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The scale heights derived from the Arecibo incoherent scatter radar measurements

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We statistically analyze the ionospheric scale heights in the lower topside ionosphere based on the electron density profiles observed from the incoherent scatter radar at Arecibo (114.4ąãE, 30.6ąãN), Puerto Rico. In this study, a database of these data, containing observations from 1966 to 2002, has been used in order to investigate the diurnal and seasonal variations and solar activity dependences of the vertical scale height (VSH), which is deduced from the profiles defined as the value of dh/d(ln(Ne)), and the effective scale height (Hm), which is defined as the scale height in the ChapmanęÁ function to approximate the Ne profiles. As a measure of the slope of the height profiles of the topside electron density, the derived VSH and Hm show marked diurnal and seasonal variations and solar activity dependences. Their features are discussed in terms of thermal structure and dynamical processes in the lower topside ionosphere. We also investigate the quantitative relationships between Hm, VSH and other parameters over Arecibo. The similarities and differences in these scale heights are discussed. This study made use of the NCAR CEDAR Database which is supported by the National Science Foundation of USA. The Arecibo Observatory is operated by Cornell University under an agreement with the National Science Foundation of USA. This research was supported by National Natural Science Foundation of China (40674090), the KIP Pilot Project (kzcx3-sw-144) of Chinese Academy of Sciences, and National Important Basic Research Project (2006CB806306).