REMOTE SENSING ANALYSIS OF THE 2015-2016 SHEVELUCH VOLCANO ACTIVITY

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Sheveluch is one of the most active volcanoes of Kamchatka. Sheveluch volcanic edifice has a complex structure, including the Late Pleistocene Old Sheveluch stratovolcano (3.283 km) complicated on its western flank with a later lava field (Baidarny ridge) and the 9-km-wide caldera enclosing Holocene active Young Sheveluch (2.8km) eruptive center. In addition, several Holocene domes have been emplaced at the western slopes of Old Sheveluch.

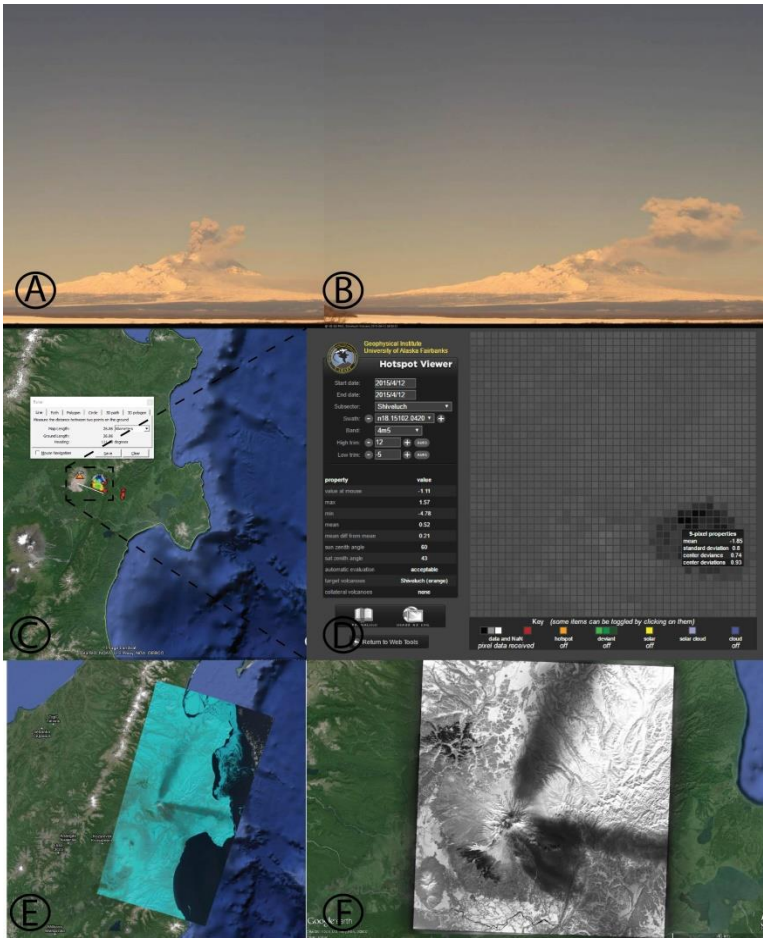

Figure 1. *Webcam snapshots of the eruption on April 12, 2015 at 03:48 (A) and 03:59 UTC (B) respectively, as well as the NOAA AVHRR BTD from 04:20 UTC (C) and zoomed in around the volcano (D). Also included is an example of the high spatial resolution data from LANDSAT 8 on April 17, 2015(Band 7, E and Band 3, F).*

Two large Plinian eruptions of Sheveluch occurred in 1854 and 1964 [1]. In 1980, a new lava dome began growing into the 1964 explosive crater and continues at present. Strong paroxysmal explosive eruptions connected with a growth of the lava dome, occurred in 1993, 2001, 2004, two in 2005, 2007, and 2010 [2].

Significant explosive activity of Sheveluch volcano occurred in the first half of 2015 with explosions sending volcanic ash up to 7-12 km above sea level (ASL), and ash plumes extended more than 900 km from the volcano [3]. These events occurred on January 7, 12, and 15; February 1, 17, and 28; March 4, 8, 16, 21-22, and 26; and April 7 and 12, see Figure 1A - 1D, with ashfall seen in high resolution data from April 17 (Figure 1E and 1F). Ashfall also occurred at Ust'-Kamchatsk on March 16, and Klyuchi on October 30, 2015. Strong and moderate hot avalanches, mainly from the lava dome, were observing in the second half of 2015.

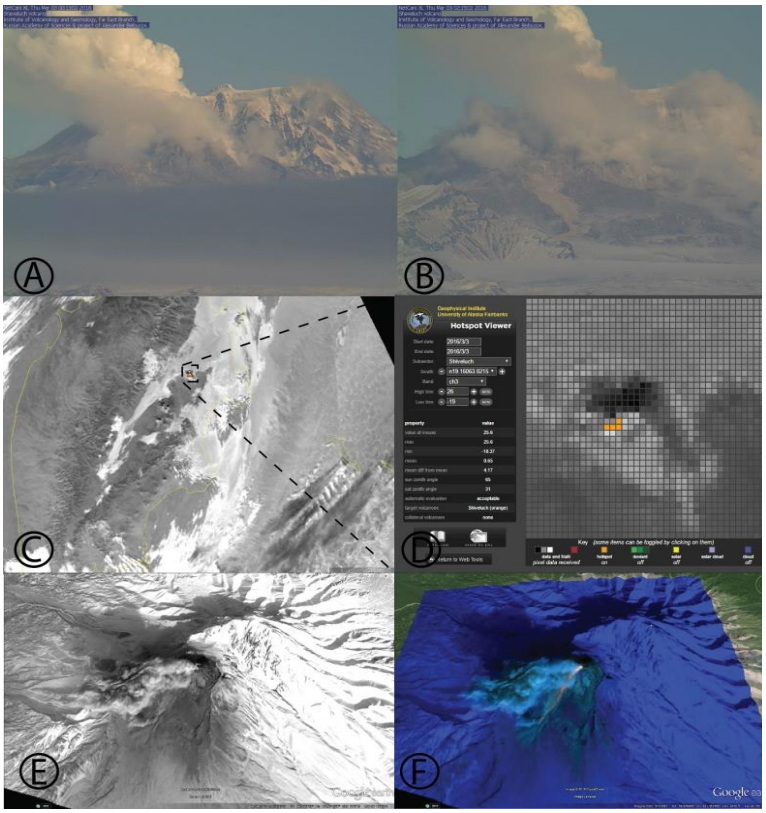

Figure 2. *Webcam snapshots of on March 3, 2016 activity at 00:13 (A) and 02:15 UTC (B) respectively, as well as the NOAA AVHRR MIR from 02:15 UTC (C) and zoomed in around the volcano (D). Also included is an example of the high spatial resolution data from LANDSAT 8 at 00:13 UTC (Band 8, E and RGB of Bands 765, F).*

In 2016, Sheveluch is still very active as the large lava block continues to grow on the northern part of the dome over the past 11 months (since April 2015). Hot avalanches are continually observed from the western and eastern flanks of the lava dome. Figure 2 shows an example of the finer spatial resolution data from LANDSAT 8 that illustrates a significant thermal signal from a volcanic flow as compared to the coarser spatial resolution advanced very high resolution radiometer (AVHRR) data at 02:15 UTC. The AVHRR data only shows a weak signal while the LANDSAT 8 data clearly captures the flow. Combining these two datasets together can help us to better understand the ongoing activity at Sheveluch.

We will present on how remote sensing data has and is being used to analyze the volcanic plumes and clouds along with the surface activity within the summit crater and at the lava dome. We will show both the coarse spatial, high temporal frequency data often used in real-time monitoring as well as the coarser temporal, higher spatial resolution data to map out the thermal activity at the summit dome. We will illustrate how by combining the datasets together along with ground observations that volcano scientists can obtain a better understanding of the volcanic eruption and evaluate the impact to the local region.

Acknowledgments

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References

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