Space Studies of the Upper Atmospheres of the Earth and Planets including Reference Atmospheres (C)
Recent Advances in Equatorial, Low- and Mid-latitude Mesosphere, Thermosphere and Ionosphere Studies (C1.1)

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

Vania Fatima Andrioli, vaniafatima@gmail.com
State Key Laboratory of Space Weather, National space science center, Chinese Academy of Science, Sao Jose Dos Campos, Brazil
Jiyao Xu, xujy@nssc.ac.cn
State Key Laboratory of Space Weather, Center for Space Science and Applied Research, Chinese Academy of Sciences , Beijing, China: Chinese Academy of Sciences (CAS)
Paulo Batista, paulo.batista@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Alexandre Pimenta, alexandre.pimenta@inpe.br
National Institute for Space Research (INPE), 4047, Brazil
Maria Paulete Martins, maria.paulete@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Laysa Resende, laysa.resende@gmail.com
State Key Laboratory of Space Weather, National space science center, Chinese Academy of Science, São José Dos Campos, Brazil
Siomel Savio, siomel@gmail.com
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Cristiane Targon, cristiane.targon@inpe.br
National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil
Guotao Yang, gtyang@swl.ac.cn
National Space Science Center,CAS, Beijing, China: Chinese Academy of Sciences (CAS)
Jing Jiao, jjiao@spaceweather.ac.cn
National Space Science Center, Chinese Academy of Sciences, Beijing, China: Chinese Academy of Sciences (CAS)
Chi Wang, cw@spaceweather.ac.cn
National Space Science Center, Chinese Academy of Sciences, Beijing, China: Chinese Academy of Sciences (CAS)
Zhengkuan Liu, zkliu@spaceweather.ac.cn
National Space Science Center, CAS, Beijing, China: Chinese Academy of Sciences (CAS)

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.