Improvements to Horizontal-to-vertical spectral Ratio PRocessing with The Open-source Python Package hvsrpy

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Abstract

The horizontal-to-vertical spectral ratio (HVSR) is one of the most-widely used techniques for non-invasive site characterization with users spanning the fields of geophysics, engineering, and seismology. As a result, the HVSR community is broad and contains diverse perspectives on how HVSR data should be processed. Unfortunately, existing open-source and commercial software tools have focused on supporting specific HVSR processing workflows, with no tool having yet been developed that can support the full range of perspectives in the HVSR community. In response, this work presents a new major release (v2.0.0) of the open-source Python package, *hvsrpy*. The new major release of *hvsrpy,* developed over the past two years, has focused on creating a simple, extensible, and reproducible tool for microtremor and earthquake HVSR processing. The latest release of *hvsrpy* provides a comprehensive set of features not available in any other software. These features include: parsing of microtremor and earthquake records in all common file formats (seven in total), processing of ambient noise using the traditional, azimuthal, and diffuse wavefield approaches, combining horizontal components using all common methods (seven in total), smoothing of Fourier spectra using all common methods (seven in total), removing low-quality HVSR windows using time-domain or HVSR-domain approaches (four in total), quantifying rigorous statistical measures, and computing power spectral densities as an HVSR diagnostic tool. The presentation will highlight these recent improvements and outline future plans for the maintenance and further development of *hvsrpy* as an open-source Python package for the HVSR community.