Photographing Lightning Summary Notes by Mary McIntyre

What is lightning?

- A naturally occurring electrostatic discharge, where 2 electrically charged regions temporarily equalize
- Causes an instantaneous release of a huge amount of energy so your number one priority is to **stay safe!** If you count the seconds between a lightning flash and the thunder then divide by 5, it tells you how many miles away the discharge was. A count of 5 seconds means the discharge was just 1 mile away!
  Be mindful of the 30:30 rule; if you can count fewer than 30 seconds from lightning to the thunder you are potentially in danger. Take shelter and wait for 30 minutes. If you are out and about being inside your car is a safe place because it acts like a faraday cage (don't touch any metal parts!). If you're out walking and away from your car, do not shelter under a tall tree – instead keep low to the ground.
- The 3 distinct types categorised by where they occur:
  - inside a single thundercloud
  - between 2 different clouds (cloud to cloud or CC)
  - between a cloud and the ground (cloud to ground or CG)
- Thunder is caused by rapid increase in pressure of gas in the air following the discharge

Getting Started – you will need:

- Camera
- Tripod
- Remote shutter cable
- **Waterproof camera cover – very important!**
- Neutral Density Filters for shooting in the daytime
- Practice manual focusing! – Infinity will be too far, so you may need to focus on a distant object in daylight and put a bit of tape on the lens. Autofocus will not work on a dark, cloudy sky!

Keep an eye on the Real Time Lightning Map or use the Blitzortung App to track the movement of storms and chose your vantage point. It is safer, easier (and drier!) to photograph lightning from a distance (if you have a flat horizon you can image storms over 40 miles away)

Remember that having foreground interest gives context and scale and will make the shot even more appealing.

Photographing Lightning in Daylight:

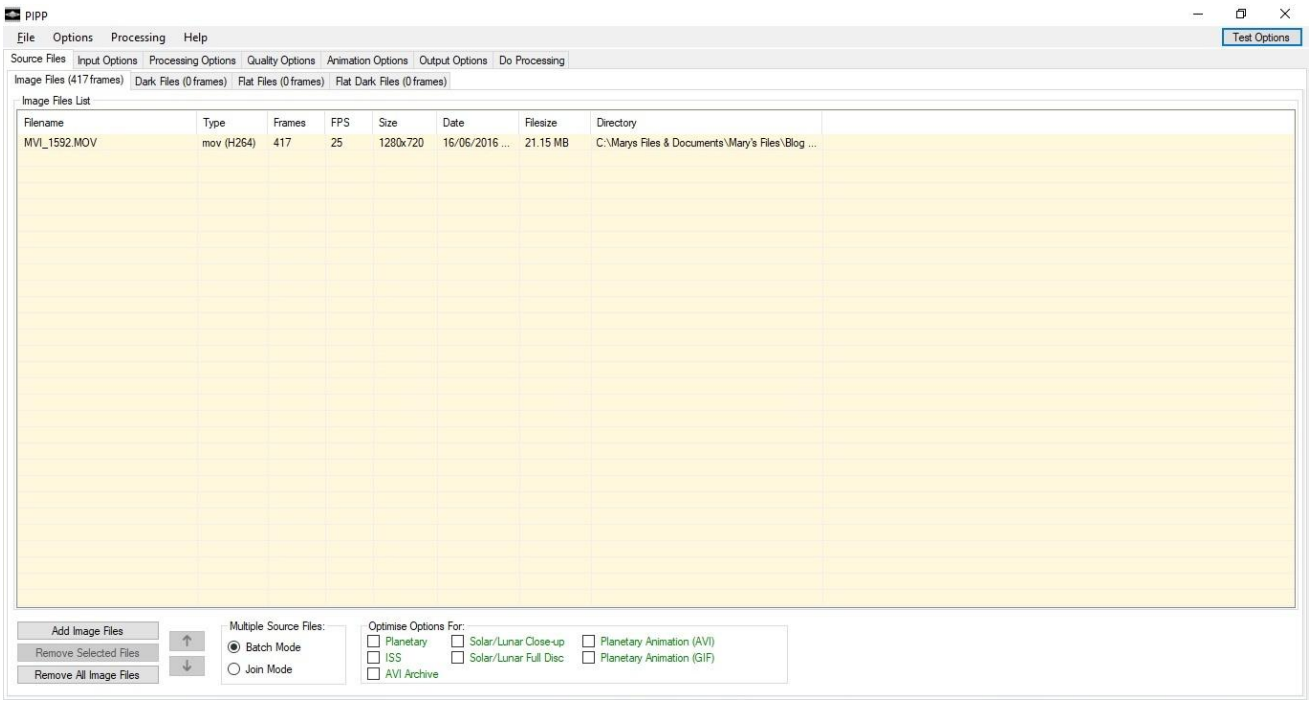
2 methods:

- 1. Shoot lots of short videos. If you capture a flash, extract the individual frames using PIPP and process the frames as if they are still images (see instructions below on how to do this). The result will be screenshot resolution, but better than nothing!
- 2. Use neutral density filters to cut down the light. This allows you to shoot a continuous sequence of longer exposures, and removes the need for you to try and react to the lightning flash. The images can lack definition using this method but with some processing you can still some nice images
    - I bought the set of ND 2, 4, 8 and 16 and use 8 and 16 stacked together
    - Set the f/stop to 22, ISO-100 and around 2 to 5 seconds
    - Keep shooting on continuous and hopefully you'll catch a lightning flash
    - This method risks you missing a lightning flash during the frequent gaps while the image is saving to card, but it takes up much less room on a memory card than lots of video clips, plus there is less processing involved. The downside is that the lightning will have less contrast against the sky so only bright flashes are caught

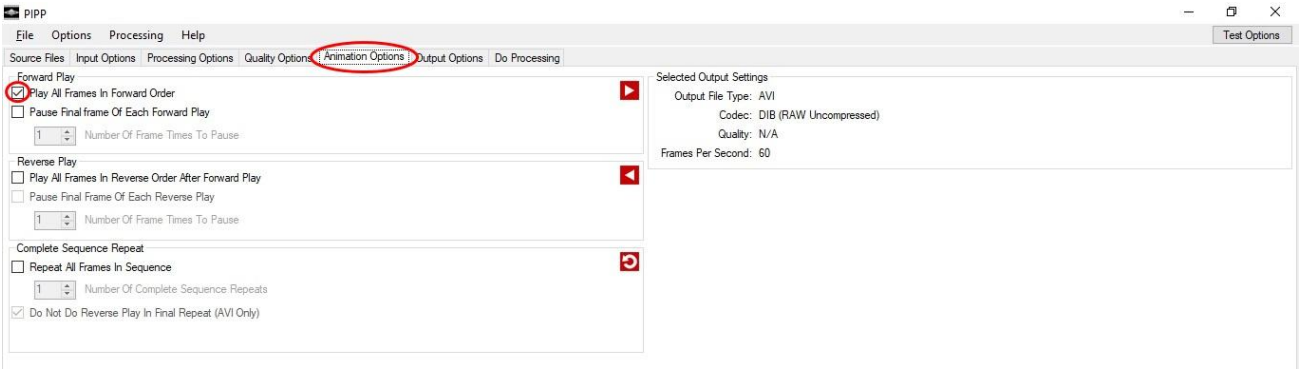
How to Extract Frames from a Video using PIPP

For this demo I used a 16 second long video taken with my Canon 1100D on 16th June 2016

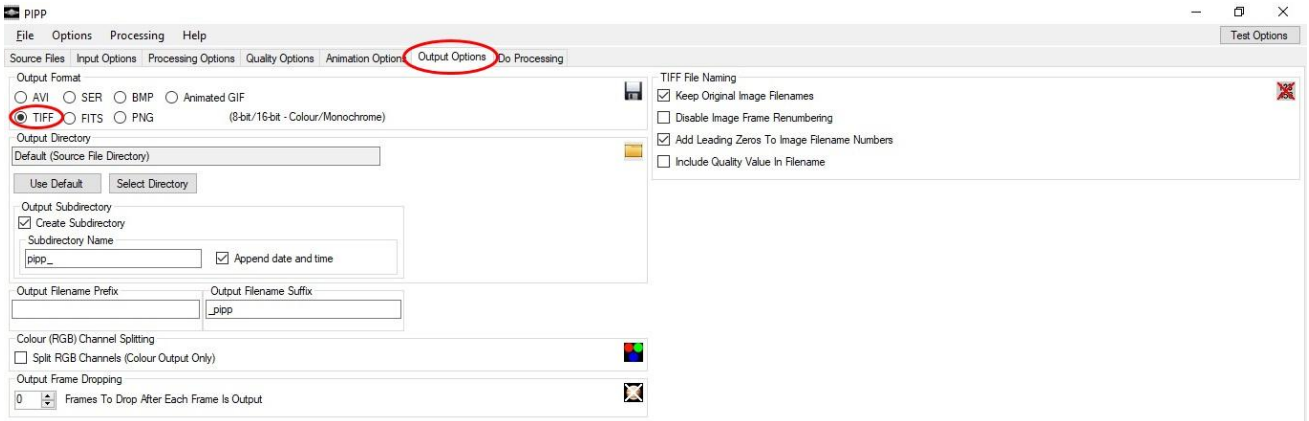
Step 1: Open PIPP then drag and drop your video file into it



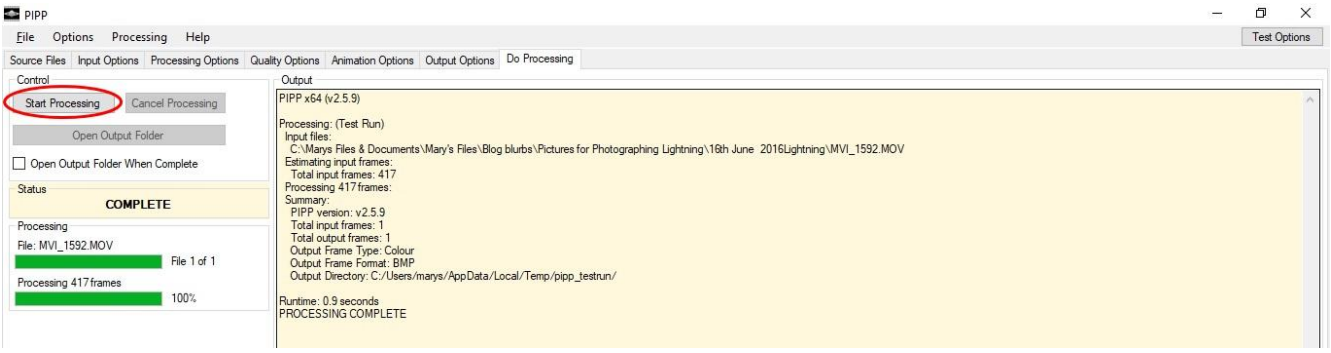
Step 2: In the **Animation Options** tab, check the **play all frames in forward order** box



Step 3: In the **Output Options** tab, select **TIFF**



Step 4: In the **Do Processing** tab, click **Start Processing**



PIPP will now exact all of the frames from the video and save them in a separate folder. This video contained 417 frames and the lightning crossed over 5 of them. You can stack those images together or just select the best image from them. The image will probably be over-exposed but you can correct that with some post-processing. The images before and after processing are shown below. You can use this same method to extract frames from a video shot at night.

Method 2 – Using Neutral Density Filters

For comparison, below is a picture of lightning taken in daylight with ND filters. The lightning doesn't look as dramatic as photos taken at night. This is because the background sky is much lighter so the relative brightness of the lightning flash compared to the sky is much less.

The photo below was taken closer to sunset, so the lightning stands out a little more

Photographing Lightning at Night:

This is much easier because you can shoot at a low ISO and do longer exposures. A lightning flash is so bright that it will have no problem being detected by your camera

- Set the f/stop to between 3.5 – 8, ISO-100 for 5 – 10 seconds (depending how often flashes are occurring). If the shots are looking over-exposed stop the lens down a couple more steps.
- Shoot on continuous to make sure you don't miss any flashes
- If you keep the camera still you can stack all of the images which contain lightning bolts to produce a really striking image (no pun intended!) I use StarStaX for this, which is free to download, link below
- You can also create a timelapse video with your images shot on continuous
- If you are shooting with a mobile phone or any other camera with a video function, you can shoot short video clips and use PIPP to extract all of the still frames from the video. Depending on the frame rate, you may get lightning in several frames so you can stack them together using StarStaX or Photoshop

Image Processing:

Usually only minimal processing is required if the exposure was right. But the following will help to improve things:

- If the lightning bolt is over-exposed, turn down the highlights
- Increase the clarity / sharpen a bit if necessary
- Correct white balance if necessary
- You can also create a timelapse video with your images shot on continuous

Keep an eye on the movement of the storm and if it is getting too close, get yourself somewhere safe. It's really not worth the risk for a nice photo.

Single lightning shot

Stack of 7 lightning shots, stacked using StarStaX

Photographing Lightning with a Mobile Phone Camera

The easiest way to do lightning photography with a phone camera, regardless of whether you're doing it in the daytime or at night, is to shoot video clips and capture lightning flashes. If there is a lightning bolt with good structure, just extract the frames using PIPP as described above. Remember that it's also fun to keep recording until after the thunder has finished because then you'll have an audio clip to go with each photo.

Sprites:

What are sprites?

- Clusters of large scale plasma discharges that occur 50 – 90 km above storm clouds
- It causes very faint and fast red/orange flashes so they are not visible during the day
- Usually triggered by discharge of lightning between cloud and ground
- First visual report was in 1730, but they were not photographed until 1989

"Dancing Sprites" photographed by Paul M. Smith

Photographing sprites:

- You will need a clear view of the sky above the storm clouds. They are so high above the thunderstorm that they can be photographed from hundreds of miles away. Our UK Meteor Network Cameras in the southern UK often capture sprites above storms happening over France but dedicated sprites photographers have captured them from 600 miles away
- Sprites are faint and fast. A common method of capturing them is to use a very high frame rate video camera and then extract the individual frames as described earlier
- To capture them with a DSLR, you will need to set the camera to a much higher ISO and lower f/stop and a shutter speed of 5 seconds. Then shoot on continuous and

hope for the best! Because sprites are usually a long way from the observer, a fixed 50mm lens is a great option, but sprites are absolutely huge, often a hundred miles tall, so if the storm is closer you may need a larger field of view. The people who regularly photograph sprites are using cameras capable of extremely high ISO settings without any noise issues, such as the Sony A7S

- An astronomy-modded camera will help because it has had the IR-block filter removed which makes it more sensitive to red light

One last thing to consider is that if you shoot in RAW, make sure you have a high speed memory card. A slow write to card speed means less time taking images so you could miss out on a really good lightning shot.

Don't forget to keep an eye out for interesting cloud formations such as shelf clouds which often accompany thunder storms. Also be mindful of the possibility of tornadoes – there are approximately 30-50 tornadoes each year in the UK!

Make sure you report your severe weather observations to TORRO – the Tornado and Storm Research Organisation

Once again, please stay safe!

Mary McIntyre

My lightning album on Flickr: http://bit.ly/2nfFeCm

Some useful links:

StarStaX - http://www.markus-enzweiler.de/software/software.html

PIPP - https://www.rsastro.com/downloads/

Real-Time Lightning Map - https://www.lightningmaps.org

The real-time lightning app is called Blitzortung

TORRO – http://www.torro.org.uk/

Mary's Social Media:
Email: spiceyspiney@gmail.com
Visit my website: www.marymcintyreastronomy.co.uk
Follow me on Facebook: facebook.com/marymcintyreastronomy
Follow me on X (formerly Twitter): @spicey_spiney
Follow me on Instagram: instagram.com/spiceyspiney/
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