PhD scripts and functions

Description

This directory contains all of the scripts used in completing my PhD in GeoPhysics at Victoria University of Wellington from 2015-2019.

PhD title: Characterizing microseismicity at the Rotokawa and Ngatamariki geothermal fields, North Island, New Zealand

Usage

The *python/workflow* directory contains all of the relevant python files used through the course of this work. Other directories contain older versions of the scripts contained under *workflow* but are left as is for posterity.

Each *python/workflow* script detailed below is only a collection of functions. They cannot be executed on their own and the functions within are meant to be imported and used from within a python interpreter. In order to use a particular function from a file, make sure the file is on your python path before using: `from plot_mags import plot_mags`, for example.

The most important files are explained below.

##Workflow functions:

- *data_prep.py*: Functions to take raw miniseed and sc3ml files and output usable QML and pyasdf files for use in main workflows. This includes functionality for creating templates.
- *relocate.py*: Functions for relocating events in catalogs, including NLLoc, HypoDD and GrowClust.
- *magnitudes.py*: Wrappers on magnitude calculation functions in EQcorrscan for matched filter detections.
- *obspyck_util*: Wrapper functions on the python-based picker GUI, Obspyck. These were used for making all polarity picks.
- *focal_mecs*: Focal mechanism calculation, plotting and file parsing for use with a number of packages including: MTFit, Richard Arnold's R codes, HybridMT, etc...
- *shelly_focmecs.py*: Python implementation functions for David Shelly's polarity clustering routines. Read the paper here
- *shelly_mags.py*: Python implementation functions for David Shelly's relative-amplitude calculation workflow. Read the paper here

##Plotting functions: * *plot_detections.py*: A large number of plotting functions for catalog locations, time

series, cumulative detections and much more

- *plot_mags.py*: Various magnitude plotting functions (i.e. b-values, magnitude time series, etc...)
- *plot_stresses.py*: Plotting mostly of the output of Richard and John's focal mechanism inversion codes, including a python version of the principal stress axes and pdfs.
- *plot_well_data.py*: Large number of functions for plotting most of the Mercury datasets including PTS runs, flow rates, pressures, well locations, etc

Data location and processing

This section serves as reference for any VUW students and staff needing to locate and access the data files used in this project

Waveform files:

The raw day-long miniseed files live in two locations on the network:

For 2012-2013 data: * /Volumes/Taranaki_01/data/civilfra/Rotokawa_Seismic/raw_data/RT-NM_mseed

For 2014-2015 data: * /Volumes/Taranaki_01/data/hoppche/waveform_data

For a local archive of all GeoNet waveforms relevant to our network: * /Volumes/GeoPhysics_07/users-data/hoppche/geonet_waveforms

Earthquake catalogs

The final earthquake catalogs and station information can be accessed at: * This project's OSF repository * On the VUW network: /Volumes/GeoPhysics_07/users-data/hoppche/FINAL_FILES_29-3-19

Mercury datasets

The Mercury flow rate and pressure datasets used throughout the project are found in the following directory on the network: * /Volumes/GeoPhysics_07/users-data/hoppche/MERCURY_FILES

I will retain these locally, but will not make them publically available via the above repo, as they are proprietary.

Acknowledgments

These scripts rely heavily upon other Python packages including, but not limited to: * EQcorrscan * Obspy * Obspyck These scripts assume that the above are installed properly and are accessible on the users machine.