



*An Astronomical Learning Curve;
- A Complete Beginner's Guide to Processing
of "Backyard" Planetary Images*

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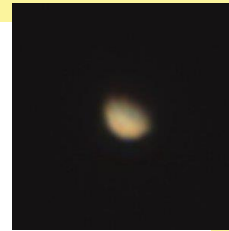
#PortsladePlanetarium

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My Planetary Imaging With Celestron CPC800; - 'The Planet Suite'



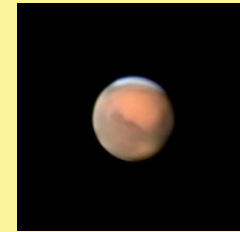
Neptune



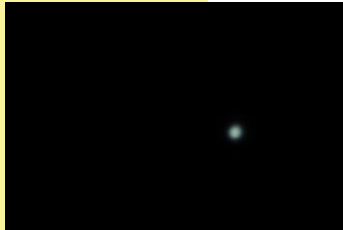
Mercury



Venus



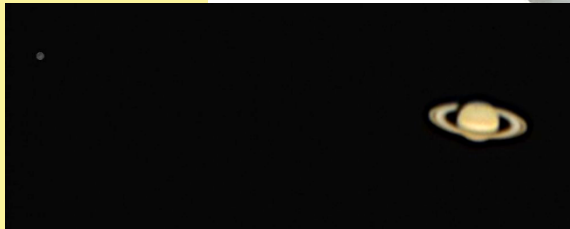
Mars



Uranus



Jupiter, Four Galilean Moons & 2 Shadows



Titan and Saturn



Moon

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Latest 'Star Party' & Jupiter Imaging Session With CPC800; Nov. 2023



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- *Planetary Imaging Pre-Processor (PIPP); Chris Garry;
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Stellarium Modelling The Jovian System At 01:34 BST On 18-Sep-21

Jupiter

Type: planet
Magnitude: -2.79 (reduced to -2.33 by 3.57 Airmasses)
Absolute Magnitude: -9.40
Mean Opposition Magnitude: -2.70
RA/Dec (J2000.0): 21h44m55.34s/-14°48'55.1"
RA/Dec (on date): 21h46m05.42s/-14°43'00.2"
HA/Dec: 2h35m36.03s/-14°39'56.2" (apparent)
Az./Alt.: +219°14'41.0"/+16°12'10.7" (apparent)
Gal. long./lat.: +39°02'08.6"/-45°01'40.6"
Supergal. long./lat.: -97°28'51.8"/+38°06'35.4"
Ecl. long./lat. (J2000.0): +323°29'47.2"/-1°11'40.7"
Ecl. long./lat. (on date): +323°47'44.2"/-1°11'46.1"
Ecliptic obliquity (on date): +23°26'15.7"
Mean Sidereal Time: 0h21m48.1s
Apparent Sidereal Time: 0h21m47.2s
Rise: 18h08m
Transit: 22h58m
Set: 3h47m
Parallactic Angle: +24°23'12.6"
IAU Constellation: Cap
Hourly motion: +0°00'14" towards 252.2°
Hourly motion: $da = -0°00'14"$ $d\delta = -0°00'04"$
Elongation: +148°26'25.1"
Phase angle: +6°01'02.1"
Illuminated: 99.7%
Distance from Sun: 5.017 AU (750.577 M km)
Distance: 4.133 AU (618.345 M km)
Light time: 0h34m22.6s
Orbital velocity: 13.539 km/s
Sidereal period: 4331.87 days (11.860 a)
Synodic period: 398.89 days (1.092 a)
Apparent diameter: +0°00'47.70"
Equatorial diameter: 142984.0 km
Sidereal day: 9h55m40.6s
Mean solar day: 9h55m44.0s
Equatorial rotation velocity: 12.568 km/s
Position angle of axis: +339°28'22"
Center point: $L_{lib} = +149°37'$ $\phi_{c1} = +0°38'54"$
Subsolar point: $L_{lib} = +8°47'35"$ $\phi_{s1} = +0°39'58"$
Albedo: 0.51

Ganymede (III)

Jupiter
Io (I)
Europa (II)
Callisto (IV)

Date and time

Date and time		Julian Day	
2021	9 - 18	1	34 : 0

Earth, Graeme's Garden (Portslade), 58 m

FOV 0.149° 17.9 FPS 2021-09-18 01:34:00 UTC+01:00

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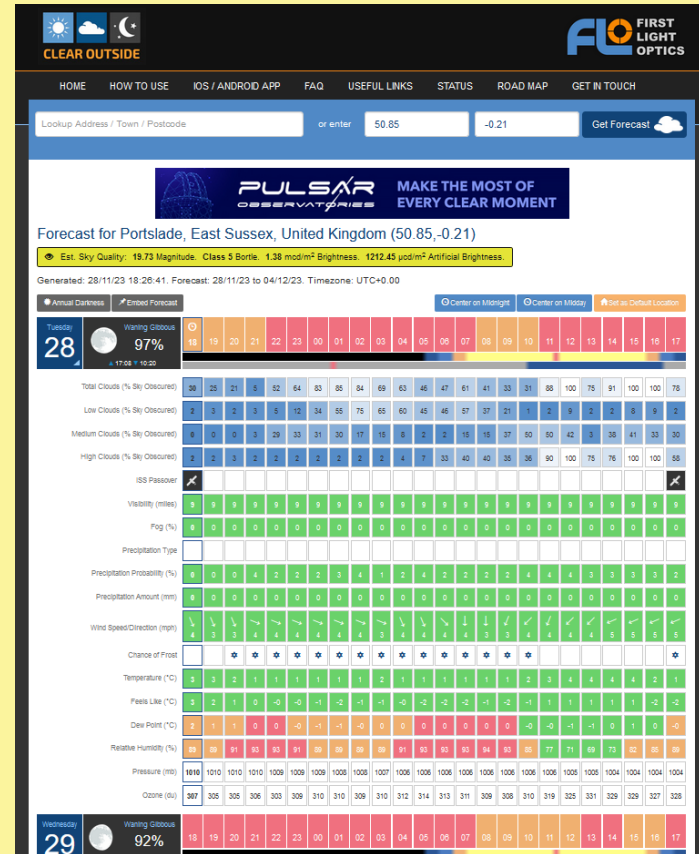
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Clear Outside; First Light Optics; clearoutside.com

Stellarium CANNOT Forecast The Weather; - But 'Clear Outside' Can...

- Available at above web address, or as an App for Android or IOS
- Set your address as the 'Home' for 7-day forecast; App also forecasts for 'Current' or other 'Locations'
- Forecasts cloud cover % at 3 different levels, and also combined total cloud
- Moon phase, rise & set
- ISS visibility
- Visibility, precipitation, wind, frost, temperature & likelihood of dew
- Hourly red/amber/green 'traffic-light' indicator can be assimilated at a glance



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Fully Featured Planetary Capture Tool; - Many More Features Than I Use!

- *Native Support of Planetary Cameras*
e.g. ZWO ASI120 MC-S
- *Flexible Windowing*
- *Control of Gain, Exposure & Gamma*
- *Planetary Profiles & Programmable File Duration & Format*
- *Status Reporting*
- *Live Histograms*
- *Temperature Monitoring...*

FireCapture v2.7.10 x64 ZWO ASI120MC-S (T=5.0°C) USB3.0 Heap: 1013MB

Image: 10 Bit Bin 2x Max (1280x960) ROI: 640 x 480

Control: Gain: 50 Exposure: 27.84 Gamma: 50 More: 1.00 - 100 ms

Capture: 2023-11-24-1922_2-U-RGB-Jup Jupiter RGB Limit 120s SER

Status: HDD: 730 GB FPS: 28.4 Buffer: 217 Frames Lost: 0 Recording #2 Remaining: 66s

Frames	Saved	Time	MB	FPS	MB/s
1558	1558	00:54	1825	28	33

Histogram: 0/161.63% 0/144.56% 0/135.52%

Temperature: 11.0°C 4.2°C

Settings: © Torsten Edelmann

10 FPS 100% 50% 100% 200%

Debayer 55.0 1567 RGB 28.4

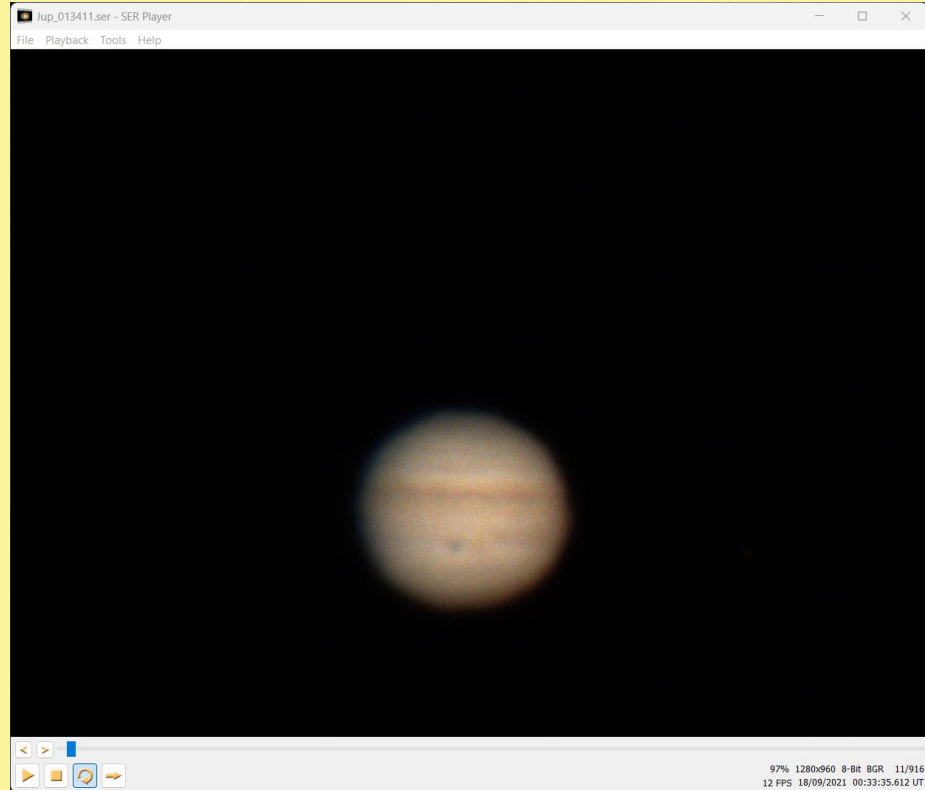
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Now from: astrowhat.com/resources/ser-player.89/

A Single Frame From The SER Video Captured 01:34 BST On 18-Sep-21



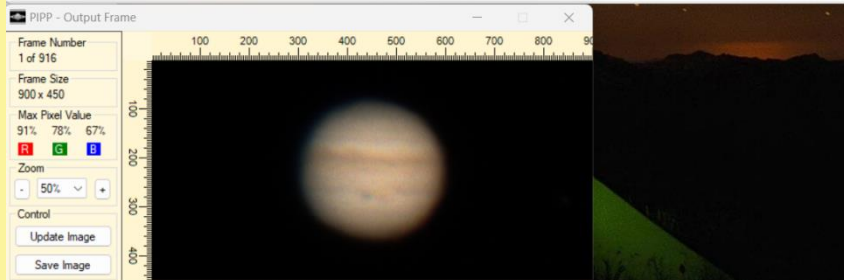
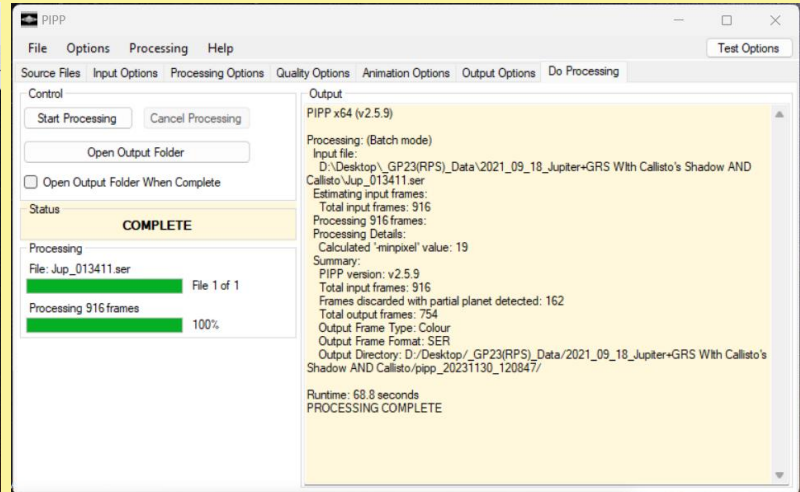
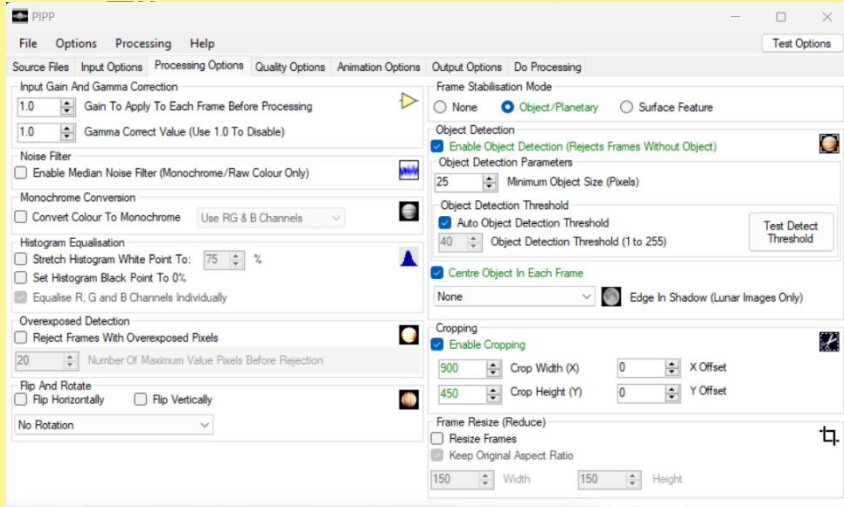
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PIPP Is Used Primarily To Stabilize & Centralize Planets In Video O/P



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SER Player; Chris Garry;
Now from: astrowhat.com/resources/ser-player.89/

SER Player Processing: Original Video v Optimised Video Appearance

The image displays two windows of the SER Player software. The left window, titled 'Jup_013411.ser - SER Player', shows the original video of Jupiter. The right window, titled 'Jup_013411_pipp.ser - SER Player', shows the same video after processing. A 'Processing' control panel is overlaid on the bottom right of the right window, showing various adjustment sliders and checkboxes. A 'Histogram' window is also visible in the top right corner of the right window, displaying three histograms for the Red, Green, and Blue channels.

Processing Panel Settings:

- Frame Inversion: Invert Frames
- Gain and Gamma: Gain 1.00, Gamma 0.81
- Colour Channel Align: Red Channel (x: -3, y: 3), Blue Channel (x: 3, y: -3)
- Monochrome Conversion: Convert To Monochrome Using: RG & B Channels
- Colour Saturation: Saturation 1.50
- Colour Balance: Red -10, Green 36, Blue 90
- Frame Crop: X Position: 0, Width: 900, Y Position: 0, Height: 450

Video Metadata (Bottom Right):

100% 900x50 8-Bit BGR 411/754
12 FPS 18/09/2021 00:34:00.316 UT

Video Metadata (Bottom Left):

97% 1280x660 8-Bit BGR 11/916
12 FPS 18/09/2021 00:33:35.612 UT

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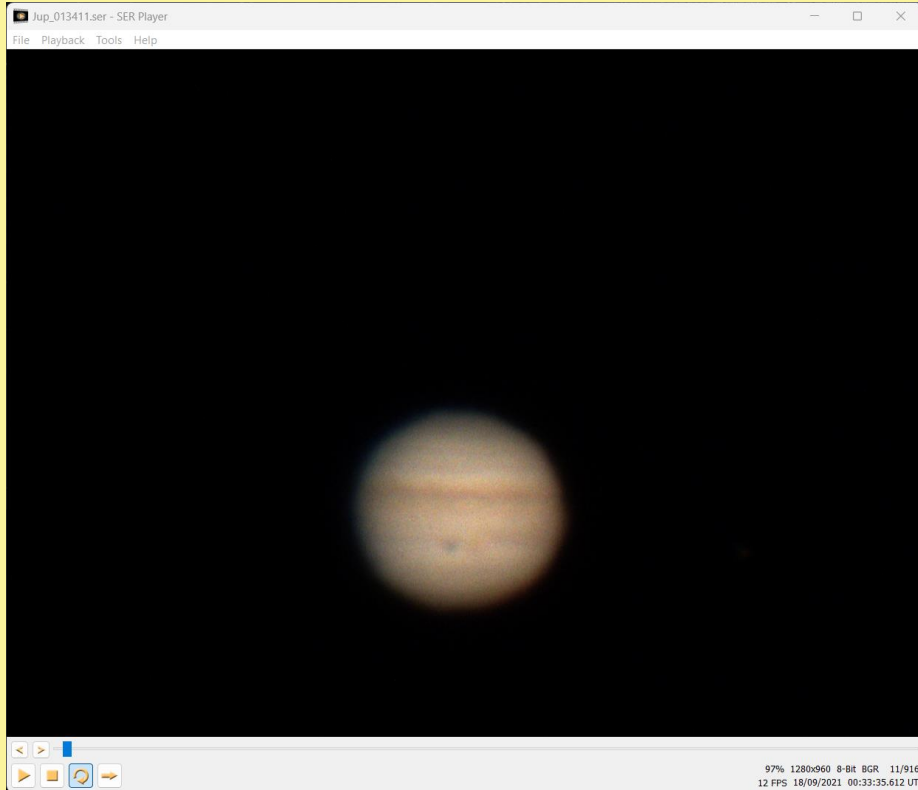
Autostakkert!3 Configured To Stack 50% Of Frames; 45 Auto + 2 Man APs

The screenshot displays the Autostakkert!3 software interface, configured for stacking 50% of frames. The main window is titled "AutoStakkert! 3.1.4 (x64) - free for non-commercial use © Emil Kraaikamp 2009-2018". The interface is divided into several panels:

- 1) Open:** Includes "Expand Limit" and "Filter" options.
- Image Stabilization:** Options for "Surface" and "Planet (COG)", with "Dynamic Background" checked.
- Quality Estimator:** "Laplace Δ" is checked, and "Noise Robust 6" is set to "Normal range".
- Reference Frame:** "Auto size" is selected.
- Status:** Shows "Mem. usage 48.4% (used 0.8 GB, available 0.8 GB)", "Threads 8 / 8", and "AVX2". A "Done!" message is displayed.
- Stack Options:** "Number of frames to stack:" is set to 50 (50% of frames). "Frame percentage to stack:" is also set to 50%. "Save in Folders" is checked.
- Advanced Settings:** "Drizzle" is set to "Off", and "Resample" is set to "2.0 X".
- 3) Stack:** The "Stack" button is visible.
- Quality Graph:** A line graph showing the quality of the stack over time, with a green line and a 50% threshold line.
- Right Panel:** Shows "Image Size" (896x448), "Display Options" (Draw AP's checked), "Scaling (FIT / SER)", and "Export Frame(s)" (Current, All, As displayed here). The main image area shows a stack of frames with alignment points (APs) overlaid.

Autostakkert!3: Emil Kraaikamp; www.autostakkert.com

Original SER Video File Still Frame v Output TIF File From Autostakkert!3



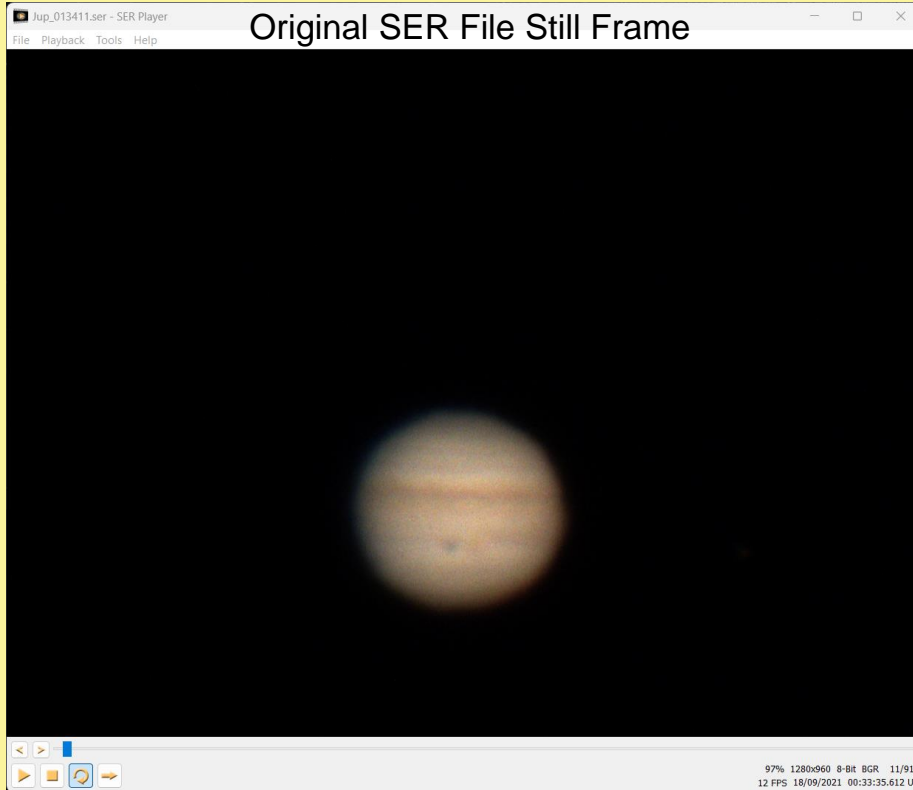
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Original Video Still Frame v Autostakkert!3 O/P v Registax6 O/P



Autostakkert!3
Output



Registax6
Output

All the SAME data!

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Contrast Enhancements & Rotation To Mimic Pose Of Jovian System



Registax6 Output



ImageJ Global Contrast Enhancement 0-221

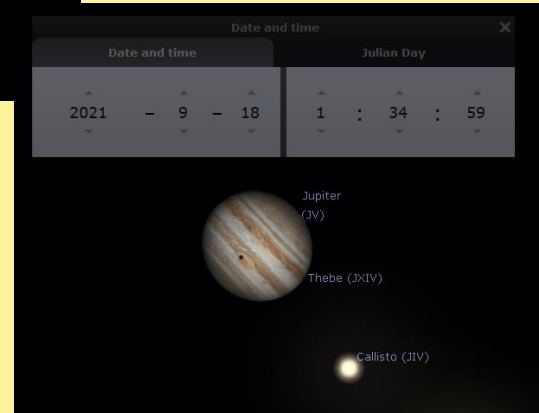


ImageJ Global Contrast Enhancement 0-221 & Selective Enhancement 0-105 of Callisto Moon Region



Fully Enhanced Image Rotated & Re-Composed To Mimic Actual Pose of Jovian System On 18/9/21

Stellarium Model Of Jupiter & Callisto At 1:34 On 18/9/21



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- *Registax6: Cor Berrevoets et al; www.astronomie.be/registax*
 - *Wido's Astroforum: Registax tutorial: How to process the planets (part 2)
<https://astroforumspace.com/registax-tutorial-how-to-process-the-planets-part-2/>*
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Thank You For Your Attention!

Any questions?