

# Software Tools for Analysis of Data from High-Resolution Animal-Borne Tags

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## Project Background

Bio-logging studies with high-resolution movement-sensors offer opportunities to observe animal behavior in unprecedented detail, but analysis of the resulting data is often complex, and there is a need for freely available, easy-to-use, flexible, well-documented software tools to facilitate analysis and interpretation.

We introduce a new open-source tool kit for processing data from tags with high-resolution movement sensors.

### Examples of Tags:

- DTAG, CATS, Acousonde, DailyDiary, etc.



Photo of a CATS tag on a whale shark.  
<http://www.cats.is/wp-content/uploads/2015/10/Whaleshark-with-CatsCam.jpg>



Photo of a DTAG being attached to a Cuvier's beaked whale (*Ziphius cavirostris*) in the Ligurian Sea, Italy.  
[https://www.soundtags.org/files/2012/05/tagging1\\_small.jpg](https://www.soundtags.org/files/2012/05/tagging1_small.jpg)

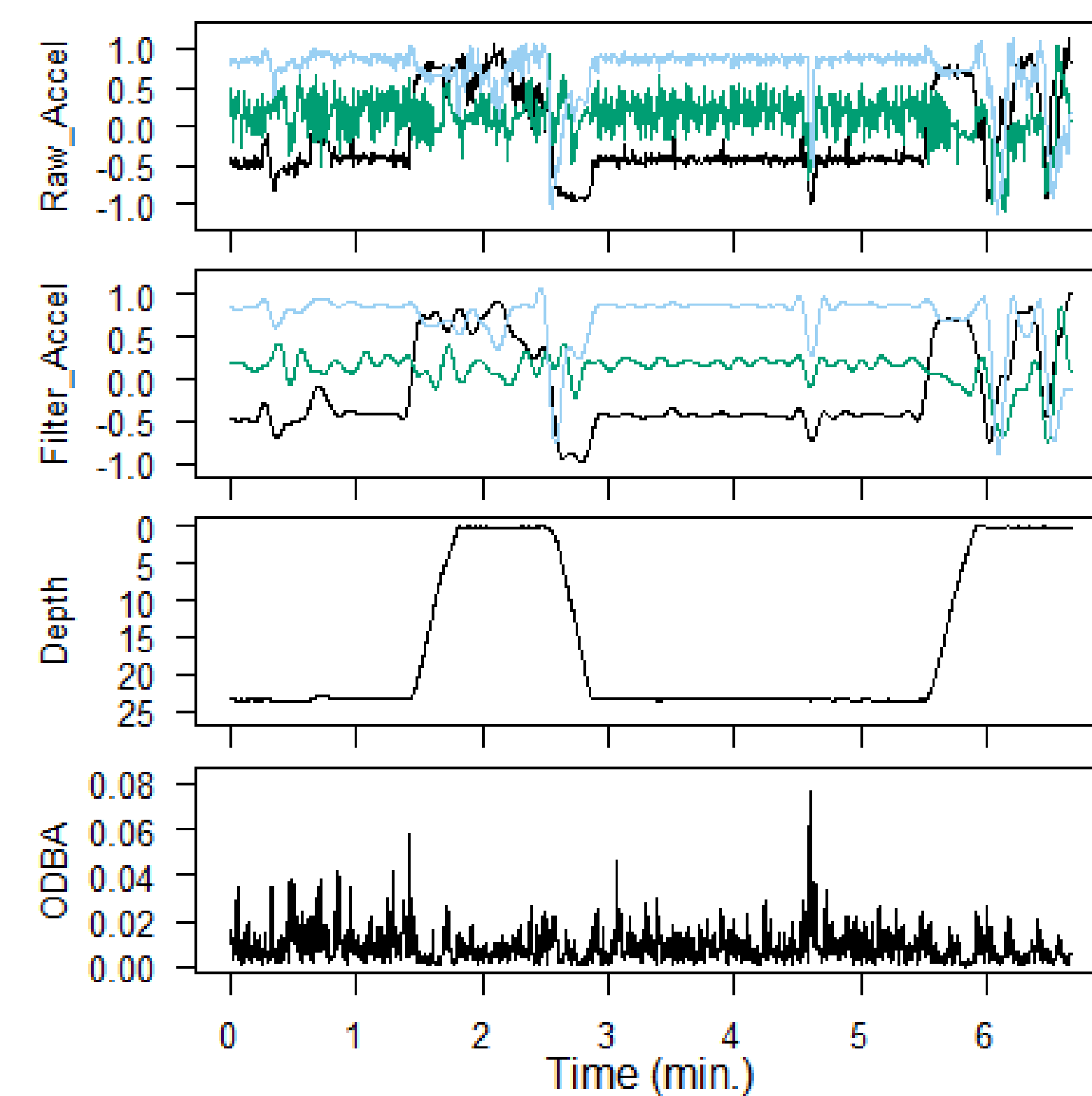
## Software Tools Overview

### Primary Research Tasks:

- Translating developed tools into all three software program languages
  - Matlab, Octave, R
- Developing new tools to include in the tagtools package
- Developing and enhancing help documentation for all tools

### Types of Tools:

- Reading and writing data
- Calibration and writing data
- Data processing and visualization
- Statistical Analysis



## Documentation

A wiki with detailed documentation of all tools, software downloads, tutorials, example datasets, workshop information, and more is at [www.animaltags.org](http://www.animaltags.org).

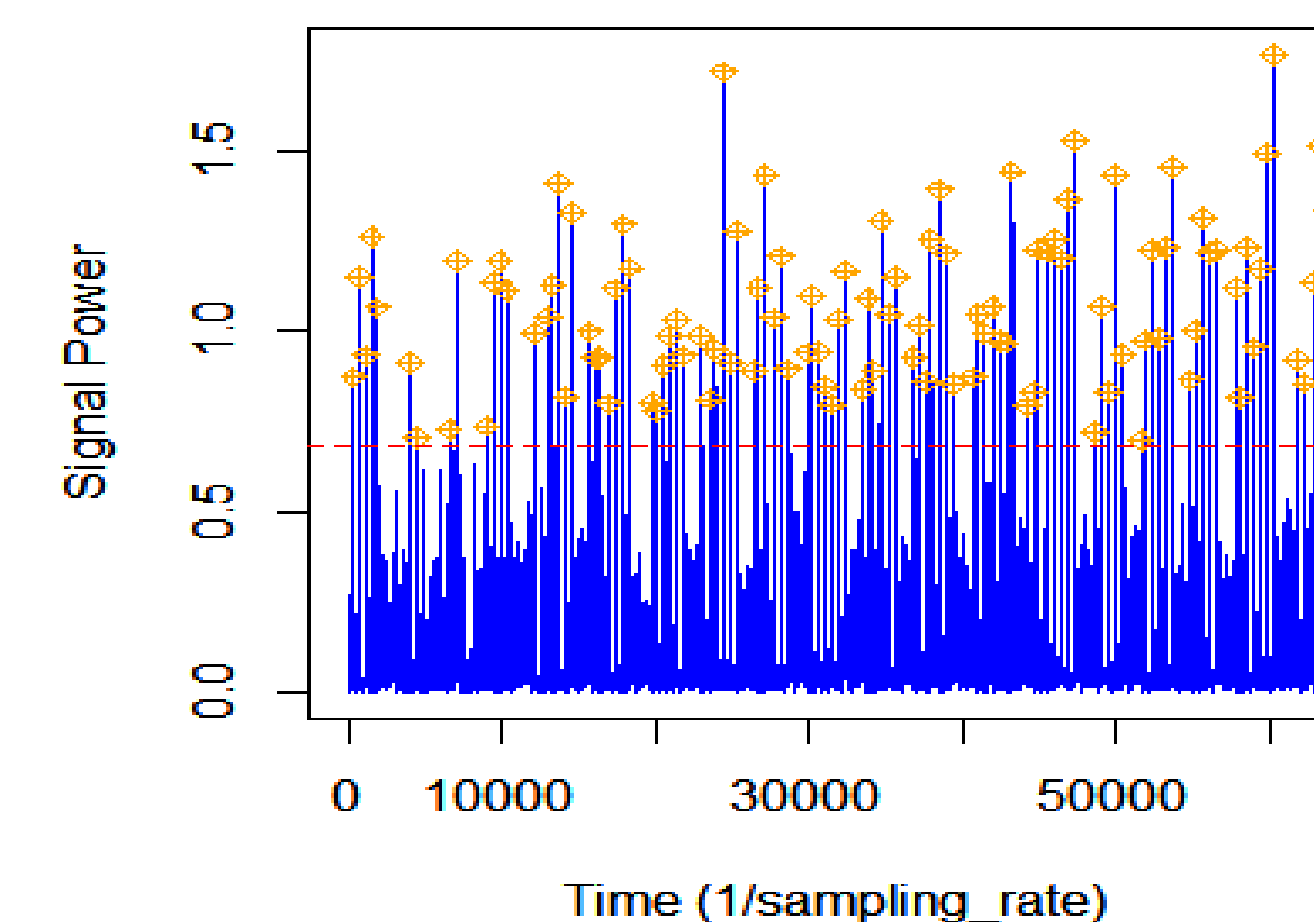
## Event Detection

### Purpose of detect\_peaks:

- Allow for the automated detection of animal behavioral events from signal vector data

### Current Research Applications:

- Detecting rorqual lunge-feeding events from norm-jerk signals
- Detecting dolphin foraging events from norm-jerk signals



## Tag Metadata

- Tag metadata contains additional information about a tag including but not limited to:
  - Location/time of tag deployment
  - Tag type
- A simple interface for appending tag metadata to a dataset is provided in the tool kit
- The metadata\_editor combines metadata automatically culled from the tag data files with user-input to a html metadata form, producing a completed tag metadata html file

### Tag Metadata Form

Open from previously uploaded csv  
Choose File | No file chosen | Open from CSV

All fields with a \* should be completed

Device Information | Tag and Animal Information | Timezone and Time Information | Locality Information | Project Information | Provider Information | Citation Information

Tag and animal information  
Catalogue ID, Band ID or Flipper Tag ID (optional):   
Describe how the tag was attached (e.g. glued, implanted, suction cups): \*   
Common name of species: \*   
Scientific name: \*   
Save as: (file name):   
Save

## Workshops

### University of St. Andrews

Our summer concluded with a three day introductory workshop at the University of St. Andrews. It was attended by 30 participants representing 7 countries and 18 home institutions.



Group photo of all who participated in our August 2017 workshop at the University of St. Andrews.

### Future Workshops:

- A second workshop is planned for October 2017 at Aarhus University in Denmark.
- A third, one-day workshop, will take place at the Society for Marine Mammalogy Conference in Halifax, Nova Scotia, Canada in October 2017.

## Software Repositories

Development versions of the tool kit are available from [www.animaltags.org](http://www.animaltags.org) (past workshops section) and from [github.com/stacyderuiter/TagTools](https://github.com/stacyderuiter/TagTools). The R package can be installed from github and will be distributed via CRAN soon.

## Acknowledgements



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