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Aerosol and cloud studies using LIDAR, satellite and model data in South Africa

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Atmospheric aerosols are minute particles suspended in the atmosphere. They interact both directly and indirectly with the Earth's radiation budget and climate. The aerosol optical depth (AOD) is the most important parameter used to quantify the impact of aerosols on radiative energy budget. In this study we report on the various aerosol and cloud measurements we have carried out this far. Firstly, we report on the distribution and seasonal variation of various aerosols such as black carbon (BC), sulphate and dust AOD in South Africa using Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2) model data. BC aerosols were observed to be dominant in the north eastern parts of South Africa (SA) while sulphate aerosols were observed to be dominant in eastern parts of SA. Secondly, we report on the transport of volcanic aerosols over SA from the Calbuco volcano eruption in Chile that occurred on 21 April 2015. Volcanic aerosols were observed over SA from 28 April 2015 to 16 May 2015 as indicated by Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) data. Lastly, we report on the observation of clouds over Durban using the CSIR mobile Light Detection And Ranging (LIDAR) instrument. Low level cloud layers showed high extinction coefficients values ranging between 0.9 and 4.4 km⁻¹, whereas low extinction coefficients for high level clouds were observed at values ranging between 0.001 and 0.002 km⁻¹.

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Primary author: Dr SHIKWAMBANA, Lerato (SANSA)

Co-author: Prof. SIVAKUMAR, Venkataraman (University of KwaZulu Natal)

Presenter: Dr SHIKWAMBANA, Lerato (SANSA)

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