

Estimating Daytime, Vertical ExB Drift Velocities from Ground-based Magnetometer Observations in the Peruvian Sector

The approach we have used to estimate the ΔH -inferred, daytime, vertical ExB drift velocity for the CETI days between March 1, 2007 and March 31, 2008 is described, briefly. In the paper by Anderson et al. (2004), we presented 3 techniques for determining the daytime, vertical ExB drift velocities in the Peruvian longitude sector. The simplest technique was the linear, least squares approach, where the ΔH values (Jicamarca-Piura H values) were compared with the JULIA (Jicamarca Unattended Long-term Ionosphere Atmosphere) radar measuring the 150 km daytime ExB drift values every 5 minutes between 0900 and 1600 LT. These comparisons were made between August, 2001 and December, 2003. There were approximately 270 days of observations. The other two approaches using these data sets were a multiple regression least-squares technique and a neural network technique. In the linear least-squares approach, we derived a slope for ΔH vs ExB drift for each month during this period. Figure 1 displays these slopes for the 27 months. Since this publication, we have also added slopes for Jan., 2004 through May, 2004.

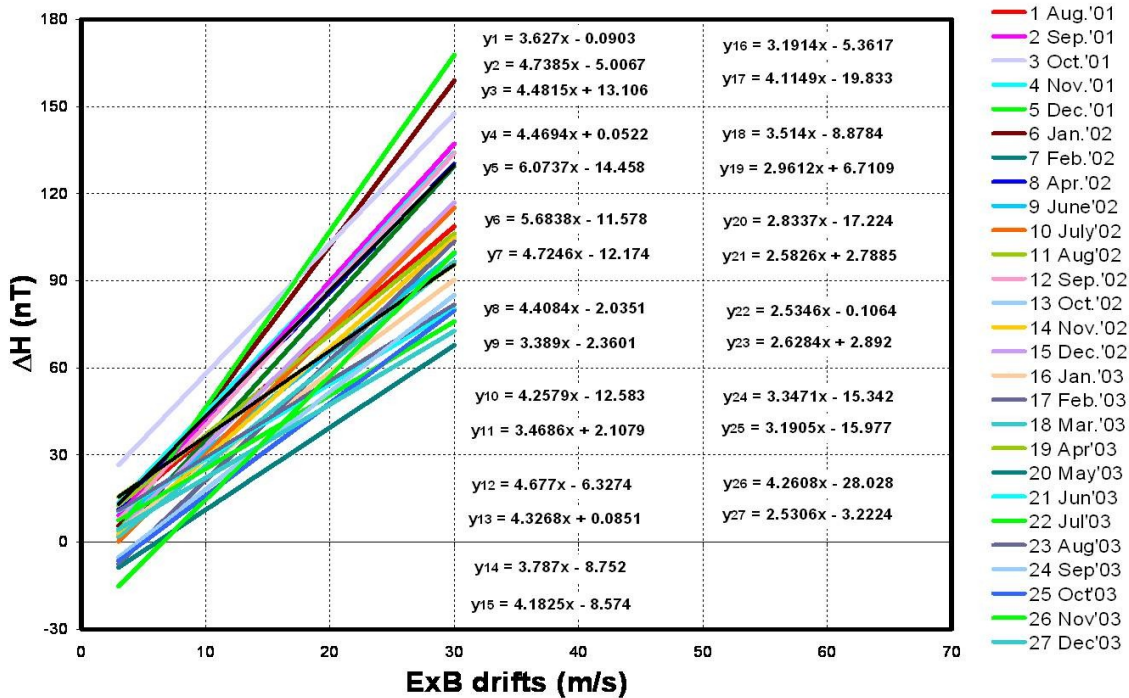


Figure 1. Monthly, linear least-square ΔH vs ExB drift values for the 27 months from Aug., 2001 through Dec., 2003

In order to determine the ExB drift velocity vs LT for the CETI period, we determined, for each month, the most appropriate slope for ΔH vs ExB drift by comparing the JULIA ExB drift

velocities with the ΔH -inferred ExB drifts for 2 or 3 specific days during that month and then adopted this slope for each of the days in that month. Figure 2 gives an example of this comparison for Oct. 8, 2007.

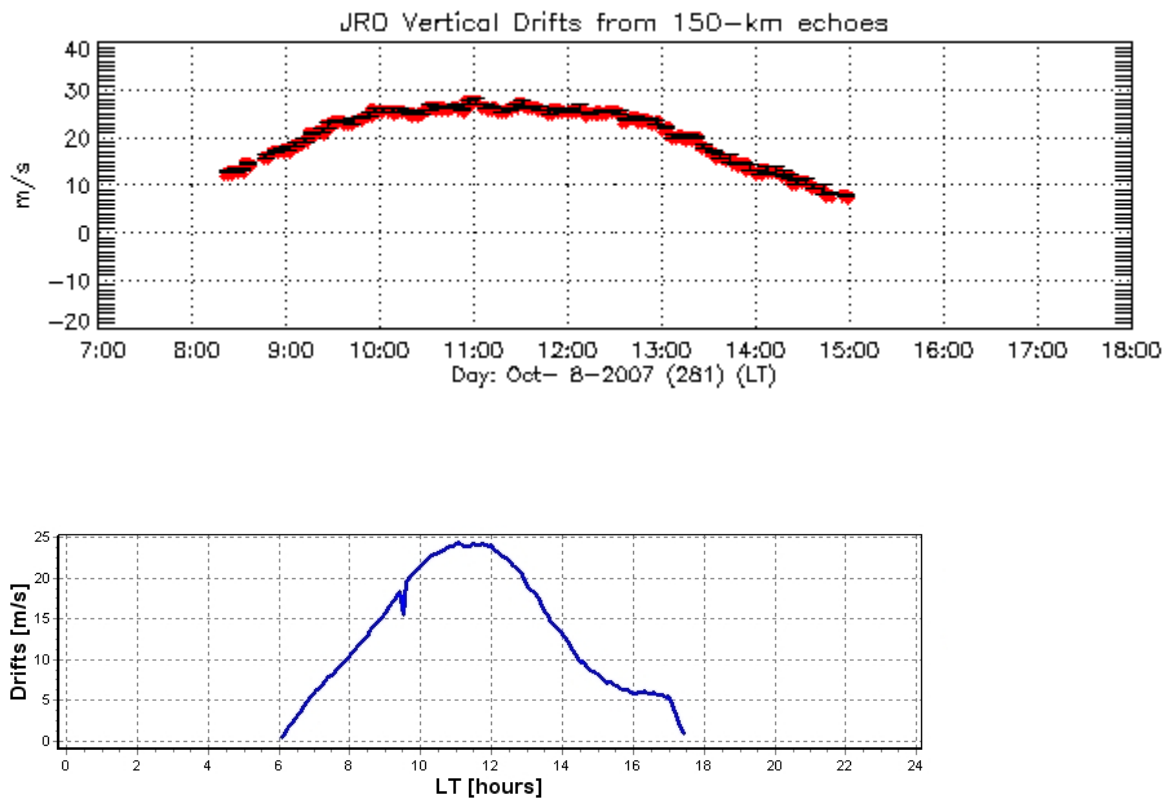


Figure 2. JULIA 150 km ExB drift velocities vs LT (top panel) and ΔH -inferred ExB drift velocities vs LT (bottom panel) on Oct. 8, 2007

For the CETI period, whenever there is an absence of ExB drift velocity on a particular day, this is due to an absence of magnetometer observations on that day. All days are included, independent of geomagnetic activity or daily A_p values.

Reference

Anderson, David, Adela Anghel, Jorge Chau, Oscar Veliz, (2004), *Daytime vertical ExB drift velocities inferred from ground-based magnetometer observations at low latitudes*, Space Weather 2, S11001, doi: 10.1029/2004 SW000095.