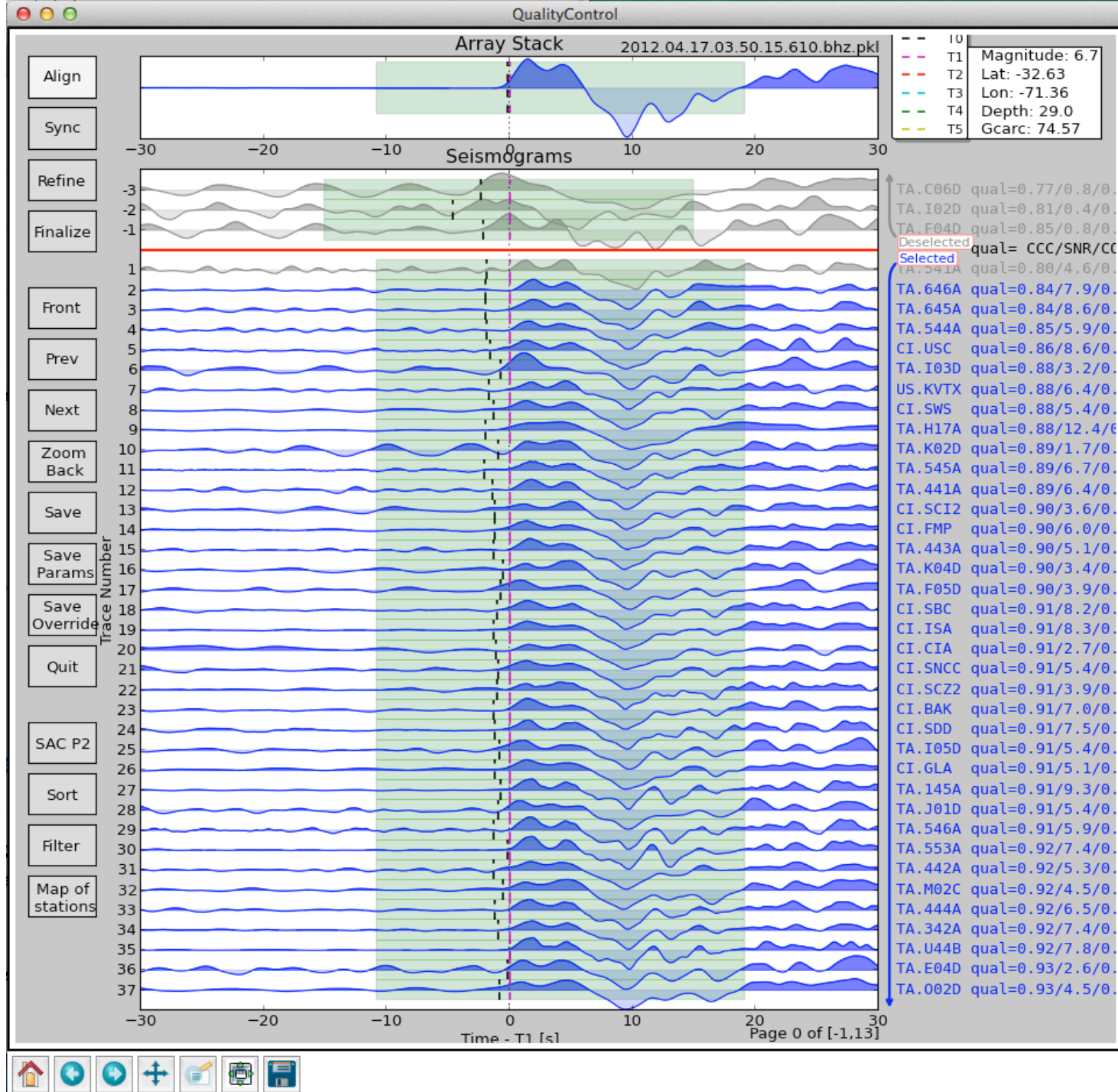


# AIMBAT

USArray  
Short  
Course  
2016



# AIMBAT

- Open-source software package for efficiently measuring teleseismic body wave arrival times for large seismic arrays (Lou et al., 2013).
  - Based on MCCC (multi-channel cross-correlation) developed by VanDecar and Crosson (1990).
  - Automated picking by aligning via an ICCS (iterative cross-correlation and stack) algorithm.
  - Graphical user interface for interactive seismogram quality control.
- User processing time is reduced while valuable input from a user's expertise is retained.
- As a byproduct, SAC (Goldstein et al., 2003) plotting and phase picking functionalities are replicated and enhanced.

ikloh (Lay Kuan Loh) x Welcome to AIMBAT's docu x

aimbat.readthedocs.org/en/latest/

AIMBAT

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## Welcome to AIMBAT's documentation!

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## Welcome

Sphinx is a tool that makes it easy to create intelligent and beautiful documentation, written by Georg Brandl and licensed under the BSD license.

It was originally created for [the new Python documentation](#), and it has excellent facilities for the documentation of Python projects, but C/C++ is already supported as well, and it is planned to add special support for other languages as well. Of course, this site is also created from reStructuredText sources using Sphinx! The following features should be highlighted:

*What users say:*  
"Cheers for a great tool that actually makes programmers **want** to write documentation!"

- **Output formats:** HTML (including Windows HTML Help), LaTeX (for printable PDF versions), ePub, Texinfo, manual pages, plain text
- **Extensive cross-references:** semantic markup and automatic links for functions, classes, citations, glossary terms and similar pieces of information
- **Hierarchical structure:** easy definition of a document tree, with automatic links to siblings, parents and children
- **Automatic indices:** general index as well as a language-specific module indices
- **Code handling:** automatic highlighting using the [Pygments](#) highlighter
- **Extensions:** automatic testing of code snippets, inclusion of docstrings from Python modules (API docs), and [more](#)

Sphinx uses [reStructuredText](#) as its markup language, and many of its strengths come from the power and straightforwardness of reStructuredText and its parsing and translating suite, the [Docutils](#).

← → ↻ [www.latex-project.org](http://www.latex-project.org)



# LaTeX – A document preparation system

LaTeX – A document preparation system

# Python -Geos

← → ↻ [trac.osgeo.org/geos/](http://trac.osgeo.org/geos/)

GEOS (Geometry Engine - Open Source) is a C++ port of the [Java Topology Suite \(JTS\)](#) to contain the complete functionality of JTS in C++. This includes all the [OpenGIS Simple Features Specification \(SFS\)](#) spatial predicate functions and spatial operators, as well as specific JTS enhanced topology functions.

GEOS is available under the terms of [GNU Lesser General Public License \(LGPL\)](#), and is also available under the terms of [OSGeo](#).

## Capabilities Include

- Geometries: Point, LineString, Polygon, MultiPoint, MultiLineString, MultiPolygon, C
- Predicates: Intersects, Touches, Disjoint, Crosses, Within, Contains, Overlaps, Equals
- Operations: Union, Distance, Intersection, Symmetric Difference, Convex Hull, Envelope
- Prepared geometries (pre-spatially indexed)
- STR spatial index
- OGC Well Known Text (WKT) and Well Known Binary (WKB) encoders and decoders
- C and C++ API (C API gives long term ABI stability)
- Thread safe (using the reentrant API)

## Download

- 2013/08/25 [geos-3.4.2.tar.bz2](#) ([Changes](#))
- 2013/09/04 [geos-3.3.9.tar.bz2](#) ([Changes](#))
- 2011/09/21 [geos-3.2.3.tar.bz2](#) ([Changes](#))
- 2009/06/15 [geos-3.1.1.tar.bz2](#) ([Changes](#))
- [Older versions...](#)
- Nightly snapshot: <http://geos.osgeo.org/snapshots/>



# Python - Basemap



» Package Index > basemap > 1.0.7

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[List trove classifiers](#)

[List packages](#)

[RSS \(latest 40 updates\)](#)

[RSS \(newest 40 packages\)](#)

[Python 3 Packages](#)

[PyPI Tutorial](#)

[PyPI Security](#)

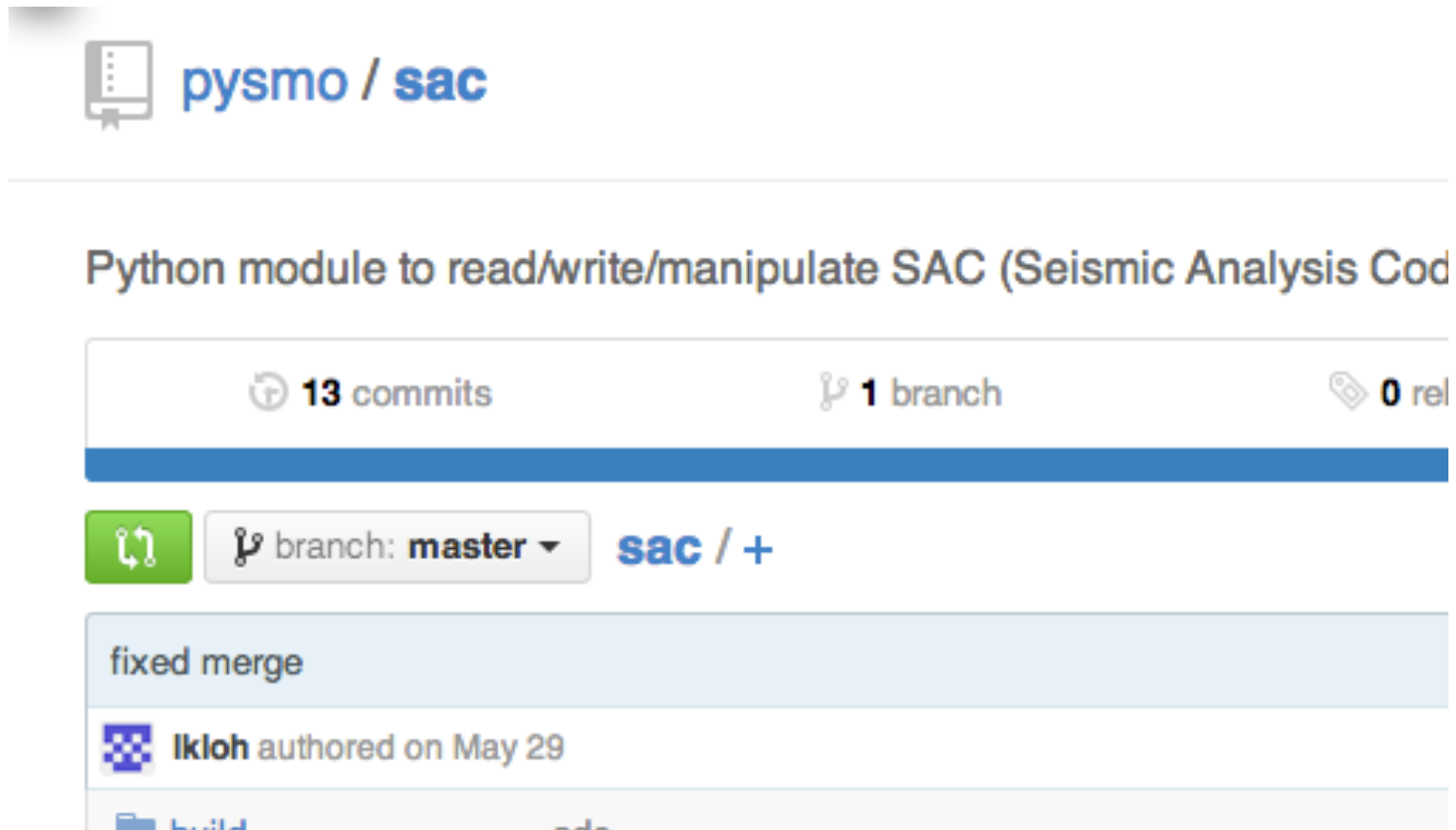
## basemap 1.0.7

*Plot data on map projections with matplotlib*


An add-on toolkit for matplotlib that lets you plot data on map projections with coastlines, lakes, rivers and political boundaries. See <http://matplotlib.github.com/basemap/users/examples.html> for examples of what it can do.

# Installing AIMBAT

- Install pysmo.sac








The screenshot shows the GitHub repository page for `pysmo / sac`. The repository is described as a "Python module to read/write/manipulate SAC (Seismic Analysis Cod)". It has 13 commits, 1 branch, and 0 releases. The current branch is `master`. The repository is owned by `ikloh`, who authored it on May 29. The repository structure includes a `build` directory and a `sac` directory.

 **pysmo / sac**


---


Python module to read/write/manipulate SAC (Seismic Analysis Cod)

 **13** commits       **1** branch       **0** rel

  branch: **master** ▾      **sac / +**

fixed merge

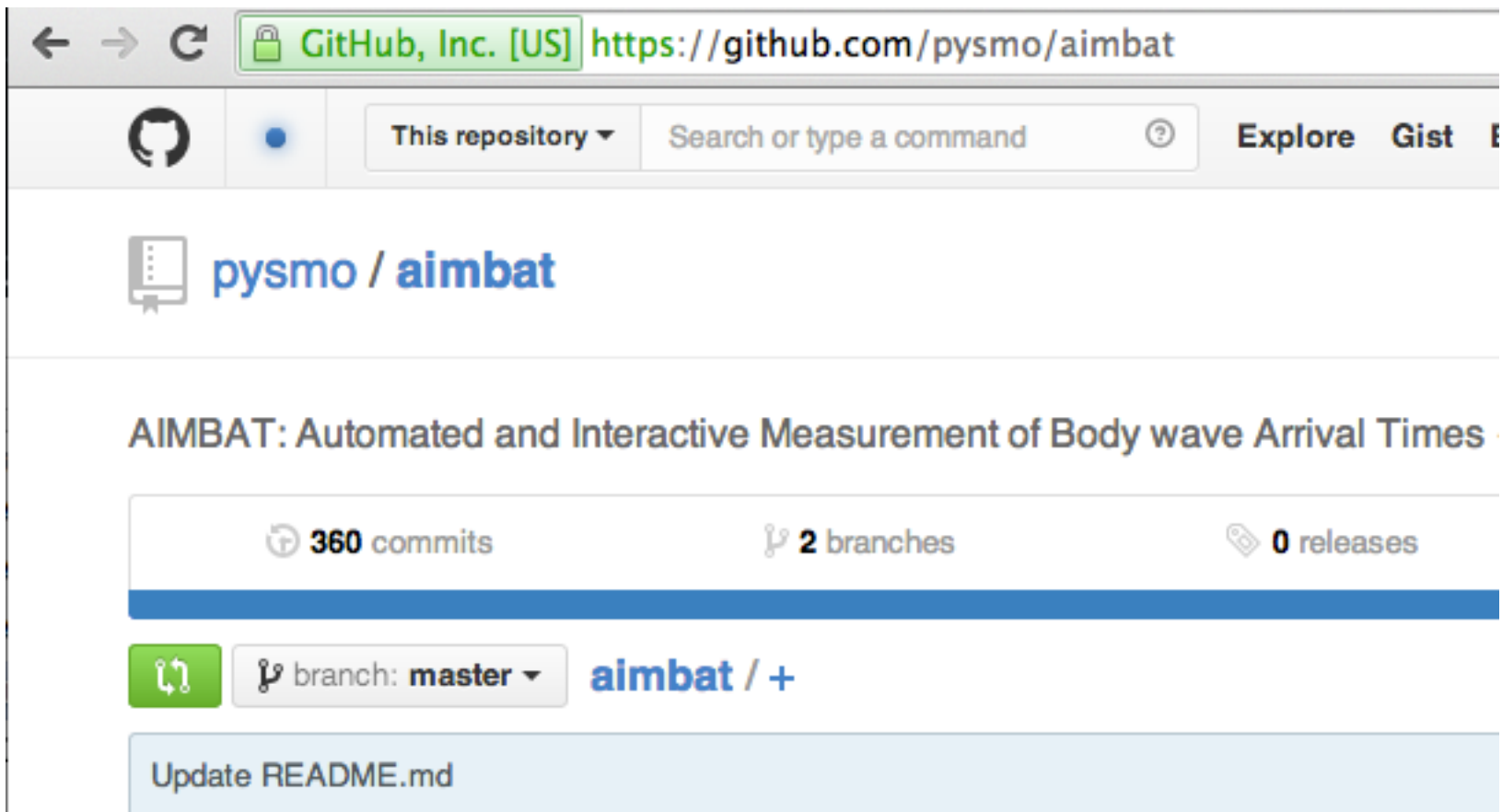
 **ikloh** authored on May 29

 `build`      `sac`



# Installing AIMBAT

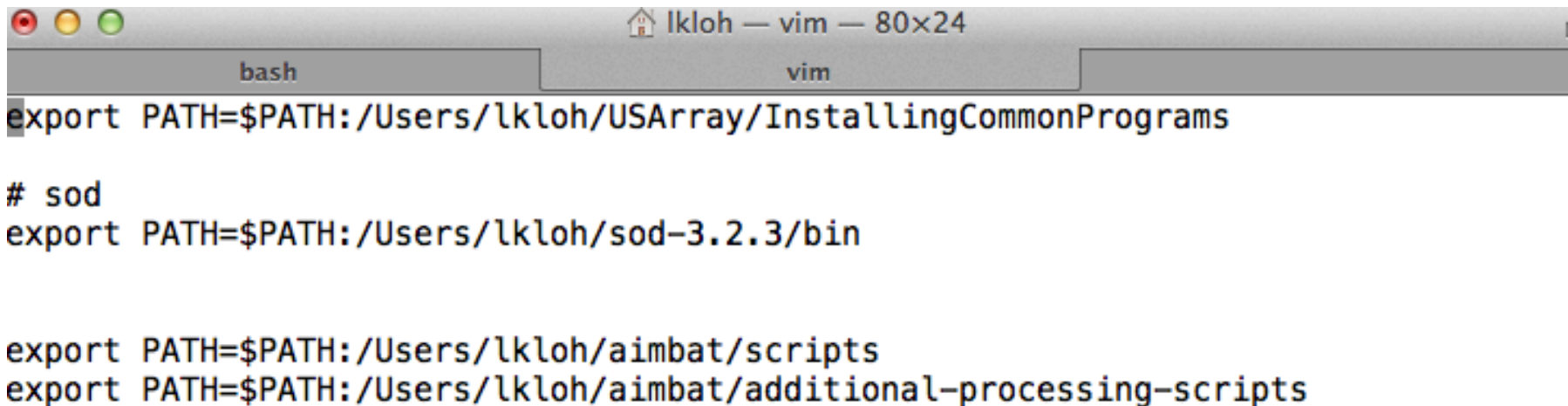
- Install `pysmo.aimbat`



The screenshot shows the GitHub web interface for the repository `pysmo/aimbat`. The browser address bar displays the URL `https://github.com/pysmo/aimbat`. The repository name `pysmo / aimbat` is shown in blue. Below the repository name, the description reads: `AIMBAT: Automated and Interactive Measurement of Body wave Arrival Times`. The repository statistics are displayed as `360 commits`, `2 branches`, and `0 releases`. At the bottom, there is a green button with a fork icon, a dropdown menu showing `branch: master`, and a blue button labeled `aimbat / +`. Below these buttons is a light blue button labeled `Update README.md`.

# .bash\_profile

- Edit .profile or .bashrc

A screenshot of a terminal window titled "lkloh — vim — 80x24". The window shows the contents of a .bash\_profile file being edited in vim. The file contains several export statements for the PATH variable, adding directories to the system path. The terminal output is as follows:

```
export PATH=$PATH:/Users/lkloh/USArray/InstallingCommonPrograms

# sod
export PATH=$PATH:/Users/lkloh/sod-3.2.3/bin

export PATH=$PATH:/Users/lkloh/aimbat/scripts
export PATH=$PATH:/Users/lkloh/aimbat/additional-processing-scripts
```

Sort by file Index Name:

File

Sort by Quality:

All

CCC

SNR

COH

Sort by Header:

NPTS

B

E

Delta

STLA

STLO

Dist

AZ

BAZ

GCARC

Waiting for User input

FILENAMES

File: Sort in alphabetical order by filename

QUALITY:

All: Weighted Ratio of all quality measures

CCC: Cross-coefficient Coefficient

SNR: Signal-to-noise Ratio

COH: time domain coherence

OTHER HEADERS:

NPTS: Number of points per data component

B: Beginning value of the independent variable

E: Ending value of the independent variable

Delta: Increment between evenly spaced samples

STLA: Station latitude (deg, north positive)

STLO: Station longitude (deg, east positive)

DIST: Station to event distance (km)

AZ: Event to station azimuth (deg)

BAZ: Station to event azimuth (deg)

GCARC: Station to event great circle arc length (deg)



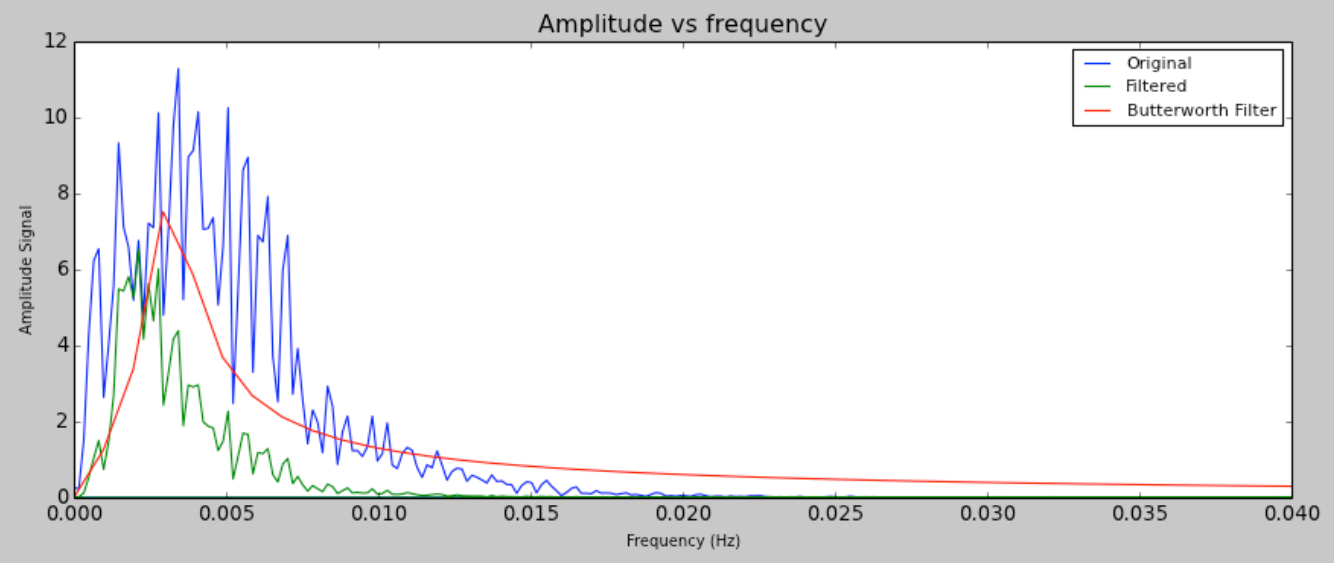
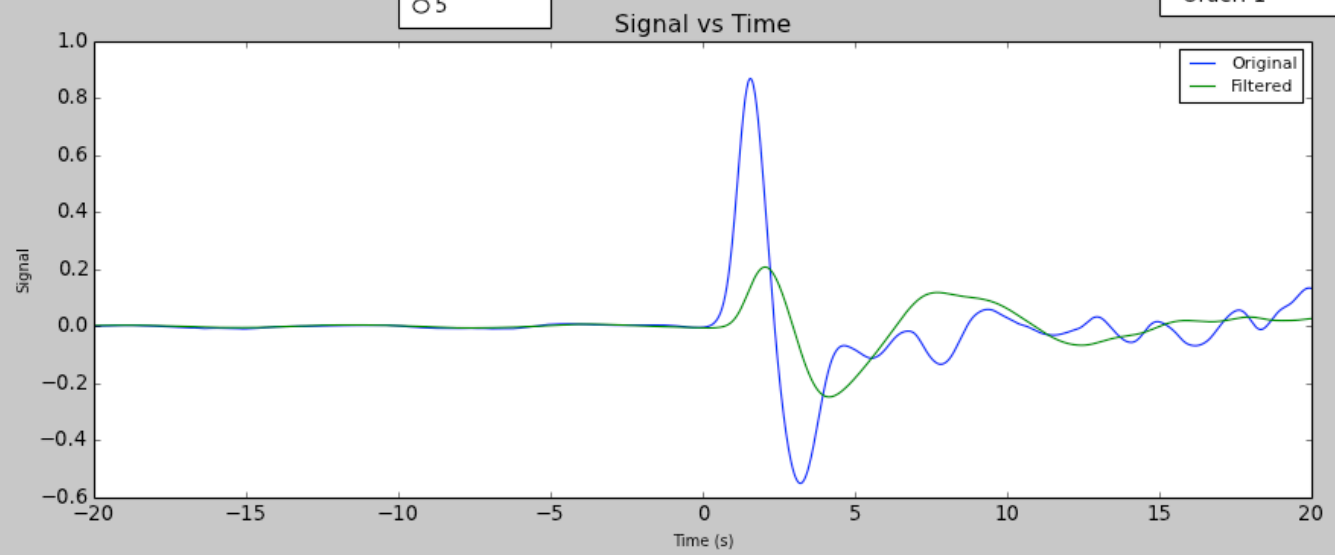
10  
10  
10  
10  
!

# Butterworth Filter

Select Order:

- 1
- 2
- 3
- 4
- 5

Low Freq: 0.005  
High Freq: 0.008  
Order: 1



# Thank you Developers:

Xiaoting Lou

Simon Lloyd

Lay Kuan Lo

Nick Ambruz



thank you!

# Possible Future Development: Using Obspy to download IRIS data from within AIMBAT (volunteers?)

1. `getWaveform()`: The following example illustrates how to request and plot 18 seconds of all three single band channels ("EH\*") of station Jochberg/Hochstaufer ("RJOB") of the Bavarian network ("BW") for seismic event around 2009-08-20 04:03:12 (UTC).

```
>>> from obspy import UTCDateTime
>>> from obspy.arclink.client import Client
>>> client = Client(user='test@obspy.org')
>>> t = UTCDateTime("2009-08-20 04:03:12")
>>> st = client.getWaveform("BW", "RJOB", "", "EH*", t - 3, t + 15)
>>> st.plot()
```

# Possible Future Development: Using GMT-py to make maps within AIMBAT (volunteers?)



The screenshot shows a web browser window with the URL `gmt.soest.hawaii.edu/projects/gmt-python-api/wiki`. The browser's address bar and tabs are visible at the top. Below the browser window, the page content is displayed. The main heading is "The GMT/Python API Wiki". Below this heading, there is a logo for GMT (The Generic Mapping Tools) which features a globe with the letters "GMT" in red, and a plus sign next to the Python logo (a blue and yellow snake) with the word "powered" underneath it. To the right of the main content, there is a sidebar with the heading "Wiki" and a list of links: "Start page", "Index by title", and "Index by date".

Home Projects Help Sign In Register

## GMT » GMT/Python API Search:

Overview Activity Issues News **Wiki**

### The GMT/Python API Wiki

+

powered

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- [Index by date](#)



/Volumes/usarray/Modules/Tuesday/AIMBAT



AIMBAT\_exercise\_i  
nstructions.pdf

AIMBAT exercise 2016 USArray data processing short course