Geophysical Research Abstracts
Vol. 19, EGU2017-12702, 2017
EGU General Assembly 2017

A preliminary comparison of Na lidar and meteor radar zonal winds during quiet and sub-storm conditions

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It is speculated that sufficiently large electric fields during geomagnetic disturbed conditions may decouple the meteor trail electron motions from the background neutral winds and leads to erroneous neutral wind estimation. As per our knowledge, the potential errors have never been reported. In the present case study, we have been using co-located meteor radar and sodium resonance lidar zonal wind measurements over Andenes (69.27^{o}N,16.04^{o}E) during intense sub storms in the declining phase of Jan 2005 solar proton event (21-22 Jan 2005). In total 14 hours of continuous measurements are available for the comparison, which covers both quiet and disturbed conditions. For comparison, the lidar zonal winds are averaged in meteor radar time and height bins. High cross correlations ($\sim$0.8) are found in all height regions. The discrepancies can be explained in the light of differences in the observational volumes of the two instruments. Further, we extended the comparison to address the ionization impact on the meteor radar winds. For quiet hours, the observed meteor radar winds are quite consistent with lidar winds. While during the disturbed hours comparatively large differences are noticed at higher most altitudes. This might be due to ionization impact on meteor radar winds. At the present one event is not sufficient to make any consolidate conclusion. However, at least from this study we found some effect on the neutral wind measurements for the meteor radar. Further study with more co-located measurements are needed to test statistical significance of the result.