Safeguarding

Protecting national land of Japan

Acquiring and disseminating disaster information using surveying technologies

GSI, Designated Government Organization (DGO) under the Disaster Countermeasures Basic Act, is promoting disaster response-related policies and measures against frequent natural disasters, employing the survey and cartographic techniques to protect the nation's land and people's lives and properties.
The information collected through emergency photography and surveying is analyzed and interpreted to acquire data necessary to understand the disaster situation and provide the data as quickly as possible.

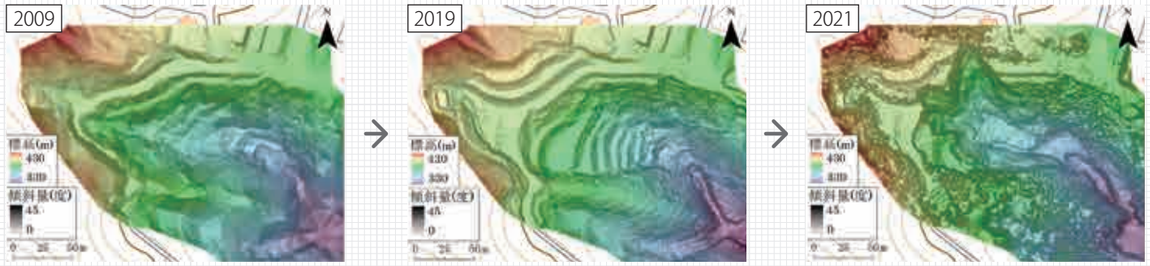
GSI's "Kunikaze Photography Team" is a recipient of the NPA President's Award (Occupational Division)

The "Kunikaze Photography Team" board GSI's aerial survey aircraft "Kunikaze" to learn about the state of damage during a disaster. For more than 60 years, since 1960, the team has been taking aerial photographs that are necessary to create and update base maps that are the basis for all maps. Due to the team's excellent results, they received the NPA President's Award (Occupational Division) in FY 2020.

GSI's recent responses to disasters

Calculating elevational changes using airborne laser surveys (Torrential rains that began on 1 July 2021)

Torrential rains that began on 1 July 2021 led to a debris flow disaster on Mt. Izu in Atami City. Using drones, GSI's survey team conducted airborne laser surveys on the source head of the debris flow, and the 3D point data obtained therefrom was used to create elevation data. From these results, and the results of previous airborne laser surveys, the volume of change in elevation was calculated and provided to relevant organizations. This information was also released to the public on GSI's home page and its "GSI Maps" web maps.



Elevation data before the disaster　　Elevation data after the disaster

Identifying submergences using SNS (Producing Provisional Inundation Depth Maps) (Heavy rains of August 2021)

Provisional Inundation Depth Map of the Rokkaku River (area around Takeo City, Saga Prefecture)

By interpreting the positions of water edges from SNS and aerial photograph data, the inundation depth is calculated from that information and digital elevation data, and "Provisional Inundation Depth Maps" are produced to express depths with shading.
During the heavy rains of August 2021, Provisional Inundation Depth Maps around the Rokkaku River showing submergence conditions at the time the information became available were created and provided to relevant organizations. Provisional Inundation Depth Maps of the same river were also provided during the heavy rains of August 2019.
Such information is used to plan the deployment of drainage pump trucks which are used in restoration and rescue activities.
This Information is also released to the public on GSI's home page and through "GSI Maps" web maps.

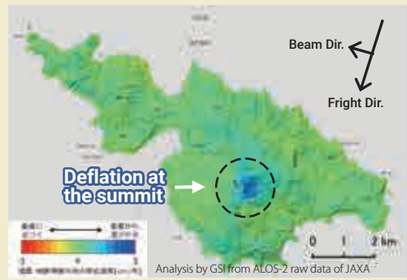
Estimation of seismic fault model (2018 Hokkaido Eastern Iburi Earthquake)

Based on the knowledge about crustal movements that has been obtained from observations at GNSS CORSs, SAR interferograms, etc., GSI is identifying epicenter faults that are the cause of crustal movements and ground shaking that occur during major earthquakes.
The figure on the left shows an estimated earthquake fault model representing the slip on the underground rocks during the Hokkaido Eastern Iburi Earthquake on September 6, 2018. The model revealed the positions and movements of the faults and the magnitude of the earthquake.
The information was provided to the Earthquake Research Committee operated by the government for evaluation of seismic activities.

Identifying minute crustal deformation of active volcanoes utilizing satellite images

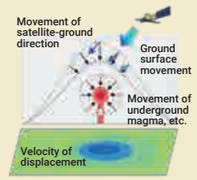
GSI is promoting the introduction of analysis methods using a large number of satellite images from the Synthetic Aperture Radar (SAR*) mounted on the satellite "DAICHI-2". This method can detect minute crustal deformation and their temporal changes, which had been difficult to do with convention methods. Analyses have already clarified minute crustal deformation that occur with active volcanoes such as Kuchino-Erabujima Island and Mt. Yakedake. The results are released to the public on GSI Maps.

*SAR (Synthetic Aperture Radar) :
This is radar technology which emits radio waves from flying objects such as satellites, etc., and receives radio signals reflected back from the Earth's surface to measure the distance to the ground surface, ground surface properties, etc., with a high degree of spatial resolution.



Contraction of the summit of Kuchino-Erabujima Island, Kagoshima Prefecture.

【schematic diagram】



When the summit deflates, the movement away from the satellite (blue color) is observed.