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Experimental use of satellite data for automatic detection of volcanic eruptions

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The Hong Kong Observatory (HKO) has developed an experimental algorithm for automatic detection of volcanic eruption using Himawari-9 satellite channel 7 (3.9 μ m), channel 13 (10.4 μ m) and channel 15 (12.4 μ m) data. Based on the studies of Chu et al. (2020), Normalized Brightness Temperature Difference Index (NBTDI) values were calculated to indicate the potential existence of volcanic hotspots. Further, Brightness Temperature Difference (BTD) between channels 13 and 15 was computed to identify if there would be volcanic ash clouds. For a particular volcano, NBTDI and BTD values covering a spatial extent of 100km x 100km with the volcano at the centre were determined for assessing the possibility of volcanic eruption. Past NBTDI and BTD statistics for that volcano covering the summer months from April to September in 2020-2022 were calculated for testing with NBTDI and BTD thresholds would be best used for triggering the automatic alert of volcanic eruption. As a trial basis, the algorithm was applied for five different volcanoes in the Southeast Asia including Mayon, Fukutoku-Okanoba, Sakurajima, Semeru and Krakatoa volcanoes. Preliminary results based on the eruption of Mayon volcano in June 2023 showed sign of precursor which was useful to alert aviation forecasters for heightened volcanic watch.