Data format of ISS-IMAP's EUVI_LOS file

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EUVI_LOS is the line-of-sight 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 line-of-site vector for each EUVI pixel, and location of the International Space Station (ISS).

1 File name

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

IMP_EU_*YYYY–MM–DD–hhmmss*_*T*_LOS.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_LOS 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_LOS.nc

2 Data file format

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

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3 Data

3.1 Attributes

Several attributes are defined in EUVI_LOS 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_LOS files. “Version" is the version number of the EUVI_LOS data. “CONTACT" is the e-mail address of the contact persons on the EUVI_LOS 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.

Table 1. Example values of attributes in EUVI_LOS

Attribute	Example value
MISSION	“ISS-IMAP"
DATA	“EUVI Line-Of-Sight (LOS)"
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

3.2 Dimensions

Several dimensions are defined in EUVI_LOS 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 × “NUM_Y_PIX" pixel.

Table 2. Values of dimensions in EUVI_LOS

Dimension	Example value
DIM_XYZ	3
NUM_X_PIX	128
NUM_Y_PIX	128

3.3 Data arrays

EUVI_LOS 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. “X_AXIS", “Y_AXIS" and “Z_AXIS" are the unit vector of the direction of the EUVI image's three axes in the geographic coordinates. “X_AXIS" is the horizontal axis of the EUVI image, and “Y_AXIS" is the vertical axis. “Z_AXIS" is the determined to satisfy the right-handed coordinate system. “LOS" is the unit vector of line-of-sight for each EUVI pixel in the geographic coordinates.

Table 3. Data arrays in EUVI_LOS

Name	Type	Dimension	Unit
ISS_LATI	float	(1)	Degree
ISS_LONGI	float	(1)	Degree
ISS_ALTI	float	(1)	km
ISS_XYZ	float	(3)	km
X_AXIS	float	(3)	Unit vector
Y_AXIS	float	(3)	Unit vector
Z_AXIS	float	(3)	Unit vector
LOS	float	(DIM_XYZ, NUM_X_PIX, NUM_Y_PIX)	Unit vector

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.