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C-STRUCTURES IN MESOSPHERIC NA AND K LAYERS AND THEIR RELATIONS WITH DYNAMICAL AND CONVECTIVE INSTABILITIES

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In the present work, we deeply analyzed the C-Structures Sporadic layers in the mesospheric

metal layers, first using the data of a narrow band Sodium Density and Temperature LIDAR and second a high-resolution simultaneous Sodium and Potassium LIDAR, both operated at São José dos Campos, Brazil (23°S,46°W). We also used ionosonde for Es layer investigation and wind measurements from an all-sky interferometric meteor wind radar, both located at Cachoeira Paulista, a nearby location. From the first set of measurements, 82 nights of data from 2007 to 2008 were analyzed and 3 C-type events were found. Convective and dynamic instabilities were investigated. All the events showed lower temperatures inside of C- Structures when compared to the borders. Besides, the squared Brunt-Väissälä frequency N^2 was not negative in the region of C-Structures, but their values were close to zero, which indicates a threshold to convective instability. All three cases showed strong wind shear in the altitude and time where C-Structures appeared. In 2 out 3 cases dynamical instability was present ($Ri < 0.25$). Ionospheric Es layers were also analyzed. The advection of a Sodium Cloud to the Na lidar station and a wind distortion seems to be the reasonable mechanism that can explain all the 3 C-Structures observed. We compared these results with the 9 simultaneous C-type events identified in Na and K layers with the Dual-beam Na-K LIDAR from 2017-2019, totalizing 185 nights. Since the characteristics of C-Structure in K and Na layers are very similar, the above mechanism can be used to explain C-type in Na and K layers.