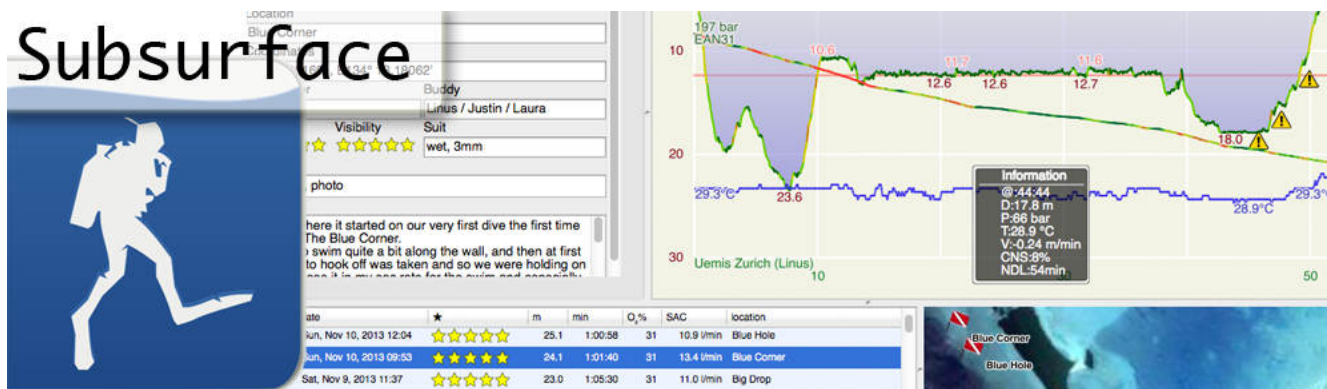


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## USER MANUAL

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*Version 4.7, October 2017*

Welcome as a user of *Subsurface*, an advanced dive logging program with extensive infrastructure to describe, organize, interpret and print scuba and free dives. *Subsurface* offers many advantages over other similar software solutions:

- Do you need a flexible way of logging dives using recreational equipment, even without a dive computer?
- Do you wish to seamlessly include GPS locations of dive sites into your dive log?
- Do you use two different dive computer brands, each with its own proprietary software for downloading dive logs? Do you dive with rebreathers as well as open circuit or recreational equipment? Do you use a Reefnet Sensus time-depth recorder along with a dive computer? *Subsurface* offers a standard interface for downloading dive logs from all of these different pieces of equipment, storing and analyzing the dive logs within a unified system.
- Do you use more than one operating system? *Subsurface* is fully compatible with Mac, Linux and Windows, letting you access your dive log on a range of operating systems using a single application.
- Do you use Linux or Mac, but your dive computer has only Windows-based software for downloading dive information (e.g. Mares or Scubapro)? *Subsurface* provides a way of downloading and analyzing your dive logs on other operating systems.
- Do you need an intuitive graphical dive planner that integrates with, and takes into account, dives you've already logged?
- Do you need a way of storing or backing up your dive log on the Internet, letting you view your dive log from anywhere using an Internet browser?
- Do you wish to access or modify your dive log using a mobile phone?

*Subsurface* binaries are available for Windows PCs (Win 7 or later from version 4.6 of *Subsurface* onwards), Intel based Macs (OS/X) and many Linux distributions. *Subsurface* can be built for many more hardware platforms and software environments where Qt and libdivecomputer are available.

This manual explains how to use the *Subsurface* program. To install the software, consult the

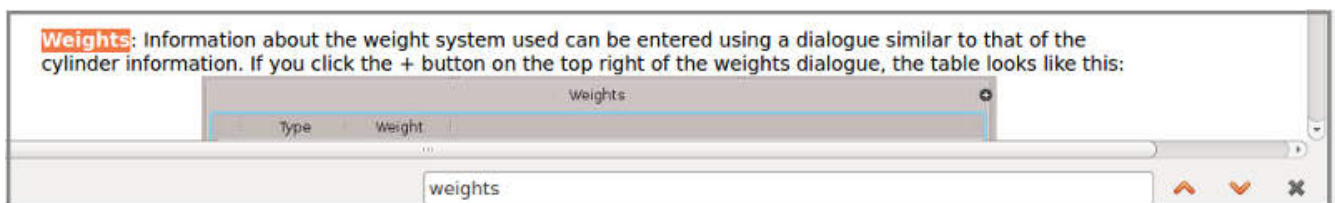
Downloads page on the [Subsurface web site](#). Please discuss issues with this program by sending an email to [our mailing list](#) and report bugs at [our bugtracker](#). For instructions on how to build the software and (if needed) its dependencies please consult the INSTALL file included with the source code.

**Audience:** Recreational Scuba Divers, Free Divers, Tec Divers, Professional Divers

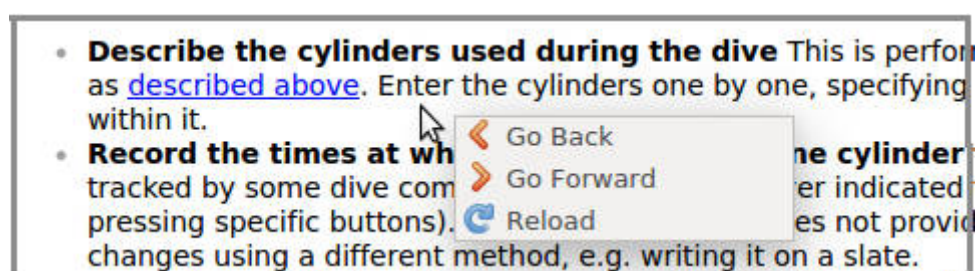
# 1. Using this manual

When opened from within *Subsurface*, this manual does not have external controls for paging or selecting previous pages. However, two facilities are provided:

- The *SEARCH* function is activated by pressing control-F or command-F on the keyboard. A text box appears at the bottom right-hand of the window (see image below). For instance, typing the word "weights" into the search text box, searches throughout the user manual. To the right of the search text box are two arrows pointing up and down. These find the previous and the next occurrence of the search term.



- *PREVIOUS/NEXT LINK*. Move between links (underlined words that jump to specific sections in the user manual) by right-clicking on the text of the manual. This brings up a context menu to PREVIOUS links selected. (see image below). For instance if a link has been selected, then the option to *Go Back* shows the text at the previous link selected (similar to the Previous Page button in a browser). Conversely the *Go Forward* option jumps to the text seen before selecting the *Go Back* option. The *Reload* option reloads the complete user manual into the window.



# 2. The user survey

In order to develop *Subsurface* to serve its users in the best possible way, it's important to have user information. Upon launching *Subsurface* and using the software for a week or so, a one-box user survey pops up. It is entirely optional and the user controls what, if any, data are sent to the *Subsurface* development team. All data the user sends is useful, and will only be used to steer future development and to customize the software to fit the needs of the *Subsurface* users. If you complete the survey, or click the option not to be asked again, that should be the last communication of this type you receive. However, if your diving and/or subsurface habits change and you wish to fill in

another survey, just launch *Subsurface* with the `--survey` option on the command line.

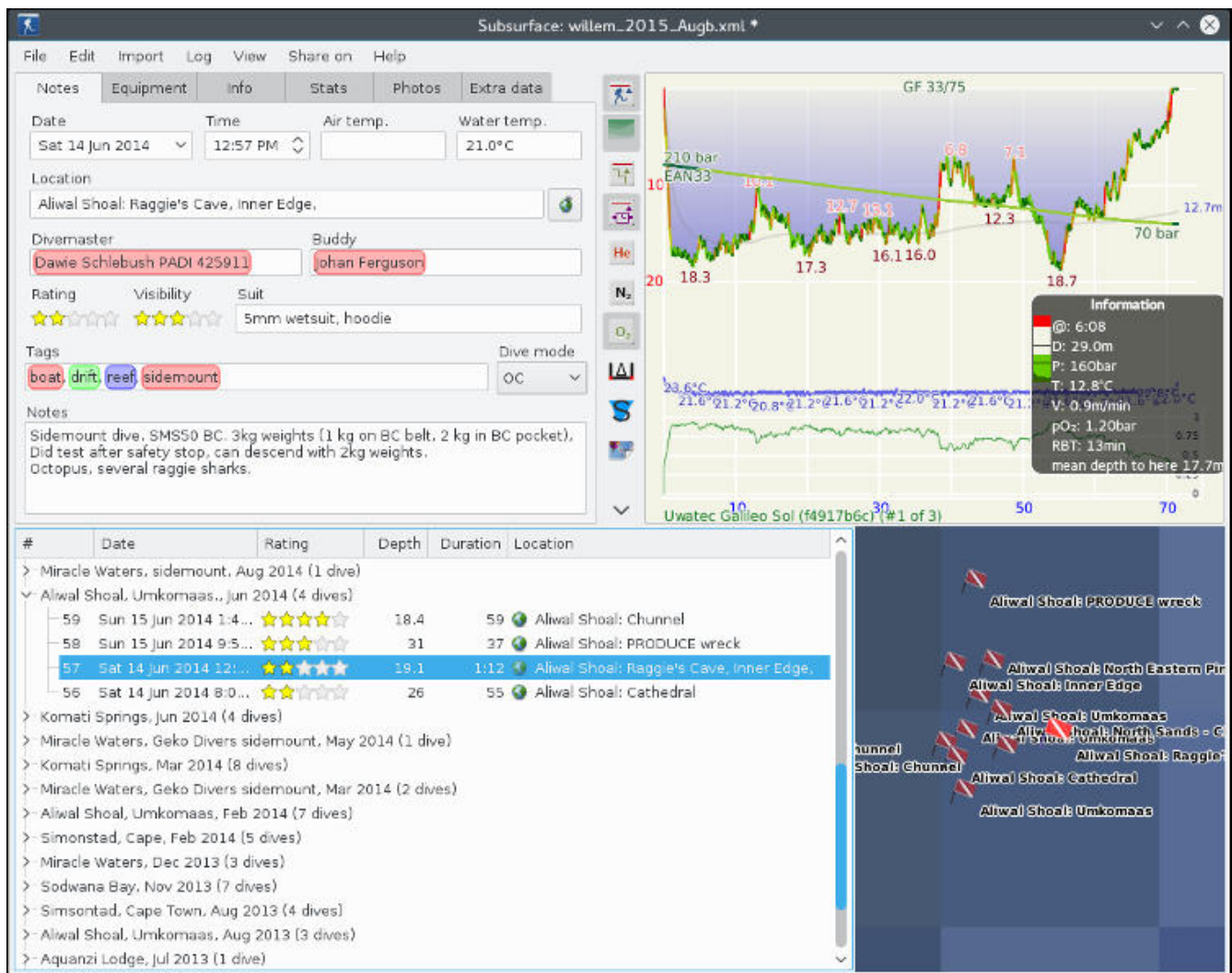
## 3. Start Using the Program

The *Subsurface* window is usually divided into four panels with a **Main Menu** (File Edit Import Log View Share Help) at the top of the window (for Windows and Linux) or the top of the screen (for Mac and Ubuntu Unity). The four panels are:

1. The **Dive List** on the bottom left, showing all the dives in the user's dive log. A dive can be selected and highlighted on the dive list by clicking on it. In most situations the up/down keys can be used to switch between dives. The **Dive List** is an important tool for manipulating a dive log.
2. The **Dive Map** on the bottom right, showing the user's dive sites on a world map and centered on the site of the last dive selected in the **Dive List**. The map scale can be increased or decreased.
3. The **Info** on the top left, giving more detailed information on the dive selected in the **Dive List**, including some statistics for the selected dive or for all highlighted dive(s).
4. The **Dive Profile** on the top right, showing a graphical dive profile of the selected dive in the **Dive List**. You can zoom into the dive profile for a more detailed view.

The dividers between panels can be dragged to change the size of any of the panels. *Subsurface* remembers the position of the dividers, so the next time *Subsurface* starts it uses the positions of the dividers from the last time the program was used.

If a single dive is selected in the **Dive List**, the dive location, detailed information and profile of the *selected dive* are shown in the respective panels. If several dives are selected, the last highlighted dive is the *selected dive*, but summary data of all *highlighted dives* is shown in the **Stats** tab of the **Info** panel (maximum, minimum and average depths, durations, water temperatures and SAC; total time and number of dives selected).



The user decides which of the four panels are displayed by selecting the **View** option on the main menu. This feature has several choices of display:

**All:** show all four of the panels as in the screenshot above.

**Divelist:** Show only the Dive List.

**Profile:** Show only the Dive Profile of the selected dive.

**Info:** Show only the Notes about the last selected dive and statistics for all highlighted dives.

**Globe:** Show only the world map, centered on the last selected dive.

Like other functions that can be accessed via the Main Menu, these options can also be triggered using keyboard shortcuts. The shortcuts are shown with an underline in the main menu entries, with the Alt-key pressed, or are denoted after the menu item.

When the program is started for the first time, it shows no information at all, because it does not have any dive information available. In the following sections, the procedures to create a new logbook will be explained.

## 4. Creating a new logbook

Select *File* → *New Logbook* from the main menu. All existing dive data are cleared so new information can be added. If there are unsaved data in an open logbook, the user is asked whether the open logbook should be saved before a new logbook is created.

## 5. Storing dive information in the logbook

Now that a new logbook is created, it is simple to add dive data it. *Subsurface* allows several ways of adding dive data to a logbook.

1) If the user has a handwritten divelog, a spreadsheet or another form of manually maintained divelog, dive data can be added to the logbook using one of these approaches:

- Enter dive information by hand. This is useful if the diver didn't use a dive computer and dives were recorded in a written logbook. See: [Entering dive information by hand](#)
- Import dive log information that has been maintained either as a spreadsheet or as a CSV file. Refer to: [APPENDIX D: Exporting a spreadsheet to CSV format](#) and to [Importing dives in CSV format](#).

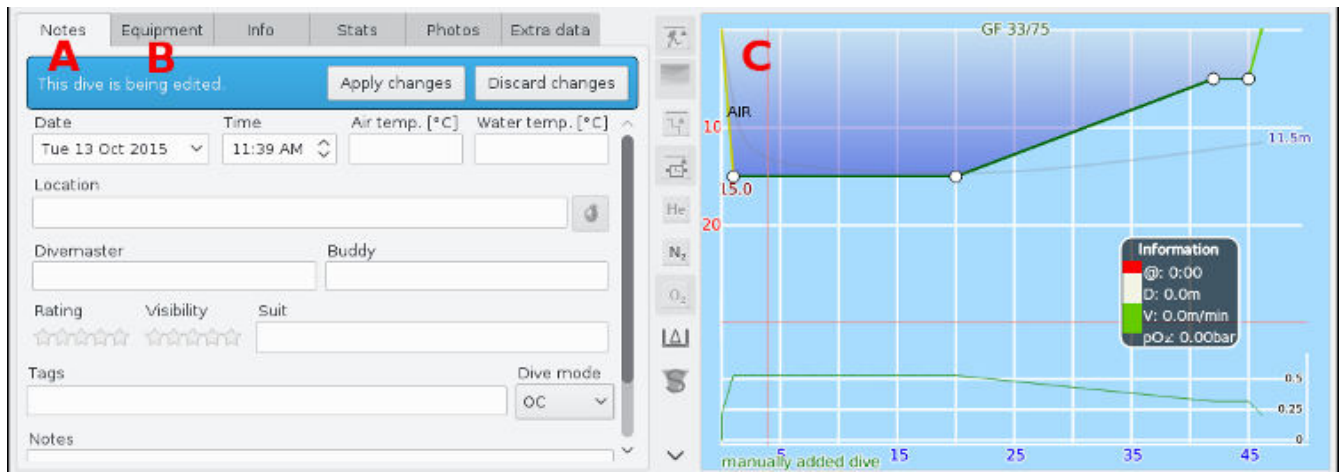
2) If a dive is recorded using a dive computer, the depth profile and a large amount of additional information can be accessed. These dives can be imported from:

- The dive computer itself. See: [Importing new dive information from a Dive Computer](#);
- Proprietary software distributed by manufacturers of dive computers. Refer to: [Importing dive information from other digital data sources or other data formats](#).
- Spreadsheet or CSV files containing dive profiles. See: [Importing dives in CSV format from dive computers or other dive log software](#)

### 5.1. Entering dive information by hand

This is usually the approach for dives without a dive computer. The basic record of information within *Subsurface* is a dive. The most important information in a simple dive logbook usually includes dive type, date, time, duration, depth, the names of your dive buddy and the divemaster or dive guide, and some remarks about the dive. *Subsurface* can store much more information for each dive. To add a dive to a dive log, select *Log* → *Add Dive* from the Main Menu. The program then shows three panels on which to enter information for a dive: two tabs in the **Info** panel (**Notes** and **Equipment**), as well as the **Dive Profile** panel that displays a graphical profile of each dive. These panels are respectively marked A, B and C in the figure below. Each of these tabs will now be explained for data entry.





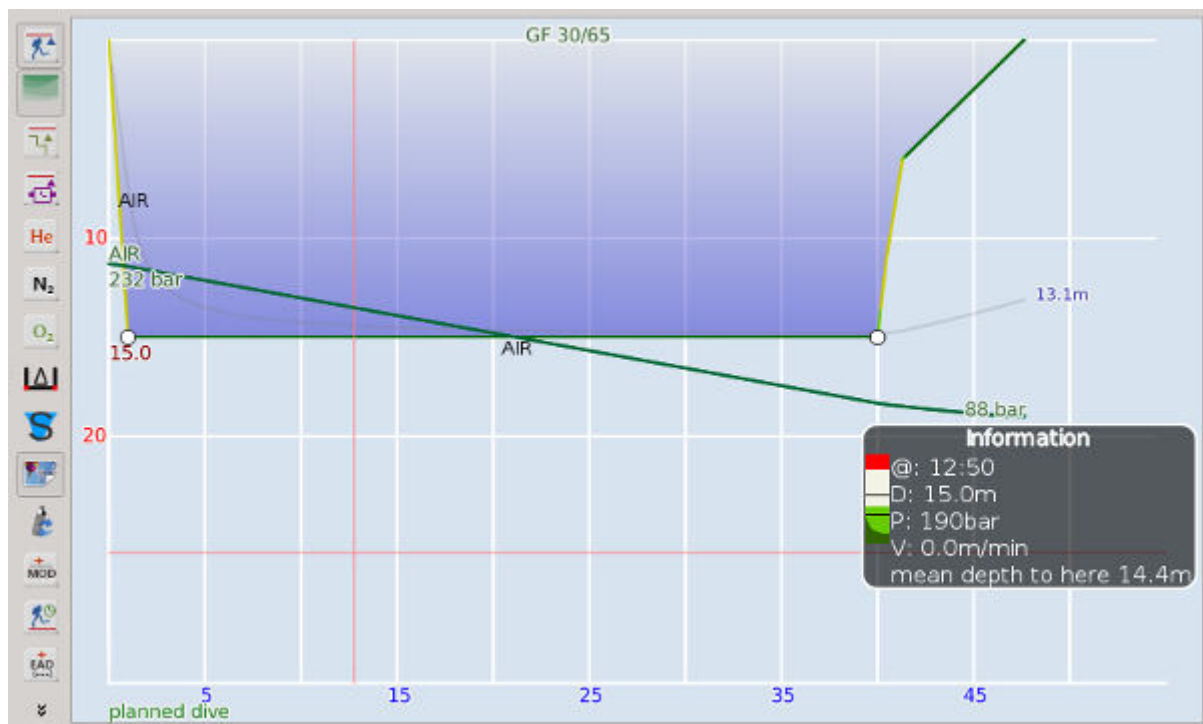
When you edit a field in Notes or Equipment panels, *Subsurface* enters **Editing Mode**, indicated by the message in the blue box at the top of the **Notes** panel (see the image below). This message is displayed in all the panels under Notes and Equipment when in **Editing Mode**.



The *Apply changes* button should only be selected after all the parts of a dive have been entered. When entering dives by hand, the *Info*, *Equipment* and *Profile* tabs should be completed before applying the information. By selecting the *Apply changes* button, a local copy of the information for this specific dive is saved in memory but NOT written to disk. The *Apply changes* button should ONLY be selected after all parts of a dive have been entered. When closing Subsurface, the program will ask again, this time whether the complete dive log should be saved on disk or not.

### 5.1.1. Creating a Dive Profile

The **Dive Profile** (a graphical representation of the depth of the dive as a function of time) is shown in the panel on the top right hand of the *Subsurface* window. When a dive is manually added to a logbook, *Subsurface* presents a default dive profile that needs to be modified to best represent the dive described:



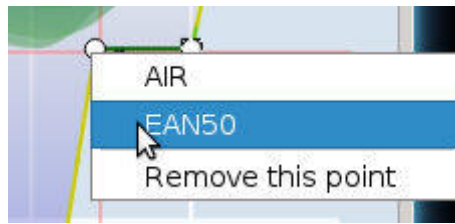
*Modifying the dive profile:* When the cursor is moved around the dive profile, its position is shown by two right-angled red lines as seen below. The time and depth represented by the cursor are indicated at the top of the black information box (@ and D). The units (metric/imperial) on the axes are determined by the **Preference** settings. The dive profile itself comprises several line segments demarcated by waypoints (white dots on the profile, as shown above). The default dive depth is 15 m. If the dive depth was 20 m then you need to drag the appropriate waypoints downward to 20 m. To add a waypoint, double-click on any line segment. To move an additional waypoint, drag it. Moving can also be done by selecting the waypoint and using the arrow keys. To remove a waypoint, right-click on it and choose "Remove this point" from the context menu. Drag the waypoints to represent an accurate time duration for the dive. Below is a dive profile for a dive to 20 m for 30 min, followed by a 5 minute safety stop at 5 m.



*Specifying the gas composition:* The gas composition used is indicated along the line segments of the dive profile. This defaults to the first gas mixture specified in the **Equipment** tab, which was air in the case of the profile above. The gas mixtures of segments of the dive profile can be changed by



right-clicking on the particular waypoint and selecting the appropriate gas from the context menu. Changing the gas for a waypoint affects the gas shown in the segment *to the right* of that waypoint. Note that only the gases defined in the **Equipment** tab appear in the context menu (see image below).



With the profile now defined, more details must be added to have a fuller record of the dive. To do this, the **Notes** and the **Equipment** tabs on the top left hand of the *Subsurface* window should be used. Click on [this link](#) for instructions on how to use these tabs.

## 5.2. Importing new dive information from a Dive Computer

### 5.2.1. Connecting and importing data from a dive computer.

The use of dive computers allows the collection of a large amount of information about each dive, e.g. a detailed record of depth, duration, rates of ascent/descent and of gas partial pressures. *Subsurface* can capture this information, using dive details from a wide range of dive computers. The latest list of supported dive computers can be found at: [Supported dive computers](#).



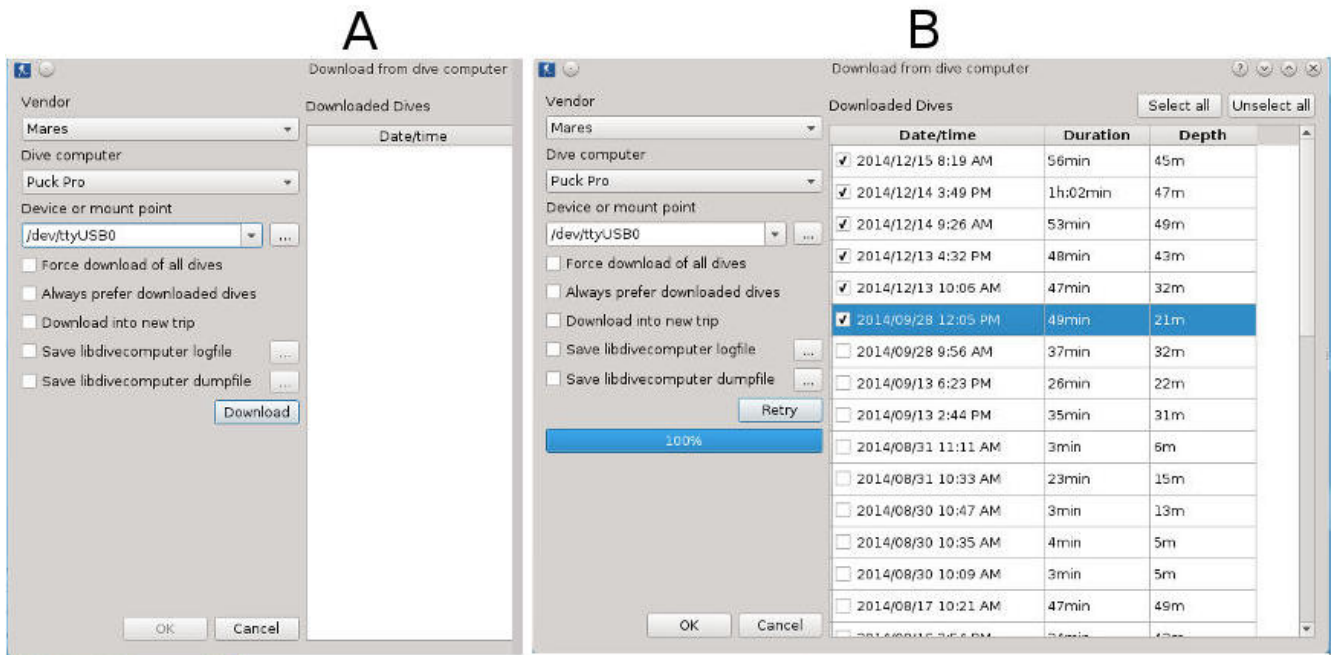
Several dive computers consume more power when they are in PC-Communication mode. **This could drain the dive computer's battery.** We recommend the user checks to be sure the dive computer is charged when connected to the USB port of a PC. For example, several Suunto and Mares dive computers do not recharge through the USB connection. Users should refer to the dive computer's manual if they are unsure whether the dive computer recharges its batteries while connected to the USB port.

To import dive information from a dive computer to a computer with *Subsurface*, the two pieces of equipment must communicate with one another. This involves setting up the communications port (or mount point) of the computer with *Subsurface* that communicates with the dive computer. To set up this communication, users need to find the appropriate information to instruct *Subsurface* where and how to import the dive information. [Appendix A](#) provides the technical information to help the user achieve this for different operating systems and [Appendix B](#) has dive computer specific information.

After this, the dive computer can be hooked up to the user's PC using these steps:

1. The interface cable should be connected to a free USB port (or the Infra-red or Bluetooth connection set up as described later in this manual)
2. The dive computer should be placed into PC Communication mode. (Refer to the manual of the specific dive computer)

3. In *Subsurface*, from the Main Menu, select *Import* → *Import From Dive Computer*. Dialogue A in the figure below appears:



Dive computers tend to keep a certain number of dives in memory, even though these dives have already been imported to *Subsurface*. For that reason, if the dive computer allows this, *Subsurface* only imports dives that have not been downloaded before. This makes the download process faster on most dive computers and also saves battery power of the dive computer (at least for those not charging while connected via USB).

- The dialogue has two drop-down lists, **Vendor** and **Dive Computer**. On the **vendor** drop-down list select the make of the computer, e.g. Suunto, Oceanic, Uwatec, Mares. On the **Dive Computer** drop-down list, the model name of the dive computer must be selected, e.g. D4 (Suunto), Veo200 (Oceanic), or Puck (Mares).
- The **Device or Mount Point** drop-down list contains the USB or Bluetooth port name that *Subsurface* needs in order to communicate with the dive computer. The appropriate port name must be selected. Consult [Appendix A](#) and [Appendix B](#) for technical details on how to find the appropriate port information for a specific dive computer and, in some cases, how to do the correct settings to the operating system of the computer on which *Subsurface* is running.
- If all the dives on the dive computer need to be downloaded, check the checkbox *Force download of all dives*. Normally, *Subsurface* only downloads dives after the date-time of the last dive in the **Dive List** panel. If one or more of your dives in *Subsurface* has been accidentally deleted or if there are older dives that still need to be downloaded from the dive computer, this box needs to be checked. Some dive computers (e.g. Mares Puck) do not provide a contents list to *Subsurface* before the download in order to select only new dives. Consequently, for these dive computers, all dives are downloaded irrespective of the status of this check box.
- If the checkbox *Always prefer downloaded dives* has been checked and, during download, dives with identical date-times exist on the dive computer and on the *Subsurface* **Dive List** panel, the dive in the *Subsurface* divelog will be overwritten by the dive record from the computer.
- The checkbox marked *Download into new trip* ensures that, after upload, the downloaded dives are grouped together as a new trip(s) in the **Dive List**.

- Do **not** check the checkboxes labelled *Save libdivecomputer logfile* and *Save libdivecomputer dumpfile*. These are only used as diagnostic tools when there are problems with downloads(see below).
- Then select the *Download* button. With communication established, you can see how the data are retrieved from the dive computer. Depending on the make of the dive computer and/or number of recorded dives, this could take some time. Be patient. The *Download* dialogue shows a progress bar at the bottom of the dialogue. Remember for some dive computers progress information could be inaccurate since *Subsurface* doesn't know how much downloadable data there are until the download is complete. After the dives have been downloaded, they appear in a tabular format on the right-hand side of the dialogue (see image **B**, above). Each dive comprises a row in the table, showing the date, duration and depth. Next to each dive is a checkbox: check all the dives that need to be transferred to the **Dive List**. In the case of the image above, the last six dives are checked and will be transferred to the **Dive List**. Then click the *OK* button at the bottom of the dialogue. All the imported dives appear in the **Dive List**, sorted by date and time. Disconnect and switch off the dive computer to conserve its battery power.
- If there is a problem in communicating with the dive computer, an error message is shown, similar to this text: "Unable to open /dev/ttyUSB0 Mares (Puck Pro)". Refer to the text in the box below.

## PROBLEMS WITH DATA DOWNLOAD FROM A DIVE COMPUTER?



Check the following:

- Is the dive computer still in PC-communication or Upload mode?
- Is the dive computer's battery fully charged? If not then charge or replace it.
- Is the connecting cable faulty? Does the cable work using other software? Has it worked before, or is this the first time the cable is being used? Are the contacts on the dive computer and the cable clean?
- Consult [Appendix A](#) to be sure the correct Mount Point was specified (see above).
- On Unix-like operating systems, does the user have write permission to the USB port? If not, consult [Appendix A](#)

If the *Subsurface* computer does not recognize the USB adapter by showing an appropriate device name next to the Mount Point, then there is a possibility the cable or USB adaptor is faulty. A faulty cable is the most common cause of communication failure between a dive computer and *Subsurface*. It's also possible *Subsurface* cannot interpret the data. Perform a download for diagnostic purposes with the following two boxes checked in the download dialogue discussed above:

Save libdivecomputer logfile  
Save libdivecomputer dumpfile

**Important:** These check boxes are only used when problems are encountered during the download process. Under normal circumstances they should not be checked. When checking these boxes, the user is prompted to select a folder where the information will be saved. The default folder is the one in which the *Subsurface* dive log is kept.

**Important:** After downloading with the above checkboxes checked, no dives are added to the **Dive List** but two files are created in the folder selected above:

subsurface.log  
subsurface.bin

These files should be send to the *Subsurface* mail list: [subsurface@subsurface-divelog.org](mailto:subsurface@subsurface-divelog.org) with a request for the files to be analyzed. Provide the dive computer make and model as well as contextual information about the dives recorded on the dive computer.

### 5.2.2. Connecting *Subsurface* to a Bluetooth-enabled dive computer

Bluetooth is becoming a more common way of communication between dive computers and *Subsurface*. *Subsurface* provides a largely operating system independent Bluetooth interface. An increasing number of dive computers use Bluetooth Low Energy (BTLE) as a means of communication. However, BTLE is not a standardised protocol, consequently adaptations need to

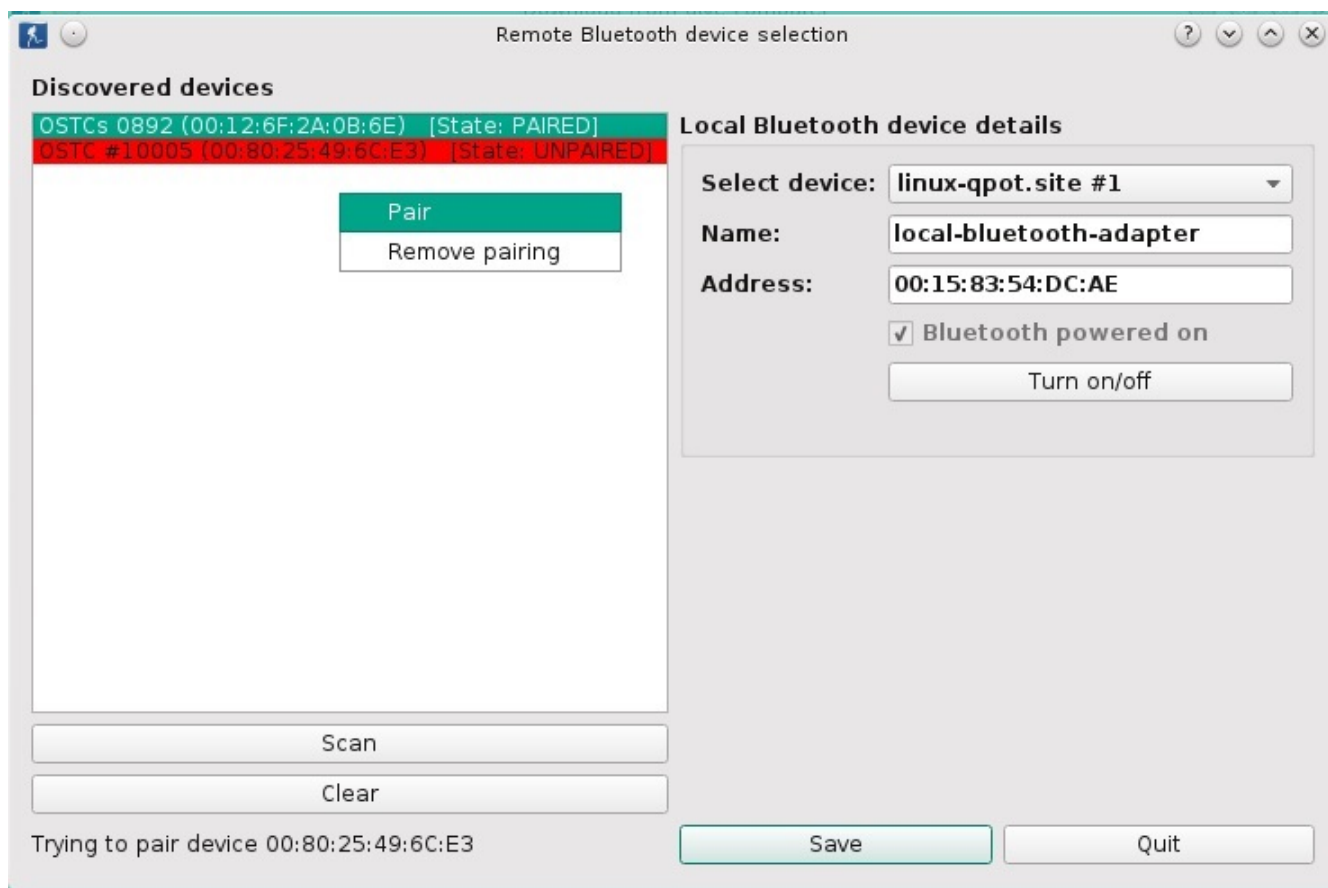
be made for communicating with each different dive computer model. See the [list of supported dive computers](#). Bluetooth communication is often more reliable if all Bluetooth devices seen by the *Subsurface* computer are removed and pairing with the Bluetooth dive computer is performed from afresh. The Bluetooth and BTLE interfaces are under active development with respect to new dive computers that use this mechanism of communication.

Setting up *Subsurface* for Bluetooth communication requires four steps:

- Ensure Bluetooth is activated on the host computer running *Subsurface*.
- Ensure *Subsurface* sees the Bluetooth adapter on the host computer.
- Ensure the Bluetooth-enabled dive computer is Bluetooth-discoverable and in PC upload mode.
- Ensure *Subsurface* is paired with the Bluetooth-enabled dive computer.

Select the Download dialogue by selecting *Import* → *Import from dive computer* from the **Main Menu**. After checking the box labeled "*Choose Bluetooth download mode*", the dialogue below appears.

### On Linux or MacOS:



Although the *Subsurface* Bluetooth interface is intended to function without Bluetooth pairing at the operating system level, it is always prudent to follow up initial Bluetooth pairing problems by pairing the Bluetooth dive computer with the *Subsurface* computer using the operating system services of the desktop computer. Delete all existing pairings and start by scanning for Bluetooth devices from an empty list (on the desktop) of Bluetooth devices. Once *Subsurface* has recognised the Bluetooth dive computer, subsequent divelog downloads are likely to be simple.

On the *Linux* or *MacOS* platforms the name of the *Subsurface* computer and its Bluetooth address are shown on the right hand side. The power state (on/off) of the Bluetooth adapter is shown below the address and can be changed by checking the *Turn on/off* box. If the Bluetooth address is not shown, then *Subsurface* does not see the local Bluetooth device. Ensure the Bluetooth driver is installed correctly on the *Subsurface* computer and check if it can be used by other Bluetooth utilities like *bluetoothctl* or *bluemoon*. This completes the first two steps above. Ensure the Bluetooth-enabled dive computer is in PC-upload mode and it is discoverable by other Bluetooth devices. Consult the manual of the dive computer for more information. Now the third item in the list above has been finished. Select the *Scan* button towards the bottom left of the dialogue above. After searching, the dive computer should be listed (perhaps as one of a number of Bluetooth devices) in the main list box on the lefthand side of the dialogue (see image above). If this does not work, select the *Clear* button, then scan again for Bluetooth devices using the *Scan* button. After taking these actions *Subsurface* should see the dive computer. On the left hand side, if the computer has more than one local Bluetooth devices connected, use the list box to indicate which one needs to connect to *Subsurface*. The label of the discovered dive computer contains the name of the device, its address and its pairing status. For BTLE devices the address often starts with "LE". If the device is not paired and has a red background color, a context menu can be opened by selecting the item with a right-click. Select the *Pair* option and wait for the task to complete. If this dive computer is being paired to *Subsurface* for the first time, it's possible *Subsurface* will request a Pass Code or PIN number. The most commonly-used Pass Code is 0000, and this works for the Shearwater Petrel. If necessary, consult the user manual of the dive computer being used.



Currently *Subsurface* does not support Bluetooth pairing with dive computers that require a custom PIN code. In order to pair the devices, use other OS utilities as suggested below.

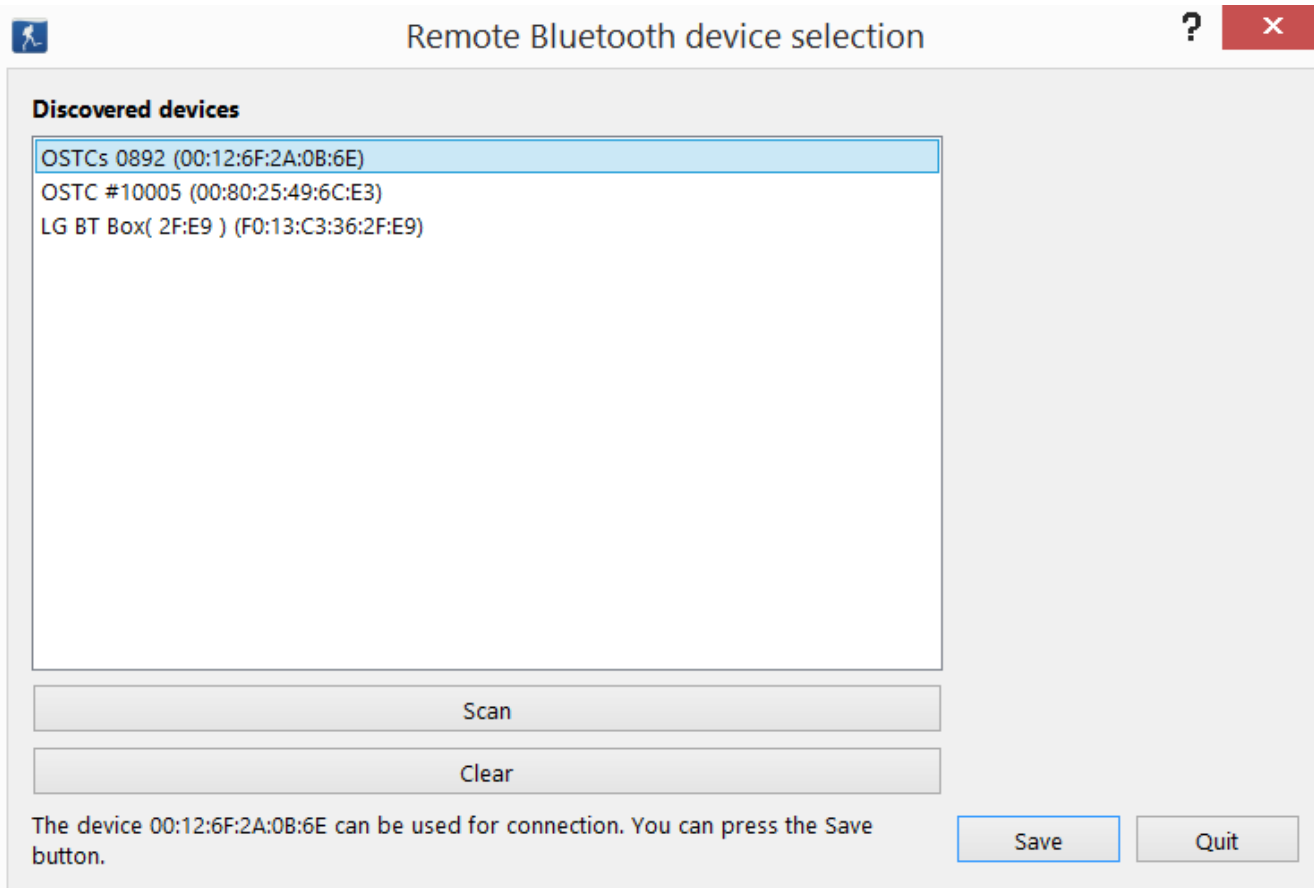
One way to achieve this is to use *bluetoothctl*:

```
$ bluetoothctl
[bluetooth]# agent KeyboardOnly
Agent registered
[bluetooth]# default-agent
Default agent request successful
[bluetooth]# pair 00:80:25:49:6C:E3
Attempting to pair with 00:80:25:49:6C:E3
[CHG] Device 00:80:25:49:6C:E3 Connected: yes
Request PIN code
[agent] Enter PIN code: 0000
```

After the devices are paired, press the *Save* button of the dialogue. This closes the Bluetooth dialogue. Now select *Download* in the *Download from dive computer* dialogue which should still be open. The downloaded dives are shown on the righthand side of the download dialogue.

### On Windows:





On *Windows* platforms the *Local Bluetooth device details* section on the right is not displayed as is the case on the *Linux/Mac* systems. To start a scan (by pressing the *Scan* button) check that the Bluetooth device on the *Subsurface* computer is turned on by selecting the dive computer from the list of available Bluetooth devices (see image above). If the dive computer is being accessed by *Subsurface* for the first time, it's possible *Subsurface* will request a Pass Code or PIN number. Supply the Pass Code recommended in the user manual of the dive computer. A Pass Code or PIN of 0000 is often the default.

The pairing step is checked and done automatically during the download process. If the devices have never been paired the system will ask permission and put a message on the right side of the screen: *Add a device, Tap to set up your DC device*. Always allow this pairing. After a discovered item is selected, select the *Save* button. Finally select the *Download* button on the *Download* dialogue and wait for the process to complete.



Currently *Subsurface* works only with local Bluetooth adapters which use Microsoft Bluetooth Stack. If the local device uses *Widcomm*, *Stonestreet One*, *Bluetopia Bluetooth* or *BlueSoleil* drivers it will not work. However, Bluetooth hardware/dongles from these manufacturers (e.g. iSonic) that support the Microsoft Bluetooth Stack do work.

A log message on the bottom left of the *Remote Bluetooth device selection* shows details about the current status of the Bluetooth agent. To select another dive computer for download using the "Remote Bluetooth selection dialogue" press the three-dots button from the "*Choose Bluetooth download mode*" option.



**IN CASE OF PROBLEMS:** If the Bluetooth adapter from the *Subsurface* computer gets stuck and the *Download* process fails repeatedly, *unpair* the devices and then repeat the above steps. If this is not successful, [Appendix A](#) contains information for manually setting up and inspecting the Bluetooth connection with *Subsurface*.

### 5.2.3. Changing the name of a dive computer

It may be necessary to distinguish between different dive computers used to upload dive logs to *Subsurface*. For instance if a buddy's dive computer is the same make and model as your own and dive logs are uploaded from both dive computers to the same *Subsurface* computer, then you might like to call one "Alice's Suunto D4" and the other "Bob's Suunto D4". Alternatively, consider a technical diver who dives with two or more dive computers of the same model, the logs of both (or all) being uploaded. In this case it might be prudent to call one of them "Suunto D4 (1)" and another "Suunto D4 (2)". This is easily done in *Subsurface*. On the **Main Menu**, select *Log* → *Edit device names*. A dialog box opens, showing the current Model, ID and Nickname of the dive computers used for upload. Edit the Nickname field for the appropriate dive computer. After saving the Nickname, the dive logs show the nickname for that particular device instead of the model name, allowing easy identification of devices.

### 5.2.4. Uploading data for a specific dive from more than one dive computer

Some divers use more than one dive computer at the same time, e.g. during technical diving. If you import the dive profiles from these different dive computers into *Subsurface*, the profiles can be viewed independently. During upload the data from the dive computers are automatically merged into a single dive. The different profiles are presented on the *Profile* panel with the name of each dive computer indicated at the bottom left. **While the dive is highlighted in the Dive List**, switch between the profiles of the different dive computers by using either the left/right arrow keyboard keys or by selecting *View* → *Previous DC* or *View* → *Next DC*. The data in the *Notes* panel are not affected by the specific dive computer that is selected.

### 5.2.5. Updating the dive information imported from the dive computer.

With the uploaded dives in the **Dive List**, the information from the dive computer is not complete and more details must be added to have a full record of the dives. To do this, the **Notes** and the **Equipment** tabs on the top left hand of the *Subsurface* window should be used.

#### Notes

To have a more complete dive record, the user needs to add additional information by hand. The procedure below is virtually identical for hand-entered dives and for dives downloaded from a dive computer.

In some cases, you must provide the date and time of the dive, for example when entering a dive by hand or when a dive computer doesn't provide the date and time of the dive. (Usually the date and time of the dive, gas mixture and water temperature are shown as obtained from the dive computer) If the contents of the **Notes tab** is changed or edited in any way, the message in a blue box at the top of the panel shows the dive is being edited. If you click on the **Notes** tab, the following fields are visible (left hand image, below):

The right hand image, above, shows a **Notes** tab filled with dive information. The **Date** and **Time** fields reflects the date and time of the dive. By clicking the date, a calendar is displayed for selecting the correct date. Press ESC to close the calendar. The time values (hour and minutes) can also be edited directly by clicking on each of them in the text box and by over-typing the information displayed.

**Air/water temperatures:** Air and water temperatures during the dive are shown in text boxes to the right of the Start time. Many dive computers supply water temperature information and this box may have information. If air temperature isn't provided by the dive computer, the first temperature reading might be used for the air temperature. Generally this is close to the real air temperature. If editing is required, only a value is required, the units of temperature will be automatically supplied by *Subsurface* (following the *Preferences*, metric or imperial units will be used).

### Location:



Dive locations are managed as a **separate** part of the dive log. The dive information in the **Notes** and **Equipment** tabs can therefore NOT be edited at the same time as the dive site information. Save all the other dive information (e.g. divemaster, buddy, protective gear, notes about the dive) by selecting *Apply changes* on the **Notes** tab BEFORE editing the dive site information. Then supply a dive site name in the textbox labelled *Location* on the **Notes** tab.

**Using existing dive locations:** Type in the name of the dive site, e.g. "Tihany, Lake Balaton, Hungary". If several dives are made at the same location, the site information for the first dive is re-used. Therefore, if a dive site has been used before, the name of that site (and sometimes the names of similar sites) appears below the dive site text box (image below). Double-click on the appropriate dive site name and the dive location will be associated with the dive being entered. Then select *Apply Changes* (image below) to save the geolocation for this dive site.

File Edit Import Log View Share on Help

This dive is being edited. Apply changes Discard changes

Notes Equipment Information Statistics Photos Extra Info

Date: Wed 18 Oct 2017 Time: 09:16 Air temp. [°C]: Water temp. [°C]:

Depth: 15.0m Duration: 0:46

Location: Part

Part  
Create a new dive site, copying relevant information from the current dive

Partridge Point, Simonstad  
Create a new dive site, copying relevant information from the current dive

Partridge Point, Simonstad  
Pick site: 34°14'28.255"S 18°28'47.204"E (~721km away, 4 dives here)

**Entering a new dive location:** On the other hand, having dived at a new dive location, a new record needs to be created that could be used for the new and for later dives at this new site. Type the name of the new dive site into the text box (image A below).

**A**

This dive is being edited. Apply changes Discard changes

Notes Equipment Information Statistics Photos Extra Info

Date: Wed 18 Oct 2017 Time: 09:16 Air temp. [°C]: Water temp. [°C]:

Depth: 15.0m Duration: 0:46

Location: St Croix Island, Algoa Bay

St Croix Island, Algoa Bay  
Create a new dive site with this name

**B**

Notes Equipment Information Statistics Photos Extra Info

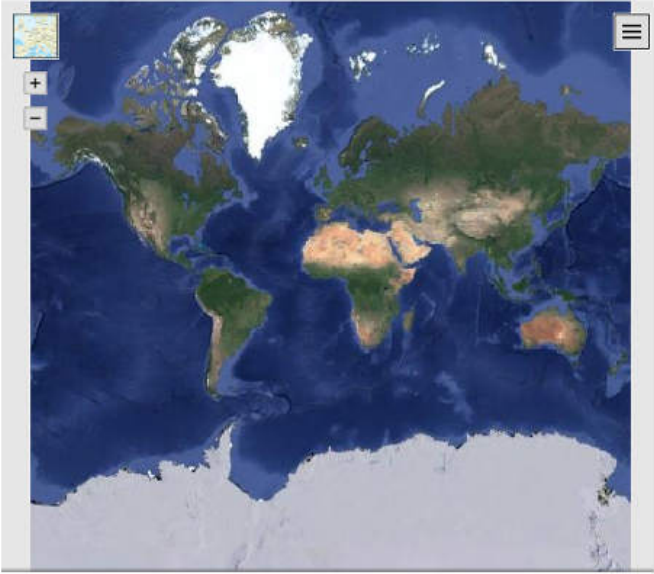
Date: Wed 18 Oct 2017 Time: 09:16 Air temp. [°C]: Water temp. [°C]:

Depth: 15.0m Duration: 0:46

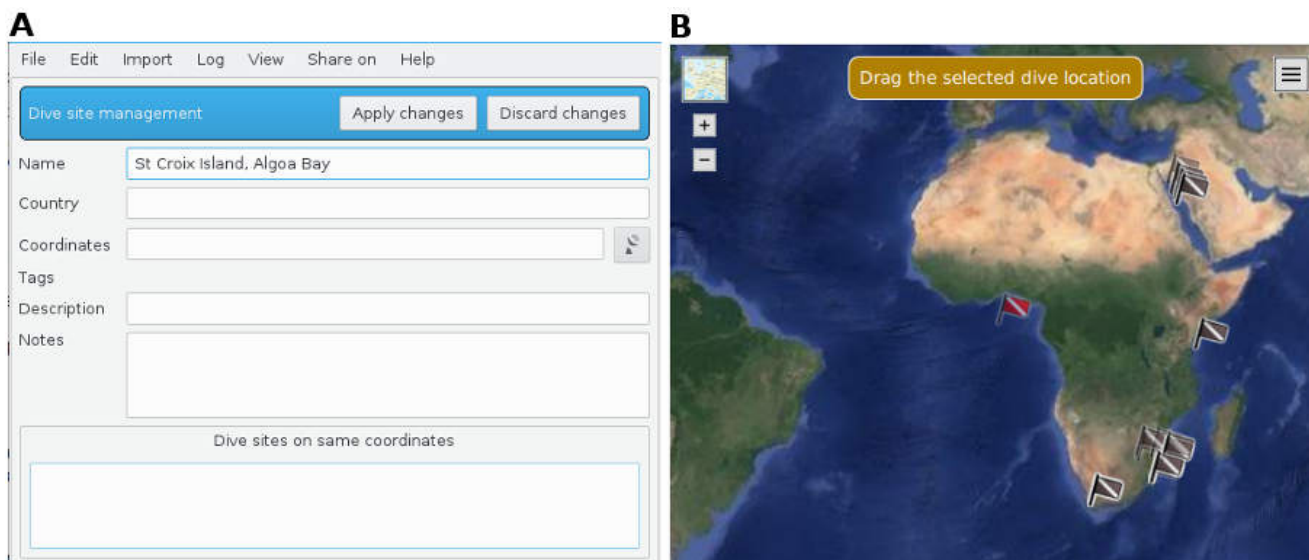
Location: St Croix Island, Algoa Bay

Divemaster: Buddy:

**C**



Double-click on the blue bar below the new dive location name. The blue bar disappears (image B above) and the globe icon on the right-hand of the location name text box turns blue. In the Dive Map part of the *Subsurface* window, a world map appears (image C above). Click on the blue globe icon to the right of the dive site name in the *Notes* panel (image B above). This opens a window for entering the details of the new dive location (image A above). The globe icon changes to indicate that the location data are being edited. The only important data here are the geographic coordinates of the dive location.



There are three ways of adding the coordinates:

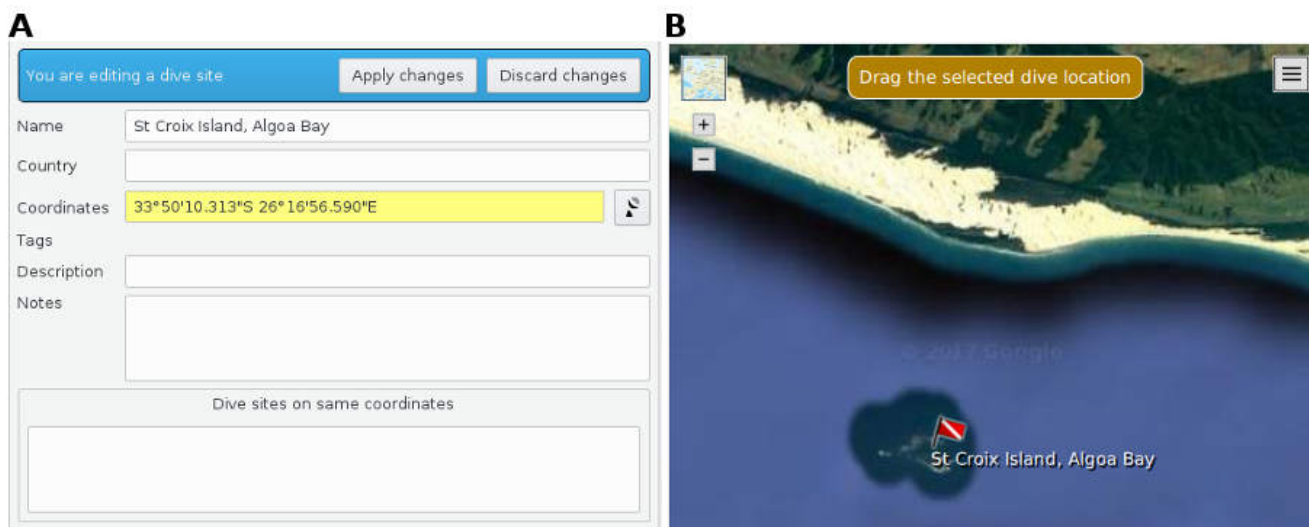
**(1):** Enter coordinates by hand if they are known, using one of four formats with latitude followed by longitude:

ISO 6709 Annex D format e.g. 30°13'28.9"N 30°49'1.5"E  
 Degrees and decimal minutes, e.g. N30° 13.49760' , E30° 49.30788'  
 Degrees minutes seconds, e.g. N30° 13' 29.8" , E30° 49' 1.5"  
 Decimal degrees, e.g. 30.22496 , 30.821798

Southern hemisphere latitudes are given with a **S**, e.g. S30°, or with a negative value, e.g. -30.22496. Similarly western longitudes are given with a **W**, e.g. W07°, or with a negative value, e.g. -7.34323. Some keyboards don't have the degree sign (°). It can be replaced by a **d** like this: N30d W20d. Enter any other contextual information about the dive site (Description and Notes), then select *Apply Changes* to save the geolocation for this dive site. The dive site information can later be edited by clicking the globe icon to the right of the dive site name in the **Notes tab**.

**(2):** Use the Dive Map to specify the coordinates. The Dive map now shows all the existing dive locations in grey as well as an additional marker in red (image B above). Drag the red marker to the location of the dive site being entered. The map can be dragged and zoomed using the mouse wheel. Position the red marker by dragging it on the map, zooming in on the appropriate part of the map and placing the marker at an appropriate position (image B below). The coordinates of the dive location are automatically inserted into the appropriate text box in the dive location information window (image A below). Enter any other contextual information about the dive site (Description and Notes), then select *Apply Changes* to save the geolocation for this dive site. The dive site information can later be edited by clicking the globe icon to the right of the dive site name in the **Notes tab**.





Once the dive location data have been saved, the dive on the Dive List has a globe icon immediately to the left of the location name of a particular dive.

**(3):** Obtain the coordinates using either the Subsurface-Mobile App or the *Subsurface* Companion App on an Android or iPhone device with GPS and if the dive site coordinates were stored using one of these apps. [Click here for more information](#)



GPS coordinates of a dive site are linked to the location name - so **saving** a dive site with only coordinates and no name causes problems. (Subsurface will think all of these dives have the same location and try to keep their GPS coordinates the same).

**Dive site name lookup:** If you typed coordinates into the appropriate text box, you can do an automated name lookup based on the coordinates. This is done when *Subsurface* uses the Internet to find the name of the dive site based on the coordinates that were given. If a name has been found, it is automatically inserted into the tags box. The list box (Titled *Dive sites on same coordinates*) at the bottom of the dive site panel contains the names of other dives sites used at the current location. For instance if the dive site is "Blue Hole" and there are several sites named "Blue Hole", all of them are listed.

Enter any other contextual information about the dive site (Description and Notes), then select *Apply Changes* to save the geolocation for this dive site. The dive site information can later be edited by clicking the globe icon to the right of the dive site name in the **Notes** tab.

**Dive mode:** This is a dropdown box allowing you to choose the type of dive performed. The options are OC (Open Circuit SCUBA, the default setting, for most recreational dives), Freedive (dive without SCUBA equipment), CCR (Closed-circuit rebreather) and pSCR (Passive semi-closed rebreather).

**Divemaster:** The name of the divemaster or dive guide should be entered in this field which offers auto selection based on the list of divemasters in the current logbook.

**Buddy:** In this field, enter the name(s) of the buddy or buddies (separated with commas) who were on the dive. Auto selection based on the list of buddies in the current logbook is offered.

**Suit:** Here the type of dive suit used can be entered. Auto selection of the suit description is available. Some dry-suit users may choose to use this field to record what combination of suit and



thermal under suit was used.

**Rating:** Provide a subjective overall rating of the dive on a 5-point scale by clicking the appropriate star on the rating scale.

**Visibility:** Provide a rating of visibility during the dive on a 5-point scale by clicking the appropriate star.

**Tags:** Tags that describe the type of dive done can be entered here (separated by commas). Examples of common tags are boat, drift, training, cave, etc. *Subsurface* has many built-in tags. By starting to type a tag, *Subsurface* lists the tags that correspond to the typing. For instance, by typing cav, the tags **cave** and **cavern** are shown to choose from.

**Notes:** Any additional information for the dive can be entered here.

The *Apply changes* and *Discard changes* buttons are used to save all the information for tabs in the **Info** panel and in the **Dive Profile** panel. Use them when **ALL** other information has been added. The image [at the beginning of this section](#) shows an example of a **Notes tab** after completing the dive information.

## Equipment

The Equipment tab allow entering information about the type of cylinder and gas used, as well as the weights used for the dive. The message in the blue box at the top of the panel:



shows the equipment is being edited. This is a highly interactive part of *Subsurface* and the information on cylinders and gases (entered here) determines the behavior of the **Dive profile** (top right-hand panel).

**Cylinders:** The cylinder information is entered through a dialogue that looks like this:



For hand-entered dives, this information needs to be typed in. For dive computers, *Subsurface* often gets the gas used from the dive computer and automatically inserts the gas composition(% oxygen or % helium) in the table. The + button at the top right allows adding more cylinders for this dive. The dark dustbin icon on the left allows you to delete information for a cylinder. Note that it is not possible to delete a cylinder if it is used during the dive. A cylinder might be implicitly used in the dive, even without a gas change event. Start by selecting a cylinder type on the left-hand side of the table. To select a cylinder, the *Type* box should be clicked. This brings up a list button that can be used to display a dropdown list of cylinders:

Type	Size	Work press.	Start press.	End press.	O₂%	He%
unknown	11.1l	207.0bar			32.0%	

The drop-down list can then be used to select the cylinder type that was used for this dive, or just start typing in the box which shows the available options for the entered characters. The **Size** of the cylinder as well as its working pressure (*Work.press*) will automatically be shown in the dialogue.

Next, indicate the starting pressure and the ending pressure of the specified gas during the dive. The unit of pressure (metric/imperial) corresponds to the settings chosen in the *Preferences*.

Finally, provide the gas mixture used. If air was used, the value of 21% can be entered into the oxygen box or this field can be left blank. If nitrox or trimix were used, their percentages of oxygen and/or helium should be entered. Any inappropriate fields should be left empty. After typing the information for the cylinder, save the data either by pressing *ENTER* on the keyboard or by clicking outside the cell containing the cursor. Information for any additional cylinders can be added by using the + button at the top right hand. Here is an example of a complete description for a dive using two cylinders (air and EAN50):

Size	Work press.	Start press.	End press.	O₂%	He%
15.0l	232.0bar	230.0bar	52.0bar		
5.5l	206.8bar	206.0bar	45.0bar	50.0%	

**Weights:** Information about the weight system used can be entered using a dialogue similar to that of the cylinder information. If you click the + button on the top right of the weights dialogue, the table looks like this:

Type	Weight
	0.0kg

By clicking on the *Type* field, a drop-down list becomes accessible through a down-arrow:



This can be used to select the type of weight system used during the dive. You may start typing in the box to specify a different weighting mechanism that will be saved by *Subsurface*. In the **Weight** field, type in the amount of weight used during the dive. After specifying the weight system, save the data by pressing *ENTER* on the keyboard or by clicking outside the cell with the cursor. It's possible to enter information for more than one weight system by adding an additional system using the + button on the top right hand. Weight systems can be deleted using the dust bin icon on the left hand. Here is an example of information for a dive with two types of weights: integrated as well as a weight belt:



## 5.2.6. Editing several selected dives simultaneously

**METHOD 1:** After downloading dives from a dive computer, the dive profiles of each is shown in the **Dive profile** tab, as well as a few items of information in the **Notes** tab (e.g. water temperature) and in the **Equipment** tab (e.g. gas pressures and gas composition). Other fields remain empty. It may be useful to simultaneously edit some of the fields in the **Notes** and **Equipment** tabs. For instance, it's possible that a diver performed several dives during a single day, using identical equipment at the same dive site, or with the same divemaster and/or buddy or tags. Instead of completing the information for each dive separately, select all the dives for that day in the **Dive List** and insert the same information in the **Notes** and **Equipment** fields that need identical information. This is done by editing the dive notes or the equipment for any one of the selected dives.

Simultaneous editing only works with fields that do not already contain information. This means if some fields have been edited for a particular dive among the selected dives, these are not changed while editing the dives simultaneously. Technically, the rule for editing several dives simultaneously is: if the data field being edited contains *exactly the same information* for all the dives that have been selected, the new, edited information is substituted for all the selected dives. Otherwise only the edited dive is changed, even though several dives have been selected in the **Dive List**. This speeds up the completion of the dive log after several similar dives.

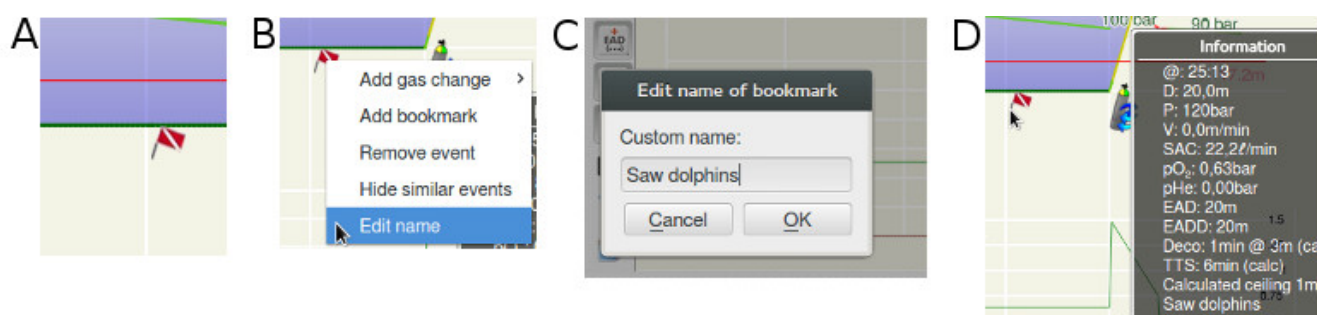
**METHOD 2:** There is a different way of achieving the same goal. Select a dive with all the appropriate information typed into the **Notes** and **Equipment** tabs. Then, from the main menu,

select *Log* → *Copy dive components*. A box is presented with a selection of check boxes for most of the fields in the **Notes** and **Equipment** tabs. Select the fields to be copied from the currently selected dive, then select *OK*. Now, in the **Dive List**, select the dives into which this information is to be pasted. Then, from the main menu, select *Log* → *Paste dive components*. All the selected dives now contain the data initially selected in the original source dive log.

### 5.2.7. Adding Bookmarks to a dive

Many divers wish to annotate dives with text that indicate particular events, e.g. "Saw dolphins", or "Released surface buoy". This is easily done:

- Right-click at the appropriate point on the dive profile. This brings up the dive profile context menu. Select *Add bookmark*. A red flag is placed on the dive profile at that point (see **A** below).
- Right-click on the red flag. This brings up the context menu (see **B** below). Select *Edit name*.
- A text box is shown. Type the explanatory text for the bookmark (see **C** below). Select *OK*. This saves the text associated with the bookmark.
- Hovering the mouse over the red bookmark, the appropriate text is shown at the bottom of the information box (see **D** below).



### 5.2.8. Saving the updated dive information

The information entered in the **Notes** tab and the **Equipment** tab can be saved by using the two buttons on the top right hand of the **Notes** tab. If the *Apply changes* button is clicked, the dive data are saved in the memory image of the dive. If the *Discard changes* button is clicked, the newly entered dive data are erased from the computer memory, although the dive profile is retained. When the user exits *Subsurface* there is a final prompt to confirm the new data should now be saved permanently on the computer disk.

## 5.3. Importing dive information from other digital data sources or other data formats

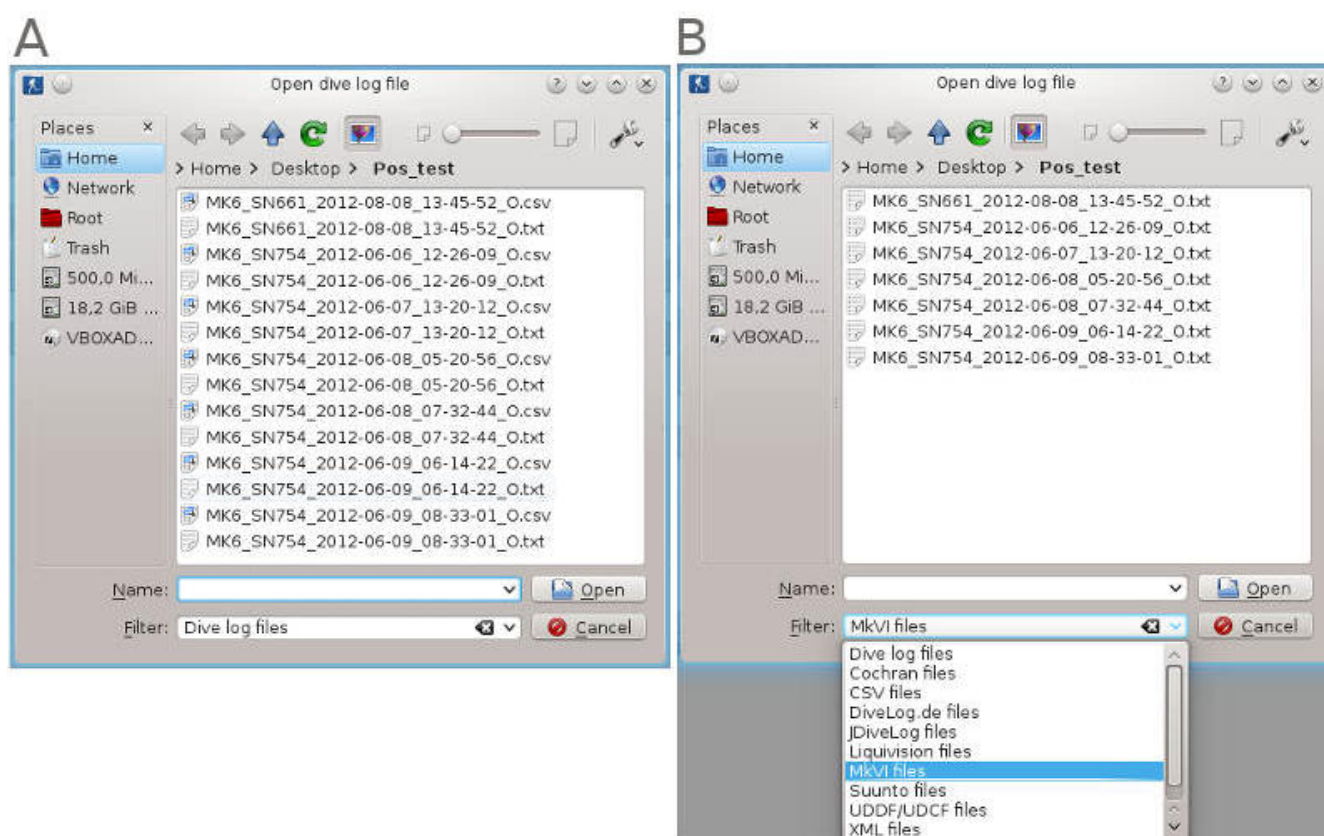
Many divers log their dives using the proprietary software provided by the manufacturers of their dive computers. *Subsurface* can import dive logs from a range of other dive log software. While import from some software is supported natively, others require export of the dive log to an intermediate format that can then be imported into *Subsurface*. Currently, *Subsurface* supports importing CSV log files from several sources. Dive log import from APD LogViewer, XP5, Sensus and Seabear files are preconfigured, but because the import is flexible, users can configure their own imports. Manually kept log files (e.g. a spreadsheet) can also be imported by configuring the CSV

import. *Subsurface* can also import UDDF and UDCF files used by some dive log software and some dive computers, like the Heinrichs & Weikamp DR5. Finally, for some dive log software like Mares Dive Organizer we currently recommend importing the logbook first into a web service like *divelogs.de* and then import from there with *Subsurface*. DiveLogs.de supports a few additional logbook formats that *Subsurface* currently cannot handle.

If the format of other software is supported natively on *Subsurface*, select either *Import* → *Import log files* or *File* → *Open log file*. Notice that the import adds the imported data to the current **Dive list**, and the open style starts a new dive list. *Subsurface* supports the data formats of many dive computers, including Suunto, Shearwater and some CCR equipment. When importing dives, *Subsurface* tries to detect multiple records for the same dive and merges the information as best as it can. If there are no time zone issues (or other reasons that would cause the beginning time of the dives to be significantly different) *Subsurface* will not create duplicate entries. Below is more specific information to import data to *Subsurface*.

### 5.3.1. Using the universal import dialogue

Importing dives from other software is done through a universal interface activated by selecting *Import* from the Main Menu, then clicking on *Import Log Files*. This brings up dialogue **A**, below.



Towards the bottom right is a dropdown selector with a default label of *Dive Log Files* which accesses different types of direct imports available, as in dialogue **B**, above. Currently these are:

- XML-formatted dive logs (DivingLog 5.0, MacDive and several other dive log systems)
- Cochran dive logs
- UDDF-formatted dive logs (e.g. Kenozooid)
- UDCF-formatted dive logs



- Poseidon MkVI CCR logs
- APD Inspiration/Evolution CCR logs
- LiquiVision logs
- divelogs.de logs
- OSTC Tools logs
- JDiveLog
- Suunto Dive Manager (DM3, DM4, DM5)
- DL7 files used by Diver's Alert network (DAN)
- Underwater technologies AV1 dive logs
- Divesoft dive logs
- Poseidon MK VI eCCR dive logs
- CSV (text-based and spreadsheet-based) dive logs, including APD CCR logs

Selecting the appropriate format and then the specific log file in the large window containing the file list on the right of the dialogue, opens the imported dive log in the *Subsurface Dive List*. Some other formats not accessible through the Import dialogue are also supported, as explained below.

### 5.3.2. Importing from OSTCTools

*OSTC Tools* is a Microsoft-based suite of dive download and dive management tools for the OSTC family of dive computers. *OSTC Tools* downloads dive data from the dive computer and stores it as a binary file with file extension *.dive*. Subsurface can directly import these files when using the universal import dialogue. From the dropdown list at the bottom right select *OSTCTools Files (.dive .DIVE)*. This makes the *OSTC Tools* dive logs visible in the file list panel. Select one or more dive, then click the *Open* button. The OSTC dives are shown in the **Dive List** panel.

All H&W devices supported by OSTCTools can be imported to *Subsurface*. This includes OSTC, OSTC Mk2, OSTC 2N/2C, OSTC3, OSTC Sport, and probably although untested, Frog, OSTC2 and OSTC CR.

Please remember that OSTCTools is **not** true diving log software, but rather a useful set of tools for analysis and management of OSTC devices. Only raw dive computer data will be imported to *Subsurface*; the rest of the data (buddies, equipment, notes, etc) need to be completed manually.

### 5.3.3. Importing from Mares Dive Organizer V2.1

Since Mares uses proprietary Windows software not compatible with multi-platform applications, these dive logs cannot be directly imported into *Subsurface*. Mares dive logs need to be imported using a three-step process, using *www.divelogs.de* as a gateway to extract the dive log information.

1. Export the dive log data from Mares Dive Organizer to your desktop, using a *.sdf* file name extension. Refer to [Appendix C](#) for more information.
2. Data should then be imported into *www.divelogs.de*. First, create a user account in *www.divelogs.de* and Log into that web site, then select *Import Logbook → Dive Organizer from the menu on the left hand side*. The instructions must be carefully followed to transfer the dive



information (in *\_.sdf* format) from the Dive Organizer database to *www.divelogs.de*.

3. Finally, import the dives from *divelogs.de* to *Subsurface*, using the instructions below.

### 5.3.4. Importing Scubapro SmartTrak divelogs

*SmartTrak* stores the raw data from a Uwatec/Scubapro dive computer along with a plethora of other data manually added by the user, ranging from dive points to buddies data or DAN survey info. However, this is Microsoft Windows-based proprietary software by Uwatec (today Scubapro) using Microsoft Access databases, preventing the integration the importer into the *Subsurface* core application.

A stand alone tool for Linux has been developed to import the *.slg* files generated by SmartTrak to Subsurface's *.xml* format. It can be built together with *Subsurface* for Linux systems. Two dependencies need to be installed in your system before building: *libglib2.0* and *libmdb2*.

In addition, a web service is available for divelog conversions from SmartTrak to *Subsurface* (see below).

Feel free to contact the *Subsurface* development team on [our mailing list](#) for assistance in importing *SmartTrak* dive logs.

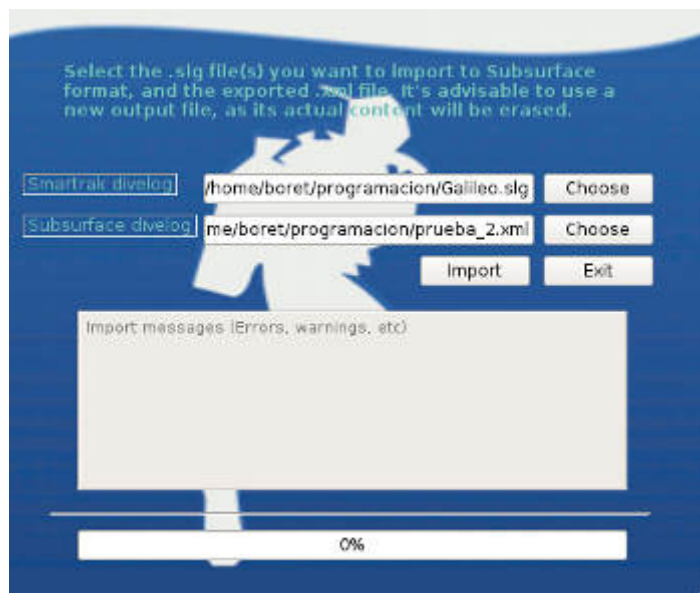
#### Building *smtk2ssrf*

Assuming the above dependencies have been installed and the *Subsurface* source tree is in the directory *~/src/subsurface*, then:

- Move to the source tree directory.
- Run " `$ cmake build` " and set SMARTTRAK\_IMPORT option to **on** (off by default).
- Generate with [c] and save and exit with [g].
- Build as you prefer, using the *build.sh* script (recommended) or moving to build directory and running *make*.
- After a successful build, there will be an executable named *smtk2ssrf* in the *subsurface/build* directory. Copy or move it to a directory in your \$PATH, e.g. *~/bin*.

#### Running

*smtk2ssrf* accepts 0, 2 or more parameters. If it is launched without parameters in a graphical user interface, a simple window opens for choosing the *.slg* file(s) to import and a destination file to store the *Subsurface*-formatted data into (see image below).



Existing data in the destination file will be erased, so **DO NOT** use a regular subsurface divelog file as a destination: rather, specify a **new** filename as a destination.

If launched from a command line with two or more parameters, the format is as follows:

```
$ smrtk2ssrf /input/file_1.slg /input/file_2.slg /output/file3.xml
```

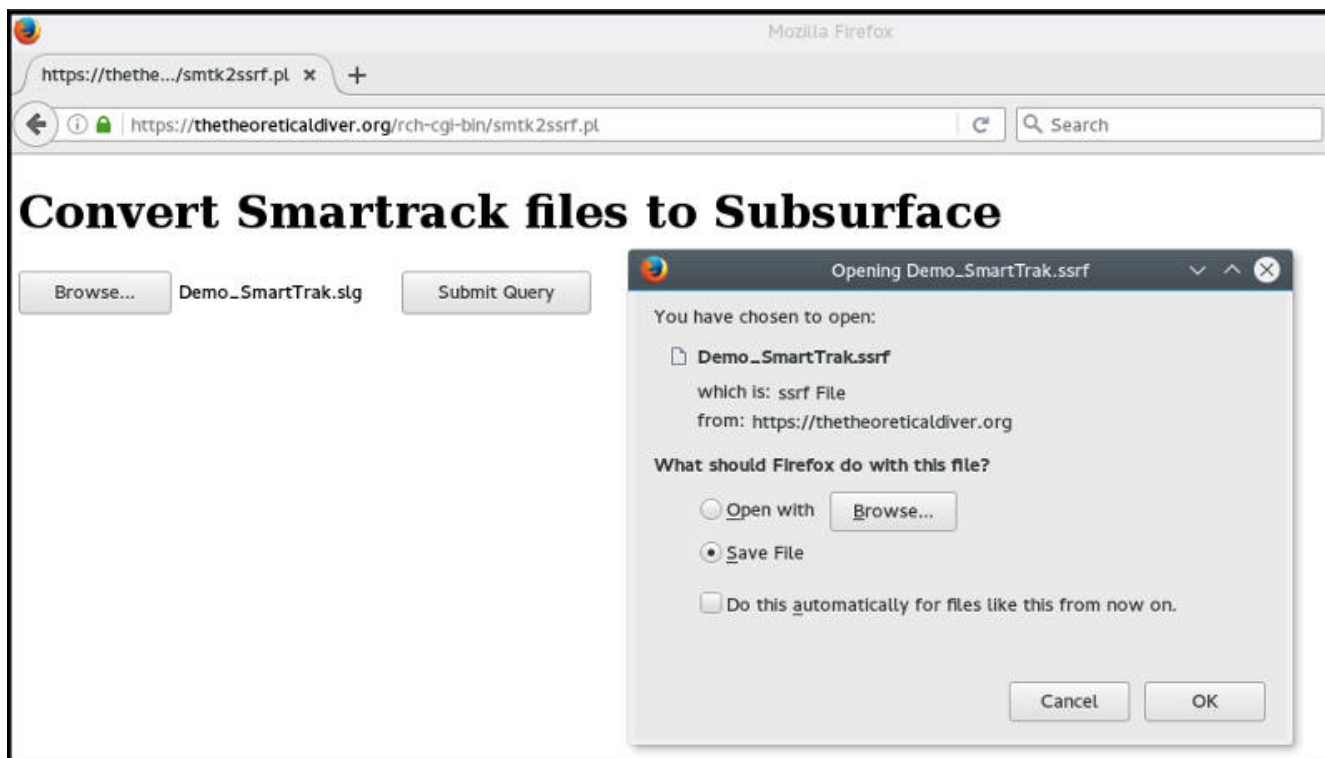
where *input* is the directory containing the .slg file(s) and *output* is the directory where the *Subsurface*-formatted output is written to. Files *file\_1.slg* and *file\_2.slg* in the *input* directory are imported and stored in *file3.xml* in the *output* directory. Check any warning and error messages in the console or in the graphical window: some may be relevant as support for Galileo family of dive computers is still a work in progress.

### For the lazy: a web service to convert *SmartTrak* to *Subsurface*

Open the website at:

<https://thetheoreticaldiver.org/rch-cgi-bin/smtk2ssrf.pl>

This is a no-frills web service for converting *SmartTrak* dive logs to *Subsurface*. Select the browse button. This allows you to browse your computer directories and to select the *SmartTrak* divelog to be converted. Once it has been selected, click the *Submit query* button. After a short while, a dialog box appears (image below) for saving the converted file to the local computer.

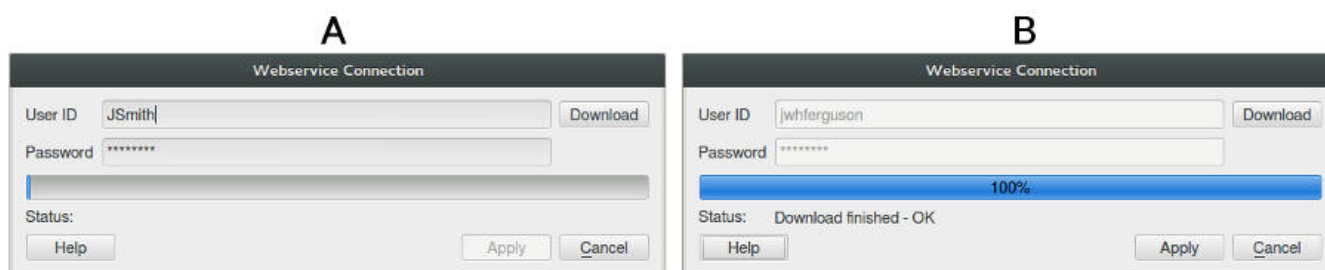


### Merging the imported dives with the existing divelog

Open the new file (generated in the previous steps) using *Subsurface* and check the dives and data. If everything is fine, close the *.xml* file and open your regular divelog. Then from the **Main Menu** select *Import* → *Import log file* and choose the *.xml* file containing the imported dives: these will show in the **Dive List**, time ordered, along with the existing dives. The new dives, although time ordered, will keep the numbering system from *SmartTrak*, so a renumbering action is needed. See the section on [Renumbering the dives](#) for instructions on this topic.

### 5.3.5. Importing dives from divelogs.de

Importing dive information from *divelogs.de* is simple, using a single dialogue box. The *Import* → *Import from Divelogs.de* option should be selected from the Main Menu. This brings up a dialogue box (see image **A** below). Enter a user-ID and password for *divelogs.de* and then select the *Download* button. Download from *divelogs.de* starts immediately, displaying a progress bar in the dialogue box. At the end of the download, the success status is shown (see image **B**, below). The *Apply* button should then be selected, after which the imported dives appear in the *Subsurface Dive List* panel.



### 5.3.6. Importing data in CSV format

A comma-separated file (.csv) can be used to import dive information either as dive profiles (as in

the case of the APD Inspiration and Evolution closed circuit rebreathers) or as dive metadata (in case the user keeps dive data in a spreadsheet). The CSV format is a universal simplified format that allows easy information exchange between different computers or software packages. For an introduction to CSV-formatted files see [A Diver's Introduction To CSV Files](#). *Subsurface* dive logs can also be exported in CSV format to other software that reads this format. See [APPENDIX D: Exporting a spreadsheet to CSV format](#) for information that may be helpful for importing spreadsheet-based data into *Subsurface*.

## Importing dives in CSV format from dive computers or other dive log software

CSV files can be viewed using an ordinary text editor. A CSV file is normally organized into a single line that provides the headers (or *field names* or *column headings*) of the data columns, followed by the data, one record per line.

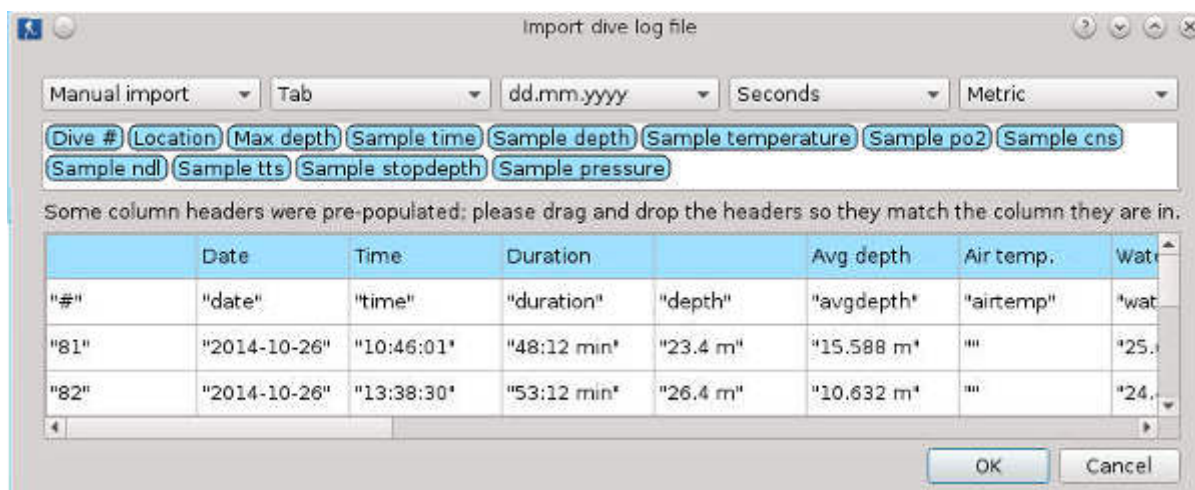
There are two types of CSV dive logs that can be imported into *Subsurface*:

1. *CSV dive details*: This dive log format contains similar information to that of a typical written dive log, e.g. dive date and time, dive depth, dive duration, names of buddy and divemaster and information about cylinder pressures before and after the dive, as well as comments about the dive. All the data for a single dive go on a single line of text, following the order of the column headings.
2. *CSV dive profile*: This dive log format includes much more information about a single dive. For instance there may be information at 30-second intervals, indicating depth, water temperature, and cylinder pressure at that moment in time. Each line contains the information for a single instant in time during the dive, 30 seconds after that of the previous instant. Many lines are required to complete the depth profile information for a single dive. This is a common export format used by closed-circuit rebreather (CCR) dive equipment and many software packages that handle dive computer data and/or dive logs.

Before being able to import the CSV data to *Subsurface* **you need to know a few things about the data being imported**:

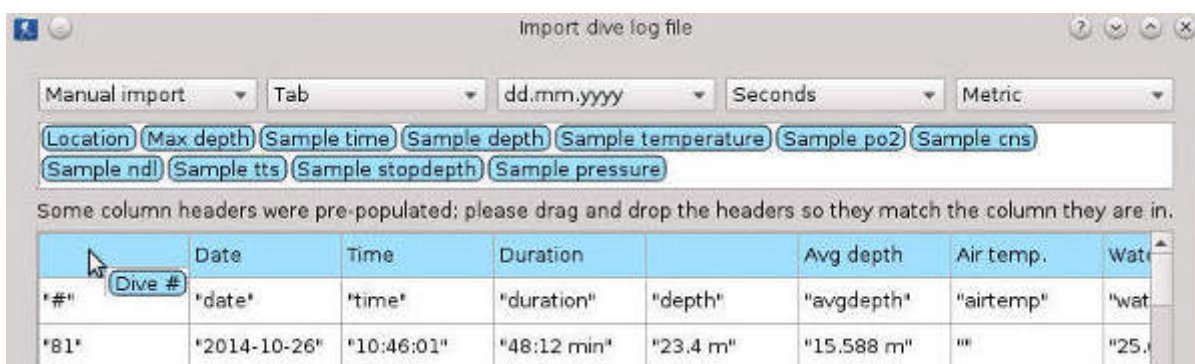
- a. Which character separates the different columns within a single line of data? This field separator should be either a comma (,) a semicolon (;) or a TAB character. This can be determined by opening the file with a text editor. If it is comma-delimited or semicolon-delimited, the comma or semicolon characters between the values are clearly visible. If these are not evident and the numbers are aligned in columns, the file is probably TAB-delimited (i.e. it uses a TAB as a field separator).
- b. Which data columns need to be imported into *Subsurface*? Is it a *CSV dive details* file or a *CSV dive profile* file? Open the file using a text editor and note the titles of the columns to be imported and their column positions.
- c. Is the numeric information (e.g. dive depth) in metric or in imperial units?

With this information, importing the data into *Subsurface* is straightforward. Select *Import* → *Import Log Files* from the main menu. In the resulting file selection menu, select *CSV files* (towards the bottom right). This shows all .CSV files in the selected directory. Select the file that needs to be imported. A configuration panel appears as depicted below:



At the top left, there is a dropdown list containing pre- configured settings for common dive computers and software packages. If the CSV file being imported originated from any of these pre-configured items, select it. Otherwise use the *Manual Import* option. The configuration panel also has dropdown lists for the specification of the appropriate field separator (Tab, comma or semicolon), the date format used in the CSV file, the time units (seconds, minutes or minutes:seconds), as well as the unit system (metric or imperial). Selecting the appropriate options among these is critical for successful data import.

Complete this by ensuring that all the data columns have the appropriate column headings. The top blue row of the data table contains the column headings found in the CSV data file. The blue row of balloons immediately above these contains the names understood by *Subsurface*. These balloons can be moved using a drag-and-drop action. For instance, *Subsurface* expects the column heading for Dive number (" # ") to be "Dive # ". If the column heading that *Subsurface* expects is not in the blue row, drag the appropriate balloon from the upper area and drop it in the appropriate blue cell at the top of the table. For example, to indicate the correct column for "Dive #", drag the ballooned item labelled "Dive # " and drop it in the blue cell immediately above the white cell containing " # ", depicted in the image below.



Continue in this way to ensure all the column headings in the blue row of cells correspond to the headings listed in the top part of the dialogue. When finished, select the *OK* button on the bottom right of the dialogue. The data from the CSV file are imported and shown in the **Dive List** panel.



## A Diver's Introduction to CSV Files



CSV is an abbreviation for a data file format: *Comma-Separated Values*. It is a file format that allows you to view or edit information using a text editor like Notepad (Windows), gedit (Linux) or TextWrangler (OS/X). There are two main advantages of the CSV format. First, the data are easily editable as text without any proprietary software. Second, all information is human-readable, not obscured by any custom or proprietary attributes that proprietary software inserts into files. Because of its simplicity the CSV format is used as an interchange format between many software packages, e.g. between spreadsheet, statistical, graphics, database and diving software. Within *Subsurface*, CSV files can also be used to import information from other sources like spreadsheet-based dive logs and some dive computers.

The most important attribute of a CSV file is the *field separator*, the character used to separate fields within a single line. The field separator is frequently a comma, a colon, a SPACE character or a TAB character. When exporting data from spreadsheet software, the field separator needs to be specified in order to create the CSV file. CSV files are normally organized into a single line that provides the headers (or *field names*) of the data columns, followed by the data, one record per line. Note that each field name may comprise more than one word separated by spaces; for instance *Dive site*, below. Here is an example of dive information for four dives using a comma as a field separator:

```
Dive site,Dive date,Time,Dive_duration, Dive_depth,Dive buddy
Illovo Beach,2012-11-23,10:45,46:15,18.4,John Smith
Key Largo,2012-11-24,09:12,34:15,20.4,Jason McDonald
Wismar Baltic,2012-12-01,10:13,35:27,15.4,Dieter Albrecht
Pulau Weh,2012-12-20,09:46,55:56,38.6,Karaeng Bontononpo
```

The above data are not easily read by a human. Here is the same information in TAB-delimited format:

Dive site	Dive date	Time	Dive_duration	Dive_depth	Dive buddy
Illovo Beach	2012-11-23	10:45	46:15	18.4	John Smith
Key Largo	2012-11-24	09:12	34:15	20.4	Jason McDonald
Wismar Baltic	2012-12-01	10:13	35:27	15.4	Dieter Albrecht
Pulau Weh	2012-12-20	09:46	55:56	38.6	Karaeng Bontononpo

It is clear why many people prefer the TAB-delimited format to the comma-delimited format. The disadvantage is that you cannot see the TAB characters. For instance, the space between *Dive* and *date* in the top line may be a SPACE character or a TAB character (in this case it is a SPACE character: the tabs are before and after *Dive date*). If the field names in the first line are long, the alignment with data in the other lines cannot be maintained. Here is a highly simplified and shortened TAB-delimited example of a CSV dive log from an APD closed-circuit rebreather (CCR) dive computer:



Dive Time (s)	Depth (m)	p0~2~ - Setpoint (Bar)	p0~2~ - C1 Cell 1 (Bar)
Ambient temp. (Celsius)			
0	0.0	0.70	0.81
0	1.2	0.70	0.71
0	0.0	0.70	0.71
0	1.2	0.70	0.71
0	1.2	0.70	0.71
10	1.6	0.70	0.72
20	1.6	0.70	0.71
30	1.7	0.70	0.71
40	1.8	0.70	0.68

When a CSV file is selected for import, *Subsurface* displays the column headers as well as some of the data in the first few lines of the CSV file, making it much easier to work with CSV files. CSV files can be used in many contexts for importing data into a *Subsurface* dive log. Knowing a few basic things about the content of the CSV file helps with a smooth import of the dives into *Subsurface*.



But, the CSV import has a couple of caveats. Avoid some special characters like ampersand (&), less than (<), greater than (>) and double quotes (") as part of the numbers or text within a cell. The file should use UTF-8 character set, if using non-ASCII characters. Also the size of the CSV file might cause problems. Importing 100 dives at a time (*CSV dive details*) works, but larger files might exceed the limits of the parser used. When encountering problems with CSV imports, first try with a smaller file to make sure everything works.

## 5.4. Importing Dive coordinates from a mobile device with GPS.

A smartphone with built-in GPS facilities can be used to store the locations of dives. This is performed by:

- 1) Taking the mobile device along on the dive boat / liveaboard while automatically collecting dive site coordinate information.
- 2) Uploading the coordinates from the mobile device to the *Subsurface* Internet server.
- 3) Synchronising the dives in the *Subsurface* dive list with the coordinates stored on the *Subsurface* Internet server.

*Subsurface* has two tools for achieving this:

- The *Subsurface Companion App* (Android and iOS).
- The *Subsurface-mobile* app (Android and iOS)

Both of these applications perform the collection of dive site coordinates and the synchronisation

with dives in the *Subsurface* dive list. However, the Companion App is not being further developed and has largely been replaced by the *Subsurface-mobile* app. While the *Companion app* serves exclusively to collect dive site coordinates and to make these available to the *Subsurface* desktop version, *Subsurface-mobile* performs many of the functions of the desktop version, including the management and viewing of dive information. Below, we describe how to perform the above three steps using each of the two mobile apps.

For information on using the *Subsurface Companion App*, click [here](#).

### 5.4.1. Storing and using GPS locations using *Subsurface-mobile*

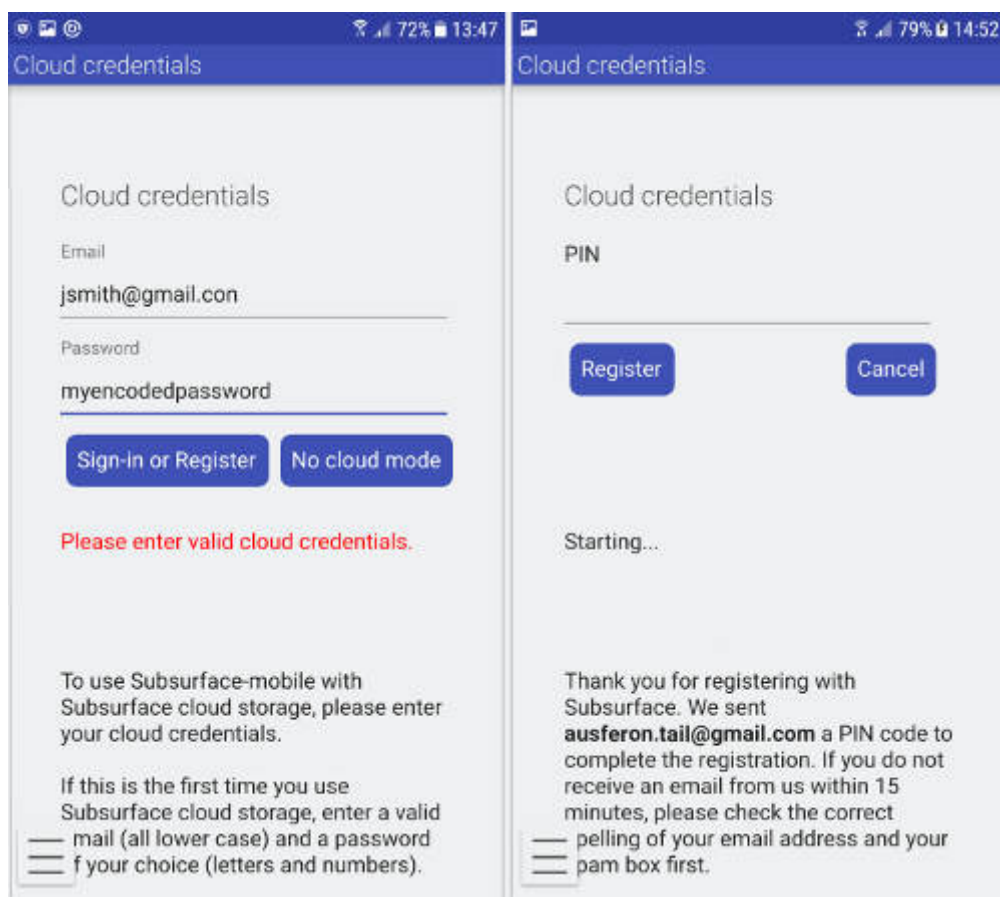
#### Install *Subsurface-mobile*

Find *Subsurface-mobile* on Google Play and install it on an Android device. The app is free. The iOS version is currently experimental. *Subsurface-mobile* has an extensive [user manual](#) accessible from within that app.

#### Create a *Subsurface-mobile* account

This topic is discussed at length in the *Subsurface-mobile* user manual. In the Credentials screen of *Subsurface-mobile* provide an e-mail address and a user password that enables subsequent access. A PIN number is e-mailed from the *Subsurface* Internet server to the e-mail address that has been provided. Type the PIN into the appropriate text field in the Credentials screen (see image below). The *Subsurface* Internet server notifies the user that a new user has been registered.

**N.B.:** To successfully create a user account, the mobile device must have Internet connectivity, either through the cellular network or via wifi.



## Configure auto-collecting of GPS coordinates

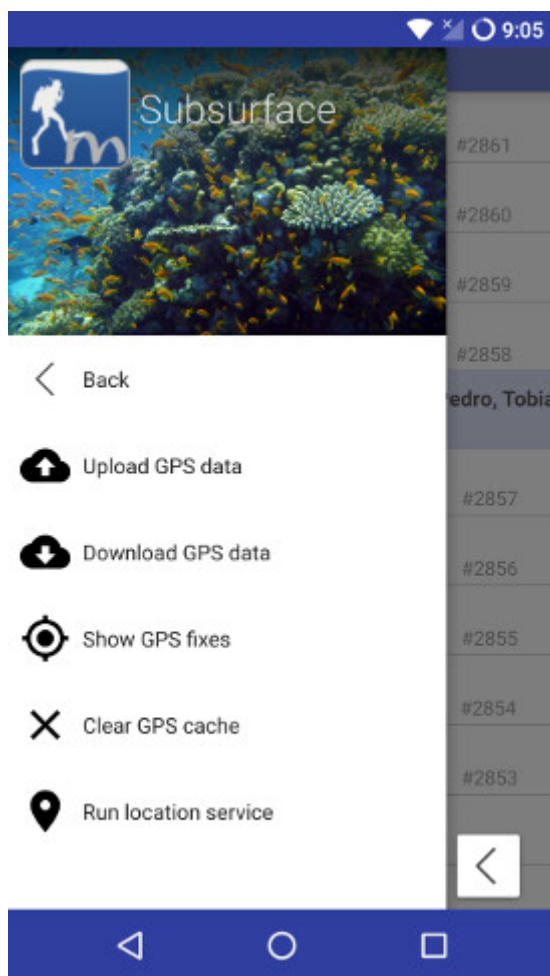
Activate the main menu of *Subsurface-mobile* by selecting the "hamburger" menu button at the bottom left of the *Subsurface-mobile* screen (see image above), then select *GPS* → *Preferences* (see image below). The collection of GPS locations is done in the background and automatically, using two settings:

- *Time threshold*. (minutes). The app will try to get a location every X minutes
- *Distance threshold*. (meters). Minimum distance between two locations.

**How are GPS coordinates collected?** Assuming the diver sets 5 minutes and 50 meters in the settings above, the app will start by recording a location at the current location, followed by another one at every 5 minutes **or** every time you move 50 m from previous location, whichever happens first. If subsequent locations are within a radius of 50 meters from the previous one, a new location is not saved. If the diver is not moving, only one location is saved, at least until the *Time-threshold* period has elapsed. If the diver moves, a trace of the route is obtained by saving a location every 50 meters.

## Activate the automated recording of GPS locations

The *Subsurface-mobile* GPS menu has an option at the bottom labeled *Run location service* (see image below). Selecting this starts the automated recording of GPS positions.



## After the dive, stop the automated recording of GPS locations

Select the menu option *Disable location service* at the bottom of the *Subsurface-mobile* GPS menu.

## Upload the GPS locations onto the *Subsurface* Internet server.

**N.B.:** Uploading the GPS locations to the Internet can only take place if the mobile device has reliable access to the Internet, either via a cellular network or via a wifi connection. If the Internet is not accessible from the dive site(s), then GPS uploading can only take place after the dive or after the dive trip, when an Internet connection has been re-established.

From the *Subsurface-mobile* main menu, select *GPS* → *Upload GPS data*. The locations are uploaded.

## Apply the stored GPS locations to dives on the *Subsurface* dive list.

*Subsurface* collects the first GPS location recorded after the start of a dive (obtained within *Subsurface* from either the dive computer or from the manually-entered dive information) and before the end of a dive. These coordinates are shown in the *Coordinates* field of the dive site panel for each dive. Within the dive site panel, provide a name for the coordinates that have been assigned to the dive, following the instructions under the heading above [Location management](#).

The [user manual for \*Subsurface-mobile\*](#) (accessible from within that app) contains detailed instructions for performing the collection of GPS data and for managing, uploading and synchronising this information.

## 5.4.2. Importing GPS coordinates with the *Subsurface Companion App* for mobile phones

Using the **Subsurface Companion App** on an *Android* device or *iPhone* with GPS, the coordinates for the diving location can be automatically passed to the *Subsurface* dive log. The Companion App stores dive locations on a dedicated Internet server. *Subsurface* can collect the locations from the server. To do this:

### Create a Companion App account

- Register on the [Subsurface companion web page](#). A confirmation email with instructions and a personal **DIVERID** will be sent, a long number enabling access to the file server and Companion App capabilities.
- Download the app from [Google Play Store](#) or from [F-Droid](#).

### Using the *Subsurface* companion app on an Android smartphone

On first use the app has three options:

- *Create a new account*. Equivalent to registering in the *Subsurface* companion page using an Internet browser. You can request a **DIVERID** using this option, but it's supplied via email and followed up by interaction with the [Subsurface companion web page](#) to activate the account.
- *Retrieve an account*. If you forget your **DIVERID** you will receive an email to recover the ID string.

- Use an existing account. You are prompted for your **DIVERID**. The app saves this **DIVERID** and doesn't ask for it again unless you use the *Disconnect* menu option (see below).



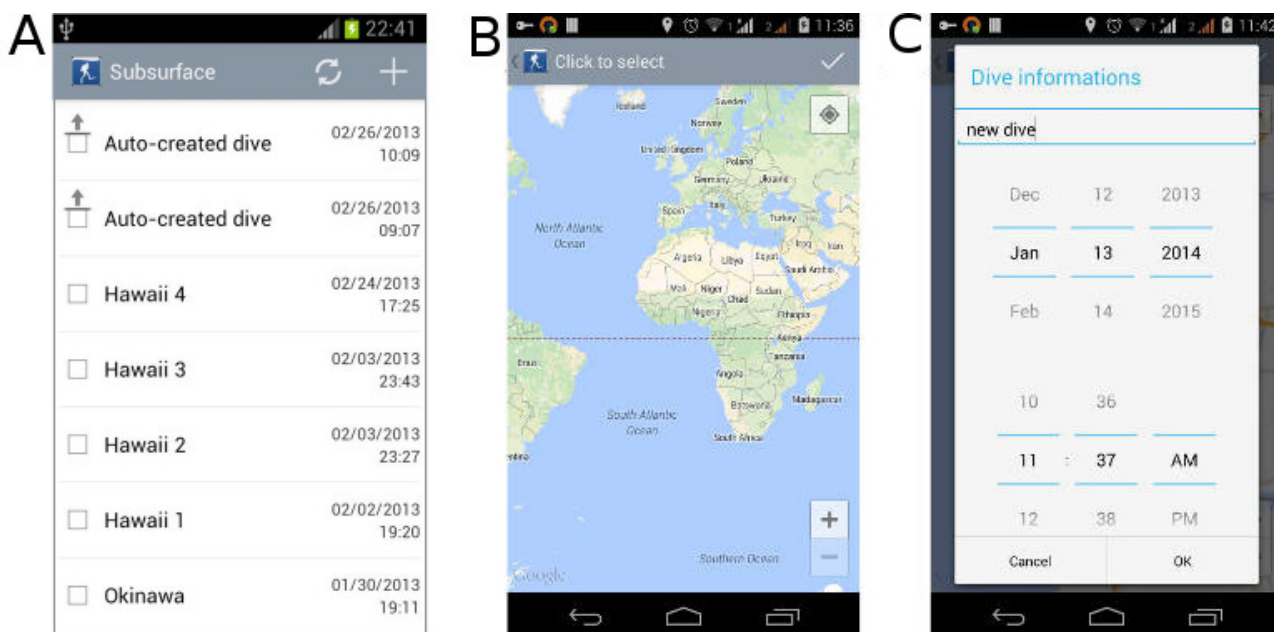
In the *Subsurface* main program, the **DIVERID** should also be entered on the Default Preferences panel, by selecting *File* → *Preferences* → *General* from the main menu in *Subsurface* itself. This helps synchronization between *Subsurface* and the Companion App.

## Creating new dive locations

Now you are ready to get a dive position and send it to the server. The Android display looks like the left hand image (A) below, but without any dives.

Touch the + icon at the top right to add a new dive site. A menu with 3 options shows:

- Current: A prompt for a place name is shown (or a request to activate the GPS if it is turned off), after which the current location is saved.
- Use Map: This option allows you to fix a position by searching a world map. A world map is shown (see B below). Specify the desired position with a *long press* on the touch sensitive screen (if the marked location is wrong, simply choose a new location) and select the check symbol in the upper right. A dialog is shown allowing you to enter the name of the dive location and the date and time of the dive (see C below). In order to import this dive location in *Subsurface*, set the time to agree with the time of that dive on the dive computer.



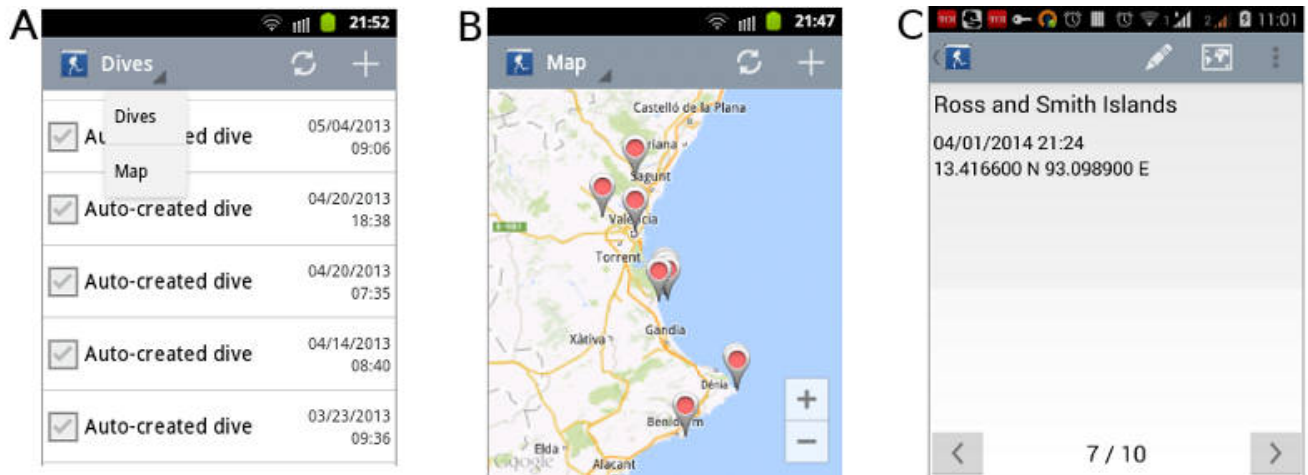
- Import local GPX file: The Android device searches for .gpx files and located archives will be shown. The selected .gpx file is opened and its locations shown. Now select the appropriate locations, and select the check symbol in the upper right to add them.

## List of dive locations

The main screen shows a list of dive locations, each with a name, date and time (see A below). Some locations may have an arrow-up icon over the selection box to the left showing they need to be uploaded to the server. You can select individual dive locations from the list. A selected location has

a check mark in the selection box on the left. Group operations (like *Delete* or *Send*) are performed on several selected locations.

Dive locations in this list can be viewed in two ways: a list of locations or a map showing them. The display mode (List or Map) is changed by selecting *Dives* at the top left of the screen (see **A** below) and then selecting the display mode. The display mode can be changed either from the list of locations or from the map (see **B** below). Upon selecting a location (on the list or on the map), an editing panel opens (see **C** below) where the dive description or other details may be changed.



Upon selecting a dive (**not** selecting the check box), the name given to it, date/time and GPS coordinates are shown with two options at the top of the screen:

- Edit (pencil): Change the name of the dive location.
- Maps: Display a map showing the dive location. After editing and saving a dive location (see **C** above), upload it to the web service, as explained below.

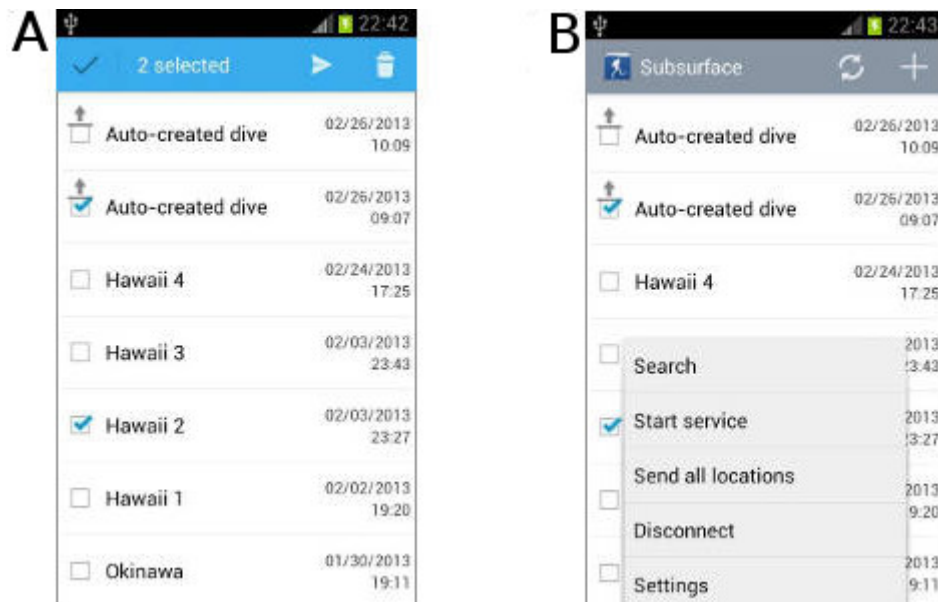
### Uploading dive locations

There are several ways to send locations to the server. The easiest is simply selecting the locations (See **A** below) and then touching the right arrow at the top right of the screen.



Be careful! The trash icon on the right means exactly what it should; it deletes the selected dive location(s).





After a dive trip using the Companion App, all dive locations are ready to be downloaded to a *Subsurface* dive log (see below).

### Settings on the Companion App

Selecting the *Settings* menu option results in the right hand image above (B).

#### Server and account

- *Web-service URL*. This is predefined (<http://api.hohndel.org/>)
- *User ID*. The DIVERID obtained by registering as described above. The easiest way to get it is to copy and paste from the confirmation email or just type it in.

#### Synchronisation

- *Synchronize on startup*. If selected, dive locations in the Android device and those on the web service synchronize each time the app is started.
- *Upload new dives*. If selected, each time the user adds a dive location it is automatically sent to the server.

#### Background service

Instead of entering an unique dive location, you can leave the service running in the background, allowing a continuous collection of GPS locations.

The settings below define the behavior of the service:

- *Min duration*. In minutes. The app will try to get a location every X minutes until stopped by the user.
- *Min distance*. In meters. Minimum distance between two locations.
- *Name template*. The name the app will use when saving the locations.



*How does the background service work?* Assuming the diver sets 5 minutes and 50 meters in the settings above, the app will start by recording a location at the current location, followed by another one at every 5 minutes **or** every time one moves 50 m from previous location. If subsequent locations are within a radius of 50 meters from the previous one, a new location is not saved. If the diver is not moving, only one location is saved. If the diver is moving, a trace of the route is obtained by saving a location every 50 meters.

#### *Other*

- *Mailing List.* The mail box for *Subsurface*. Users can send an email to the Subsurface mailing list.
- *Subsurface website.* A link to the URL of Subsurface web
- *Version.* Displays the current version of the Companion App.

#### *Search*

Search the saved dive locations by name or by date and time.

#### *Start service*

Starts the *background service* following the previously defined settings.

#### *Disconnect*

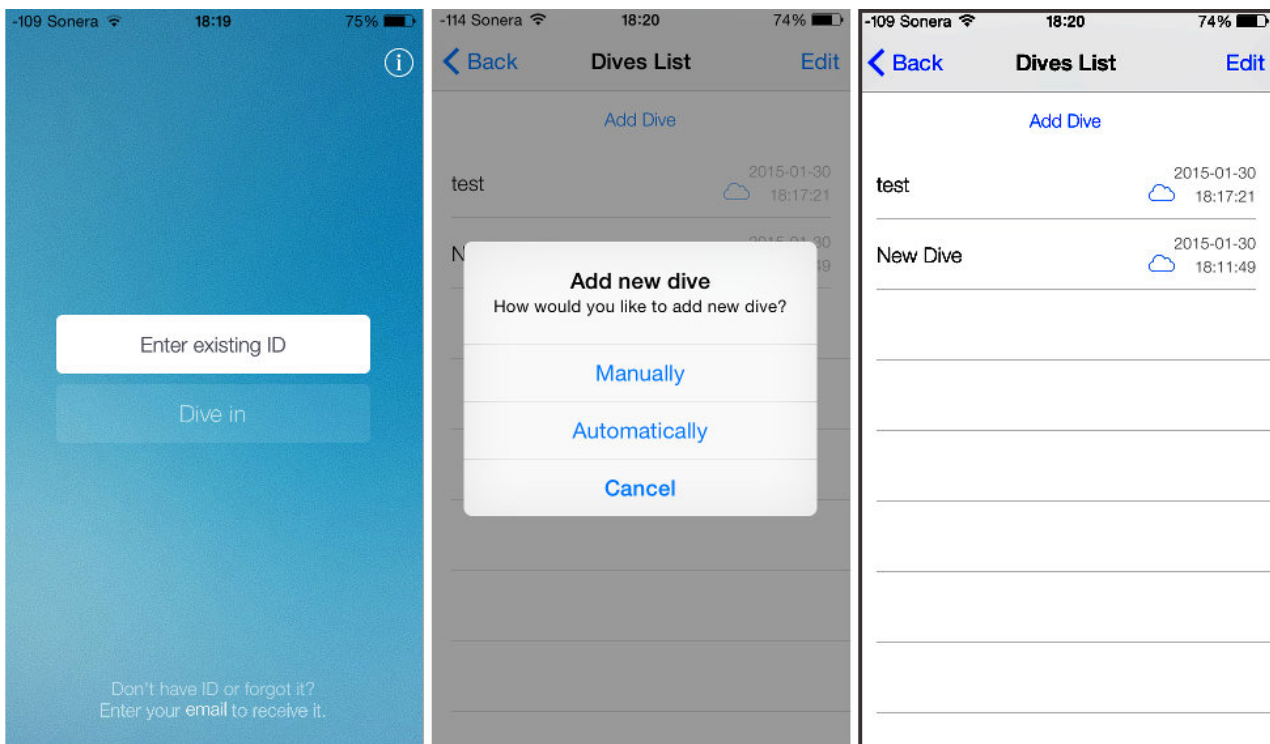
This is admittedly a badly named option that disconnects the app from the server. It resets the user ID in the app, showing the first screen where an account can be created, retrieve the ID for an existing account or use the users own ID. The *Disconnect* option is useful if the Android device was used to download the dive locations of another registered diver.

#### *Send all locations*

This option sends all locations stored in the Android device to the server.

### **Using the Subsurface companion app on an iPhone to record dive locations**

The iPhone interface is quite simple. Type the user ID (obtained during registration) into the space reserved for it, then select "Dive in" (see left part of the image below) and start collecting dive location information.

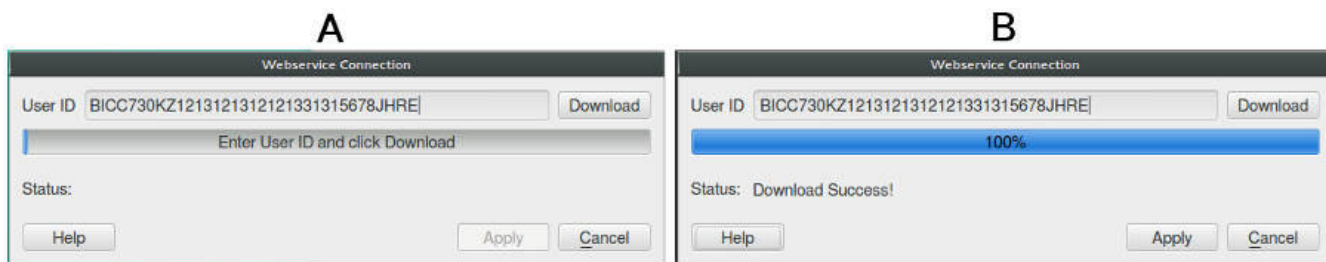


Dives can be added automatically or manually. In manual mode, a dive location or waypoint is added to the GPS input stream. In automatic mode, a continuous path of GPS locations is created from which, after import, Subsurface can select the appropriate GPS locations based on the times of dives. The default mode for the *iphone* is automatic. When adding a dive, the location service is started automatically and a red bar appears at the bottom of the screen. After the dive, click on the red bar to end the location service. While the location service is running you can only add dives manually.

You can edit the site name afterwards by selecting the dive from the dive list and clicking on the site name. There are no other editable fields. The dive list is automatically uploaded from the iPhone to the web service. There is no option to trigger upload manually.

### Downloading dive locations to the *Subsurface* divelog

Download dive(s) from a dive computer or enter them manually into *Subsurface* before obtaining the GPS coordinates from the server. The download dialog can be reached via *Ctrl+G* or from the *Subsurface* Main Menu *Import* → *Import GPS data from Subsurface Service*, resulting in the image on the left (A), below. On first use the DIVERID text box is blank. Provide a DIVERID, then select the *Download* button to start the download process, after which the screen on the right (B) below appears:



Note that the *Apply* button is now active: selecting it updates the locations of the newly entered or uploaded dives in *Subsurface*, i.e. it applies the coordinates and names entered on the app to all the

new dives that match the date-times of the uploaded GPS localities. The names of dive locations entered within *Subsurface* (i.e. before downloading the GPS coordinates) have precedence over downloaded dive locations.

Since *Subsurface* matches GPS locations from the mobile device and dive information from the dive computer based on date-time data, automatic assignment of GPS data to dives depends on agreeing date-time information between the two devices. Although *Subsurface* has a wide range tolerance, it may not be able to identify the appropriate dive if there is a large difference between the time in the dive computer and that of the Android device. This results in no updates.

Similar date-times may not always be possible and there may be many reasons for this (e.g. time zones). *Subsurface* may also be unable to decide which is the correct position for a dive (e.g. on repetitive dives while running *background service* there may be several locations that would be included in the time range that fit not only the first dive, but one or more subsequent dives as well). A workaround to manually edit the date-time of a dive in the *Subsurface* Dive List **before** downloading the GPS data and then to change the date-time back again **after** downloading GPS data.



#### TIPS:

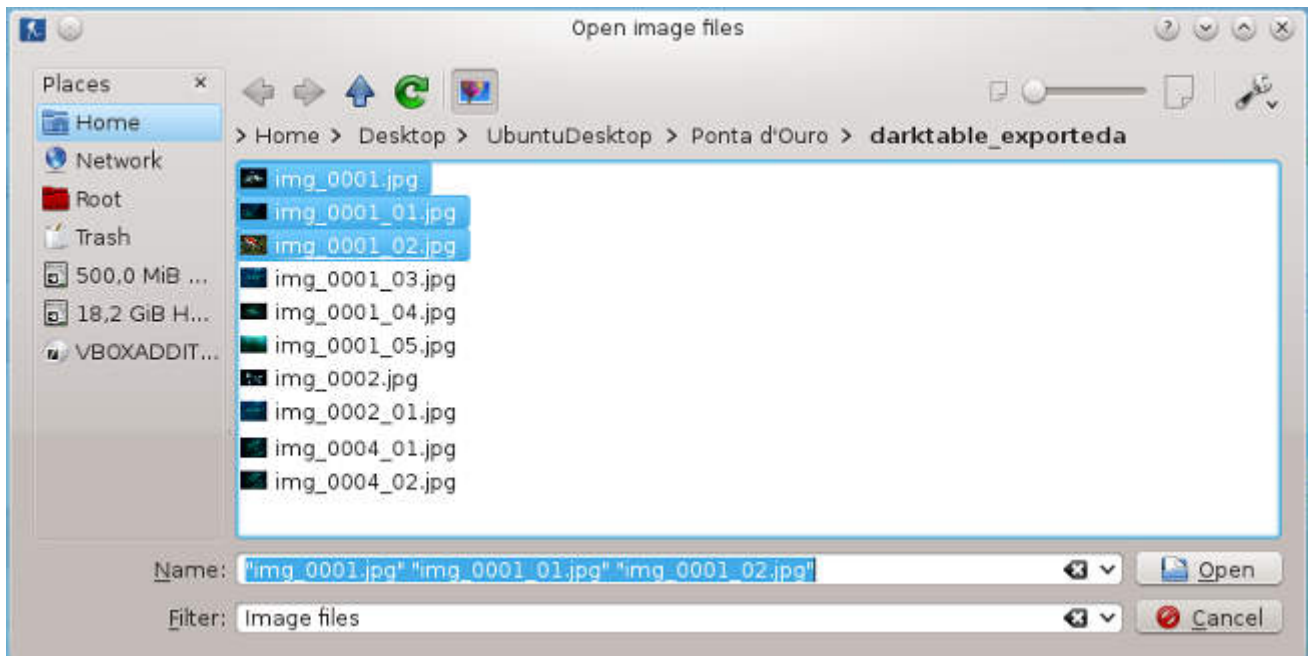
- *Background service* may fill the location list with unnecessary locations that don't correspond to the exact dive point but do correspond to the boat's route. Right now, these locations are difficult to delete from the server. In some situations it is better to clean up the list on the mobile device before sending the dive points to the web server by simply deleting the inappropriate locations. This might be necessary, for instance, to keep the location list clear to see dives in the web service map display (see above).
- It may also be useful to give informative names to the locations sent to the web server, or at least to use an informative name in the *Name Template* setting while running the *background service*, especially on a dive trip with many dives and dive locations.

## 5.5. Adding photographs to dives

Many (if not most) divers take photographs during a dive. *Subsurface* allows the storage and display of photographs for each dive. Photos are superimposed on the dive profile at the times during the dive when they were taken. They can also be viewed from the dive profile.

### 5.5.1. Loading photos and synchronizing between dive computer and camera

Right-click on a dive or on a group of dives on the dive list, bringing up the [Dive list context Menu](#). Select the appropriate option to import images either from file or from the Internet. The system file browser appears. Select the folder and photographs that need to be loaded into *Subsurface* and click the *Open* button.



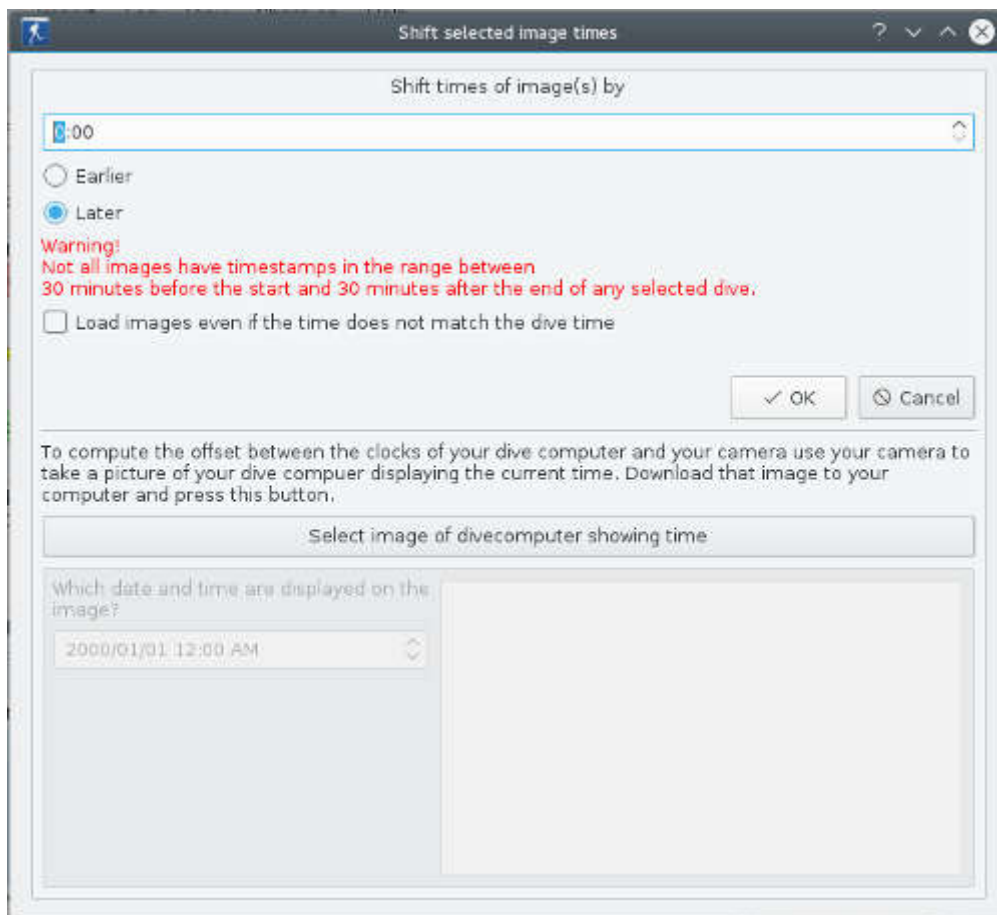
If photos are imported from the Internet, provide a URL pointing to a single photograph. If the URL points to a directory, no images are imported: photos from the Internet need to be imported one at a time. If photos are loaded from the Internet, *Subsurface* assumes there is an Internet connection each time this photo is viewed within *Subsurface*.

Having selected the local folder or Internet image to be imported, the time synchronization dialog appears (see image below). The time synchronization is not perfect between the dive computer used during a dive and the camera used during that same dive. These two devices often differ by several minutes. *Subsurface* attempts to synchronize these two devices so that the exact times of photographs can be used to position photographs on the dive profile.

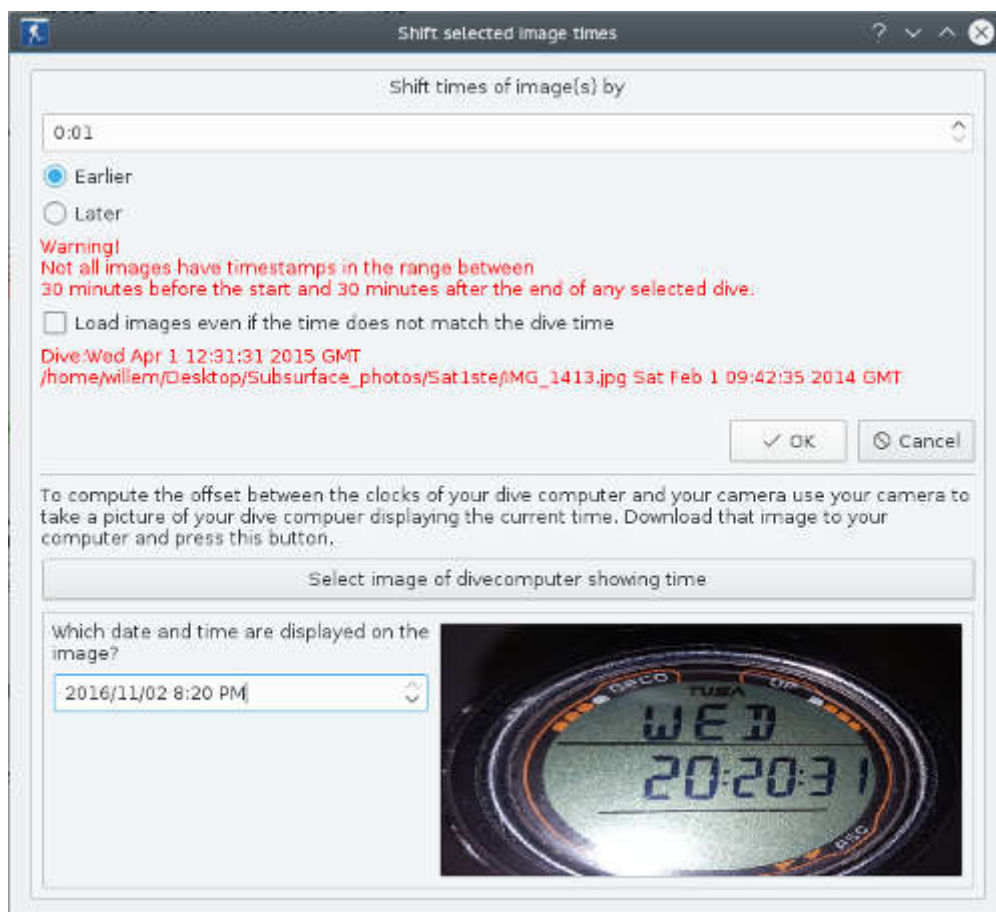
*Subsurface* synchronizes camera with dive computer in three ways:

- **Pro-actively:** Before the dive, ensure synchronization of the dive computer time settings with the time settings of the camera by changing the date-time settings on one or both of these devices.
- **Manually:** Writing down the exact camera time at the start of a dive allows using the difference in time between the two devices. As long as the device settings for time has not been changed in either device, the times of both devices after the dive or even at the end of the day allows manually setting the time difference in the *Time shift* dialog (see image below). Towards the top of the dialog is a time setting tool immediately under the heading *Shift times of image(s) by*, in the image below. If the camera time is 7 minutes later than that of the dive computer, set the time setting tool to a value of 00:07 and select the *Earlier* radio button. This is appropriate, since the photos need to be shifted 7 minutes earlier (camera is 7 minutes ahead of dive computer). Ignore any "AM" or "PM" suffix in that tool. Click the *OK* button and synchronization is done.





- **By photograph:** There is a very slick way of achieving synchronization, requiring a photograph of the face of the dive computer showing the time. *Subsurface* gets the exact time the photograph was taken, using the metadata the camera stores within each photo and compares this with the time visible on the photo. To do this, use the bottom half of the *Time shift* dialog. In this case the top part of the dialog is ignored. Click on the horizontal bar called *Select image of dive computer showing time*. This brings up a file browser for selecting the photograph of the dive computer time. Select the photograph using the file browser and click on *OK*. This photograph of the dive computer appears in the bottom panel of the *Shift times* dialog. Now *Subsurface* knows exactly when the photograph was taken. Now set the date-time dialog to the left of the photo so it reflects the date and time of the dive computer in the photo. When the date-time tool has been set, *Subsurface* knows exactly what the time difference between camera and dive computer is, and it can synchronize the devices. The image below shows a photograph of the face of the dive computer and with the date-time tool set to the date-time.



If the timestamp of a photograph is more than 30 minutes before or after the dive, it is not placed on the dive profile (see the red warning in the image above). However, If the appropriate checkbox is selected (see image above) these images can still be placed on the *Photos* tab of the **Notes** panel so that all photos associated with a dive are visible, including photos taken before or after the dive.

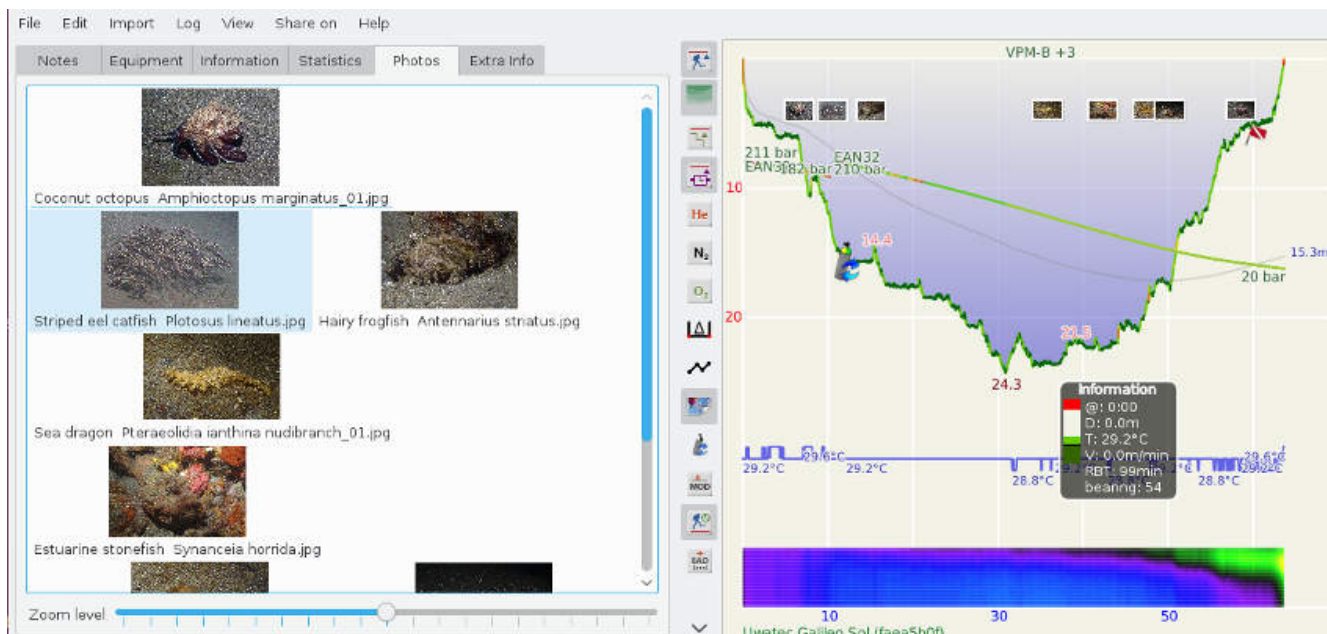
### 5.5.2. Viewing the photos

After the images have been loaded, they appear in two places:

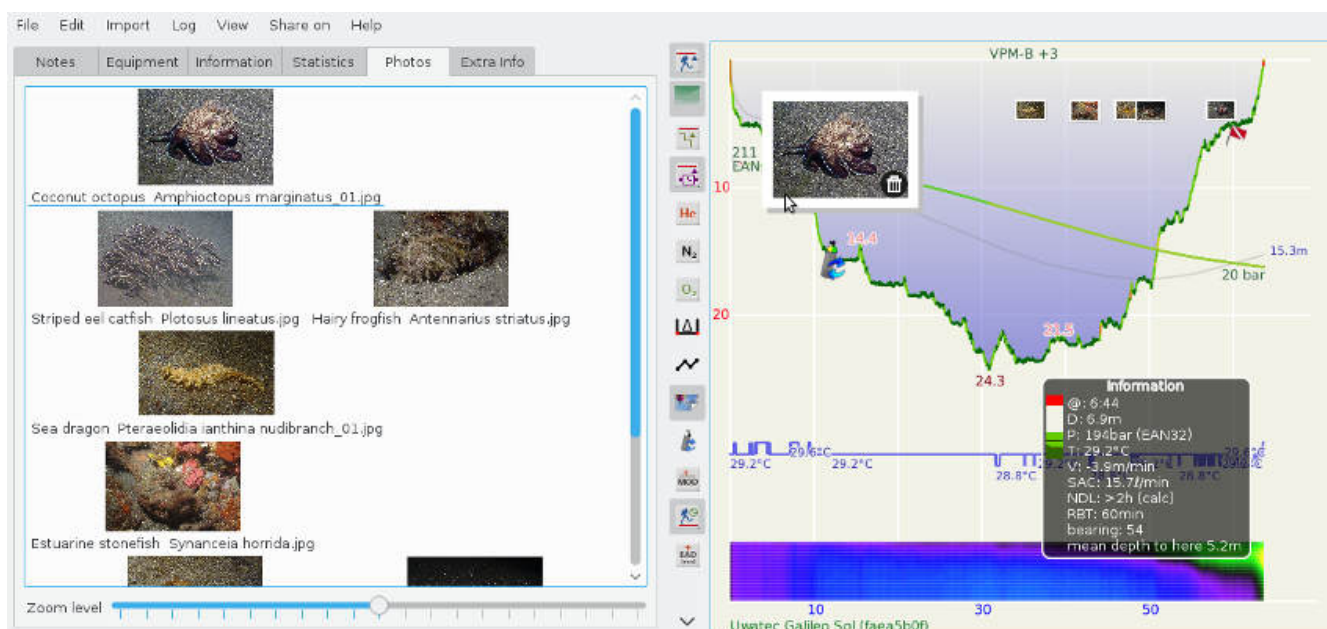
- the *Photos* tab of the **Notes** panel (left part of image below).
- as tiny icons (stubs) on the dive profile at the appropriate positions reflecting the time each photograph was taken. To view the photos on the dive profile, activate the *show-photos* button in the tool bar to the left of the dive profile:



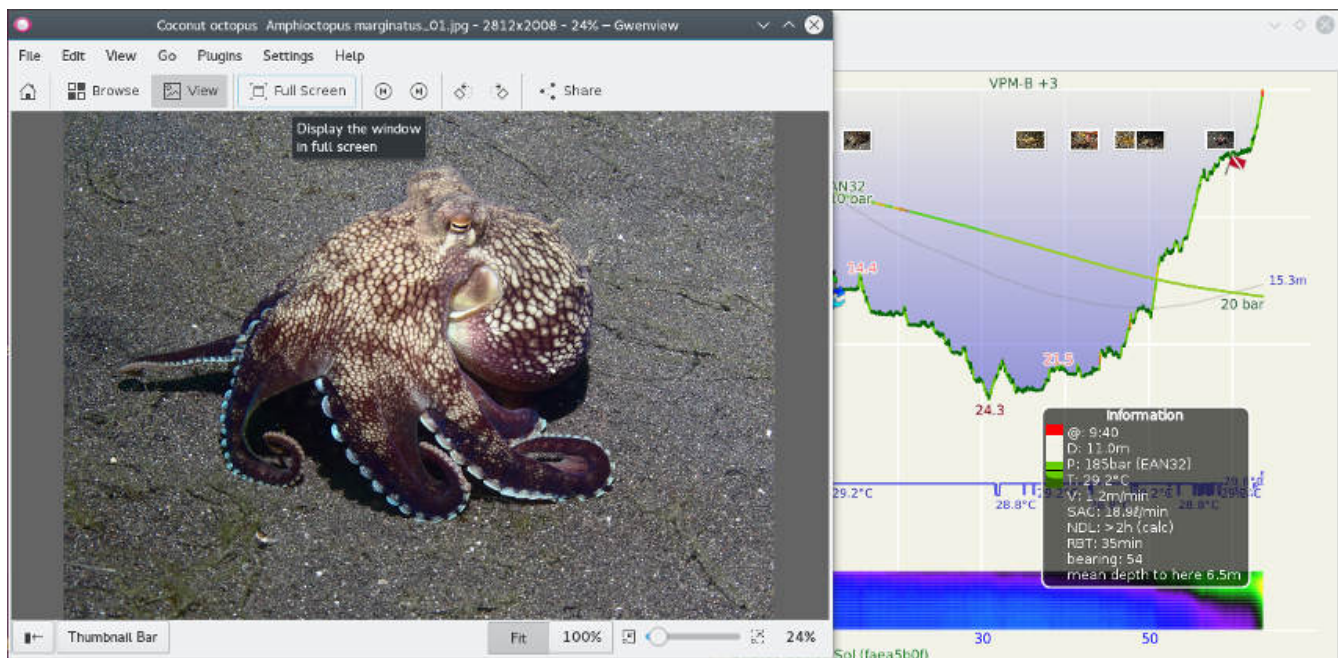
This results in a profile display as in the image below:



Hover the mouse over any of the photo stubs. A thumbnail photo is shown of the appropriate photo. See the image below:



Clicking on the thumbnail brings up a full size photo overlaid on the *Subsurface* window, allowing a good view of the photographs (see the image below). **Note** that the thumbnail has a small dustbin icon in the bottom right hand corner (see image above). Selecting the dustbin removes the image from the dive. Be careful when clicking on a thumbnail. Images can also be deleted using the *Photos* tab (see text below).



### 5.5.3. The Photos tab

Photographs associated with a dive are shown as thumbnails in the *Photos* tab of the *Notes* panel. Photos taken in rapid succession during a dive (therefore sometimes with large overlap on the dive profile) can easily be accessed in the *Photos* tab. This tab serves as a tool for individually accessing the photos of a dive, while the stubs on the dive profile show when during a dive a photo was taken. The size of the thumbnails in the *Photos* tab can be changed using the *Zoom level* slider at the bottom of the panel. Single-click a thumbnail in the *Photos* panel to select a photo. Double-click a thumbnail to view the full-sized image, overlaying the *Subsurface* window. Delete a photo from the *Photos* panel by selecting it (single-click) and then by pressing the *Del* key on the keyboard. This removes the photo BOTH from the *Photos* tab as well as the dive profile.

### 5.5.4. Photos on an external hard disk

Most underwater photographers store photos on an external drive. If such a drive can be mapped by the operating system (almost always the case) the photos can be directly accessed by *Subsurface*. This eases the interaction between *Subsurface* and an external repository of photos. When associating a dive profile with photos from an external drive, the normal procedure of selection and synchronization (see text above) is used. After the external drive has been disconnected, *Subsurface* cannot access these photos any more. If the display of photos is activated (using the toolbox icon to the left of the *Dive Profile*), the program shows a small white dot where each photo should be on the dive profile. In addition the *Photos* tab shows only the file names of the photos. If the external drive with the photos is re-connected, the photos can be seen in the normal way.

### 5.5.5. Finding out which dives have associated photos.

Inspecting each individual dive in order to determine whether there are associated photos can be time consuming. There is a rapid way of seeing which dives have associated photos and which not: activate the *Photos* checkbox in the dropdown list obtained by right-clicking on the header bar of the **Divelist**. In the **Divelist**, all dives with associated photographs have an icon indicating whether the photographs were taken during the dive, just before/after the dive or both during and



before/after the dive. More information is provided in the section dealing with [photo icons on the Divelist](#).

### 5.5.6. Moving photographs among directories, hard disks or computers

After a photograph has been loaded into *Subsurface* and associated with a specific dive, *Subsurface* saves the directory path where the photo lies as well as the file name of the photo, in order to find it when the dive is opened again. If the photo or the whole photo collection is moved to another drive or to a different machine, the path to the photo changes. Now, *Subsurface* looks for the photos at their original location before they were moved, cannot find them and cannot display them. Because, after moving photos, large numbers of photos may need to be deleted and re-imported from the new location, *Subsurface* has a mechanism to ease this inconvenience: automatic updates using fingerprints.

When a photo is loaded into *Subsurface*, a fingerprint for the image is calculated and stored with the other reference information for that photo. After moving a photo collection (that has already been loaded into *Subsurface*) to a different directory, disk or computer, *Subsurface* can:

- look through a particular directory (and all its subdirectories recursively) where photos have been moved to,
- calculate fingerprints for all photos in this directory, and
- if there is a match between a calculated fingerprint and the one calculated when a photo was originally loaded into *Subsurface* (even if the original file name has changed), automatically update the directory information so that *Subsurface* can find the photo in the new moved directory.

This is done by selecting from the Main Menu: *File* → *Find moved images*. This brings up a window within which the NEW directory of the photos needs to be specified. Select the appropriate directory and click the *Scan* button towards the bottom right of the panel. The process may require several minutes to complete, after which *Subsurface* will show the appropriate photographs when a particular dive is opened.

#### Upgrading legacy photo collections without fingerprints



*Subsurface* automatically calculates fingerprints for all images that it can access. When manipulating images, ensure that all the images associated with the dive log can be accessed by *Subsurface*.

*Subsurface* automatically checks and, if necessary, updates the fingerprints associated with a single dive if:

- The images associated with that dive are visible as thumbnails on the **Dive Profile**.
- If you edit anything in the **Notes** panel and save the edits by selecting *Apply changes*.



## 5.6. Logging special types of dives

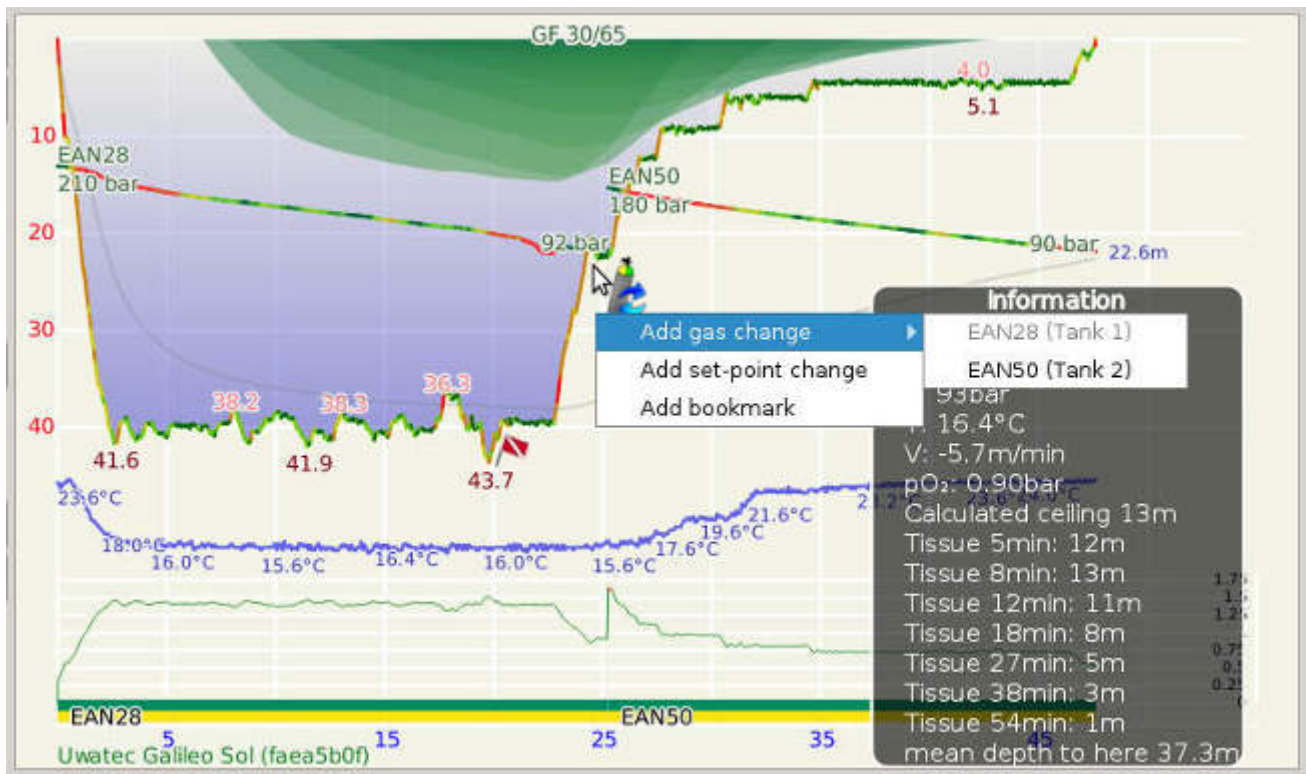
This section gives examples of the versatility of *Subsurface* as a dive logging tool.

### 5.6.1. Multicylinder dives

*Subsurface* easily handles dives involving more than one cylinder. Multi-cylinder diving usually happens (a) if a diver doesn't have enough gas for the complete dive in a single cylinder; (b) if a diver needs more than one gas mixture because of the depth or the decompression needs of the dive. For this reason multi-cylinder dives are often used by technical divers who dive deep or long. As far as *Subsurface* is concerned, there are only two types of information that need to be provided:

- **Describe the cylinders used during the dive** This is performed in the **Equipment tab** of the **Info** panel, as [described above](#). Enter the cylinders one by one, specifying its size and pressure, as well as the gas composition within it.
- **Record the times at which the switch from one cylinder to another was done:** This is information tracked by some dive computers (provided the diver indicated these changes to the dive computer by pressing specific buttons). If the dive computer does not provide the information, the diver has to record these changes using a different method, e.g. writing it on a slate or by creating a bookmark on the dive computer.
- **Record the cylinder changes on the dive profile:** If the latter option was followed, the diver needs to indicate the gas change event by right-clicking at the appropriate point in time on the **Dive Profile** panel and indicating the cylinder to which the change was made. After right-clicking, follow the context menu to "Add gas change" and select the appropriate cylinder from those defined during the first step, above (see image below). If the **gas bar** button in the toolbar has been activated, the cylinder switches are also indicated in the gas bar (image below).

When this is complete, *Subsurface* indicates the appropriate use of cylinders in the dive profile. Below is a two-cylinder dive, starting off with EAN28, then changing cylinders to EAN50 after 26 minutes for decompression.



Several dive computers perform automatic recording of cylinder pressure. In this case no manual intervention is needed. Older dive computers (e.g. Uwatec Galileo, several Suunto models) handle more than one pressure transducer on cylinders, switching from one sensor to another as the diver switches among cylinders and providing a sequential record of cylinders pressures during a dive. Some of the latest models (e.g. Shearwater Perdix AI, Scubapro G2) record two or more pressure transducers concurrently and continuously during the whole dive. In these cases *Subsurface* correctly interprets the data. There is continuous effort within the *Subsurface* development team to add new dive computer models to those that can be downloaded from and to represent cylinder pressures correctly. Regardless of the type of sensor handling of dive computers, technical divers are likely to use both automated and manual methods of cylinder pressure logging when more than two gases are used. However, automated recording of cylinder pressure simplifies logging of sidemount dives (where two cylinders are used). See the [list of supported dive computers](#).

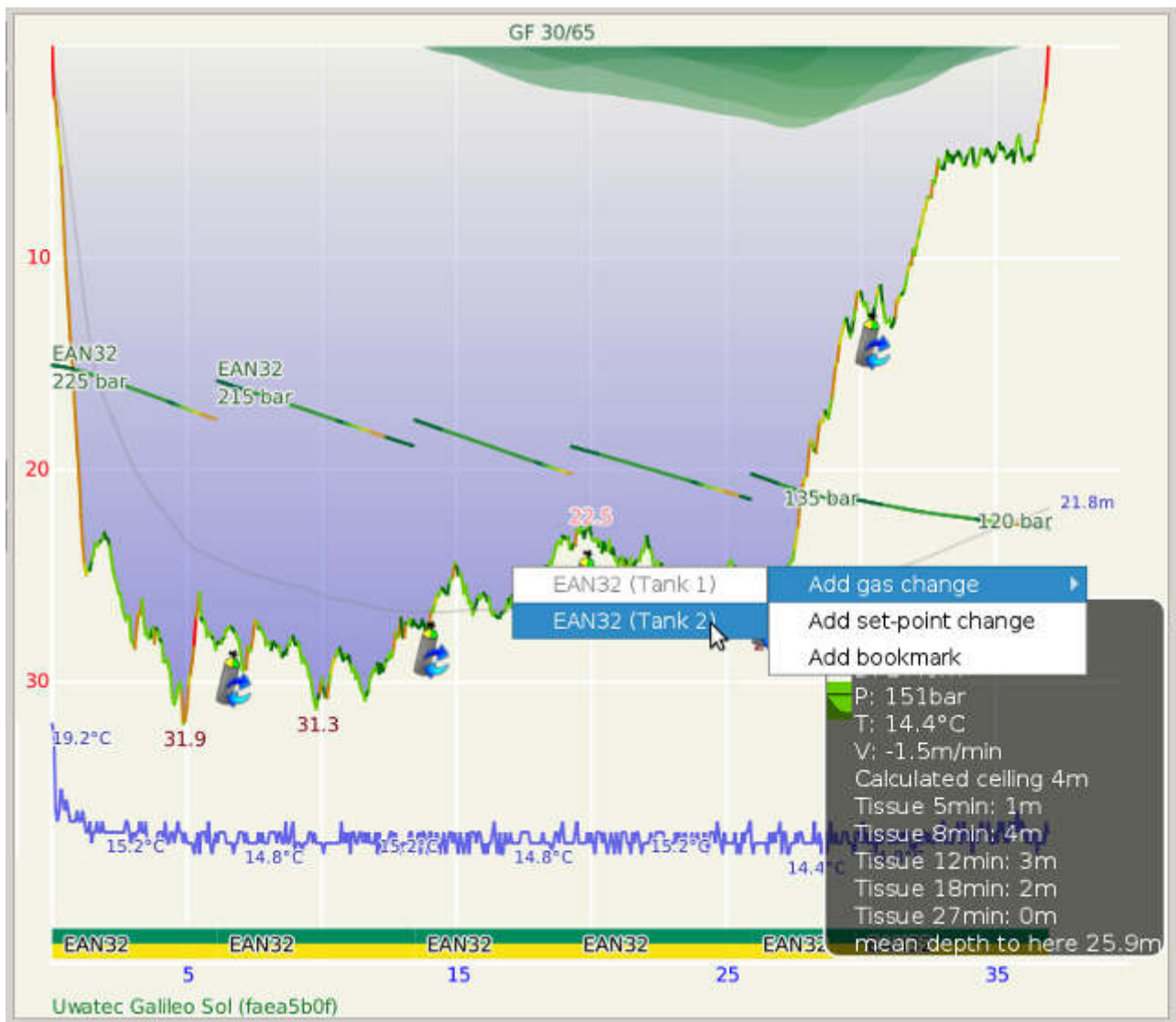
### 5.6.2. Sidemount dives

Sidemount diving is just another form of multi-cylinder diving, often with both or all cylinders having the same gas mixture. Although it's a popular configuration for cave divers, sidemount diving can be done by recreational divers who have completed the appropriate training. See the comments in the last paragraph, above, about automated recording of cylinder pressures. Manual logging of cylinder pressures during sidemount involves three steps, exactly as with multi-cylinder dives above:

- **During the dive, record cylinder switch events.** Since sidemount diving normally involves two cylinders with air or with the same gas mixture, *Subsurface* distinguishes between these different cylinders. In contrast, many dive computers that allow gas switching only distinguish between different *gases* used, not among different *cylinders* used. This means when sidemount dives are downloaded from these dive computers, the switching event between cylinders with the same gas is not downloaded. This may mean that a diver may have to keep a written log of cylinder switch times using a slate, or (if the dive computer has the capability) marking each

cylinder switch with a bookmark that can be retrieved later. Returning from a dive with the times of cylinder changes is the only tedious part of logging sidemount dives.

- **Within *Subsurface* describe the cylinders used during the dive.** The diver needs to provide the specifications of the different cylinders, using the **Equipment** tab of the **Info Panel** (see image below where two 12 litre cylinders were used).
- **Indicate cylinder change events on the *Subsurface* dive profile.** Once the dive log has been imported from a dive computer into *Subsurface*, the cylinder switch events need to be shown on the dive profile. Cylinder changes are recorded by right-clicking at the appropriate point on the dive profile, then selecting *Add gas change*. A list of the appropriate cylinders is shown with the currently used cylinder greyed out. In the image below Tank 1 is greyed out, leaving only Tank 2 to be selected. Select the appropriate cylinder. The cylinder change is then shown on the dive profile with a cylinder symbol. If the **gas bar** is activated using the toolbar to the left of the profile, then the cylinder change is also shown on the gas bar (see image below). After all the cylinder change events have been recorded on the dive profile, the correct cylinder pressures for both cylinders are shown on the dive profile, as in the image below.



### 5.6.3. Passive semi-closed circuit rebreather (pSCR) dives



Passive semi-closed rebreathers (pSCR) are a technical advance in diving equipment that recirculates the breathing gas a diver uses, while removing carbon dioxide from the exhaled gas. While a small amount (typically a tenth) of the exhaled breathing gas is released into the water, a small amount of fresh gas is released from the driving gas cylinder. A diver using a single cylinder of breathing gas can therefore dive for much longer periods than using a recreational open-circuit configuration. With pSCR equipment, a very small amount of breathing gas is released every time the diver inhales. With active SCR (aSCR) equipment, in contrast, a small amount of breathing gas is released continuously from the driving cylinder.

To log pSCR dives, no special procedures are required. Use the normal steps outlined above:

- Select pSCR in the *Dive Mode* dropdown list on the **Info** panel.
- pSCR diving often involves gas changes, requiring an additional cylinder. Define all the appropriate cylinders as described above and indicate the cylinder/gas changes as described above in the section on [multicylinder dives](#).

If a pSCR *Dive Mode* has been selected, the dive ceiling for that is adjusted for the oxygen drop across the mouthpiece, which often requires longer decompression periods. Below is a dive profile of a pSCR dive using EAN36 as bottom gas and oxygen for decompression. Note that this dive lasted over two hours.



#### 5.6.4. Closed circuit rebreather (CCR) dives





Closed system rebreathers also recirculate gas that has been breathed. However, they use advanced technology to maintain a breathable oxygen concentration: a) remove carbon dioxide from the exhaled gas. b) regulate the oxygen concentration to remain within safe diving limits. The CCR interface of *Subsurface* is currently experimental and under active development. *Subsurface* currently supports Poseidon MkVI and APD Discovery/Evolution dive computers, as well as Shearwater dive computers connected to CCR systems. In contrast to a conventional recreational dive computer, a CCR system computer usually does not allow the download of a log containing multiple dives. Rather, each dive is stored independently. This means that *Subsurface* cannot download a dive log directly from a CCR dive computer, but that it imports individual CCR dive profiles in the same way it imports dive log data from other digital databases: one dive at a time. However, the Shearwater based CCR systems are different in this respect and allow multi-dive downloads.

### Import a CCR dive

For Shearwater CCR controllers, or independent Shearwater CCR logs, just download the dive log as would be the case for non-CCR dives. *Subsurface* interprets the CCR dive log correctly. Except for Shearwater CCR dive computers, CCR dive data are currently obtained from the proprietary software provided when purchasing CCR dive equipment. See the section dealing with [Importing dive information from other digital sources](#) and [Appendix B](#) for more complete information. Use that software to download the dive data into a known directory. From the main menu of *Subsurface*, select *Import* → *Import log files* to bring up the [universal import dialogue](#). As explained in that section, the bottom right hand of the import dialogue contains a dropdown list (labeled *Filter*;) of appropriate devices that currently include (Poseidon) MkVI or APD log viewer files. Import for other CCR equipment is under active development. Having selected the appropriate CCR format and the directory where the original dive logs have been stored from the CCR dive computer, select a particular dive log file (in the case of the MkVI it is a file with a .txt extension). After selecting the appropriate dive log, click the *Open* button at the bottom right hand of the universal import dialogue. The selected dive is imported to the *Subsurface* dive list.

### Displayed information for a CCR dive

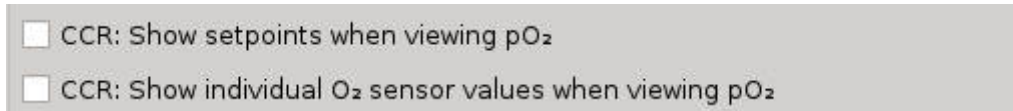
*Partial pressures of gases*: The graph of oxygen partial pressure shows the information from the oxygen sensors of the CCR equipment. In contrast to recreational equipment (where  $pO_2$  values are calculated based on gas composition and dive depth), CCR equipment provide actual measurements of  $pO_2$ , derived from oxygen sensors. In this case the graph for oxygen partial pressure should be fairly flat, reflecting the setpoint settings during the dive. The mean  $pO_2$  is NOT the mean oxygen partial pressure as given by the CCR equipment, but a value calculated by *Subsurface* as follows:

- For TWO  $O_2$  sensors the mean value of the two sensors are given.
- For THREE-sensor systems (e.g. APD), the mean value is also used. However differences of more than 0,1 bar in the simultaneous readings of different sensors are treated as false. If one of the three sensors provides false data, it is ignored.
- If no sensor data are available, the  $pO_2$  value is assumed to be equal to the setpoint.

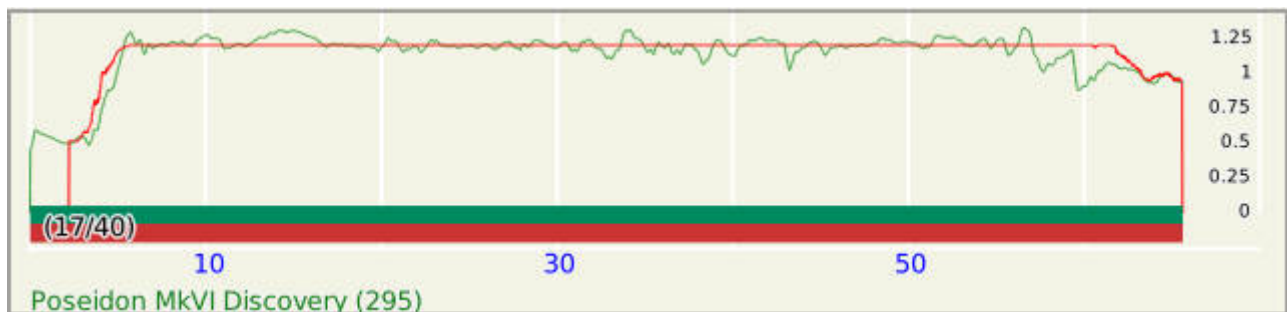


The mean pO<sub>2</sub> of the sensors is indicated with a green line,

The oxygen setpoint values as well as the readings from the individual oxygen sensors can be shown. The display of additional CCR information is turned on by checking the appropriate boxes in the *Preferences* panel (accessible by selecting *File → Preferences → Profile*). This part of the *Preferences* panel is shown in the image below, representing two checkboxes that modify the display of pO<sub>2</sub> when the appropriate toolbar button on the Dive Profile has been checked.



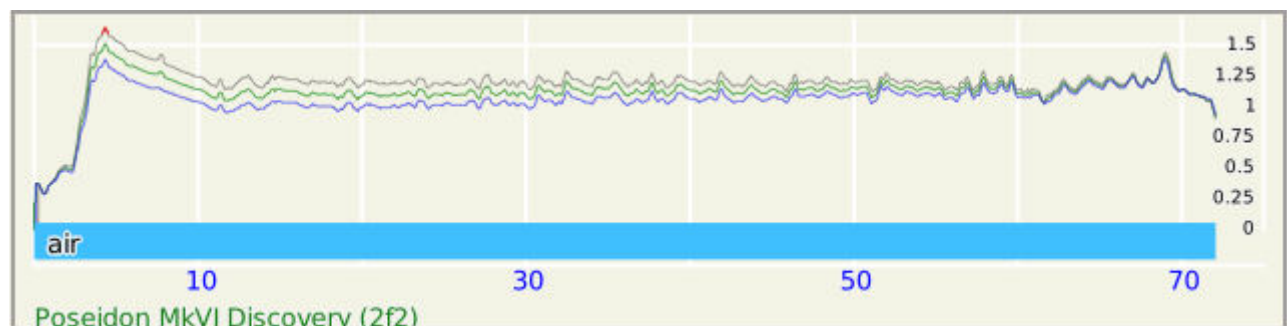
Checking any of these boxes allows the display of additional oxygen-related information whenever the pO<sub>2</sub> toolbar button on the *Profile* panel is activated. The first checkbox allows the display of setpoint information. This is a red line superimposed on the green oxygen partial pressure graph and allows a comparison of the mean measured oxygen partial pressure and the setpoint values, as shown below.



The second checkbox allows the display of the data from each individual oxygen sensor of the CCR equipment. The data for each sensor is color-coded as follows:

- Sensor 1: grey
- Sensor 2: blue
- Sensor 3: brown

The mean oxygen pO<sub>2</sub> is indicated by the green line. This allows the direct comparison of data from each of the oxygen sensors, useful for detecting abnormally low or erratic readings from a particular sensor.



The setpoint data can be overlaid on the oxygen sensor data by activating both of the above checkboxes. Partial pressures for nitrogen (and helium, if applicable) are shown in the usual way as for open circuit dives.

*Events:* Several events are logged, e.g. switching the mouthpiece to open circuit. These events are indicated by yellow triangles and, if you hover over a triangle, a description of that event is given as the bottom line in the [Information Box](#).

*Cylinder pressures:* Some CCR dive computers like the Poseidon MkVI record the pressures of the oxygen and diluent cylinders. The pressures of these two cylinders are shown as green lines overlapping the depth profile. In addition, start and end pressures for both oxygen and diluent cylinders are shown in the *Equipment Tab*. Below is a dive profile for a CCR dive, including an overlay of setpoint and oxygen sensor data, as well as the cylinder pressure data. In this case there is agreement from the readings of the two oxygen sensors.

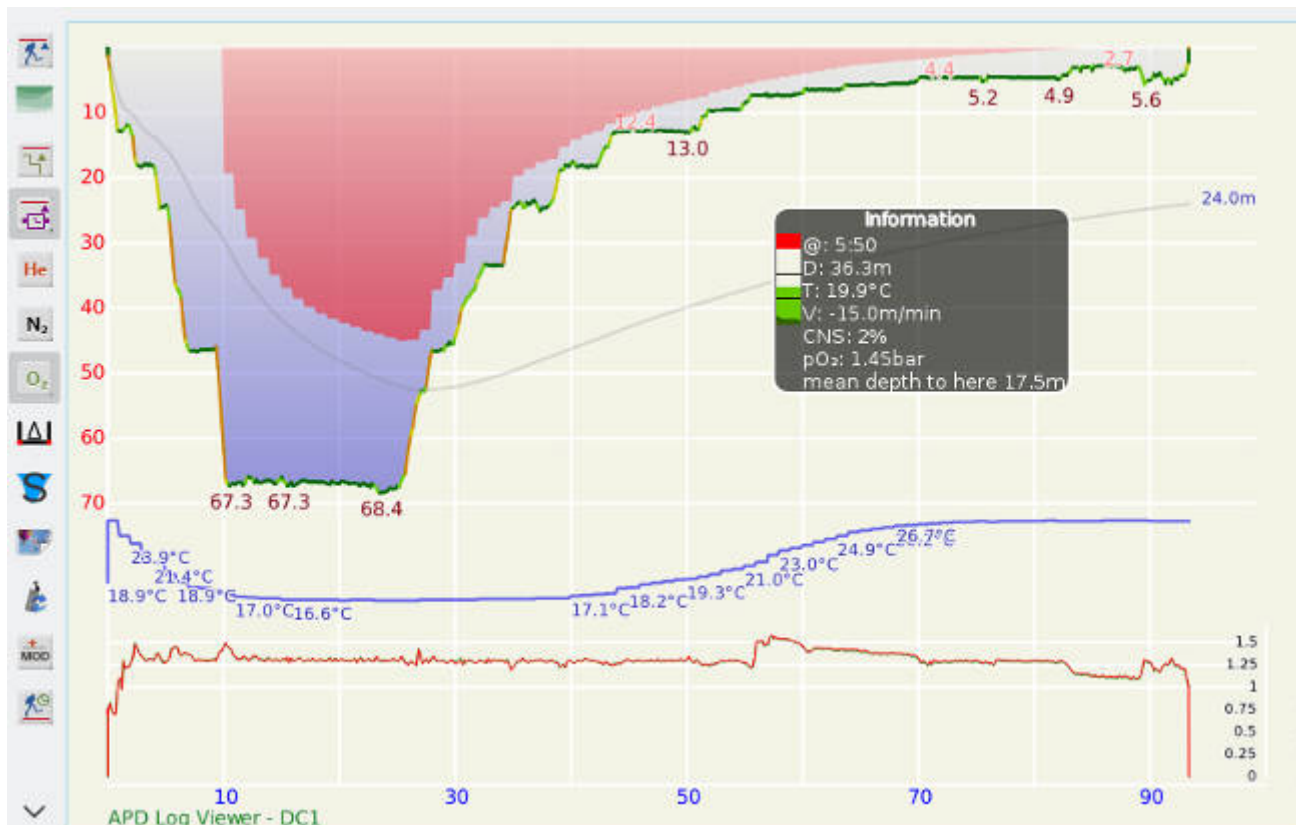


*Equipment-specific information:* Equipment-specific information gathered by *Subsurface* is shown in the [Extra data tab](#). This may include setup information or metadata about the dive.

The deco ceiling calculated by *Subsurface* is not very accurate because the precise pressure of nitrogen in the loop can usually not be determined from the dive log imported from the CCR equipment. Many CCR dive computers, however, report an internally-calculated deco ceiling that is reported in the dive log, reflecting a more accurate assessment. The display of this ceiling is activated by clicking the appropriate button to the left of the dive profile:



The default color of the computer-generated deco ceiling is white. This can be set to red by checking the appropriate check box after selecting *File* → *Preferences* → *Profile*. Below is a dive profile indicating the dive computer-generated deco ceiling:



More equipment-specific information for downloading CCR dive logs for Poseidon MkVI and APD equipment can be found in [Appendix B](#).

## 6. Obtaining more information about dives entered into the logbook

### 6.1. Using the Dive Map to obtain more dive information

The Dive Map has a number of buttons useful for manipulation several aspects of a dive. These are:



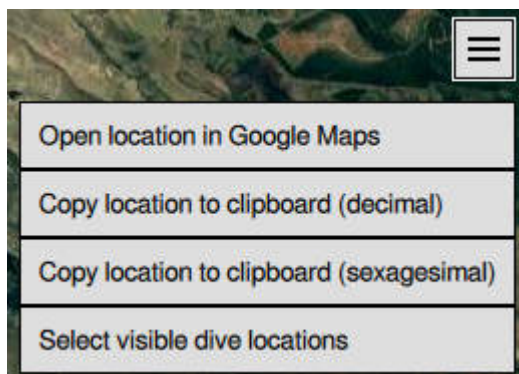
Select this button to show the Dive Map as a satellite image or as a Google Maps representation.



Zoom in. Select a smaller area of the map.



Zoom out. Select a larger area of the map.



The "Hamburger" button on the top right-hand of the Dive Map activates the Map menu. The items are:

- Open location in *Google Maps*. Open the location of the active dive in a separate Google Maps window with the dive site indicated by a Google Maps teardrop marker.
- Copy location to clipboard (decimal). Copy the coordinates of the active dive to the clipboard in decimal degrees e.g. -25.933905 30.710572
- Copy location to clipboard (sexagesimal). Copy the coordinates of the active dive to the clipboard in sexagesimal, e.g. 25°56'02.058"S 30°42'38.059"E
- Select visible dive locations. In the Dive List panel, highlight all the dive sites visible in the Dive Map. This allows easy selection of the dives within a particular geographical area to inspect them or to calculate statistics for them.

## 6.2. The Info tab (for individual dives)

The Info tab gives some summary information about a particular dive that has been selected in the **Dive List**. Useful information here includes the surface interval before the dive, the maximum and mean depths of the dive, the gas volume consumed, the surface air consumption (SAC) and the number of oxygen toxicity units (OTU) incurred.



Gas consumption and SAC calculations: *Subsurface* calculates SAC and Gas consumption taking in account gas incompressibility, particularly at tank pressures above 200 bar, making them more accurate. Refer to [Appendix F](#) for more information.

## 6.3. The Extra Data tab (usually for individual dives)

When using a dive computer, it often reports several data items that cannot easily be presented in a standardised way because the nature of the information differs from one dive computer to another. These data often comprise setup information, metadata about a dive, battery levels, no fly times, or gradient factors used during the dive. When possible, this information is presented in the **Extra Data** tab. Below is an image showing extra data for a dive using a Poseidon rebreather.

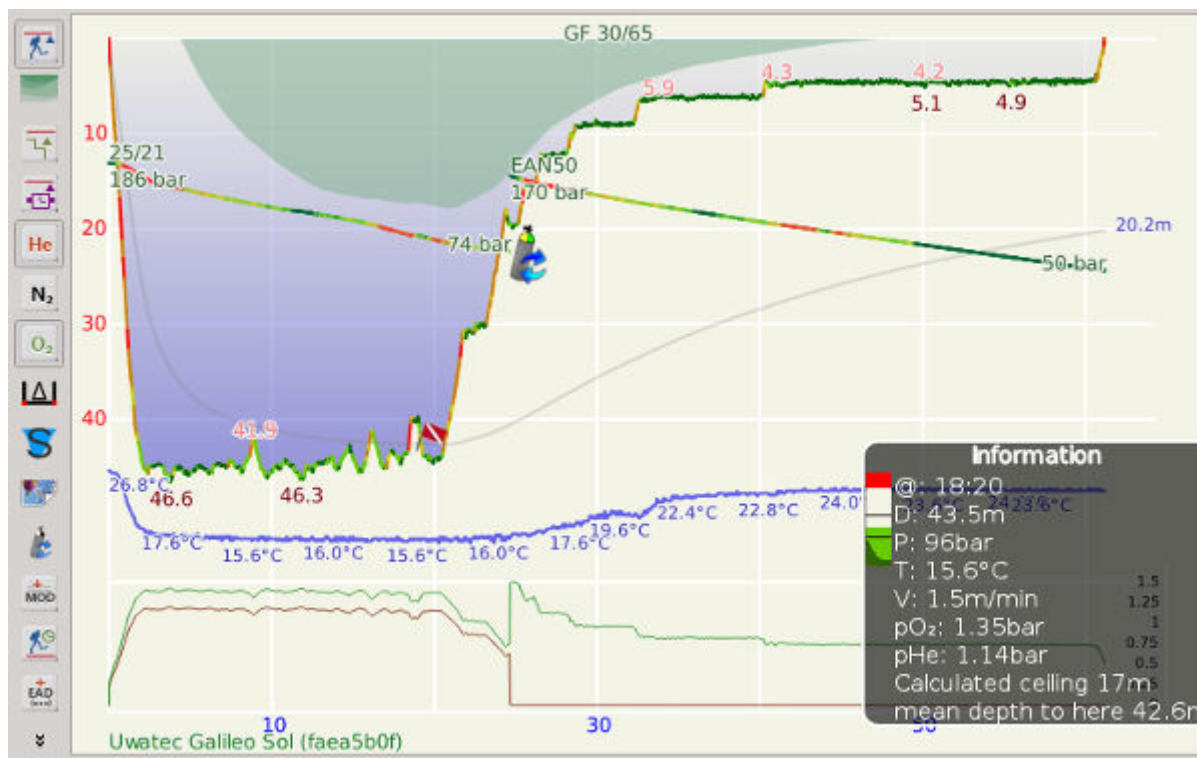
Dive notes	Equipment	Dive info	Stats	Photos	Extra data
Additional data from dive computer					
Key		Value			
Starting Dil Pressure(Bar)		143.8			
Starting PO2 Sensor 1 (Bar)		0.40			
Starting PO2 Sensor 2 (Bar)		0.44			
Starting PO2 Sensor 1 (mV)		24			
Starting PO2 Sensor 2 (mV)		23			
Starting Depth (m)		0.4			
Depth offset (m)		0.0			
Mouthpiece Position		Closed Circuit (1)			
Version number of logger		25			
Assumed FO2 of oxygen		99			
Software version		48			
Battery Serial number		A328			
Rig Serial number		0754			
Number of logs		2			
Days since learn cycle		1			
Helium percentage		0			
Nitrogen percentage		79			

## 6.4. The Stats tab (for groups of dives)

The Stats tab gives summary statistics for more than one dive, assuming that more than one dive has been selected in the **Dive List** using the standard Ctrl-click or Shift-click of the mouse. If only one dive has been selected, figures for only that dive are given. This tab shows the number of dives selected, the total amount of dive time in these dives, as well as the minimum, maximum and mean for the dive duration, water temperature and surface air consumption (SAC). It also shows the depth of the shallowest and deepest dives of those selected.

## 6.5. The Dive Profile





Of all the panels in *Subsurface*, the Dive Profile contains the most detailed information about each dive. The Dive Profile has a **button bar** on the left hand side, allowing control of several display options. The functions of these buttons are described below. The main item in the Dive Profile is the graph of dive depth as a function of time. In addition to depth, it also shows the ascent and descent rates compared to the recommended speed of going up or down in the water column. This information is given using different colors:

Color	Descent speed (m/min)	Ascent speed (m/min)
Red	> 30	> 18
Orange	18 - 30	9 - 18
Yellow	9 - 18	4 - 9
Light green	1.5 - 9	1.5 - 4
Dark green	< 1.5	< 1.5

| **Command-line option** | **Description** | --help | Print a summary of the command-line options | -h | Print a summary of the command-line options | --import logfile ... | A file name before this option is treated as an existing dive log, everything after is imported into the existing dive log | --verbose | Print debug information while running *Subsurface* | -v | Print debug information while running *Subsurface* | -v -v | Print even more debug information while running *Subsurface* | --version | Prints the current version of *Subsurface* | --survey | Opens the [user survey](#) immediately after starting *Subsurface* | --user=<username> | Choose the [configuration space](#) of user <username> | --cloud-timeout=<duration> | Set the timeout for cloud connection (0 < duration < 60). This enables longer timeouts for slow Internet connections

## == Description of the Subsurface Main Menu items

This section describes the functions and operation of the items in the Main Menu of Subsurface. Several of the items below are links to sections of this manual dealing with the appropriate operations.

=== File - [New Logbook](#) - Close the currently open dive logbook and clear all dive information. - [Open logbook](#) - Open the file manager to select a dive logbook to open. - [Save](#) - Save the dive logbook currently open. - [Save as](#) - Save the current logbook under a different file name. - [Open cloud storage](#) - Open the dive log previously saved in [Cloud storage](#). - [Save to cloud storage](#) - Save the current dive log to [Cloud storage](#). - [Take cloud storage online](#) - \* - **Close** - Close the dive logbook currently open. - [Export](#) - Export the currently open dive logbook (or the selected dives in the logbook) to one of several formats. - [Print](#) - Print the currently open logbook. - [Preferences](#) - Set the *Subsurface* preferences. - [Find moved images](#) - If photos taken during dives have been moved to a different disk or directory, locate them and link them to the appropriate dives. - [Configure dive computer](#) - Edit the configuration of a dive computer. - [Quit](#) - Quit *Subsurface*.

=== Edit - The Edit option allows one to undo or redo an action, e.g. deleting dives.

=== Import - [Import from dive computer](#) - Import dive information from a dive computer. - [Import Log Files](#) - Import dive information from a file in a *Subsurface*-compatible format. - [Import GPS data from Subsurface web service](#) - Load GPS coordinates from the *Subsurface* mobile phone app. - [Import from Divelogs.de](#) - Import dive information from [www.Divelogs.de](#).

=== Log - [Add Dive](#) - Manually add a new dive to the \*Dive List panel. - [Edit dive](#) - Edit a dive where the profile was entered by hand and not from a dive computer. - [Plan Dive](#) - Plan dives. - [Edit dive in planner](#) - Edit a dive plan that has been saved into the Dive List. - [Copy dive components](#) - Copy information from several fields of a dive log onto the clipboard. - [Paste dive components](#) - Paste, into the selected dives in the Dive List, the information copied using the *Copy dive components* option. - [Renumber](#) - Renumber the dives listed in the Dive List panel. - [Auto Group](#) - Group the dives in the Dive List panel into dive trips. - [Edit Device Names](#) - Edit the names of dive computers to coordinate your logs. - [Filter divelist](#) - Select only some dives, based on specific tags or dive criteria.

=== View - [All](#) - View the four main *Subsurface* panels all at once. - [Dive List](#) - View only the Dive List panel. - [Profile](#) - View only the Dive Profile panel. - [Info](#) - View only the Notes panel. - [Globe](#) - View only the World Map panel. - [Yearly Statistics](#) - Display summary statistics about dives during this and past years. - [Prev DC](#) - Switch to data from previous dive computer, if a single dive was logged from more than one. See the sections on [using multiple dive computers for the same dive](#) and [Saving an uploaded dive with its dive plan](#). - [Next DC](#) - Switch to next dive computer. - [Full Screen](#) - Toggles Full Screen mode.

=== Share on - [Facebook](#) - Share the currently selected dive on your Facebook timeline.

=== Help - [About Subsurface](#) - Show a panel with the version number of *Subsurface* as well as licensing information. - [Check for updates](#) - Find out whether a newer version of *Subsurface* is available on the [Subsurface web site](#). - [User survey](#) - Help to make *Subsurface* even better by taking part in our user survey or by completing another survey if your diving habits have changed. - [User manual](#) - Open a window showing this user manual.

|**Name**|**Description** |number| (**int**) dive number |id| (**int**) unique dive ID, should be used to fetch the dive profile |date| (**string**) date of the dive |time| (**string**) time of the dive |location| (**string**) location of the dive |duration| (**string**) duration of the dive |depth| (**string**) depth of the dive |divemaster| (**string**) divemaster for the dive |buddy| (**string**) buddy for the dive |airTemp| (**string**) air temperature of the dive |waterTemp| (**string**) water temperature of the dive |notes| (**string**) dive notes |rating| (**int**) dive rating which ranges from 0 to 5 |sac| (**string**) SAC value for the dive |tags| (**string**) list of dive tags for the dive |gas| (**string**) list of gases used in the dive |suit| (**string**) the suit used for the dive |cylinders| (**string**) complete information of all used cylinders |cylinder0-7| (**string**) information about a specific cylinder |weights| (**string**) complete information of all used weight systems |weight0-5| (**string**) information about a specific weight system |maxcns| (**string**) maxCNS value for the dive |otu| (**string**) OTU value for the dive |sumWeight| (**string**) the summed weight of all used weight systems |startPressure| (**string**) the start pressure |endPressure| (**string**) the end pressure |firstGas| (**string**) first used gas

*Subsurface* also exports **template\_options** data. This data must be used as CSS values to provide a dynamically editable template. The exported data is shown in the following table:

=====

**Name**

**Description**

font

(**string**) font family

borderwidth

(**int**) border-width value dynamically calculated as 0.1% of the page width with minimum value of 1px

font\_size

(**double**) size of fonts in vw, ranges between 1.0 and 2.0

line\_spacing

(**double**) distance between text lines, ranges between 1.0 and 3.0

color1

(**string**) background color

color2

(**string**) primary table cell color

color3

(**string**) secondary table cell color

color4

(**string**) primary text color

color5

(**string**) secondary text color

color6

(**string**) border colors

template.html

```
border-width: {{ template_options.borderwidth }}px;
```

output.html

```
border-width: 3px;
```

Another variable that *Subsurface* exports is **print\_options**. This variable contains a single member:

Name	Description
grayscale	Use CSS filters to convert the page into grayscale (should be added to body style to enable printing grayscale prints)

template.html

```
body {  
    {{ print_options.grayscale }};  
}
```

output.html

```
body {  
    -webkit-filter: grayscale(100%);  
}
```

## 6.6. Defined CSS selectors

As the dive profile is placed after rendering, *Subsurface* uses special CSS selectors to search in the HTML output. The CSS selectors in the following table should be added.

Selector	Type	Description
dive_{{ dive.id }}	id	is used to fetch the relevant dive profile
diveProfile	class	each dive that will contain a dive profile should have this class selector in addition to the dive_{{ dive.id }} id selector
dontbreak	class	prevents the dive with this class from being divided into two pages. This can be used in flow layout templates only (when data-numberofdives = 0)