GEO 2018 Progress Reporting Template

Please provide the requested information in this template in the spaces provided below each question. Save the completed file with the GWP activity acronym in the file name.

1. Brief Description of the GEO Work Programme (GWP) Activity

Title of the GWP Activity (Applies to all GWP Activities – Flagships, Initiatives and Community Activities)

Format: Full title (Acronym)

Geohazard Supersites and Natural Laboratories (GSNL)

Overarching Tagline (All GWP Activities)

Format: [overarching purpose] + [overarching activity].

This information will support improvements to the WP activity descriptions on the GEO website.

Reducing Geohazard impacts through open data and knowledge sharing

Value Statement (All GWP Activities)

This information will support improvements to the WP activity descriptions on the GEO website.

Please provide a one sentence statement of how the activity is working to achieve the above mission.

Format: [policy framework supported, if relevant] + [slightly more detailed description of what the activity delivers to achieve the above stated purpose].

Our seismic, volcanic and multi-hazard Supersites provide state of the art scientific information for Geohazard assessment to local stakeholders, using a network approach to implement collaborative Open Science.

2. Progress and Impacts Achieved

Self-Assessment of Progress (All GWP Activities)

Please provide a brief (fewer than 500 words) assessment of the progress achieved in the WP activity since 2016.

This assessment will inform Programme Board preparations for the 2020-2022 Work Programme and an edited version will be included in documentation provided to GEO-XV Plenary.

The assessment should include discussion of:

- *Whether available resources (financial and in-kind) are sufficient to implement the WP activity;*
- *Status of development and implementation of products and services (where applicable);*
- *Whether users or potential users have been engaged and how;*
- *Status of Implementation Plan milestones and deliverables (Initiatives and Flagships only); and*
- *Progress on recognition of a policy mandate (Initiative and Flagships only);*

The assessment should aim to provide a fair and balanced summary of progress, including successes, challenges and areas for improvement.

We provide a summary of the progress with respect to the planned tasks (see Table 5.1 and 5.2, pagg13-14 of the Implementation plan).

Task	Task (% completion)	Task progress summary
1.1	Management (70%)	A draft for the new governance structure has been submitted to the Scientific Advisory Committee (June 20, 2018) and is under evaluation. Seven new Supersite progress reports have been received and evaluated and are available on our website. Two more are under evaluation. Constant collaboration with the CEOS agencies within the WG Disasters has resulted in their support to three new Supersites and a Natural Laboratory. Full coordination with the CEOS Disaster Pilots and Demonstrators is in place. Meetings of the GSNL community are organized yearly at AGU and EGU.
1.2	Networking activities (40%)	We have established the San Andreas Fault Natural Laboratory and three new Supersites: multihazard Supersite in the Southern Andes of Chile, Virunga volcanoes in D.R. Congo, Gulf of Corinth in Greece, all supporting local end users. We closely coordinated with EPOS, UNAVCO, the ESA GEP, for the provision of data and processing services to the Supersites. We have established contacts with WB and UNISDR exploring the possibility to fund activities of Supersites in developing countries. We have presented the initiative to researchers and stakeholders in 14 different countries, stimulating the participation in the initiative. A few new Supersite proposals are now in preparation.
1.3	Data provision (60%)	We analyzed the various Supersite contexts and issued the GSNL Data Policy Principles, to promote the adoption of the GEO Data Sharing Principles in the long term. We have implemented e-collaboration, processing and information services through the GEP and the EVER-EST VRE. We obtained further support from the CEOS, with access to over 5000 new images. We are still pursuing JAXA support to the initiative. We have established new procedures for satellite data access using specialized data infrastructures as the UNAVCO SSARA and the GEP. We have

		documented the new data access procedures on our website. We have set up an agreement with ESA to provide access to over 10,000 COSMO-SkyMed satellite images through the ESA GEP portal.
1.4	Dissemination & Outreach (75%)	We have created a new website and discontinued the one managed by GEOSec. We have prepared new material for dissemination, as a GSNL brochure and a 4-page summary. We have placed all the Supersite reports on the website, and we are gradually extracting success stories from each report for more immediate communication of results. We have started to use the Research Object Hub (ROHUB) to implement a repository for the scientific results and other information generated within the Supersites.

Task	Task (% completion)	Task progress summary
2.1	Supersite management (60%)	Comprehensive reports are submitted and evaluated by the SAC and the CEOS every two years from the date of establishment of the Supersite. Coordinators have been instructed by the GSNL Chair on the satellite tasking and data request procedures. Supersite coordinators maintain communication with their scientific communities and report on the achievements. They re-assess the results from the scientific community and provide the relevant information to their national end users. A few Supersites are now supported, at least in part, by national or regional projects. The new Open Science approach has started to be implemented at some Supersites; the technological resources are available to support this step (e.g. the EVER-EST platform), but the community still needs to be fully engaged. In some cases there is now a clear acknowledgement by the end users of the importance of the Supersite to improve the hazard assessment.
2.2	Supersite community building (40%)	Community building around Supersites is being developed through dissemination at scientific meetings. Capacity building at some Supersites is provided through exchanges of personnel and through the use of common resources for e.g., remote data processing.
2.3	Supersite infrastructure maintenance & development (50%)	A few Supersites have developed their own data infrastructures to share in situ data. Others use community infrastructures. Most satellite data are now provided through specific portals, and data become available in few hours to 2-3 days from acquisition. Scientific results and information for hazard assessment are constantly provided to the Supersite end users through the local coordinators. In some cases the The Iceland and Ecuador Supersites are using the EVER-EST VRE for EO data processing on virtual machines.
2.4	Supersite dissemination /outreach (10%)	Supersite coordinators provide on request material showcasing the results of their Supersite.

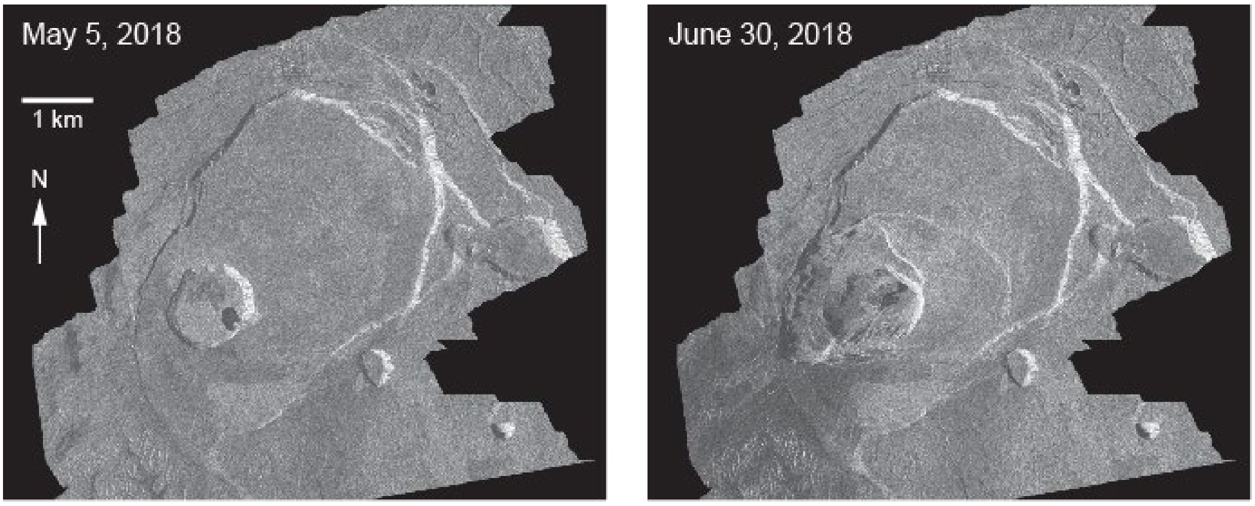
The rest of the program period will be dedicated to the remaining subtasks.

2017-2018 Highlights (Optional – complete if relevant)

Highlight for 2018:

The value of EO data for emergency response during the 2018 Kilauea eruption, Hawai'i, USA

The Hawaiʻi Supersite has made invaluable contributions to understanding the crisis at Kīlauea Volcano that started in early May 2018 with a new lava eruption in the populated lower Puna district of the Island of Hawaiʻi on May 4 and continues as of early July. Over 600 homes were destroyed by the lava flow, but since late May the eruption seems to have stabilized on a single eruptive vent. Surface deformation as revealed by radar interferometry and ground-based GPS stations suggests that there has been no additional motion that might indicate a threat of new eruptive fissures opening, and this information has been of crucial importance to the Hawaiian Volcano Observatory, which is tasked with monitoring the eruption, and Hawaiʻi County Civil Defense, which is responsible emergency response operations (including evacuations). Starting in late May, the summit of Kīlauea began to subside rapidly as magma drained from subsurface reservoirs to feed the lava eruption occurring 40 km away. As of early July, parts of the summit have dropped by 400 meters, and felt earthquakes, in the M3-5 range, are nearly constant as the caldera collapses. High-resolution SAR data have provided unprecedented views of the collapse and have been critical for understanding how the subsidence is evolving over time. These data, along with high-temporal-resolution GPS and seismic data, have helped the Hawaiian Volcano Observatory interpret the hazard associated with the summit deformation, the interpretations of which have guided the response by Hawaiʻi County Civil Defense. In the months and years to come, we expect that the data collected by international space agencies and the Hawaiian Volcano Observatory and partners, will be extensively exploited to better understand this unprecedented eruptive event at Kīlauea. The results of those studies will be used to improve assessment of volcanic hazards not just in Hawaiʻi, but in other similar volcanos around the world.



Cosmo-SkyMed data from Kīlauea Volcano, Hawaiʻi, have been provided by the Agenzia Spaziale Italiana to the Hawaii Supersite within hours of acquisition and have been invaluable in guiding hazard assessment by the Hawaiian Volcano Observatory. Data from the volcano's summit caldera on May 5 (left) and June 30 (right) illustrate the dramatic changes to the landscape which are ongoing at the volcano

Previous Impact Highlights (Optional – complete if relevant)

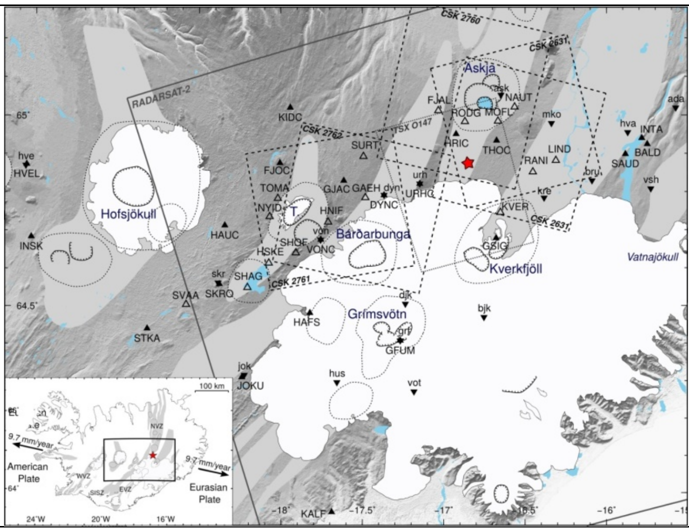
Highlight for 2014:

Scientific products to support Emergency Management during the 2014-2015 eruption in the Bardabunga volcanic system, Iceland

A major diking event, effusive eruption, and gradual caldera collapse occurred in the Bardabunga volcanic system 2014-2015, in the area covered by the Iceland Supersite. Thanks to the Supersite network partnership, three radar satellites acquired frequent images of the area: Radasat 2 of the Canadian Space Agency - CSA, TerraSAR X of the German Space Agency - DLR, and COSMO-SkyMed of the Italian Space Agency - ASI.

The SAR images provided by these satellites were used to generate constantly updated maps of the ground deformation in the volcanic area. This information was integrated with precise GPS measurements collected on the ground, and with seismological and geological data, to generate models of the volcanic plumbing system, which allowed to closely monitor the evolution of the eruption.

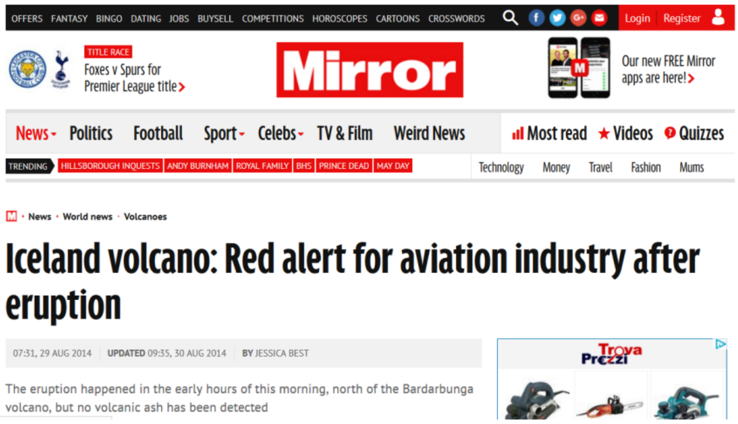
This eruption shows the use of Supersite scientific products in the decision making process of end-users, as explained in the figures below provided by the FUTUREVOLC EC project, supporting the Supersite activities during the period 2013-2016.



The Bardabunga volcano (caldera) is located underneath the 800-m think Vatnajökull ice cap (white area in the figure).

The rectangles show the extent of the X and C band SAR images used to monitor the area. The Supersite receives over 700 of these images per year.

The diking event began on August 16, 2014 with strong earthquake activity and deformation. The worst scenario prompted for strong magma/water interaction, important explosive activity and emission of >10-km high volcanic ash cloud.



OFFERS FANTASY BINGO DATING JOBS BUYSELL COMPETITIONS HOROSCOPES CARTOONS CROSSWORDS Login Register

TITLE RACE Foxes v Spurs for Premier League title

Mirror

Our new FREE Mirror apps are here!

News Politics Football Sport Celebs TV & Film Weird News Most read Videos Quizzes

TRENDING HILLSBOROUGH INQUESTS ANDY BURNHAM ROYAL FAMILY BHS PRINCE DEAD MAY DAY Technology Money Travel Fashion Mums

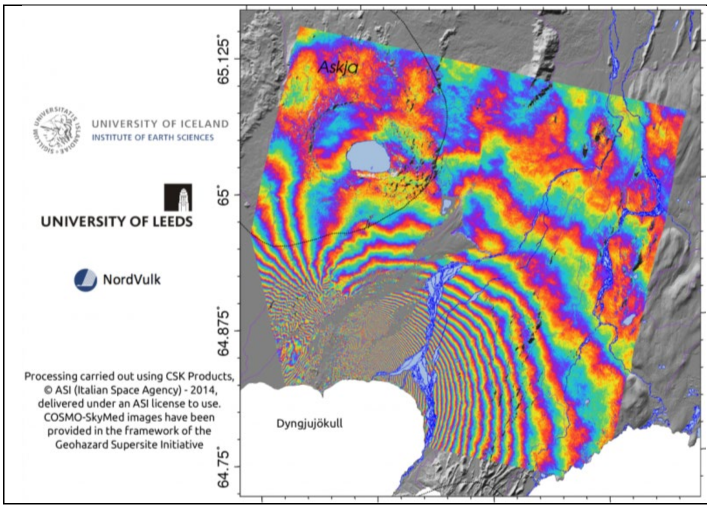
News · World news · Volcanoes

Iceland volcano: Red alert for aviation industry after eruption

07:31, 29 AUG 2014 UPDATED 09:35, 30 AUG 2014 BY JESSICA BEST

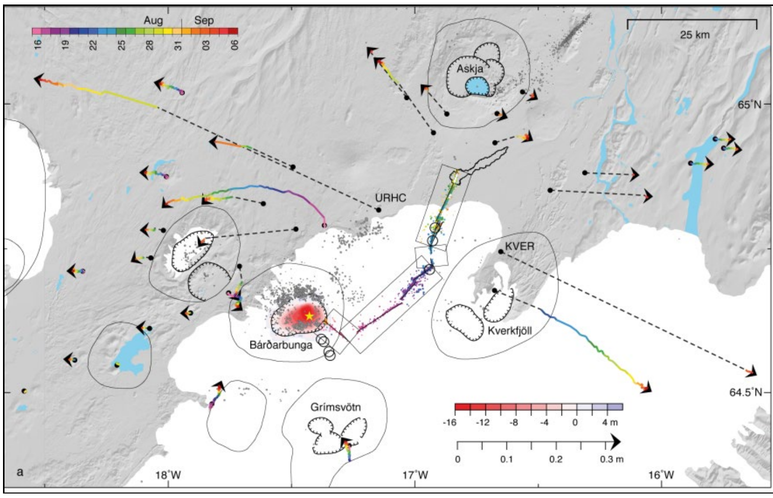
The eruption happened in the early hours of this morning, north of the Bardarbunga volcano, but no volcanic ash has been detected

On August 29 a Red alert was issued for commercial air flights. This immediately raised much concern in the international media, for fear of a possible repetition of the 2010 eruption effects of Eyjafjallajökull, which caused global losses of over one billion dollar.
Eventually, through intensive monitoring and collaborative research, it was determined that magma from beneath the caldera travelled laterally along a dike path, and only erupted outside the ice cap, in an effusive eruption, not explosive as if the magma had erupted under the ice cap.



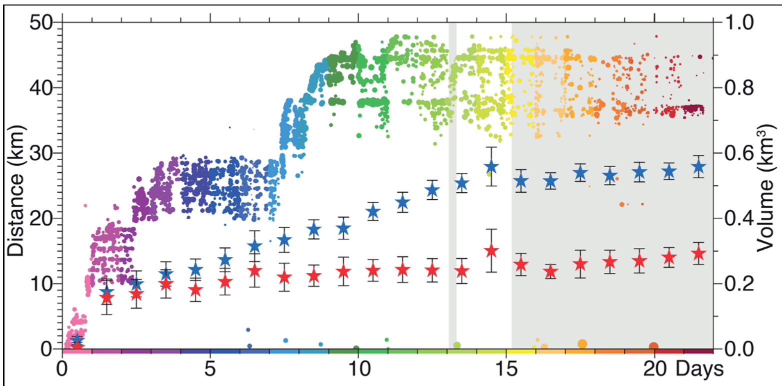
SAR Interferograms generated using the Supersite satellite imagery were used to monitor the ground deformation occurring in the area. These products were generated by a research group including scientists from Iceland, UK, and Norway.
The delivered product consisted of the ground displacement in the considered interval, for each coherent pixel.

FUTUREVOLC



In situ measurements of ground deformation were collected using GPS by Iceland scientists and integrated with InSAR results to provide very precise information on the movements of magmatic masses in the system.

The delivered products consisted of the station positions in the three cartesian components for the different measurement epochs.



The international research group analyzed satellite and in situ data to monitor the evolution of the dike and the eruption, and observed the migration of magma from the Bardabunga caldera to a location outside of the ice cap, 40 km to the north.

The products delivered by IMO and University of Iceland to the Iceland Civil Protection consisted of synthetic information on the status and possible evolution of the eruption, summarized from the model parameters and the scientific discussions.

NATIONAL COMMISSIONER OF THE ICELANDIC POLICE DEPARTMENT OF CIVIL PROTECTION AND EMERGENCY MANAGEMENT	The scientific products generated by the different research groups **were periodically delivered to the Civil Protection authority,** under the responsibility of the Supersite coordinator institution.

NATIONAL COMMISSIONER OF THE ICELANDIC POLICE

DEPARTMENT OF CIVIL PROTECTION AND EMERGENCY MANAGEMENT

THE SCIENTIFIC ADVISORY BOARD OF THE ICELANDIC CIVIL PROTECTION		
Date: 03.12.2014	Time: 09:30	Location: Crisis Coordination Centre, Skogarhlid.
Regarding: Volcanic activity in the Bardarbunga system.		
Attending: Scientists from Icelandic Met Office and the Institute of Earth Sciences University of Iceland along with representatives from the Icelandic Civil Protection, the Environmental Agency of Iceland, Vatnajokull National Park and the Directorate of Health.		

Main points

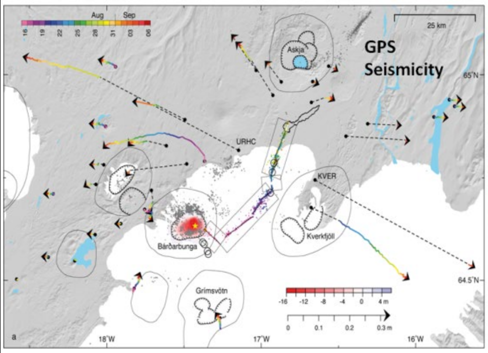
- An overview of the activity in Bardarbunga and the volcanic eruption in Holuhraun
- Air quality
- Scenarios

Notes

- Today the Scientific Advisory Board of the Icelandic Civil Protection reviewed data about the development of events in Bardarbunga and the volcanic eruption in Holuhraun, from the beginning of the unrest until the present day. Most of the data show a decline in the subsidence of the Bardarbunga caldera and the volcanic eruption on Holuhraun. Earthquake activity is though still strong and the flow of lave great in comparison to volcanic eruptions in Iceland for over the last 100 years. The findings of the meetings are as follows:
  - **Earthquakes in Bardarbunga:** Seismic activity has been very strong since mid-august. The activity peaked in first half of September, it has slowly decreased since then, but activity remains intense. The period of seismic unrest is one of the largest ever recorded in a volcano globally.
  - **Earthquakes in the dyke from Bardarbunga to Holuhraun:** Strong seismic activity coincided with the progression of the dyke in the second half of August, but it decreased after the volcanic eruption began on Holuhraun. Earthquakes are still detected in the dyke but they are small and relatively few.
  - **Subsidence of the Bardarbunga caldera:** In the days following the onset of the seismic unrest, the ice-covered base of the caldera began to subsidence up-to 80 cm a day, but the subsidence has since slowed and it is now around 25 cm per day. The subsidence is in the shape of a bowl and it is greatest in the centre of the caldera, about 50 m, but smaller to the edges.
  - **Crustal deformation:** Extensive ground deformation Major was recorded while the dyke was forming, signalling the progression of the dyke and subsidence towards Bardarbunga. Interpretation of GPS data and analysis of satellite interferograms indicates that the volume of the magma in the dyke is about 0.5 cubic kilometres, and that it was fully formed by the beginning of the volcanic eruption. After the eruption started the subsidence has been steady, but slowly decreasing, towards Bardarbunga.
  - **The volcanic eruption in Holuhraun:** The volcanic eruption that began on Holuhraun on 31 of August is characterised by a large and unusually steady flow of lava. The magma that comes up is a rather primitive basalt, with a chemical composition typical of the Bardarbunga volcanic system. The petrology analysis of the magma suggests that it stabilised at 9-20 km depth, meaning that it could not have resided at a shallower depth in the crust. The lava field is now 76 square kilometres in area.

The scientific products **helped take many decisions during the emergency,** eventually lowering the red alert to orange when the data showed that the eruption was not going to happen under the ice cap but well outside of it, in Holuhraun.

FUTUREVOLC



Segmented lateral dyke growth in a rifting event at Bárðarbunga volcanic system, Iceland

Freysteinn Sigmundsson[1], Andrew Hooper[2], Sigrún Hreinsdóttir[3], Kristín S. Vogfjörd[4], Benedikt G. Ófeigsson[4], Elías Rafn Heimisson[1], Stéphanie Dumont[1], Michelle Parks[1], Karsten Spaans[2], Gunnar B. Gudmundsson[4], Vincent Drouin[1], Thóra Árnadóttir[1], Kristín Jónsdóttir[4], Magnús T. Gudmundsson[1], Thórdís Högnadóttir[1], Hildur María Fridriksdóttir[1,4], Martin Hensch[4], Páll Einarsson[1], Eyjólfur Magnússon[1], Sergey Samsonov[5], Bryndís Brandsdóttir[1], Robert S. White[6], Thorbjörg Ágústsdóttir[6], Tim Greenfield[6], Robert G. Green[6], Ásta Rut Hjartardóttir[1], Rikke Pedersen[1], Richard A. Bennett[7], Halldór Geirsson[8], Peter C. La Femina[8], Helgi Björnsson[1], Finnur Pálsson[1], Erik Sturkell[9], Christopher J. Bean[10], Martin Möllhoff[10], Aoife K. Braiden[10] & Eva P. S. Eibl[10]

Nature, online 15 December 2014

The scientific results of this large, coordinated effort were published in the Nature journal, acknowledging the wide international collaboration (Sigmundsson et al., Nature, Online 2014).

A follow up paper evaluating the gradual caldera collapse that occurred during a 6-month long eruption that followed the diking event was published in Science (Gudmundsson et al., Gradual caldera collapse at Bárdarbunga volcano, Iceland, regulated by lateral magma outflow, Science 2016).

.

FUTUREVOLC

Supporting Documents (Optional – complete if relevant)

Please attach or provide links to documents that provide evidence of outcomes and/or impact achieved by the Work Programme activity. These may include, for example, reports provided to funders or other organizations; statistics on usage of products or services; feedback or testimonials from users; official recognition from other organizations, etc.

Links to the available Supersite reports:

Supersite	First biennial report	Second biennial report
Hawai'I	2014	2016
Iceland	2015	2017
Etna	2016	
Campi Flegrei	2016	
Marmara	2016	
Ecuador	2017	
Taupo	2016	

Links to the data infrastructures providing access to in situ Supersite data (registration is needed):

Iceland: http://futurevolc.vedur.is/
Mt Etna: http://medsuv_portal.ct.ingv.it/http://medsuv_portal.ct.ingv.it/
Vesuvius-Campi Flegrei: http://medsuv_portal.ct.ingv.it/
Hawaii and San Andreas Fault: http://www.unavco.org/data/gps-gnss/data-access-methods/dai2/app/dai2.html#

Links to data portals providing access to satellite data for the Supersites:

TerraSAR X satellite data can be accessed from the DLR Supersite Data Portal
COMO-SkyMed SAR data can be accessed from the ESA Geohazard Exploitation Platform

Links to web platforms/services providing access to on demand processing resources for the Supersites.

https://vre.ever-est.eu/supersites/

3. Communications Update

Relevant Links (Optional – complete if relevant)

Website: *(www…)* *geo-gsnl.org*

Twitter: *(@handle & URL): We had one but we are going to discard it because we have little time for keeping it lively.*

Facebook page: *(name / URL)*: we do not have a Facebook page

Other:

Key Upcoming Events (Optional – complete if relevant)

Format: Event title, Dates, Location, Website

Supersite session at the 10th Cities on Volcano Conference, Naples, Italy.
https://www.citiesonvolcanoes10.com/

Links to Recent Publications or Communications Products (Optional – complete if relevant)

Format: Title, year released, URL

Salvi, Stefano. "The GEO Geohazard Supersites and Natural Laboratories-GSNL 2.0: improving societal benefits of Geohazard science." *EGU General Assembly Conference Abstracts*. Vol. 18. 2016.
http://adsabs.harvard.edu/abs/2016EGUGA..18.6969S

Trasatti, E., Rubbia, G., Romaniello, V., Merucci, L., Corradini, S., Spinetti, C., Puglisi, G., Borgstrom, S., Salvi, S., Parks, M. and Dürig, T., 2017, April. Contribution of the EVER-EST project to the community of the Geohazard Supersites initiative. In *EGU General Assembly Conference Abstracts* (Vol. 19, p. 9691).
http://adsabs.harvard.edu/abs/2017EGUGA..19.9691T

Salvi, S., Poland, M.P., Sigmundsson, F., Puglisi, G., Borgstrom, S., Ergintav, S., Vogfjord, K.S., Fournier, N., Hamling, I.J., Mothes, P.A. and Savvaidis, A., 2017, December. From Open Data to Science-Based Services for Disaster Risk Management: the Experience of the GEO Geohazards Supersite Network. In *AGU Fall Meeting Abstracts*.
http://adsabs.harvard.edu/abs/2017AGUFMPA22A..04S

Communications Contact Person(s) (All GWP Activities)

Format: Name, position, organization and email address

Please identify the person responsible for running the website, social media if relevant, and who can inform GEO Secretariat of updates, events, and achievements. The GEO Communications Manager will follow up with this person for any questions or media inquiries. This person may be the same as the primary Point of Contact for the GWP activity or may be different.

The main GSNL contact person is Stefano Salvi, Technological Director at the Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy.
Email: stefano.salvi@ingv.it or info@geo-gsnl.org