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Inter-annual climatology of the wave-number four structures in the topside ionosphere as a subject of vertical coupling at mid and low latitudes by means of DMSP/SSIES and TIMED/SABER data

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This work examines major peculiarities in the inter-annual climatology of the so-called "wave-number four" (WN4) structures in the topside ionosphere at mid and low latitudes. For the period of declining solar activity 2002-2005, densities of major H+ and O+ ions as well as ion temperature data obtained at ∼840km altitude by "Special Sensor-Ion, Electron and Scintillations" (SSIES) instrument onboard DMSP-F13 and DMSP-F15 satellites are used. DMSP-F13, F15 satellites are on sun-synchronous orbit of operation since 1994 and 1999, respectively. Inter-annual climatology of the WN4 wave in the longitudinal distribution of O+, H and ion temperature Ti show remarkable seasonal stability in the longitudinal position of the wave crests within longitude sector with nearly zero magnetic declination (60°-100°). Reversely, throughout winter season and longitude zone with declination extrema wave peaks merge to reduce total number of wave crests. Thus, observed longitudinal behavior of the WN4 wave in the topside ionosphere is a major source of the winter minimum in the WN4 amplitude at these altitudes. Inter-comparison with annual behavior of the atmospheric temperature Tn at E-region height taken from TIMED/SABER data, show remarkable similarity in tidal climatology of DE3 and DE2 waves for the same period of observations.