

The Addition S1.

To Figure 2

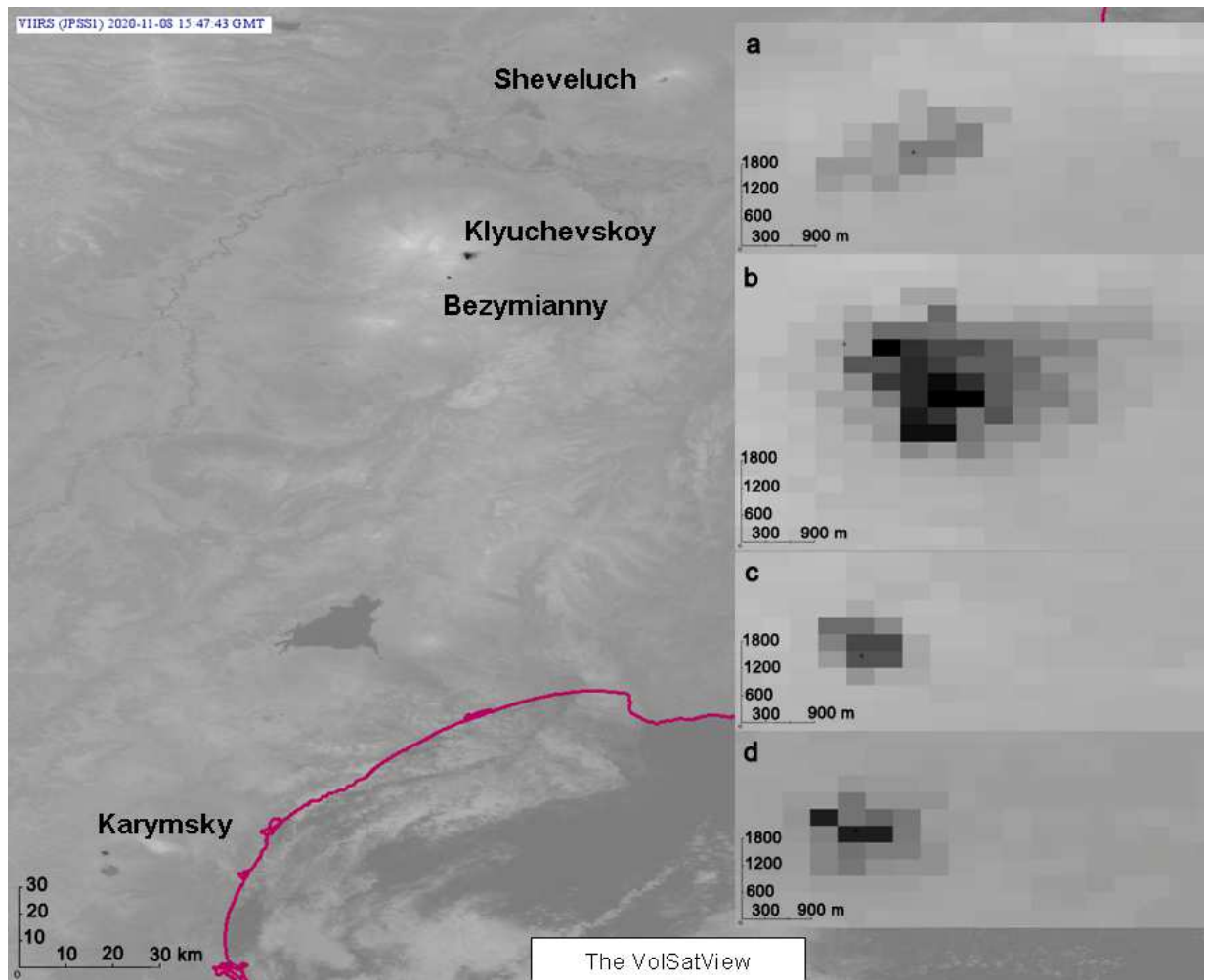


Figure 2. The thermal anomalies over the Kamchatkan volcanoes at 15:47 UTC on November 08, 2020 on JPSS-1 (I4 channel) satellite image; these thermal anomalies on an enlarged scale: (a) Sheveluch; (b) Klyuchevskoy; (c) Bezymianny; (d) Karymsky. The pink line is the border of the Kamchatka Peninsula.

The brightness temperature of the volcano thermal anomaly is an indication of its activity. The video data in IR band close to the date of this satellite image shows: (e) Sheveluch, a glow of the lava dome on November 09, 2020; (f) Klyuchevskoy, the Strombolian activity and effusing of a lava flow on November 08, 2020; (g) Bezymianny, a glow of the lava dome on November 03, 2020.



Institute of volcanology and seismology, KVERT & Weathernews Inc. 2020-11-09 19:25:01

e



Institute of volcanology and seismology, KVERT & Weathernews Inc. 2020-11-08 15:47:01

f



KB GS RAS Bezymianny Volcano 2020-11-03 11:00:01

g

To Section 3.1 The Background Activity of the Volcano

The highest temperature of the Sheveluch thermal anomaly is associated with explosive activity of the Vulcanian-type and intensive growth of the lava dome (squeezing out extrusive blocks and lava flows), accompanied by the collapse of hot avalanches, e.g., (Figures S1– S4).



Figure S1. Strong explosive event of the Sheveluch volcano at 17:47 UTC on February 17, 2015. Video data by KVERT IVS FEB RAS and Weathernews Inc. (<http://www.kscnet.ru/ivs/kvert/imgs/2053.jpg>)



Figure S2. The growth of the Sheveluch lava dome accompanied by the collapse of hot avalanches on August 05, 2022. Photo by Yu.V. Demyanchuk (<http://www.kscnet.ru/ivs/kvert/imgs/2798.jpg>)



Figure S3. The growth of the Sheveluch lava dome, accompanied by the collapse of hot avalanches on August 09, 2021. Video data by KVERT IVS FEB RAS and Weathernews Inc. (<http://www.kscnet.ru/ivs/kvert/imgs/2726.jpg>)



Figure S4. The growth of the Sheveluch lava dome accompanied by the collapse of hot avalanches on February 22, 2019. Photo by Yu.V. Demyanchuk (<http://www.kscnet.ru/ivs/kvert/imgs/2411.jpg>).

The highest temperature of the Bezymianny volcano thermal anomaly is associated with explosive activity of the Vulcanian-type and squeezing lava flows onto the lava dome slopes, accompanied by the hot avalanches collapses, e.g., (Figures S5–S6).



Figure S5. The strong explosive event of Bezymianny volcano on March 15, 2019. Hot fragments of rocks (white color) collapse on the lava dome slopes. Video data by KBGS RAS. (<http://www.kscnet.ru/ivs/kvert/imgs/2413.jpg>).



Figure S6. The incandescence of the Bezymianny lava dome on June 18, 2017. Photo by A. Belousov (<http://www.kscnet.ru/ivs/kvert/imgs/2278.jpg>).

The highest temperature of the Klyuchevskoy volcano thermal anomaly is associated with effusive eruptions and explosive activity of the Strombolian and Vulcanian types of the summit crater, e.g., (Figures S7–S9).



Figure S7. Strombolian activity of the Klyuchevskoy volcano and a lava flow effusing into Apakhonchich chute on June 10, 2020. Photo by E. Saphonova (<http://www.kscnet.ru/ivs/kvert/imgs/2541.jpg>).



Figure S8. Strombolian activity of the Klyuchevskoy volcano and a lava flow effusing along the southern slope on December 24, 2020. Photo by Yu. Demyanchuk (<http://www.kscnet.ru/ivs/kvert/imgs/2664.jpg>).



Figure S9. The explosive-effusive eruption of the Klyuchevskoy volcano continues: lava flows effuse on the eastern and southeastern its flanks on September 28, 2016. Photo by A. Pavlov (<http://www.kscnet.ru/ivs/kvert/imgs/2202.jpg>).

The lateral breaks are also characterized by explosive and effusive eruptions, e.g., (Figure S10, and S11).



Figure S10. Wall of fire (from right to left): ash column up to 7.5 km a.s.l. above the summit crater of the Klyuchevskoy volcano; ash column up to 7 km a.s.l. above a cinder cone into Apakhonchich chute at the southeastern volcanic flank (the lateral breakthroughs named after volcanologist E.K. Markhinin); and above a lava flow front on July 06, 2016. Video data by KVERT IVS FEB RAS and Weathernews Inc. (<http://www.kscnet.ru/ivs/kvert/imgs/2171.jpg>)



Figure S11. The cinder cone and a lava flow of the lateral breakthroughs named after volcanologist G.S. Gorshkov on the northwestern flank of the Klyuchevskoy volcano on March 16, 2021. Photo by D. Budkov (<http://www.kscnet.ru/ivs/kvert/imgs/2684.jpg>)

The highest temperature of the thermal anomaly of the Karymsky volcano is associated with the explosive activity of the Strombolian and Vulcanian types, as well as the growth of the extrusive dome in the crater, e.g., (Figures S12–S14).

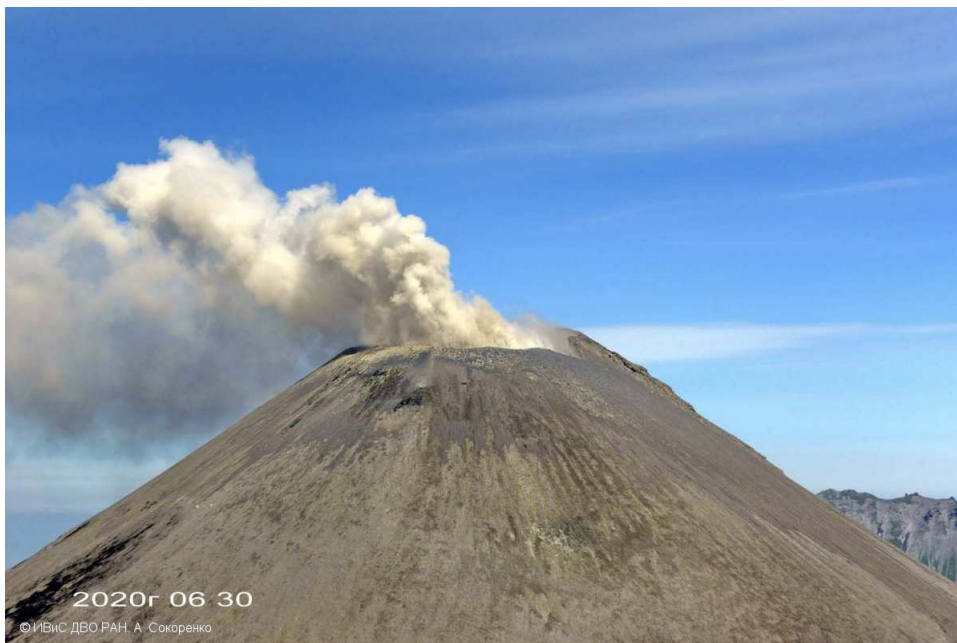


Figure S12. The ash emission from the Karymsky volcano on June 30, 2020. Photo by A. Sokorenko (<http://www.kscnet.ru/ivs/kvert/imgs/2557.jpg>)



Figure S13. The Strombolian activity of the Karymsky volcano on September 12, 2018. Photo by D. Melnikov (<http://www.kscnet.ru/ivs/kvert/imgs/2391.jpg>).



Figure S14. The lava dome in the crater of the Karymsky volcano on September 25, 2005. Photo by M. Zelensky (<http://www.kscnet.ru/ivs/kvert/imgs/1316.jpg>).