

SET HASDM DENSITY DATABASE

November 26, 2020

BACKGROUND. For a number of years, the U.S. and international space science communities have been interested in utilizing the unclassified HASDM (U.S. Air Force High Accuracy Satellite Drag Model) atmosphere densities derived real time from accurate radar observations of multiple calibration satellites. Space Environment Technologies (SET) has produced an archive of those data from 2000/01/01 – 2019/12/31. This archive, generated by Bruce Bowman of SET, covers two full solar cycles of historical HASDM density with 3-h time resolution, 10°×15° latitude/longitude bins, and 25 km steps between 175 and 825 km. Also provided are yearly plots of density standard deviations as a function of altitude.

With the full two solar cycle density database, SET offers to agencies and academia no-charge access to the historical HASDM density data. These neutral mass densities are the “gold standard” baseline for the upper atmosphere, especially during geomagnetic storm periods. Physics-based models can compare their results with these densities. Out of this work we believe much better operational space track models relevant to space traffic management and conjunction analysis can be developed.

SET DATABASE USE AGREEMENT. The SET HASDM Database information is freely accessible to the international science community for research purposes only. It is provided at no charge as a public service by SET with the aim of encouraging improvement to models of the Earth’s thermosphere. This Database is produced, owned, and managed by Space Environment Technologies (SET). The user of this Database is granted a restricted, non-exclusive license to use these data for research purposes only. Commercial uses are permitted only through an explicit agreement with SET.

WARRANTY. The SET HASDM Database is furnished “AS IS.” SET makes NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

CITATION. SET HASDM Database information should be referred to as ‘Courtesy of the SET HASDM Database’.

DATA FORMAT. The SET HASDM database file format is the following:

Data line format:

FORMAT(I5,3I5,F7.3,F15.6,F9.2,F7.2,2F8.2,E12.4,3F8.0,F10.4)

Data line variables:

IYR,IYDAY,IHR,IMIN,SEC,D1950,HTM,XLT,XLAT,XLON,RHO

All times are UTC:

IYR = year
IYDAY = day of year (1 through 366)
IHR = hour of day
IMIN = minutes of hour
SEC = seconds of minute
D1950 = days since 0 Jan 1950
HTM = altitude above EGM-96 (km)
XLT = local solar time (hour)
XLAT = geocentric latitude (deg)
XLON = geographical longitude (deg)
RHO = HASDM density (kg/m3)

Added fields for test file:

IYR,IYDAY,IHR,IMIN,SEC,D1950,HTM,XLT,XLAT,XLON,RHO,F10,F10B,ap,DDAY
F10 = daily flux (delayed by 24 hr)
F10B = mean flux (90-day post average)
ap = 3-hour ap (delayed by 6 hrs)
Day = Day of year with fraction of day

FOR MORE INFORMATION. Please contact data@spacewx.com