Volcanic Cloud Detection, Characterization, Alerting, and Modeling Applications for GOES-R

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Previously developed methods for extracting quantitative information on volcanic clouds from satellite measurements have several important limitations that greatly reduce their significance for research and operational applications. No single method is capable of utilizing the entire volcanic cloud relevant space-based observing system to detect and characterize all major types of volcanic clouds (ash plumes/dispersed ash clouds and ice rich/opaque ash clouds) with the exceptional skill needed for automated alerting, model validation, and real-time data assimilation applications. To ensure that advanced sensors like the GOES-R Advanced Baseline Imager (ABI) are fully utilized, the National Oceanic and Atmospheric Administration (NOAA), in collaboration with the University of Wisconsin, has developed new techniques for automatically identifying clouds in satellite imagery that contain volcanic ash with much greater skill than previously demonstrated. The NOAA algorithm suite also contains procedures for automatically retrieving important volcanic cloud properties relevant to modeling applications and alerting forecasters when a volcanic cloud is detected. The NOAA methods are applicable to any volcanic cloud relevant satellite sensor, including the ABI, and can actually utilize combinations of satellite sensors to produce consistent, high quality, results. An overview of the applications developed for volcanic cloud monitoring and forecasting will be given.