

GeoDAS Software

Introduction

GeoDAS software is a graphical Microsoft Windows-based application running under Windows 2000 / XP / Vista / 7. It provides the most comprehensive, intuitive and versatile features available in the earthquake, seismic, structural, dynamic and static monitoring and measuring industry.

Fundamentally the program is used for instrument configuration and for acquisition of data provided by any standard GeoSIG instrument. Data is delivered through serial communication channels. Two types of data delivery are supported. The first type is event downloading. In this case the instrument is configured as a seismic recorder, which detects events and keeps them locally in the instrument memory. These files are transferred to the PC via telephone line or direct link to GeoDAS. The second type is a continuous telemetry link or direct connection via cable providing near real-time data from the instrument, which is configured as digitiser in such case. If the serial channels to an instrument are bi-directional ones, GeoDAS can perform full configuration of the remote instrument and can monitor its state of health. GeoDAS is mainly intended for serving several instruments at the same time. The instruments may have different types and parameters and they are accessed through independent serial channels.

An example of the main GeoDAS screen is shown in the figure below. The figure indicates also the basic elements of this screen: the main information windows, main menu, toolbars, context menus, etc.

The screenshot shows the GeoDAS Data Acquisition System interface. The main window displays a table of station information, serial communication channels, and data streams. A graph at the bottom shows real-time data for multiple channels. A context menu is open over the graph, showing options like 'Add/Remove Channels...', 'Countdown Time', 'Redraw Monitor', 'Physical Units', 'Synchronised Display', 'Auto Scale Channel', 'Keep Current Scale', 'Set Channel Scale', 'Remove This Channel', 'Send Testpulse', and 'Launch at Startup'. The status bar at the bottom indicates 'Data Acquisition System ready' and 'OnLine: 1 (STA05) OffLine: 5 | GeoDAS 1.00'.



Specifications GeoDAS

General Tasks of GeoDAS

- Instrument setup to change any configuration parameters of any instrument(s)
- State of Health (SOH) monitoring for permanent or periodical monitoring of instrument/system status
- Downloading of the event files from recorder(s)
- Real-time data viewer and recorder for instrument(s) providing data streams
- Off-line data viewer and basic data analysis*
- Logger features to store important system messages in a log file

GeoDAS has been designed to meet all requirements with respect to almost every possible application. The program has an open architecture not only for multiple local recorders connected to the standard serial port, but also for networking of local recorders, supporting modem and network communications, including communication via Internet (TCP/IP protocol). These features provide flexible interfacing between GeoSIG recorders and users irrespective of how far they are located from each other.

Additionally to the features above, GeoDAS allows all the Windows standard functionality to be used in an easy and intuitive way. The program provides a perfect software interface between users (operators) and hardware based on GeoSIG instruments. Besides that, GeoDAS provides data analysis*, which has been developed mainly for engineering purposes and preliminary seismic analysis of recorded data. With GeoDAS one can set any configuration of GeoSIG recorders, which is supported by current versions of hardware including some of the later versions of old GeoSys recorders.

GeoDAS supports data exchange between the recorders and the PC both in interactive and automatic modes of operation.

Instrument Setup

Any parameter of any GeoSIG standard instrument can be set with GeoDAS. The instrument will work according to these settings, even without being connected to the computer, since they are saved in the instrument memory. The user interface for setting parameters is shown in the figure below.

Instrument Setup Manager for the station <STA05>

Sampling | Event Trigger | Alarms | Channels | Communication | Time Triggers
Errors and Warnings | Interconnection | Data Streams | Printer | Batch Mode
Station | Instrument | Power and Batteries | Date and Time | Test | LCD Display

General Station Information

Station Info

Station code	STA	Altitude	00000	Recorder	Unknown	GPS
Location	Glattbrugg	Latitude	47°25.800N		Unknown	
Restarts	5	Longitude	008°33.200E		Unknown	

Reset Restarts Counter | Update from GPS

Check and Comments

Date of Installation: 01.01.1997
Date of Last Check: 01.01.1997 | Checked by: GS
Comment: GSR-18 GeoSIG

Screen <...> Instrument
Active Page | All Settings
Monitor | Reset
Put | Put
These actions are available when on-line only. All pages are updated upon login

Screen <...> Station setup file
All pages are loaded from or saved to the setup file
Load | Save

Screen <...> Clipboard
Active Page | All Settings
Copy | Copy
Paste | Paste

Screen <...> Any config file
Export or import all pages
Import | Export

Screen <...> GeoDAS defaults
Active Page | All Settings
Default | Default

Status: Normal operation | Disconnect | Exit Setup Manager

Instrument Setup Manager dialog consists of several tabs. They are filled up with the detailed information stored in the instrument. The following tabs are available: Station, Instrument, Sampling, Channels, Date and Time, Data Streams, Communication, Interconnection, Event Trigger, Time Triggers, Error and Warnings, Test, Power and Batteries, Alarms, Printer, Batch Mode, LCD Display.

Specifications GeoDAS

Downloading Events

The most typical operation mode of GeoSIG instruments is the standalone recorder. After the installation of such an instrument, one has to set its parameters in a way that the instrument will be capable of recording the events. The event files containing data records are kept in the recorder memory, which is usually a memory card or on-board SRAM. As soon as new event files are saved to the recorder memory, one can login to this recorder with GeoDAS and can download these files to the computer. Furthermore the event files can be viewed, processed and analysed with the Off-Line Data Viewer.

In general there are two possibilities: either data files are downloaded by GeoDAS automatically or the user can do so at any time in the manual mode with the Event File Manager, which is shown in the figure below.

Filename	Type	Date	Time	Duration	Flags	Peak Values	File Status
GCR_20000101_000000	Perm.	01.01.2000	0:00:00	54 sec	-----	1.45e+000 mm/s 1.8...	Not Downloaded
GCR_20000101_000027	Event	01.01.2000	0:00:27	02 sec	-----T-----	1.27e+000 mm/s 1.8...	Downloaded
GCR_20000101_000100	Perm.	01.01.2000	0:01:00	59 sec	-----	1.50e+000 mm/s 1.8...	Not Downloaded
GCR_20000101_000132	Event	01.01.2000	0:01:32	02 sec	-----T-----	9.19e-001 mm/s 1.4...	Downloaded
GCR_20000101_000200	Perm.	01.01.2000	0:02:00	59 sec	-----	1.90e+000 mm/s 3.2...	Not Downloaded
GCR_20000101_000241	Event	01.01.2000	0:02:41	02 sec	-----T-----	1.21e+000 mm/s 2.2...	Not Downloaded
GCR_20000101_000300	Perm.	01.01.2000	0:03:00	59 sec	-----	1.41e+000 mm/s 2.6...	Not Downloaded
GCR_20000101_000322	Event	01.01.2000	0:03:22	02 sec	-----T-----	4.91e-001 mm/s 1.2...	Not Downloaded
GCR_20000101_000345	Event	01.01.2000	0:03:45	02 sec	-----T-----	1.25e+000 mm/s 2.1...	Downloaded

Data Streams

Several types of GeoSIG instruments can provide the streams of data through a communication channel. Data streams carry either data samples, which are sent in the binary format as soon as they are gathered from the A/D converters, or data packets of samples collected within a time frame of maximum one-second interval. In general the instruments are capable of recording files and sending data streams at the same time.

The data delivered by a stream can be saved to files, analysed, used for issuing a seismic network trigger and forwarded to other data processing applications, for instance, to the USGS Earthworm software package or the SEISAN software package from University of Bergen. The Data Graph Monitor is a graphical representation of the active data streams. The data signals arriving from the instrument are displayed as waveforms:



Specifications GeoDAS

Off-line Data Viewer

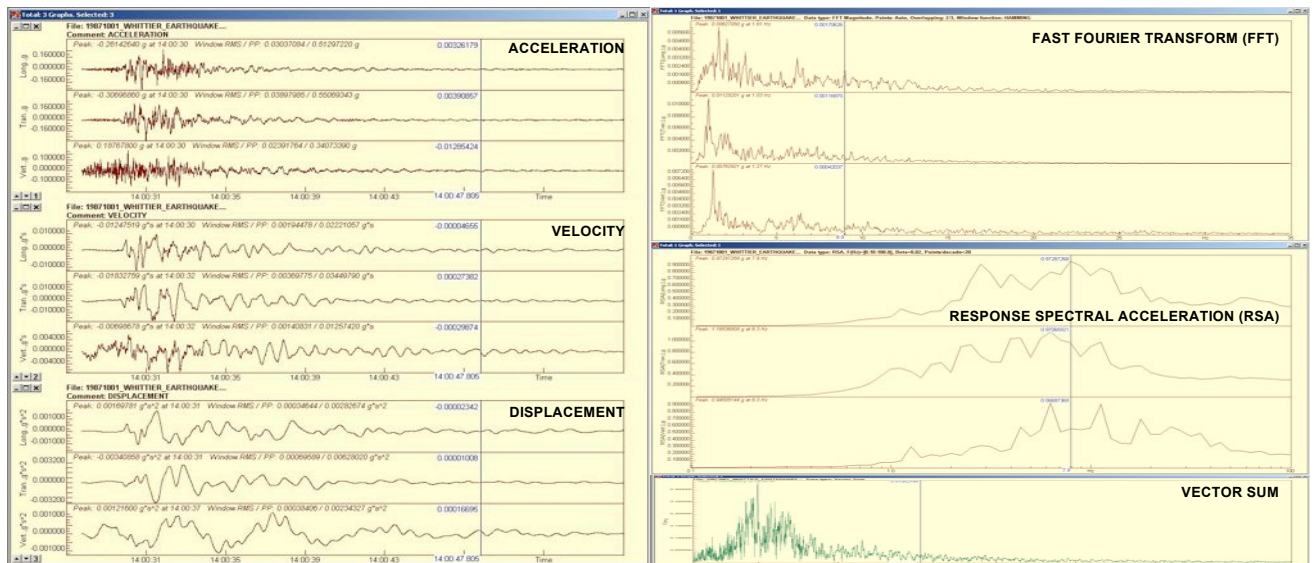
The Off-Line Data Viewer (ODV) is intended for reviewing and interactive analysis* of the digital signals off-line. Original waveforms are taken from a file, which can have one of the standard formats created or supported by other GeoSIG software and by the data recorders.

The ODV supports various numbers of data channels in such way that operators could display on the screen and plot any set of them in any combination, make scaling, zooming, axis style changing, export to and import from various data formats, etc. in intuitive manner. Mathematical analysis* will include such operations like digital filtering, response spectra calculation, integration and differentiation of signals, CAV calculation and others.

Data Analysis (OPTIONAL)

The Data Analysis part of GeoDAS (GeoDAS-DAP) has been developed by GeoSIG especially for the strong motion, earthquake engineering and civil engineering data analysis. The following operations can be performed:

- Lowpass Filter
- Highpass Filter
- Baseline correction
- Integration
- Differentiation
- Vector Sum
- Cumulative Absolute Velocity (CAV)
- Time-domain Filtering
- Effective Values
- Damping
- Power Spectra
- FFT Magnitude
- Terzband Spectra
- Response Spectra
- JMA Intensity
- STA/LTA Ratio
- Signal Characteristics
- Analysis Templates



All the operations listed above are performed with the Off-line Data Viewer in a way that the user can see the result of every operation in the graphical format. Details of these operations are given in the GeoDAS Manual.

Other Capabilities of GeoDAS

The general functionality of GeoDAS briefly described above is used in most applications based on GeoSIG equipment. But GeoDAS offers also the special functionality, which is required for particular applications or it can be activated in some special cases only, these are covered under a separate document.

*: Available with GeoDAS-DAP.