

Data format of ISS-IMAP's EUVI_loc file

A. Saito^{*1} I. Yoshikawa^{*2}

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EUVI_loc is the location data file for Extreme Ultra Violet Imager (EUVI) instrument of the ISS-Ionosphere, Mesosphere, upper Atmosphere, and Plasmasphere mapping (ISS-IMAP) mission. It contains the information of the coordinates of the location where each EUVI pixel observed, and location of the International Space Station (ISS). The altitude of the emission layer of the ion resonant scattering is fixed.

1 File name

One EUVI_loc file contains the location data for one observation of EUVI. Nomenclature of EUVI_loc file is as follows:

IMP_EU_YYYY-MM-DD-hhmmss_T_loc.nc

YYYY: Year of the observation start time in UT

MM: Month of the observation start time in UT

DD: Day of the observation start time in UT

hhmmss: Hour, Minute and Second of the observation start time in UT

T: Telescope of EUVI

For example, name of EUVI_loc file for the observation of Telescope A, 30.4nm, which started at 01:05:25UT on December 20 in 2012 is:

IMP_EU_2012-12-20-010525_A_loc.nc

^{*1} Kyoto University: saitoua@kugi.kyoto-u.ac.jp

^{*2} University of Tokyo: yoshikawa@k.u-tokyo.ac.jp

2 Data file format

EUVI_loc is in the format of netCDF (Network Common Data Format) version 4/HDF (Hierarchical Data Format) version 5.

3 Data

3.1 Attributes

Several attributes are defined in EUVI_loc file. "MISSION" is the identifier of the mission. It is set as "ISS-IMAP" for all of the ISS-IMAP data. "DATA" is the identifier of the data type. It is set as "EUVI Location (loc)" for all of the EUVI_loc files. "Version" is the version number of the EUVI_loc data. "CONTACT" is the e-mail address of the contact persons on the EUVI_loc files. "TELESCOPE" is identifier of the telescope. "A [He+: 30.4nm]" or "B [O+: 83.4nm]" is specified. "DATE" is the date of the observation start time in UT in the format of "YYYY-MM-DD". "START_TIME_SEC" is the second of the day of the observation start time in UT. "EXPOSURE_TIME_SEC" is the exposure time in second. "MAPPING_HEIGHT_KM" is the altitude of the emission layer of the ion resonant scattering in kilometer. That is used to calculate the observed location.

Table 1. Example values of attributes in EUVI_loc

Attribute	Example value
MISSION	"ISS-IMAP"
DATA	"EUVI Mapping Location (Loc)"
Version	1.0
CONTACT	"yoshikawa@k.u-tokyo.ac.jp saitoua@kugi.kyoto-u.ac.jp"
TELESCOPE	"A [He+: 30.4nm]"
DATE	"2012-12-19"
START_TIME_SEC	86250
EXPOSURE_TIME_SEC	60
MAPPING_HEIGHT_KM	800

3.2 Dimensions

Several dimensions are defined in EUVI_loc file. "DIM_XYZ" is 3 for the Cartesian coordinates. "NUM_X_PIX" is the number of pixels of the EUVI image along the x-axis. This is 128 for all the EUVI observations. "NUM_Y_PIX" is the number of pixels of the EUVI image along the y-axis. This is 128 for all the EUVI observations. The observed

data is two-dimensional image whose size is "NUM_X_PIX" pixel $\times$ "NUM_Y_PIX" pixel.

Table 2. Values of dimensions in EUVI_loc

Dimension	Example value
DIM_XYZ	3
NUM_X_PIX	128
NUM_Y_PIX	128

3.3 Data arrays

EUVI_loc file contains several data arrays. "ISS_LATI", "ISS_LONGI" and "ISS_ALTI" are the geographic coordinates of the ISS location in WGS-84. The units are, degree, degree and kilometer, respectively. "ISS_LATI" in the northern hemisphere has positive value, and in the southern hemisphere has negative value. "ISS_LONGI" in the eastern hemisphere has positive value, and in the western hemisphere has negative value. "ISS_XYZ" is the geographic coordinates of the ISS location in kilometer. "LOC_LATI" and "LOC_LONGI" is the geographic coordinates of the observed location of EUVI's each pixel. The observed location is the point where the line-of-site of each pixel crosses the plane in the "MAPPING_HEIGHT" altitude.

Table 3. Data arrays in EUVI_loc

Name	Type	Dimension	Unit
ISS_LATI	float	(1)	Degree
ISS_LONGI	float	(1)	Degree
ISS_ALTI	float	(1)	km
ISS_XYZ	float	(3)	km
LOC_LATI	float	(NUM_X_PIX, NUM_Y_PIX)	Degree
LOC_LONGI	float	(NUM_X_PIX, NUM_Y_PIX)	Degree

4 Reference

Yoshikawa, I., T. Homma, K. Sakai, G. Murakami, K. Yoshioka, A. Yamazaki, T. Sakanoi and A. Saito, Imaging Observation of the Earth's Plasmasphere and Ionosphere by EUVI of ISS-IMAP on the International Space Station, IEEJ Trans. on Fundamentals and Materials, vol. 131, 12, 1006-1010, doi: 10.1541/ieejfms.131.1006, 2011.