

Install Standalone Application of Perplex7

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Introduction

Here the Perplex7 Standalone Application was compiled for Windows PC; Win10 or higher. If you like to use Perplex7 Standalone Application on other operating systems, you have access to the Matlab source code in Mathworks File Exchange or on Github (<https://github.com/rohardt/Perplex7>). To build a Perplex7 Standalone Application for e.g. Mac OS Matlab License with Mapping TB and Matlab Compiler are required.

This manual explains the individual steps to install Perplex, how to obtain external data sets and in which folders these are then saved so that Perplex7 can use them.

If first e.g. **GRIDONEnc2mat_Installer_web.exe** is executed, the installer checks whether the Matlab runtime of the corresponding release (here **R2023b**) is installed on the PC. If this is not the case, the PC automatically connects to the Internet, runs the Matlab runtime installation program and then starts the installation of Matlab runtime on the PC. This process takes some time. Since the three required programs (GRIDONEnc2mat_Installer_web.exe, WayPointsAlongTransect_Installer_web.exe and Perplex7_Install_web.exe) have all been compiled with **Matlab Compiler R2023b**, the installation is much faster when e.g. installing WayPointsAlongTransect. To do the installations later on board a research vessel or somewhere with a weak internet connection, you should install the Matlab runtime on your PC beforehand.

For this purpose, use the following link:

<https://de.mathworks.com/products/compiler/matlab-runtime.html>

and select R2023b(23.2) Windows 64-bit; see figure below

<https://de.mathworks.com/products/compiler/matlab-runtime.html>

MATLAB Compiler	
Produkte nach: Kategorie Alphabetisch	
Release (MATLAB Runtime Version#)	Windows
R2024a (24.1)	64-bit
R2023b (23.2)	64-bit
R2023a (9.14)	64-bit

Download, unzip and execute installation.

Some usefull links:

1. <https://de.mathworks.com/matlabcentral/fileexchange/>)search for, “Perplex7” (this includes the source code of GRIDONEnc2mat too) and search for “WayPointsAlongTransect”
2. <https://github.com/rohardt/Perplex7>
3. <https://github.com/rohardt/WaypointsAlongTransect>
4. <https://github.com/rohardt/Perplex7-EXE>

To use Perplex7 on a MAC, you can:

(a) Use the Matlab source code. This requires a Matlab license with the Mapping Toolbox; see link 1, 2 and 3 for downloading the source code.

or

(b) Install Windows (64bit) in parallel on the MAC. Then install compiled Perplex7 and the associated programs there; see link 4.

Download from Github

A total of three individual install programs are required for Perplex7. Download them from Github (<https://github.com/rohardt/Perplex7-EXE>). Here you will also find PDF documents - the instructions for the software.

1. GRIDONEnc2mat_Installer_web.exe
2. WayPointsAlongTransect_Installer_web.exe
3. Perplex7_Install_web.exe

Save these tree files and die pdf-files in folder, e.g. “C:\Perplex-Standalone”.

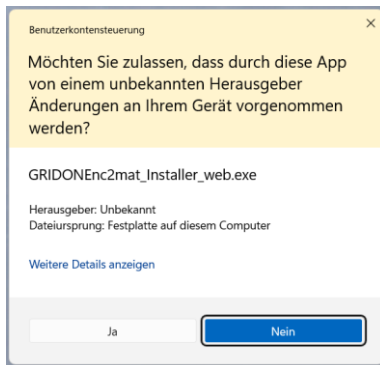
Execute Installation

First create a folder in which the software (GRIDONEnc2mat, WayPointsAlongTransect, Perplex7) is to be installed, e.g. “C:\Perplex7”.

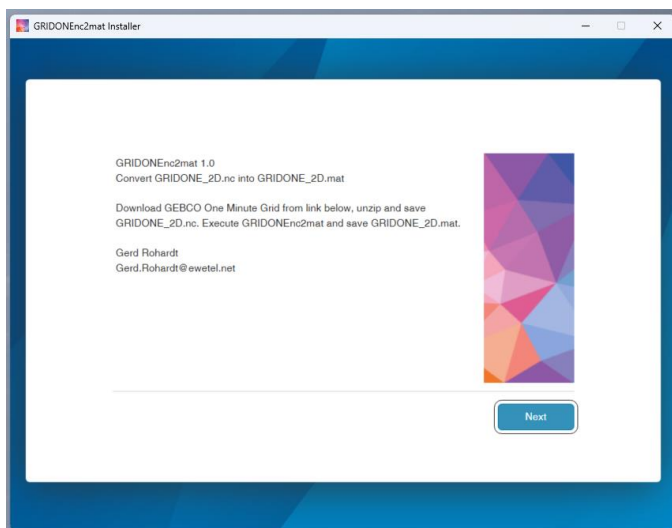
Perplex7 needs a topographic data set to get the water depth at stations. As shown in the next section, but this is available in netCDF format and must be converted to MAT format for performance reasons.

Therefore, start with the installation of **GRIDONEnc2mat** first:

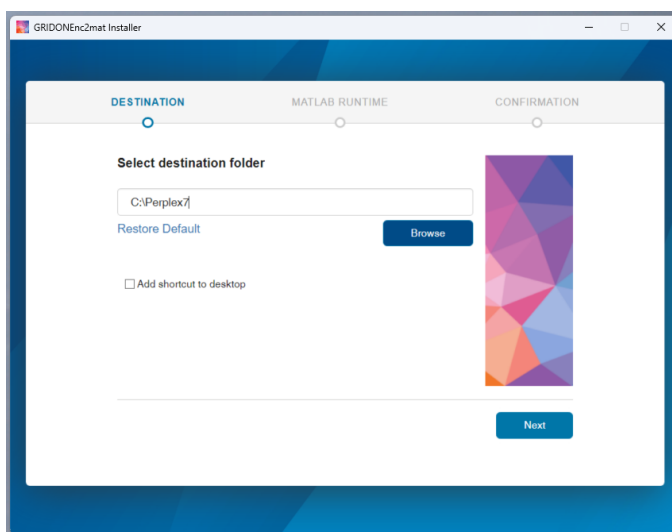
Execute GRIDONEnc2mat_Installer_web.exe



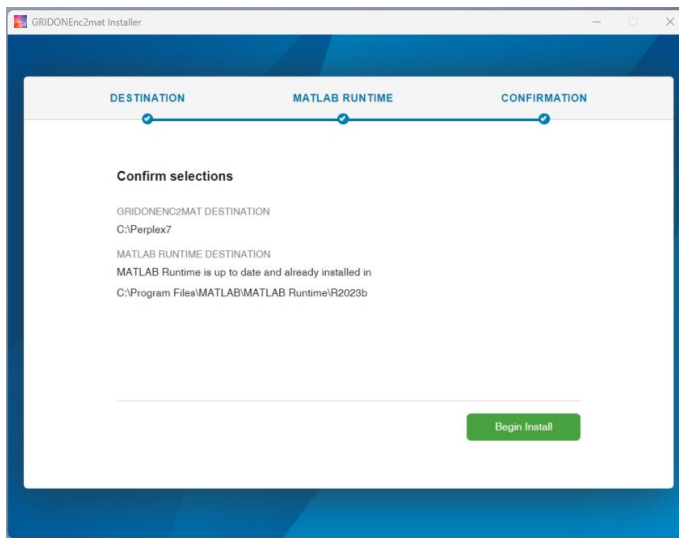
Press [Ja/yes]



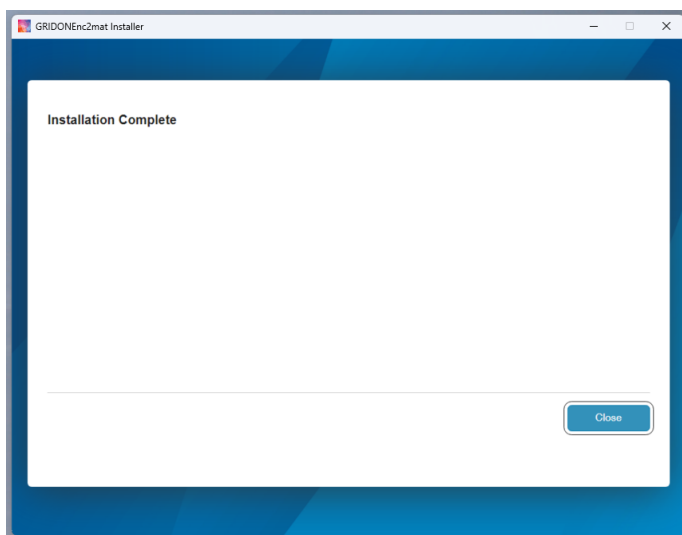
Press [Next]



Change destination folder to “C:\Perplex7” and press [Next]. Attention: Do **not** activate “Add shortcut to desktop”.



Press [Begin Install]



Press [Close]

Repeat the above steps for the installation of **WayPointsAlongTransect**. This software calculates the latitude and longitude of stations that should be equidistant from each other along a transect. It can be used in parallel with Perplex7. As an example at the end of the installation will show.

Execute WayPointsAlongTransect Installer web.exe

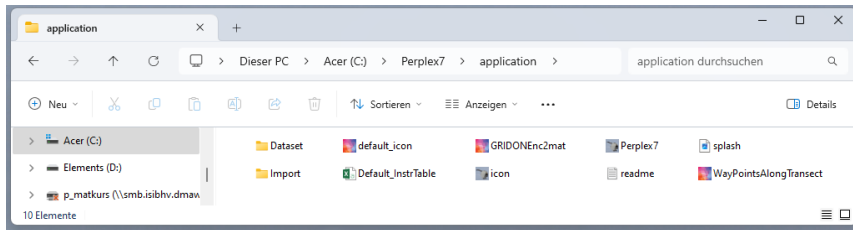
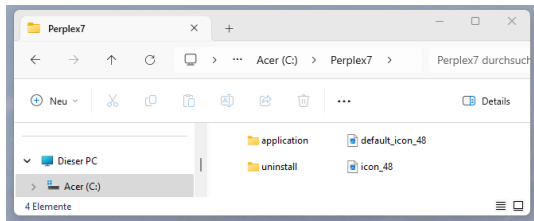
See screenshots above and use same folder (C:\Perplex7). Also, note here that: Do **not** activate “Add shortcut to desktop”.

Repeat the above steps for the installation of **Perplex7**.

Execute Perplex7 Installer web.exe

See screenshots above and use same folder (C:\Perplex7). Also, note here that: Do **not** activate “Add shortcut to desktop”.

After the three installations have been completed, the software GRIDONEnc2mat, Perplex7 and WayPointsAlongTransect are located in C:\Perplex7\application.



Together with the installation of Perplex7, two folders "Dataset" and "Import" were created. The folders "Cruise", "Export" and "Docs" still need to be created manually. Perplex requires these folders and external data sets that Perplex7 needs to plot the map must be copied into the "Dataset" folder. The "Export" folder is used to save station plans in text format, for example.

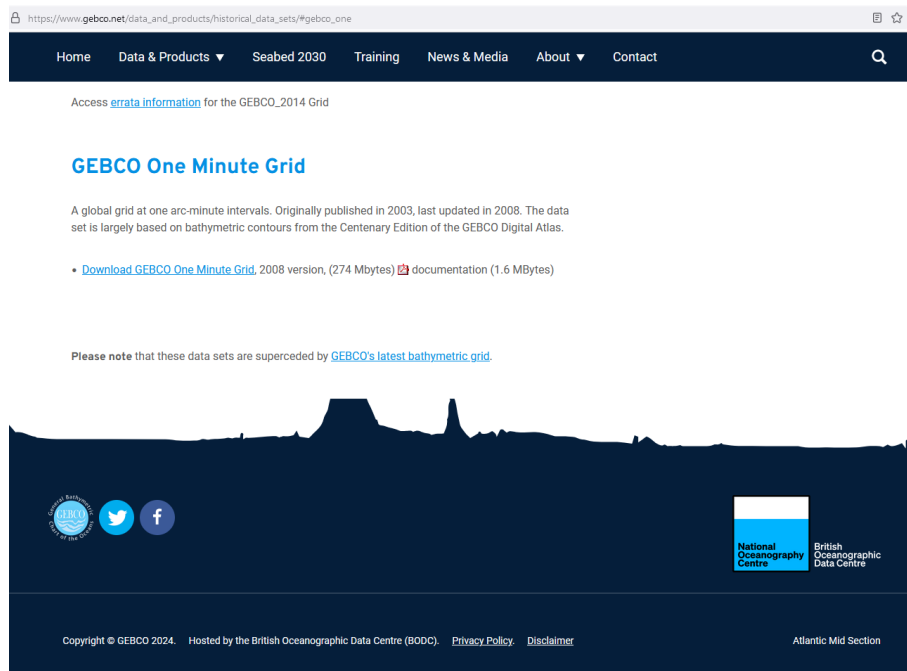
Data sets from external sources


Ocean Depths (required)

As already mentioned, Perplex requires a global dataset of ocean depths.

Download “GEBCO One Minute Grid”, see web site below and afterwards unzip and save **GRIDONE_2D.nc** folder **C:\Perplex7\application\Dataset**

The netCDF format must later be converted into a MAT format.

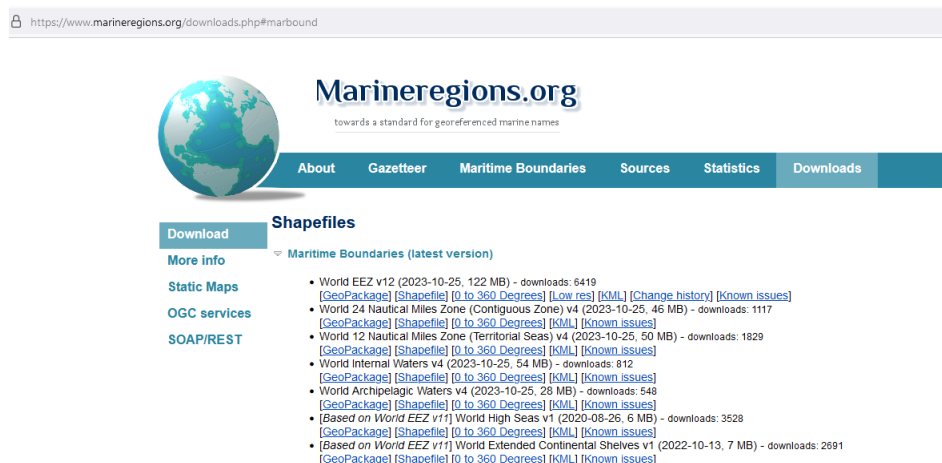


The screenshot shows the GEBCO One Minute Grid web page. The browser address bar displays https://www.gebco.net/data_and_products/historical_data_sets/#gebco_one. The navigation bar includes links for Home, Data & Products, Seabed 2030, Training, News & Media, About, and Contact. A search icon is also present. Below the navigation bar, a link to [errata information](#) for the GEBCO_2014 Grid is provided. The main heading is "GEBCO One Minute Grid". The text describes it as a global grid at one arc-minute intervals, originally published in 2003 and last updated in 2008, based on bathymetric contours from the Centenary Edition of the GEBCO Digital Atlas. A download link is provided: [Download GEBCO One Minute Grid](#), 2008 version, (274 Mbytes)  documentation (1.6 Mbytes). A note states that these data sets are superseded by [GEBCO's latest bathymetric grid](#). The footer features the GEBCO logo, social media icons for Twitter and Facebook, and logos for the National Oceanography Centre and the British Oceanographic Data Centre. Copyright information for 2024 and links to Privacy Policy and Disclaimer are also included.

Exclusive Economic Zones (optional)

While the topography is required in any case, Perplex7 also plots the boundaries of the EEZ on the map if needed. To use the EEZ, the user must download the relevant data:

- Go to: <https://www.marineregions.org/downloads.php#marbound>
- Select: “Maritime Boundaries (latest version)”
- Choose: “World EEZ” [Shapefile]
- Fill out the form to download the data.
- Save the files ee_z_v11.cpg, *.xml, *.prj, *.qpj, *.shp, *.shx in folder **C:\Perplex7\application\Dataset**



Sea Ice Concentration (optional)

The sea ice concentration can be found here:

<https://data.meereisportal.de/relaunch/index.php?lang=en>

Go to *Maps & Data*, next to *Parameter* and then select *Sea ice concentration*.







For example, if you are planning a cruise to Antarctica in December and January, you can download the currently available data on December 1, December 15, January 1, January 15 and January 31. However, the corresponding data set with the geocoordinates (longitude, latitude) must also be downloaded beforehand; see red arrow in figure 1.



Sea ice concentration

The data, maps and sea ice analyses of the Arctic and Antarctic available for download are based on the information of the satellite radiometers mentioned below. Measurements of the satellite radiometer AMSR-E range from June 19th, 2002 until September 30th, 2011. On Oct 4, 2011, measurements of AMSR-E stopped.

AMSR-E's successor AMSR2 was successfully deployed to orbit on May 18th 2012. Since August 1st, 2012 AMSR2 has been sending microwave data from which daily sea ice concentrations are derived. Sea ice concentration based on SSMIS has been available from October 1st, 2011 up to today. Data of AMSR2 is of higher quality than SSMIS data. On meereisportal.de, SSMIS data is therefore only used to fill data gaps of AMSR2. The sensor used to define sea ice concentrations is recorded in the name of the respective daily file.

The sea ice concentration data is written in HDF-format. The [coordinates and land mask files](#) needed for further processing can be downloaded here and will be needed only once per hemisphere.

All  sea ice concentration data of the Arctic and the Antarctic, including data until June 19th 2002, (HDF-format) from the University of Bremen ( Institute of Environmental Physics) can be accessed there. This site includes data sets for Arctic, Antarctic and, in a higher temporal resolution (3.125km), a number of regional maps. They use a polar stereographic projection with equal area at 70° latitude. The geographical coordinates of the pixels are given in separate files for Arctic () and for Antarctica ().  

Furthermore, downloads of daily updated KMZ files usable for Google Earth depictions are available for the Arctic () and for Antarctica ().

SELECTION MENU

Region:

Antarctic

Temporal resolution:

daily

Time period from:

Year: 2023
Month: 12
Day: 1

Time period to:

Year: 2023
Month: 12
Day: 1

Maps preview:

yes

Repeat annually time period:

no

display

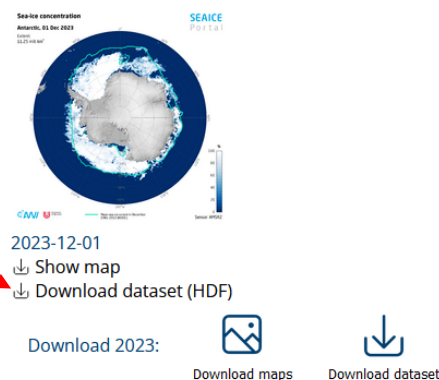
clear

Fig. 1: “Meereis Portal” to download sea ice concentration and geographical coordinates. Both, for Arctic and Antarctic are needed; see red arrow.

After pressing [display], the map with the sea ice concentration is displayed. The data can then be downloaded as an HDF file. Data from a different date can be saved in the same way. Find in your download folder: “asi-AMSR2-s6250-20231201-v5.4.hdf”; see Figure 2.

Sea ice concentration

2023



SELECTION MENU

Region:
Antarctic ▾

Temporal resolution:
daily ▾

Time period from:
Year: 2023 ▾ Month: 12 ▾ Day: 1 ▾

Time period to:
Year: 2023 ▾ Month: 12 ▾ Day: 1 ▾

Maps preview:
yes ▾

Repeat annually time period:
no ▾

display

clear

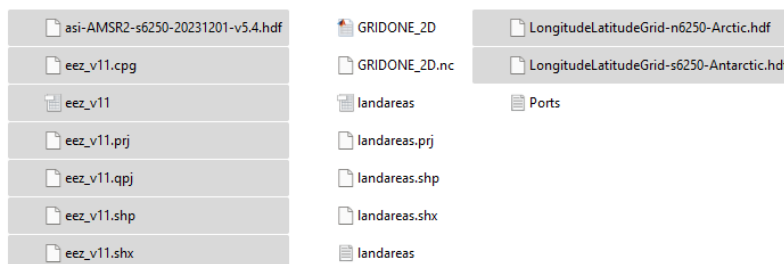
Fig. 2: Shows the Sea ice concentration of December 1st 2023. The red arrow shows where to get the HDF file, which we like to display in the map of the Perplex7 software.

Move the HDF-Files into your Matlab directory: **C:\Perplex7\application\Dataset**.

Copy data sets from external sources into folder **..\Dataset**

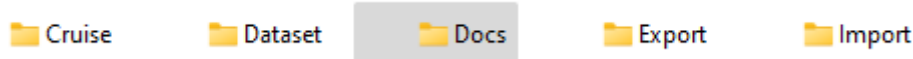
Copy **GRIDONE_2D.nc** to the folder **C:\Perplex7\application\Dataset** and execute the program **GRIDONEnc2mat**. The folder must be selected during execution. It will then contain **GRIDONE_2D.mat** as well as **GRIDONE2D.nc**.

Check contents of folder **C:\Perplex7\application\Dataset**



Highlighted files are optional.

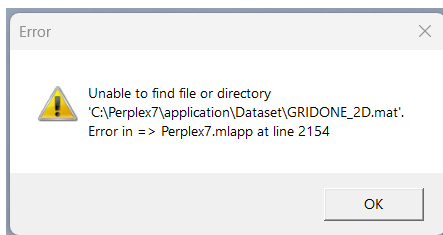
Perplex7 accesses certain folders. Therefore, check again that they are complete. The following folders must exist in **C:\Perplex7\application**:



The Docs folder is empty. The manuals respectively the PDF documents downloaded from <https://github.com/rohardt/Perplex7-EXE> can be saved in this folder.

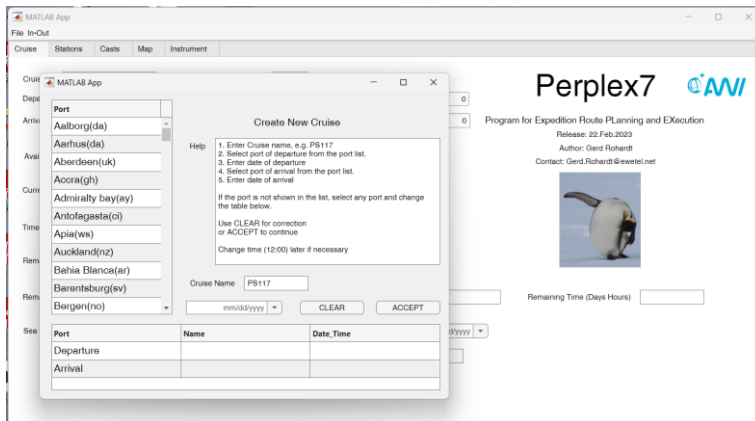
Execute Perplex7 for Testing

Go to C:\Perplex7\application and double click Perplex7 (.exe) to execute the application. It may take a few minutes for the application to open. At the beginning, a check is made to ensure that all required files are available in the designated folders. If **GRIDONE_2D.mat** does not exist, the following error message appears.

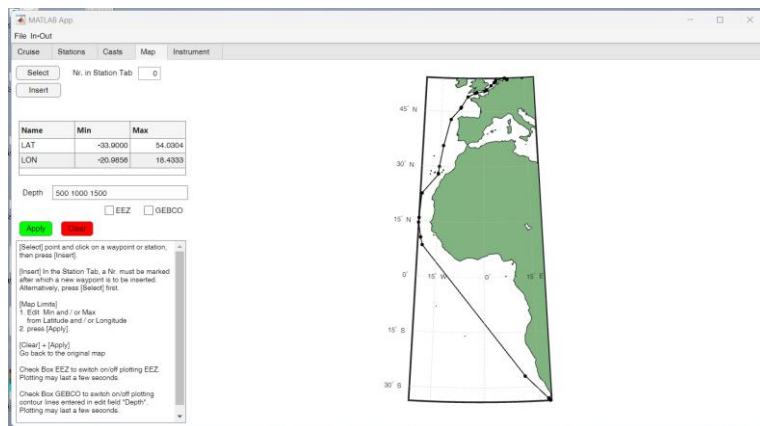


See chapter “Copy data sets from external sources into folder ..\Dataset” and check contents of folder **C:\Perplex7\application\Dataset**. Then execute Perplex7 once again.

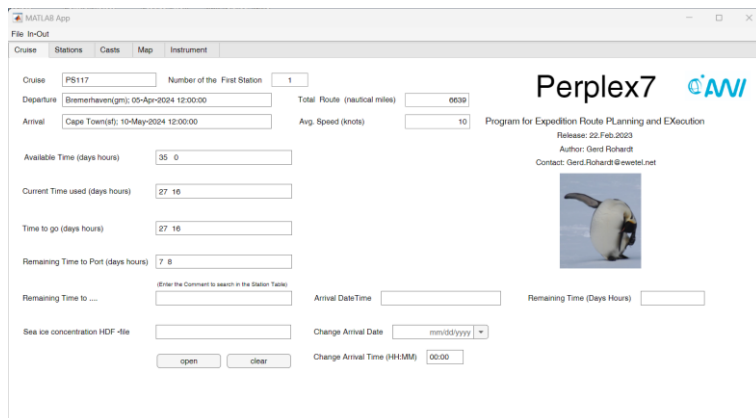
Perplex7 loads the file **C:\Perplex7\application\Perplex7_cfg.mat** at startup, in which the file name of the last edited cruise is saved. After installing Perplex7, **Perplex7_cfg.mat** does not yet exist. Perplex7 therefore automatically starts with the menu for creating a new voyage; see also Menu: [File - New].



See Perplex7-Manual.pdf; Chapter “Create a new cruise”.



As an example, the cruise "PS117" has been created here, which is saved with [File - Save]. In **C:\Perplex7\application\Cruise** you will then find **PS117.mat** and **PS117_cfg.mat** and in **C:\Perplex7\application** file **Perplex7_cfg.mat**. If Perplex7 is closed [File - Exit] and restarted, the last editing status appears immediately.



How Perplex7 is modified to individual requirements

Ports.txt

Use any text editor to change the **Ports.txt** file. First, a copy of the file should be saved in any directory for security reasons. The header line must not be deleted.

Delete any ports or lines that are not required, making sure that there are no empty lines.

Inserting a new port:

Format: Name of the port; latitude in decimal degrees; longitude in decimal degrees;
(South :== - or West:== -)

Port; Latitude; Longitude

Aalborg(da); 57.05; 9.9333

Aarhus(da); 56.15; 10.2167

Aberdeen(uk); 57.15; -2.0833

Wismar(gm); 53.9; 11.4667

Wolgast(gm); 54.05; 13.7833

Yokohama(ja); 35.4500; 139.5833

Save Ports.txt in folder ..\Dataset

Default_InstrTable.csv

First, a copy of the file should be saved in any directory for security reasons.

Use any text editor to change the file **Default_InstrTable.csv**.

Delete instruments that are permanently not required – mark line or section and delete.

Rename e.g. Instrument: **CTD** to **CTD-WS** and Description: CTD plus Watersampler

Specify the **User** typical times and the down- and up speeds for the use of an instrument:

- Edit column 1: 0 or 1 0:== this instrument will not be user in Perplex7. 1:== will be used. In Perplex7 the table of Default_InstrTable.csv is displayed in the “Instrument Tab” and can be edited and sorted here. When sorting, all rows with "1" in the first column are moved to the top of the table in alphabetically order. At the same time, these instruments appear for selection in the "Cast Tab", see Perplex7-Manual.pdf on page 8.
- Edit column 4 to 9.
- The name of the “User” may change for every cruise.
- “Fixed” is the time in hours that an instrument requires when used at a station, i.e. independent of the water depth or the down- and up speed.
- Handling is the time in minutes required to bring a device into the water or back on deck.
- The down and up speeds in m/s together with the water depth give the time required for hoisting and lowering. A bottom grab, for example, can be lowered relatively quickly, but must be hoisted slowly so that the sample is not damaged.
- Trawling is the time in minutes that, for example, a net is still being dragged after lowered in a specific water depth.

Save changes in Default_InstrTable.csv

Default_InstrTable.csv

Used,Instrument,Description,User,Fixed,Handling,Down,Trawling,Up

0,ADCP,Acoustic Doppler Current Profiler,nn,0,0,0,0,0

0,AEROS,Aerosol Sampler,nn,0,0,0,0,0

0,AIRGN,Airgun - Seismic Source,nn,0,0,0,0,0

0,AIRS,Air sampler,nn,0,0,0,0,0

0,ALTI,Altimeter,nn,0,0,0,0,0

0,ATURBP,Air Turbulence Profiler,nn,0,0,0,0,0

0,AUV,Autonomous underwater vehicle,nn,0,0,0,0,0

0,BC,Box Corer,nn,0,0,0,0,0

0,BN,Bottom Net,nn,0,0,0,0,0

0,BOAT,Boat,nn,0,0,0,0,0

0,BOO,Boomer - Seismic Source,nn,0,0,0,0,0

0,BS,Benthos Sampler,nn,0,0,0,0,0

0,BT,Bathymograph,nn,0,0,0,0,0

0,BUOY,Buoy,nn,0,0,0,0,0

0,CALIB,Calibration,nn,0,0,0,0,0

0,CCN,Cloud Condensation Nuclei,nn,0,0,0,0,0

0,CHAM,Benthic chamber,nn,0,0,0,0,0

0,CM,Current Meter,nn,0,0,0,0,0

0,CO2S,CO2 Sensor,nn,0,0,0,0,0

0,CORER,Corer,nn,0,0,0,0,0

0,CPT,Cone penetration testing-lance,nn,0,0,0,0,0

0,CRS,Cloud Radar System,nn,0,0,0,0,0

0,CSEM,Controlled Source Electromagnetics,nn,0,0,0,0,0

1,CTD,CTD,Sandra,0,15,0.8,0,0.8

0,DOAS,Differential Optical Absorption Spectrometers,nn,0,0,0,0,0

0,DRG,Dredge,nn,0,0,0,0,0

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and so on...