
RSKtools for Matlab access to RBR data

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Introduction

RSKtools provides some convenience functions for common data extraction (e.g., extracting profiles from a continuous dataset) and visualisation (e.g., plotting individual profiles). New in v2.0.0 are a suite of functions to perform routine processing steps to enhance the data quality (see RSKtools_vignette2 for more information). From this version on, we are expanding our data post-processing suite. See the Future Plans for some ideas, and please feel free to make suggestions.

Installing

The latest stable version of RSKtools can be found at <http://www.rbr-global.com/support/matlab-tools>.

- Unzip the archive (to ~/matlab/RSKtools, for instance)
- Add the folder to your path from the command line (`addpath ~/matlab/RSKtools`) or launch the path editor gui (`pathtool`).
- type `help RSKtools` to get an overview and take a look at the examples.

Examples of use

A connection to the database must be made to work with an RSK file using RSKtools. This connection is made using the `RSKopen()` function. Note that `RSKopen` does not actually read the data, but reads a /thumbnail/ of the data, which is up to 4000 samples long. The structure returned after opening an RSK looks something like:

```
file = 'sample.rsk';  
rsk = RSKopen(file)  
  
rsk =  
        dbInfo: [1x1 struct]
```

```
instrumentChannels: [7x1 struct]
    channels: [7x1 struct]
    epochs: [1x1 struct]
    schedules: [1x1 struct]
    deployments: [1x1 struct]
    instruments: [1x1 struct]
    appSettings: [1x1 struct]
    ranging: [7x1 struct]
    continuous: [1x1 struct]
    parameters: [1x1 struct]
    parameterKeys: [23x1 struct]
    thumbnailData: [1x1 struct]
        region: [762x1 struct]
        regionCast: [508x1 struct]
        profiles: [1x1 struct]
    log: {[7.3688e+05] 'sample.rsk opened using
RSKtools v2...']}
```

To read the actual data, use the `RSKreaddata` function. If given with one input argument (the variable name of the RSK structure) it will read the entire data set. Because RSK files can store a large amount of data, it may be preferable to read a subset of the data, specified using a start and end time (in Matlab datenum format, which is defined as the number of days since January 0, 0000).

```
t1 = datenum(2014, 05, 03);
t2 = datenum(2014, 05, 04);
rsk = RSKreaddata(rsk, 't1', t1, 't2', t2);
```

Note that the logger data can be found in the structure at:

```
rsk.data

ans =
    tstamp: [22346x1 double]
    values: [22346x7 double]
```

In this example, because the instrument is a "CTD"-type instrument, Practical Salinity can be derived from conductivity, temperature, and pressure. `RSKderivesalinity` is a wrapper for the TEOS-10 GSW function `gsw_SP_from_C`, and it adds a new channel called `Salinity` as a column in `rsk.data.values`. The TEOS-10 GSW Matlab toolbox is freely available from <http://teos-10.org/software.htm>.

```
rsk = RSKderivesalinity(rsk);
rsk.channels.longName

ans =
Conductivity
ans =
Temperature
ans =
Pressure
ans =
Dissolved O2
ans =
Turbidity
ans =
```

```
PAR
ans =
Chlorophyll
ans =
Salinity
```

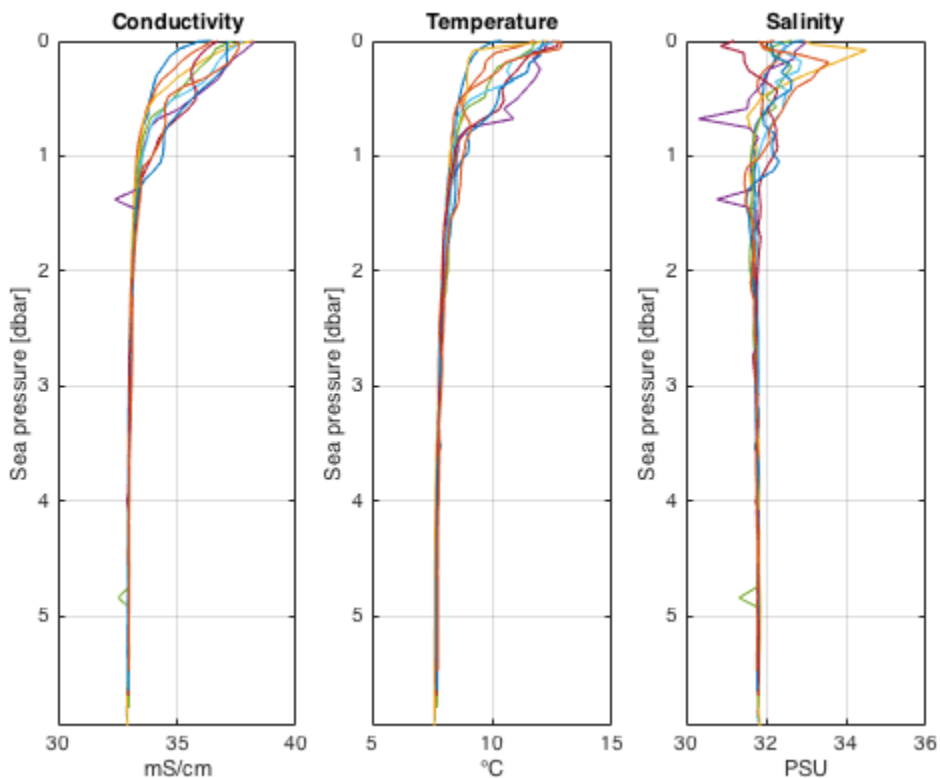
Working with profiles

Profiling loggers with recent versions of firmware contain the ability to detect and log profile "events" automatically; these are denoted as "downcasts" and "upcasts". The function `RSKreadprofiles` extracts individual profiles from the raw data, based on the previously identified profiling events. Then, plots of the profiles can be made using the `RSKplotprofiles` function.

If profiles have not been detected by the logger or Ruskin, the function `RSKfindprofiles` can be used. The `pressureThreshold` argument, which determines the pressure reversal required to trigger a new profile, and the `conductivityThreshold` argument, which determines if the logger is out of the water, can be adjusted to improve profile detection when the profiles are very shallow, or the water is very fresh.

```
% load the second to tenth profiles in both directions (upcast and
downcast)
rsk = RSKreadprofiles(rsk, 'profile', 2:10, 'direction', 'both');
rsk = RSKderivesalinity(rsk);

% plot the upcasts of conductivity, temperature, and salinity
handles = RSKplotprofiles(rsk, 'channel',
    {'conductivity', 'temperature', 'salinity'}, 'direction', 'up');
```



Customising plots

All plotting functions return a handle which enables access to the lines in the plot. The output is a matrix containing a column for each channel subplot and a row for each profile.

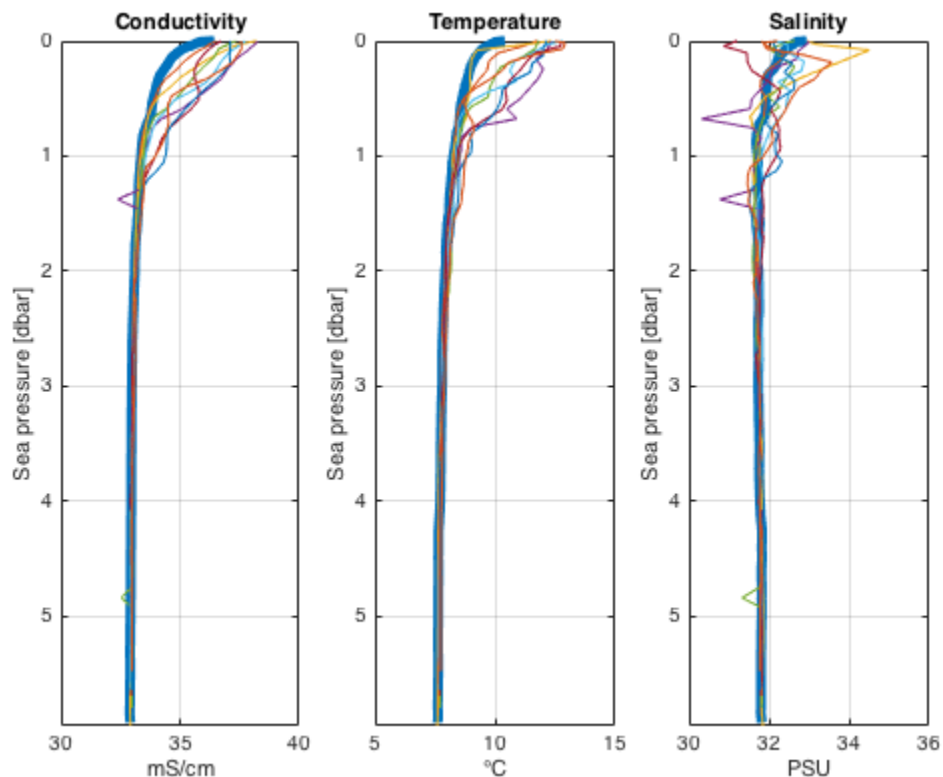
handles

```
% To increase the linewidth of the first profile in all subplots  
set(handles(1,:),{'linewidth'},{5});
```

handles =

9x3 Line array:

Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line
Line	Line	Line



See RSKtools_vignette2

A second vignette is available for information on getting started with post-processing functions.

Future plans

- Function to write metadata, log and data to a file.
- Wave processing functions.
- Function to plot temperature-salinity diagrams.

About this document

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