cempa

GLOBAL EARTHQUAKE MONITORING PROCESSING ANALYSIS



VORTEX Volcano Monitoring

Volcano observation and monitoring



VORTEX in a nutshell

Gempa's volcano monitoring modules, including VORTEX, analyze seismic, infrasound, and video data to assess volcano conditions. The sensor data is visualized in real-time through RSAM, SSAM, and timeseries plots. Additional sensor data as gas measurements can be added. VORTEX goes beyond by providing additional insights through heatmaps, 3D clusters, Gutenberg-Richter, and occurrence rate plots. It identifies areas of heightened seismicity, groups events based on spatiotemporal characteristics, and depicts the frequency and size distribution of volcanic earthquakes. By integrating these data sources and analysis techniques, comprehensive VORTEX offers а volcano monitoring solution that aids in understanding volcanic behavior and potential hazards.

FEATURES

- Multi-sensor data integration
- Visualization of video, seismic and infrasound data, air pressure, etc.
- RSAM: Real-time Seismic Amplitude Measurement
- SSAM: Seismic Spectral Amplitude Measurement
- Multiplot dashboard and sensor selection on maps
- 3D visualization of microseismicity



Multi-sensor analysis

In combination with CAPS, VORTEX can display and analyze data from various sensors such as seismograms, temperature or infrasound in almost any given format. Sensor data, here transformed into RSAM, are shown in customizable dashboards allowing simultaneous analysis and easy access to further analysis tools.

RSAM and SSAM

RSAM and SSAM allow to discriminate weak seismic and infrasound signals from noise. Signals from different sources can be classified and identified based on frequency content. Such volcanic seismic sources may be indicative of phases before and during eruptions. Zooming and filtering can be applied to each stream/sensor.



Cluster analysis and visualization

The seismicity plot displays volcano-related seismic activity in three dimensions, allowing for the rotation and zooming of the view. It reveals spatial patterns, clustering, and areas of heightened activity, providing insights into subsurface volcanic behavior, magma pathways, and fault structures for enhanced volcano monitoring.

TECHNOLOGY

Gempa's volcano monitoring modules, including VORTEX, analyze seismic, infrasound, and video data to assess volcano conditions. The sensor data is visualized in real-time through RSAM, SSAM, and timeseries plots. VORTEX goes beyond by providing additional insights through heatmaps, 3D clusters, Gutenberg-Richter, and occurrence rate plots. It identifies areas of heightened seismicity, groups events based on spatiotemporal characteristics, and depicts the frequency and size distribution of volcanic earthquakes. By integrating these data sources and analysis techniques, VORTEX offers a comprehensive volcano monitoring solution that aids in understanding volcanic behavior and potential hazards.

CAPS acquires data from co-located sensors like seismometers, CGPS, thermometers, video cameras, etc., providing VORTEX with the necessary data for detailed volcano monitoring.

scanloc, included in the volcano package, is an advanced auto-location module for local earthquakes. It ensures reliable earthquake monitoring in high-rate seismicity situations, enhancing accuracy and earthquake location precision.

ccloc employs cross-correlation techniques to analyze seismic waveforms for similarity between events. It aids in detecting earthquake clusters and volcanic tremor episodes, enhancing volcano monitoring systems.