

SPATIAL DATA INFRASTRUCTURE FOR INFORMATION SUPPORT OF VOLCANOLOGICAL INVESTIGATIONS

Romanova I.M, Girina O.A.

Institute of Volcanology and Seismology FEB RAS, Petropavlovsk-Kamchatsky, Russia

Spatial Data Infrastructure (SDI) of the Institute of Volcanology and Seismology FEB RAS was created in 2010 and has been developing since that time. The SDI is aimed at providing free access to the distributed spatial data, and is designed to provide data exchange and complex utilization of data in scientific research. SDI is being created using modern IT solutions and methods based on the unified international standards that meet the requirements of data and services interoperability in the network environment (Romanova, 2015). At the present SDI contains the Geoportal providing the single point of access into the distributed environment of spatial data and services and the Repository, that is the open archive of publications from various areas of Earth Sciences.

The IVS FEB RAS Geoportal (<http://geoportal.kscnet.ru>) provides access to the data search service in the metadata catalogue (<http://geoportal.kscnet.ru/geonetwork/>), data collections, thematic geoservices (Romanova, 2013a) (Fig. 1). The geoportal's architecture is implemented on the basis of free open source software products distributed under GPL license (GNU General Public License). To create geoservices we apply technologies based on international standards OGC WMS (Web Map Services), WFS (Web Feature Service), WCS (Web Coverage Service) and KML (Keyhole Markup Language). One of the main directions of geoportal development is creation of web-oriented databases and information systems (IS). Such resources are VOKKIA (Volcanoes of Kurile-Kamchatka Island Arc) IS and KVERT (Kamchatkan Volcanic Eruption Response Team) IS.

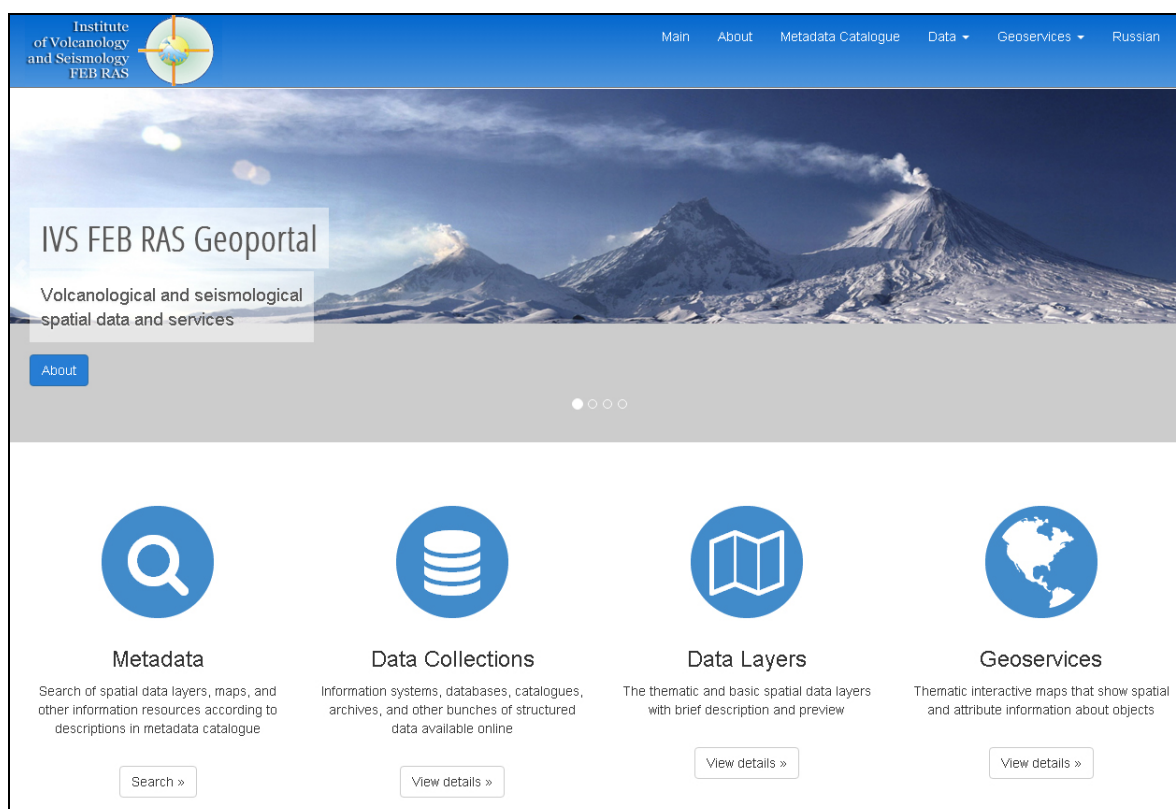


Fig. 1. The main page of IVS FEB RAS Geoportal (<http://geoportal.kscnet.ru>)

The VOKKIA system is the comprehensive information web-system (<http://geoportal.kscnet.ru/volcanoes/>), aimed at integration of heterogeneous scientific data on volcanoes and submarine volcanoes of the Kurile-Kamchatka region (Romanova et al., 2012). IS stores and provides historical and real-time data, obtained using remote, geological and geophysical methods from 1935 till present. At the present the web-

interface VOKKIA is represented by interrelated information modules: Volcanoes, Eruptions, Monitoring, Images, Rocks, Deposits, Bibliography, Geoservices (Fig. 2).

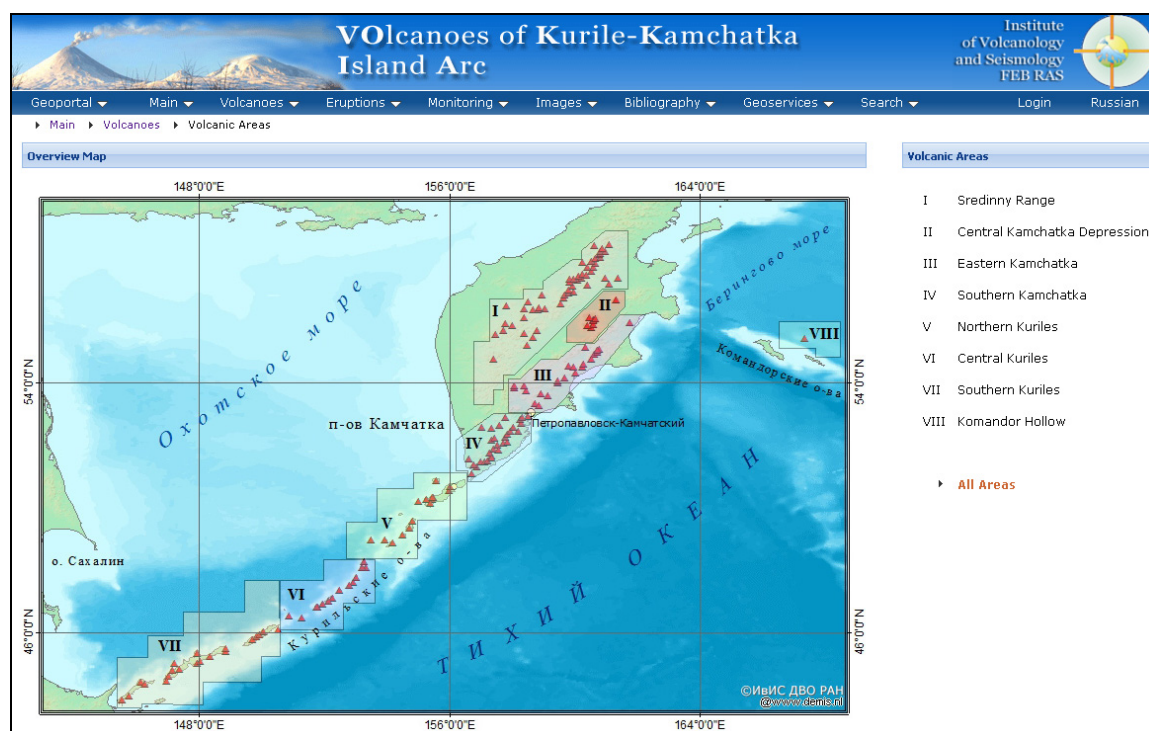


Fig. 2. Overview map of volcanoes and volcanic zones of the Kurile-Kamchatka Island arc. Data from VOKKIA IS

The **KVERT system** is designed to automate the process of preparing the KVERT-messages (Gordeev, Girina, 2014), data storage and its statistical analysis (<http://www.kscnet.ru/ivs/kvert/>). The IS includes data on 30 active Kamchatkan and 6 Northern Kuriles volcanoes (Atlasov and Paramushir Islands), i.e. descriptions of volcanoes, dates of eruptions, data on hazards to aviation and population, and an archive of releases about volcanic activity: VONA (Volcano Observatory Notice for Aviation) on detecting ash clouds and changing Aviation Color Code (ACC); Weekly Releases that include a forecast of the volcanic hazard for aviation for the upcoming week; Daily Reports on the status of active volcanoes for the past day.

In order to analyze data related to the explosive events, the system created a graphical visualization service (Fig. 3). The analysis of the operative data allows revealing the most active volcanoes at a certain period of time as well as frequency and height of ash explosions, prevailing directions and lengths of ash clouds and plumes over certain monitoring periods.

There is realized a replication of data on ash plumes and volcano ACC to the remote Signal IS (Computing Center FEB RAS, <http://signal.febras.net>), in which, based on this information, the Puff-modeling of the ash plumes distribution is conducted (Sorokin et al., 2017). The modeling results sent to IVS FEB RAS web-server and are published on the KVERT IS and VOKKIA IS.

The **IVS FEB RAS Repository** is an archive of scientific publications (<http://repo.kscnet.ru>), which is based on the concept of Open Access (<http://www.openarchives.org>) (Romanova, 2013b). The subject of the repository is the Earth Sciences: geology, geophysics, geochemistry including volcanology, seismology, hydrogeology and others. The repository is available for hosting of scientific publications, which match the repository subjects, for both the IVS FEB RAS scientists and scientists from other institutions. One of the tasks of the repository is the creation of publications collections on the objects of IVS FEB RAS research, and their integration with data collections of the geoportal.

This work was supported partly by the Far East Branch of Russian Academy of Sciences “Far East” Project No.18-5-091.

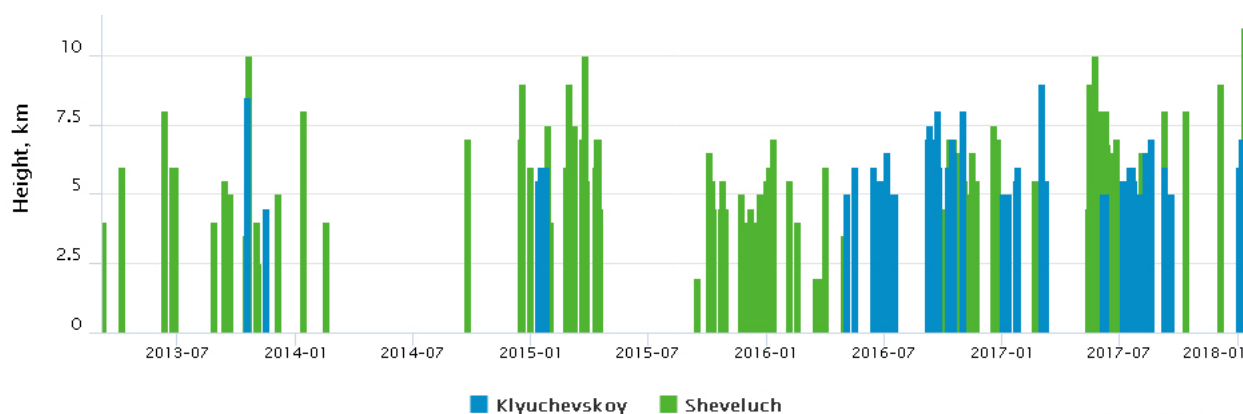


Fig. 3. Explosive events at Klyuchevskoy and Sheveluch volcanoes in 2013-2018. Data from KVERT IS

References

- Gordeev E.I., Girina O.A. Volcanoes and their hazard to aviation // Herald of the Russian Academy of Sciences. 2014. Vol. 84. No. 1. P. 1-8. doi: 10.1134/S1019331614010079
- Romanova I.M. IVS FEB RAS Geoportal as a Single Point of Access to Volcanological and Seismological Data. Geoinformatika. 2013a. No. 1. P. 46-54 (in Russian)
- Romanova I.M. Open Access Repository of the Institute of Volcanology and Seismology FEB RAS: principles of creation and implementation experience // Vestnik KRAUNTS. Nauki o Zemle. 2013b. Vol. 22. No. 2. P. 78-90 (in Russian)
- Romanova I.M. Spatial Data Infrastructure of the Institute of Volcanology and Seismology FEB RAS: current state and future evolution // Vestnik KRAUNTS. Nauki o Zemle. 2015. Vol. 25. No. 1. P. 72-78 (in Russian)
- Romanova I.M., Girina O.A., Maksimov A.P., and Melekestsev I.V. Development of Integrated Information Web-System Volcanoes of the Kurile-Kamchatka Island Arc (VOKKIA) // Informatika i Sistemy Upravleniya. 2012. No. 3. P. 179-187 (in Russian)
- Sorokin A.A., Girina O.A., Loupian E.A. et al. Satellite observations and numerical simulation results for the comprehensive analysis of ash clouds transport during the explosive eruptions of Kamchatka volcanoes // Russian Meteorology and Hydrology. 2017. Vol. 42. No. 12. P. 759-765. doi: 10.3103/S1068373917120032