Description of AMP_FIT code in IDL

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amp_fit_full
* Input data definition – (i) location and dBs in Cartesian GEI cords
(ii) each satellite has orbit track identification
(iii) data quality flags
(iv) no spatial data gaps – along track direction

* Set analysis parameters – widget or command line
* Times for Start Hr and End Hr are in decimal UT time

calls read_ampere_data_full
read_ampere_ncdf - Read netCDF input AMPERE data file provided by Lars
Define input data structure
Select data subset based on sHr, eHr – select whole sphere of data
Populate data structure of
utc, quality, splice etc.
GEI locations in XYZ
GEI dBs in XYZ
GEI (r,thet, phi)
GEI dB in spherical cords
amp_trk_lab Check for mislabelled orbit tracks
ampere_get_rotmat_full:
calc track intersection point, SVD on parabola track shape
calc rotation matrix from GEI pole to intersection point
ampere_shift_data: rotate position and vector data
Sort data along track (to allow along track spatial check)
Check for points within 1 deg of poles (Nth and Sth)
Calc great circle eqn for each track to identify and mark strays
ampere_ghost_calc: ensure Nyquist for longitude is Ok
If debug, then plot input and shifted data dBs

ampere_setupSHFns_full (given k,m)
Calc number of basis ftns
Loop in m (0->maxM)
Calc Legendre function and derive
Normalise and add r-dependence (has r, thet, phi)
Calc spherical harmonics and derivs
Form basis function array [2x2]
Solve for coeffs using dB_th,dB_ph
Mult coeffs by basis set = estimated data at input locations
Calc rms error of fit

North hemisphere: aacgm_grid (aacgm not defined equatorial regions)
Calc uniform grid in aacgm Lat, Lon based on nLat and nLon
Conv this grid to GEOG coords [Lat, Lon]
Conv these to GEOG XYZ
Conv these to GEI XYZ
Conv these to GEI (r, thet, phi)
Exit aacgm_grid -> back to amp_fit

ampere_shift_coord
Calc shifted GEI locations from uniform AACGM grid

ampere_setupSHFns_full (given k,m)
    Calc basis functions over uniform shifted GEI grid for Nth hemisphere
Calc jPar at uniform grid locations using coeffs x basis set
Calc dBs at uniform grid locations

ampere_shift_vec
    Reverse rotate the dBs and cords

geiVec_to_aacgmVec
    Take data to AACGM components (get all possibilities)

Write data to output files (GRD, IRD)

Repeat for South Hemisphere
    aacgm_grid
    ampere_shift_coord
    ampere_setupSHFns_full
    ampere_shift_vec
    gei_to_aacgmVec
    output GRD, IRD data

Repeat for whole sphere (no aacgm step in here)

Finished