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Thermodynamic structure of the lower subtropical troposphere over the Canary Islands

J.C. Guerra(1), J. Carrillo(1), J. Rodríguez(1) J.P Díaz(1), M.T. Arencibia(1), E. Cuevas(2)

(1) Earth and Atmospheric Observation Group (GOTA), School of Physics, La Laguna University, Canary Islands, Spain.(2) Izaña Atmospheric Observatory, National Institute of Meteorology (INM), Tenerife, Spain (jcguerra@ull.es /Fax: +34 922318228 /Phone: 34 922318247

Atmospheric sounding analysis over the tropical-subtropical region show, among its most prominent features, layers with sharp inversion in temperature associated to the descending Hadley branch. Most of the subtropical region is under the influence of a general subsidence regimen, which favors the development of inversion layers that typically occur over the subtropical ocean, between 1.5 and 2.5 km. These layers of high stability are found associated to vertical specific humidity peaks according to the capping of cumulus clouds into the trade wind convective layer. Moreover, soundings in mid-latitudes and tropics also show other stable and inversion layers, which have different dynamic and thermodynamic formation mechanism. So, for example, we find similar temperature and moisture inversions associated with melting levels in stratiform rain region. However these and others stable layers have not received too much attention. In this study twice-a-day radiosonde data (1982 to 2006) from Tenerife station is used to investigate vertical features of the subtropical lower troposphere (under 8 km) over the Canary Islands. The thermodynamic properties and static stability were analyzed in order to understand the behavior of temperature inversion layers and significant stable layers. Static stability was evaluated from the vertical temperature gradient and Brunt-Vaisala frequency, and water vapor mixing ratio vertical gradient was calculated in order to characterize these stable layers. Our results show a region of great stability, where it is found generally a temperature inversion layer, between 1-3 km altitude, with a marked seasonal behavior. Others layers with great

stability are found under the 0žC isotherm, mainly during rainy months, while region of a high-stability above 6 km approximately is observed in summertime.