Geophysical Research Abstracts, Vol. 8, 01434, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01434

Tidal effects on midlatitude sporadic E layers inferred from ionogram Height-Time-Intensity observations

C. Haldoupis (1), C. Meek (2), N. Christakis (3), D. Pancheva (4), A. Bourdillon (5)

(1) Physics Department, University of Crete, Heraklion, Greece, (2) Institute of Space and Atmospheric Studies, University of Saskatchewan, Saskatoon, Canada, (3) Department of Applied Mathematics, University of Crete, Heraklion, Greece, (4) Department of Electronics and Electrical Engineering, University of Bath, Bath, UK, (5) IETR/CNRS, Université de Rennes 1, Rennes, France (chald@physics.uoc.gr /Fax: +30-2810-394201)

A new methodology of ionosonde height-time intensity (HTI) analysis is introduced which allows the investigation of sporadic E layer (E_s) vertical motion and variability. This technique, which is useful in measuring descent rates and tidal periodicities of E_s, is applied on ionogram recordings made during a summer period from solstice to equinox. On the average, the ionogram HTI analysis revealed a pronounced semidiurnal periodicity in layer descent and occurrence. It is characterized by a daytime layer starting at 120 km near 06 hours LT and moving downwards to altitudes below 100 km by about 18 hours LT when a nighttime layer appears above at $\sim$125 km. The latter moves also downward but at higher descent rates (1.6 to 2.2 km/h) than the daytime layer (0.8 to 1.5 km/h). The nighttime E_s is weaker in terms of critical sporadic E frequencies (*foEs*), has a shorter duration, and tends to occur less during times close to solstice. Here, a diurnal periodicity in E_s becomes dominant. The HTI plots often show the daytime and nighttime E_s connecting with weak traces in the upper E region which occur with a semidiurnal, and at times terdiurnal, periodicity. These, which are identified as upper E region descending intermediate layers (DIL), play an important role in initiating and reinforcing the sporadic E layers below 120-125 km. The observations are interpreted by considering the downward propagation of wind shear convergent nodes that associate with the $S_{2,3}$ semidiurnal tide in the upper Eregion and the $S_{1,1}$diurnal tide in the lower E region. The daytime sporadic E layer is attributed to the confluence of semidiurnal and diurnal convergent nodes, which may explain the well known pre-noon daily maximum observed in *foEs*. The nighttime layer is not well understood, although most likely it is associated with the intrusion of

the daytime DIL into the lower E region due to vertical wind shear convergence nodes descending with the semidiurnal tide. Finally, the descent rates of sporadic E may not always represent the vertical phase velocities of the tides, especially in the nighttime layer.