



The ionospheric disturbance dynamo investigated with CHAMP observations

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The energy and momentum input from the magnetosphere is most efficiently coupled into the high latitude Ionosphere-Thermosphere (IT) system. During disturbance periods the direct penetration electric field and the ionospheric disturbance dynamo are the two important coupling mechanisms from high latitudes to low latitude regions. The disturbance dynamo has been postulated many decades ago. But due to the sparseness of thermospheric wind measurements details of the phenomena could not be studied. In this study we focus on the ionospheric disturbance dynamo as observed by CHAMP during 2001 to 2005. During quiet times the zonal wind at equatorial regions exhibits a typical diurnal variation blowing westward at daytime and changing sign to eastward around 1500 LT. On a global scale the wind is deflected westward when propagating equatorward under the influence of the Coriolis force during magnetically disturbed periods. At high and subauroral latitudes, the westward zonal wind is strongly enhanced, and an enhancement of westward zonal wind (about 40 m/s) can be found at low latitudes between 00 to 06 local time (LT). At middle latitudes the westward enhancement occurs already around evening to early night hours. By applying a superposed epoch analysis it is shown that the disturbance dynamo needs 3-4 h to reach the equator. Based on CHAMP observations we try to illustrate the whole chain of processes from the solar wind driving to the ionospheric effects at lower latitudes.