

# List of free geophysics software

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This is a list of free and open source software for geophysical data processing and interpretation. The list is split into broad categories, depending on the intended use of the software and its scope of functionality.

Notice that 'free and open source' requires that the source code is available. Simple being 'free of charge' is not sufficient—see gratis versus libre. The reader interested in freeware (just free of charge) software is referred to the list of freeware geophysics software.

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## Reflection seismic processing packages

Name	Description	Originator	License	Platforms	Language	Notes
<b>Madagascar</b> <sup>[1]</sup>	Multidimensional data analysis including seismic processing	Sergey Fomel and others	GPL	Cross-platform	C, Python	Program Interfaces to C++, Fortran 77, Fortran 90, Python, Java, MATLAB
<b>FreeUSP</b> <sup>[2]</sup>	Seismic processing	Amoco, BP	Custom	Unix, Linux	Fortran 77, C	
<b>FreeDDS</b> <sup>[3]</sup>	Seismic processing	Amoco, BP	Custom	Unix, Linux	Fortran 77, C	Generic format (SEG Y, SU, SEPlib, USP)
<b>PSEIS-OSS</b> <sup>[4]</sup>	Parallel seismic processing	Randy Selzler	GPL	Unix, Linux	Fortran 77, C	Generic format (SEG Y, SU, SEPlib, USP, Madagas)
<b>CWP/SU (Seismic Un*x)</b> <sup>[5]</sup>	Seismic processing	Stanford, Colorado School of Mines	BSD-style	Unix, Linux, Mac OS X, Cygwin 32	C, some Fortran 77	World's most widely used (69 countries and territories)
<b>CPSeis</b> <sup>[6]</sup>	Seismic processing	ConocoPhillips	MIT	Cross-platform	Fortran 90, C++	
<b>SPARC</b> <sup>[7]</sup>	Seismic processing	ARCO	GPL	Cray	Fortran	
<b>SEPlib</b> <sup>[8]</sup>	Seismic processing	Stanford University	Custom	Cross-platform	Fortran, C	
<b>BotoSeis</b> <sup>[9]</sup>	Seismic processing	Williams Lima, Brazil	GPL	Cross-platform	Java	Interfaces with SU, Madagas etc.
<b>GeBR</b> <sup>[10]</sup>	Seismic processing	Various contributors, Brazil	GPL	Linux	C	Interfaces with SU, Madagas etc.
<b>OpenSeaSeis</b> <sup>[11]</sup>	Seismic processing	Bjorn Olofsson, Colorado School of Mines	BSD-style	Linux, Windows, Mac OS X	C, C++, Java	Interfaces with SU data. Reads most common SEG Y and a subset of SEG D formats.

## Reflection seismic processing utilities

Name	Description	Originator	License	Platforms	Language	Notes
<b>GSEGYView</b> <sup>[12]</sup>	Display SEG-Y files	Vladimir Bashkardin	GPL	Cross-platform	Fortran, C	
<b>SegyPY</b> <sup>[13]</sup>	Read and write SEG-Y files	Thomas Mejer Hansen, Univ. of Copenhagen	LGPL	Cross-platform	Python	Requires matplotlib
<b>segpy-py</b> <sup>[14]</sup>	Read SEG-Y files	Kurt Schwehr, Google	Custom	Cross-platform	Python	Various FOSS packages
<b>Delivery</b> <sup>[15]</sup>	Bayesian inversion	CSIRO	GPL, BSD-style	Cross-platform	Java	
<b>WaveletExtractor</b> <sup>[16]</sup>	Well-ties	CSIRO	GPL, BSD-style	Cross-platform	Java	
<b>GPLib++</b> <sup>[17]</sup>	Seismic and magnetotelluric processing	Max Moorkamp, Dublin Inst. Adv. Studies	GPL	Unix, Linux	C++	
<b>JavaSeis</b> <sup>[18]</sup>	Pre-stack seismic I/O	ARCO	CPL	Cross-platform	Java	
<b>kogeo</b> <sup>[19]</sup>	Geophysical analysis and visualization	University of Hamburg	GPL	Windows	C++	
<b>Mines JTK</b> <sup>[20]</sup>	Signal processing and display	Dave Hale, Colorado School of Mines	CPL	Cross-platform	Java	
<b>JRG</b> <sup>[21]</sup>	Modeling and basic processing	John Louie, University of Nevada	Custom	Cross-platform	Java	
<b>Jive3D</b> <sup>[22]</sup>	Modeling and tomographic inversion	James Hobro, University of Cambridge	Custom	Unix, Linux	Fortran	GMT and other libraries
<b>SLIMpy</b> <sup>[23]</sup>	Processing front end	Felix Herrmann, Univ. of British Columbia	LGPL	Cross-platform	Python	Interfaces with SU, Madagas etc.
<b>SIOSEIS</b> <sup>[24]</sup>	Seismic reflection and refraction processing	Paul Henkart, SIO	BSD	Cross-platform	gfortran, gcc	

## Non-reflection-seismic processing utilities

Name	Description	Originator	License	Platforms	Language	Notes
<b>Fatiando a Terra</b> <sup>[25]</sup>	Geophysical modeling and inversion	Leonardo Uieda et al.	BSD	Multi-platform	Python	Uses Numpy and Cython.
<b>ObsPy</b> <sup>[26]</sup>	Seismology toolbox	Moritz Beyreuther et al.,	LGPL	Multi-platform	Python	Uses Numpy and Cython.
<b>PAMGUARD</b> <sup>[27]</sup>	Passive acoustic monitoring for marine mammals	Multiple workers	GPL	Linux, Windows, Mac OS X	Java	Plug-in-able
<b>PyGMI</b> <sup>[28]</sup>	3D interpretation and modelling of magnetic and gravity data	Patrick Cole	GPL	Multi-platform	Python	
<b>Sesarray</b> <sup>[29]</sup>	Signal processing for ambient vibrations	Joseph Fourier University, University of Potsdam	GPL	Linux, Windows, Mac OS X	C, C++	Includes geopsy (signal processing & inversion)
<b>Seismic Handler</b> <sup>[30]</sup>	Signal processing for earthquakes	SZGRF	GPL	Linux, Solaris	C, Python	
<b>STK</b> <sup>[31]</sup>	Signal processing for earthquakes	Dominique Reymond	GPL	Unix, Linux, Windows	C	
<b>TauP</b> <sup>[32]</sup>	Travel-time & ray-path calculation	University of South Carolina	GPL	Cross-platform	Java	

## Visualization, interpretation & analysis packages

Name	Description	Originator	License	Platforms	Language	Notes
<b>OpendTect</b> <sup>[33]</sup>	Geoscience interpretation and visualization	dGB Earth Sciences ( <a href="http://www.dgbes.com">http://www.dgbes.com</a> )	GPL or custom	Cross-platform	C++	Interfaces with Petrel, Madagas GMT, Google Earth/Map
<b>GeoTriple for Oil&amp;Gas Exploration</b> <sup>[34]</sup>	Geoscience data management, display and analysis	Geoforge project ( <a href="http://geoforge.org/">http://geoforge.org/</a> )	LGPL	Cross-platform	Java	Interfaces with WorldW
<b>GeoCraft</b> <sup>[35]</sup>	Geophysical analysis and visualization	ConocoPhillip	MIT	Cross-platform	Java	
<b>qiWorkBench</b> <sup>[36]</sup>	Geophysical interpretation and visualization	BHP Billiton Petroleum	GPL, BSD	Cross-platform	Java	
<b>Generic Mapping Tools</b> <sup>[37]</sup>	Map generation and analysis	Lamont-Doherty and University of Hawaii	GPL	Cross-platform	C	Implementer in OpendTect
<b>ParaViewGeo</b> <sup>[38]</sup>	Geoscience extension of ParaView	Kitware ParaView, MIRARCO	BSD	Cross-platform	C++, Python	Oriented towards mining
<b>GI</b> <sup>[39]</sup>	Geophysical interpretation and visualization		GPL	Cross-platform	C++, Qt	Alpha version

## Not true free and open source projects

The following projects have unknown licensing, licenses which place some restriction on use or redistribution, or depend on non-open-source software like MATLAB, and therefore do not meet the Open Source Definition from the Open Source Initiative. (For example, the license may rule out use by certain people or for certain purposes, e.g. in a commercial

context.) They are included here because they may be of interest for those in an academic environment or access to tools like MATLAB.

Name	Description	Originator	License	Platforms	Language	Notes
<b>GeoFEST</b> <sup>[40]</sup>	Fault and terrain visualization	Greg Lyzenga & Jay Parker, Jet Propulsion Laboratory	Not obvious	Unix, Linux	C	Hosted by Open Channel Founde
<b>MSLT</b> <sup>[42]</sup>	Finite element stress-strain modeling	Peggy Li & Herb Siegel, Jet Propulsion Laboratory	Not obvious	Unix, Linux, Mac OS X	C	
<b>GeoSeis</b> <sup>[43]</sup>	Processing seismic refraction data	Muhammed Celik, Kocaeli University	Freeware	Windows	Visual Basic	Comple free after v. 1.3.8
<b>GPRSoft Lite</b> <sup>[44]</sup>	GPR Data Visualization	Geoscanners AB	Freeware	Windows		GSF, DZT, RAD3, DT1, formats suppor
<b>GP Workbench</b> <sup>[45]</sup>	GPR processing	USGS	Not obvious	Windows	C++	SU format
<b>Seismic Lab</b> <sup>[46]</sup>	Seismic processing toolbox	Mauricio Sacchi, University of Alberta	GPL	Cross-platform	MATLAB	Require MATLA
<b>CREWES</b> <sup>[47]</sup>	Seismic processing toolbox	Gary Margrave, University of Calgary	Custom, free for non-commercial use	Cross-platform	MATLAB	Require MATLA
<b>SegyMAT</b> <sup>[48]</sup>	Read and write SEG-Y files	Thomas Mejer Hansen, Univ. of Copenhagen	LGPL	Cross-platform	MATLAB	Require MATLA
<b>IMAGE2SEGY</b> <sup>[49]</sup>	Image converter	Marcel·lí Farran, Institut de Ciències del Mar (http://www.icm.csic.es/)	Creative Commons	Cross-platform	MATLAB	Require MATLA & SegyM
<b>SW3D</b> <sup>[50]</sup>	Seismic processing	Vlastislav Cervený, Charles University	Not obvious			
<b>rayinvr</b> <sup>[51]</sup>	2D travelttime inversion	Colin Zelt, Rice University	Custom, non-commercial use only	Unix, Linux	Fortran 77, C	
<b>fast</b> <sup>[52]</sup>	3D travelttime tomography	Colin Zelt,	Custom, non-commercial use	Unix, Linux	Fortran 77, C	

		Rice University	only			
<b>passeis</b> <sup>[53]</sup>	Passive seismic analysis	Haishan Zheng, University of Saskatchewan	Not obvious	Cross-platform	MATLAB	Requires MATLAB
<b>seismon</b> <sup>[54]</sup>	Processing for earthquakes	Stefan Mertl	GPL	Cross-platform	MATLAB	Requires MATLAB
<b>PyShottab</b> <sup>[55]</sup>	Processing for ocean-bottom seismic	Dalhousie University	Not obvious	Cross-platform	Python	Windows binary
<b>IGeoS (formerly SIA)</b> <sup>[56]</sup>	Geophysical processing and analysis	University of Saskatchewan	Custom, free for non-commercial use	Unix, Linux	C++	Interface with SU, GMT
<b>Seizmo</b> <sup>[57]</sup>	Global seismic analysis	Garrett Euler, Washington University in St. Louis	Not obvious	Cross-platform	MATLAB	Octave compatible

## Probably defunct projects

The following projects have seen very little activity for more than a year.

Name	Description	Originator	License	Platforms	Language	Notes
<b>openGPR</b> <sup>[58]</sup>	GPR processing and interpretation	Mats Schuh	GPL	Linux	Python	No longer in active development
<b>OpenCarre</b>	Integrated interpretation system	IFP				
<b>MagIC-Py</b> <sup>[59]</sup>	Magnetic data processing				Python	
<b>geoid</b> <sup>[60]</sup>	Geological mapping					
<b>ART</b> <sup>[61]</sup>	Ray tracing					
<b>GPCPP</b> <sup>[62]</sup>						
<b>Seismic Refraction Tomography</b> <sup>[63]</sup>			GPL			

## References

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4. ^ <http://pseis.org>
5. ^ <http://www.cwp.mines.edu/cwpcodes>
6. ^ <http://cpseis.org>
7. ^ <http://freeusp.org/Arco>
8. ^ <http://sepwww.stanford.edu>
9. ^ <http://botoseis.sourceforge.net>
10. ^ <http://www.gebrproject.com>
11. ^ <http://cwp.mines.edu/cwpcodes/OpenSeaSeis/>
12. ^ <http://gsegyview.sourceforge.net>
13. ^ <http://segymat.sourceforge.net>
14. ^ <http://vislab-ccom.unh.edu/~schwwehr/software/seismic-py/>
15. ^ <http://www.csiro.au/products/Delivery.html>
16. ^ <http://www.csiro.au/products/WaveletExtractor.html>
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19. ^ <http://www.kogeo.de>
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21. ^ <http://crack.seismo.unr.edu/jrg/>
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