4.211 Aerosol-cloud-radiation interaction along the western coast of southern Africa as simulated by a regional climate model.

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Abstract:

Atmospheric aerosol particles are known to influence the radiative balance at regional and global scales through their interactions with clouds (first and secondary aerosol indirect effects) and solar/infrared radiation (direct radiative forcing). In addition, the feedback mechanisms associated with the absorption of solar radiation due to absorbing particles (especially smoke) on cloud microphysical properties (semi-direct effect) is also recognized as an important radiative perturbation. In this context, the western coast along southern Africa is an ideal region to study these processes because it is characterized by both the presence of anthropogenic smoke particles and persistent stratocumulus clouds, both of which are known to be essential in the global radiative budget. This has been the main motivation for the development of the AEROCLO-SA project (FR), in collaboration with the ORACLES (US) and CLARIFY (UK) programs. Within the framework of AEROCLO-SA, we evaluate the capacity of a regional climate model (RegCM) to represent aerosol stratocumulus interactions and their impact on regional climate by comparing simulations performed with and without explicit biomass burning aerosol. Here we present preliminary results of simulations performed at a 30 km horizontal resolution, focusing on shortwave aerosol optical depth, absorbing properties (AAOD and SSA), heating rate, as well as the representation and changes in Sc cloud macrophysical/microphysical and optical properties.