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South African night sky brightness during high aerosol epochs

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Abstract content
 (Max 300 words)

Sky conditions in the remote, dry north-western interior of South Africa are now the subject of considerable interest in view of the imminent construction of numerous solar power plants in this area. Furthermore, the part of this region in which the core of the SKA is to be located (which includes SALT) has been declared an Astronomical Advantage Zone, for which sky brightness monitoring will now be mandatory. In this project we seek to characterise the sky brightness profile under a variety of atmospheric conditions. Key factors are of course the lunar phase and altitude, but in addition the sky brightness is also significantly affected by the atmospheric aerosol loading, as that influences light beam scattering. In this paper we chose to investigate the sky characteristics soon after the Mount Pinatubo volcanic eruption in 1991, which resulted in huge ash masses reaching the stratosphere (where they affected solar irradiance for several years). We re-reduced photometric sky measurements from the South African Astronomical Observatory archives (and originally obtained by us) in different wavelengths and in a variety of directions. We use this data to explore relationships between the aerosol loading and the sky brightness in a range of conditions, including several post-Pinatubo phases and during the passage of biomass burning induced haze and dust clouds. We discuss the impact of our findings on the applicability of light scattering models and light scatterer properties.

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