



scmag calculates magnitudes (e.g. MLh, MLv, mb, mB, Mwp, Mw(mB), Mw(Mwp), Mjma, Ms(BB)) using amplitudes and origins as input. It produces station- and network magnitudes (averaged station magnitudes) as output. In addition scmag computes a summary magnitude M, a best possible compromise among all magnitudes.

scevent receives different origins (hypocenter, time and magnitudes) associating these to one event and chooses the origin and magnitude which represents the best location, time and strength.

DATA MANAGEMENT

scxmldump exports event and station information from DB.

scimex exchanges event parameters between SeisCompP3 systems.

scbulletin creates bulletins of events.

scvoice gives voice alerts of incoming events.

import_dlsv imports dataless Seed files.

sync_staxml imports, exports and converts StationXML.

GRAPHICAL USER INTERFACES

The main graphical user interfaces of SeisCompP3 are shown and introduced on the figures at the bottom of the brochure.

COMMERCIAL ADD-ONS

scautomt and **scmtv** generates automatic and interactive MT/CMT solutions (developed in cooperation with GFZ)

mapprojection plug-in supports several map projections as rectangular, Mercator, Spherical and Karavskiy projection (gempa)

dissemination server allows to publish the SeisCompP3 results through different services as web page, SMS and EMail etc.(gempa)

earthquake information page shows recent and historic earthquake information (gempa)

GRAPHICAL USER INTERFACES OF THE GEMPA ADD-ONS

scmtv (MomentTensorView) is used to create and revise moment tensor solutions. It supports body waves, surface waves, mantle waves and W-Phase.

Overview map of the **earthquake information page**.

SEISCOMP3

developed by

Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences and gempa GmbH

APPLICATION

- Tsunami Early Warning System
- National, Regional, Local Data Centers
- Telemetry Networks
- Metadata Management and Exchange System
- Interactive Event Data Processing
- Real-Time Dissemination of Event Alert
- Hazard Mitigation System

FEATURES

- State-of-the-Art Innovative Software Architecture
- Modular Design
- Scalable to Multiple Network Architectures
- Advanced Data Acquisition
- Real-Time Data Transfer Protocol
- Automatic Hypocenter, Time and Magnitude determination
- Sophisticated Alert and Visualization Tools



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COMMERCIAL ADD-ONS

- Different map projections
- Notifications through EMail, SMS
- Earthquake information web page
- MT and CMT calculations

INTRODUCTION

gempa (Global Earthquake Monitoring Processing Analysis) GmbH, Potsdam, Germany, a spin-off of GFZ (German Research Center for Geosciences), Potsdam, Germany presents an advanced Real-Time Data Processing and Management system handling data recording, acquisition, archiving, processing and management. gempa is the servicing company, headed by professional scientists and programmers, providing installation, training, support and maintenance services for the GFZ, owner and developer of SEISCOMP3. GFZ is providing SEISCOMP3 to research and warning institutes for free for non-commercial usage. SEISCOMP3 was originally developed for GEOFON Network, further extended within the MEREDIAN project under the lead of GEOFON/GFZ Potsdam and ORFEUS, finally fulfilled the requirements of 24/7 early warning control center under the GITEWS project (German Indian Ocean Tsunami Early Warning System). It becomes nowadays the most widely distributed software package for seismological real-time data acquisition, archiving,

exchange and processing over internet. A SEISCOMP3 automatic system consists of a set of independent applications each performing a discrete task communicating via a TCP/IP based messaging system. The applications in SEISCOMP3 are divided in four different groups: data acquisition, processing, graphical user interfaces and data management utilities. SEISCOMP3 supports the following features:

- Real-time data acquisition, archiving, exchange and processing
- Automatic and interactive event detection and localization
- Determination of focal mechanism through first motion analysis
- Seismic network status monitoring and data quality control
- Real-time parametric data exchange using QuakeML
- Easy access to relevant information through sophisticated GUIs
- Event parameter archiving
- Text- and voice based issuing of earthquake alerts
- Distributed computing

DATA ACQUISITION

SeedLink is a TCP/IP based real-time data acquisition protocol and a client-server software that implements this protocol. SeedLink uses a plug-in concept to import waveform data from all established formats and sources. It is the most common protocol to exchange waveform data world-wide. It is supported by all main data centers (e.g. IRIS, GEOFON, ORFEUS). ArcLink developed by GFZ Potsdam within the NERIES project (Network of Research Infrastructures for European Seismology) complements SeedLink and provides archived waveform data as well as station meta data information in form of mini-, full- or dataless-seed volumes.

DATA PROCESSING

Automatic Data Processing group consists of modules dealing with phase picking, event location calculation, amplitude and magnitude estimation, waveform quality determination and event parameter management. A brief description of the most important modules is following. The interaction between different

subsystems is performed via a TCP/IP based messaging tool - scmaster.

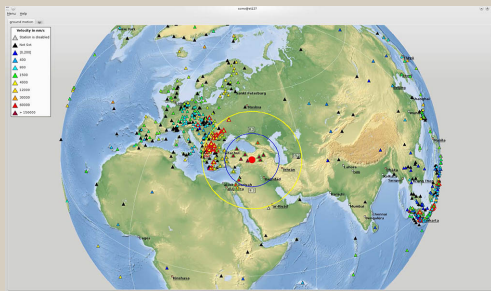
scmaster is a mediator which delegates client requests.

scautopick searches in real-time for waveform anomalies in form of changes in amplitude applying a robust sta/ta algorithm to the waveform streams. To improve system performance it also determines amplitudes (mb, mB, MLV) in real-time to speed up the magnitude calculation process.

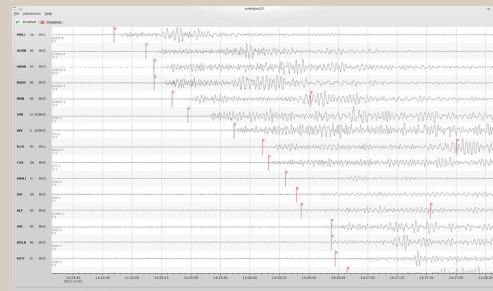
scautoloc is the SEISCOMP3 component for automatic locating of seismic events in near-real time. It normally runs as a daemon continuously reading picks and amplitudes and processes them in real time. It is configurable for different fields of applications as localization of local, regional and teleseismic events. Also offline and testing modes are supported.

scamp measures several different kinds of amplitudes (e.g. MLV, mb, mB, Mwp) from waveform data. It listens for origins and measures amplitudes in time windows determined from the origin. scamp is only determining amplitudes which are not already measured by scautopick for example MLh or amplitudes for manual picks.

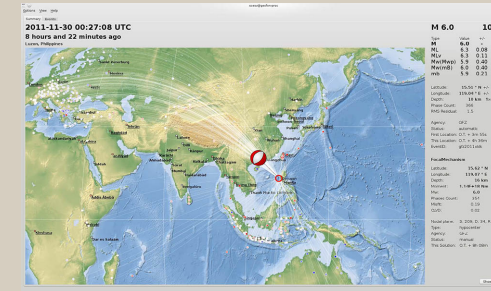
MAIN GRAPHICAL USER INTERFACES



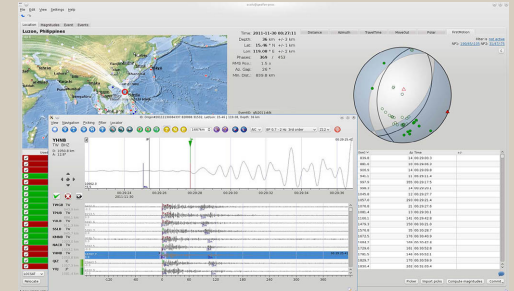
scmv (MapView) visualizes the actual situation within the region of interest including actual ground motion at the stations, trigger status and event parameters (here with spherical map projection).



scrttv (RealTimeTraceView) shows the recent waveforms of each station in default order or in distance to epicenter order.



scesv (EventSummaryView) shows the most important information of an earthquake like origin time, time ago, location, depth, magnitude and quality parameter (here with Kavrayskiy projection).



scolv (OriginLocatorView) is used to review and revise earthquake solutions interactively including hypocenter, magnitude, phase picking and first motion analysis.