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Dynamics of non-migrating semidiurnal tides during spring and autumn

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Atmospheric tides play a key role in coupling different regions of the atmosphere. Thus, understanding their variability on different time scales is critical. However, most of the previous studies were based on single-point analysis techniques and therefore were subject to inherent spatiotemporal ambiguities. To overcome this ambiguity, this study uses the Whole Atmosphere Community Climate Model with thermosphere-ionosphere eXtension (WACCM-X) data with a horizontal resolution of 2.5° in longitude. We aim to investigate the seasonal variation of non-migrating semidiurnal tides (SW1 and SW3), particularly the spring and autumn transitions. The period of analysis is between 2009 and 2016. Their dynamics is compared with hourly mesospheric and lower thermospheric wind measurements recorded by five Specular Meteor Radars (SMR) from three different longitudinal sectors, namely east Asia, Europe, and America. These SMR sites are located at mid-latitudes at about 49±8.5° N. The winds were derived with a vertical resolution of 2 km. From this data, the 12 h period with wavenumber 1, 2, and 3 are filtered. The SMR data shows that SW1, which maximizes in winter, has not significative changes for its spring and autumn transitions. As expected, SW2 is the dominant component with minimum values in these seasons. On the other hand, SW3 maximizes for those same seasons. Interestingly, during autumn, SW2 and SW3 have comparable strength between each other. We discuss the strengths of these two last tides during autumn and its possible association to the October effect observed in very low frequency data. We also compare SW1 and SW3 dynamics with those obtained from WACCM-X and discuss their similarities and differences.