GISMO: A MATLAB toolbox for seismic research, monitoring, & education

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GISMO is an open-source, object-oriented MATLAB toolbox which provides a framework to build workflows and applications that read, process, visualize and write seismic waveform, catalog and instrument response data. Features include:

- GISMO knows how to get data from a variety of sources / data formats, spanning file boundaries (e.g. SAC, Seisan, Antelope/Datascope, IRIS web services, Earthworm/WINSTON wave servers etc.). This is often the most time consuming part for scientists writing code from scratch.
- GISMO simplifies everything by turning data from any source into a waveform or catalog object.
- Common types of time series plots are built-in to GISMO, e.g. record section plots, helicorder plots, spectrograms, depth-time sections, number of events per unit time, energy release per unit time. Also map view and cross-sections of hypocentral data.
- Many common processing methods are also included, e.g. GISMO includes an extensive set of tools for correlation analysis (contributed by M. West).
- Support is being added to interface GISMO with ObsPy.

GISMO encourages community development of an integrated set of codes and accompanying documentation, eliminating the need for seismologists to "reinvent the wheel". By sharing code the repeatability of science is enhanced.

GISMO has recently been migrated to GitHub and documented via a project wiki. GISMO has been used at USF and UAF in graduate-level courses including Seismic Data Analysis, Time Series Analysis and Computational Seismology. GISMO has also been tailored to interface with the common seismic monitoring software and data formats used by volcano observatories in the US and the developing world. Training has been provided to INETER (Nicaragua).

Applications built on GISMO include IceWeb (e.g. web-based spectrograms, see figure below) and Rockmap (locating debris flows).