**Using Multi-Sensor Observations for Volcanic Cloud Detection, Characterization, and Improved Dispersion Modeling**

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Abstract

GOES-R will provide unprecedented capabilities to detect and track hazardous volcanic clouds. These capabilities, however, will only be fully realized using automated algorithms as the impressive GOES-R data volume makes volcanic eruption detection, solely using manual analysis of imagery, impossible. To ensure that the full spectral, spatial, and temporal capabilities of GOES-R are utilized for volcanic cloud monitoring, the Volcanic Cloud Analysis Toolkit (VOLCAT) was developed. VOLCAT utilizes spectral, spatial, and temporal metrics provided by GOES-R to detect and characterize volcanic ash clouds (VOLCAT can actually be applied to nearly any geostationary or low earth orbit sensor). We propose to build upon previous research by incorporating additional key data sources into VOLCAT, performing several case studies, and developing an application that utilizes VOLCAT to improve operational volcanic ash dispersion modeling. This proposal directly addresses NWS research priorities A (improved model forecasts) and B (improved situational awareness) and is a natural progression of a pre-existing line of (successful) research. The proposed research will directly address several operational challenges associated with tracking and forecasting volcanic clouds, which are a well-known aviation hazard. NOAA operates two Volcanic Ash Advisory Centers (VAACs) and three Meteorological Watch Offices (MWO) with operational volcanic hazard monitoring and forecasting responsibilities. NOAA's total area of responsibility covers a very large region that stretches from the Western Pacific to the Eastern Caribbean and from Alaska to Ecuador. Thus, volcanic cloud monitoring and forecasting is an important component of NOAA operations.