

Animation of Jupiter images

Voyager 3 and other projects

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Planetary observing in Sweden

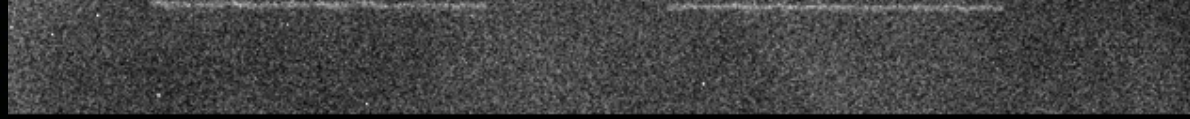
- 15 observers, 5 continually active
- SAAF/Solar System Section
 - web pages
 - Astronet discussions
 - section workshops and Fokus tutorials
- Common imaging software
 - FireCapture, AutoStakkert, WinJupos
- Archiving
 - SAAF gallery, Astronet image flow
 - PVOL, BAA, ALPO-Japan, ALPO, JunoCam,...



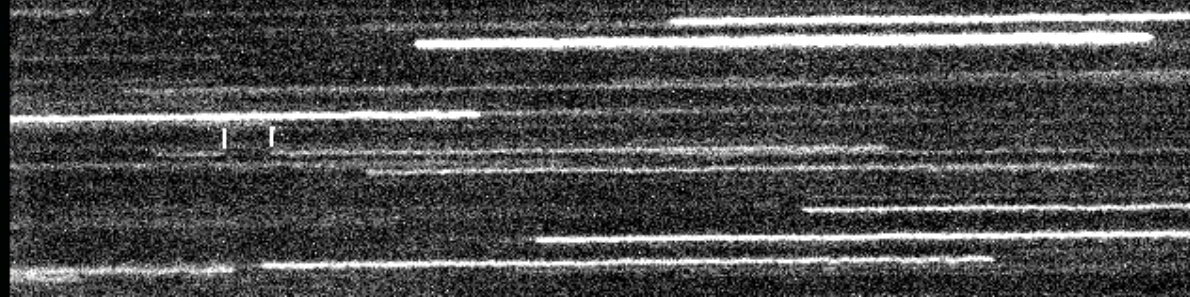
Lindby Observatory (K60)
25 cm Newton f/23 + DBK21AU618
T22, T52 under construction



(275) Sapiientia 2015-Sep-30, 04:26:34.1 UT, 14.78 sec, 25 cm f/4.6. J. Warell, Lindby (K60)

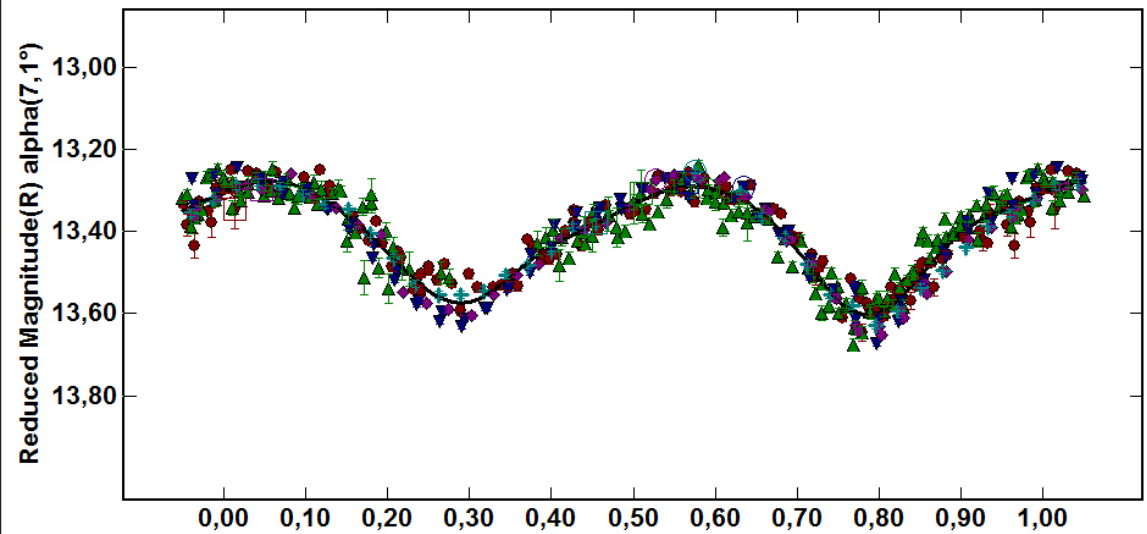


(314) Rosalia 2015-Oct-03, 03:17:09.82 UT, 3.81 sec, 25 cm f/4.6. J. Warell, Lindby (K60)



67P/Churyumov-Gerasimenko 2016-Feb-04 2328 UT 8 x 60 sec FOV 21x16 arc min
25 cm f/4,6 SCT + SXV-H9 + Clear filter
Johan Warell Lindby Observatory (K60) Sweden

Phased Plot: (10042) Budstewart



Period: 3,6945520366 ± 0,0012771082 h Amp: 0,33 JDo(LTC): 2456917,326635

VOYAGER PROJECT

Torbjörn
Holmqvist

Martin
Högberg

Roger
Utas

Göran
Strand
Peter
Rosén

Noomi

Daniel
Sundström

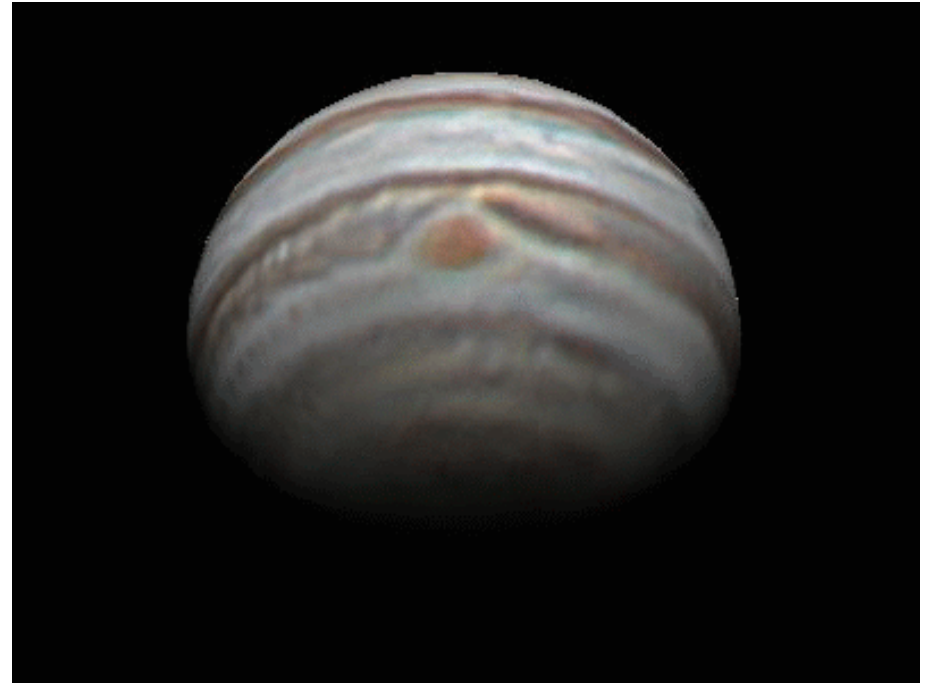
Project
Initiator

Johan
Warell



Animation projects

- Voyager 3 + analysis from 2014
 - Swedish data
- GRS rotation from 2015
 - Swedish+international data
- High-resolution, global animation from 2015
 - international data – the best of the best

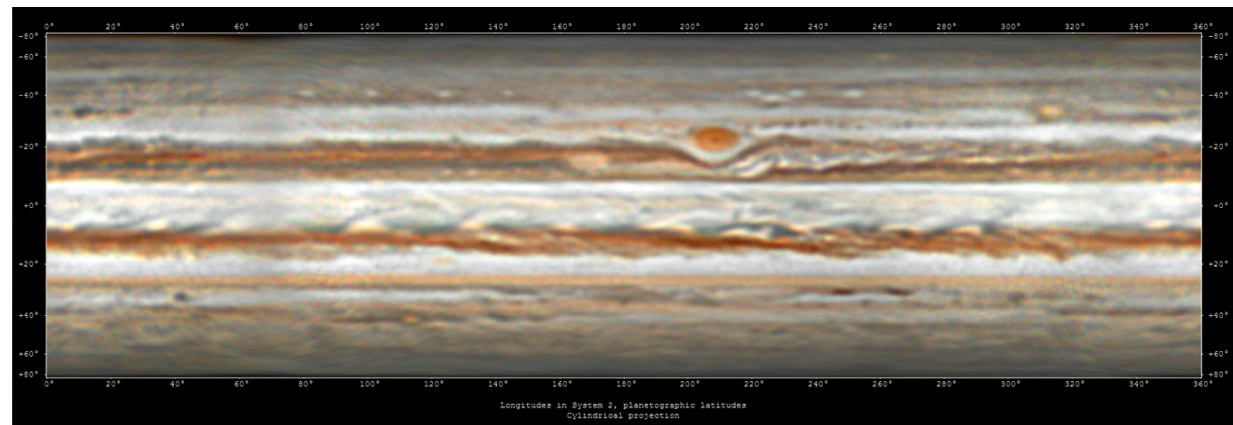
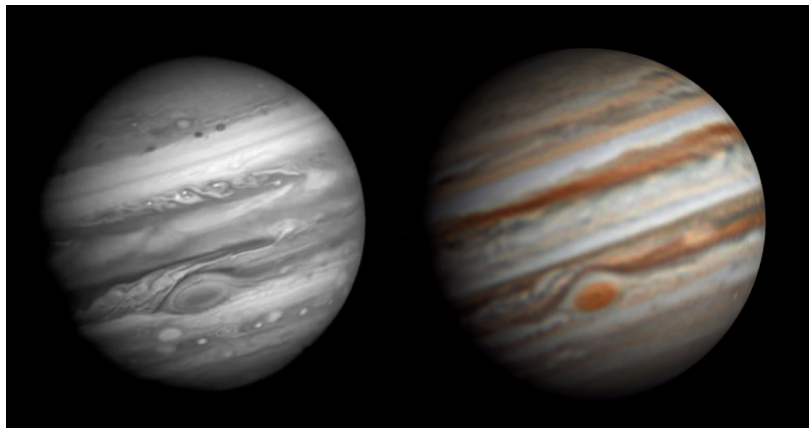


Creating an animation

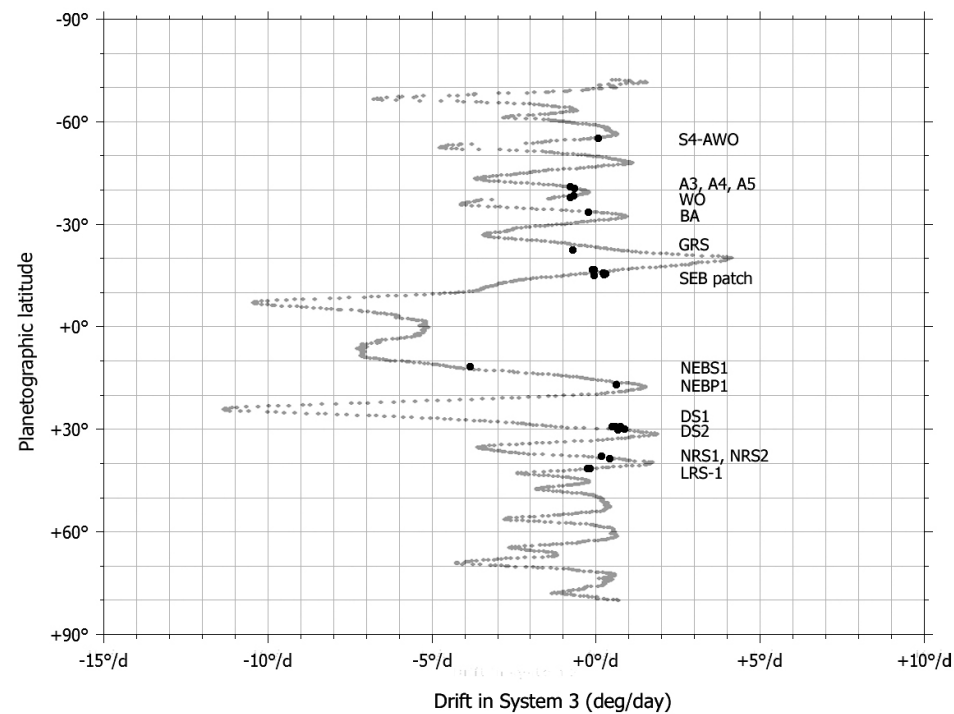
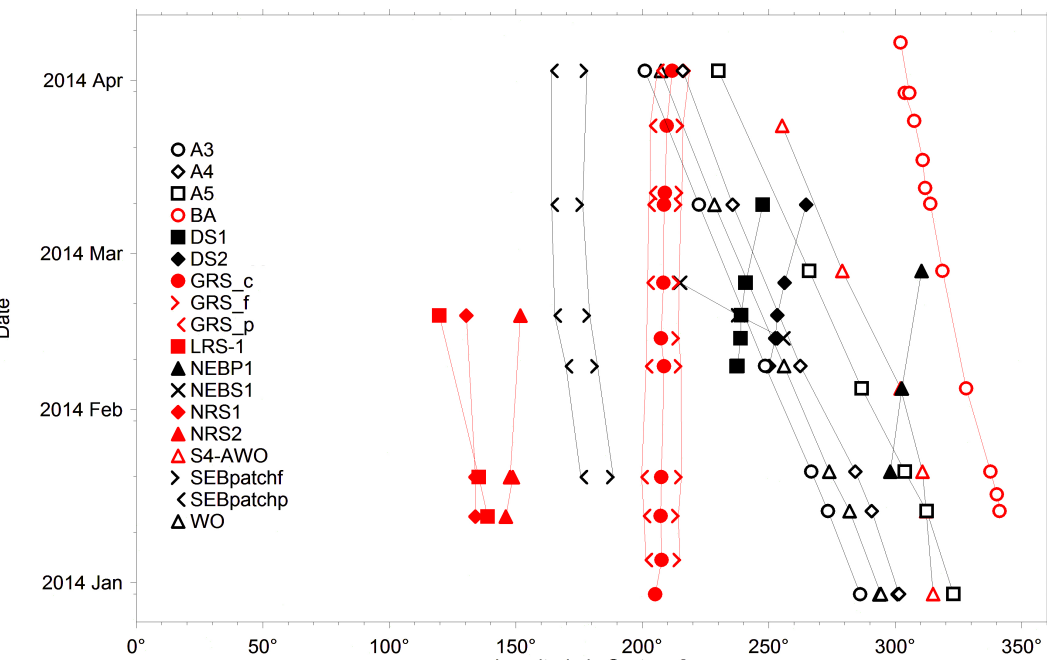
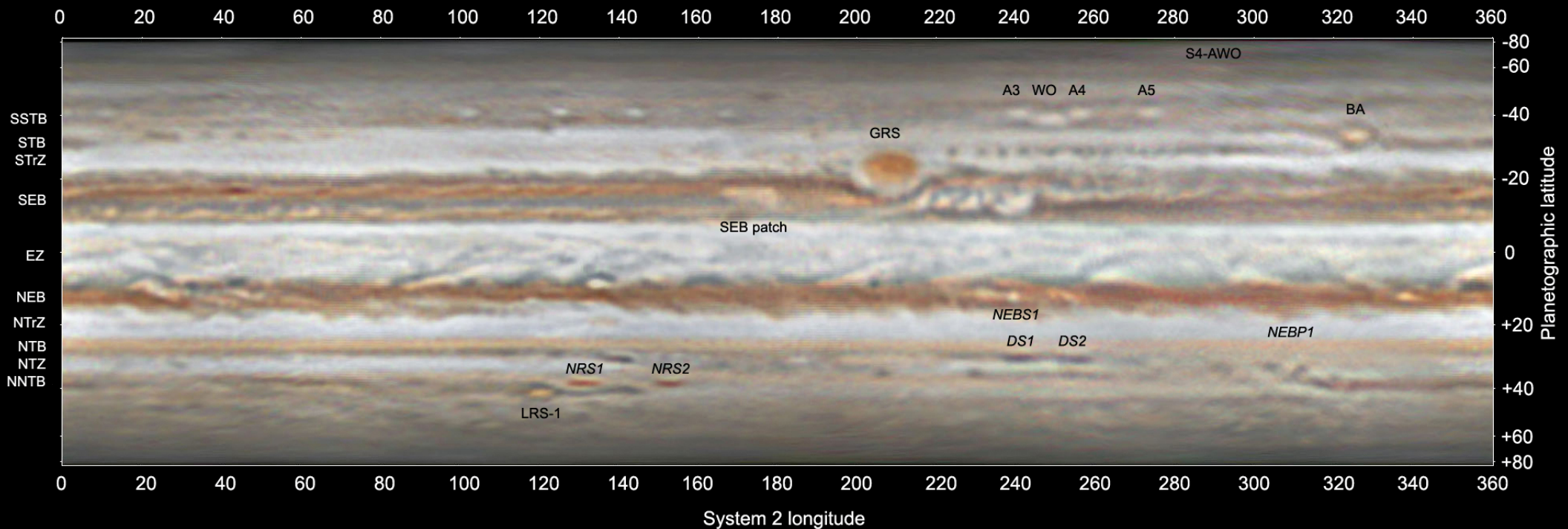
- Image acquisition and processing
- Image selection
- Post processing: color, brightness, contrast
- Standardised image filenames
- Navigation, timing correction and mapping
- Global map stitching
- Morphing to simulate data in-between samples
- Animation and presentation

Voyager 3

- 560 images January-March 2013 (about 200 sessions)
- 18 global maps from 5 days of images on average
- 72 morphed maps for one map per day (FantaMorph)
 - morphing of 4 regions separately: Sys I, Sys II and I/II transition regions
 - matching ends of maps to earlier/later maps
 - low-resolution data was beneficial
- Creating the flyby simulation (Starry Night Pro+ 6)
- Acquisition/processing: approx 500 h
- Post processing/animation: approx 2 000 h



Jupiter 2014 Feb 17



Rotating GRS

- Animation based on images from 10-22 March 2015
- Swedish team + Emil Kraaikamp, Anthony Wesley, Phil Miles, Trevor Barry
- 23 sessions, 160 images, 15 maps
- Still images + morphing
- 4 day rotation of GRS



**Rotation of Jupiters
Great Red Spot**

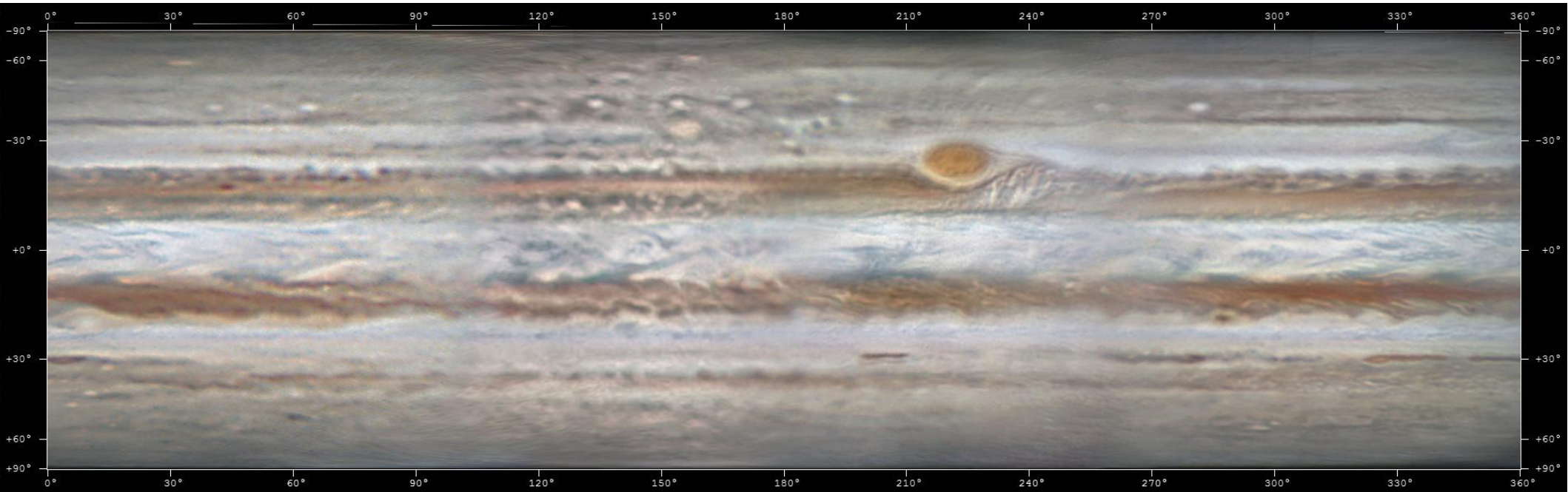
10 - 22 March 2015

Longitudes in System 2, planetographic latitudes
Cylindrical projection

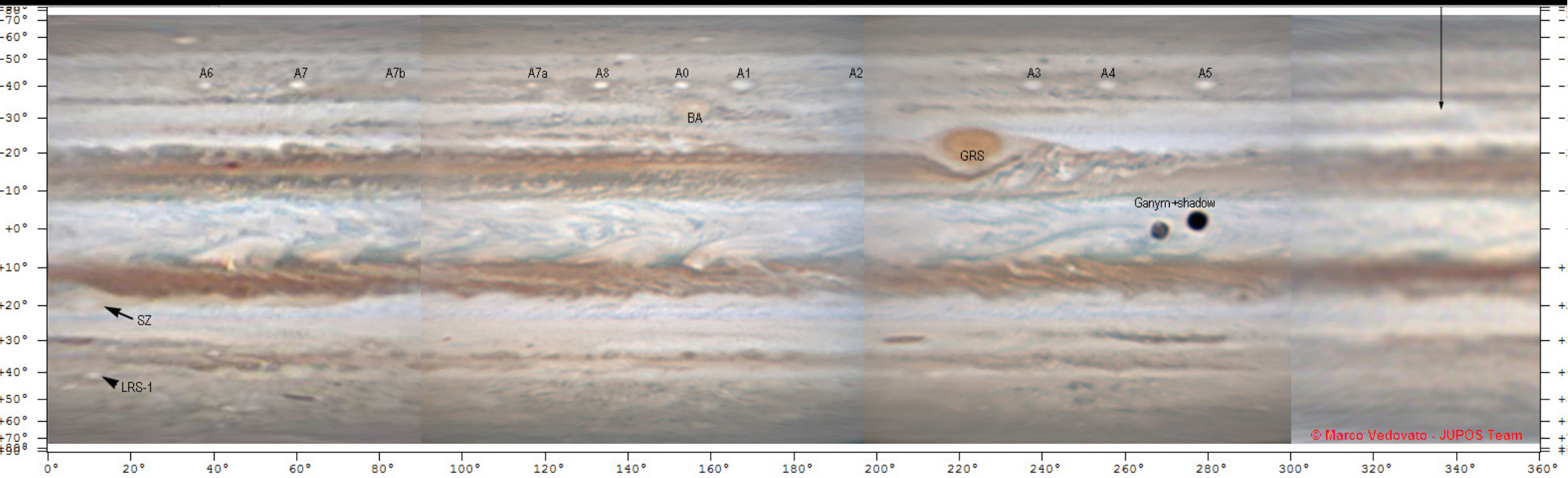
Global high-resolution animation

- Work in progress
- Dynamics of belts, cyclones and GRS rotation
- Period January-May 2015
- Highest quality image data available
- Contributions from 40 observers worldwide
- About 1 500 images selected
- One complete map every 2-4 days
- Morphing to achieve 1 map/day

Sample map February 7-10, 2015



Longitudes in System 2, planetographic latitudes
Cylindrical projection



Longitudes in System 2, planetographic latitudes
Cylindrical projection

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Optimal images for animation

- Minimal image-to-image variation
 - "natural color"
 - well calibrated computer screen
 - compare images in PVOL or ALPO-Japan archives
- Moderate processing
 - Keep unsharp masking radius small
 - maximizing detail and contrast may not be ideal
- Standard settings for animation purposes?
 - contrast, color, curves, limb darkening correction
 - sRGB profile

Easify observer contribution

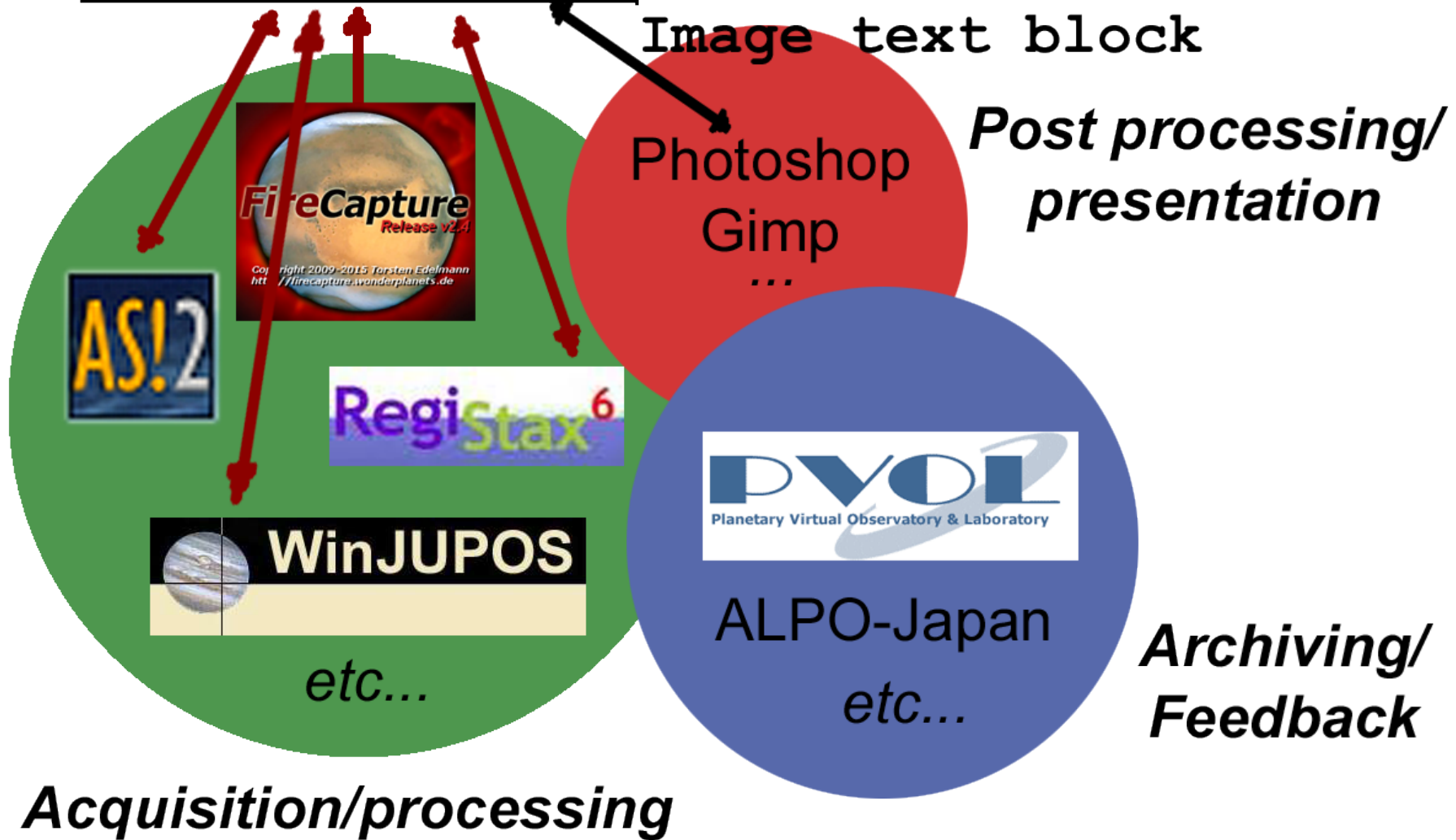
- Common challenges
 - planetary imaging/processing is time consuming
 - proper documentation/archiving is cumbersome
 - images are posted "everywhere" > difficult to find
- Effects
 - new astrophotographers are difficult to engage
 - valuable images may be missed, overview difficult
 - standards difficult to enforce > missing image data
- Possible solutions
 - seamless workflow from acquisition to archiving
 - standardised text information in final images
 - one flexible archive for everyone's needs

Collaborating software chain

- Acquisition thorough processing to archiving
- File reading from same default directory
- Same file naming convention
 - strict, standardized name structure
 - additional information is appended at the end
- Processing data file inherited and expanded
 - text file with all image processing documentation + ephemeris
 - each software appends new processing data
- Image data presentation block
 - created/extracted at many points throughout chain
 - a snap to paste into final image without errors!

2016-03-29, 21:12:48 UT, CMI 337.5° CMII 49.9° CMIII 69,5°
α 4.3° , De -1.8° , diam. 43.7”
22 cm Newton @ f/23, DBK 21AU618, 0,22”/pix, derot 6x2 min
MPCC Mark III, PieroAstro ADC, x2.8 Klee Barlow, Baader UV/IR-block
Alt. 41 deg, Seeing 5/10, Transp 4/5
Johan Warell, Lindby Observatory (K60), Skurup, Sweden

PROCESSING DATA



Global planet image archive

- One place to submit and archive data
 - internationally recommended and endorsed > "all images"
 - all data types: images, maps, animations, drift charts...
 - based on PVOL and WinJupos databases?
- National/association data harvesting
 - search and statistics on association and country levels
 - easy download of image batches and lists
 - eliminates need for national archives
- Feedback and reports
 - e-mail: regular reports with database statistics
 - web: statistics from global to personal level
 - inspiration for both established and new contributors
- COBS (Comet Observation Database) example : www.cobs.si

Thank you and good observing!