

Large-scale mapping of the vegetation of the Yuzhno-Sakhalinsk mud volcano and the adjacent landscape (Sakhalin Island) using satellite data

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Abstract. The methods of remote sensing of the Earth, due to their efficiency and information content, are widely used to research vegetation dynamics and monitor volcanic activity. The purpose of this work is to research the dynamics of the mud volcanic landscapes and vegetation cover of the Yuzhno-Sakhalinsk mud volcano, as well as its eruption, using Earth remote sensing data. The total area of the study area is 11.5 km². The work was done in QGIS 3.16 program using Sentinel-2B satellite image, images from Google Earth program and graphic maps of the study area created by O.A. Melnikov and V.V. Ershov. An updated large-scale schematic map of the Yuzhno-Sakhalinsk mud volcano has been created, displaying all known volcanic eruption fields over the last 70 years, modern and extinct eruptive centers. A semi-automatic classification of the Sentinel-2B satellite image was carried out using the methods of supervised and unsupervised classification using the Semi-Automatic Classification Plugin module. Based on the results of two types of classification, the areas of vegetation classes of the study area were calculated and two maps of the vegetation cover of the Yuzhno-Sakhalinsk mud volcano were created on a scale of 1 : 50 000 as of 2018. The maps need to be refined, but they can already be used to analyze the dynamics of the vegetation cover of the study area. In our opinion, it is more expedient to apply unsupervised classification before conducting a field survey of the area of interest, and supervised classification after. The practical significance of satellite monitoring of the Yuzhno-Sakhalinsk mud volcano lies in the ability to quickly monitor its activity, assess the recreational load and study the impact of volcano activity on vegetation and the landscape as a whole.

Keywords:

satellite monitoring, space imagery, mud volcano, eruption, semi-automatic classification, vegetation recovery dynamics, natural stress, mud volcano landscape

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