Data format of ISS-IMAP's VISI_LOS file

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VISI_LOS is the line-of-sight data file for Visible-light and Infrared Spectrum Imager (VISI) 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 VISI pixel, and location of the International Space Station (ISS).

1 File name

One VISI_LOS file contains the location data for one consecutive observation of VISI in the same observational mode. Nomenclature of VISI_LOS file is as follows:

IMP_VI_*YYYY–MM–DD–hhmmss*_*MOD*_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
MOD: Observational mode of VISI

For example, name of VISI_LOS file for the observation in P07 mode, which started at 13:40:05UT on December 14 in 2012 is:

IMP_VI_2012–12–14–134005_P07_LOS.nc

2 Data file format

VISI_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 VISI_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 "VISI Location (loc)" for all of the VISI_LOS files. “Version" is the version number of the VISI_LOS data. “CONTACT" is the e-mail address of the contact persons on the VISI_LOS files.

Table 1. Example values of attributes in VISI_LOS

Attribute	Example value
MISSION	“ISS-IMAP"
DATA	“VISI Line-Of-Sight (LOS)"
Version	1.0
CONTACT	“tsakanoi@pparc.gp.tohoku.ac.jp saitoua@kugi.kyoto-u.ac.jp"

3.2 Dimensions

Several dimensions are defined in VISI_LOS file. “DIM_FB" is the number of Field-of-view (FOV) of VISI. Because VISI has two FOVs, the forward FOV and the backward FOV, it is set as “2" for all of the VISI observation. “DIM_XYZ" is 3 for the Cartesian coordinates. “NUM_PIX" is the number of pixels for one FOV and one swath. This corresponds to the number of the image pixels perpendicular to the ISS trajectory. “NUM_SWATH" is the number of the swath along the ISS trajectory. The observed data is two-dimensional image whose size is “NUM_PIX" pixel $\times$ “NUM_SWATH" pixel.

Table 2. Values of dimensions in VISI_LOS

Dimension	Example value
DIM_FB	2
DIM_XYZ	3
NUM_PIX	64
NUM_SWATH	779

3.3 Data arrays

VISI_LOS file contains several data arrays. “SWATH_TIME" is day and time in UT of the observation for each swath. The format of the day and time is “YYYY-MM-SS

hh:mm:ss". “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. “LOS" is the unit vector of line-of-sight for each VISI pixel in the geographic coordinates.

Table 3. Data arrays in VISI_LOS

Name	Type	Dimension	Unit
SWATH_TIME	string	(NUM_SWATH)	
ISS_LATI	float	(1)	Degree
ISS_LONGI	float	(1)	Degree
ISS_ALTI	float	(1)	km
LOS	float	(DIM_XYZ, DIM_FB, NUM_PIX, NUM_SWATH)	Unit vector

4 Reference

Sakanoi, T., Y. Akiya, A. Yamazaki, Y. Otsuka, A. Saito, I. Yoshikawa, Imaging observation of the earth’s mesosphere, thermosphere and ionosphere by VISI of ISS-IMAP on the international space station, IEEJ Trans. on Fundamentals and Materials, vol. 131, 12, 983-988, doi: 10.1541/ieejfms.131.983, 2011.