

A Theoretical Investigation of Cosmic Ray Influence on Atmospheric Boundary Layer Dynamics

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Abstract: *Cosmic rays are extremely high energy particles originating from outer space which incessantly collide with Earth's atmosphere. Their involvement in upper atmospheric ionization has been proven beyond doubt, however, their potential effect on the Atmospheric Boundary Layer (ABL) has not been adequately researched. This paper reports on a theoretical study of the effect cosmic rays might have on boundary layer dynamics based on knowledge prior to 2019. Processes such as ionization, aerosol nucleation and cloud microphysics were considered and how these could affect turbulence, radiative budget and atmospheric stability. Bringing together ideas from atmospheric physics and space physics, this paper attempts to conceptually describe the link between the cosmic ray flux and processes in the boundary layer. Although evidence is presented suggesting the effect is indirect, the absence of direct, conclusive evidence indicates future work.*

Keywords: Cosmic Rays, Atmospheric Boundary Layer, Ionization, Aerosol Formation, Climate Dynamics