

THE OCCULTATION OF 7.3 MAGNITUDE HIP
24973 BY (3200) PHAETHON
JULY 29, 2019

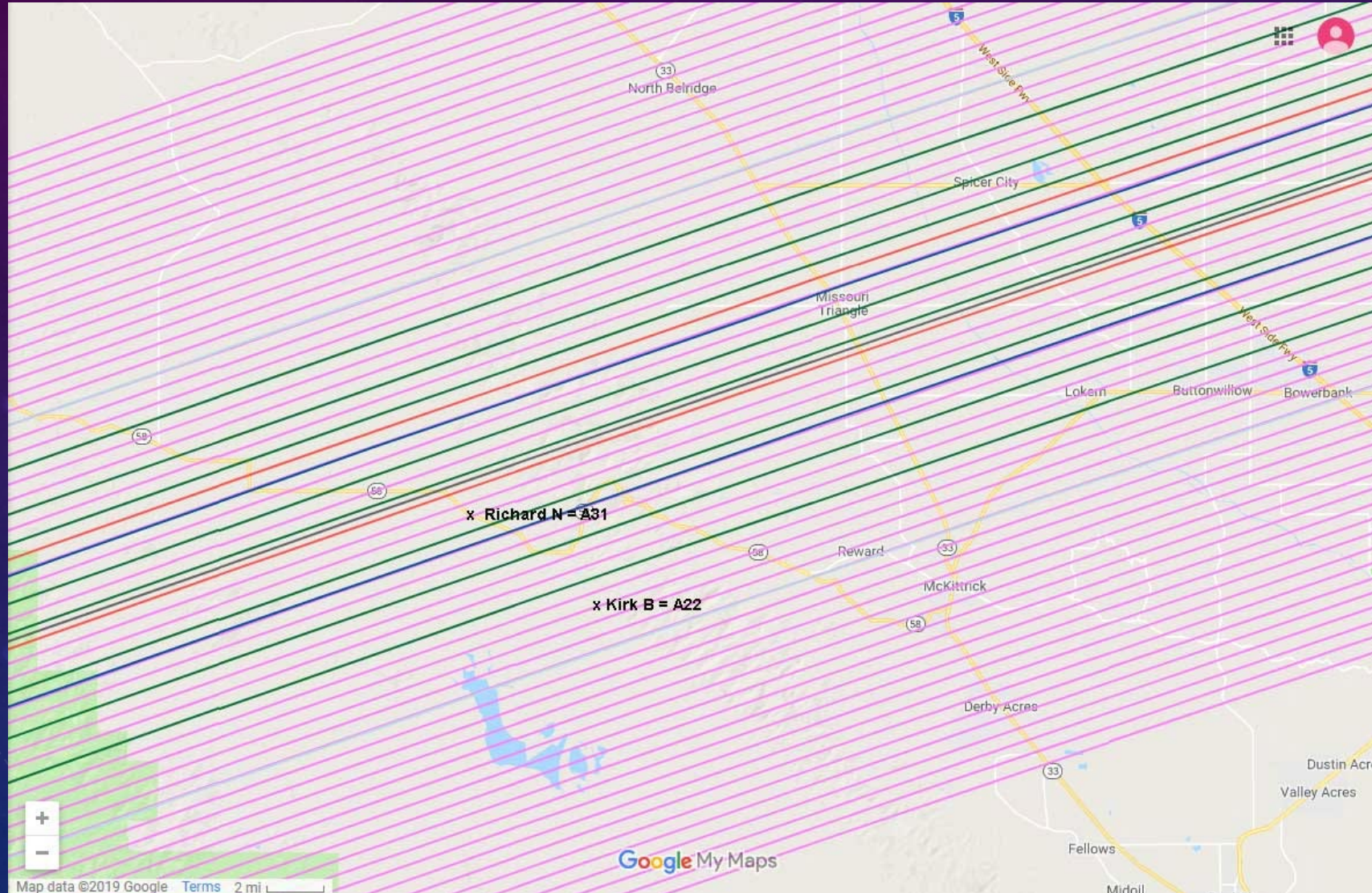
FROM CARRIZO PLAIN, CA

RICHARD NOLTHENIUS
CABRILLO COLLEGE ASTRONOMY

KIRK BENDER (LEFT) AND RICHARD NOLTHENIUS, AT BENDER'S STATION SOUTH OF THE SHADOW PATH



THE BRIGHT TARGET AND IMPORTANCE ENCOURAGED A HIGH TURN-OUT OF OBSERVERS AND MOST TRACKS WERE MANNED. NOLTHENIUS AND BENDER OBSERVED FROM CARRIZO PLAIN, WHICH WAS HIGHER ELEVATION AND QUIETER THAN THE CENTRAL VALLEY SITES.





BENDER WAS ASSIGNED TRACK A22, WHICH HAPPENED TO CROSS A DIRT ROAD ("X") INTERSECTION NOLTHENIUS HAD USED FOR A 22-EVENT GRAZE SOME 20 YEARS EARLIER. IT WAS OUR STAGING AREA AND CAMP

NOLTHENIUS USED TRACK A31 IN THE CENTER OF THE NOMINAL PREDICTED PATH. SET UP WAS AT AN ENTRANCE TO THE TOPAZ SOLAR FARM, ONE OF THE WORLD'S LARGEST.





BOTH STATIONS USED IDENTICAL EQUIPMENT FROM CABRILLO COLLEGE ASTRONOMY:

- * CELESTRON 8SE SCT TELESCOPES, POWERED BY ORION POWER STATION.
- * MEADE F/3.3 FOCAL REDUCERS,
- * IOTA-VTI TIME INSERTERS AND
- * WATEC 910HX VIDEO CAMERAS POWERED BY DURACELL 14AH 12VDC GEL CELLS.
- * CANON ZR45MC CAMCORDERS TO MINI-DV, USING LARGE CAPACITY CANON BATTERIES.



Video jack “up”

**When inserted
into scope,
the Watec
must be
oriented like
this**

**OSD
remote
unit wiring
on left side**

BY CAREFUL ORIENTATION OF THE VIDEOCAM ON THE 8SE ALT/AZ SCOPE, AND CREATION OF CUSTOM ALT/AZ FINDER CHARTS IN C2A, THE SCALE AND ORIENTATION OF THE STAR FIELDS MATCHES THAT SEEN IN THE ORION Q70 32MM EYEPIECE, AND THEN ON THE LCD SCREEN OF THE CANON CAMCORDER.

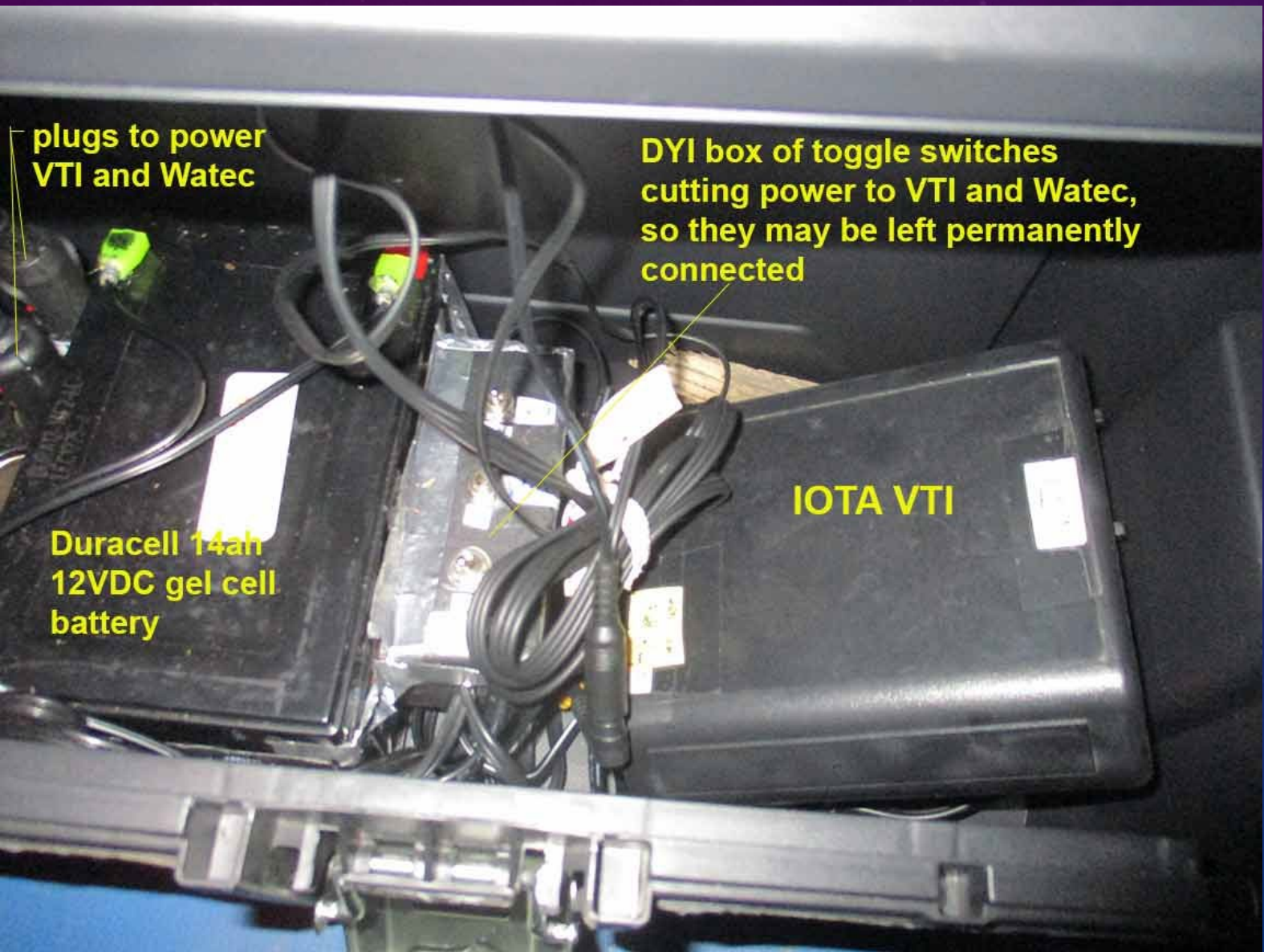


Microphone

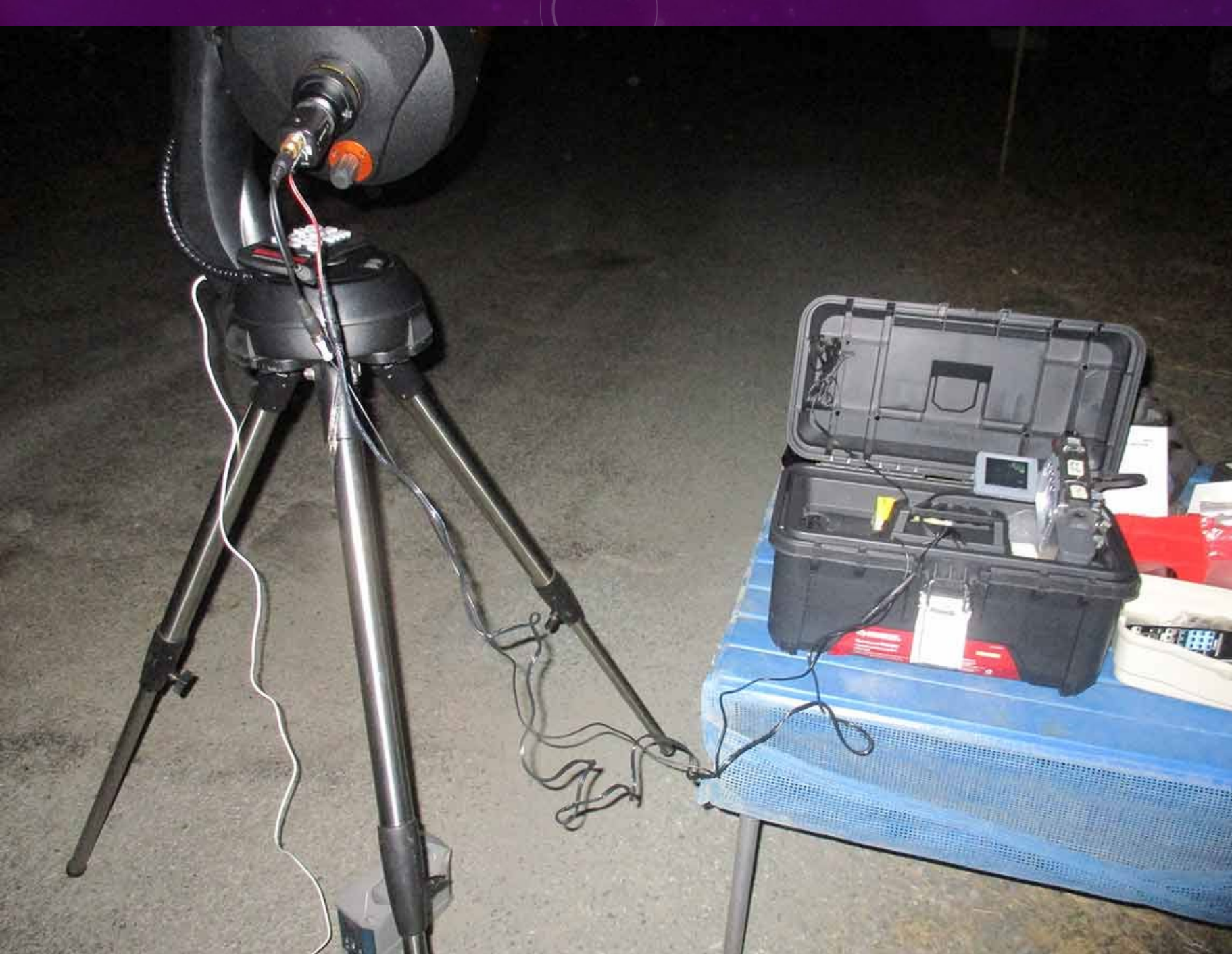
Bottom layer: IOTA-VTI, 14ah 12VDC battery, toggle switches to power connectors, to enable leaving all equipment connected

Water camera left permanently connected to power and video

MY CUSTOM DESIGNED "OCC BOX". DURING USE, CAMCORDER SITS ON TOP BAY. WIRING GOES BELOW TO A 14AH BATTERY, POWER TOGGLE, AND IOTA VTI. ALL EQUIPMENT IS LEFT CONNECTED, SO DEPLOYMENT AND POWER-UP IS FAST.

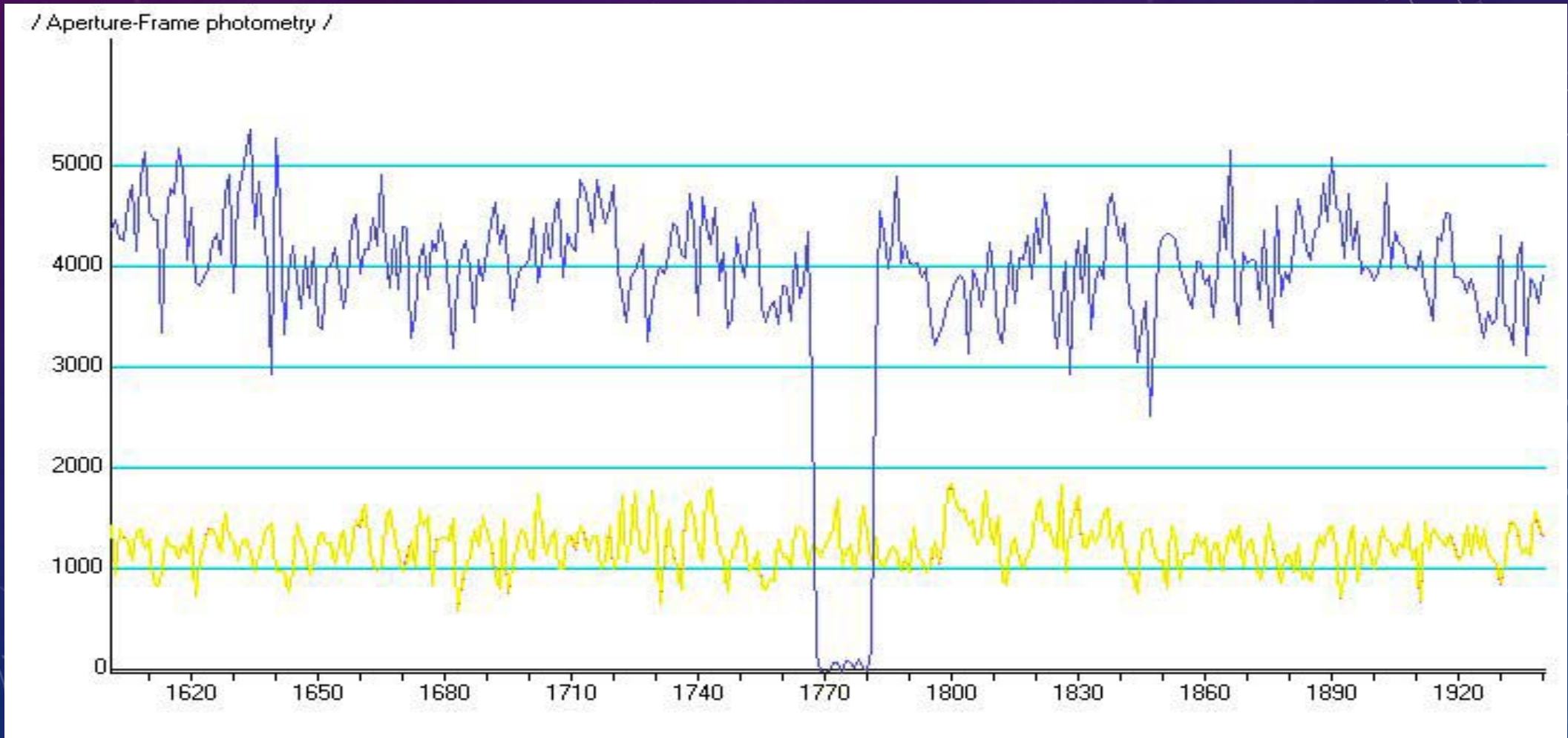


UNDER THE TOP TRAY,
THE IOTA VTI AND
ELECTRICAL
CONNECTIONS ARE
LEFT PERMANENTLY
CONNECTED, WITH A
TOGGLE SWITCH
(ACCESSIBLE THROUGH
A HOLE IN THE TOP
TRAY) UPSTREAM OF
THE PLUGS

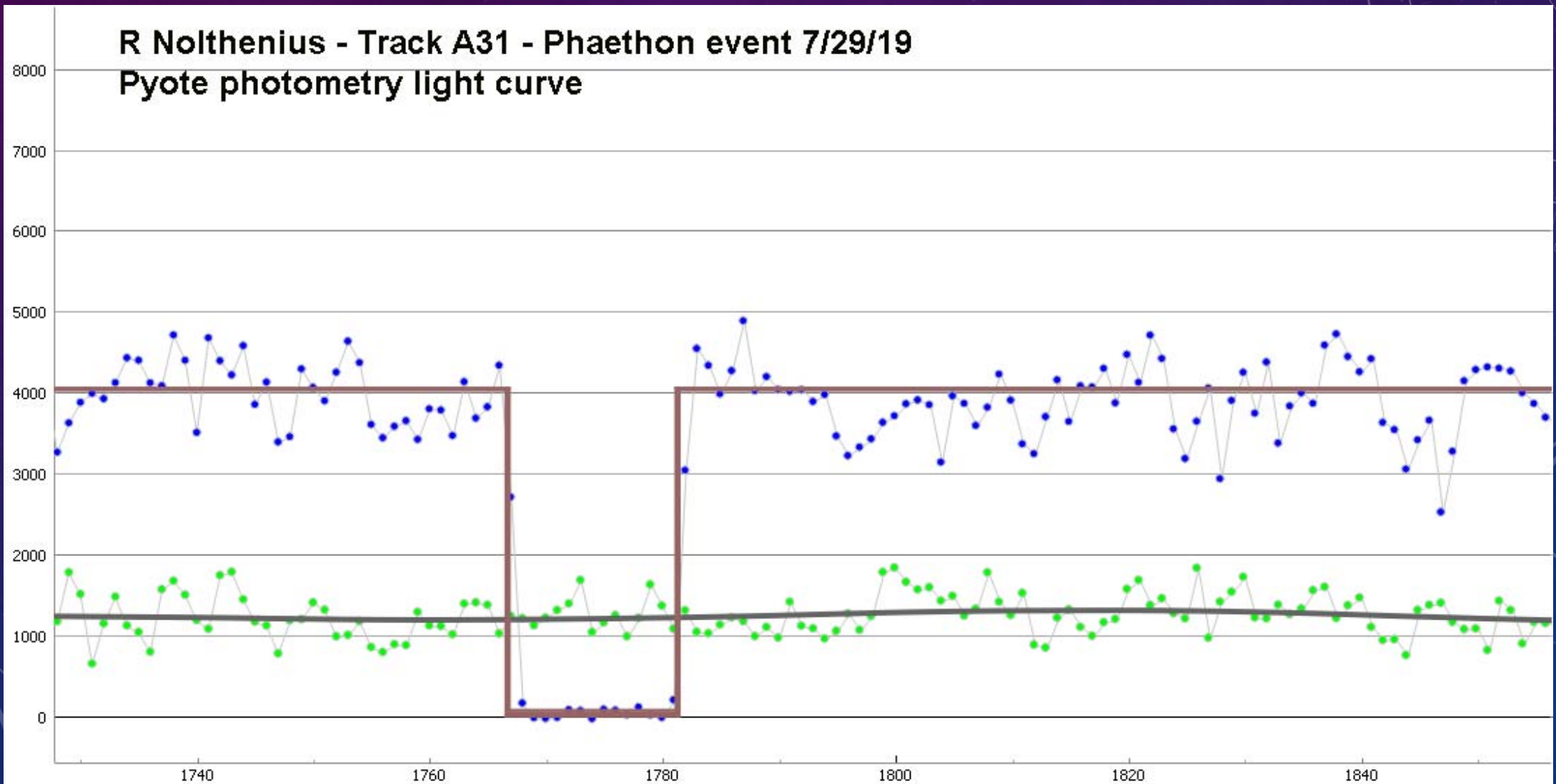


20 MIN BEFORE THE EVENT, I FLIP THE POWER TOGGLE SO THE VTI CAN SYNC W/ SATELLITES. AFTER SCOPE IS AIMED, THE WATEC WITH POWER AND VIDEO RCA CABLE ATTACHED ARE UNBAGGED, MOUNTED, THE VIDEO/AUDIO CABLE FROM THE VTI INSERTED IN THE CANON CAMCORDER, AND WE'RE READY TO RECORD. SCOPE IS POWERED WITH AN ORION DYNAMO LITHIUM ION BATTERY

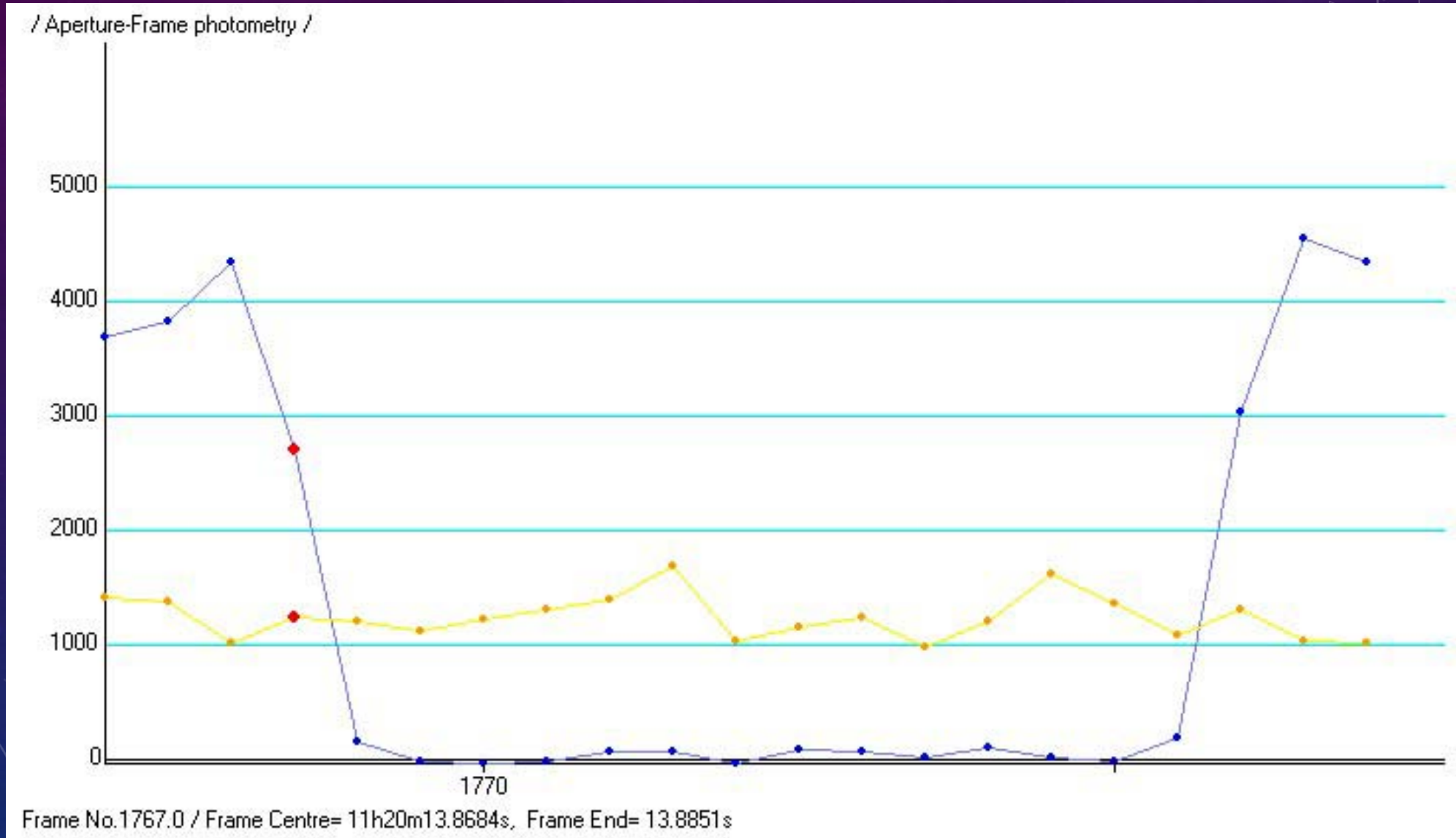
LIMOVIE PHOTOMETRY FROM NOLTHENIUS' VIDEO



TIMINGS DETERMINED BY PYOTE SOFTWARE



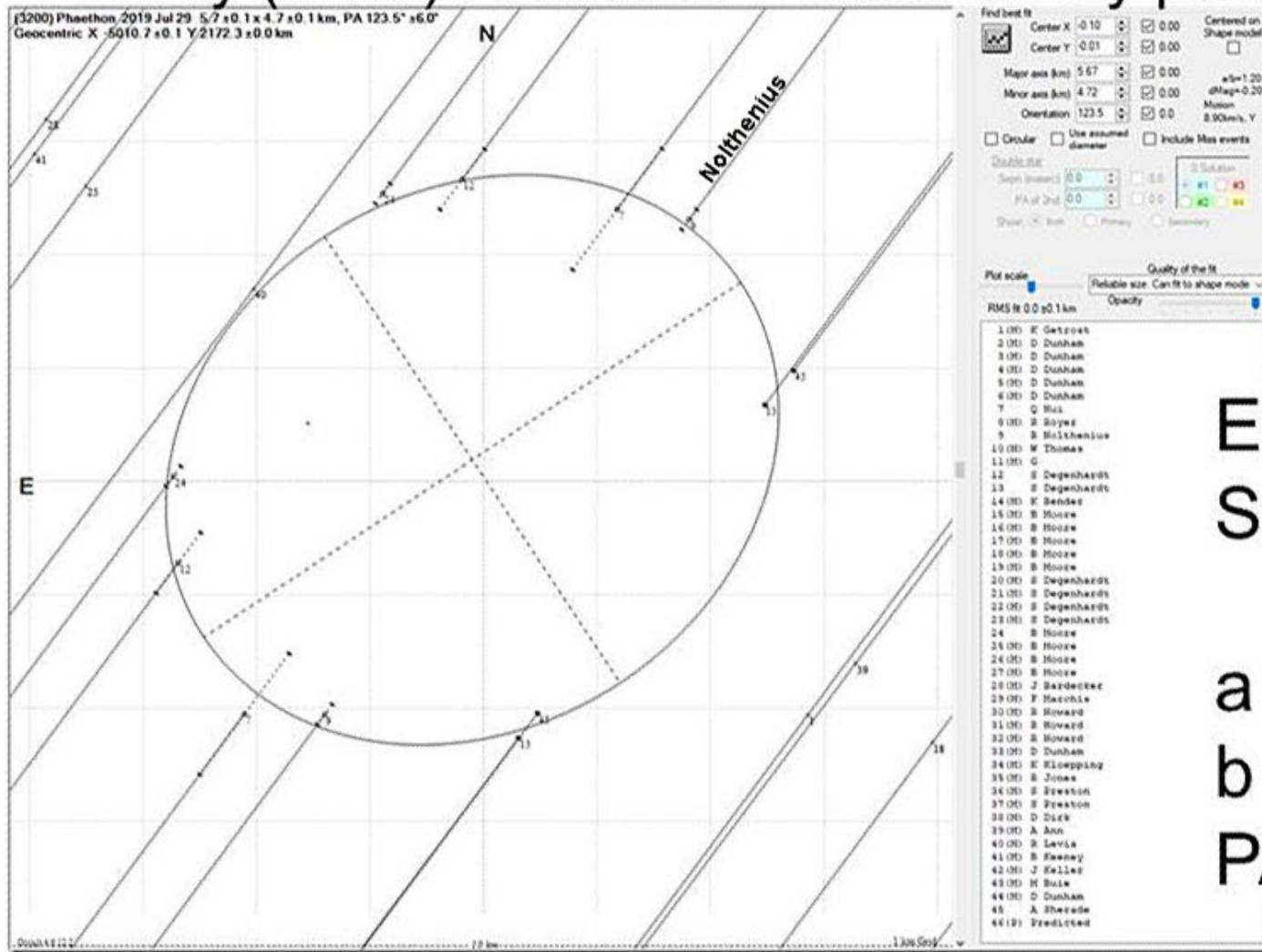
DURATION OF THE EVENT WAS ONLY 0.4868 SECONDS



NOLTHENIUS'
RECORDING,
TRIMMED TO
EVENT. WIN10
"EXTREME SLO-
MO" APPLIED AT
"R". COMPRESSION
FOR THIS
PRESENTATION
OBSCURED
FRACTIONAL
SECOND READINGS



2019 July 29 Occ'n of 7.3-mag. HIP 24973 by (3200) Phaethon – Second Sky-plane Plot



Elliptical Fit
Solution:

$$a = 5.67 \text{ km}$$

$$b = 4.72 \text{ km}$$

$$PA = 123.5^\circ$$

SKY PLANE PLOT
OF
OBSERVATIONS
PROVIDED A
GOOD MATCH
TO THE RADAR
IMAGE FROM 18
MONTHS
EARLIER...

IOTA and SwRI chords, including all 6 positive chords (13 & 45 almost on the same line).
Light 1-km grid shown. John Moore, Dave Herald, and David Dunham, 2019 August 9

Arecibo Observatory/NASA/NSF



3200 Phaethon 17 Dec 2017 UT

ARECIBO RADAR IMAGING
FROM DECEMBER 2017. A
FAIRLY SMOOTH, EGG-
SHAPED OBJECT



KIRK BENDER RECORDED A MISS.
POST-OCCULTATION REST BEFORE
SUNRISE AND HOT TEMPERATURES
RETURNED.