ANALYZING THE INDIRECT EFFECTS OF VOLCANICALLY INCREASED SO_2 ON MARINE BOUNDARY LAYER CLOUDS USING A-TRAIN

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Mt. Kilauea became active in 2008, emitting a significantly anomalous SO_2 plume. This geological event provides an excellent experimental opportunity to investigate the degree to which low-level maritime clouds are influenced by changes in sulfate aerosol. In this study we examine how the downwind clouds of Mt. Kilauea change using only A-Train measurements. We then infer, based on these measurements, how and to what extent the cloud properties have been modified. We find that the changes in measurements from the inactive period to the active period show an unambiguous decrease in 94 GHz brightness temperature (Tb), a weak decrease in integrated Z, a slight increase in 2.1 micron reflectance, and a nearly constant reflectance in the mid visible. This combination of changes suggests that cloud droplet size decreased consistent with the first aerosol indirect effect, yet albedo remained nearly constant because liquid water path decreased proportionally. The role of precipitation in this process is unclear. For instance, did changes to precipitation play a causal role in the liquid water path changes by modulating the stability of the lower troposphere or are changes to precipitation merely a result of decreased liquid water path? Either way, given a nearly constant cloud fraction, evidence for the second aerosol indirect effect is weak.