

A study on the equinox asymmetry in the ionosphere based on global ionosonde measurements over decades

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We have investigated the equinox asymmetry in the ionosphere based on global ionosonde measurements over decades. The F2 layer peak density (NmF2) and its height (hmF2), and also the equivalent winds derived from ionosonde measurements (Liu et al., 2002) are analyzed in different solar conditions to identify their equinox asymmetry, i.e., the difference between spring equinox and fall equinox. At most stations, evident trends of equinox asymmetry are found in the F2 layer peak density and height from moderate to higher solar activities regardless of day and night. During daytime, the NmF2 in spring equinox can be over 1.3 times larger than in fall equinox, while during night, the former can be 1.6 times larger. Similarly, the F2 layer peak height is mostly higher in spring equinox than in fall equinox. During daytime, the difference between spring and fall in hmF2 is mostly between 10-20 km, and it can reach 30 km at some stations in solar maximum. During night, the equinox asymmetry of hmF2 is decreased by 5-10 km. Appreciable trend of equinox asymmetry in equivalent winds is only found during daytime while absent at night over most stations. At moderate solar activity, the magnitude of VEWs is consistently smaller by an average of around 5-10 m/s in spring than that in fall. An attempt is tried to explain the above equinox asymmetry by thermosphere dynamics, neural components and geographical asymmetry.