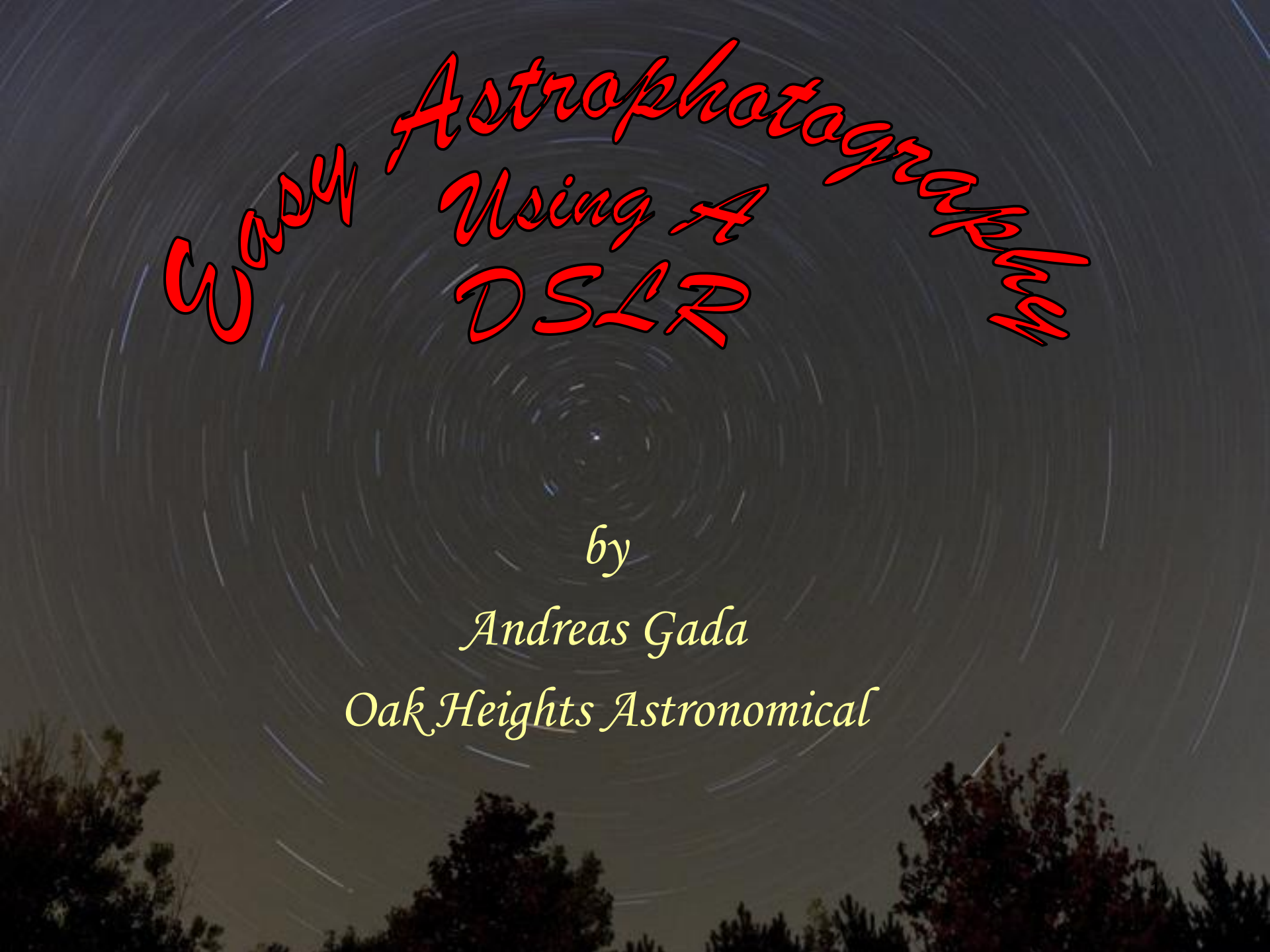
Easy Astrophotography Using A DSLR



by

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Oak Heights Astronomical

Objectives

On completion of this workshop you will know how to take images of the night sky and be introduced to the use of time-lapse imaging to show the motion of the heavens. Photography of the following will be covered:

- Constellations
- Meteors
- Satellites
- Northern Lights
- Planetary Conjunctions
- Star Trails
- The Moon

Basic Equipment

- Tripod
- DSLR Camera
- Remote Control Cable / Timer (optional)
- Flashlight with red filter

Basic Equipment

Digital Camera On Tripod With Remote Timer

Composition

- Start by visualizing what you want to capture
- Attach the camera to the tripod and level the tripod
- Aim the camera at the subject and adjust the position of the camera until the subject is positioned in the view finder as desired
- Check the corners and edges of the frame for distracting elements
- Take trial exposures to verify composition

Focus

- Most auto focus systems do not work properly in dim lighting and will result in out of focus pictures
- Turn auto focus off and focus lens manually
- Use old style manual focus lens and set at infinity
- Take a test image and review to verify that the subject is in focus

Exposures

- Set the ISO to the highest setting possible (800 – 1600)
- Set the lens f/ value to the lowest value (3.5 or lower)
- Set the shutter speed to the longest duration possible (8” – 30”)
- Turn long exposure noise reduction on
- Turn high ISO noise reduction on

Summer Milkyway, July 11, 2010, Oak Heights

Canon 20Da, 10mm f/3.5, 60”, ISO-1600 No Noise Reduction

Summer Milkyway, July 11, 2010, Oak Heights

Canon 20Da, 10mm f/3.5, 60”, ISO-1600 Dark Frame

Summer Milkyway, July 11, 2010, Oak Heights

Canon 20Da, 10mm f/3.5, 60”, ISO-1600 With Noise Reduction

Taurus, Gemini and Orion, Oct 13, 2007, Oak Heights

Canon 20Da, 16mm f/3.5, 25”, ISO-1600

Circumpolar, Sept. 16, 2007, Oak Heights

Canon 20Da, 16mm f/3.5, 60”, ISO1600

Milky Way, Aug 13, 2007

River Place Park, Mount Forest

Canon 20Da, 16mm f/3.5, 30”, ISO1600

Leonid Meteor, Nov 16, 2009, Sandy Flats

Canon 20Da, 16mm f/3.5, 30”, ISO-1600

Fireball, Nov 16, 2009, Sandy Flats

Canon 20Da, 16mm f/3.5, 30”, ISO-1600

ISS and Shuttle, Sep 9, 2009, Sandy Flats

Canon 40D, 16mm f/3.5, 30”, ISO1600, composite of 3 images

Venus, Saturn and Mercury, Oct 11, 2009, Sandy Flats

Canon 20Da, 48mm f/5, 1”, ISO-800

Zodiacal Light, Nov 18, 2009, Grafton, photo by Malcolm Park

Nikon D3,14mm f/3.2, 25”, ISO 1600

Northern Lights, Aug 4, 2010, Oak Heights,

Canon 40D, 10mm f/3.5, 60”, ISO 1600

Northern Lights, Aug 4, 2010, Oak Heights,

Canon 40D, 10mm f/3.5, 60”, ISO 1600

Northern Lights, Feb 1, 2010, Kvaløya, Norway, photo by Fredrik Broms,

Nikon D3, 20mm f/2.8, 6”, ISO 1000, full moon conditions

Northern Lights, Feb. 11, 2008, Fairbanks, Alaska, photo by Lance Parrish, Nikon D3, 12 – 24 mm f/4, 8”, ISO 1000

Dealing With The Cold and Dew

- Cold weather can drastically reduce the camera battery life
- An external battery packs/supplies can be used to provide continuous power

- During the night as the temperature drops dew/frost can form on the camera lens and body
- Camera shrouds and lens heater can be used to combat dew and protect camera

Essential Accessories

- External Power Supply
- 2 Gig Memory Card
- External Camera Battery
- Dew Heater
- Camera Shroud

The Camera Ready For Action

Star Trails

Traditional Star Trails

- Typical exposures 5 minutes or longer
- Set the ISO to 400 or slower depending on exposure length
- Set the lens to f/8 or higher depending on exposure length
- Turn long exposure noise reduction on
- Turn high ISO noise reduction on
- Attach the remote control timer and set the exposure time
- Start timer and twice the length of the exposure to allow for long exposure noise reduction to take place

Circumpolar, Sep 16, 2007, Oak Heights

Canon 20Da, 16mm f/3.5, 60”, ISO1600

Circumpolar Star Trails, Sep 16, 2007, Oak Heights

Canon 20Da, 16mm f/8, 60 minutes, ISO-400

Gemini Star Trail, Nov 19, 2007, Oak Heights

Canon 20Da, 16mm f/8, ISO 800, 30 minutes

ISS Flyby, Mar 18, 2010, Sandy Flats

Canon 40D, 10mm f/3.5, ISO 200, 5 minutes

Composite Star Trails

- Combine many short exposure images taken sequential over 5 minutes or longer periods of time
- Set the ISO to 1600 or higher
- Set the lens to f/3.5 or lower
- Turn long exposure noise reduction off
- Turn high ISO noise reduction on
- Attach the remote control timer and set the exposure time to 30” - 60” seconds
- Set the interval to 33” - 63” to allow for processing time between exposures
- Take five to ten dark frames

Fireball, Nov 16, 2009, Sandy Flats

Canon 20Da, 16mm f/3.5, 30”, ISO-1600

Circumpolar Star Trail Composite, Nov 16, 2009, Oak Heights

Canon 20Da, 16mm f/3.5, 30”, ISO-1600, 400 images, 3.5 hours

Quadrantid Meteor Shower Composite, Jan 03, 2009, Sandy Flats

Canon 40D, 10mm f/3.5, 30”, ISO-1600, composite of 25 images

ISS, Sep 13, 2009, Sandy Flats

Canon 40D, 16mm f/3.5, 2.5”, ISO1600, composite of 236 images

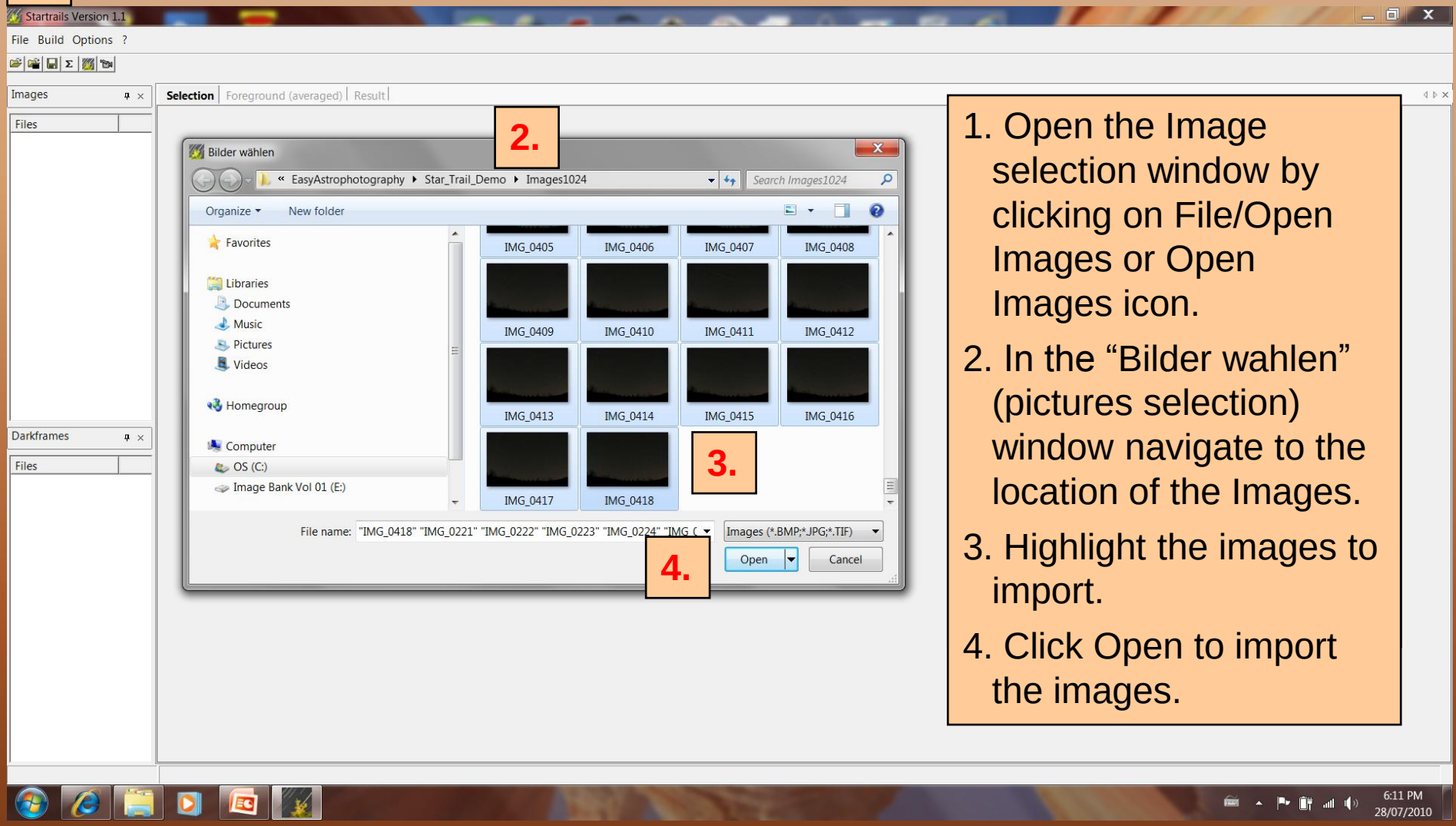
Night Search, Jul 17, 2010, Sandy Flats

Canon 40D, 22mm f/4.5, 60”, ISO1600, composite of 75 images

Startrails Software

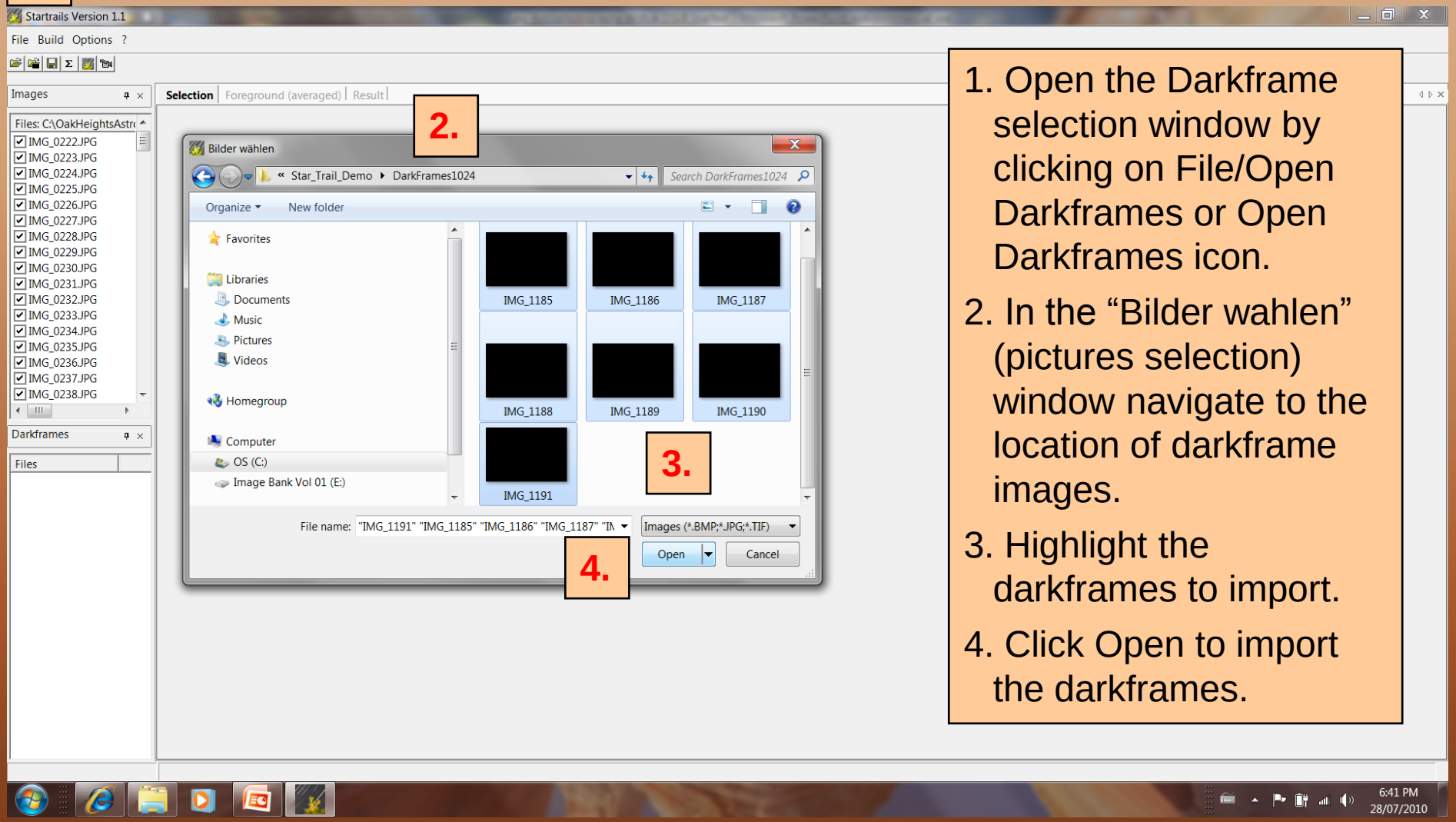
- Freeware developed by Achim Schaller
- Automatically combines 200 – 300 short exposure images to create as Star Trail composite
- Autoamatically applies dark frames when suppliedd
- http://www.startrails.de/html/software.html

Creating Composites Using Startrails



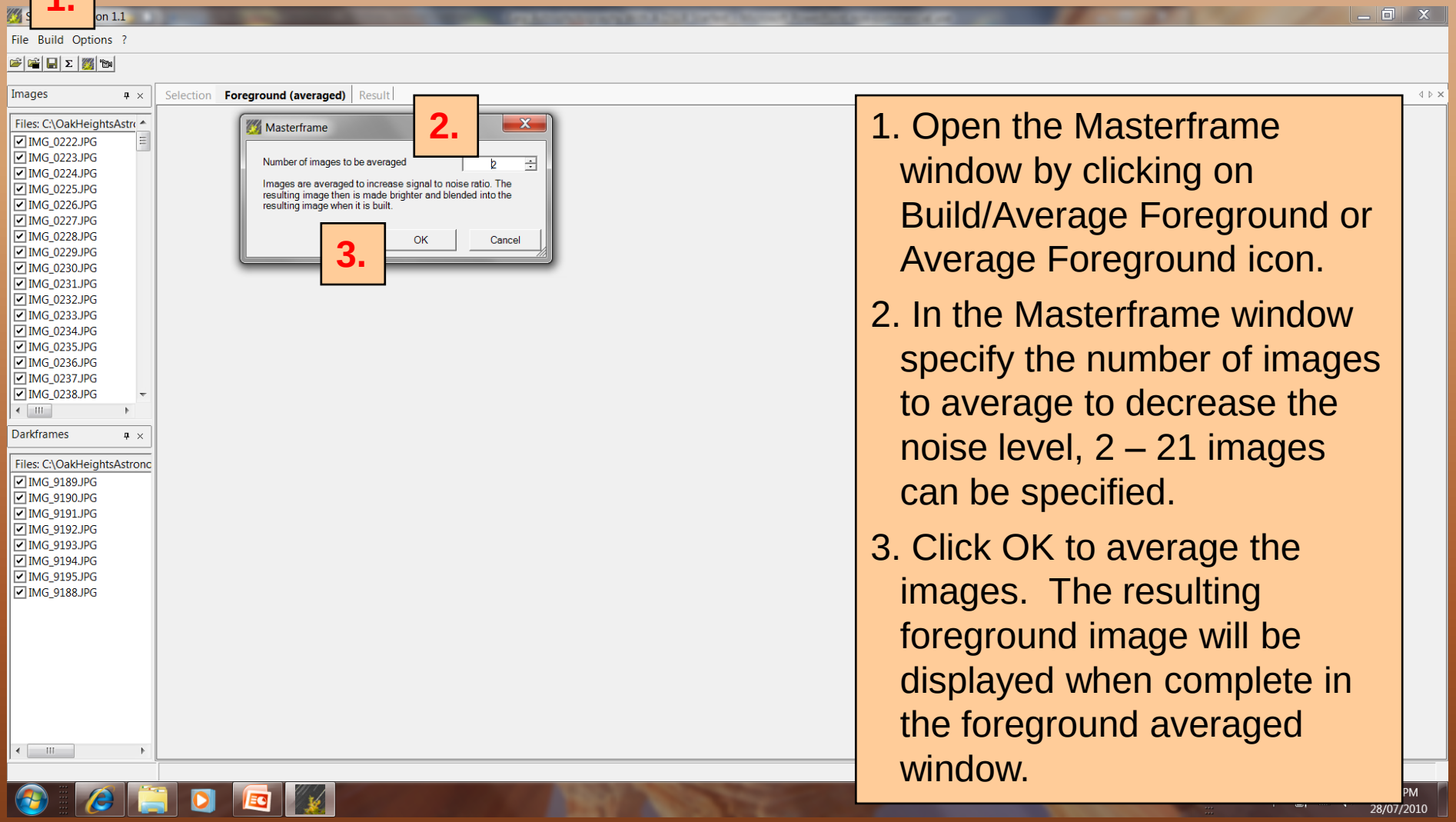
1. Open the Image selection window by clicking on File/Open Images or Open Images icon.
2. In the “Bilder wahlen” (pictures selection) window navigate to the location of the Images.
3. Highlight the images to import.
4. Click Open to import the images.

Creating Composites Using Startrails - Darkframes



1. Open the Darkframe selection window by clicking on File/Open Darkframes or Open Darkframes icon.
2. In the “Bilder wahlen” (pictures selection) window navigate to the location of darkframe images.
3. Highlight the darkframes to import.
4. Click Open to import the darkframes.

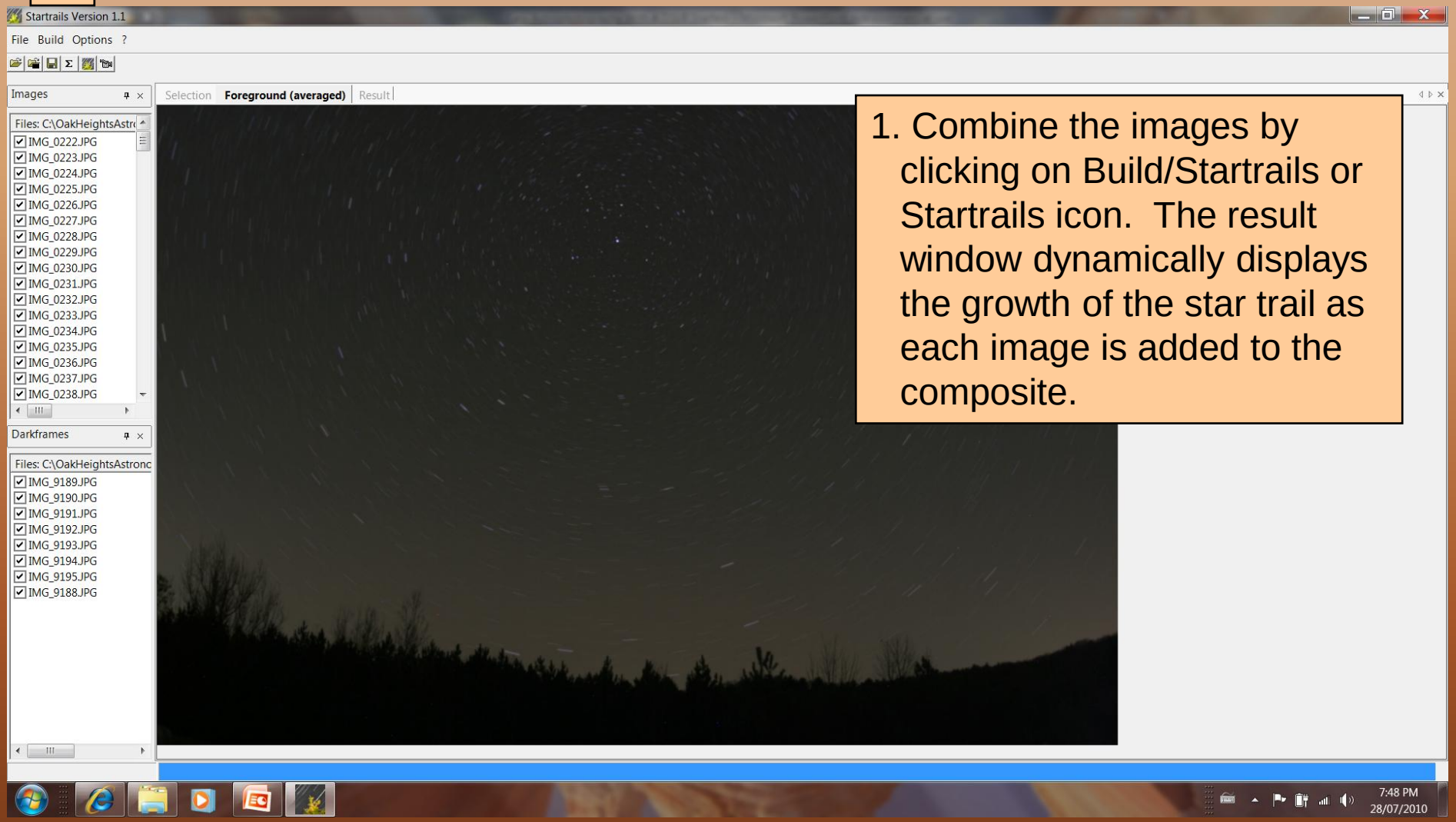
Creating Composites Using Startrails - Masterframe



1. Open the Masterframe window by clicking on Build/Average Foreground or Average Foreground icon.
2. In the Masterframe window specify the number of images to average to decrease the noise level, 2 – 21 images can be specified.
3. Click OK to average the images. The resulting foreground image will be displayed when complete in the foreground averaged window.

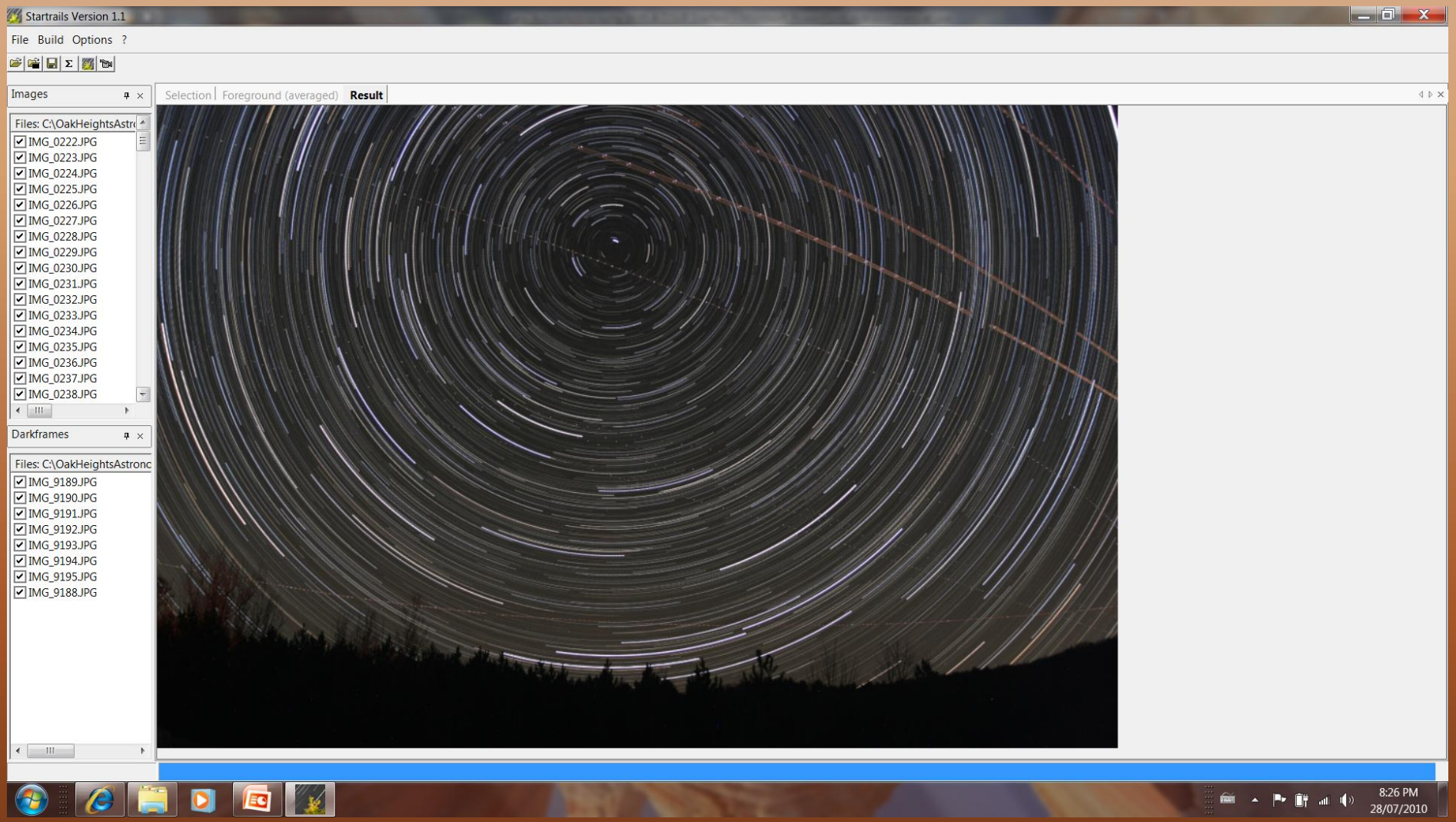
Creating Composites Using Startrails – Trail Build

1.

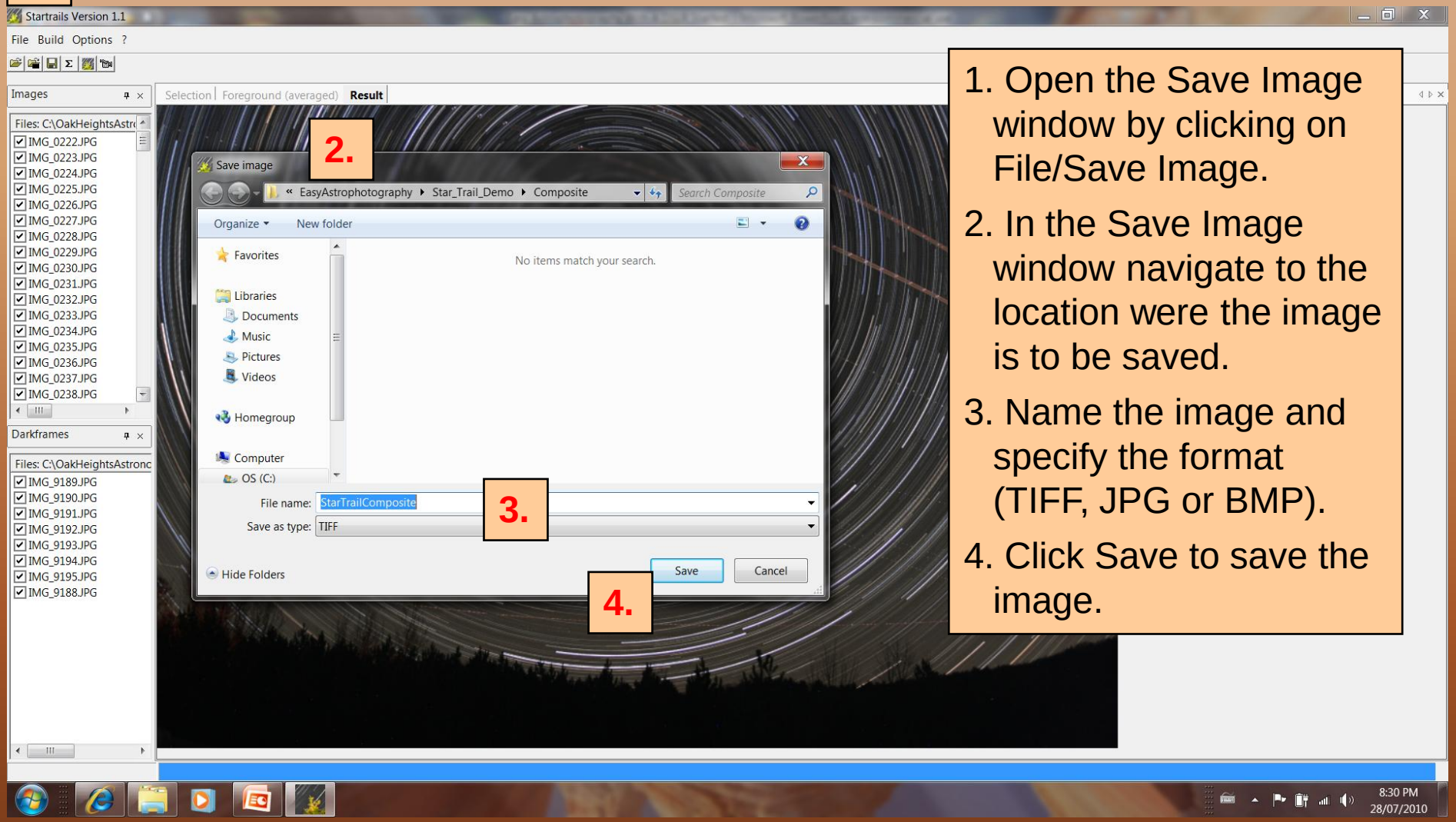


1. Combine the images by clicking on Build/Startrails or Startrails icon. The result window dynamically displays the growth of the star trail as each image is added to the composite.

Creating Composites Using Startrails - Result



Creating Composites Using Startrails – Save Composite

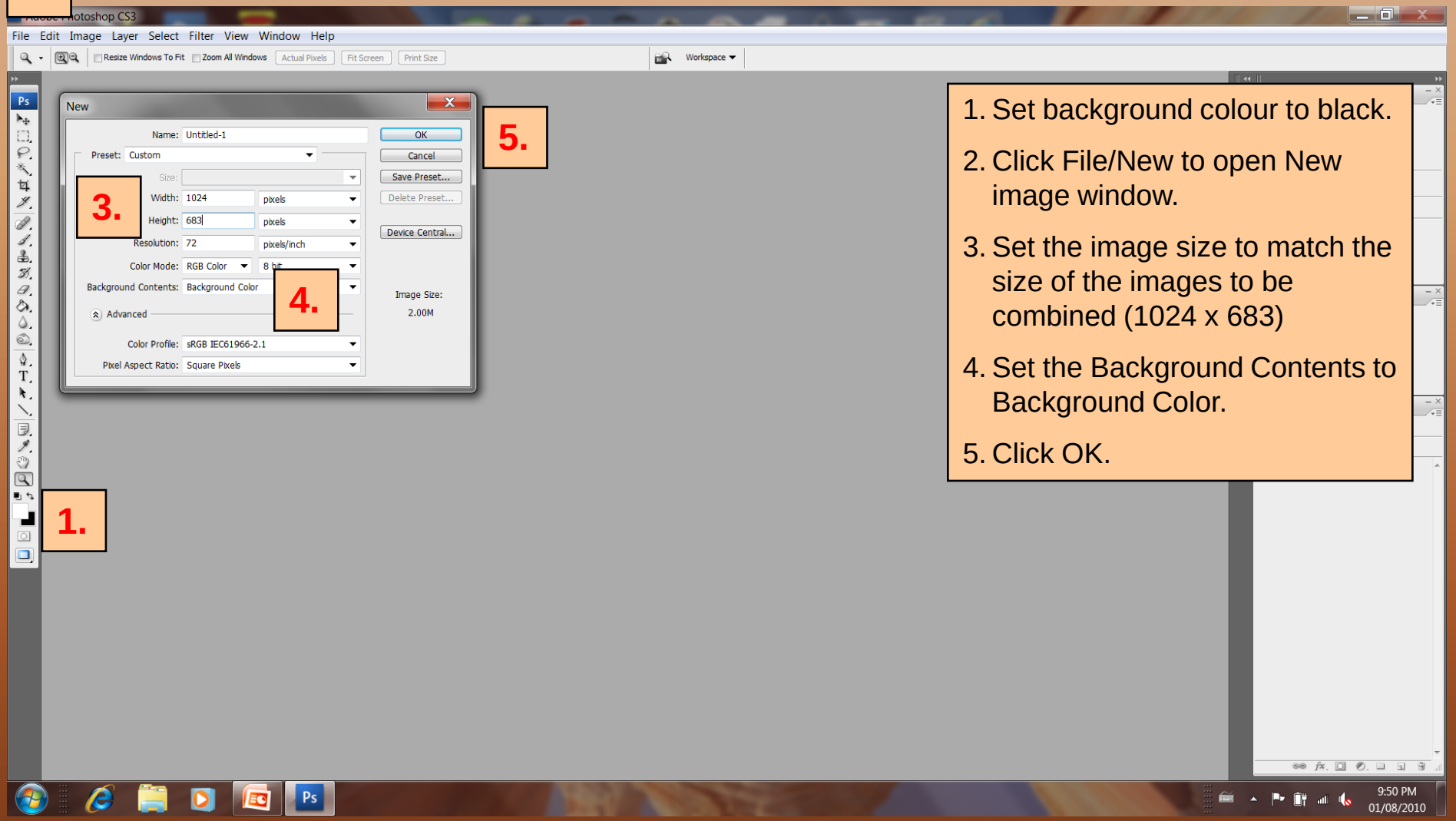


1. Open the Save Image window by clicking on File/Save Image.
2. In the Save Image window navigate to the location were the image is to be saved.
3. Name the image and specify the format (TIFF, JPG or BMP).
4. Click Save to save the image.

Creating Star Trails With Photoshop

- Photoshop can be used to combine two or more images to create star trails by combining layers using the lighten blend options.
- This process can be automated using actions and batch processing capabilities.
- This is a multi-step process:
  1. Determine the steps that need to be followed to combine two images together using the lighten blend option.
  2. Create an Action by recording the steps that were used to combine the images.
  3. Playback the Action using the File/Automate/Batch selection
- Actions can be replayed as often as required
- Actions can be created to automate many routine image processing activities

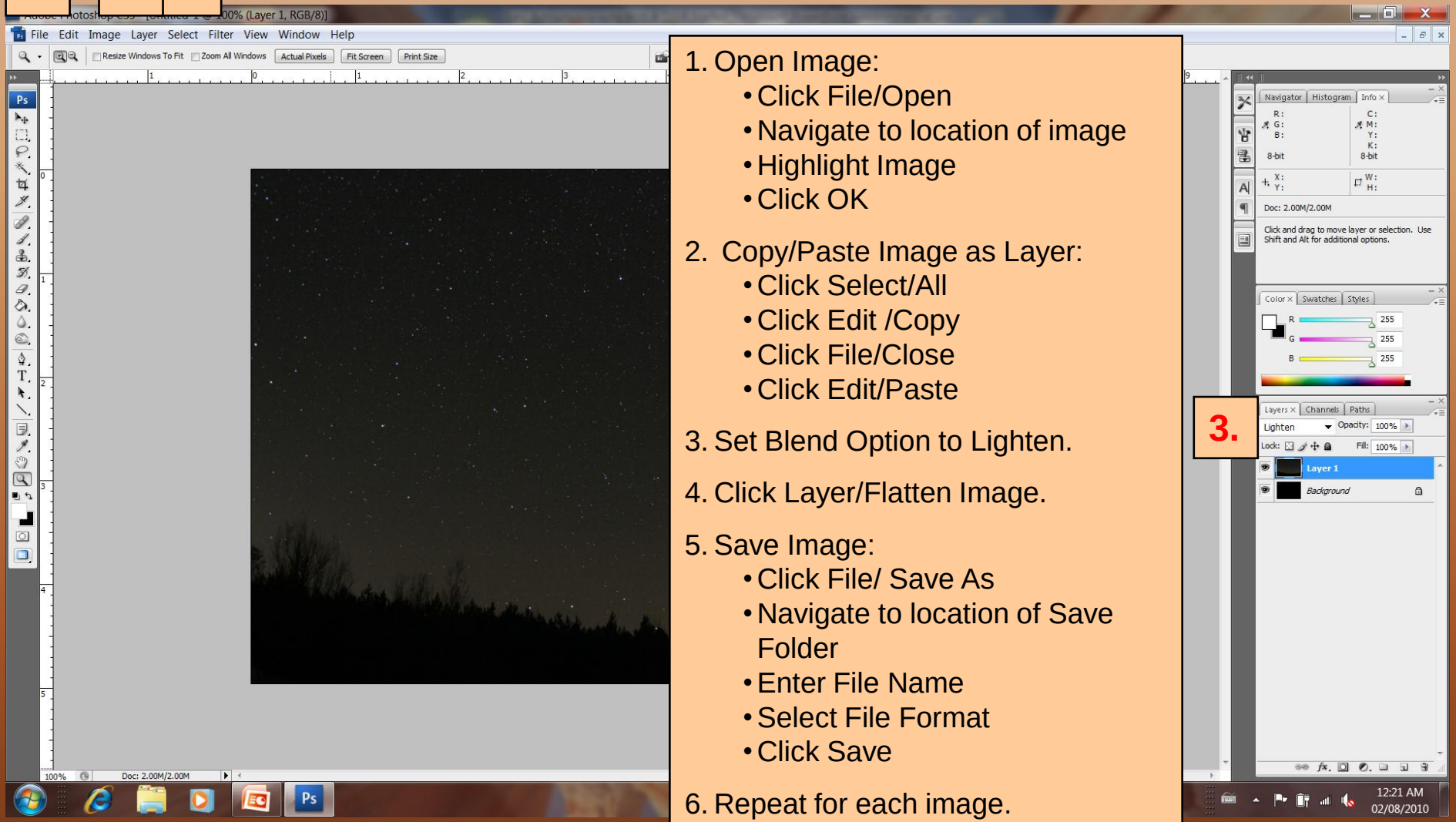
Creating Star Trails With Photoshop – Black Background Image



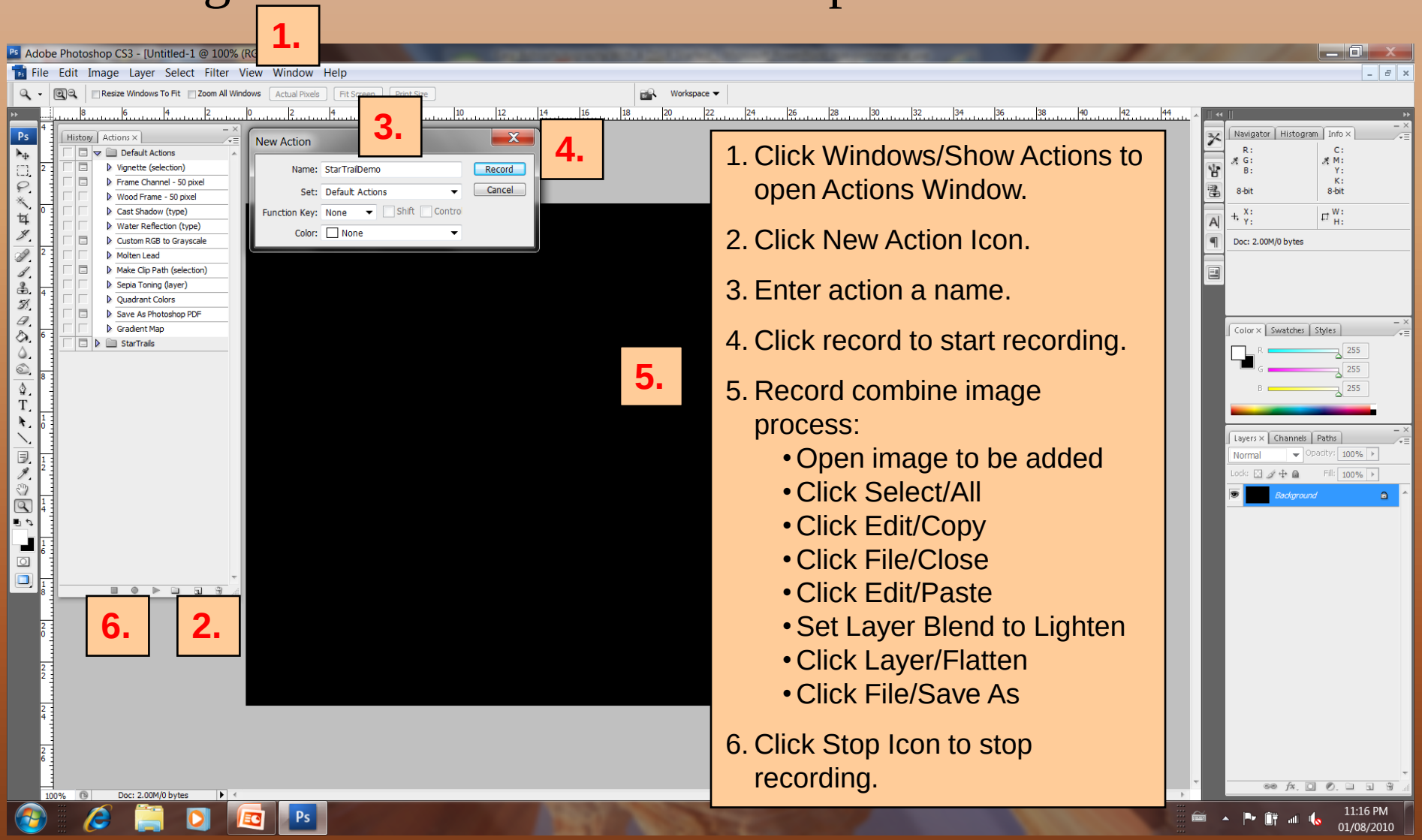
1. Set background colour to black.
2. Click File/New to open New image window.
3. Set the image size to match the size of the images to be combined (1024 x 683)
4. Set the Background Contents to Background Color.
5. Click OK.

Creating Star Trails With Photoshop – Combine Images

1. Open Image:
   - Click File/Open
   - Navigate to location of image
   - Highlight Image
   - Click OK
2. Copy/Paste Image as Layer:
   - Click Select/All
   - Click Edit /Copy
   - Click File/Close
   - Click Edit/Paste
3. Set Blend Option to Lighten.
4. Click Layer/Flatten Image.
5. Save Image:
   - Click File/ Save As
   - Navigate to location of Save Folder
   - Enter File Name
   - Select File Format
   - Click Save
6. Repeat for each image.

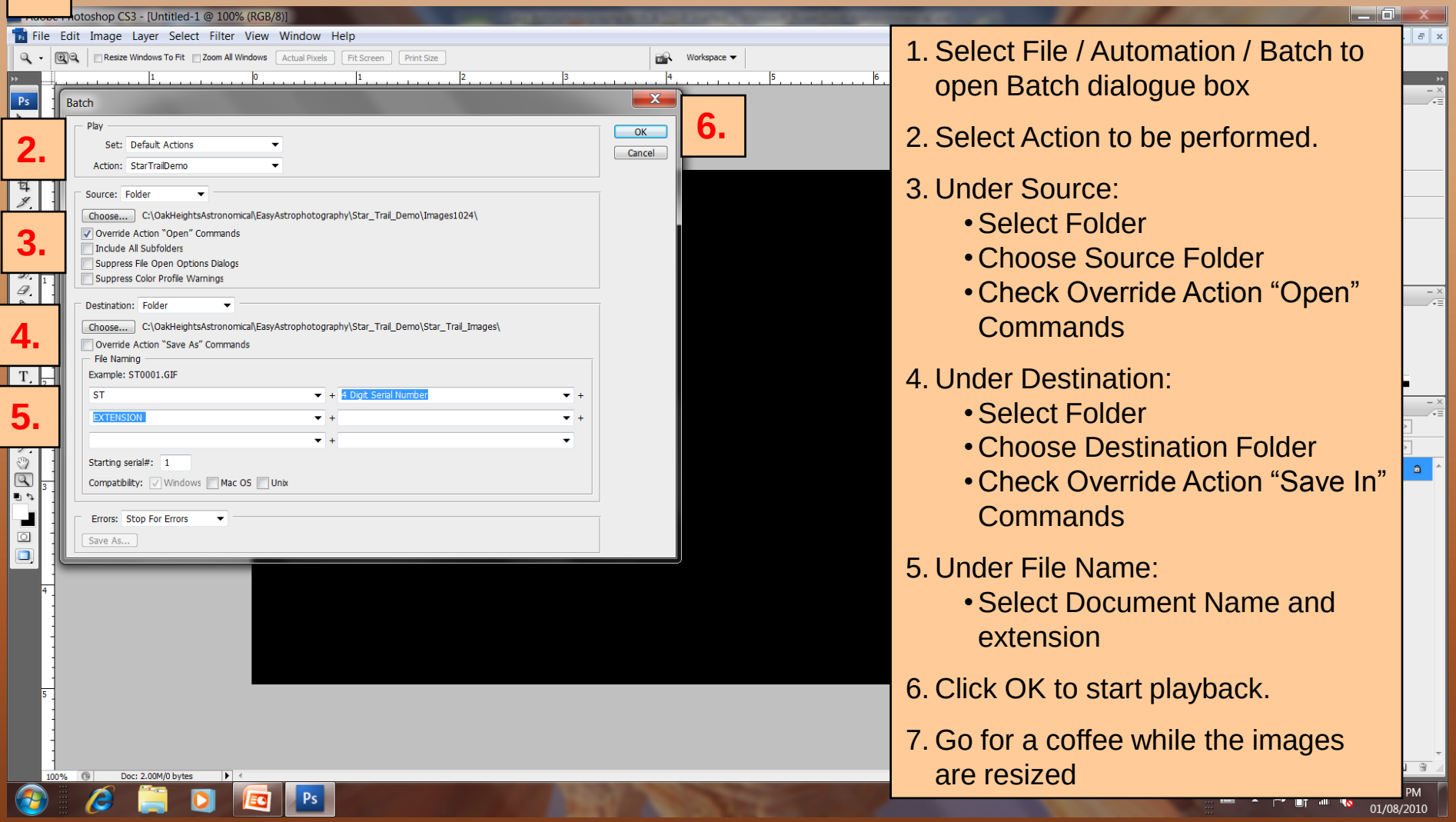


Creating Star Trails With Photoshop – Create An Action



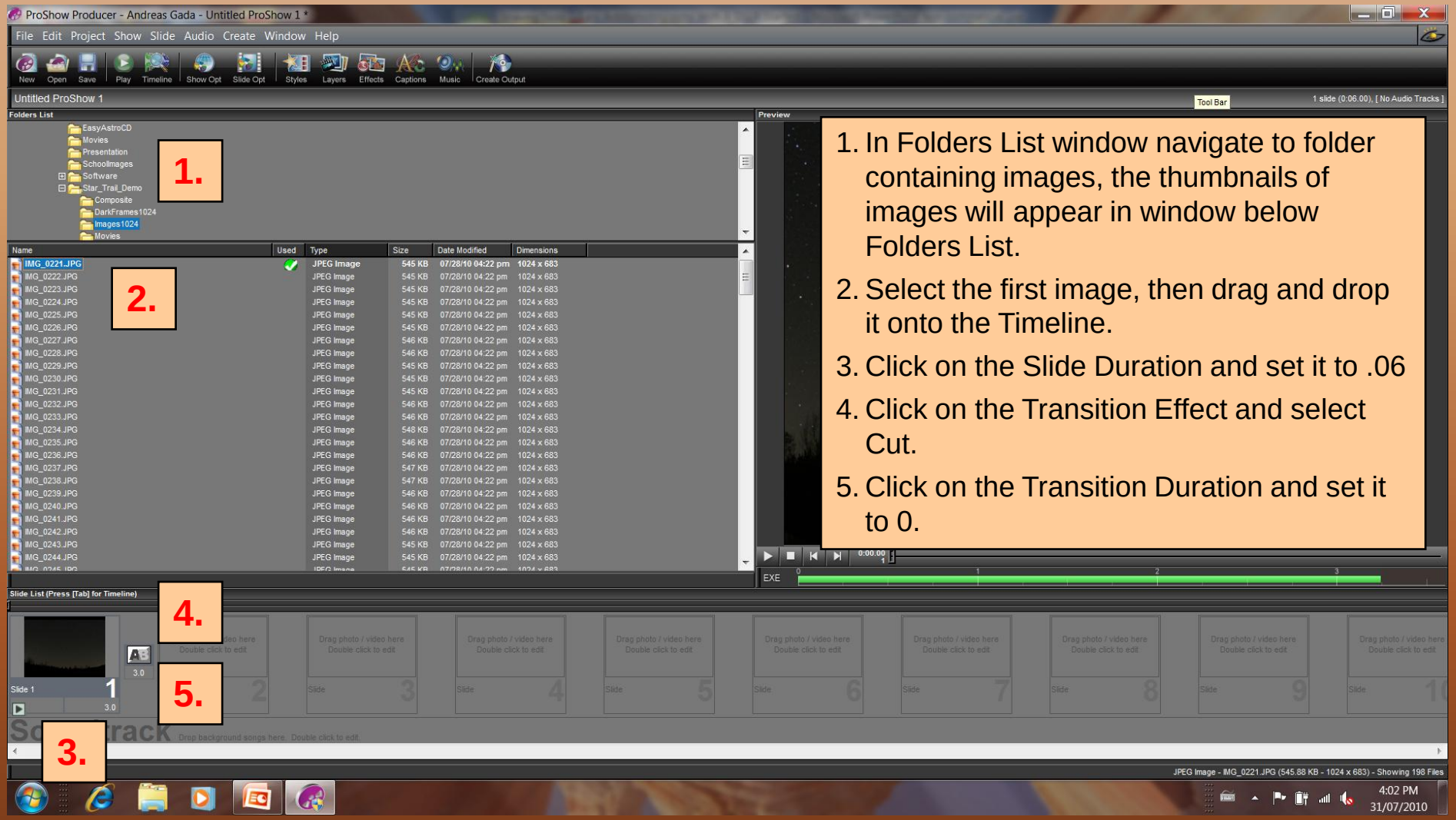
1. Click Windows/Show Actions to open Actions Window.
2. Click New Action Icon.
3. Enter action a name.
4. Click record to start recording.
5. Record combine image process:
   - Open image to be added
   - Click Select/All
   - Click Edit/Copy
   - Click File/Close
   - Click Edit/Paste
   - Set Layer Blend to Lighten
   - Click Layer/Flatten
   - Click File/Save As
6. Click Stop Icon to stop recording.

Creating Star Trails With Photoshop – Using A Batch Command

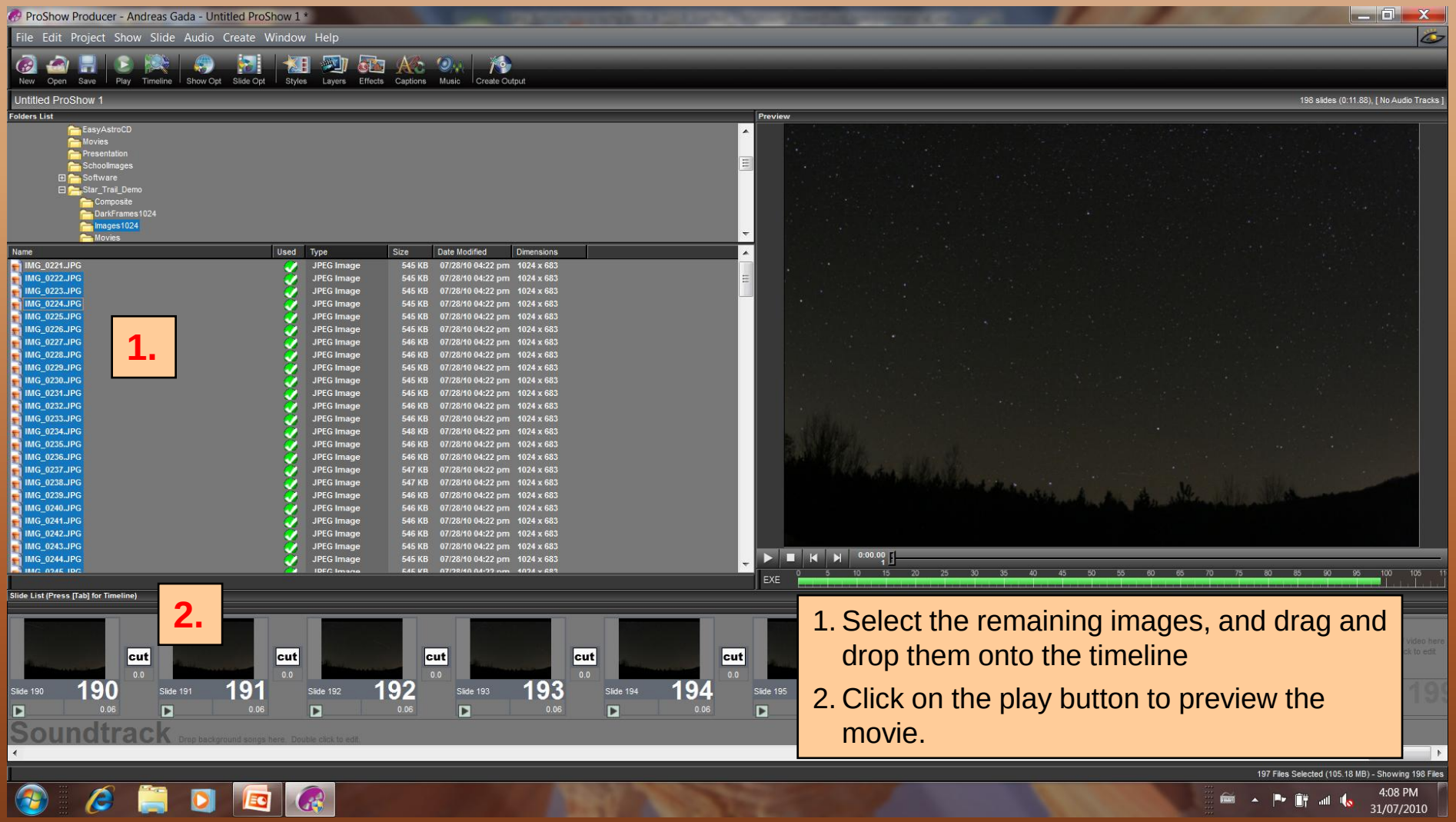


1. Select File / Automation / Batch to open Batch dialogue box
2. Select Action to be performed.
3. Under Source:
   - Select Folder
   - Choose Source Folder
   - Check Override Action “Open” Commands
4. Under Destination:
   - Select Folder
   - Choose Destination Folder
   - Check Override Action “Save In” Commands
5. Under File Name:
   - Select Document Name and extension
6. Click OK to start playback.
7. Go for a coffee while the images are resized

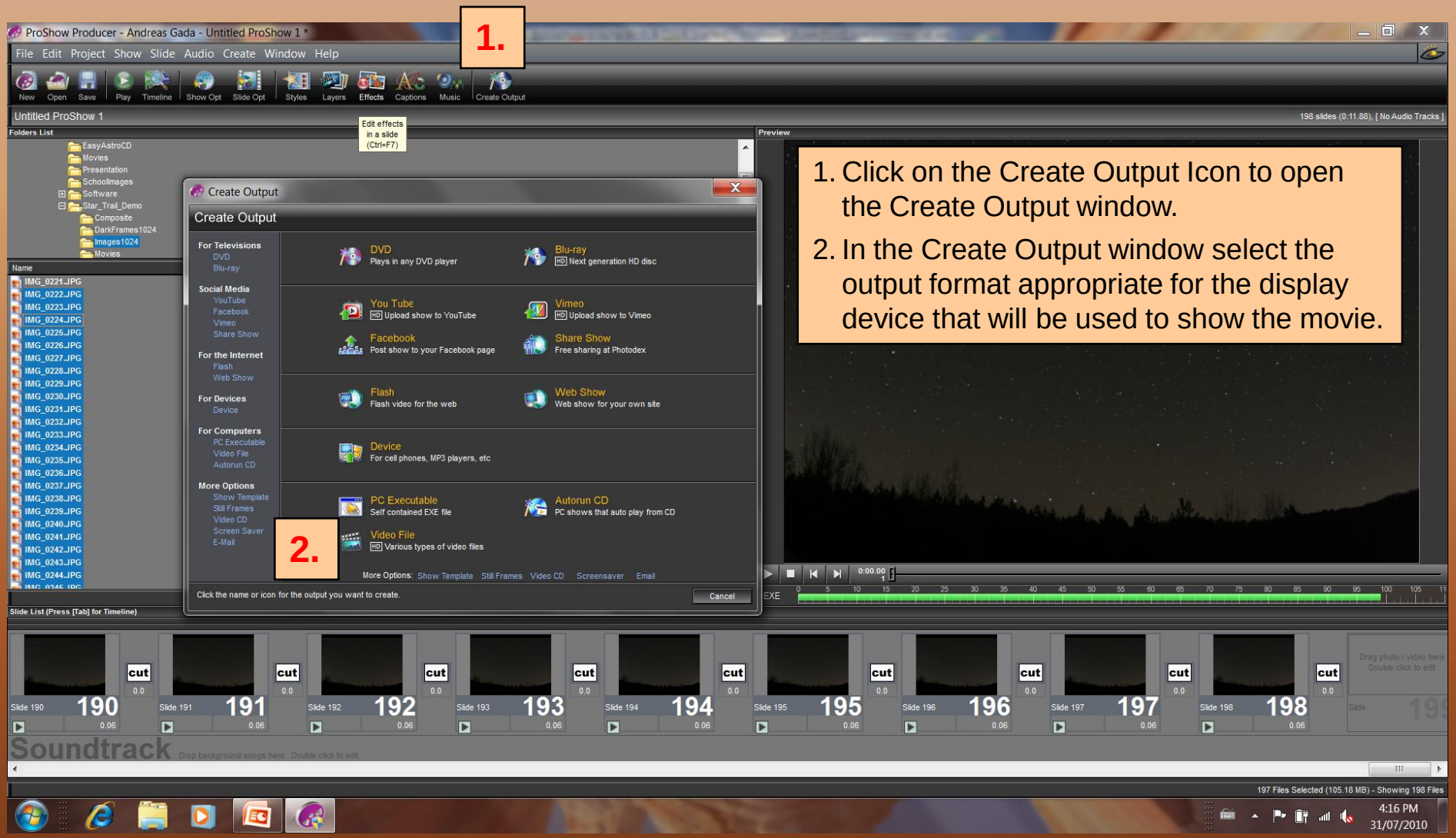
Creating Movies Using Proshow



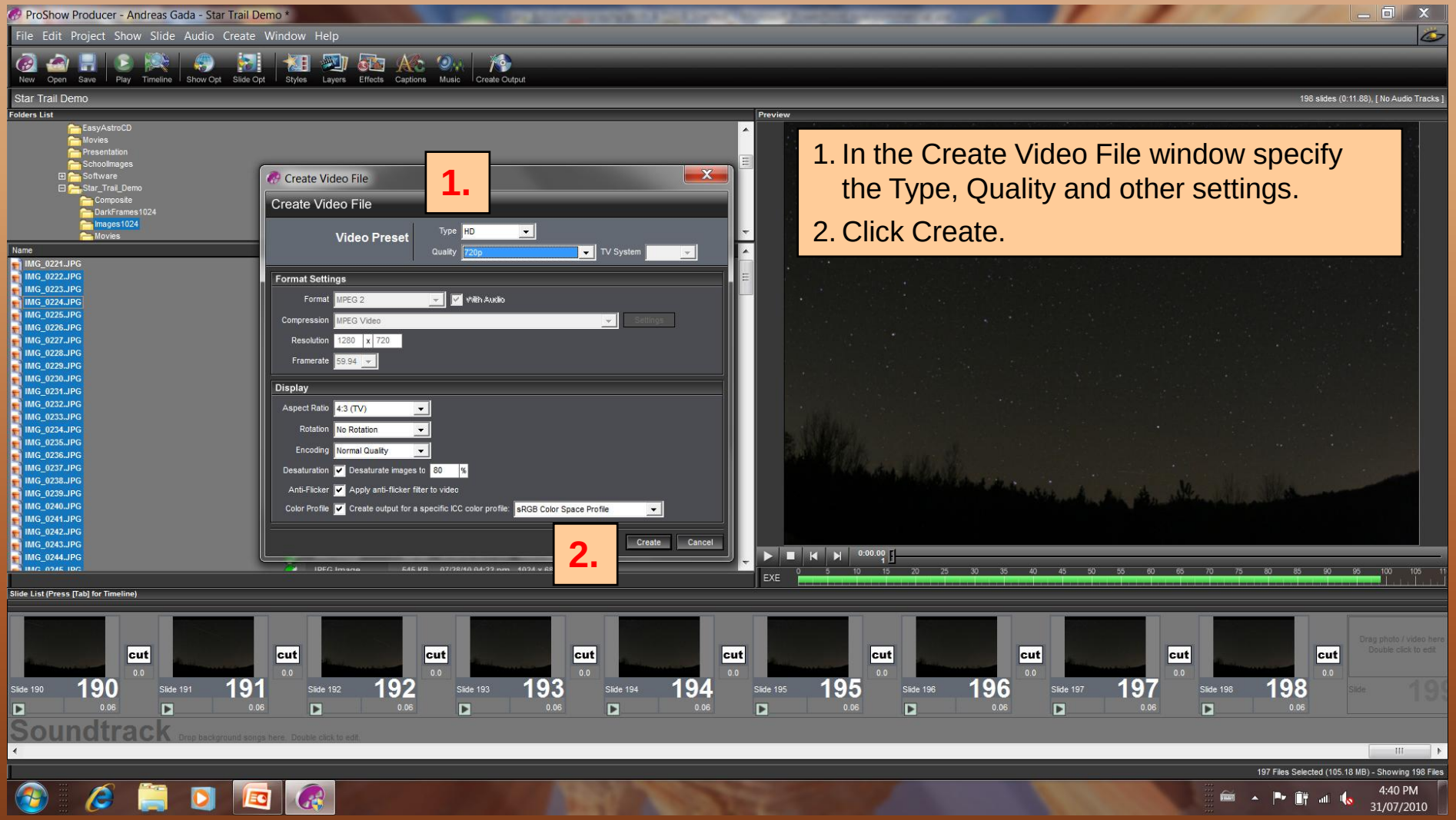
Creating Movies Using Proshow



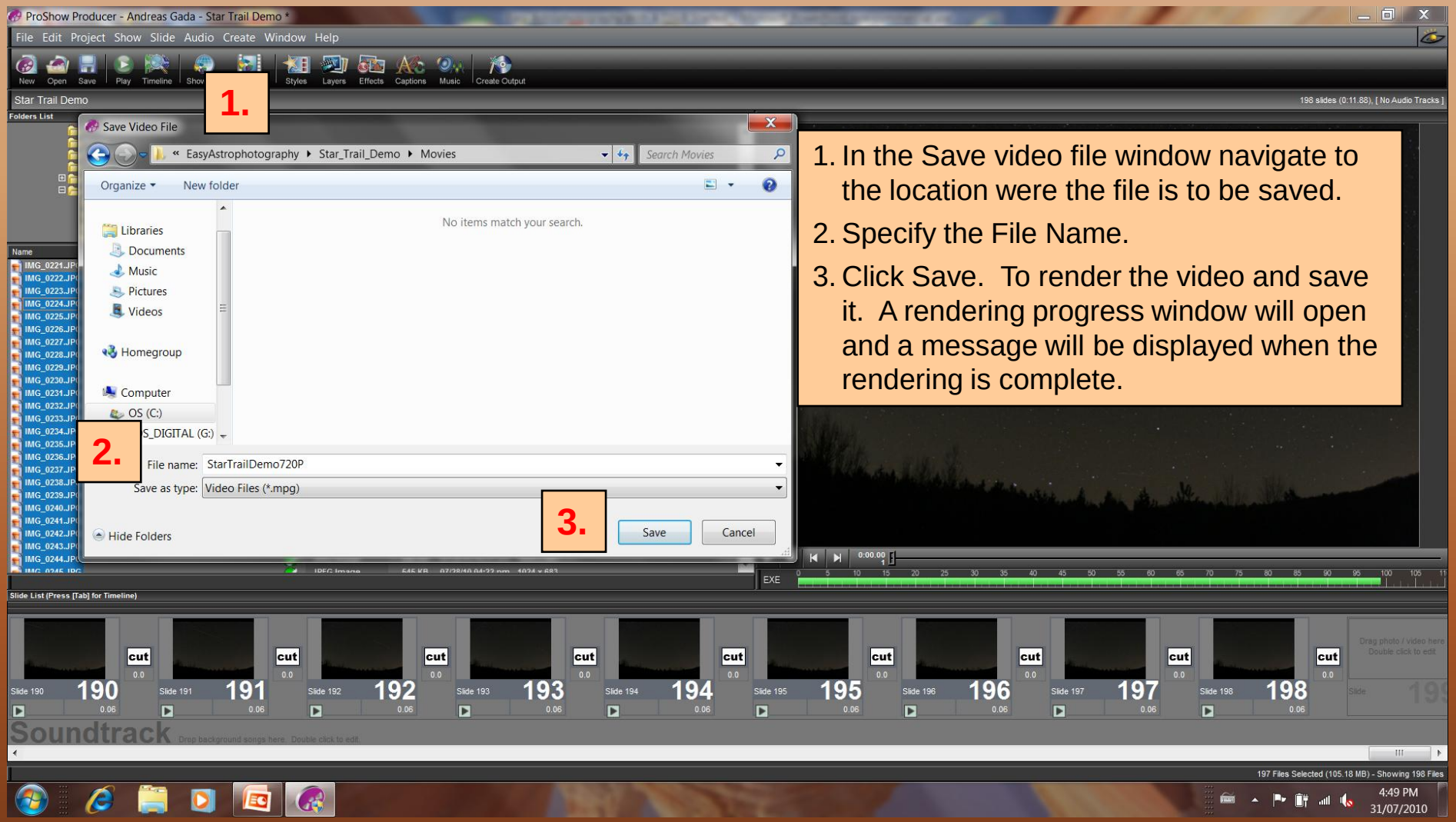
Creating Movies Using Proshow



Creating Movies Using Proshow

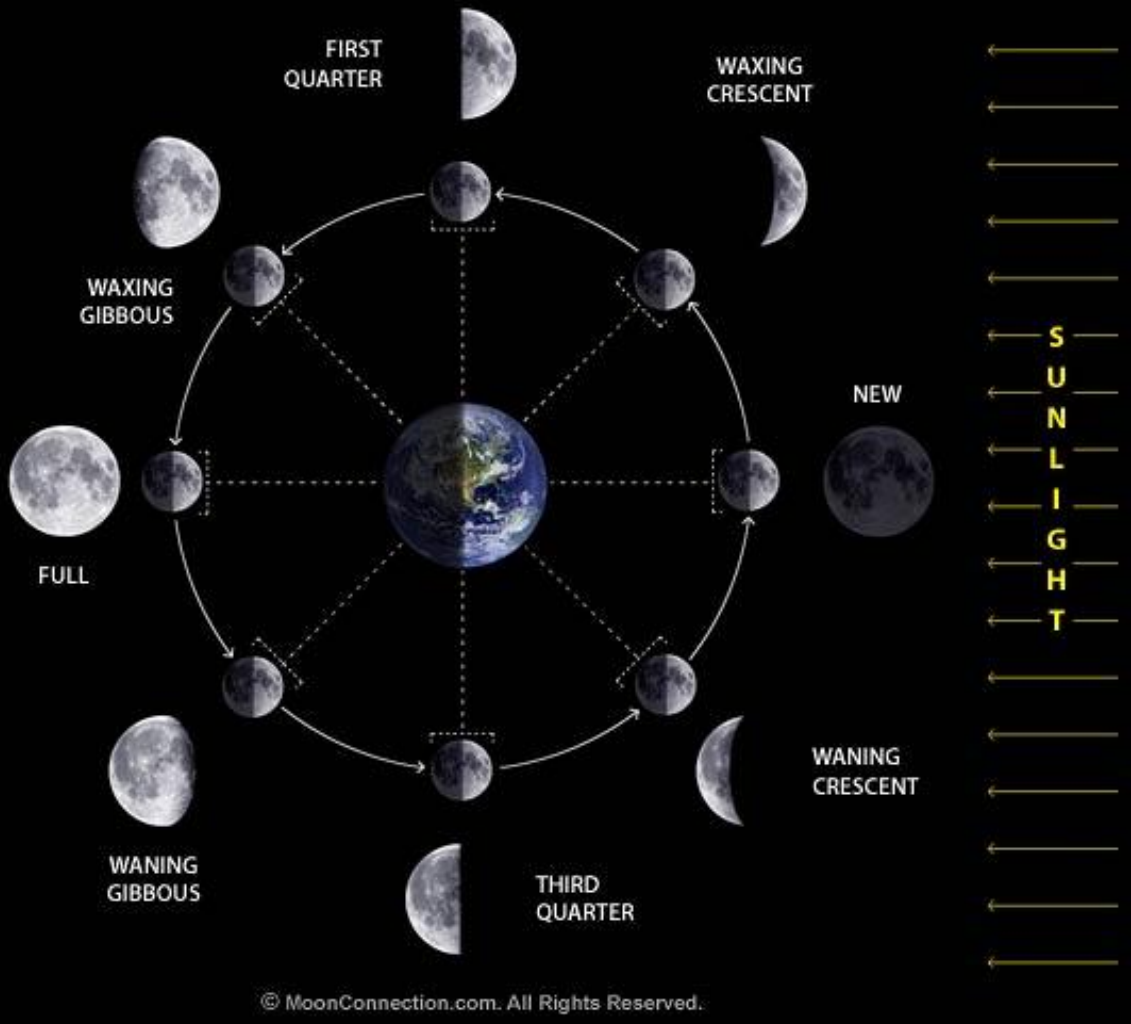


Creating Movies Using Proshow



The Moon

Moon Phases


FIRST QUARTER
WAXING CRESCENT
WAXING GIBBOUS
NEW
FULL
WANING CRESCENT
WANING GIBBOUS
THIRD QUARTER
SUNLIGHT
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Moon Exposure Table

ISO	**f/ Stop**				
100	2.8	4	5.6	8	11
200	4	5.6	8	11	16
400	5.6	8	11	16	22
800	8	11	16	22	32
1600	11	16	22	32	44
3200	16	22	32	44	64
Moon Phase	**Exposure Time**				
Full Moon	1/2000	1/1000	1/500	1/250	1/125
Gibbous	1/1000	1/500	1/250	1/125	1/60
First / Last Quarter	1/500	1/250	1/125	1/60	1/30
Thick Crescent	1/250	1/125	1/60	1/30	1/15
Thin Crescent	1/125	1/60	1/30	1/15	1/15
Earthshine	1/4 - 3"	1/2 - 2"	3" - 4"	2" - 8"	2" - 13"

Moon Over Gobi Desert, Jul 19, 2008, Gobi Desert Mongolia,

Canon 40D, 200 mm f/8, 1/180”, ISO-800

Moon Rise Over Gobi Desert, Jul 19, 2008, Gobi Desert Mongolia,

Canon 40D, 200 mm f/9.5, 1/30”, ISO-800

Moon Set over the Mediterranean, Feb 1, 2010, Tripoli Libya

Kodak DX4330, 24 mm f/4.8, 4”, ISO 400

Mongolian Moon Rise, Jul 31, 2008

Canon 40D, 200mm f/6.7, 0.7”, ISO-400

Mongolian Moon Set, Aug 3, 2008

Canon 40D, 200mm f/11, 1/10”, ISO-200

Moon and Venus, Jan 20, 2007, Oak Heights

Canon 20Da, 200mm f/6.3, 1/2”, ISO-800

Lunar Halo, Mar 15, 2008,

Sandy Flats,

Canon 20Da, 10 mm f/3.5, 8”, ISO-400

Painting With Light

Mongolian Ger Camp, Canon 20Da, 10mm f/3.5, 60”, ISO-1600

ISS with Star Trails, Sep 12, 2009, Sandy Flats

Canon 40D, 16mm f/3.5, 60”, ISO-1600, composite of 80 images

Moonlit landscapes, Aug 13, 2009, Muskoka

Canon 40D, 59 mm f/4.5, 30”, ISO-1600

Observing at Sandy Flats, Apr 7, 2008, Sandy Flats

Canon 40Da, 10 mm f/3.5, 30”, ISO-1600

Observing Session, Aug 31, 2008, Oak Heights

Canon 40D, 10mm f/3.5, 60”, ISO-1600

Astrophotography Assignment
The Basics

1. Review your camera's instruction manual to determine if it has night landscape and/or manual mode and learn how to use these modes.
2. Using a tripod, photograph the night sky. Take several photographs with different exposures. Point the camera north, south, east and west.
3. Using a tripod, photograph the moon.

Astrophotography Assignment The Challenge

1. Using the images and software provided create a composite star trail image.
2. Using Windows Movie Maker (or ProShow Gold) create a time-lapse movie showing the motion of the stars. Add titles and music to your movie.

Web Resources

http://www.skynews.ca/

http://www.skyandtelescope.com/

http://www.heavens-above.com/

http://www.nyaa.ca/

Astrophotography Contest

Astrophotography Contest

Shoot the Stars

The night sky in Lennox and Addington County is so pristine that it offers the best area in southern Ontario to stargaze…and to shoot the night sky! In partnership with the Napanee Photo Club, Lennox and Addington County is holding its first photo contest to capture the beauty of our night skies. Whether you are an amateur or professional photographer, we invite you to join us for this unique experience.

Regsiter now for this free events to have a chance of winning one of three prizes – First - $250 Second - $125 and Third - $75.

Award winners will have their photos displayed at the Lennox and Addington County Museum and will be
featured on Lennox and Addington County and Napanee Photo Club's web sites. There will be a 'best show'
recognition award as well.

What: Photo contest open to all photographers – amateurs, hobbyists and professionals alike – and features a workshop by Terence Dickinson on how best to capture the beauty of the night sky. Following this tutorial, participants will be driven to one of the best locations north of Napanee to put their knowledge to work.

When: Wednesday, September 15, 2010 commencing at 6:30pm with a reception followed by Mr. Dickinson's tutorial and field shoot.

Where: Workshop held at the Smiling Wilderness Restaurant Banquet Hall (824 Palace Rd/Hwy 401). Participants will receive a comprehensive tool kit outlining submission requirements, timelines and award structure.

Please RSVP for this event by contacting Rob Plumley at 613-354-4883 ext. 271 or rplumley@lennox-addington.on.ca. Space is limited so please register now.