

# Venus Climate Orbiter Akatsuki Level 3 Variable Description

AKATSUKI Level 3 Team

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# 1 A Note to the reader

If the string “L2 attribute” is in “comment” attribute, the variable is copied from FITS header in Level 2 data. Therefore for definition of the variable, please refer the FITS header keyword dictionary for Venus Climate Orbiter AKATSUKI. Note that the character - is replaced with \_ in Level 3 and Level 3x variables because of the limitation of the character in NetCDF variable.

## 2 List of variables in Level 3 data

type	name	description	unit
dimensions	longitude	number of grid point in longitude; nominal value is 1440 for LIR and 2880 for the others.	
	latitude	number of grid point in latitude; nominal value is 720 for LIR and 1440 for the others.	
	time	number of data in time; nominal value is 1.	
	src_index	number of index used to calculate grid point value; 5 for LIR and 4 for the others.	
	text	maximum character size of text variable.	
variables	longitude	longitude.	degrees
	latitude	latitude.	degrees
	src_index	index used to calculate grid point value.	
	time	observation time in UTC; corresponding to value of DATE-OBS in Level 2 data.	
	radiance	radiance value observed by IR1, IR2, or UVI at specified longitude, latitude, and time.	(depending on the instrument)
	btemp	brightness temperature value observed by LIR at specified longitude, latitude, and time.	K
	inangle	incidence angle at specified longitude, latitude, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	emangle	emission angle at specified longitude, latitude, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	phangle	phase angle at specified longitude, latitude, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	azangle	azimuthal angle at specified longitude, latitude, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	src_index_ax1	axis1 index of L3x data to calculate grid point value.	
	src_index_ax2	axis2 index of L3x data to calculate grid point value.	

### 3 List of variables in Level 3x data

type	name	description	unit
dimensions	axis1	length of data axis1 of a full image (but the length+3 in the case of TOP_OB mode).	
	axis2	length of data axis2 of a full image (but the length+3 in the case of TOP_OB mode).	
	time	number of data in time; nominal value is 1.	
	lpnf	number of limb points used for limb fitting.	
	lpnm	number of points which Venus limb is mapped on.	
	epn	number of points on the ellipse obtained by limb fitting.	
	paran	number of the ellipse parameters obtained by limb fitting.	
	coefn	number of the coefficients in the ellipse coefficient including a scaling factor.	
	text	maximum character size of text variable	
variables	radiance	radiance value at specified axis1, axis2, and time.	(depending on the instrument)
	btemp	brightness temperature value observed by LIR at specified axis1, axis2, and time.	K
	inangle	incidence angle at specified axis1, axis2, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	emangle	emission angle at specified axis1, axis2, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	phangle	phase angle at specified axis1, axis2, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	azangle	azimuthal angle at specified axis1, axis2, and time. This value is packed in short type. For the definition of this variable, please refer the dataset.cat in SEDR data set.	degrees
	lon	longitude at specified axis1, axis2, and time.	degrees_east
	lat	latitude at specified axis1, axis2, and time.	degrees_north

type	name	description	unit
variables	lpxf	x position in pixels of limb points used for limb fitting.	
	lpyf	y position in pixels of limb points used for limb fitting.	
	lpxm	x position in pixels of points which Venus limb is mapped on.	
	lpym	y position in pixels of points which Venus limb is mapped on.	
	epx	x position in pixels of points on the ellipse obtained by limb fitting.	
	epy	y position in pixels of points on the ellipse obtained by limb fitting.	
	epara	ellipse parameters obtained by limb fitting: the center ( $x_c$ , $y_c$ ), semi-major, semi-minor axes of the ellipse, and inclination of the semi-major axis [radian].	
	ecoef	ellipse coefficients obtained by limb fitting: A, B, C, D, E, F, and a scaling factor f0.	
	P_POSLLX	x-position of lower-left corner pixel of image; L2 attribute.	
	P_POSLLY	y-position of lower-left corner pixel of image; L2 attribute.	
	P_POSURX	x-position of upper-right corner pixel of image; L2 attribute.	
	P_POSURY	y-position of upper-right corner pixel of image; L2 attribute.	
	D_RMSAR	evaluation index of ellipse fitting, RMS of a residual of algebraic distance.	
	D_SSCPXF	D_SSCPX in a full-size image coordinate.	
	D_SSCPYP	D_SSCPX in a full-size image coordinate.	
	S_SSCPXF	S_SSCPX in a full-size image coordinate.	
	S_SSCPYP	S_SSCPX in a full-size image coordinate.	
	D_IFOV	$\text{atan}(\text{PIXEL\_SIZE} / \text{FOCAL\_LENGTH})$ multiplied by IFOV_FACT (option).	radians
	D_EAPRADI	apparent Venus radius estimated from limb fitting in the case of FIT_STAT > 0, assuming that focal length is invariant.	km

## 4 List of common variables in Level 3 and Level 3x

type	name	description	unit
variables	P_L0NAME	filename of raw image in level 0; L2 attribute.	
	TELESCOP	telescope used to acquire data; L2 attribute.	
	SPACECRAFT	spacecraft used to acquire data; L2 attribute.	
	INSTRUME	identifier of the instrument; L2 attribute.	
	OBJECT	name of observed object; L2 attribute.	
	FILTER	filter name; L2 attribute.	
	P_ID	instrument/filter ID; L2 attribute.	
	DATE_BEG	date of the start of observation; L2 attribute.	
	DATE_OBS	date of the middle of observation; L2 attribute.	
	DATE_END	date of the end of observation; L2 attribute.	
	DATE	date of creation of the L2 file; L2 attribute. The long name was copied from L2 header.	
	P_CMPSTY	image compression style, RAWDATA, LOSSLESS, or LOSSY; L2 attribute.	
	P_CMPTYP	image compression type, RAWDATA, HIREW, or JPEG2000; L2 attribute.	
	P_DVER	version of common FITS keyword dictionary for VCO; L2 attribute.	
	S_ORBITN	orbit Number; L2 attribute.	
	S_PERLON	periapsis Longitude of the orbit; L2 attribute.	degrees
	S_PERLAT	periapsis Latitude of the orbit; L2 attribute.	degrees
	S_PERALT	periapsis Latitude of the orbit; L2 attribute.	km
	S_INCANG	inclination Angle of the orbit; L2 attribute.	degrees
	S_ECCENT	eccentricity of the orbit; L2 attribute.	
	S_LONNOD	orbit plane longitude of ascending node; L2 attribute.	degrees
	S_ARGPER	orbit plane argument of periapsis; L2 attribute.	degrees
	S_SEMIAX	semi-major axis of the orbit; L2 attribute.	km

type	name	description	unit
variables	DATAMAX	maximum data value in L2 data array; L2 attribute.	(depending on the instrument)
	DATAMIN	minimum data value in L2 data array; L2 attribute.	(depending on the instrument)
	P_DPIXV	dead pixel flag value in L2 data array; L2 attribute.	(depending on the instrument)
	P_DPIXN	number of dead pixel in L2 data array; L2 attribute.	
	P_SPIXV	saturated pixel flag value in L2 data array; L2 attribute.	(depending on the instrument)
	P_SPIXN	number of saturated pixel in L2 data array; L2 attribute.	
	EXPOSURE	exposure time; L2 attribute.	s
	P_BINN	number of binning, 1 (NON BINNING) 2 4 8; L2 attribute.	
	P_FLPROT	flip and rotation flag; L2 attribute.	
	S_DISTAV	distance between S/C and Venus; L2 attribute.	km
	S_DISTVS	Venus-Sun distance; L2 attribute.	km
	S_APPDIA	apparent diameter of Venus; L2 attribute.	degrees
	S_IFOV	instantaneous field of view; L2 attribute.	radians
	S_SOLLAT	sub solar latitude; L2 attribute.	degrees_north
	S_SOLLON	sub solar longitude; L2 attribute.	degrees_east
	S_TGRADI	target radius at sub S/C point; L2 attribute.	km
	S_SSCLAT	sub S/C latitude; L2 attribute.	degrees_north
	S_SSCLON	sub S/C longitude; L2 attribute.	degrees_east
	S_SSCLT	sub S/C local time; L2 attribute.	hours
	S_SSCPHA	sub S/C phase angle; L2 attribute.	degrees
	S_CLDALT	assumed cloud altitude; L2 attribute.	km
	S_SSCPX	sub S/C x-position in pixels on L2 data array, L2 attribute.	
	S_SSCPY	sub S/C y-position in pixels on L2 data array, L2 attribute.	
	S_NPVAZM	azimuth of north pole vector; L2 attribute.	degrees

type	name	description	unit
variables	FIT_STAT	ellipsefit status; -2: OFF but prescribed S_SSCP[X,Y] was used, -1: OFF, 0: NG, 1: OK, 2: OK but inaccurate.	
	D_SSCPX	corrected value of S_SSCPX by limb-fitting technique in the case of FIT_STAT != 0.	
	D_SSCPY	corrected value of S_SSCPY by limb-fitting technique in the case of FIT_STAT != 0.	
	D_NPVAZM	corrected value of S_NPVAZM by limb-fitting technique in the case of FIT_STAT != 0.	degrees
	D_LVANG	a rotation angle used for correcting the pointing of each instrument in the case of FIT_STAT > 0, which equals to the angle between L_Vobs and L_Vfit.	degrees
units	degrees_east	unit is in degrees, and eastward is positive.	
	degrees_north	unit is in degrees, and northward is positive.	
	hours since 2000-1-1 00:00:00 UTC	hours in decimal since 2000-1-1 00:00:00 UTC.	
global attribute	title	name of the data product.	
	history	history of the processing of this file.	
	institute	institution of the data.	
	source	main source files of this data.	
	references	references that describes methods used for the processing.	
	comments	comments.	
	Conventions	NetCDF convention.	
	command	command that is executed for creating this file.	
	hgid	hash of revision for identification.	
	loaded_spice_kernels	comma-separated lists of loaded SPICE kernels.	