SPEDAS 4.0 Release Notes

- Enhancements and Bug Fixes
  - Added support for IGRF-13 field model, now used when transforming to/from GSM coordinates
  - Added interactive highlight_time_interval tool, for shading or cross-hatching selected time intervals in tplot
  - Extended valid range for isdaylightsavingtime utility
  - Updated SPICE standard SP planetary kernel to de438.bsp, updated time_ephemeris routine to reflect no leap second in 2020
  - Added option for alternate data source in noaa_load_kp routine
  - Added nmorlet and kermition_k options to wavelet analysis tool
  - Added more robust parameter handling to tplot_fill_color.pro
  - Added CDF compression info to cdf_info.pro
  - Enhanced DEPEND_1 metadata handling in cdf_info_to_tplot.pro
  - Added support for GET_VARBLOCKINGFACTOR in cdf_info.pro for IDL versions 8.6.1 and later
  - Improved support for varying-cadence data in wavelet routine wav_data.pro
  - Improved handling of negative spikes, added subtract_average and use_nn_median options to clean_spikes.pro
  - Improved support for handling integer data in deriv_data.pro
  - Enhanced store_data.pro to check for invalid characters in variable names and replace with dollar signs
  - Added support for aacgmidl_v2 external library, coefficient tables
  - Added “window=-1” option to makepng.pro, to make PNGs from all open windows
  - Enhanced cdf_info_to_tplot routine to ignore blank UNITS attributes
  - Added support for spectra variables in hapi_load_data routine
  - Enhanced curve fitting routine fit.pro
  - Added support for “smex_epoch” keyword to cdf2tplot and cdf_info_to_tplot
  - Fixed a crash in spd_flipbookify routine when there isn’t a tplot window
  - Fixed file_http_copy routine to avoid crashing in Linux and Mac environments when trying to set socket parameters in HTTP requests
  - Added support for SPEDAS_DATA_DIR environment variable
  - Tested for compatibility with version 10.6 of the GEOPACK library (including IGRF-13 updates), now recommending this GEOPACK version for SPEDAS users
  - Fixed integer truncation bug in dynamic power spectrum routine
  - Added support for perpendicular bulk velocity subtraction in slice_2d routine
  - Corrected obsolete SPDF hostname in some plugin initialization routines
- Plugin updates
  - MMS
    - Fixed bug that leads to "Service not found." errors when downloading MMS data from the SDC
    - Added new tools for identifying Science Region of Interest (SRoI) segments

        - Added routine and examples for MMS LMN transformations
        - Added functionality to include various types of vectors in MMS formation plots
        - Several more bug fixes and improvements to the MMS routines, crib sheets and test suite
    - ERG (ARASE)
        - Updated to plugin version 8.10 from Arase development team
    - THEMIS
        - Updated FGM wave survey code to use 8Hz FGL data when available
        - Updated THEMIS summary plot routines to use alternate sites for keogram panel, and avoid crashing if no keogram data is available
        - Added site name as subtitle to keogram panels in summary plots
        - Updated ground computed moments to use spd_download rather than file_retrieve
        - Improved degapping performance of SCM calibration routine (avoid dropping second half of burst for a small data dropout)
        - Added routine contributed by Toshi Nishimura to compute densities from spacecraft potential
        - Bug fix to keogram calibrations (fixes non-monotonic magnetic latitudes in calibrated products)
    - POES
        - Set default duration of POES summary plots to 1 day
    - MICA
        - Added load routines and crib sheets for working with MICA induction magnetometer data
    - CLUSTER
        - Added GUI plugin, command line load routine, and crib sheet for loading CLUSTER data from CDAWeb
    - ICON
        - Updated ICON crib sheets to reflect data availability during test phase
    - WIND
        - Added support for WIND 3dp load routine to get metadata from master CDF file
    - FAST
        - Removed obsolete k0_load functions, fixed fa_k0_load and istp_fa_load_k0 routines
        - Added crib sheet for finding density, velocity, etc. from FAST ESA L2 data

- Experimental Features
    - Added support for Chris Piker's DAS2 library and DLM, enabling use of DAS2 servers to download data
    - Added prototype load routines and crib sheets for loading Cassini, Juno, and Galileo data via DAS2