IDL KT17 DLM

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Introduction

The IDL KT17 DLM is a Dynamic Link Module (DLM) for the Interactive Data Language (IDL) by L3Harris Geospatial Solutions, Inc. The DLM provides access to the Korth-Tsyganenko 2017 (KT17) magnetic field model for Mercury's magnetic field. The model is based on techniques developed by N. A. Tsyganenko for Earth-based magnetic field models and was fit to data acquired by the MESSENGER Magnetometer. The algorithms are described in Korth et al. (2015, 2017) and the reference source code for this library is included in this archive.

Installation

The IDL KT17 DLM consists of the files idl_kt17.dlm and idl_kt17.dll. For installation, simply copy the above three files into the IDL executable directory, or into a directory in the search path of the IDL system variable !DLM_PATH.

Implemented Routines

1. KT17_HELP
   Description: Show version, copyright, and list of commands with parameters.
   Calling sequence: KT17_HELP
   Keywords: None

2. KT17_RESET
   Description: Set model parameters to default values.
   Calling sequence: KT17_RESET
   Keywords: None

3. KT17_SETPAR
   Description: Set model parameters.
   Calling sequence: KT17_SETPAR, rhel, act
   rhel: Mercury's heliocentric distance in astronomic units [AU]
   act: Magnetic Disturbance Index, see Anderson et al. (2013)
   Keywords (modification of parameters result in deviation from best fit of MESSENGER data):
   mu: Mercury's magnetic moment
   rdz: Offset from center of planet of Mercury's magnetic moment along spin axis
   tamp1: Amplitude of taildisk module
   tamp2: Amplitude of tailslab module

4. KT17_SETMPTOL
   Description: Tolerance for magnetopause encounter.
   Calling sequence: KT17_SETMPTOL, mptol
      mptol: Tolerance value, the default value is 1.0e-3
   Keywords: None

5. KT17_BFIELD
   Description: Compute model field at given location; the default coordinate system is MSO.
   Calling sequence: KT17_BFIELD, x, y, z, bx, by, bz
      x, y, z: Model location
      bx, by, bz: Model magnetic field at location
   Keywords:
      id: output indicating whether location is inside or outside the magnetopause
      mode: 0 (dipole + taildisk + tailslab), 1 (dipole), 2 (taildisk), 3 (tailslab)
      msm: Use MSM coordinates instead of MSO
      noshield: disable magnetopause shielding
      psun: intended for case of tilted dipole; not needed for Mercury

KT17_TRACE
   Description: Trace magnetic field line; the default coordinate system is MSO.
   Calling sequence: KT17_TRACE, xi, yi, zi, dir, xf, yf, zf
      xi, yi, zi: Initial position from which the field line is traced
      dir: Trace direction: -1 for parallel to B vector, +1 for anti-parallel to B vector
      xf, yf, zf: Foot/end point of field line
   Keywords:
      dsmax: upper limit on the trace step size
      err: Permissible step error
      r0: Minimum trace distance
      rlim: Maximum trace distance
      fline: [fldim,3] array containing the field line coordinates.
      mode: 0 (dipole + taildisk + tailslab), 1 (dipole), 2 (taildisk), 3 (tailslab)
      msm: Use MSM coordinates instead of MSO
      noshield: disable magnetopause shielding
      nrev: maximum number of allowed trace direction reversals in radial direction
      quiet: suppress information messages

License

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Version History

v1.0: Initial release.

References

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