Earth Surf. Dynam. Discuss.,
https://doi.org/10.5194/esurf-2017-75-RC2, 2018

Earth Surface Dynamics Discussions

Interactive comment on "The R package "eseis" – a comprehensive software toolbox for environmental seismology" *by* Michael Dietze

Anonymous Referee #2

Received and published: 25 April 2018

This paper presents a new data analysis software package called " e-seis " dedicated to the processing of seismic data and intended to be mostly used to analyze seismic signals associated with various surface processes. This library written in R aims at facilitating the routine tasks for new or advanced seismologists, including reading seismic data in various popular formats, some common preprocessing steps (filtering, instrumental response removal, ...), standard plotting (spectrogram, . . .) or basic analysis (phase picking based on STA/LTA, . . .). Some more advances tools are also available to analyses the non-impulsive seismic signals often associated with surfaces processes.

Overall it is a well written paper which includes various didactic portions of code and working examples. Although not being personally familiar with R, the "eseis" package

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seems to be well organize and quite straightforward to use, at least based on the few examples given by the author.

My main concern is mainly about the introduction part of the paper and the motivations for the "eseis" package : - The author has to better explain his motivation for developing this new R package even through there exists several other seismic data (pre)processing and analysis open source solutions, among them (Obspy, Seisan, SeismicHandler, ...) several are intensively used by a broad community. Basically I did not find in the introduction clear answers to some simple questions like : 1) If I a am new to seismic data processing (and/or if I analyze seismic data related to surface processes), why should I use "eseis" rather than another solution ? 2) what is specific to "eseis" compared to other packages (pros/cons)? 3) if I am a "R-lover", why should I use "eseis" rather than the RSEIS package (https://cran.rproject.org/web/packages/RSEIS/index.html)?

- The author argues in the introduction that it is "essential to find a common language" in environmental seismology. Why such a statement? Seismic data used for environmental seismology are not different than other (passive) seismic data and are (pre)processed in similar ways (this is actually what mostly does "eseis"). "Classic seismologists" (not focusing on surface and subsurface processes) also work on non impulsive sources ("eg. tremors"), ambient noise . . . For example, the ambient noise interferometry approach mentioned by the author (p2, l.16-18) is applied in a wide range of seismological studies, including environmental seismology but not only ! And the MSnoise package (http://www.msnoise.org/) already does the job quite well!

- For me, the introduction is too much an apologia for the R language. Other languages, and especially Python, are almost not cited although they are used by a wide and growing range of seismologists (and scientists) having the same motivations as the author.

My advice is to be less ambitious in the introduction avoiding too general (or oriented)

statements and to present the "eseis" package as a promising R solution for easy data processing with some specific modules (that users will not be able to find in other solutions; like the model_turbulence module) dedicated to the analyses of environmental surface sources that produce seismic signals. In the following sections, it might also be good to better separate the aspects related to "standard" processing of seismic data (including preprocessing, temporal/spectral plotting, sta/lta, ...) from modules purely dedicated to the analysis of surface processes.

Some other more minor or technical comments:

- Part 2 (p2 l21 to p3 l21) could be condensed. Although I agree with most of the author's statements related to data/code sharing policy and general principles in coding, these problematics are for most beyond the scope of this paper.

- Header of the "eseis" objects : How "eseis" is handling the fact that SAC files and miniseed files do not have the same information in their headers (SAC being more event oriented whereas miniseed is more dedicated to continuous streams) ? Is it possible to add information in the headers (such as events information)?

- Low level programming languages (p5, l11-15) : Note that there are a lot of other analysis techniques, not yet developed in "eseis", which would benefit from the use of low level languages (for example for continuous scanning of waveform parameters)

- Data structure (p6 l20) : The Year/Julian day file structure is not so common. Lot of seismologists use a Seiscomp "Standard Data Structure (SDS)" (Year/Net/Sta/Chan) with day long files.

- Metadata : It seems that "eseis" does not have the ability to read/write standard FDSN metadata formats (Seed dataless, StationXML). They are used by a wide variety of seismologists and they include information that may be crucial for some processing. If "eseis" does not accept such type of metadata formats, the author should mention the implications and potential limitations of their dedicated way of handling metadata.

- Deconvolution (p7 l4-10) : following the previous comment, it seems that the digitizers have only a "gain" parameter. Not taking into account stages such as anti-aliasing filter coefficients may lead to some misinterpretation of the signal in time or frequency domain.

- Metadata / channel naming: Legend 1 indicate all the "relevant metadata" but I don't see information like the "location code", "channel name", the orientation of the sensor, etc. . . For example how works the signal_rotate module (or others) if the orientation of the components are not provided in the input metadata file ?

- Output format (p9 l4) : Indicate what is the main reason for choosing SAC as the output format.

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