

Accessing and understanding your data extracts with **matos**, **rvdat**, and **otndo**

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- Interact with the ACT_MATOS database
- Pull data from receivers or ACT_MATOS database
- Wrap your head around ACT/OTN data pushes
- Programmatic and reproducible
- <https://ocean-tracking-network.r-universe.dev>

matos

<https://matos.obrien.page>

- An API to the MATOS website/database tool
- List projects and files, download files, upload files to MATOS
- No data analysis/manipulation
- May provide sanity checks in the future (Kim's sanity)

Connect to the MATOS database

Treat this just like you're visiting

<https://matos.asascience.com/account/login>

```
1 library(matos)
```


By continuing, you are agreeing to the ACT Network MATOS User Agreement and Data Policy, Version 1.2:

<<https://matos.asascience.com/static/MATOS.User.Agreement.V1.1.pdf>>

```
1 matos_login()
```

! Please log in.

✓ Login successful!



The image shows the MATOS login page. At the top, there is a blue header with the MATOS logo (a fish) and the text "MATOS Mid-Atlantic Acoustic Telemetry Observation System". Below the logo, there are navigation links: "Home", "Projects", "Login", and "User Agreement". On the right side of the header, there are icons for "EXPLORE" (a globe) and "SEARCH" (a magnifying glass). The main content area is white and contains a login form. The form has a heading "Please login." followed by the instruction "Enter your email and password. If you do not yet have a MATOS account, please [request an account](#)." Below this, there are two input fields: "Email*" and "Password*", each with a corresponding label. To the left of the input fields, there are two links: "[Request MATOS Account](#)" and "[Forgot your password?](#)". At the bottom of the form, there is a "Sign in" button. The footer of the page is a blue grid pattern.

List all projects

- Like visiting <https://matos.asascience.com/project>, but more.
- Connects to the OTN database to quickly download project metadata

```
1 all_projects <- list_projects()
```

i These projects are missing metadata as they have not yet synced with OTN:
"BTWaves Caribbean Acoustic Tagging", "CT DEEP Array (2022-2026)", "ERDC-VCU
James River Array", "ERDC_Brunswick", "SBU Eco-Pod", "SBU Landscape Lab
Array",
"SBU NY Ocean Indicators", "UNH - Rainbow smelt", "VCU/ERDCTelemetry Tags",
and
"WCS New York Sand Tiger Shark Study"

A tibble: 146 × 19

	name	number	url	FID	collectioncode	longname	shortname	ocean	seriescode
	<chr>	<dbl>	<chr>	<chr>	<chr>	<chr>	<chr>	<chr>	<chr>
1	ACK Ar...	168	http...	otn_...	ACT.NEAQACK	"Invest...	ACK Array	NE A...	ACT
2	APG At...	176	http...	otn_...	ACT.ATSHS	"Aberde...	APG Atla...	NE A...	ACT
3	ASI - ...	211	http...	otn_...	ACT.ASIWHITE21	"Atlant...	ASI - Wh...	NE A...	ACT
4	ASI Ac...	100	http...	otn_...	ACT.ASIARRAY	"Using ...	ASI Acou...	NE A...	ACT
5	ASI Sp...	227	http...	otn_...	ACT.ASISPINNER	"ASI sp...	ASI Spin...	NE A...	ACT
6	ASI Wh...	232	http...	otn_...	ACT.ASIWHITE	"ASI Wh...	ASI Whit...	NE A...	ACT
7	BOEM-D...	85	http...	otn_...	ACT.DEWEA	"Occurr...	BOEM-DE ...	MID ...	ACT
8	BOEM-V...	217	http...	otn_...	ACT.VAHMSSHARK	"Sandbr...	BOEM-VA:...	NE A...	ACT
9	BOEM L...	239	http...	otn_...	ACT.MABASKMOLA	"Invest...	BOEM Liv...	NE A...	ACT
10	Brandy...	162	http...	otn_...	ACT.BRAWSHAD	"Examin...	Brandywi...	NE A...	ACT

i 136 more rows

" : 10 more rows

List only your projects

```
1 list_my_projects()
```

	name	number
35	Maryland Department of Natural Resources	90
47	Navy Kennebec ME Telemetry Array	192
48	NCBO-MD DNR Chesapeake Backbone North	181
49	NCBO-VMRC Chesapeake Backbone South	164
123	UMCES-NYSDEC Hudson Striped Bass Spawning	127
124	UMCES Black Sea Bass & Offshore Construction	97
125	UMCES BOEM Marine Mammal Monitoring	242
126	UMCES BOEM Offshore Wind Energy	87
127	UMCES Chesapeake Backbone, Mid-Bay	161
128	UMCES Lower Hudson Striped Bass Contingents	155
129	UMCES Potomac River Striped Bass Migration	60
130	UMCES Resident Hudson Striped Bass Migration	160
131	UMCES Striped Bass Thermal Squeeze	152
132	UMCES TailWinds	240

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List your project's files

```
1 list_project_files(project = 161)
```

	project		file_type	upload_date
1	161	Deployed Receivers - Deployment	Metadata	2023-10-12
2	161	Tag Detections -	.vfl file	2023-10-12
3	161	Deployed Receivers - Deployment	Metadata	2023-09-28
4	161	Tag Detections -	.vfl file	2023-09-13
5	161	Tag Detections -	.vfl file	2023-09-13
6	161	Tag Detections -	.vfl file	2023-09-13
7	161	Tag Detections -	.vfl file	2023-09-13
8	161	Tag Detections -	.vfl file	2023-09-13
9	161	Tag Detections -	.vfl file	2023-09-13
10	161	Tag Detections -	.vfl file	2023-09-13
11	161	Tag Detections -	.vfl file	2023-09-13
12	161	Deployed Receivers - Deployment	Metadata	2022-05-05
13	161	Tag Detections -	.vfl file	2022-05-05
14	161	Tag Detections -	.vfl file	2022-05-05
15	161	Tag Detections -	.vfl file	2022-05-05

Download (get) a project file

```
1 get_project_file(2, 161)
```

— Downloading files

✓ File(s) saved to:

C:\Users\darpa2\Analysis\ACT-2024\ACT_20240123\VR2AR_546323_20231012_1.vr1

— Unzipping files

```
[1] "C:\\Users\\darpa2\\Analysis\\ACT-  
2024\\ACT_20240123\\VR2AR_546323_20231012_1.vr1"
```

List your data extract files

```
1 list_extract_files(project = 161)
```

	project	file_type	detection_type	detection_year	upload_date
1	161	Data Extraction File	qualified	2021	2023-11-21
2	161	Data Extraction File	qualified	2022	2023-11-21
3	161	Data Extraction File	qualified	2023	2023-11-21
4	161	Data Extraction File	sentinel_tag	2021	2023-03-16
5	161	Data Extraction File	sentinel_tag	2022	2023-03-16
6	161	Data Extraction File	unqualified	2021	2023-11-21
7	161	Data Extraction File	unqualified	2022	2023-11-21
8	161	Data Extraction File	unqualified	2023	2023-11-21

	file_name
1	cbbbmb_qualified_detections_2021.zip
2	cbbbmb_qualified_detections_2022.zip
3	cbbbmb_qualified_detections_2023.zip
4	cbbbmb_sentinel_tag_detections_2021.zip
5	cbbbmb_sentinel_tag_detections_2022.zip
6	cbbbmb_unqualified_detections_2021.zip

Download (get) your data extract files

```
1 get_extract_file(1, 161)
```

— Downloading files

✓ File(s) saved to:

C:\Users\darpa2\Analysis\ACT-
2024\ACT_20240123\cbbbbmb_qualified_detections_2021.zip

— Unzipping files

✓ File(s) unzipped to:

C:/Users/darpa2/Analysis/ACT-
2024/ACT_20240123/cbbbbbmb_qualified_detections_2021.csv
C:/Users/darpa2/Analysis/ACT-2024/ACT_20240123/data_description.txt

```
[1] "C:/Users/darpa2/Analysis/ACT-  
2024/ACT_20240123/cbbbbbmb_qualified_detections_2021.csv"  
[2] "C:/Users/darpa2/Analysis/ACT-2024/ACT_20240123/data_description.txt"
```

How is this helpful?

Project management! Bulk downloads:

```
1 list_extract_files(161)$url |>
2   lapply(
3     function(url) get_extract_file(url = url)
4   )
```

How is this helpful?

Bulk uploads:

```
1 upload_file(  
2     161,  
3     list.files('everything in this folder')  
4 )
```

How is this helpful?

Networking:

“I wonder who else is working on striped bass?”

```
1 all_projects <- list_projects()  
2  
3 all_projects[grepl('striped bass', all_projects$abstract), ]$name
```

```
[1] "MADMF Striped Bass Migration Ecology Study"  
[2] "Mallows Bay National Marine Sanctuary"  
[3] "MBL STRIPED BASS"  
[4] "MBL/WTGHA Striped Bass Study"  
[5] "Monmouth University Coastal Fisheries Study"  
[6] "NCBO Back Creek"  
[7] "NCCOS Poplar Island"  
[8] "NCDMF Anadromous Fisheries Tagging Study"  
[9] "NCDMF Multi-Species Tagging Program"  
[10] "NCDMF Tar-Pam Neuse Arrays"  
[11] "SERC Juvenile Striped Bass Study"  
[12] "UMCES-NYSDEC Hudson Striped Bass Spawning"  
[13] "UMCES BOEM Offshore Wind Energy"  
[14] "UMCES Lower Hudson Striped Bass Contingents"  
[15] "UMCES Potomac River Striped Bass Migration"  
[16] "UMCES Resident Hudson Striped Bass Migration"
```

More information

<https://matos.obrien.page>

obrien@umces.edu

matos 0.4.00

Reference

Articles ▾

Changelog

matos

Introduction

`matos` for the power user

Summarizing with otnd

Extracting environmental data with `rmdat`

{matos} is an API to the [Mid-Atlantic Acoustic Telemetry Observing System website](#), powered by a suite of [httr](#) and [rvest](#) functions.

Please note that you will need a MATOS account, [which you can sign up for here](#), in order to interface with any project-specific files.

Installation

You can install the most-up-to-date version from [R-universe](#) or [GitHub](#).

R-universe:

```
install.packages(  
  'matos',  
  repos = c('https://mhpob.r-universe.dev',  
            'https://cloud.r-project.org')  
)
```

GitHub:

```
# install.packages("remotes")  
remotes::install_github("mhpob/matos")
```

rvdat

Change your VUEpoint of receiver data

<https://rvdat.obrien.page/>

- An interface to `vdat.exe`, distributed with Fathom Connect



Fathom
Connect

Fathom Connect Software

The Fathom Connect software is required for the following Innovasea receivers:

- NexTrak R1
- HR2
- HR3
- VR100-300 (orange model)
- Rx-LIVE

Software Downloads

[Fathom Connect v3.5.7 \(Nov 2023\)](#)

Big note

- `rvdat` just talks to `vdat.exe`, nothing more (like data manipulation)
- If you're a `glatos` user, this functionality will be baked into the newest version (0.8.0).
 - <https://github.com/ocean-tracking-network/glatos/tree/dev>

Connect to your instance of VDAT

```
1 library(rvdat)
2
3 vdat_here('c:/program files/innovasea/fathom/vdat.exe')
```

i vdat.exe is located at c:/program files/innovasea/fathom/vdat.exe

Inspect your file

```
1 info <- vdat_inspect('VR2AR_546323_20231012_1.vrl')
```

VRL

```
File:          VR2AR_546323_20231012_1.vrl
Original:      VR2AR_546323_20231012_1.vrl
Container:     VR2AR VRL file (com.vemco.file.vrl.0207.ff02.ff02/5.2.2)
Created:       2023-10-12T14:28:01
Data UUID:     1713ed82-3f34-1a47-9f30-8afebee9b1c4
Rx Model:      VR2AR-69
Rx Serial:     546323
```

Device

```
Decoding Map:      MAP-114
Platform:           060
```

Inspect your file... to a data.frame

1 info		
	variable	value
1	File	VR2AR_546323_20231012_1.vrl
2	Original	VR2AR_546323_20231012_1.vrl
3	Container	VR2AR VRL file (com.vemco.file.vrl.0207.ff02.ff02/5.2.2)
4	Created	2023-10-12T14:28:01
5	Data UUID	1713ed82-3f34-1a47-9f30-8afebee9b1c4
6	Rx Model	VR2AR-69
7	Rx Serial	546323
8	Decoding Map	MAP-114
9	Blanking Interval	260 ms
section		
1	VRL	
2	VRL	
3	VRL	
4	VRL	
5	VRL	

Convert your VRL file (or other VDAT files!)

```
1 vdat_to_folder('VR2AR_546323_20231012_1.vrl')
```

✓ File converted:

VR2AR_546323_20231012_1.vrl

i Files saved in:

C:/Users/darpa2/Analysis/ACT-2024/ACT_20240123/VR2AR_546323_20231012_1.csv-fathom-split

```
1 list.files('VR2AR_546323_20231012_1.csv-fathom-split')
```

```
[1] "ATTITUDE.csv"      "BATTERY.csv"      "CFG_CHANNEL.csv"
[4] "CFG_STUDY.csv"     "CFG_TRANSMITTER.csv" "CLOCK_REF.csv"
[7] "DATA_SOURCE_FILE.csv" "DEPTH.csv"        "DET.csv"
[10] "DIAG.csv"          "EVENT.csv"         "EVENT_INIT.csv"
[13] "EVENT_OFFLOAD.csv" "HEALTH_VR2AR.csv"  "TEMP.csv"
```

Pull out detections

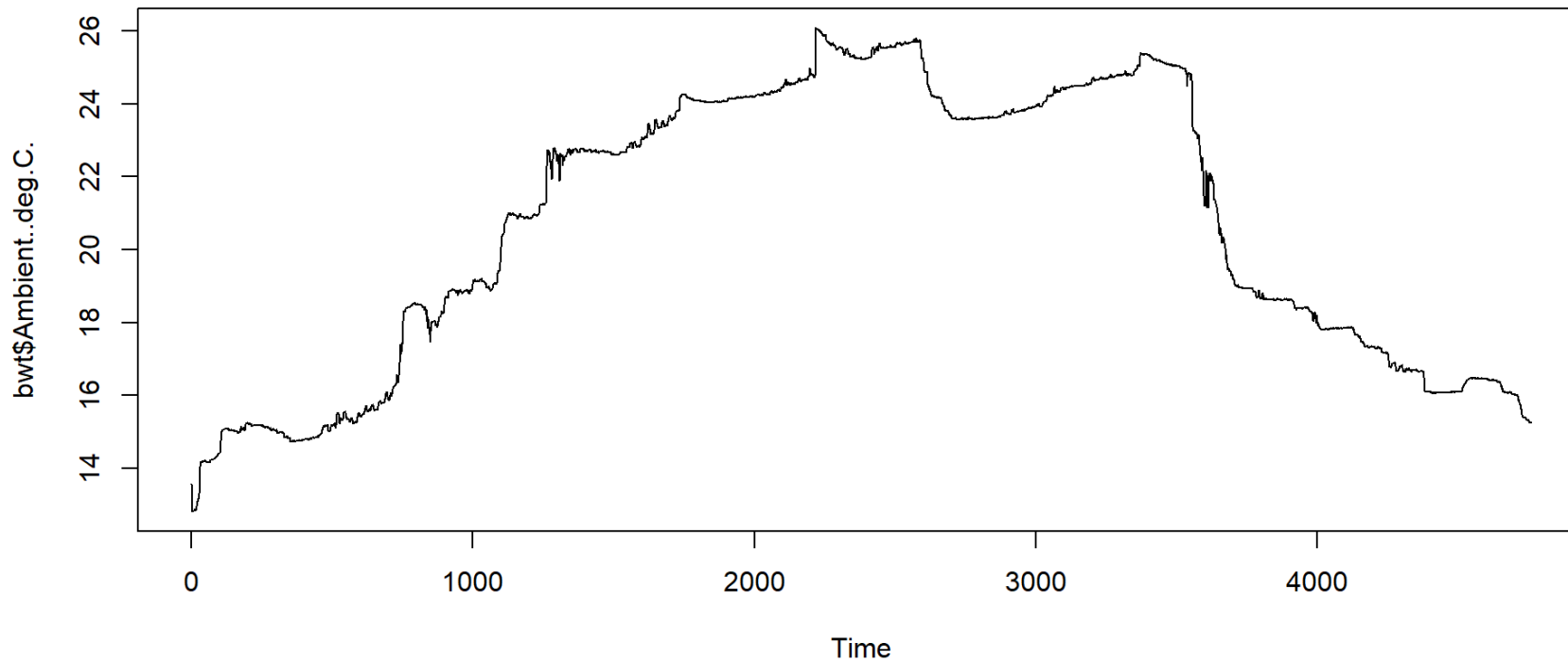
```
1 dets <- read.csv('VR2AR_546323_20231012_1.csv-fathom-split/DET.csv')
2               skip = 1)
3
4 xtabs(~ Full.ID, data = dets)
```

Full.ID

A69-1601-26187	A69-1601-60787	A69-1601-60934	A69-1602-21404	A69-1602-25905
2	28410	841	47	13
A69-1602-25908	A69-1602-34360	A69-1602-49365	A69-1602-51178	A69-1602-55932
9	4	451	2	6
A69-1602-55959	A69-1604-690	A69-9001-15398	A69-9001-15402	A69-9001-1898
13	23	31	2	2
A69-9001-21721	A69-9001-24477	A69-9001-26408	A69-9001-64709	A69-9001-6906
2	13	19	13	15

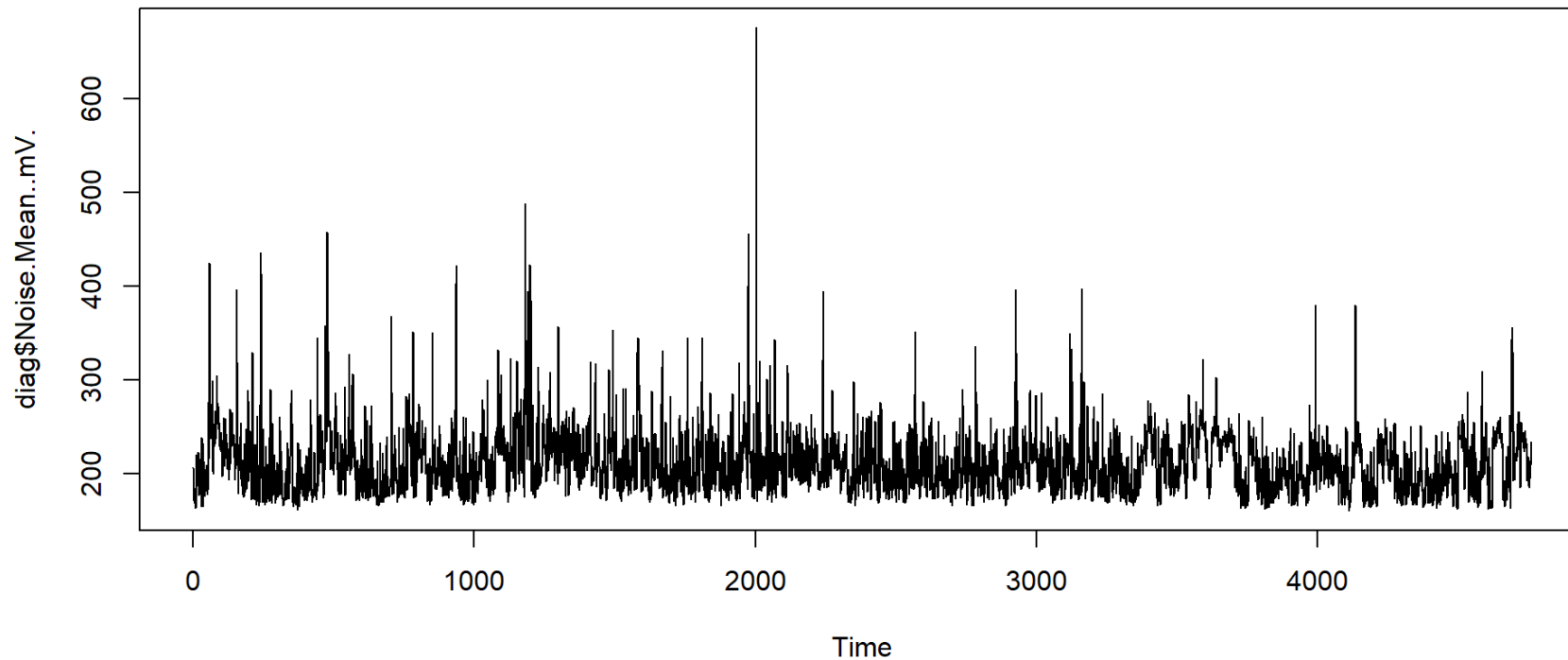
Pull out temperature data

```
1 bwt <- read.csv('VR2AR_546323_20231012_1.csv-fathom-split/TEMP.csv')
2                               skip = 1)
3
4 plot.ts(bwt$Ambient..deg.C.)
```



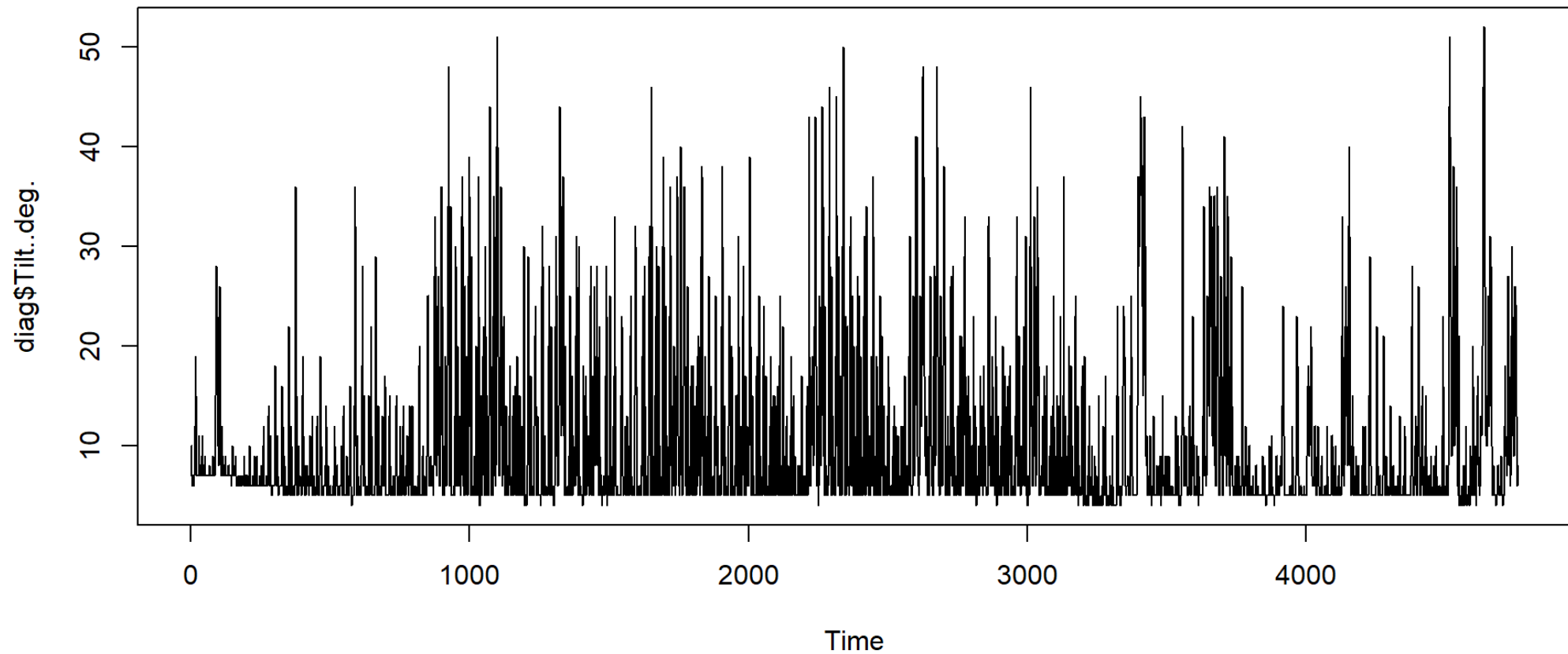
Noise

```
1 diag <- read.csv('VR2AR_546323_20231012_1.csv-fathom-split/DIAG.csv')
2               skip = 1)
3
4 plot.ts(diag$Noise.Mean..mV.)
```



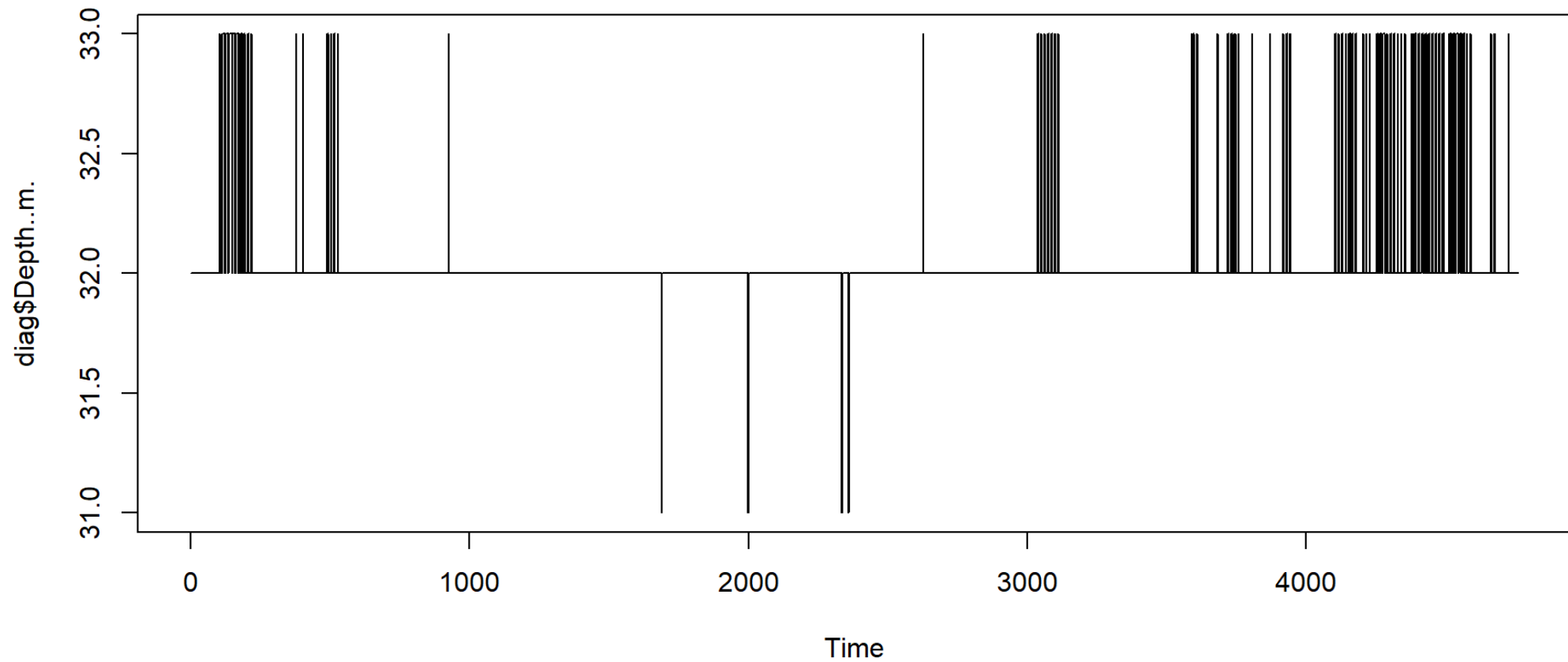
Tilt

```
1 plot.ts(diag$Tilt..deg.)
```



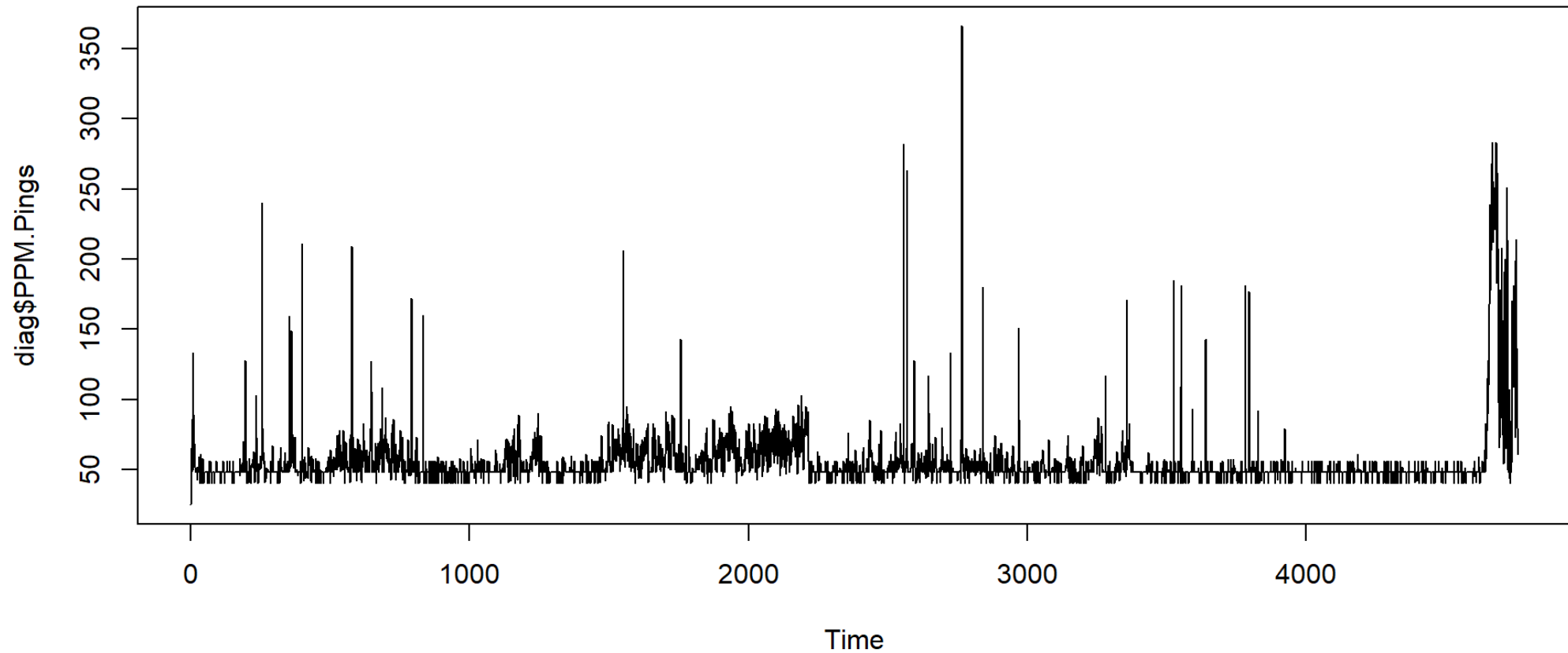
Depth

```
1 plot.ts(diag$Depth..m.)
```



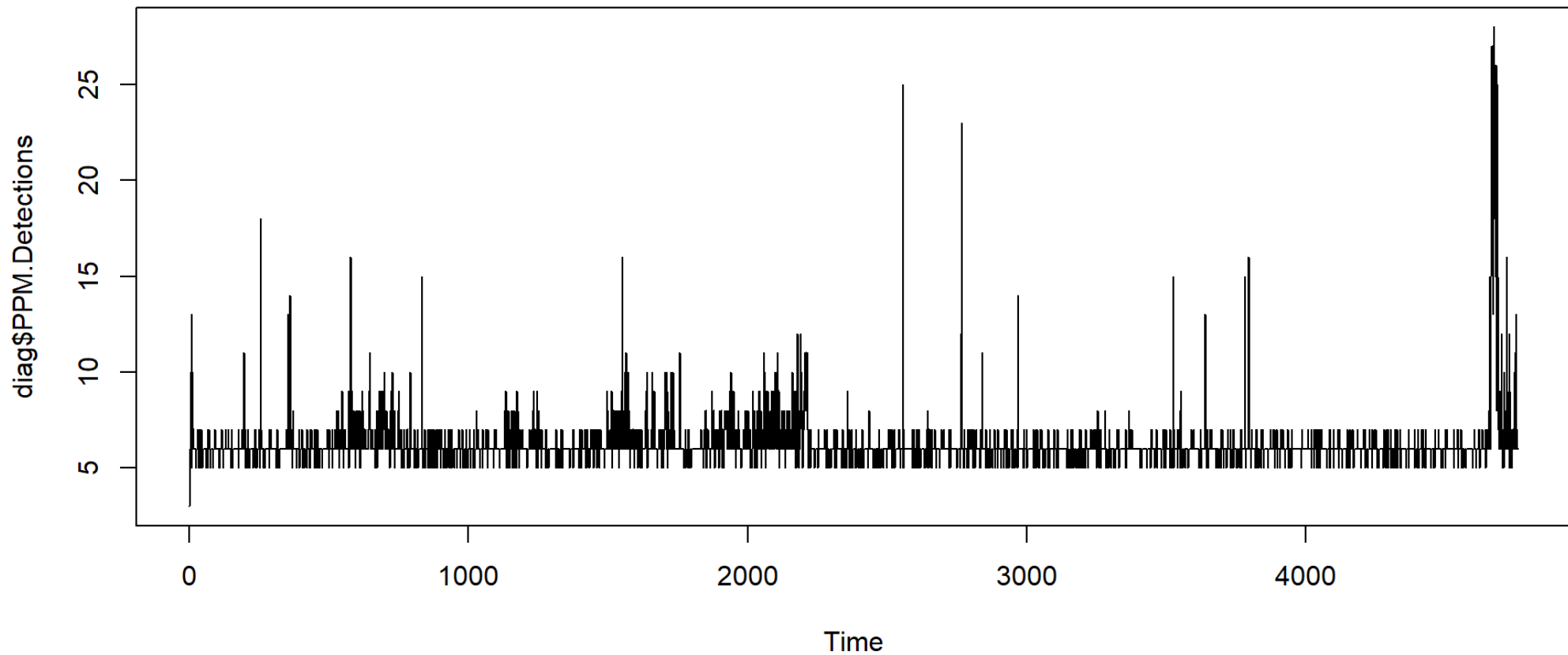
Pings

```
1 plot.ts(diag$PPM.Pings)
```



Detections

```
1 plot.ts(diag$PPM.Detections)
```



More information

<https://rvdat.obrien.page>

rvdat 0.0.0.9000 Reference Articles ▾

rvdat

How to use `rvdat`
Data within VDAT files
VDAT data structure

The intent of this package is to provide lightweight R wrapper functions around Innovasea's VDAT File Tool for those who are intimidated by the shell (me) or just want to keep everything in one language (R, also me).

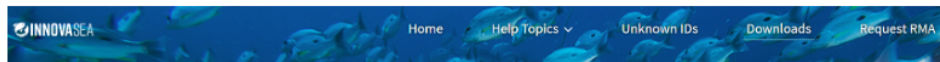
`rvdat` is intended to play nicely with the [matos](#) and [otndo](#) packages, though full connectivity and documentation on how to do so is a work in progress. Please reach out to me at mike@obrien.page or open an issue on GitHub if you need any help.

For similar implementation that has a few more bells and whistles, check out [glatos::vdat_convert](#) in version $\geq 0.8.0$ of the [glatos package](#).

Installation

Download `vdat.exe`

`rvdat` requires a VDAT executable (`vdat.exe`) in order to work, which comes packaged in Innovasea's Fathom Connect software. You can [download the software here](#) after providing your contact details and agreeing to their End User License Agreement.



Fathom Connect Software

The Fathom Connect software is required for the following Innovasea hardware:

- Sonotek 01
- H81
- H82
- VR200-002 (orange model)
- RockBVC

otndo

- Understand ACT/OTN data pushes
- Quick-and-dirty summary of the data push
- Back to the “network”

What's needed

```
1 list_my_projects()
```

	name	number
35	Maryland Department of Natural Resources	90
47	Navy Kennebec ME Telemetry Array	192
48	NCBO-MD DNR Chesapeake Backbone North	181
49	NCBO-VMRC Chesapeake Backbone South	164
123	UMCES-NYSDEC Hudson Striped Bass Spawning	127
124	UMCES Black Sea Bass & Offshore Construction	97
125	UMCES BOEM Marine Mammal Monitoring	242
126	UMCES BOEM Offshore Wind Energy	87
127	UMCES Chesapeake Backbone, Mid-Bay	161
128	UMCES Lower Hudson Striped Bass Contingents	155
129	UMCES Potomac River Striped Bass Migration	60
130	UMCES Resident Hudson Striped Bass Migration	160
131	UMCES Striped Bass Thermal Squeeze	152
132	UMCES TailWinds	240

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Receiver summary

```
1 library(otndo)
2
3 matos_receiver_summary(161)
```


Transmitter summary

```
1 matos_tag_summary(87)
```