# *ToupSky* Cameras Quick-guide

ToupSky is a capture and processing software offered by *Touptek*, the original manufacturer of the *Toupcamera* series. These are video cameras that offer live image capture for planetary imaging and deep-sky long exposures as well. They include an unique feature that reduces image noise.

ToupSky software features at a glance:
- Connects and controls the camera;
- Captures video and long-exposure images (Trigger mode not available for CGMOS);
- Processes and adjusts captured images;
- Unique dark field correction;
- Intuitive and easy to use.

Getting started

Press the *ToupSky* logo 🌑 to start the software. On the left part of the screen there are several drop-down tabs (inside the red box below) – figure 1. These tabs allow to control the camera. Click drop down button ⊗ to expand the tabs. Click 🔵 **Camera List** tab. Select camera. Below *EXCCD00300KMA* camera is available for control – figure 2.
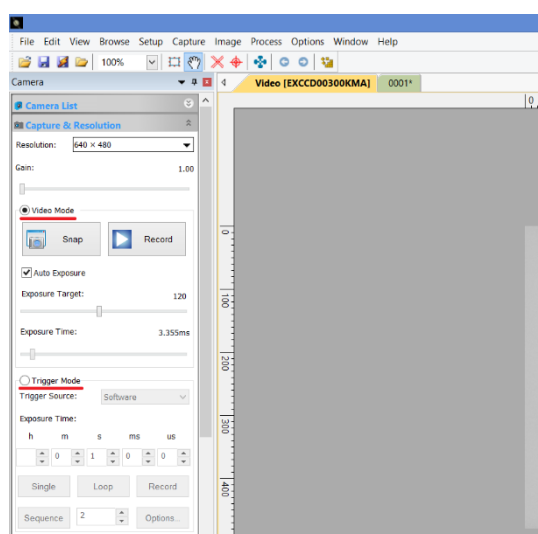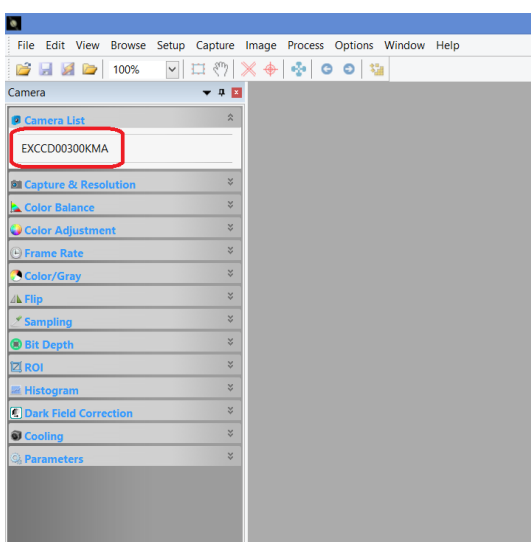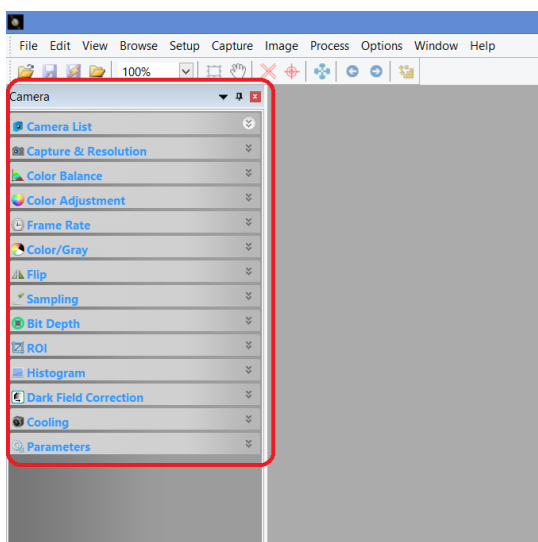
As soon as the camera is selected it will start to capture video automatically. Remove the rubber lid from the camera to expose it's sensor to light. The screen will change from black to white or grey shades.
Expand the 📷 **Capture & Resolution** tab.
There are two available capture modes.

- Video Mode
- Trigger Mode

Video Mode. It is used to capture video sequences up to 5000ms (5 seconds). This is especially useful for focusing and also planetary imaging. Videos can be saved in .AVI or .SER video file format and then be cut into individual frames for imaging processing (alignment and stacking).
Trigger Mode. It is used to capture video and long exposures. This is the most powerful feature of this capture mode and we recommend to use this not only for deep-sky objects but also for planetary imaging.

Video Mode
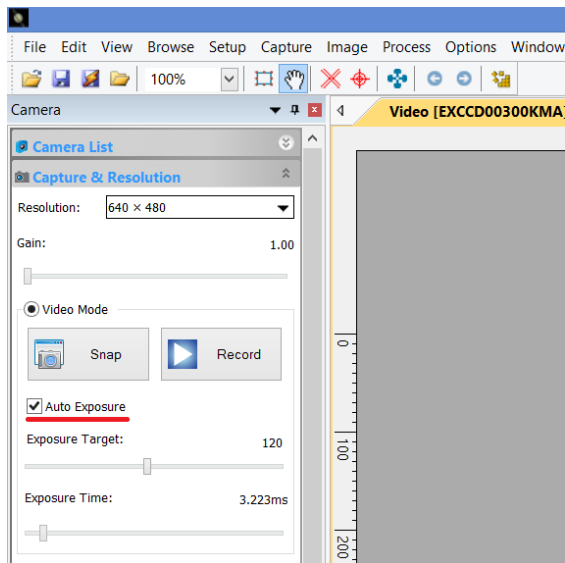
Video Mode> Auto Exposure

Auto Exposure

Auto Exposure will be selected by default. It adjusts the *Exposure Time* and *Gain* levels automatically based on the available light as sensed by the camera. The obtained image will be balanced. This is especially interesting for focusing. With *Auto Exposure* the user does not need to worry about initial image adjustments.

Video Mode> Gain

Gain

the *Gain* tab adjusts the sensitivity of the camera's sensor. A standard 1.00 *Gain* is the camera's default *Gain*, i.e., its normal sensitivity. *Gain* should be increased if object's light is not sufficient and when longer exposure time is not available or desirable.

> **Important:** Increasing *Gain* introduces noise to the image.

Video Mode> Exposure Time

Exposure Time

It is the time in ms (milliseconds) that the camera's sensor captures light from the object. The longer the E*xposure Time* the brighter the object will look on the screen. For dim objects longer *Exposure Time* is required. Longer *Exposure Time* also generate noise (white pixels in the image for monochrome cameras). In *Video Mode Exposure Time* can be set from 1ms to 5000ms. 1 second = 1000ms.
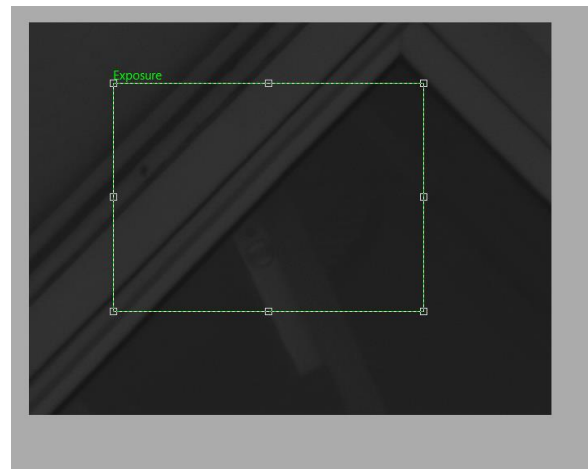
Video Mode> Exposure

Exposure Window

It's the green window that overlays the camera frame. It is used in conjunction with *Exposure Target*.

Video Mode> Exposure Target

Exposure Target

The green *Exposure* rectangle defines an area where the brightness levels are measured. These levels are compared to the *Exposure Target* level. By increasing the *Exposure Target* level one also increases the brightness level of the image.
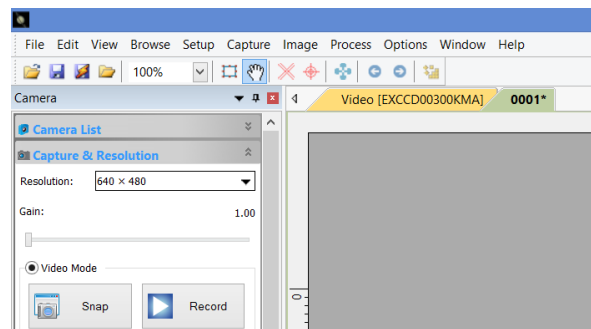
Video Mode> Snap

Snap

By clicking *Snap* a single image frame (Snapshot) is captured with the selected *Exposure Time* and *Gain* sets. A new image tab is open 0001* - figure 5. It is the basic manual command to capture images.
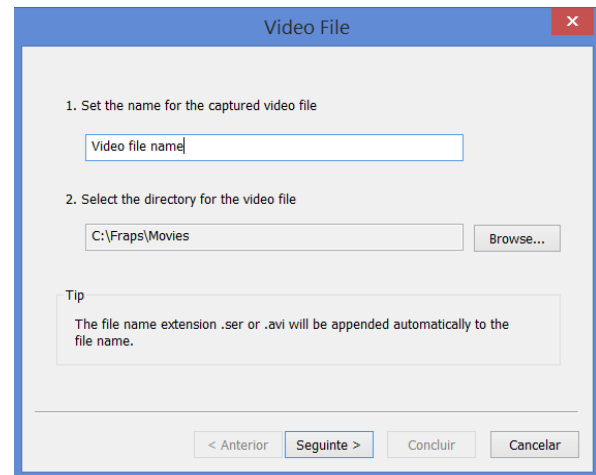
Video Mode> Record

Record

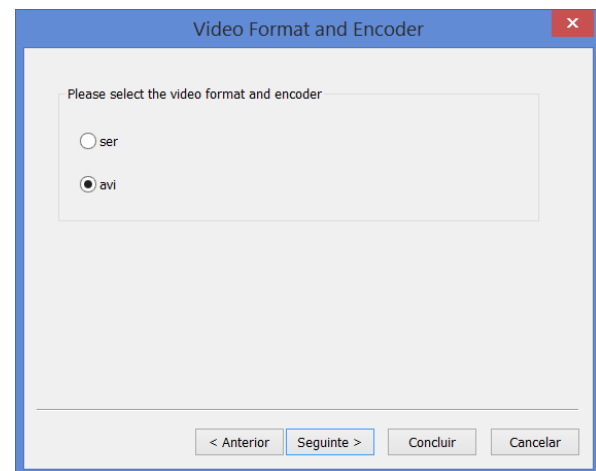Records a video and saves it to the computer's hard disc.

Click [Record] button. A new dialog box will open. Choose a video file name and write it on position 1. Browse the directory for the video file on 2.
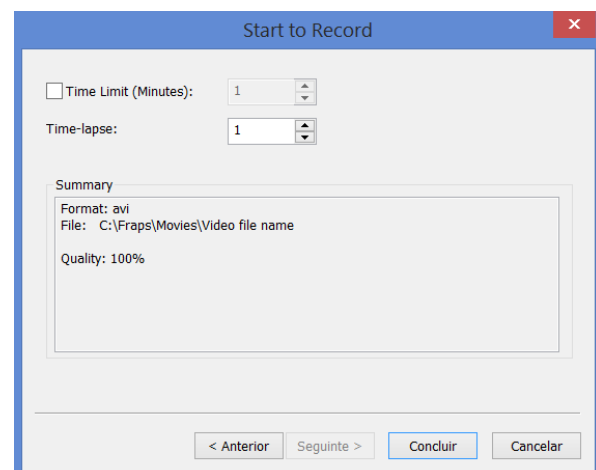Click *Next* to continue. Choose a suitable video file format.

Video File

1. Set the name for the captured video file

   Video file name

2. Select the directory for the video file

   C:\Fraps\Movies   [Browse...]

   Tip
   The file name extension .ser or .avi will be appended automatically to the file name.

   [< Anterior] [Seguinte >] [Concluir] [Cancelar]

There are two available file types .SER or .AVI. Select the desired file format and click *Next*.

Video Format and Encoder

Please select the video format and encoder

○ ser

● avi

[< Anterior] [Seguinte >] [Concluir] [Cancelar]

Check box *Time Limit (Minutes)* to interrupt video capture after the desired time in minutes.

Start to Record

☐ Time Limit (Minutes):   1

Time-lapse: 1

Summary
Format: avi
File: C:\Fraps\Movies\Video file name

Quality: 100%

[< Anterior] [Seguinte >] [Concluir] [Cancelar]
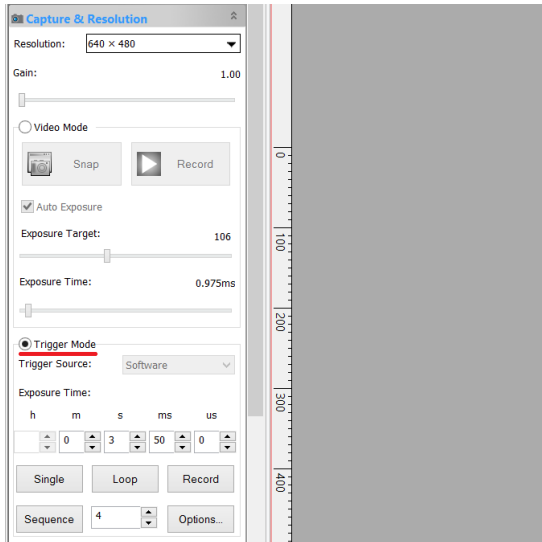
Trigger Mode

Trigger Mode> Exposure Time
Exposure Time
works as in *Video Mode*. *Exposure Time* is more clearly set. This useful for long exposures.

Trigger Mode> Single
Single
Works as *Snap* in *Video Mode* but it does not open a new image tab.

Trigger Mode> Loop
Loop
Takes exposures continuously in a *Loop*. This especially interesting for achieving precise focusing or to centre an object in the field of view.

Trigger Mode> Record
Record
records a video – similar to Video Mode.

Trigger Mode> Sequence
Sequence
creates a *Sequence* of images with same *Exposure Time*. Opens an image tab for each new image of the *Sequence*. User needs to set a number of images for the *Sequence* from 1 to desired number. Press [Stop] to interrupt *Sequence*.

> **Important:** When using *Single*, *Loop* or *Sequence* the time left to complete the command will show on the screen (right bottom) as *Time Left.* It only show for *Exposure Time* of **5 seconds** or above.

| Frame Rate: 0.0; Frame: 1 | 640 × 480 | | Time Left: 03 / 05 |

**Trigger Mode> Options**
Options
edits *Sequence* options:
"Show in window" only displays captured images on screen but does not save.
"Save to disk" saves captured images on selected Directory (Folder). For each image a prefix is required to which a name format is added."Directory" Folder to which the captured images will be added to.
"Name Format" choose from different name formats. E.g. nnnn adds a 4 number suffix to the name of the file.
"File Prefix" the root name of the images
"File Type" allows to choose between different image formats to record .BMP, .JPG, .PNG or .TIFF. Click OK to start *Sequence.*
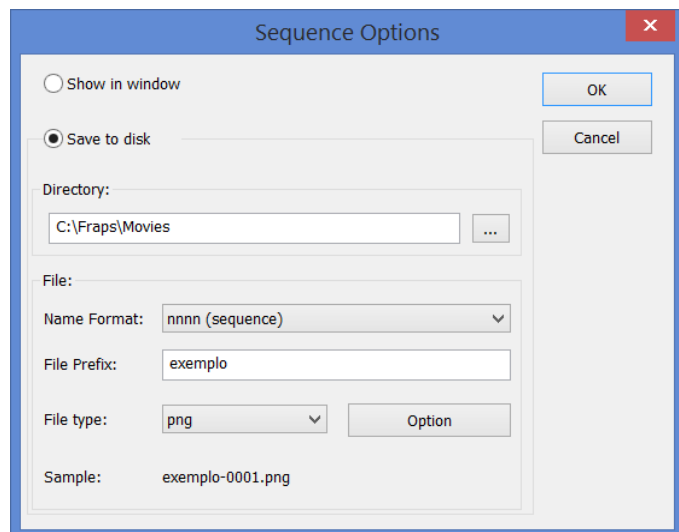
Color balance

Only available for colour cameras. It allows to adjust the individual Red, Green and Blue Channels for better colour balance. Click [Defaults] to get default adjustment values.

Color adjustment

Adjusts Hue, Saturation, Brightness, Contrast and Gamma. Click [Defaults] to get default adjustment values.
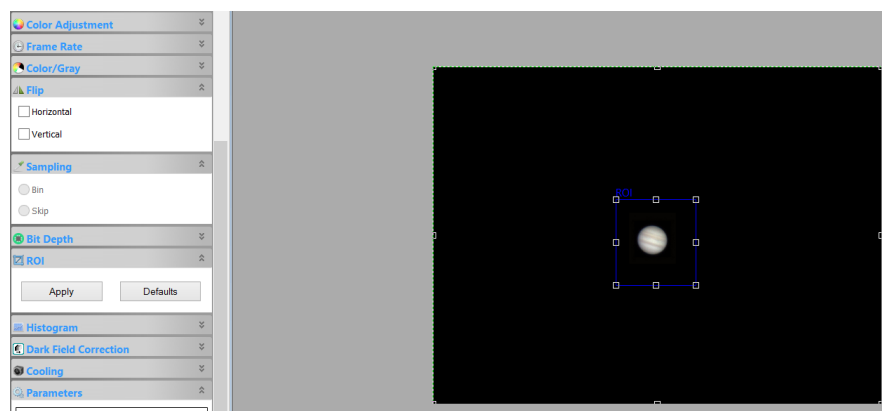
Frame Rate

Higher our lower image (frame) streaming through the USB cable depend on the computer's ability to deal with the amount of data being transferred from the camera. For planetary imaging higher frame rate is desired. Adjust frame rate as needed. If live video is no longer available it means the computer cannot deal with the amount of data being sent and the frame rate should be slightly decrease.

Flip

Mirrors the image in either Vertical or Horizontal. This is especially interesting to correct side-up planetary or deep-sky images.

Region of Interest (ROI)

Instead of using all camera's sensor's surface one can create a *ROI* (Region of interest). Only that selected portion of the camera's sensor's surface will be used to capture image thus making the original image looking smaller. This has the advantage of increasing frame rate (speed) and it is especially interesting for planetary imaging where only the planet's disc is of interest. Click [Apply] to define the *ROI*. The area of capture will now be cropped. To get back to full frame size please click [Defaults].

Histogram

The *Histogram* displays the dynamics of the image, i.e. its spectral content. 8 Bit cameras have 256 levels or Grey (from 0...255). Click [Auto] to get automatic *Histogram* adjustment. The two magenta lines will be adjusted to the limit of the available spectral information. You can also adjust it manually. For colour cameras each channel can be also individually adjusted. Click [Defaults] to get to default values.
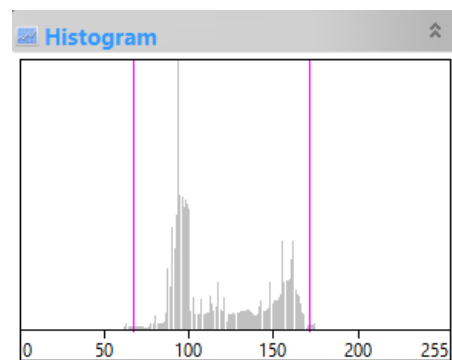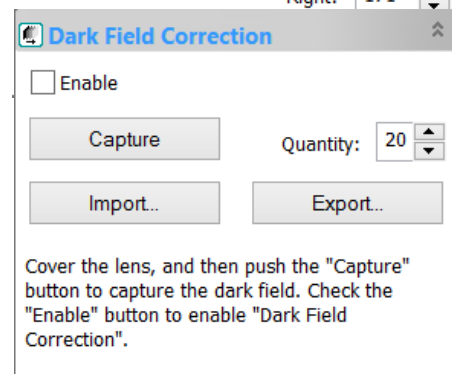
Dark field correction

It is one of the most important features of this software. *Dark field correction* is used to reduce camera's noise. When enabled the Dark field correction reduces considerably the image's noise making it easier to capture clear images.

Video Mode> Dark Field Correction
Cover the telescope so no light reaches the camera's sensor. Select the number of Dark Frames to be used to create the *Dark Field Correction* – use Quantity on the right. The more the better. We recommend at least 10 Dark Frames, ideal is 20 Dark Frames.

Click [Capture] to start the capture. After the set of Dark Frames is captured click check box ☑ Enable . The *Dark Field Correction* will start to work immediately.

Trigger Mode> Dark Field Correction

In *Trigger Mode* tab click [Loop]. While Loop is running and after choosing number of Dark Frames to create the Dark Field Correction (see how above) click [Capture]. After the set of Dark Frames is captured click check box ☑ Enable . The Dark field correction will start to work immediately.

A Dark Field is composed of several Dark Frames (a dark frame is when the telescope is covered and no light reached the camera). For each *Exposure Time* a convenient matching Dark Field must be created. For example using 10 second *Exposure Time* requires a *Dark Field Correction* with the same 10 second exposure. If *Exposure Time* is increased to 60 seconds than a new *Dark Field Correction* with several Dark Frames of 60 seconds must be created. This is of extreme importance for the *Dark Field Correction* to work properly.

Cooling

Some *ToupTek* cameras have active cooling available. A cooled camera produces less electronic noise and thus clearer, artefact free images. To enable active cooling (when available) click TEC/On and set desired temperature (Cº). Fan controls the cooling fan to increase cooling capacity.

Parameters

Allows to import/export parameters to be used later. Basically saves all existing settings.