

Superposed epoch analysis of the thermosphere global time response to geomagnetic storms

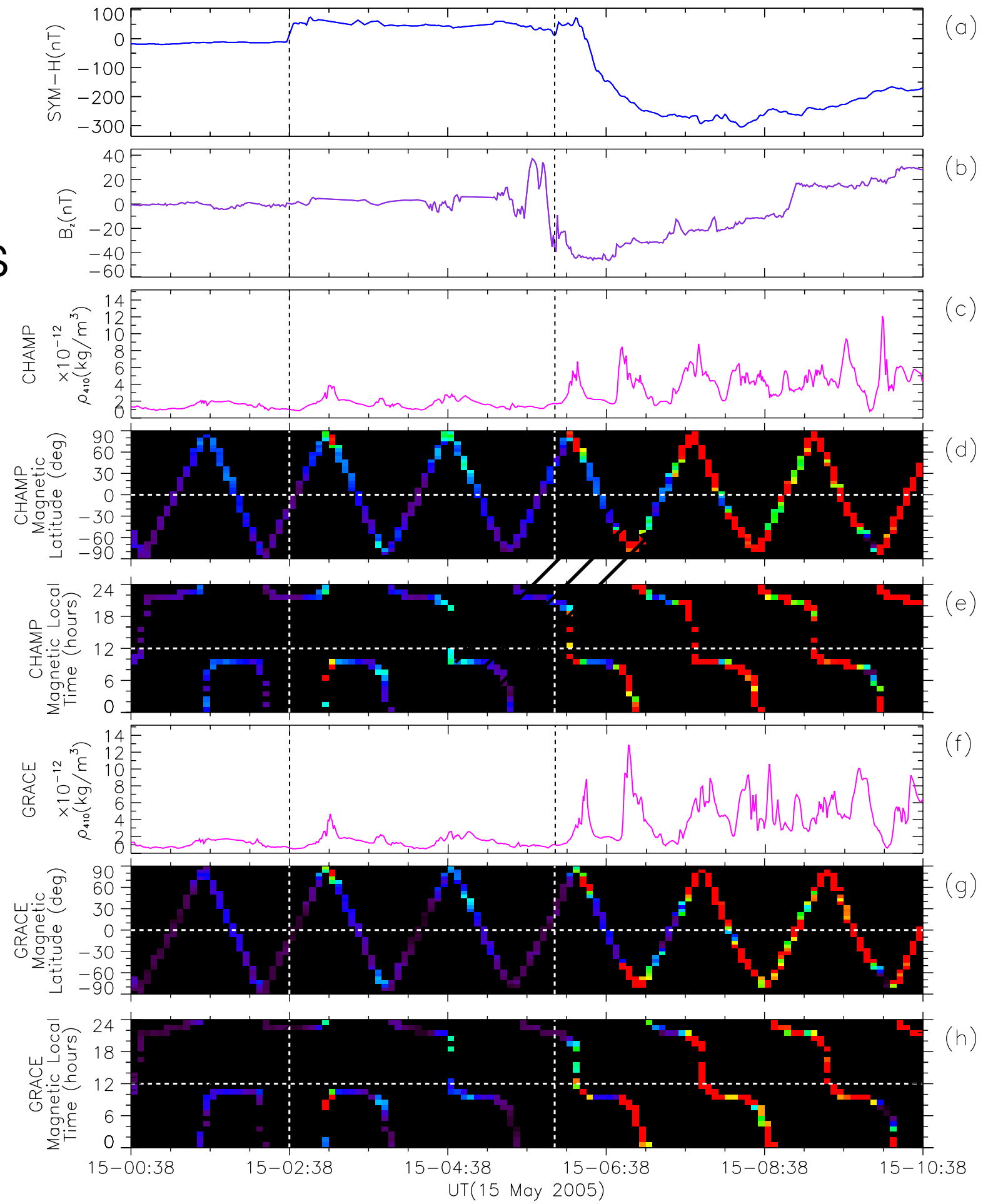
Denny M. Oliveira, Eftyhia Zesta, Peter W.
Schuck, Eric K. Sutton, Yong Shi



A NASA/GSFC and US Air Force Research
Laboratory collaboration

UT:
5-min bins

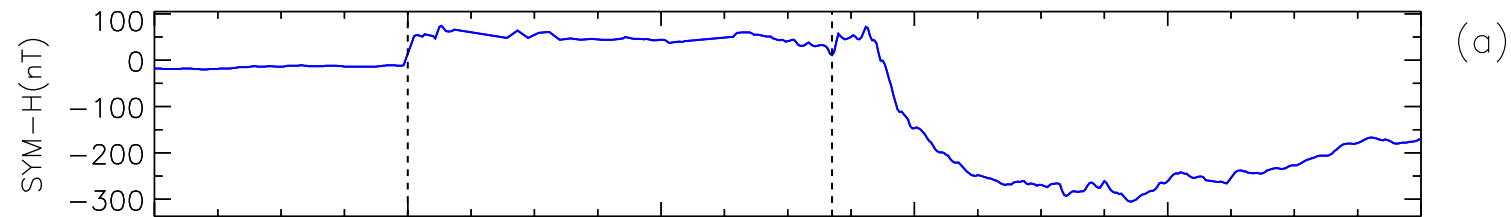
15 May 2005 Geomagnetic storm
Minimum SYM-H = -305 nT - CHAMP-GRACE/NRLMSISE00 Normalization @ 410 km



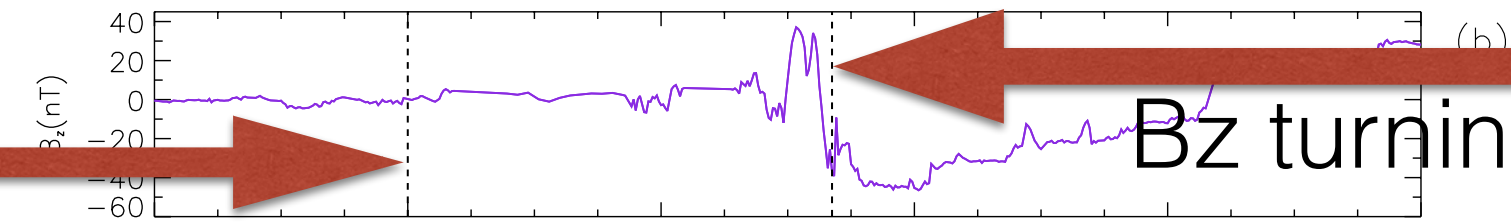
MLAT:
5-degree
bins

$$\rho_{410} = \rho_h \frac{\rho_{410}^{\text{MSIS}}}{\rho_h^{\text{MSIS}}}$$

15 May 2005 Geomagnetic storm
Minimum SYM-H = -305 nT - CHAMP-GRACE/NRLMSISE00 Normalization @ 410 km

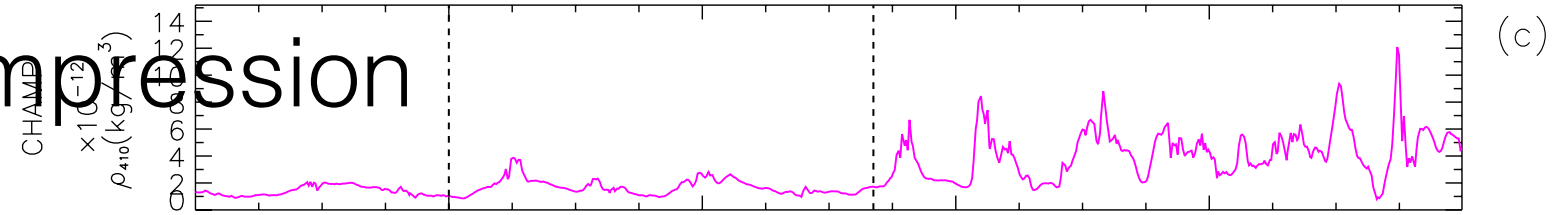


(a)

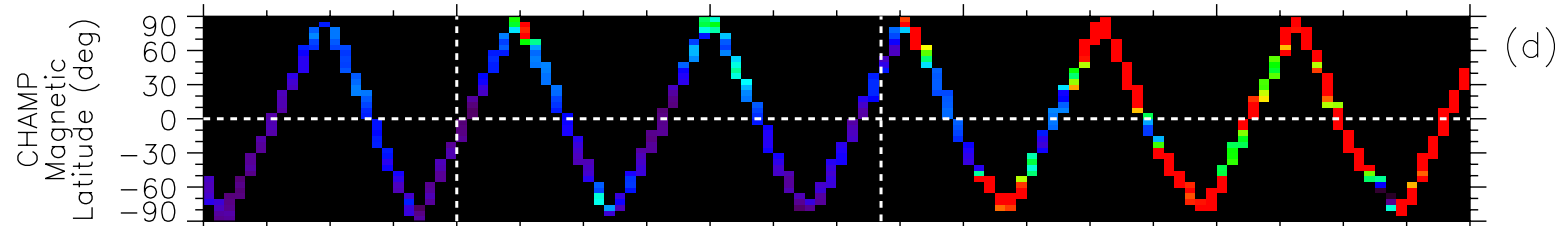


(b)

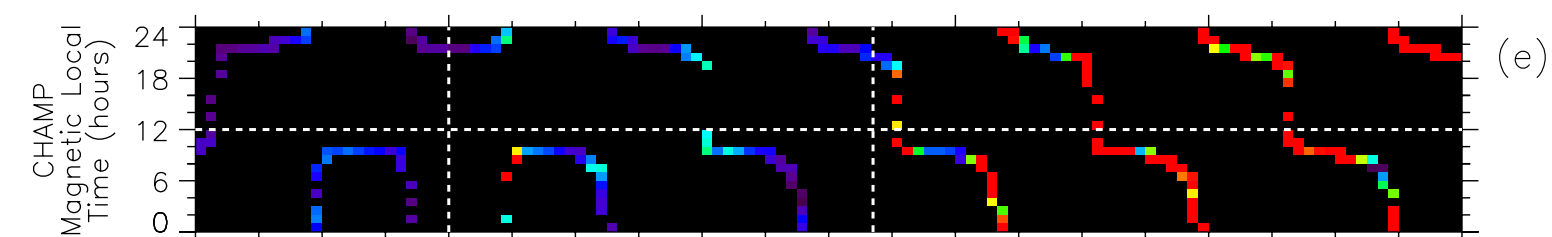
shock/compression



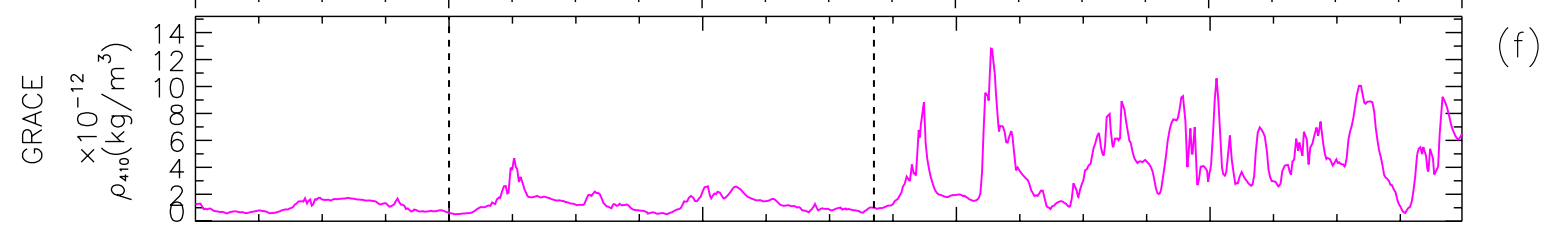
(c)



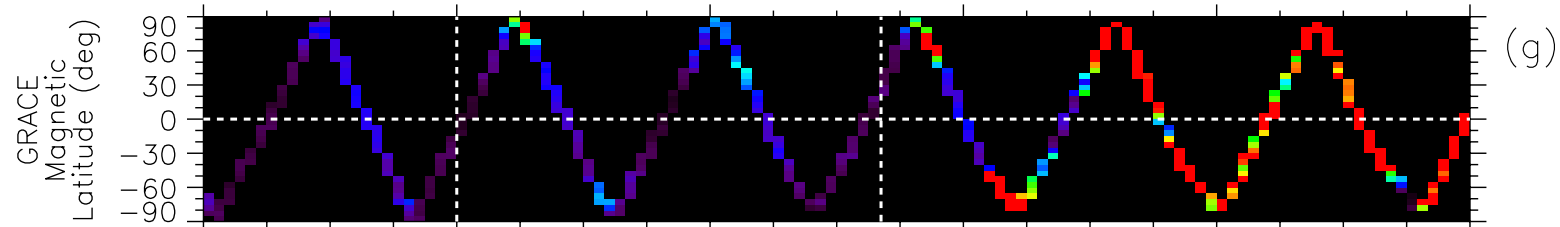
(d)



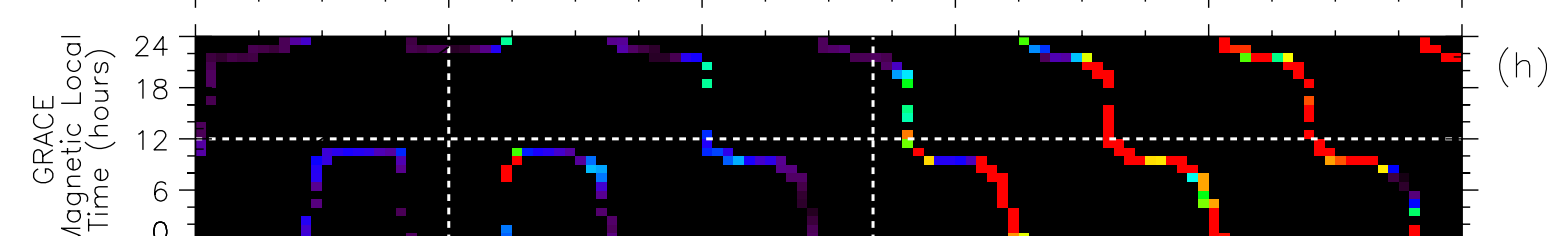
(e)



(f)

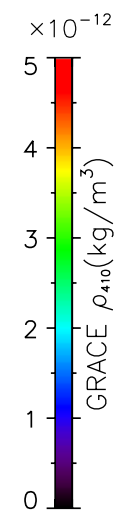
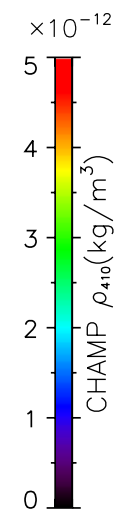


(g)

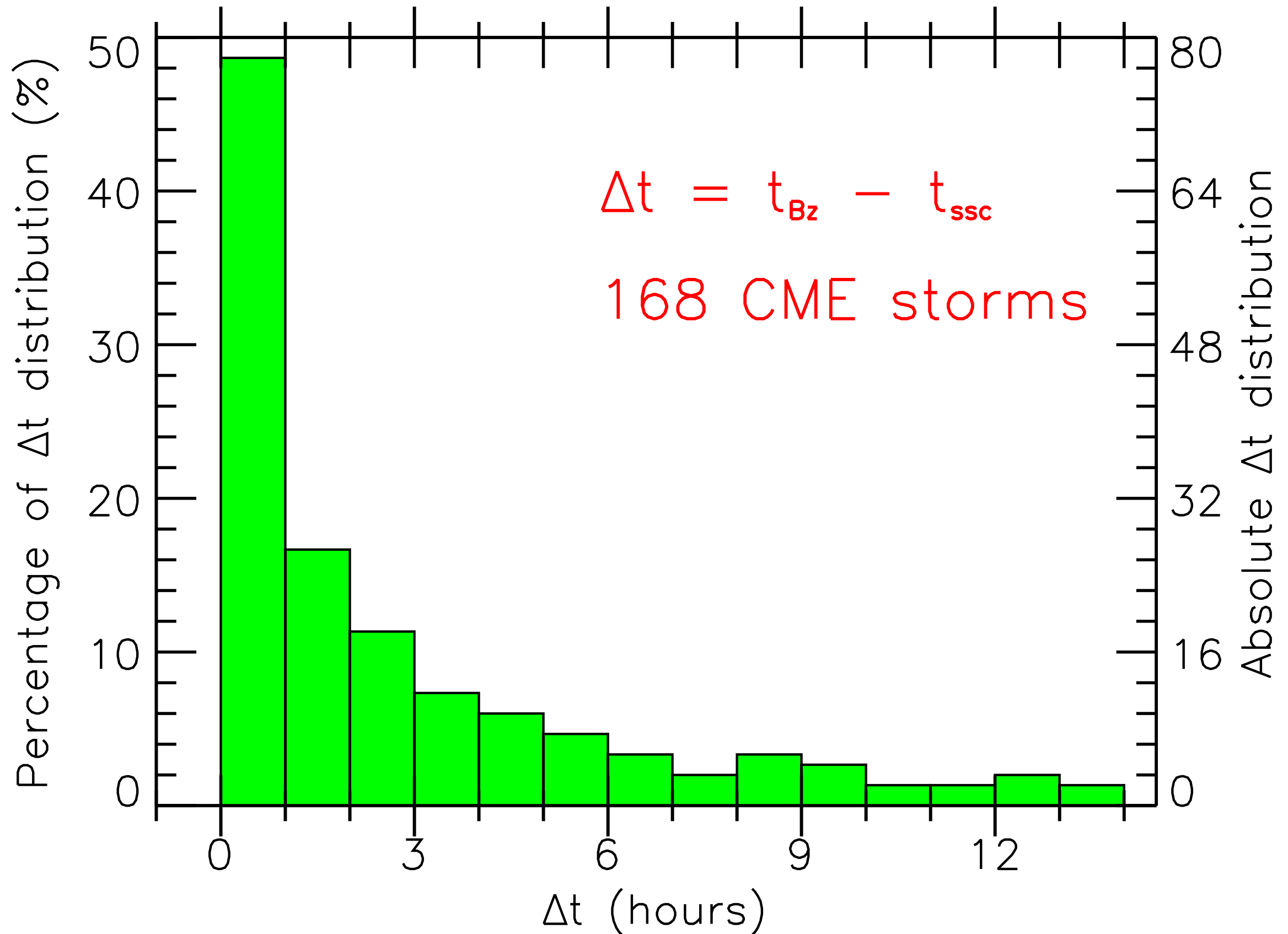


(h)

15-00:38 15-02:38 15-04:38 15-06:38 15-08:38 15-10:38
UT(15 May 2005)



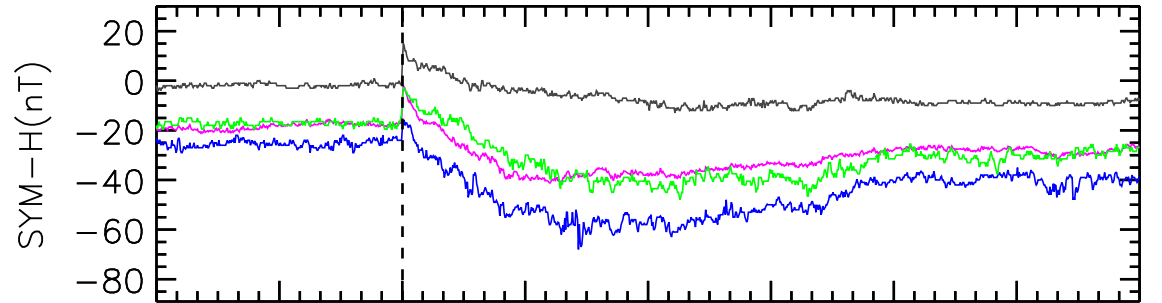
CME shock/sheath – magnetic structure time delay distribution



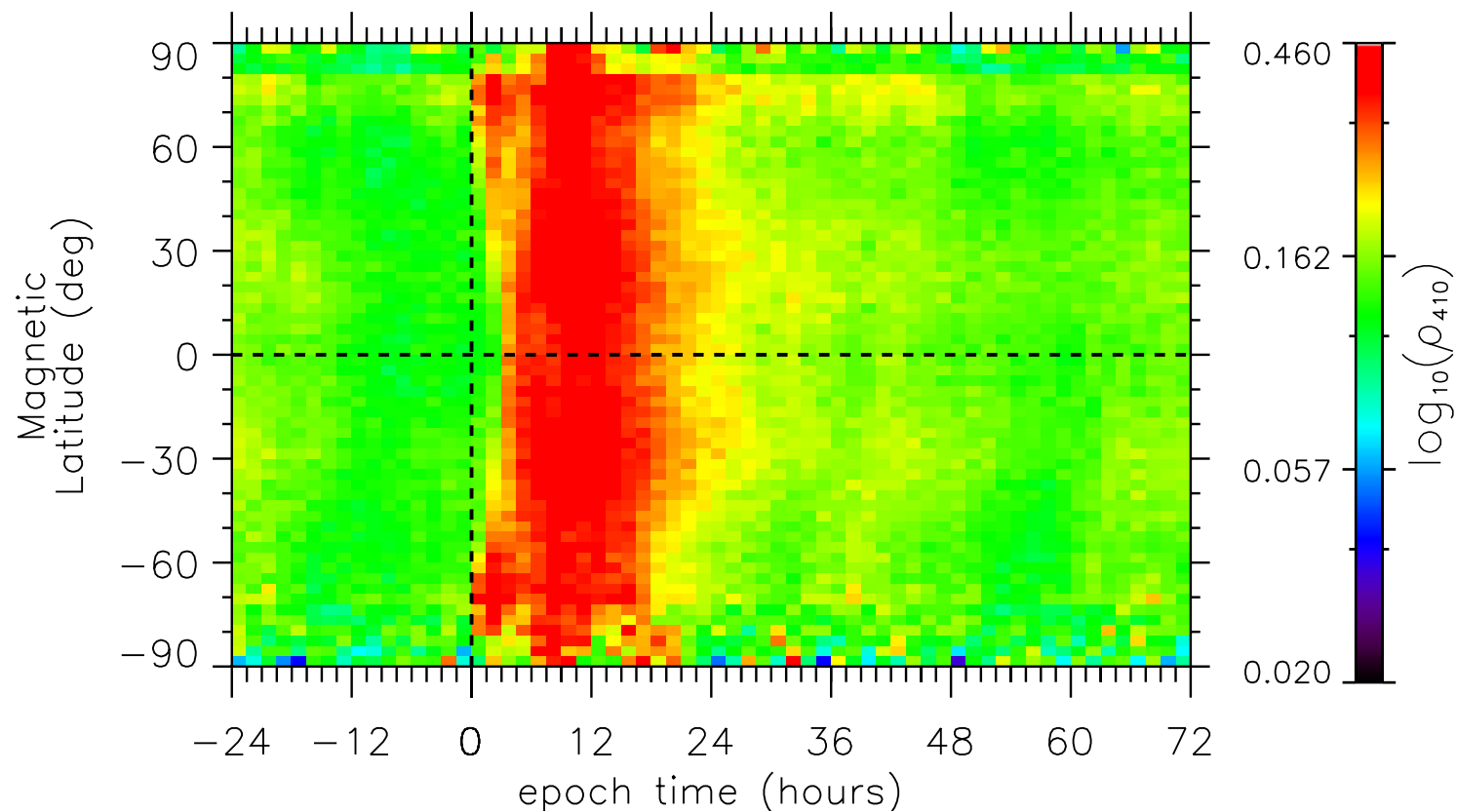
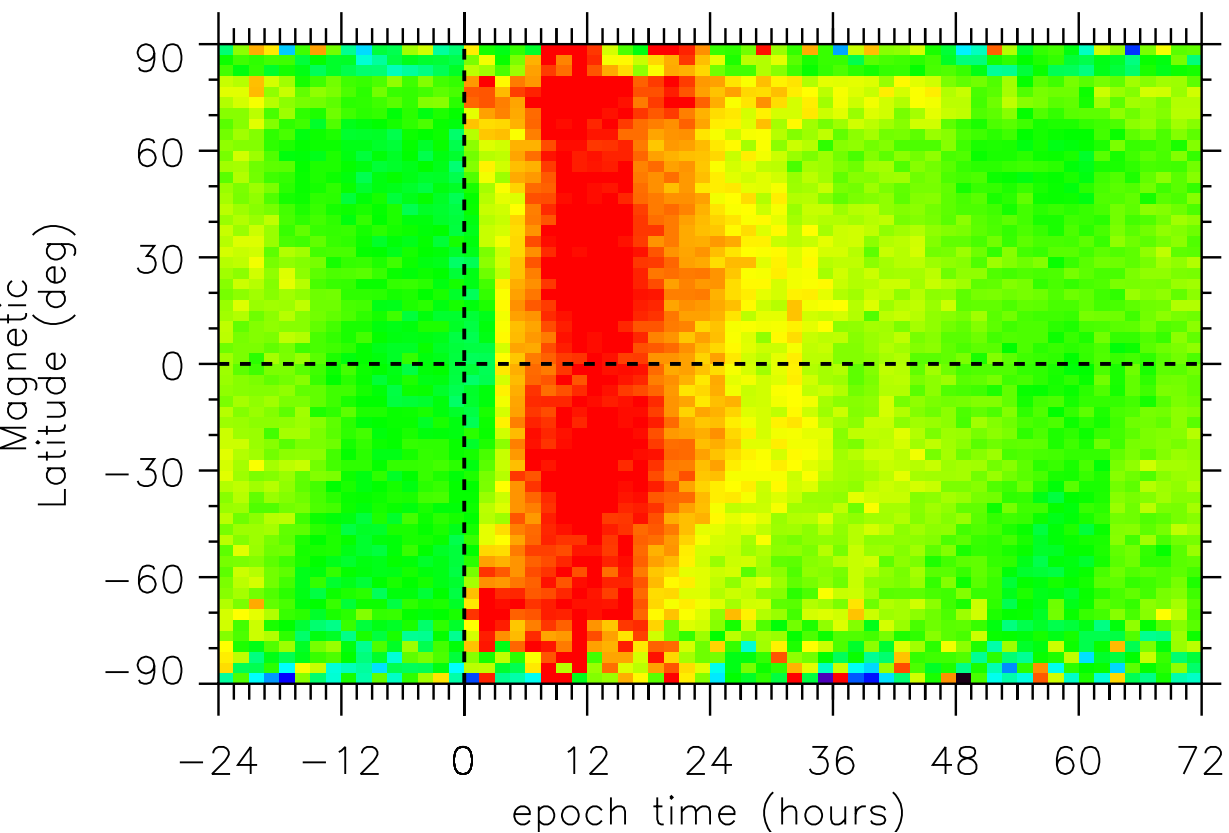
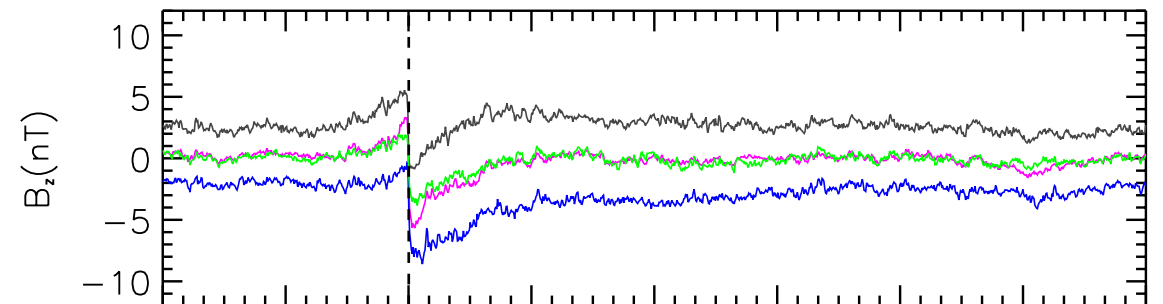
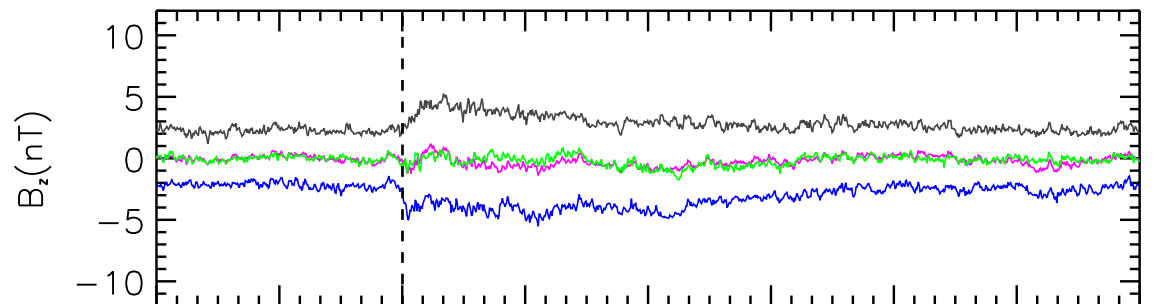
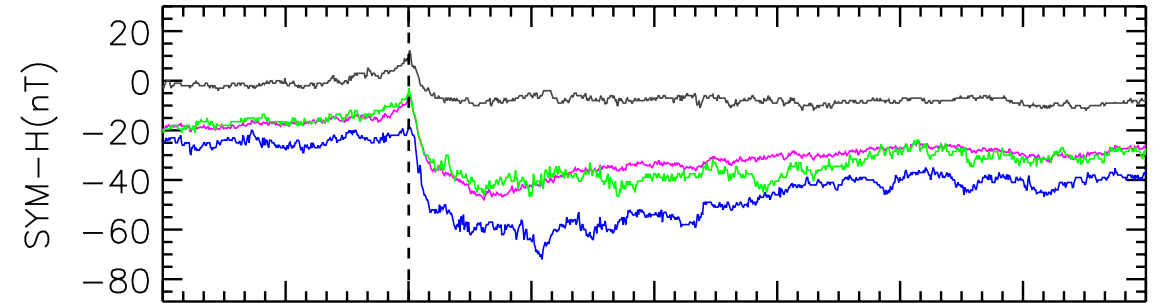
MLAT: 3- degree bins, Epoch time: 90-minute bins

CHAMP-GRACE/NRLMSISE00 Normalized Mass Density @ 410 km

Zero epoch time: Shock/compression time



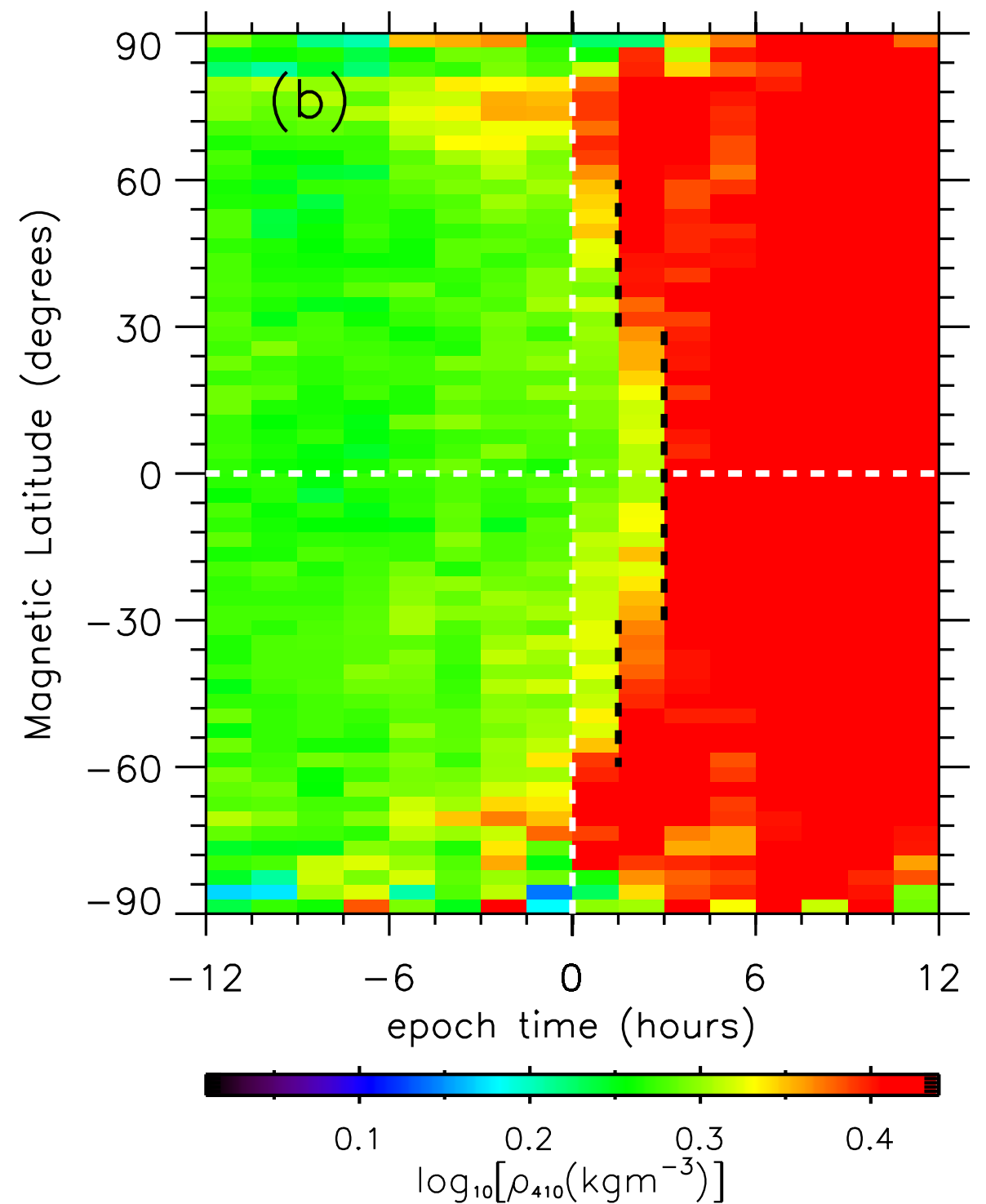
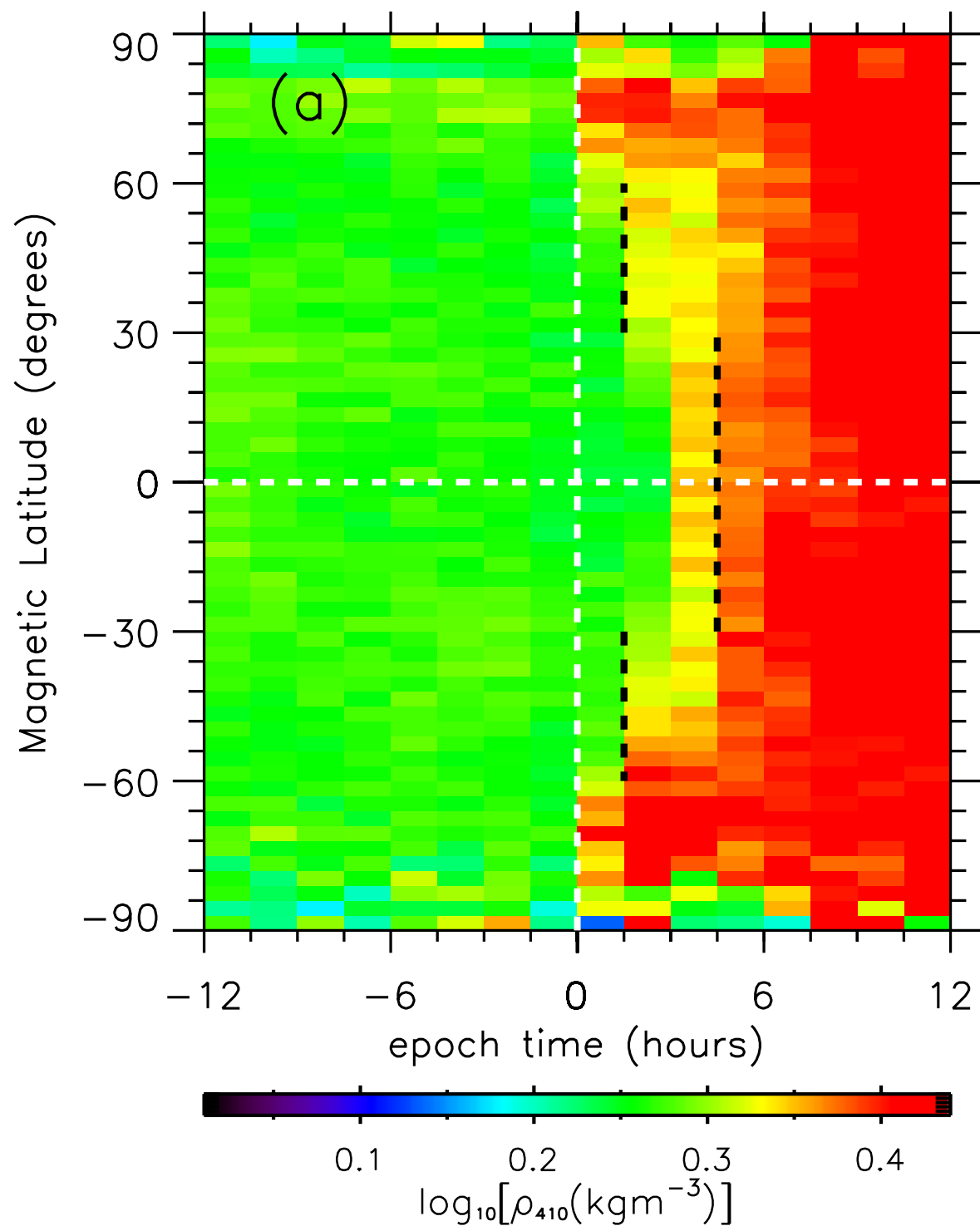
Zero epoch time: IMF B_z turning southward time



CHAMP-GRACE/NRLMSISE00 Normalized density @ 410 km

shock/compression zero epoch time

IMF Bz turning south zero epoch time



Questions:

Is the thermosphere energy input during storm times restricted only to high latitude regions (cusp and auroral zones)? Do lower local times contribute as well?

Do thermospheric density and Poynting flux enhancement coincide temporally and spatially during storms?