SPICAM Archive Tutorial

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SPICAM Archive Tutorial

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- SPICAM data levels/products
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SPICAM Instrument (1/3)

SPectroscopy for Investigation of Characteristics of the Atmosphere of Mars

- **Mars atmosphere and ionosphere sounding**
- **Spectrometer with 2 channels : UV (118-320 nm) and near IR (1100-1700 nm)**
- **4 main modes of observations :**

mode	Measurements	Main derived products
NADIR	Solar light scattered by Mars surface	Total column abundances of CO_2, O_3, H_2O
STAR/SUN occultations	Atmospheric transmission as a function of altitude and wavelength	Temperature, density vertical profiles of CO_2, O_3, O_2, CO, H_2O, aerosols
LIMB	Solar light scattered by Mars atmosphere	Vertical profiles of aeronomic emissions and dusts

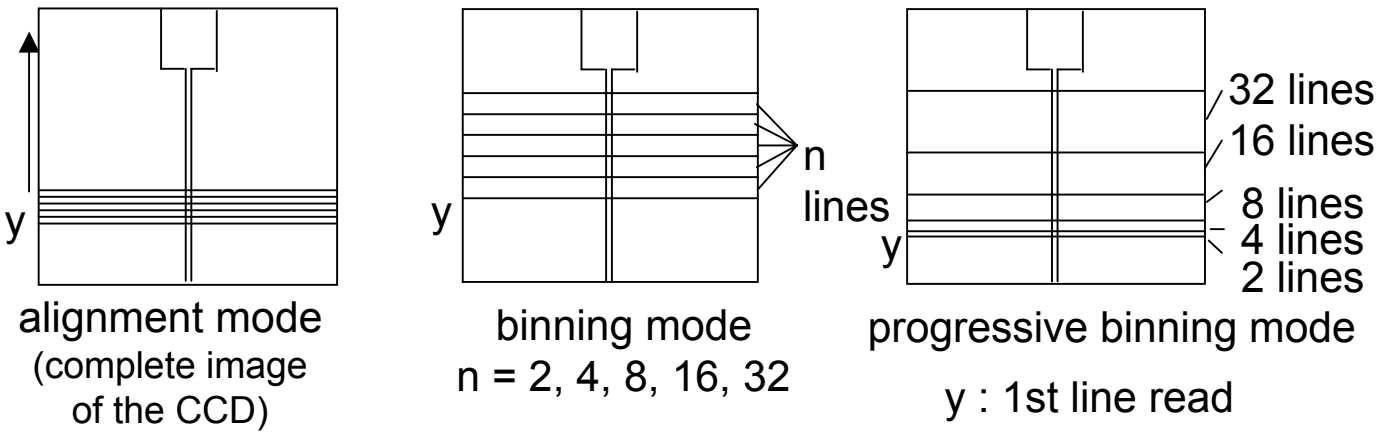
SPICAM Instrument (2/3)

➢ **Different operating modes for each channel**

UV channel = CCD (290*408 pixels - 110-320 nm) ± slit

one measurement = 5 spectral bands of 408 pixels

1 spectral band = 1 or n rows (binning)



operating parameters : high voltage, time exposure, binning, slit, acquisition period, duration of obs…

SPICAM Instrument (3/3)

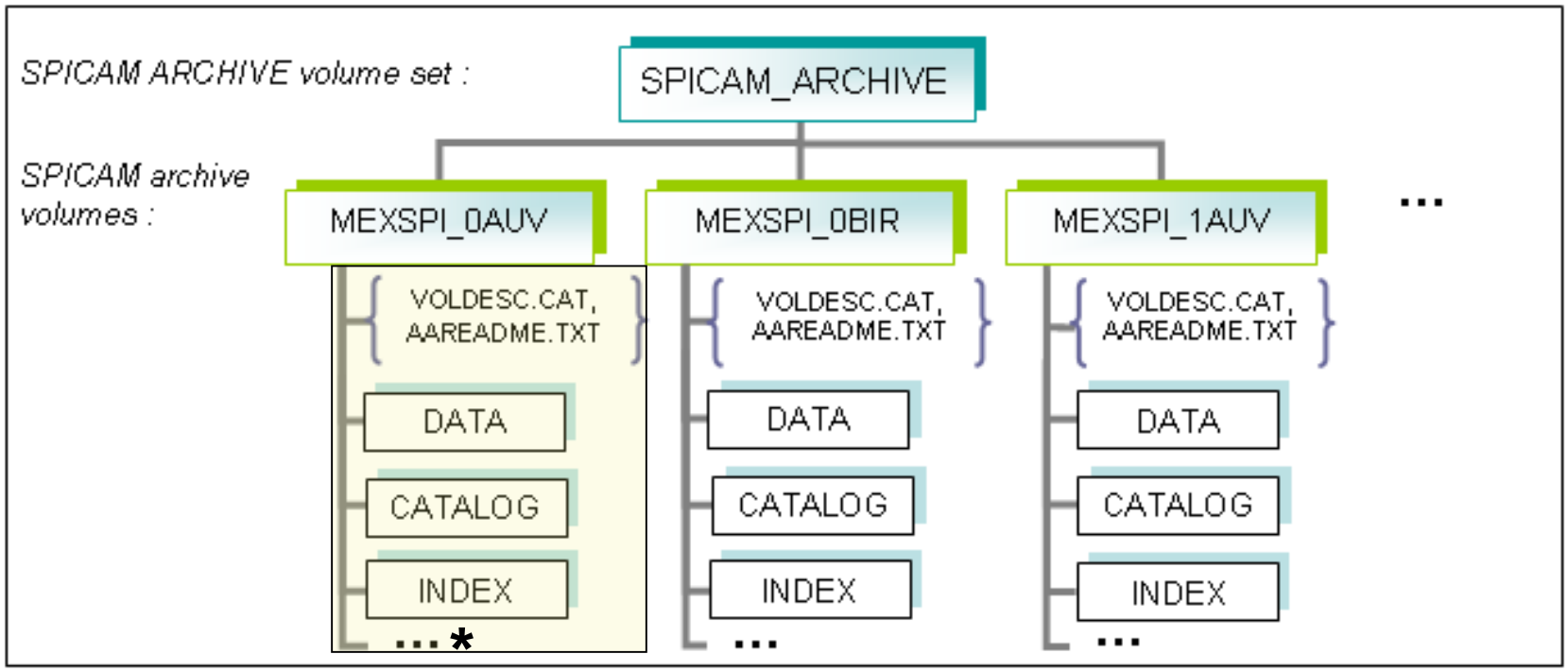
- **Different operating modes for each channel**

IR channel = AOTF Crystal, scan from 84 to 148 MHz,
2 detectors (≠ polarization)
Spectra acquisition on 1, 2 or 3 frequency windows (start frequency, points, step)
+ dots set
(max points = 3984, acquisition time = 24s)

SPICAM data levels/products

Levels	Data sets
UV	**UV**
Level 0A :SPICAM raw data files	MEXSPI_0AUV
Level 1A :Corrected SPICAM data files	MEXSPI_1AUV
Level 1B: Calibrated data (Spectrum of target, Atmospheric transmission, Limb and disk brightness)	MEXSPI_1BUV
Level 2 : total abundance, density vertical profiles	MEXSPI_2XUV
IR	**IR**
Level 0A :SPICAM raw data files	-
Level 0B :SPICAM raw data files (reconstructed spectra)	MEXSPI_0BIR
Level 1A :Corrected SPICAM data files	MEXSPI_1AIR
Level 1B: Calibrated data (Limb and disk brightness)	MEXSPI_1BIR
Level 2 : total abundance, density vertical profiles	MEXSPI_2XIR

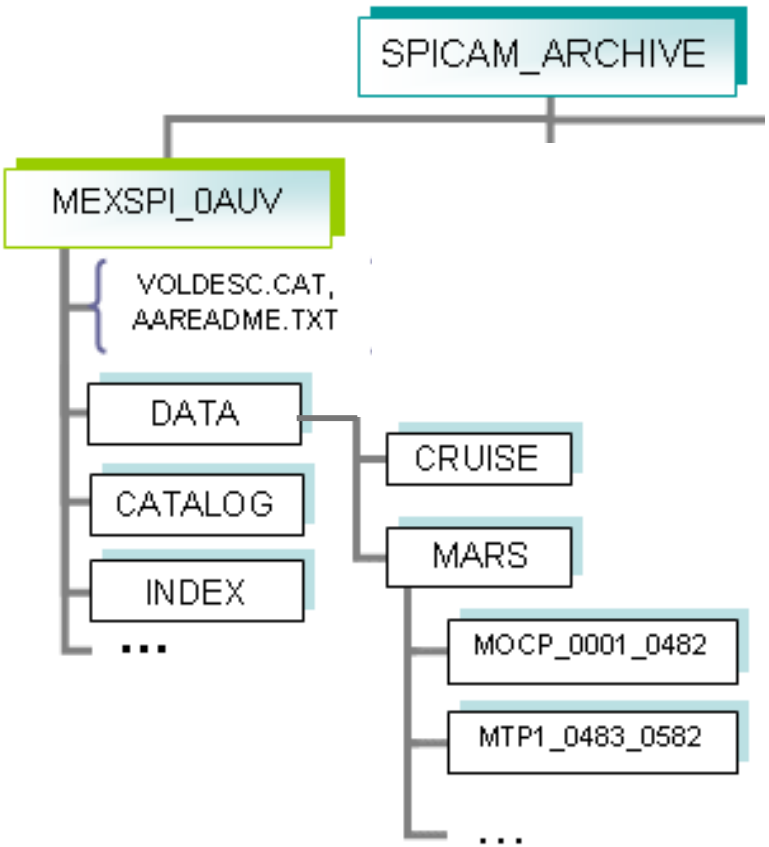
SPICAM Archive volume set organization



common structure

* **DOCUMENT, BROWSE, GEOMETRY, CALIB**

SPICAM DATA directory organization



directory naming : **XXXX_nnnn_pppp**
data collected during a Mars mission phase from **orbit nnnn** to **pppp**, with **XXXX** the **abbreviated name of the Mars mission phase**.
XXXX can have the following values :
MOCP : Mars Orbit Commissioning Phase
MTPn : Medium Term Planning n (n=1,2,3,...)

(same organization for BROWSE & GEOMETRY directories)

SPICAM file naming convention

Data products : **SPIM_YYT_nnnnAn_M_vv.DAT**
Browse products : **SPIM_YYT_nnnnAn_M_vv.PNG**
Geometry products : **SPIM_YYT_nnnnAn_M_vv_GOXww.DAT**

where

YY	SPICAM data level (eg. 0A, 0B, 1A, 1B, ...)
T	type of data collected (U for UV and R for IR)
nnnn	orbit number
An	sequence number of the observation for the nnnn orbit (A1, A2,...).
M	operation mode (E:STAR, S:SUN, L:LIMB, N:NADIR, P:PHOBOS,Y:SKY...)
vv	version number of the file
X	content of the geometry file. L: light version, F full version
ww	version number of the software generating the geometry file

note : CRUISE phase (NEV+IC phases) -> orbit number not applicable.
4 digits = 1 letter (N for NEV and C for IC) + day of the year (2003)

Examples :
SPIM_0AU_C195A1_Y_03.DAT Sky UV obs. on the 13th of July 2003 during the IC phase.
SPIM_0AU_0017A1_E_03.DAT Star UV obs. on orbit 17 during the MARS nominal phase.

Available data products

UV

Level / Mode	0A	1A	1B	2
Star	Xbg	NULL	NULL	NULL
Sun	Xbg	NULL	NULL	NULL
Nadir	Xbg	NULL	NULL	NULL
Limb	Xbg	NULL	NULL	NULL

IR

Level / Mode	0A	0B	1A	1B	2
Star	-	Xb	NULL	NULL	NULL
Sun	-	Xb	NULL	NULL	NULL
Nadir	-	Xb	NULL	NULL	NULL
Limb	-	Xb	NULL	NULL	NULL

- : not archived
X : data files available
NULL : under processing. Product not yet available.
b : data files + associated browse files
g : data files + associated geometry files

for IR geometry files, see note in GEOMINFO.TXT file

Available documentation

- EAICD
- Data file description (SPICAM_UVDATAFILE_DESC.TXT & SPICAM_IRDATAFILE_DESC.TXT)
- Geometry file description (SPICAM_GEOMETRY_DESC.TXT)
- Calibration (SPICAM_UVCALIB_DESC.TXT, SPICAM_UVT31DOC.PDF & SPICAM_IRCALIB_DESC.TXT)
- UV operating mode description (SPICAM_UVMODE_DESC.TXT)
- FUM

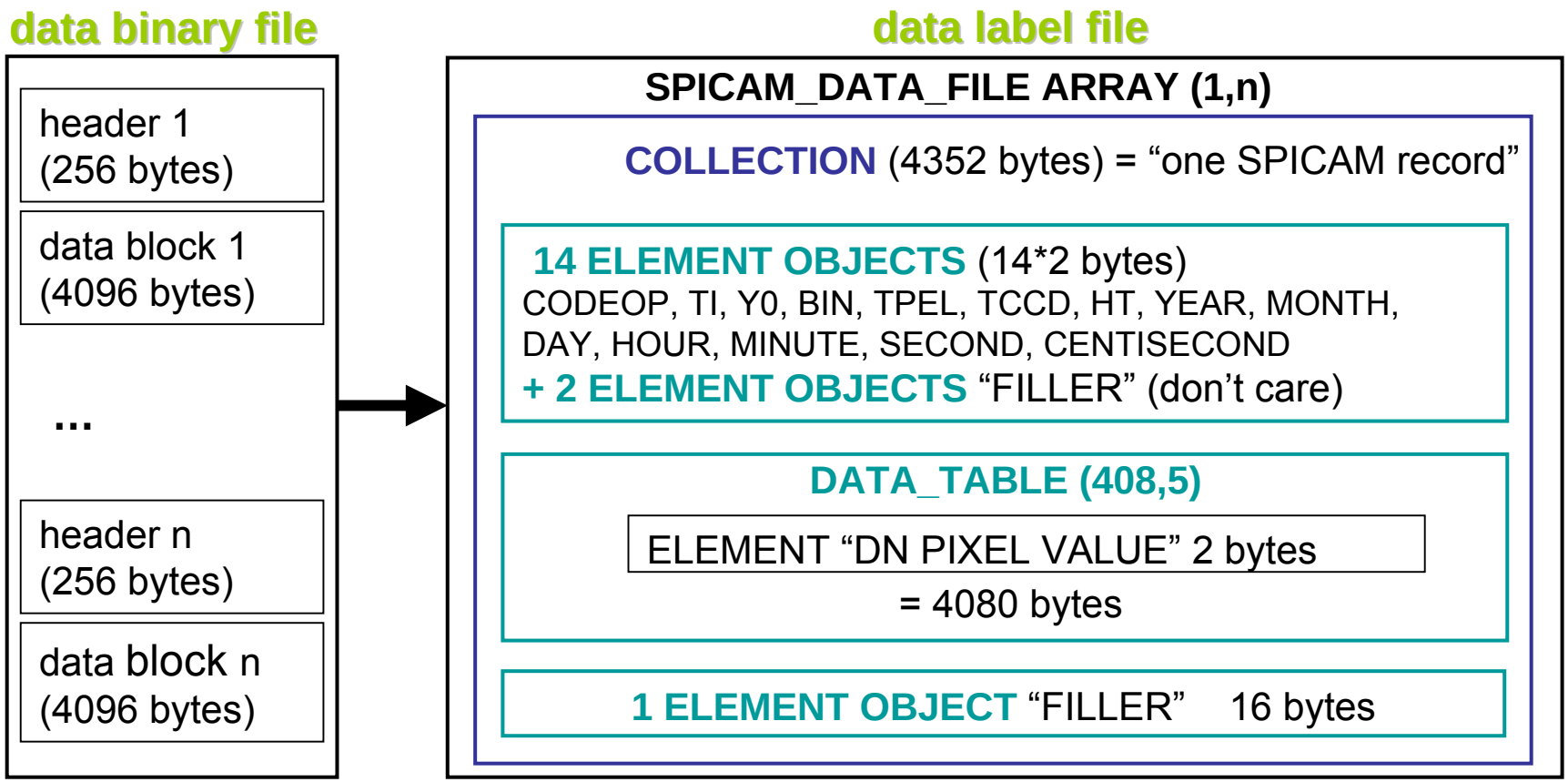
How to read the data?

No software delivered but documentation in the DOCUMENT directory (SPICAM_UVDATAFILE_DESC.TXT & SPICAM_IRDATAFILE_DESC.TXT)

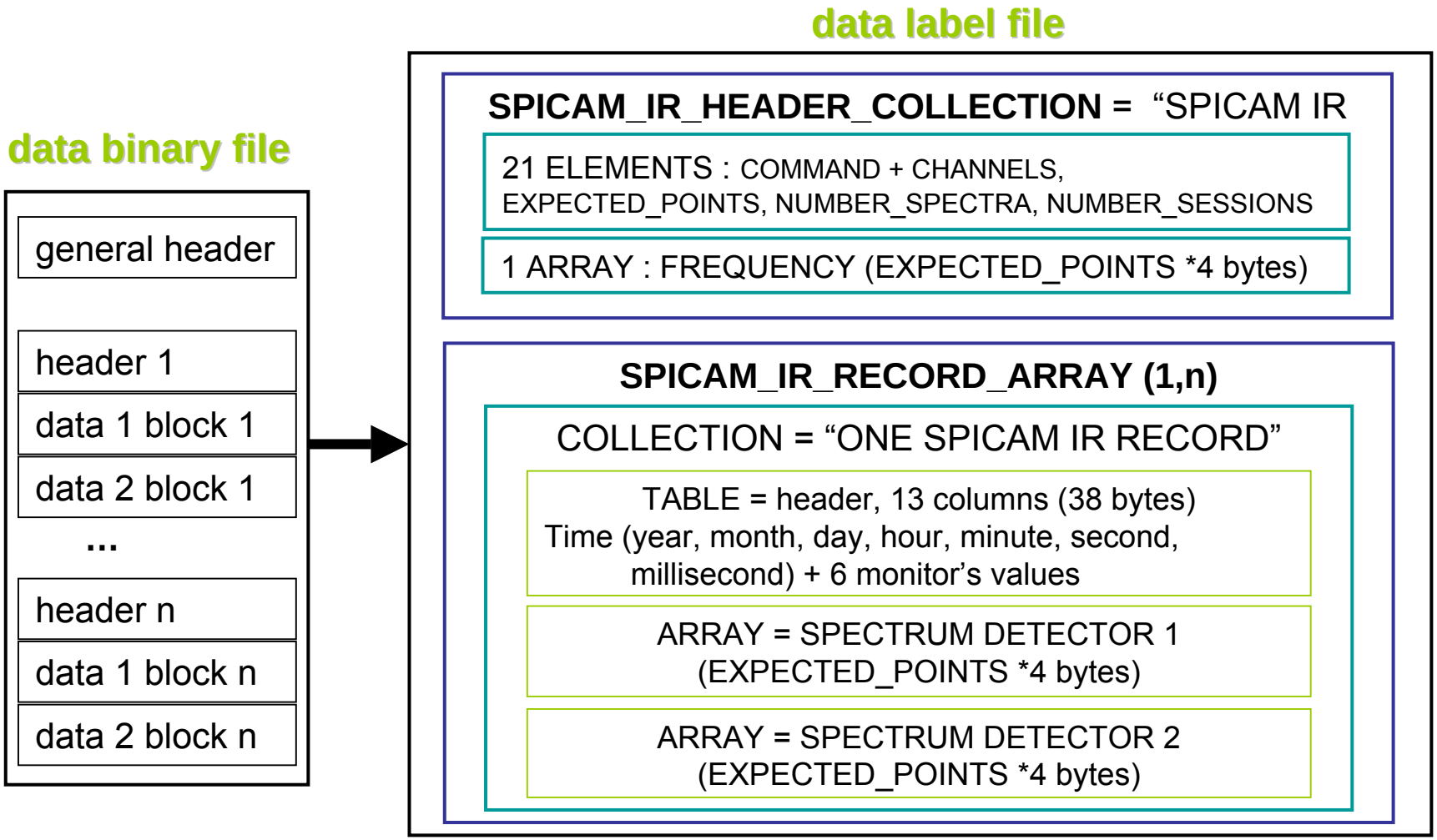
How to calibrate the data?

Calibration files and documentation in CALIB and DOCUMENT directories respectively for each data set (UV & IR)

SPICAM data representation in the label file – UV, level 0A



SPICAM data representation in the label file – IR, level 0B



Other information in the data label file

- **Type of observation**

  TARGET_NAME (MARS,STAR,SUN,PHOBOS,DEIMOS,SKY)
  SPACECRAFT_POINTING_MODE (NADIR,INERT)
  RIGHT_ASCENSION (value, “N/A” or “UNK”)
  DECLINATION (value, “N/A” or “UNK”)

- **Operational mode** (only for UV)

  INSTRUMENT_MODE_ID (ALIGN, BINNING, BINNINP)

- **Release concept**

  RELEASE_ID, REVISION_ID keywords