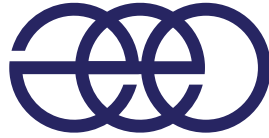


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## **SURGE DYNAMICS OF THE WESTERN BASIN OF VAVILOV ICE CAP, SEVERNAYA ZEMLYA, DETECTED FROM REMOTE SENSING DATA**

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Here we present data on a large-scale surge in the western basin of the Vavilov ice cap on Severnaya Zemlya, derived from satellite imagery (Landsat-1, 5, 7, 8, Terra ASTER, Sentinel-1 and Corona), and supported by airborne RES-2014. Analysis of 28 space images from 1963 to 2018 showed that front advance has evolved during all this period. In the first decade from 1963 to 1973 the advance was very slow from 2-5 to 12 m a<sup>-1</sup>. Since the 1980s, the advance began to accelerate from the first tens of m a<sup>-1</sup> to the first of hundreds m<sup>-1</sup> in the 2000s, the turning point came in 2012, when the front was advancing with a velocity about 0.5 km/year. In 2014 the volume of advanced snout was at least 4 km<sup>3</sup>. The rate of advance reached the maximum of 9.2 km a<sup>-1</sup> in 2016. From 1963 to 2017 the glacier margin moved forward by 11.7 km and its area increased by 134,1 km<sup>2</sup> (by 47 % relative to basin area in 1963), that was accompanied by spreading of crevasse zone up the glacier. Ice surface velocity reached a maximum of 25.4 m d<sup>-1</sup> in 2016, and in 2017 reduced to 6.8 m d<sup>-1</sup>. We assume that the initial activation of the southern and western margins of the ice cap in second half of XX c. was a response to the climate signal occurred possibly several centuries ago. As a result, the ice crevassing accompanied with cryo-hydrologic warming and reinforced by positive feedback, led to the instability of the glacier and displacement of the marginal stagnant belt of debris-laden ice frozen to the bed. The surge was facilitated by change of bedrock conditions as the ice lobe progressed offshore from permafrost coastal zone to the area of soft marine bottom sediments with low shear strength. The surge seems to be also stimulated by anomalously warm summer of 2012.

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**Keywords:** Arctic, glacier surge, ice cap, ice velocity, Severnaya Zemlya.