

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.*

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