SATELLITE DATA INTERACTIVE ANALYSIS TOOLS IN THE VOLSATVIEW VOLCANOES MONITORING SYSTEM

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There are 36 active volcanoes in Kamchatka Peninsula and the North Kurile Islands. From three to eight of them are erupting or becoming active every year. Estimation of volcanic activity dynamics and potential impact requires complex investigation of every eruption – from event sequence study to geological effect and volcanogenic products estimation. To aid these researches in 2010 the VolSatView information system for volcanic activity monitoring in Kamchatka and North Kurile Islands was developed and launched by Institute of Volcanology and Seismology FEB RAS, Space Research Institute RAS (IKI), Computing Center FEB RAS and Far Eastern Center of SRC «Planeta» (Gordeev et. al., 2016), (http://volcanoes.smislab.ru). The system provides access and analysis features for various satellite data, meteorological information and ground observations.

The VolSatView system provides access to very large (exceeding 1.5 PB) satellite data archives including low and moderate resolution data (MODIS, AVHRR, VIIRS, MSU-MR sensors), geostationary satellites data (most notably – from HIMAWARI-8 satellite), high and detailed resolution data (Landsat, Sentinel-2, Kanopus-V, Resurs-P, Meteor-M satellites) and also hyperspectral (EO-1) and radar data (Sentinel-1). Storage of these heterogenous types of data and provision of a large number of data derived products is organized with cloud-based archiving technologies (Proshin et al., 2016). It should be noted that all the data is available online to the system's users without the necessity to order and download it locally.

VolSatView also features various interactive data analysis and processing tools, based on cloud solutions (Kashnitskiy et. al., 2017). These tools are also available online, same as the data, and can be used to work with any data available via the system with the web browser. The available tools include classification and clustering for mapping, image algebra and spectral (and hyperspectral) indices calculation, color correction and synthesis, ash plumes detection and their parameters estimation. The tool set and provided analysis possibilities are constantly expanded. E.g., the most recent addition included a tool for automated analysis of images, patterns and digital elevation models for geological research. This structural analysis tool provides uniform numeric texture descriptions for any data provided by the system. Previously conduction of such analysis was possible only with dedicated stand-alone desktop software, operating only with local pieces of data (Zlatopolsky, 1997).

The presentation describes general features of data provided by the VolSatView system and available processing and analysis tools. Advantages of integration of very large data archives and advanced processing techniques within one information system are highlighted and scenarios of these techniques and tools application for volcanic activity analysis (including ash plumes detection and satellite data texture analysis) are given.

References

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