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# Propagation direction analysis of MSTIDs observed with TEC map using 3D spectral analysis method over North America

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We applied a novel three-dimensional spectral analysis method to GPS-TEC map over North America to study the propagation direction of daytime and nighttime MSTIDs. This method automatically calculates phase velocity spectrum and directionality of MSTIDs. We focus on the period of high MSTIDs occurrence, June-July 2006 for nighttime and November-December 2006 to study daytime MSTIDs. We divided the North America into west (100-130 deg W, 25-55 degN) and east (70-100 deg W, 25-55 deg N) part. Our results show MSTIDs propagations exhibit strong longitudinal variation as a function of local time and daily variation for both daytime and nighttime MSTIDs. The daytime MSTIDs dominant propagation direction is southward in the west and southeastward in the east part, respectively, with an average speed of 50-300 m/s. The local time variation shows that the MSTIDs activity peaks around 10-16 LT in west and 10-14 LT in east part. The combination of wind filtering and source location likely controls the propagation direction seen in longitudinal and local time variation. For nighttime MSTIDs, the nightly average of the spectrum in the west part shows that the propagation is shifted westward with a phase speed of 50-200 m/s. The magnetic declination (~20 deg E) seems affecting the orientation of the phase fronts, resulting in westward motion. In the east part, the average nightly spectrum shows that the dominant propagation is southwestward with a phase speed of 50-150 m/s. We do not see significant effect of magnetic declination (4 deg E-16 deg W) to propagation direction. The MSTIDs activity peaks around 20-02 LT and 20-00 LT for west and east part, respectively. We will discuss the results more in details during the presentation.