


## 2010 AGU Fall Meeting

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### **OpenStereo: Open Source, Cross-Platform Software for Structural Geology Analysis**

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Free and open source software (FOSS) are increasingly seen as synonyms of innovation and progress. Freedom to run, copy, distribute, study, change and improve the software (through access to the source code) assure a high level of positive feedback between users and developers, which results in stable, secure and constantly updated systems. Several software packages for structural geology analysis are available to the user, with commercial licenses or that can be downloaded at no cost from the Internet. Some provide basic tools of stereographic projections such as plotting poles, great circles, density contouring, eigenvector analysis, data rotation etc, while others perform more specific tasks, such as paleostress or geotechnical/rock stability analysis. This variety also means a wide range of data formatting for input, Graphical User Interface (GUI) design and graphic export format. The majority of packages is built for MS-Windows and even though there are packages for the UNIX-based MacOS, there aren't native packages for \*nix (UNIX, Linux, BSD etc) Operating Systems (OS), forcing the users to run these programs with emulators or virtual machines.

Those limitations lead us to develop OpenStereo, an open source, cross-platform software for stereographic projections and structural geology.

The software is written in Python, a high-level, cross-platform programming language and the GUI is designed with wxPython, which provide a consistent look regardless the OS. Numeric operations (like matrix and linear algebra) are performed with the Numpy module and all graphic capabilities are provided by the Matplotlib library, including on-screen plotting and graphic exporting to common desktop formats (emf, eps, ps, pdf, png, svg). Data input is done with simple ASCII text files, with values of dip direction and dip/plunge separated by spaces, tabs or commas. The user can open multiple file at the same time (or the same file more than once), and overlay different elements of each dataset (poles, great circles etc). The GUI shows the opened files in a tree structure, similar to "layers" of many illustration software, where the vertical order of the files in the tree reflects the drawing order of the selected elements.

At this stage, the software performs plotting operations of poles to planes, lineations, great circles, density contours and rose diagrams. A set of statistics is calculated for each file and its eigenvalues and eigenvectors are used to suggest if the data is clustered about a mean value or distributed along a girdle. Modified Flinn, Triangular and histograms plots are also available. Next step of development will focus on tools as merging and rotation of datasets, possibility to save 'projects' and paleostress analysis.

In its current state, OpenStereo requires Python, wxPython, Numpy and Matplotlib installed in the system. We recommend installing PythonXY or the Enthought Python Distribution on MS-Windows and MacOS machines, since all dependencies are provided. Most Linux distributions provide an easy way to install all dependencies through software repositories. OpenStereo is released under the GNU General Public License. Programmers willing to contribute are encouraged to contact the authors directly.

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<http://www.igc.usp.br/openstereo>

**Contact Information**

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