

Associating the temperature difference model, used for AVHRR and GOES, to the MODIS image from February 19, 2001 of the eruption plume of Mt. Cleveland, Aleutian Islands, Alaska

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The mass retrieval technique of airborne volcanic ash using the temperature difference model (subtracting two channels to detect airborne ash) is analyzed using a MODIS image at 2310 UTC for the Mt. Cleveland eruption plume. This mass retrieval technique is similar to that carried out in other studies on AVHRR satellite images for post-eruption analyses. The AVHRR model uses analyses of Band 4 (10.3 to 11.3 μm) minus Band 5 (11.5 to 12.5 μm) versus Band 4. This same technique is applied to the MODIS data using Band 31 (10.78 to 11.28 μm) minus Band 32 (11.77 to 12.27 μm) versus Band 32 (i.e. bands similar in wavelength to AVHRR and GOES Band 4 and Band 5 respectively). Results from the analysis of the MODIS data are compared to a similar mass retrieval from a GOES image recorded at 2315 UTC, February 19, 2001. Also, the spectral signature of airborne volcanic ash is compared for all 36 MODIS bands to determine the optimum channel to apply the temperature difference technique that will detect the maximum aerial coverage of the plume. Initially it was expected that the band differencing technique using MODIS Band 31 minus Band 32 would provide very similar results as the same channels in GOES and AVHRR data over a similar spectral range. However, preliminary results reveal that MODIS Band 31 minus Band 32 may show better internal plume structure than the GOES temperature difference of Bands 4 minus Band 5. Additionally, and possibly more of an impact to aircraft, MODIS Band 29 minus Band 32 detect a larger aerial extent of the plume as compared to the GOES Band 4 minus Band 5. The results indicate that when using MODIS imagery for eruption plume analysis temperature difference of Band 31 minus Band 32 can provide good detail on internal plume structure, but Band 29 minus Band 32 is needed to determine the aerial extent of the ash in the plume.