Definition of the mGSE Coordinate System used by EFW.

The mGSE coordinate system is a near GSE system for RBSP. Data in the Survey, Summary plot and the CDF files, as well as data presented at CDAWEB are presented in this coordinate system.

The purpose of this reference system is to allow experimenters to isolate the more accurately measured components of the electric field in the spin plane which are measured with the long booms from the less accurately measured electric fields measured with the short booms along the spin axis. We therefore avoid "mixing" good measurements with less good measurements.

Another one of the of the properties of this coordinate system is that if the spin axis points towards the sun, then the MGSE system is <u>exactly</u> the same as the GSE system. Generally speaking the mGSE system for RBSP will be about 20 degrees off the GSE system. So, for many people this is a somewhat intuitive coordinate system.

<u>**The formal definition of the mGSE system is provided below:**</u>

Here all vectors are expressed relative to the GSE coordinate system. So for example, Xmgse is the unit vector in the x direction in the mGSE system expressed in terms of the GSE system unit vectors. If S gse is the spin axis unit vector in GSE coordinates. Then:

(1) X mgse= S gse

(2) Y mgse = - (S gse x Z gse)/‖S gse x Z gse‖

So Y mgse is now in the spin plane and in the ecliptic plane and duskward (nearly the same as Ygse).

(3) Z mgse = (X mgse x Y mgse)

So Z mgse points in the spin plane nearly along the positive normal to the ecliptic.