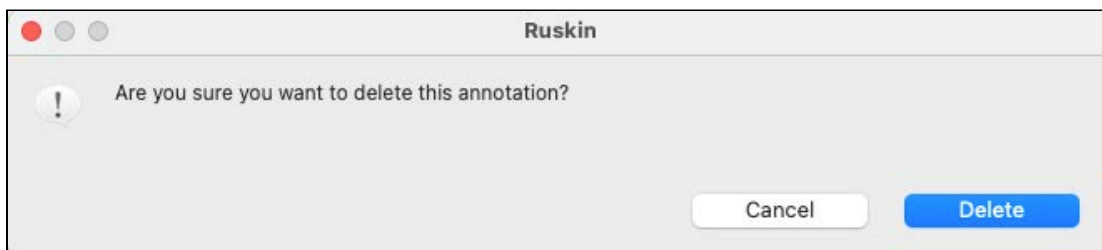


Clicking **Close**  or pressing **Esc** on the keyboard will close the tooltip without saving.

 Edit at least one detail in the tooltip before saving. Otherwise, the annotation will be deleted when deselected. Moving or resizing the annotation counts as editing and saving.

- Click the **arrows**  on the tooltip to move to the next annotation within the same category.

- Click **Delete**  on the tooltip to delete the annotation. A warning message will appear.




Click **Delete** to proceed. This action cannot be undone.

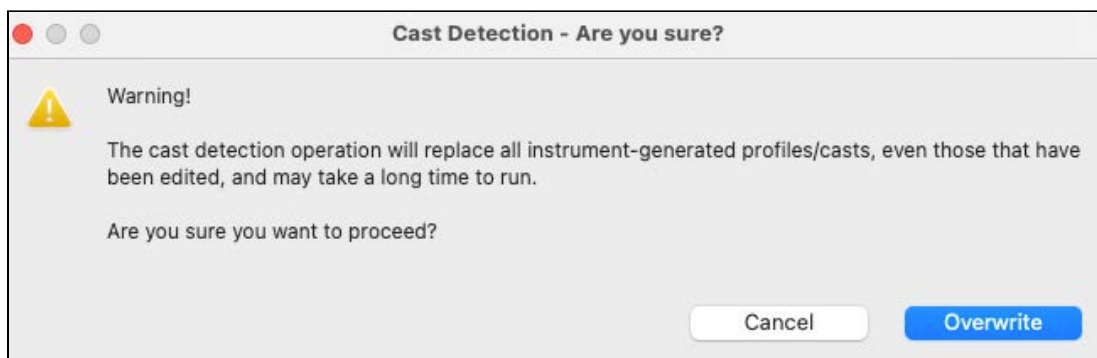
13.1.2 Cast detection

Ruskin automatically enables profile detection on instruments when a deployment is enabled. There are several criteria for enabling this feature.

- The instrument must support the `castdetection` setting
- The instrument must have a pressure sensor
- The deployment must be configured for | fast sampling (2Hz and up)
- The deployment mode must be configured as either continuous or directional

It is possible to recalculate the casts in a dataset using the cast detection feature in the **Plot** view.


Click the **Cast detection** button  to run a cast detection algorithm based on depth and conductivity to automatically generate profiles and casts. A warning message will appear.

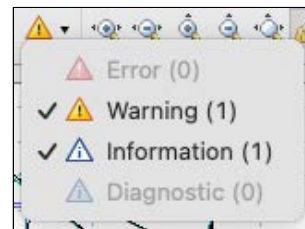
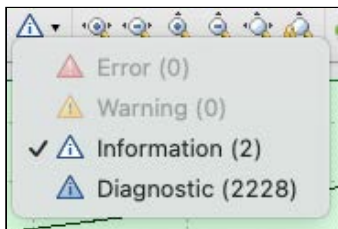
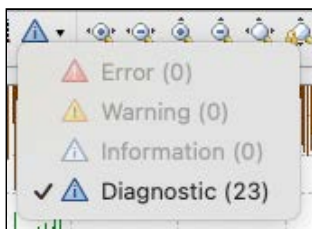


If you proceed, Ruskin will find peaks, collect events, and overwrite profiles recorded by the instrument.

✓ Double-click anywhere on the main plot to return to the full-chart view.

13.1.3 Event visibility



Click the **Event visibility** button  to turn on and off the visibility of the various levels of events: **Error**, **Warning**, **Information**, and **Diagnostic**. Its colour will reflect the highest level of event severity reported.



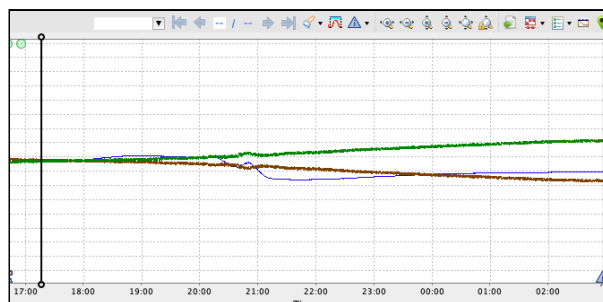
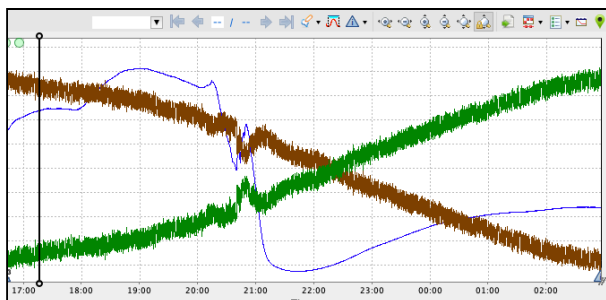
13.1.4 Zoom controls

Default scaling of the plot is based on the minimum and maximum values sampled for each channel.

Use the **Zoom in horizontally**  and **Zoom out horizontally**  buttons to increase or decrease the time range displayed.

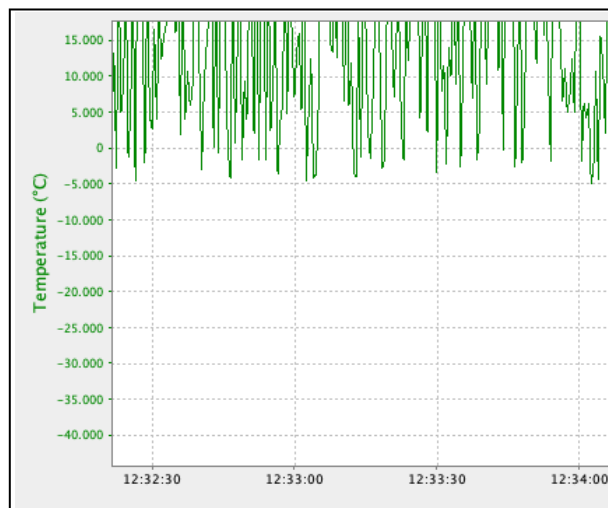
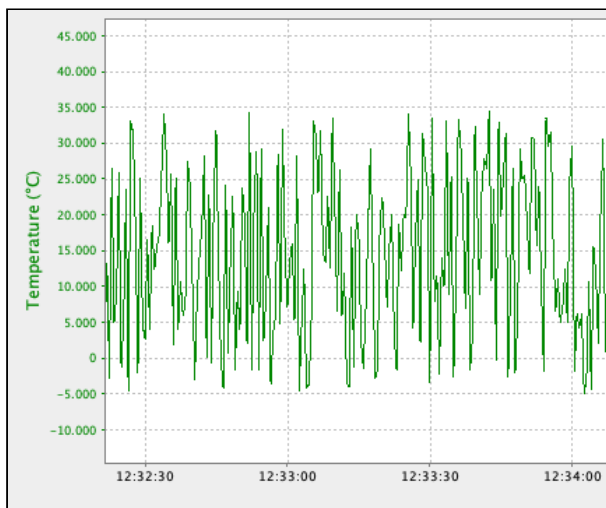
In the same way, use the **Zoom in vertically**  and **Zoom out vertically**  buttons to increase or decrease the resolution of the data displayed. Even more conveniently, hover the cursor and scroll your mouse wheel up and down to change the scale. Alternatively, hold **Shift + left click** and drag where you want to zoom in or out.


This function may be helpful when there are erroneously high or low values that make the real data appear incorrect.




Hold **Ctrl + left click** and move your mouse left and right to pan your chart horizontally.

Click a value on the vertical axis and move your mouse up and down to pan your chart vertically to centre as desired.




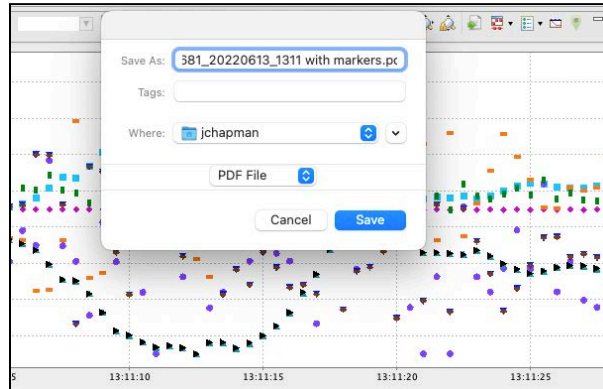
Click **Reset zoom to maximum bounds**  or **double-click** anywhere on the chart to restore the original appearance.

Use the **Toggle auto-ranging** button  to turn on and off the auto-ranging of the channel axes. Disabling the auto-ranging of the axis can be useful for looking at trends in data.

✓ Double-click anywhere on the main plot to return to the full-chart view.

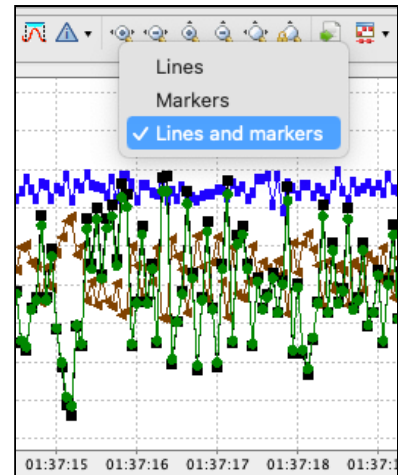
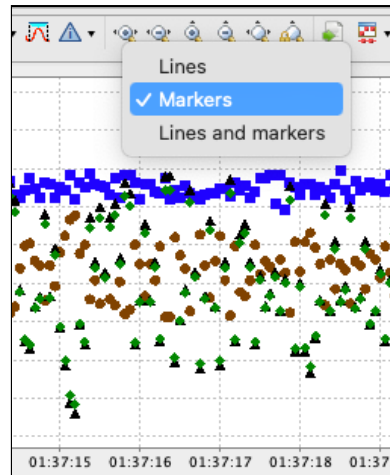
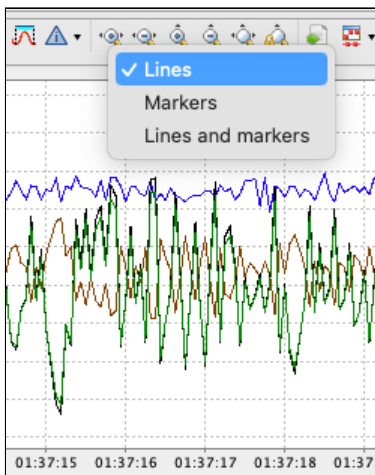
13.1.5 Export plot

Click the **Export plot** button  and select file name and location to save the current view of the main plot to a PDF or PNG file. The exported file will contain the graph only and retain all the changes to display active at the moment of export: zoom, lines and markers, visible events and annotations, and plotting by depth or time.




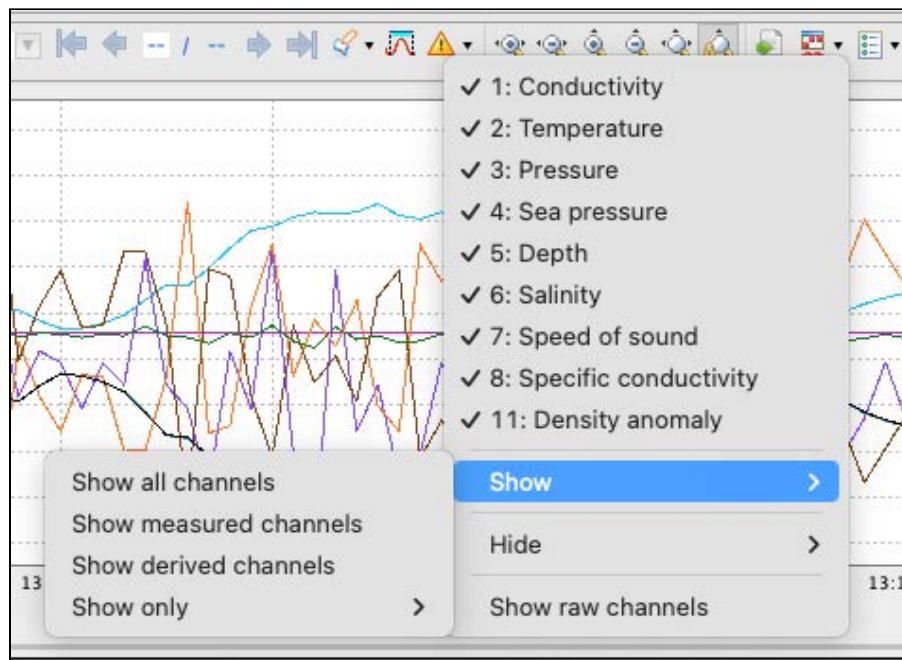
13.1.6 Appearance controls

Select your data rendering type from the **Change line type** dropdown menu : **Lines**, **Markers**, or **Lines and markers**.

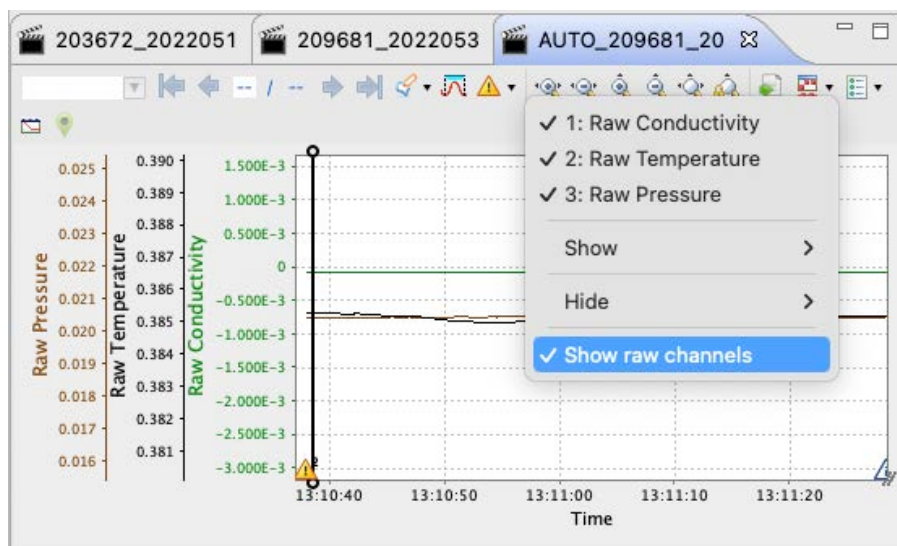


- ✓ If no data appears in the **Plot** view, try changing the rendering to **Markers**. Time spans that are larger than expected will cause breaks between data points and lines will not be drawn connecting those points, whereas markers draw at each individual point.

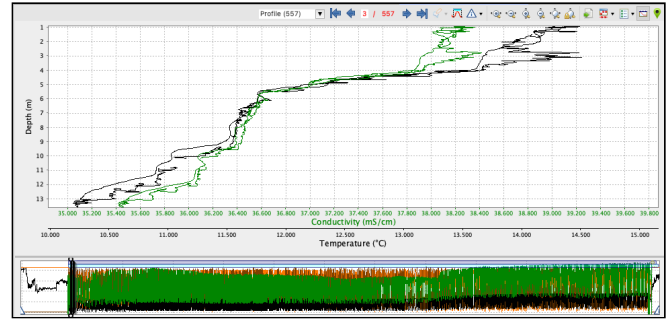
Use the **Toggle channel visibility** button  to open the dropdown menu with the list of available channels and options. Check and uncheck channels to display as desired, or select groups to show and hide.



Select **Show raw channels** to display measured data with no calibration equations applied.



By default, the data are plotted by time. Use the **Toggle depth plot**  button to switch to the plot-by-depth mode.



The thumbnail view will continue to display the plot-by-time data.

i If there is no depth channel, the plot will use the next pressure or pressure-derived channel starting from the bottom of the channel list.

13.1.7 GPS map



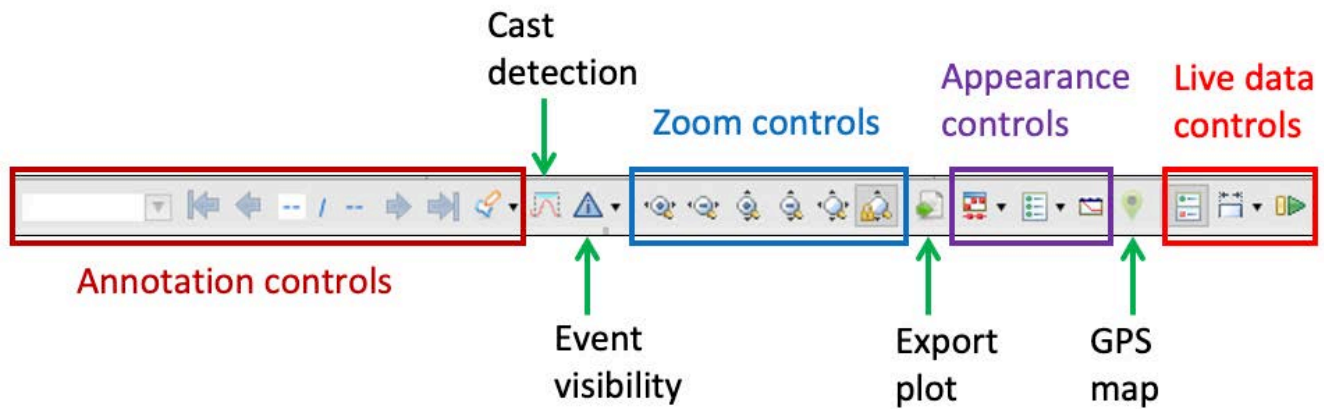
The **Show GPS map** button opens a pop-up window with the GPS map for the plot. Click on the map to display all the GPS location annotations recorded in the dataset.




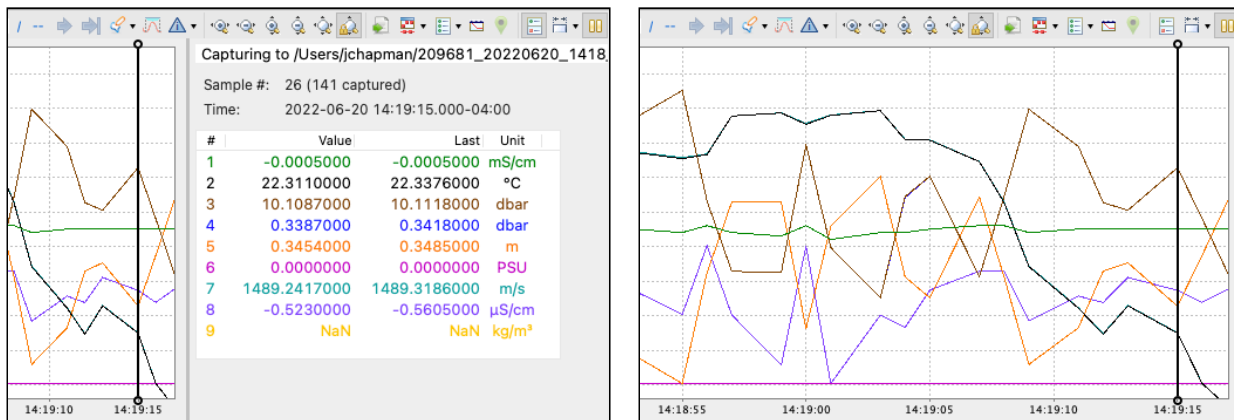
GPS mapping for **Desktop** RSK files relies on manually added location points (see [Annotation controls](#)). All location points you added using the **Annotations** feature are stored in the dataset file and can be displayed in Ruskin via the mapping functionality.

13.2 Live data plot toolbar

You can use the **Plot** window to view a live graphical display of your instrument sampling. All options described in the **Dataset plot toolbar** section apply to live data display. Additionally, three live data buttons appear at the right end of the toolbar: **Side data panel**, **Live plot time range**, and **Fetch**.

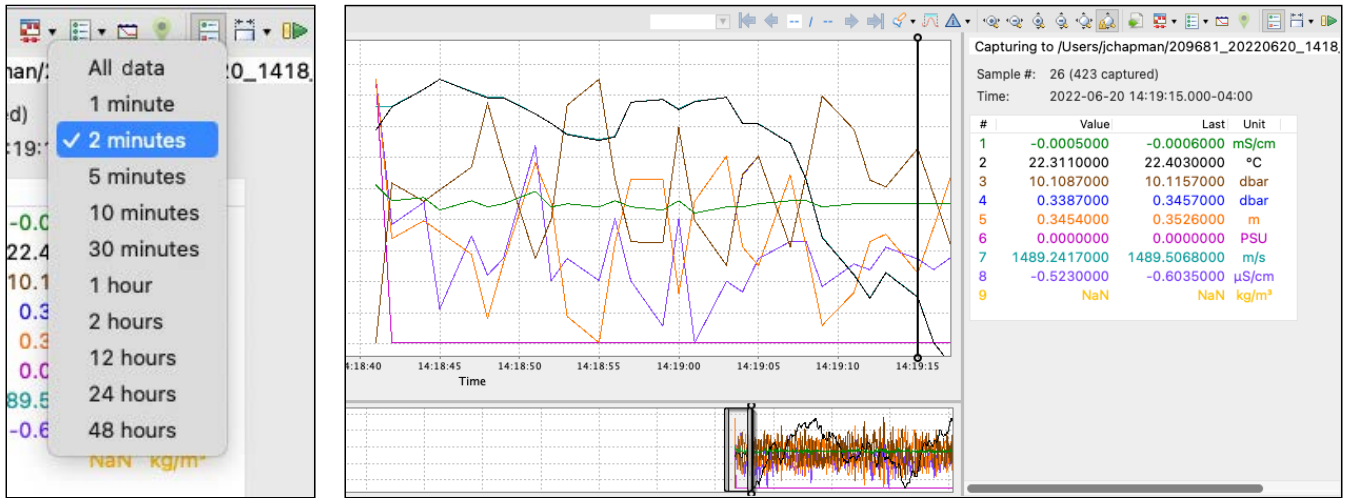


Click the **Side data panel** button  to toggle on and off the data panel to the right of the plot. It shows the file location that will be used to capture samples, the number of samples collected, the values of the last received sample, and the currently selected sample.



Click the **Live plot time range**  button to open a dropdown list of time span options.

For example, select **2 minutes** to display the data in the thumbnail view and on the side panel by two-minute time periods.






You can also choose to display all of the data collected.

Fetching

Live data can come from one of two sources: streaming or fetching.

Fetching is the action of asking the instrument to take a reading and report it.

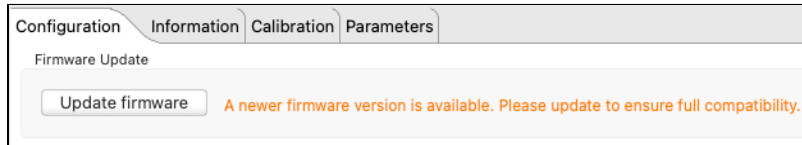
Click the **Fetch** button  to start fetching data. The button will change to **Pause** . Click the **Pause** button  to stop fetching.

14 Firmware updates

Ruskin automatically checks if your instrument firmware is up-to-date. Updates may be critical, routine, or customised.

14.1 Critical firmware updates

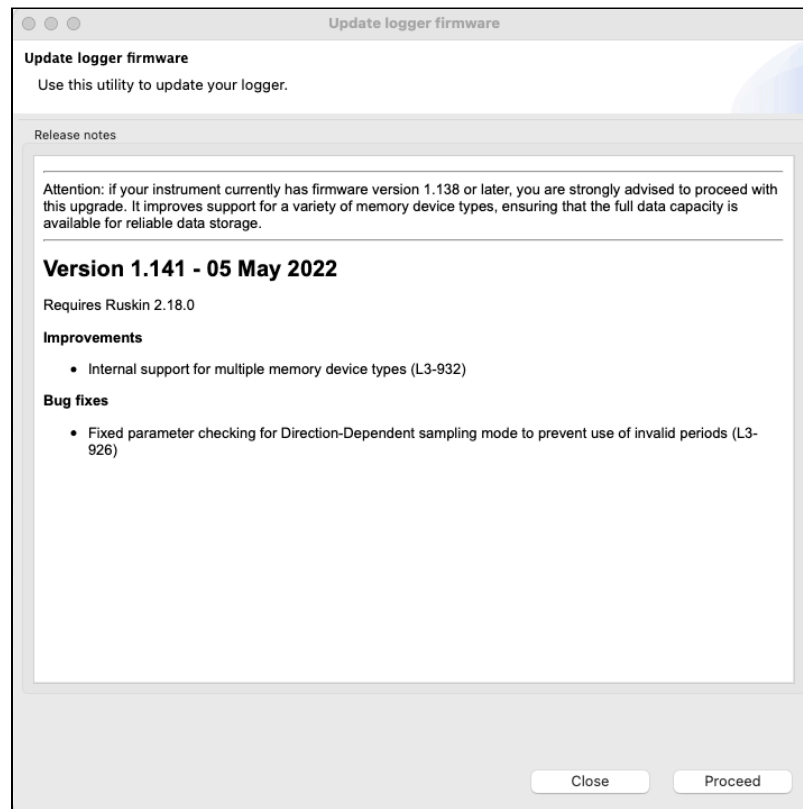
If a newer version is available and this update is critical, the **Update firmware** button and a warning message will appear at the top of the **Configuration** tab.



Steps

1. Click **Update firmware**.

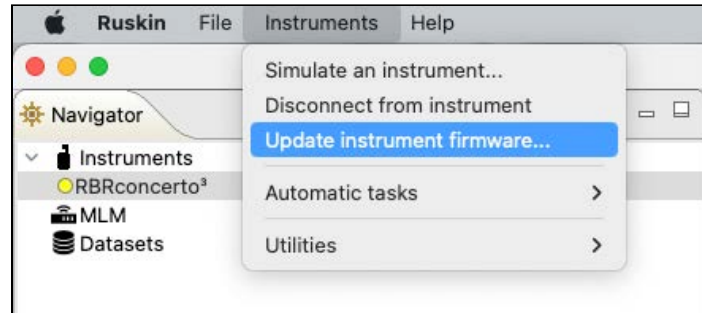
The **Update logger firmware** window will appear. It will contain **Release notes**, outlining the new version number, its release date, improvements, and bug fixes associated with this release, and two standard buttons at the bottom of the window: **Close** and **Proceed**.



2. Click **Proceed** to initialise the update.
The instrument will disappear from the **Navigator** window during the upgrade. Watch the progress bar at the bottom of the window for the status.

⚠ Do not disconnect the instrument until a confirmation message is displayed. Disconnecting during the update process may render the instrument inoperable.

If the upgrade does not complete successfully, go to the **Instruments** menu and launch the update dialogue.

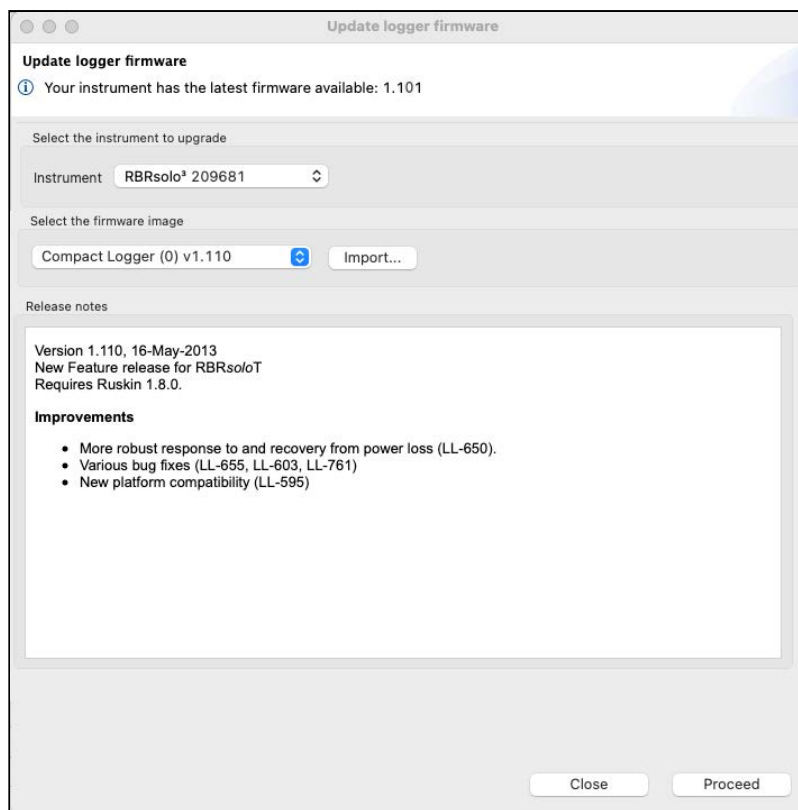


The **Update logger firmware** window will appear. Click **Proceed** again to retry.

If the instrument does not reappear in the **Navigator** window after a firmware update, disconnect your instrument from the USB port and then reconnect to establish communication.

14.2 Routine firmware updates

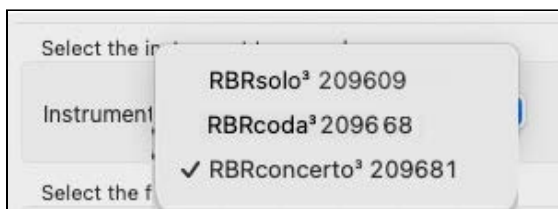
If the latest update is not critical, Ruskin will not display any warning message. However, you can always check manually if a newer firmware warning is available. Go to **Instruments > Update instrument firmware**. The **Update logger firmware** dialog box will appear.



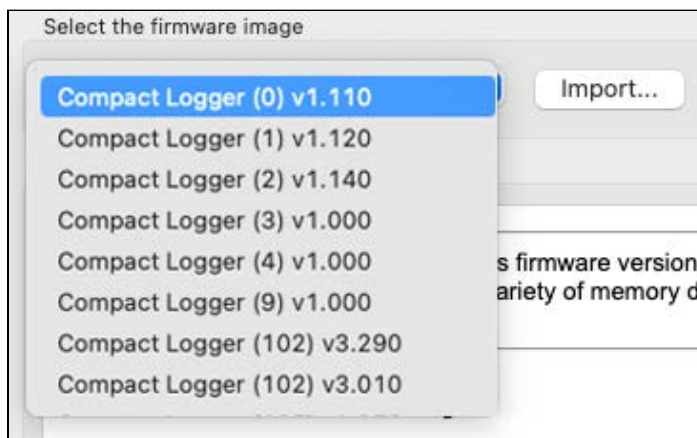
In addition to the new version number, its release date, improvements, and bug fixes, there will be two additional sections: **Select the instrument to update** and **Select the firmware image**.

Steps

1. From the **Instrument** dropdown, select the instrument you wish to upgrade.



2. From the next dropdown, select the latest firmware image.



3. Click **Proceed** to initialise the update.
The instrument will disappear from the **Navigator** window during the upgrade. Watch the progress bar at the bottom of the window for the status.

⚠ Do not disconnect the instrument until a confirmation message is displayed.
Disconnecting during the update process may render the instrument inoperable.

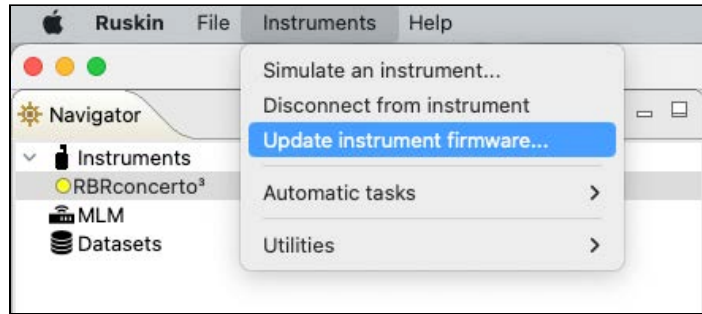
If the upgrade does not complete successfully, click **Proceed** again to retry.

If the instrument does not reappear in the **Navigator** window after a firmware update, disconnect your instrument from the USB port and then reconnect to re-establish communication.

14.3 Manual firmware updates

In certain cases, RBR may supply a customised firmware version, which will not be on the dropdown list.

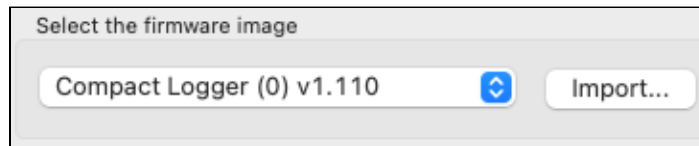
Go to the **Instruments** menu and launch the update dialogue.



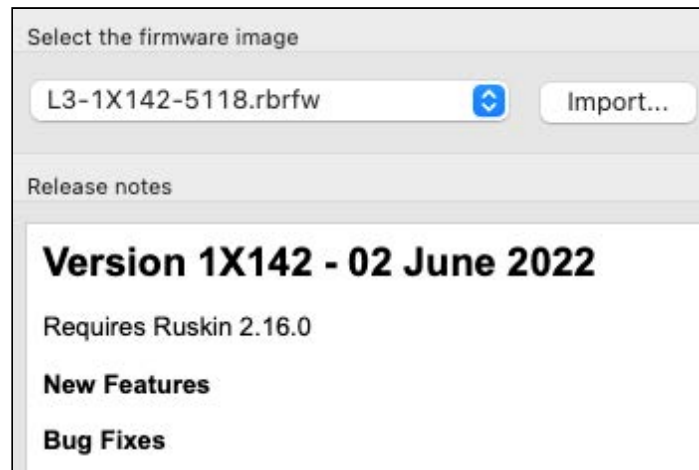
The **Update logger firmware** dialog box will appear. Follow the steps below to import the firmware image provided by RBR and update your firmware.

Steps

1. In the **Update logger firmware** dialog box, click **Import**.



2. Browse to the location of the firmware update file. The file will have the extension **.rbfw**.
3. Select the file and click **Open**.
The file will appear on the dropdown list.

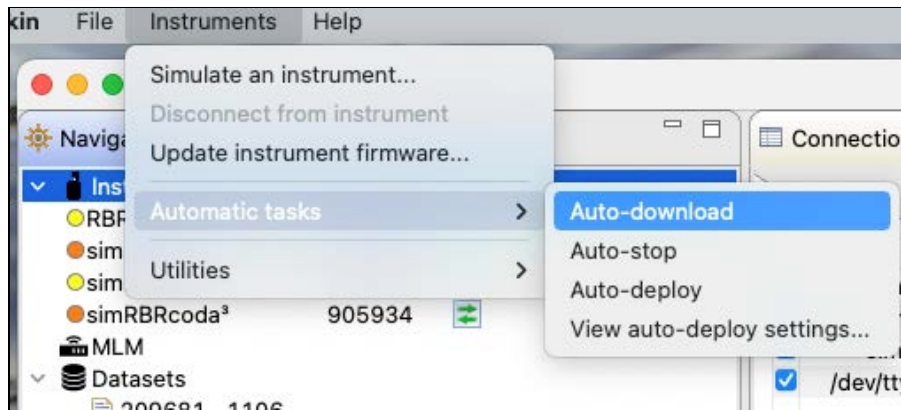


4. Click **Proceed** to initialise the update.
The instrument will disappear from the **Navigators** window during the upgrade. Watch the progress bar at the bottom of the window for the status.

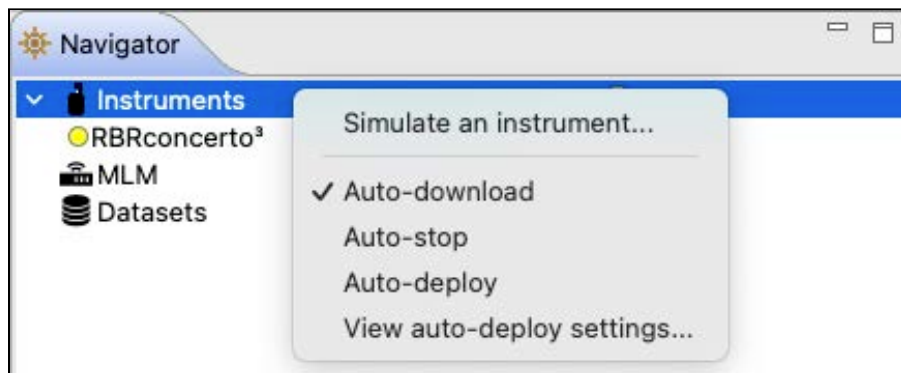
⚠ Do not disconnect the instrument until a confirmation message is displayed. Disconnecting during the update process may render the instrument inoperable.

15 Automatic tasks

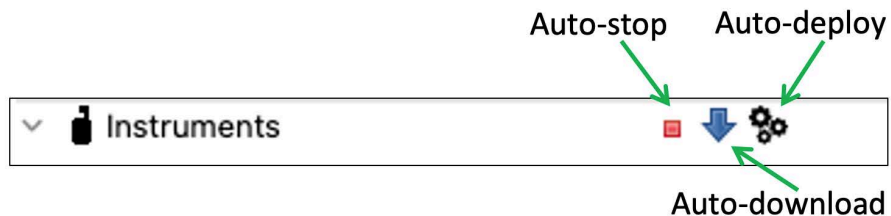
When working with a large number of similar instruments, Ruskin offers various automatic tasks. Access these options from the **Instruments** menu on the top toolbar.



Alternatively, right-click **Instruments** in the **Navigator** window.



When you enable a task, it will show a checkmark next to it, and the corresponding icon will be displayed in the **Navigator** window.




Since these tasks can change the state of your instrument, their settings default to "off" each time Ruskin is run.

Auto-download

When Ruskin detects an instrument, it will automatically start a download process. The downloaded dataset will be named following the [standard naming convention](#), and saved in the [default directory](#). Other than possibly creating unwanted files, this option is safe since it does not alter the state of the instrument.


Auto-stop

When Ruskin detects a previously enabled instrument, it will automatically stop the deployment. If auto-download is not selected, it will also display a warning about downloading the instrument data.

 All the data on the instrument will be erased as soon as you enable a new deployment. RBR recommends enabling the **Auto-download** feature whenever you enable **Auto-stop**.

Auto-deploy

When Ruskin detects an instrument, it will stop the deployment and then reprogram your instrument with the last known configuration settings. Use this feature when you have several instruments with the same capabilities.

 All the data on the instrument will be erased as soon as you enable a new deployment. RBR recommends enabling the **Auto-download** feature whenever you enable **Auto-deploy**.

To use this feature, follow these steps:

1. Connect to an instrument that will act as the model.
2. Configure this instrument with the desired settings.
3. Enable **Auto-deploy** as shown above.

Now, when you connect to an instrument with same capabilities as the model instrument, Ruskin will configure it to match the the model schedule.

 **Auto-deploy** implies **Auto-stop**.
Ruskin must stop your instrument to change deployment parameters, so it will stop even when there is no checkmark next to the **Auto-stop** task.

View auto-deploy settings

To view the currently active auto-deploy parameters, go to **Instruments > View auto-deploy settings...**

The **Auto-deploy settings** box will open, with saved parameters outlined.

Auto-deploy settings

Configuration of auto-deploy

Schedules

Clock sync: NONE
Start date: 2022-05-17 15:39:00
End date: 2099-12-30 19:00:00
Mode: CONTINUOUS
Sampling period: 2Hz

Parameters

Setting	Value
ALTITUDE	0.0000
ATMOSPHERE	9.7700000
AVERAGE_SPEED_OF_SOUND	1550.7440
CAST_DETECTION	on
CONDUCTIVITY	42.914
DENSITY	1.0000000
SIMPLIFIED_DEPTH_CALCULATION_TYPE	on
DISSOLVED_O2_GENERIC_UNIT	mg/L
DISSOLVED_O2_OPTODE_UNIT	uMol/L
DISSOLVED_O2_OXYGUARD_UNIT	mg/L
DISSOLVED_O2_RINKO_UNIT	mg/L

Requirements

FASTCONTINUOUS

Dismiss

16 User calibration

Factory calibration coefficients are calculated for each sensor, and the coefficients are stored on the instrument.

RBR calibration certificates contain calibration equations, coefficients, and residuals for each sensor. Hard copies are provided with each shipment. RBR can replace lost or misplaced calibration certificates upon request.

RBR recommends calibrating your instrument before any critical deployment, periodically once a year, or if you suspect the readings to be out of specifications.

Discuss your calibration requirements with RBR. In some cases, the instrument will need to be returned to RBR to have it checked and re-calibrated.

Please contact [RBR](#) for our current calibration fees.

View current calibration coefficients for your sensors under the [Calibration](#) tab in the **Properties** window.

Sensors such as the dissolved oxygen and turbidity can be field-calibrated. Update the calibration coefficients for these channels periodically. On occasion, you may need to manually enter new coefficients, although this is not recommended for factory-calibrated sensors (for example, T or D) unless instructed by RBR.

To calibrate a sensor, you need to let it sample in a known environment and then compare the result to the established value. The difference will be used to generate calibration coefficients. With the **N**-point method, the known environment is changed **N** times. The higher the **N**, the more accurate are calibration coefficients.

16.1 Dissolved oxygen sensor calibration

For dissolved oxygen sensors, RBR recommends user calibration using the **N**-point method, with **N** = 2, which will include a **zero reference point** and a **non-zero reference point**. It is, however, acceptable to perform a one-point calibration.

16.1.1 DO data collection

Follow the steps below to obtain the calibration dataset for your dissolved oxygen sensor.

Equipment and materials

- A wide-mouth, black-walled container with a cover
- A small container or beaker
- Air pump (for example, an aquarium air pump with a stone bubbler)
- Magnetic stirrer
- Sodium sulphite Na_2SO_3
- Distilled water

Ruskin configuration

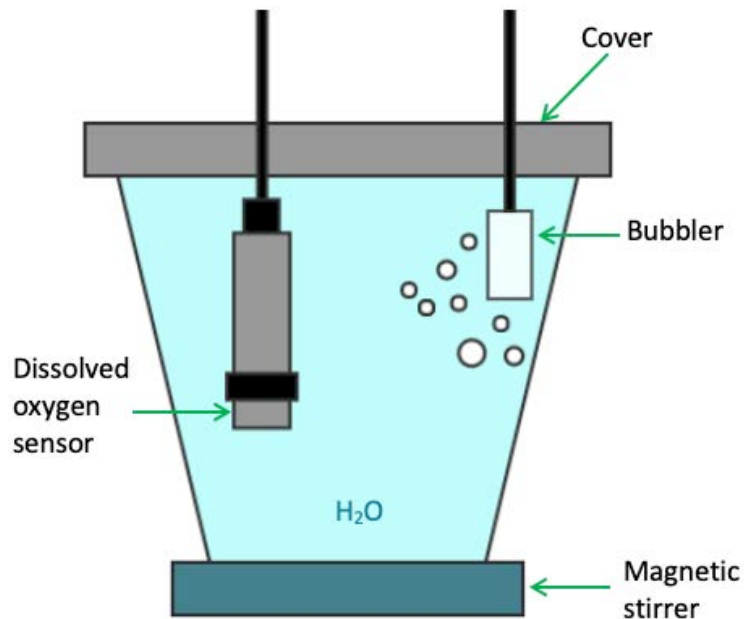
1. Go to [Configuration](#).
2. Select **UTC** or **Local**, depending on your preferences, to synchronise the instrument clock with your computer.
3. Set the sampling rate at 1s (1Hz).
4. Enable your schedule.



The instrument must be logging throughout the calibration procedure.

Non-zero reference point

1. Fill the black-walled container with distilled water.
2. Install the magnetic stirrer.
3. Install the air pump.
4. Switch on both the air pump and the magnetic stirrer.
5. Leave them on overnight, or for at least 3-4 hours, to achieve saturation.
6. Submerge the dissolved oxygen sensor in the solution, going in at an angle and stirring to avoid bubble buildup on the sensor window.
Leave some space between the sensor and the beaker walls.
7. Position the sensor near the stirrer but not directly in the bubbles.
The bubbler should be shallower than the sensor.

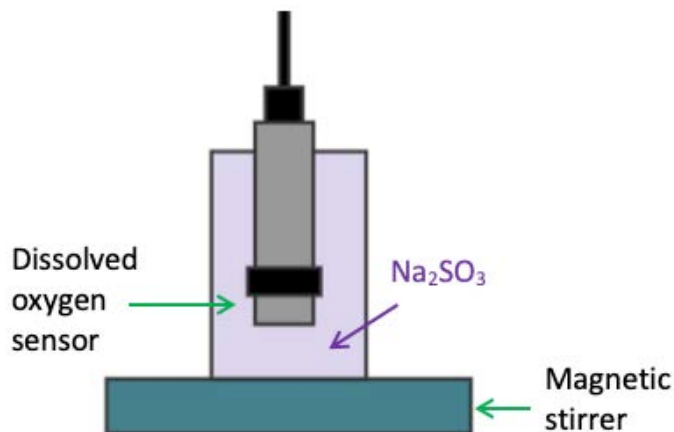


8. Record the data for at least 30 minutes.
This is the 100% oxygen concentration calibration point.


Zero reference point

⚠ Omit this step when performing the one-point calibration.
If you calibrate your dissolved oxygen sensor using the one-point calibration method at 100% oxygen concentration only, calibration should be performed at the expected temperature and salinity of the deployment environment.

1. In a small container or beaker, prepare a 0.1% solution of sodium sulphite (0.25g of Na_2SO_3 for 250mL tap water).
2. Mix the solution thoroughly with a magnetic stirrer. The solution will be oxygen-free after 15 minutes.
3. Submerge the dissolved oxygen sensor in the solution, going in at an angle and stirring to avoid bubble buildup on the sensor window.
Leave some space between the sensor and the beaker walls.



4. Record the data for at least 30 minutes.
This is the 0% oxygen concentration calibration point.

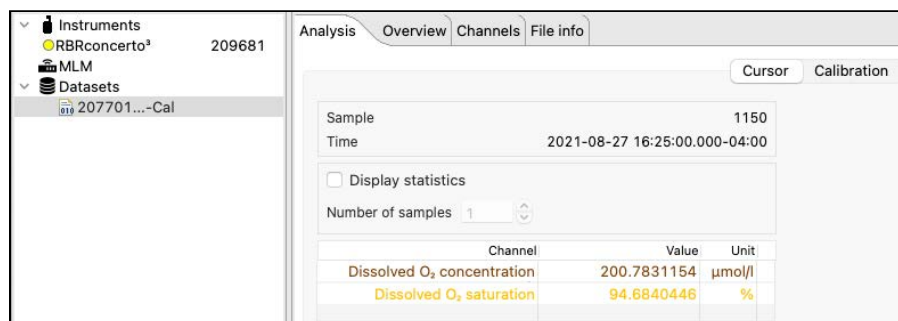
 This Na_2SO_3 solution has a limited lifespan and should not be used for more than a day.

16.1.2 DO calibration in Analysis tab

For DO sensors, RBR recommends a two-point user calibration, which includes a **zero reference point** and a **non-zero reference point**. It is, however, acceptable to use a one-point calibration.

Two-point calibration steps on Ruskin

1. Stop the deployment.
2. Download the dataset.
3. Open the dataset on Ruskin. The **Properties** windows will change to dataset properties, with the **Analysis** tab displayed.



4. Click **Calibration**.
5. Select **Dissolved O₂ saturation** from the dropdown list.
By default, the **Number of samples** is set to **100**, which means Ruskin will average the calibration coefficients over a hundred sample points. Typically, this value should be in the range from 50 to 100 samples.
The **Raw channel** box is unchecked, and thus the true DO values will be displayed in the plot below. To see the raw voltage values, check this box.

Analysis Overview Channels File info

Cursor Calibration

Dissolved O₂ saturation ☐ Raw channel ☐ 1 point Calibration

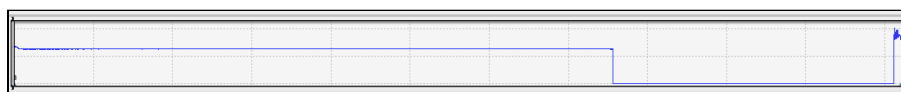
Number of samples 100 linear

Current coefficients

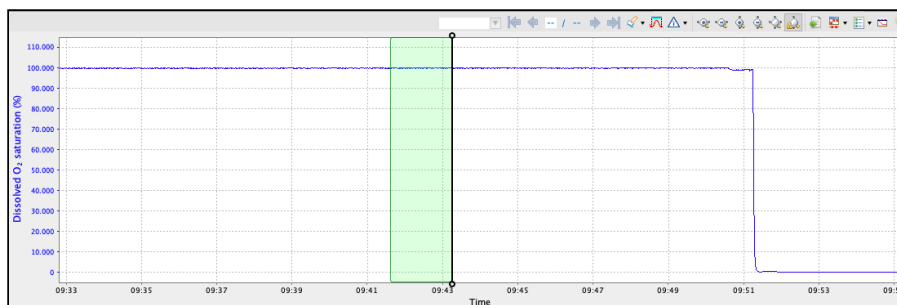
564.000000 E-3 1.0721800

	Avg	Std	Real Avg	Residual
<input type="checkbox"/>				
<input type="checkbox"/>				

A downsampled representation of the dataset will appear in the thumbnail view, with two distinct plateaus corresponding to 100% and 0%. Irregular readings in-between mark the times when you changed from distilled water to sodium sulphite solution and reassembled the setup.



- Click on a stable point in the **Plot** view corresponding to 100% oxygen.



The interval of 100 samples will be highlighted. The average value (**Avg**) and standard error (**Std**) for this interval will appear in the table above.

- Under **Real Avg** in the first row, enter **100**.

Analysis Overview Channels File info

Cursor Calibration

Dissolved O₂ saturation ☐ Raw channel ☐ 1 point Calibration

Number of samples 100 linear

Current coefficients

-2.4827037 1.0752212

	Avg	Std	Real Avg	Residual
✓	99.746015	0.0525042	100.000000	
<input type="checkbox"/>				

8. Repeat the same steps for the second plateau, entering **0** under **Real Avg**.
9. Ruskin automatically calculates the calibration coefficients, and the values appear in **Calculated coefficients**.

Analysis Overview Channels File info

Cursor Calibration

Dissolved O₂ saturation ☐ Raw channel ☐ 1 point Calibration

Number of samples 100 linear

Current coefficients

-2.4827037 1.0752212


	Avg	Std	Real Avg	Residual
<input checked="" type="checkbox"/>	99.746015	0.0525042	100.000000	-98.7840262
<input checked="" type="checkbox"/>	0.142015	0.0219689	0.000000	3.2184301
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				

New calibration coefficients have been calculated


Calculated coefficients

-2.6351535 1.0794960


10. Click **Copy** to save the new calibration coefficients to the clipboard, or write them down.
11. In the **Navigator** view, find your instrument.
12. Click **Calibration** and select **Dissolved O₂ saturation** from the dropdown list.
13. Click **C0** to select the entry field and type in the new value (in this example, **-2.6351535**).
14. Click **C1** to select the entry field and type in the new value (in this example, **1.0794960**).
15. Click **Store calibration** to save the new coefficients.

 Always click **Store calibration** to save new coefficients on the instrument. Otherwise, all changes will be lost once your session is closed.

One-point calibration steps on Ruskin

 If you calibrate your dissolved oxygen sensor using the single-point calibration method at 100% oxygen concentration only, calibration should be performed at the expected temperature and salinity of the deployment environment.

1. Stop the deployment.
2. Download the dataset.
3. Open the dataset on Ruskin. The **Properties** windows will change to dataset properties, with the **Analysis** tab displayed.
4. Click **Calibration**.
5. Select **Dissolved O₂ saturation** from the dropdown list.
6. Check the **1 point calibration** box.
7. Click on a stable point in the **Plot** view corresponding to 100% oxygen.
The interval of 100 samples will be highlighted. The average value (**Avg**) and standard error (**Std**) for this interval will appear in the table above.
8. Click the **RealAvg** column and select **100** from the dropdown.
9. Click **Copy** to save the new calibration coefficients to the clipboard, or write them down.
10. In the **Navigator** view, find your instrument.
11. Click **Calibration** and select **Dissolved O₂ saturation** from the dropdown list.
12. Click **C0** to select the entry field and type in the new value.
13. Click **C1** to select the entry field and type in the new value.
14. Click **Store calibration** to save the new coefficients.


 Always click **Store calibration** to save new coefficients on the instrument. Otherwise, all changes will be lost once your session is closed.

16.2 Turbidity sensor calibration

RBR compact instruments support turbidity sensors from Seapoint®.

RBR factory-calibrates the turbidity sensors using the **N**-point method, with **N** = 7. For user calibration, we recommend using the two-point method (**N** = 2) under fluorescent lighting, which will include a **zero reference point** and a **non-zero reference point**.

Alternatively, you can perform a one-point calibration using a single **zero reference point** in distilled water. Calibration will only correct the coefficients for an offset.

 When performing the one-point method, use only a zero reference point. With a single **non-zero reference point**, calibration will recompute the slope coefficient. Go this route only if you are confident in your non-zero standard.

16.2.1 Tu data collection


Follow the steps below to obtain the calibration dataset for your Tu sensor.

Equipment and materials

- A wide-mouth, black-walled container (large enough to hold the instrument)
- Secure black lid for the container with an orifice for the instrument
- Small black lid or any light-blocking material to cover the orifice during calibration
- 400FTU Formazin standard
- Distilled water
- Large magnetic stirrer
- Rubbing alcohol
- Soft cloth


Ruskin configuration

1. Go to [Configuration](#).
2. Use **Local** on Ruskin to synchronise the instrument clock with your computer.
3. Set the sampling rate to 1s (1Hz).
4. Under **Ranging sensors**, set **Range** to **Auto**.
5. Enable your schedule.

 The instrument must be logging throughout the calibration procedure.

Sensor preparation


1. Wash the sensor and container with distilled water and dry them with a soft cloth.
2. Check the turbidity window for stains and scratches.

 Do not proceed with calibration if there are serious scratches.

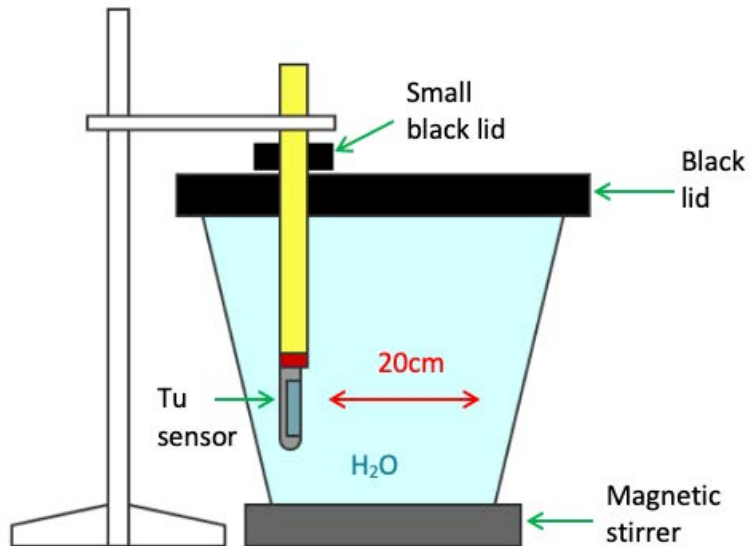
3. Wipe the turbidity window with alcohol to remove all stains.

Zero reference point

1. Fill the black-walled container with distilled water.
2. Turn on the magnetic stirrer and adjust the RPM to ensure no vortex appears.
3. Place the black lid on the container and avoid direct light on the container.
4. Submerge the sensor through the orifice in the lid, vertically along the wall, with the turbidity window facing the larger water volume.

 The distance from the turbidity window to the container wall must be at least 20 cm.

5. Cover the orifice with the smaller black lid or light-blocking material, like a thick plastic bag.



6. Record the data in distilled water for at least 15min, up to an hour.
This is the zero-turbidity calibration point.

Non-zero reference point

Repeat the steps for the **zero reference point**, replacing distilled water with 400FTU Formazin standard.

This is the 400NTU calibration point.

As each reference point takes 15 minutes to an hour, the entire procedure may take up to two hours.

After completing the procedure for both reference points (or for a single reference point, if using the one-point method), proceed to calibration on Ruskin.

16.2.2 Tu calibration in Analysis tab

For turbidity calibration, we recommend using the two-point method, which includes a **zero reference point** and a **non-zero reference point**.

Alternatively, you can perform a one-point calibration using a single **zero reference point**.

Two-point calibration steps on Ruskin

1. Stop the deployment.
2. Download the dataset.
3. Open the dataset on Ruskin. The **Properties** windows will change to dataset properties, with the **Analysis** tab displayed.

Analysis Overview Channels File info

Cursor Calibration

Sample 1401 - 1500
Time 2022-05-27 15:46:47.000Z - 2022-05-27 15:51:44.000Z

☒ Display statistics

Number of samples 100

Channel	Value	Avg	Std	Unit
Temperature	21.6900802	21.6917967	0.0006431	°C
Turbidity	327.2716984	328.4828327	0.7709818	NTU

4. Click **Calibration**.

5. Select **Turbidity** from the dropdown list.

By default, the **Number of samples** is set to **100**, which means Ruskin will average the calibration coefficients over a hundred sample points. Typically, this value should be in the range from 50 to 100 samples.

The **Raw channel** box is unchecked, and thus the true turbidity values will be displayed in the plot below. To see the raw voltage values, check this box.

Analysis Overview Channels File info

Cursor Calibration

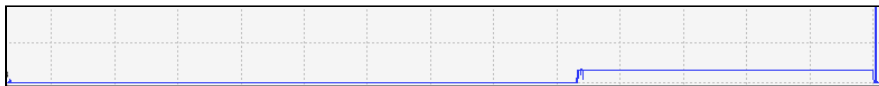
Turbidity ☒ Raw channel ☐ 1 point Calibration

Number of samples 100 linear

Current coefficients
3.0639380 E3 -4.1818820 E3

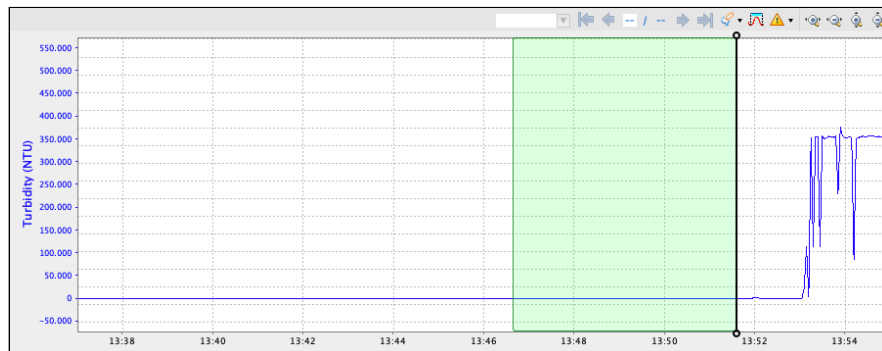
	Avg	Std	Real Avg	Residual

A downsampled representation of the dataset will appear in the thumbnail view, with two distinct plateaus corresponding to 0NTU and 400NTU. Irregular readings in-between mark the times when you changed from water to formazin and reassembled the setup.



6. Check the box next to the first row in the calibration table.

7. Click on a stable point in the **Plot** view corresponding to zero NTU.



The interval of 100 samples will be highlighted. The average value (**Avg**) and standard error (**Std**) for this interval will appear in the table above.

- Under **Real Avg** in the first row, enter **0** and press enter.

Analysis Overview Channels File info

Turbidity ☐ Raw channel ☐ 1 point Calibration

Number of samples 100 linear

Current coefficients

3.0639380 E3 -4.1818820 E3

	Avg	Std	Real Avg	Residual
<input checked="" type="checkbox"/>	0.005194	0.0091773	0.000000	

Repeat the same steps for the second plateau, entering **400** under **Real Avg**.

- Ruskin automatically calculates the calibration coefficients, and the values appear in **Calculated coefficients**.

Analysis Overview Channels File info

Turbidity ☐ Raw channel ☐ 1 point Calibration

Number of samples 100 linear

Current coefficients

3.0639380 E3 -4.1818820 E3

	Avg	Std	Real Avg	Residual
<input checked="" type="checkbox"/>	0.002736	0.0021226	0.000000	0.0000000
<input checked="" type="checkbox"/>	350.899191	1.1599181	400.000000	0.0000000
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				

New calibration coefficients have been calculated

Calculated coefficients

3.4926945 E3 -4.7670838 E3

When a two-point calibration is performed correctly, residuals will be 0.

- Click **Copy** to save the new calibration coefficients to the clipboard, or write them down.
- In the **Navigator** view, find your instrument.
- Click **Calibration** and select **Turbidity** from the dropdown list.
- Click **C0** to select the entry field and type in the new value (in this example, **3492.6945**).
- Click **C1** to select the entry field and type in the new value (in this example, **-4767.0838**).
- Click **Store calibration** to save the new coefficients.

Always click **Store calibration** to save new coefficients on the instrument. Otherwise, all changes will be lost once your session is closed.

One-point calibration steps on Ruskin

1. Stop the deployment.
2. Download the dataset.
3. Open the dataset on Ruskin. The **Properties** windows will change to dataset properties, with the **Analysis** tab displayed.
4. Click **Calibration**.
5. Select **Turbidity** from the dropdown list.
6. Check the **1 point calibration** box.
7. Click on a stable point in the **Plot** view corresponding to 0NSU.
The interval of 100 samples will be highlighted. The average value (**Avg**) and standard error (**Std**) for this interval will appear in the table above.
8. Click the **RealAvg** column and select **0** from the dropdown.

Analysis Overview Channels File info

Cursor Calibration

Turbidity ☐ Raw channel ☒ 1 point Calibration

Number of samples 100 linear

Current coefficients

3.2494240 E3 -4.4350240 E3

	Avg	Std	Real Avg	Residual
<input checked="" type="checkbox"/>	1.148650	0.0147817	0	0.0000000
<input type="checkbox"/>			100	
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				

New calibration coefficients have been calculated

Calculated coefficients

3.2860202 E3 -4.4865589 E3 Copy

9. Click **Copy** to save the new calibration coefficients to the clipboard, or write them down.
10. In the **Navigator** view, find your instrument.
11. Click **Calibration** and select **Turbidity** from the dropdown list.
12. Click **C0** to select the entry field and type in the new value.
13. Click **C1** to select the entry field and type in the new value.
14. Click **Store calibration** to save the new coefficients.

! Always click **Store calibration** to save new coefficients on the instrument. Otherwise, all changes will be lost once your session is closed.

17 Revision history

Revision No.	Release Date	Notes
1.0 - H	2011-2020	Various
J	31-August-2022	Restructured the user guide to reflect Ruskin interface, added a dedicated page for RSK files, edited existing instructions for clarity, removed outdated sections and screenshots
K	31-December-2022	Added a section on the Search option under Support (for Mac users). Updated the RSK files and File info sections to reflect new file structure labels. Enhanced Plot window instructions. Updated the Power section. Corrected typos in the User calibration section.

