On the Role of MLT Dynamics in the Quiet-Time Day-to-Day Variabilities of Ionospheric Current Systems at Low Latitudes

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Planetary-scale waves like tides, global-scale normal modes and equatorial Kelvin waves play an important role in the dynamics of the mesosphere-lower thermosphere (MLT) region. It has been hypothesized in the past that if a global-scale wave with large amplitude and fairly long vertical wavelength propagates into the ionosphere from below, it should drive an electric current system through the dynamo action with a period of the global-scale wave. This wave-like perturbation causes perturbations in geomagnetic field that could be recorded on ground. Part of these variabilities during magnetically quiet times could very well be due to the variabilities of tides and other planetary-scale waves but what conditions exist in the MLT region that permit these large-scale waves to reach the dynamo heights and have an influence on the ionospheric variabilities there and higher above are not known. Aiming to resolve this issue, we recently initiated an analysis of simultaneous observations of MLT winds from the low latitude MF radar site, Tirunelveli (8.7^{o}N, 77.8^{o}E) and observations from three other sites in the low latitude region, namely, Pameungpeuk (7.7^{o}S. 107.7^{o}E), Ascension Island (7.9^{o}S, 14.4^{o}W) and Cariri (7.4^{o}S, 36.5^{o}W) with the objective of delineating the role of large-scale MLT dynamics in the variabilities of ionospheric current systems at low latitudes. Results from this exercise will be presented and discussed in the current context of our understanding of this coupling between the MLT region and the E-region ionosphere at low latitudes.