Nightfire method to track volcanic eruptions from multispectral satellite images

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This work presents the first results of an application of the Nightfire hotspot algorithm towards volcano activity detection. Nightfire algorithm have been developed to play along with a Suomi-NPP polar satellite launched in 2011, which has a new generation multispectral VIIRS thermal sensor on board, to detect gas flares related to the upstream and downstream production of oil and natural gas. Simultaneously using of nighttime data in SWIR, MWIR, and LWIR sensor bands the algorithm is able to estimate the hotspot temperature, size and radiant heat. Four years of non-filtered observations have been accumulated in a spatio-temporal detection database, which currently totals 125 GB in size. The first part of this work presents results of retrospective cross-match of the detection database with the publicly available observed eruptions databases. The second part discusses how an approximate 3D shape of a lava lake could be modeled based on the apparent source size and satellite zenith angle. The third part presents the results of fusion Landsat-8 and Himawari-8 satellites data with the VIIRS Nightfire for several active volcanoes.