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Synoptic characterisation of the winter aerosol distribution in Southern Africa: the AEROCLO-sA campaign case study

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Atmospheric circulation over southern Africa and South Atlantic is characterised by the complex interaction of cloud cover and aerosol distribution, affecting the regional radiative budget in a way that is not fully understood yet. During austral winter, a compact stratocumulus low cloud deck over South Atlantic contrasts clear sky over the continent, where forest fires triggered by dry conditions emit large amount of biomass burning aerosols dominating the mid troposphere aerosol distribution. The characterisation of the tropospheric distribution of aerosols – biomass burning, as well as dust and sea salt aerosols – is a basic step towards the understanding of the complex cloud-aerosol interactions in the region.

In this study, a characterisation of the synoptic variability of aerosols in southern Africa and South Atlantic during austral winter is presented. By analysing data from ECMWF reanalysis products, a weather regime classification of the region is constructed and used to characterise the distribution of biomass, dust and sea salt aerosols in the period 1979-2017. The identified aerosol-circulation patterns are then used to discuss specific biomass burning and dust aerosol occurrences observed during the AEROCLO-sA campaign in August-September 2017 in Namibia, showing a robust association between synoptic circulation and aerosol measures.