

Frames and series of frames requirements for CoLiTec software processing

- 1*. Each series of frames must be located in a separate catalog.
- 2*. No less than 3 frames in a series.
- 3*. Time between frames (groups, frames' subseries) in a series during asteroids' observation – no less than 20-30 min. (see Recommendations MPEC 2011-E67 (<http://www.minorplanetcenter.org/mpec/K11/K11E67.html>)).
4. The size of a tool's field of view may vary from 20 angular minute to 10 degrees (the present software hasn't been tested within fields of view beyond specified limits).
5. Frame's size: from pixels.
6. Presence of the following information about survey conditions is required.
 - 6.1. Approximate equatorial coordinates of image center. Display variants:
 - equatorial coordinates (RA, DE) of frame center, indicated in the frame's headline (recommended)
fields "RA", "DEC" (see fig. 1);
 - name of a known observing asteroid or comet in MPC format, indicated in the frame's headline,
field "OBJECT" (see fig. 1);
 - 6.2. Telescope focal length and CCD-camera pixel's size (in millimeters)
Display variants:
 - focal length and CCD-camera pixel's size are indicated in the frame's headline and in software settings (recommended)
field "FOCALLEN" (see fig. 1);
 - focal length and pixel size are indicated in software settings.
 - 6.3. Image capacity and its parameters (must be indicated in the frame's headline)
fields "BITPIX", "BSCALE", "BZERO" (see fig. 1).

6.4. Frame size in pixels (must be indicated in the image's headline)
fields “NAXIS1” and “NAXIS2” (see fig. 1).

6.5. Date, time and duration of the display (must be indicated in the frame's headline)
fields “DATE-OBS” and “EXPOSURE” (see fig. 1).

Additional guidelines.

The following parameters may be also indicated in the frame's headline:

1. Type of the light filter used during the survey. The frames are received in a visible band (V) (default setting).

field “CLRBAND” (see fig. 1)

2. Geographical coordinates of telescope location point (latitude, longitude, altitude above sea level).

fields “LAT-OBS”, “LONG-OBS”, “ALT-OBS” (see fig. 1)

3. Air temperature during the survey.

4. Information about observer, telescope (aperture, optical scheme), used CCD-camera.

fields “OBSERVER”, “INSTRUM”, “APTAREA” (see fig. 1)

** – Paragraph contains requirements for series of frames and does not contain any requirements for their headlines. Necessarily to perform with automatic processing for series of asteroid surveys frames.*

Header	
SIMPLE	= T
BITPIX	= 16 /8 unsigned int, 16 & 32 int, -32 & -64 real
NAXIS	= 2 /number of axes
NAXIS1	= 3056 /fastest changing axis
NAXIS2	= 3056 /next to fastest changing axis
BSCALE	= 1.0000000000000000 /physical = BZERO + BSCALE*array value
BZERO	= 32768.00000000000000 /physical = BZERO + BSCALE*array value
DATE-OBS	= '2011-03-28T02:47:17' / [ISO 8601] UTC date/time of exposure start
EXPTIME	= 2.400000000000E+002 / [sec] Duration of exposure
EXPOSURE	= 2.400000000000E+002 / [sec] Duration of exposure
SET-TEMP	= -25.0000000000000000 /CCD temperature setpoint in C
CCD-TEMP	= -25.0000000000000000 /CCD temperature at start of exposure in C
XPIXSZ	= 12.0000000000000000 /Pixel Width in microns (after binning)
YPIXSZ	= 12.0000000000000000 /Pixel Height in microns (after binning)
XBINNING	= 1 / Binning level along the X-axis
YBINNING	= 1 / Binning level along the Y-axis
XORGSUBF	= 0 /Subframe X position in binned pixels
YORGSUBF	= 0 /Subframe Y position in binned pixels
READOUTM	= 'Normal ' / Readout mode of image
IMAGETYP	= 'Light Frame' / Type of image
SITELAT	= '32 54 12' / Latitude of the imaging location
SITELONG	= '-105 31 42' / Longitude of the imaging location
JD	= 2455648.6161689814 /Julian Date at start of exposure
TRAKTIME	= 0.5000000000000000 /Exposure time used for autoguiding
FOCALLEN	= 1270.00000000000000 /Focal length of telescope in mm
APTDIA	= 455.0000000000000000 /Aperture diameter of telescope in mm
APTAREA	= 162597.05930203199 /Aperture area of telescope in mm^2
SWCREATE	= 'MaxIm DL Version 5.12' /Name of software that created the image
SBSTDVER	= 'SBFITSEXT Version 1.0' /Version of SBFITSEXT standard in effect
OBJECT	= 'A01-1 ' / Target object name
TELESCOP	= 'Centurion-18' / Telescope name
INSTRUME	= 'FLI - New' / Detector instrument name
OBSERVER	= 'Elenin ' / Observer name
NOTES	= ' ' /
FLIPSTAT	= 'Flip/Mirror'
CSTRETCH	= 'Medium ' / Initial display stretch mode
CBLACK	= 6760 /Initial display black level in ADUs
CWHITE	= 12229 /Initial display white level in ADUs
PEDESTAL	= 0 /Correction to add for zero-based ADU
SWOWNER	= 'NMS ' / Licensed owner of software
READMODE	= 'Normal ' /
HISTORY File was processed by PinPoint 5.1.7 at 2011-03-28T02:51:24	
DATE	= '28/03/11' / [old format] UTC date of exposure start
TIME-OBS	= '02:47:17' / [old format] UTC time of exposure start
UT	= '02:47:17' / [old format] UTC time of exposure start
TIMESYS	= 'UTC ' / Default time system
RADECSYS	= 'FK5 ' / Equatorial coordinate system
AIRMASS	= 1.03790254176E+000 / Airmass (multiple of zenithal airmass)
ST	= '08 10 02.47' / Local apparent sidereal time of exp. start
LAT-OBS	= 3.290323000000E+001 / [deg +N WGS84] Geodetic latitude
LONG-OBS	= -1.055284300000E+002 / [deg +E WGS84] Geodetic longitude
ALT-OBS	= 2.217000000000E+003 / [metres] Altitude above mean sea level
OBSERVAT	= 'ISON-NM ' / Observatory name
RA	= '07 43 34.28' / [hms J2000] Target right ascension
OBJCTRA	= '07 43 34.28' / [hms J2000] Target right ascension
DEC	= '+18 21 20.0' / [dms +N J2000] Target declination
OBJCTDEC	= '+18 21 20.0' / [dms +N J2000] Target declination
CLRBAND	= 'R ' / [J-C std] Std. color band of image or C=Color
END	

Fig.1 FITS-frame's headline with highlighted red – required parameters; blue – recommended parameters.