Increases of Reflected Solar Radiation as Observed by MISR from Volcanic Eruptions in 2000-2018

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Stratospheric volcanic aerosols (SVAs), a natural variability, play an important role in Earth climate system by cooling the surface temperature and the troposphere for a period of several months to over a year. The 16-year MISR monthly radiances show significant enhancements of anisotropic scattering at high latitudes after several major volcanic eruptions with injection heights greater than 14 km. The anomaly of de-seasonalized radiance anisotropy between MISR's DF and DA views (70.5° forward and aft) is largest in the blue band with amplitudes amounting to 5-15% of the mean radiance. A similar magnitude of the reflected shortwave radiation increases is expected in the polar region. The anomalous radiance anisotropy is a manifestation of the stronger forward scattering of reflected sunlight due to the direct and indirect effects of SVAs. The perturbations of MISR radiance anisotropy from the Kasatochi (August 2008), Sarychev (June 2009), Nabro (June 2011) and Calbuco (April 2015) eruptions are consistent with the poleward transported SVAs observed by CALIOP and OMPS-LP.