

# TRAVIS

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**TRAVIS**

## About

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TRAVIS (short for „trajectory visualization“) is a handy tool for visualizing recent AUV (autonomous underwater vehicle) missions based on real data.

TRAVIS is capable of reading various data types and presenting them to you in an easy to understand environment. Besides of being able to display the data text wise TRAVIS is also generating deepsea landscapes based on real height data. So it is an easy way to keep track of every move the AUV did during its mission in a realistic 3D environment in which you can move around freely. The landscape and the movement of the AUV is being scaled down evenly, to represent the real mission as good as possible.

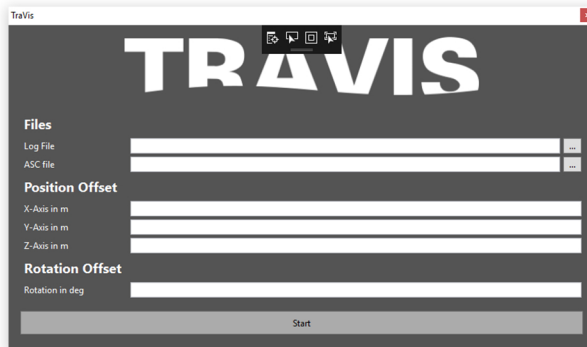
In addition to that, TRAVIS provides you various tools for visualizing important mission data directly in the 3D environment. All types of data can be mapped on the trajectory, which allows you to keep track of data changes during the mission. The mission can be played and paused. Due to our useful timeline feature you will be able to jump to any point in the mission. All on runtime and without loading.

**TRAVIS**

# Setup

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Before being able to visualise a recent mission you need to upload it by using the TRAVIS launcher. In here, you can select which data base to load and what position or rotation offset to use.



In the section files are two buttons which are used to locate and open up your mission data. The Log File is used to upload the different values which will be displayed within the UI. These are the pressure, speed and rotation and location values.

## Setup

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The ASCII file is used to upload the elevation data which will be used to generate the heightmap. It is used to generate a realistic ground.

The Position Offset is split into three kinds of values, which are defining the position on the X,Y and Z axis. Those values define the offset between the trajectory and the terrain. This feature is quite handy, due to the fact that sometimes the mission position data does not overlap perfectly with the elevation data.

The Rotation offset proceeds on the same principle. Only does it change the terrain rotation along the vertical axis and not its position or horizontal rotation.

After selecting and loading your mission file, you can start the program by clicking the start button! After the program launched, you will have access to the 3D visualisation and all its tools.

## User Interface

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The TRAVIS user interface will allow you to customize your mission visualization dynamically during runtime to serve all your needs.

The big dotted line shows you the path the AUV took during its mission. The AUV will follow this path and drive along every single point. Those points are pings in which data was received. Each value can easily be mapped to the trajectory, being represented by color.

In addition to that, some of the values can be visualised fully within the 3D space. The (box) icon lets you toggle the 3D visualization for each value independently.

# User Interface

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## VIVB - very important values bar

The VIVB contains six different values which can be visualized in 3D and on the trajectory. Three of those values are rotation values. Those show at what rotation angle the AUV is currently at. The other three icons are (from left to right) Propeller rotation speed, AUV speed and pressure. Every value has two modes:



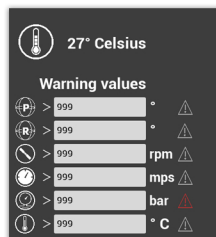
The **3D Button** lets you toggle the 3D visualization on and off. Only the values shown in the VIVB have this option. You can turn on each 3D visualization individually or all together (which is not recommended since it can become quite overloaded at times).

# User Interface

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The **Tajectory Button** lets you map a value on the trajectory, which allows you to display a value in a simple color scheme (red to blue)



The values which you dont find within the VIVB and which dont have a 3D visualisation feature are displayed as pure Text within the **Data Tab** on the left.



## User Interface

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The **Data tab** is displaying warnings if a specific value is dangerously high/low. This can be used to identify reasons for mission failure or identifying if the AUV's capabilities are maxed out. Those warnings can of course be mapped at the trajectory as well, displaying the exact position and time at when a value was too high/low.

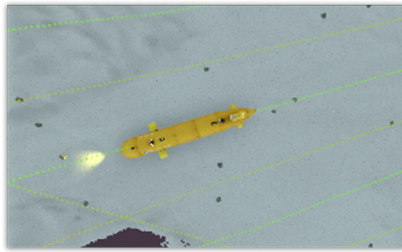


TRAVIS visualizes all given data in 1:1 realtime. Due to the fact that you might want to take a look at the last 5 minutes of the mission or the first five, TRAVIS provides you a handy tool for directly jumping to specific points during the mission: the **timeline**.

## User Interface

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By clicking the play button you can start and pause the mission. By clicking the plus icon you can increase the speed. By clicking the minus button you can reduce it.



The **Minimap** on the top left corner of the screen provides you a top down view of the mission. This gives you a better overview of the terrain and the AUV position. By using the plus and minus buttons you are able to zoom in and out of the minimap.

## User Interface

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By clicking the **Camera Mode Button** in the top left corner of the 3D viewport, you can switch between the two provided camera modes.

(To learn more about camera modes and controls under "Camera Controls")



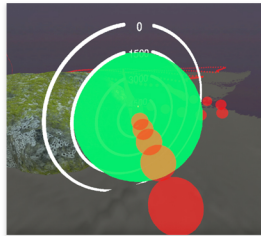
The **altitude** section displays the distance between AUV and the ground if available.

## View Modes / 3D Data Visualization

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After enabling a 3D visualization within the VIVB, you immediately see the visualisation appearing. In this section of the guide we will go through all the different kinds of visualizations and explain how they work:

### Pressure

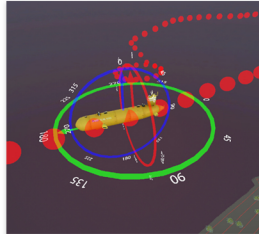


The **pressure** is visualized by a sphere. This sphere moves with the AUV and surrounds it entirely. The pressure is visualized in two ways: The size and the color of the sphere. The higher the pressure, the smaller the sphere and the more red-dish its tint.

## View Modes / 3D Data Visualization

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### Rotation



After enabling the visualization you will see a blue, red or green tinted semi cycle appearing around the AUV. Color and axis are different depending on which axis you have enabled. Those semi cycles are functioning as a kind of 3D compass. As the cycles will not rotate with the AUV, an arrow will do so. It's showing the degree the AUV is currently rotated along the specify axes.

# Trajectory Colour Mapping

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Data can be mapped directly onto the trajectory. The colour coding uses the whole RGB spectrum. We used blue for the global minimal value and red for the maximum value of each data type. The gradient is mapped onto the individual spheres, to display the data as accurate as possible.



min

max

<b>Value</b>	<b>min</b>	<b>mid</b>	<b>max</b>
pressure	0	2500	5000
rotation <i>p/m</i>	0	150	300
speed <i>mph</i>	0	1,2	2,4
roll <i>deg</i>	0	22,5	45
heading <i>deg</i>	0	180	360
pitch <i>deg</i>	0	22,5	45

## Camera Controls

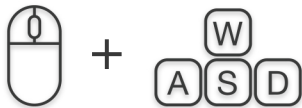
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While the mission is simulated, you have two different camera modes to choose from. The default camera is stucked to the submarine and follows as it moves. While the camera is fixed to the submarine you'll still be able to move the camera around the submarine.

TRAVIS also offers a free camera mode. It gives you the opportunity to move around in the simulated enviroment freely, get a better overview over the mission and the 3D visualization. By using this mode you can float around without sticking to the position of the submarine. This allows you to view the AUV and the scene from different and useful perspectives.

## Cheat Sheet

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free camera controll



scaling the AUV



toggle mouse visability



jump forward in time



jump backwards in time



pause



hydroplanes













**TRAVIS**