Recent Observations of Pluto's System
Probing Pluto's Atmosphere, Charon's Size and Orbital Elements

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Observatoire de Paris - LESIA
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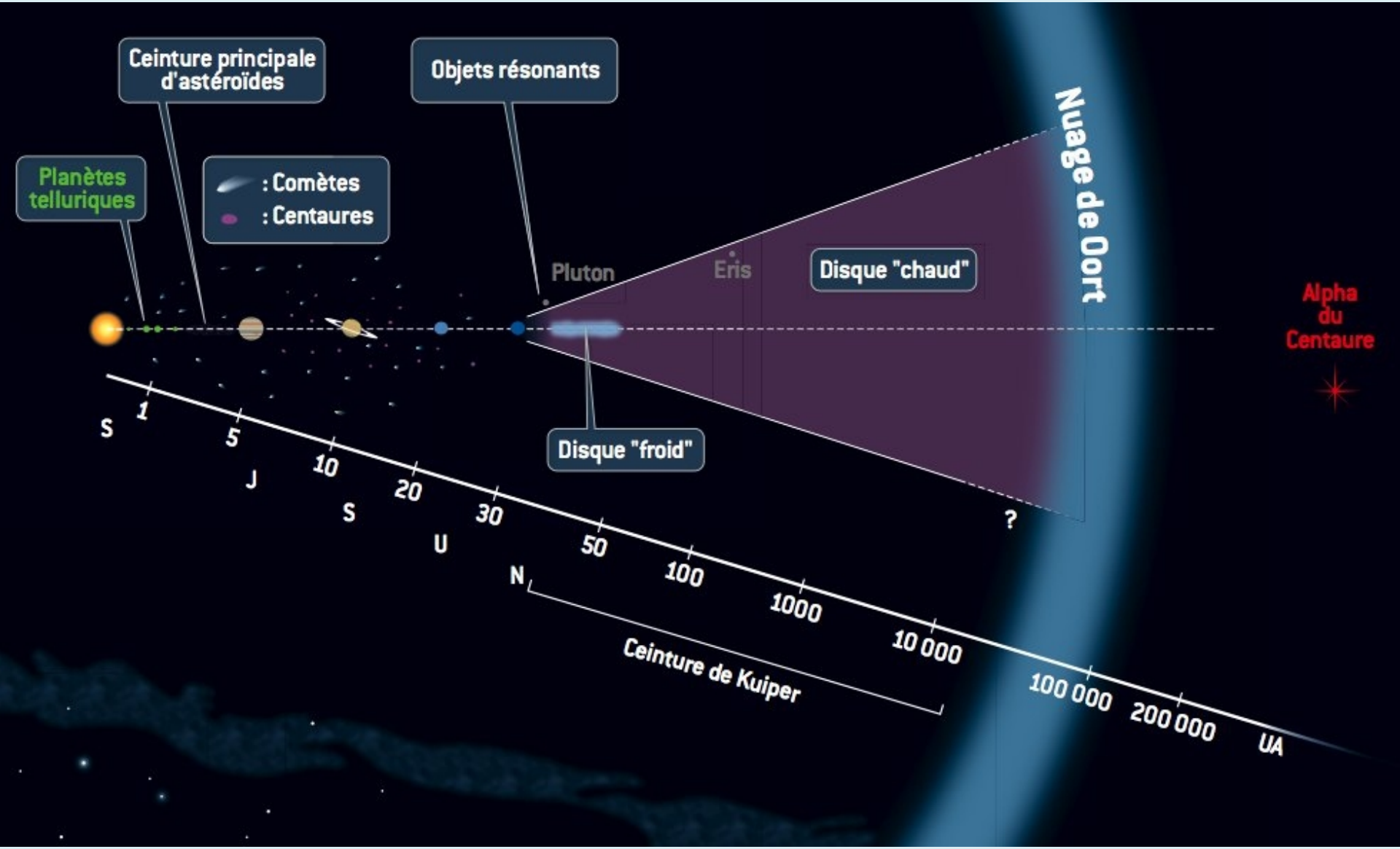
ESOP XXXI meeting
Pescara 24-27 August 2012



Doressoundiram & Lellouch, "Aux confins du système solaire"

airless Trans-Neptunian Objects (TNO's)

- radius, shape & limb features at kilometric accuracy

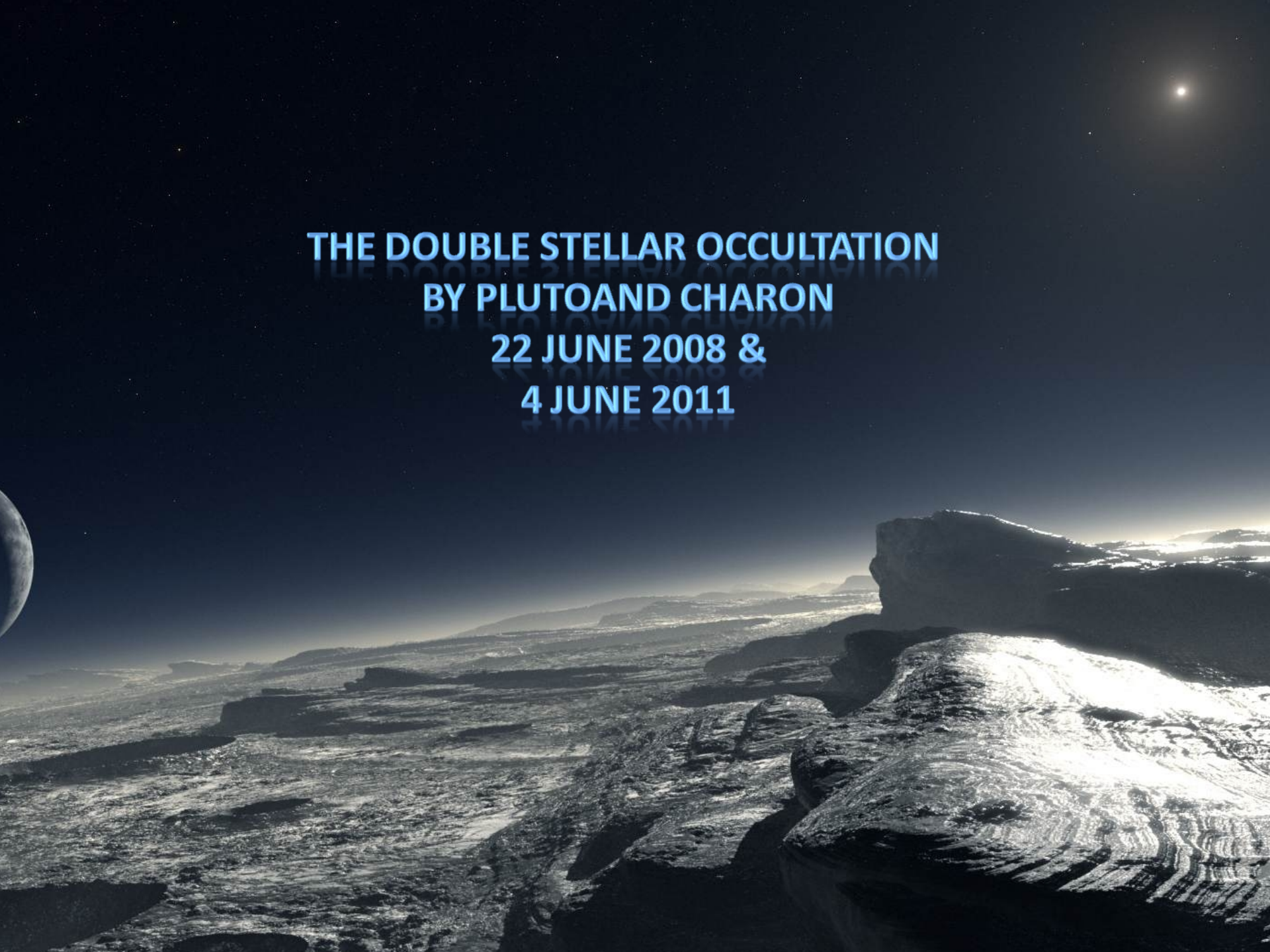
- density, if mass known from satellite motion ---> internal structure

- albedo ---> composition, state of surface

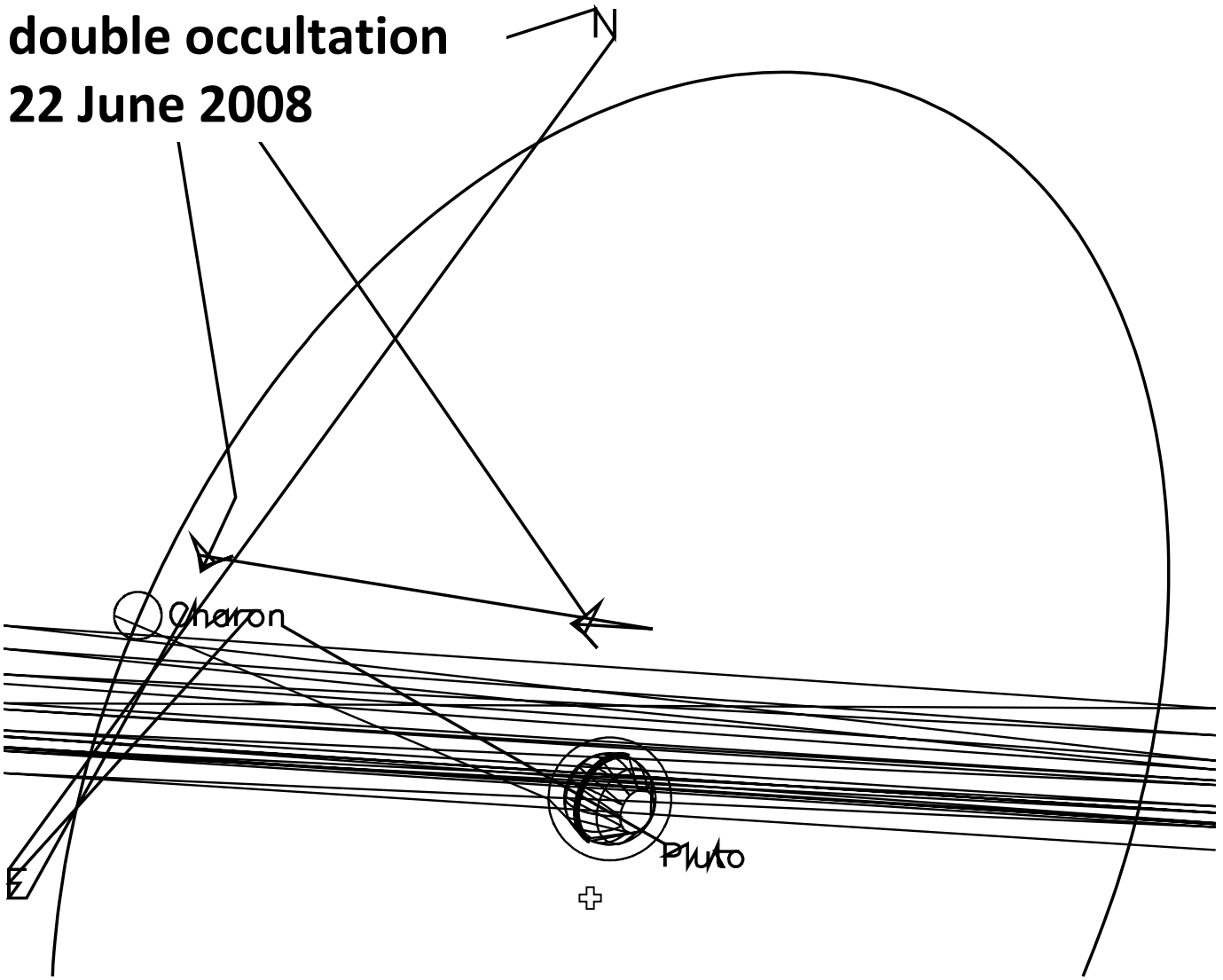
- if double occultation primary/secondary: accuracy ~ 10 km, e.g. *Pluton/Charon* ---> better orbital elements

TNO's with atmosphere

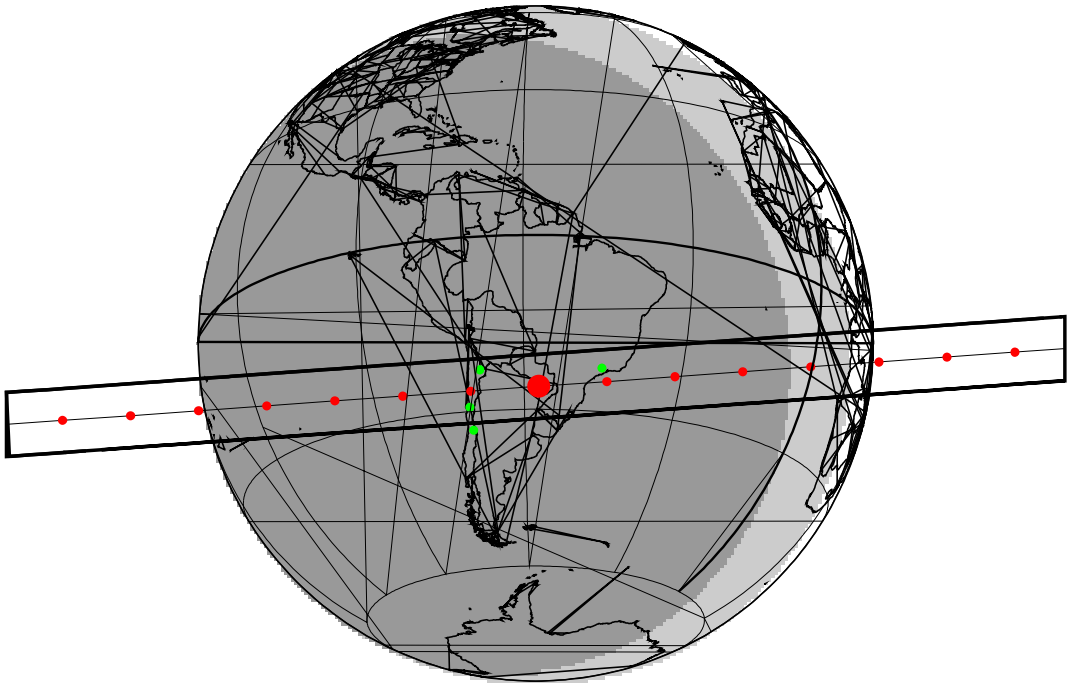
- density & temperature profiles down to nbar levels
- variations with time
- detection of activity (e.g. gravity waves)
- zonal winds measurements through central flash
- haze properties through chromatic dependence


THE DOUBLE STELLAR OCCULTATION
BY PLUTOAND CHARON
22 JUNE 2008 &
4 JUNE 2011

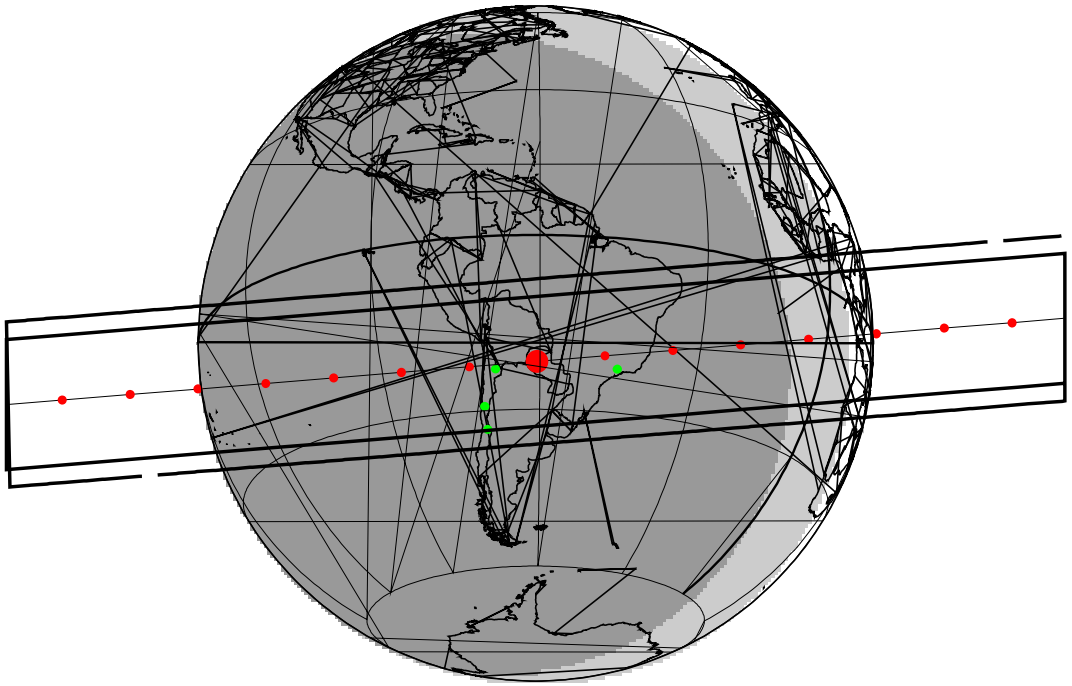
Geometry of the double occultation 22 June 2008

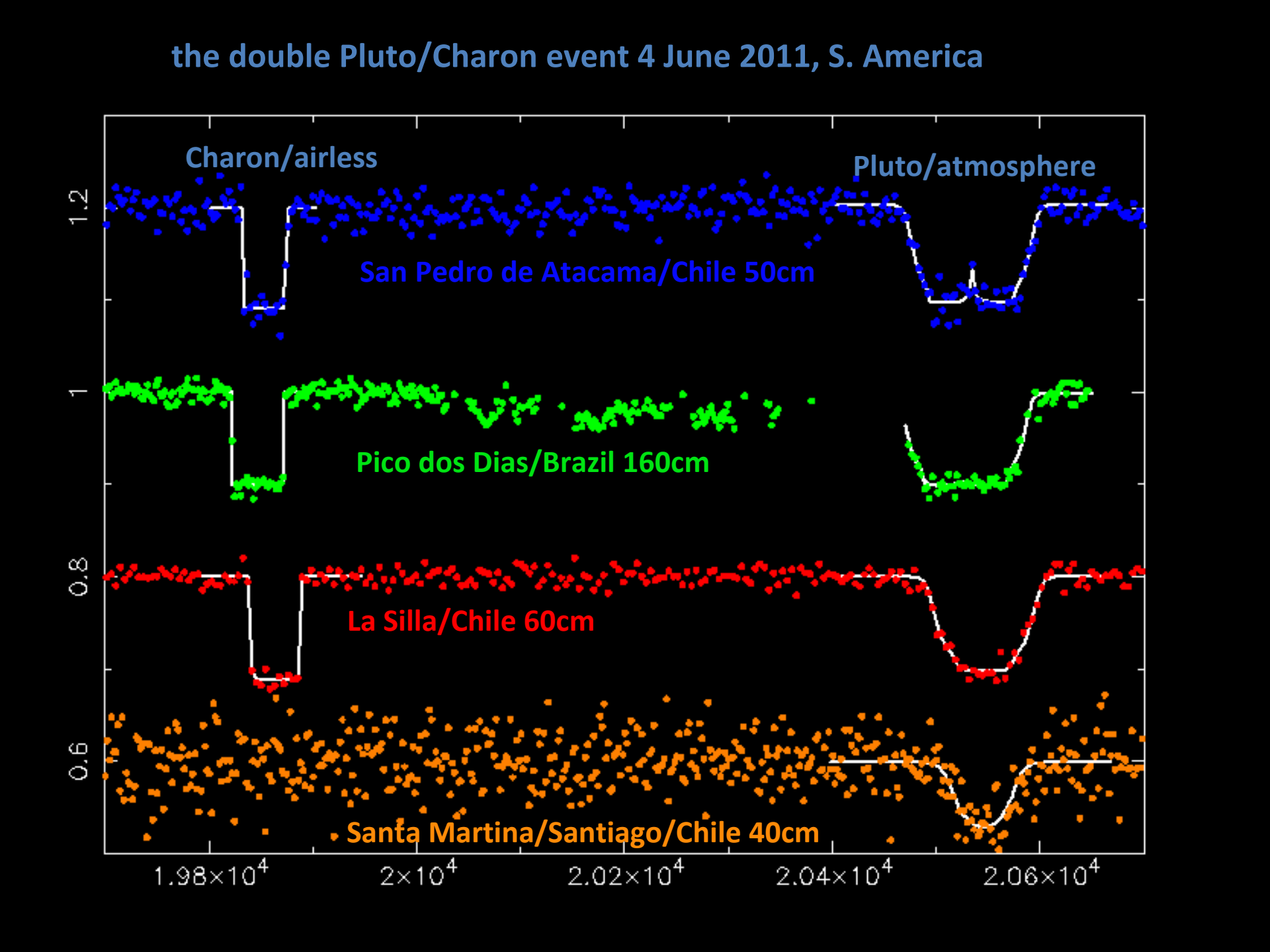


circumstances of the double occultation of 04 June 2011: Charon

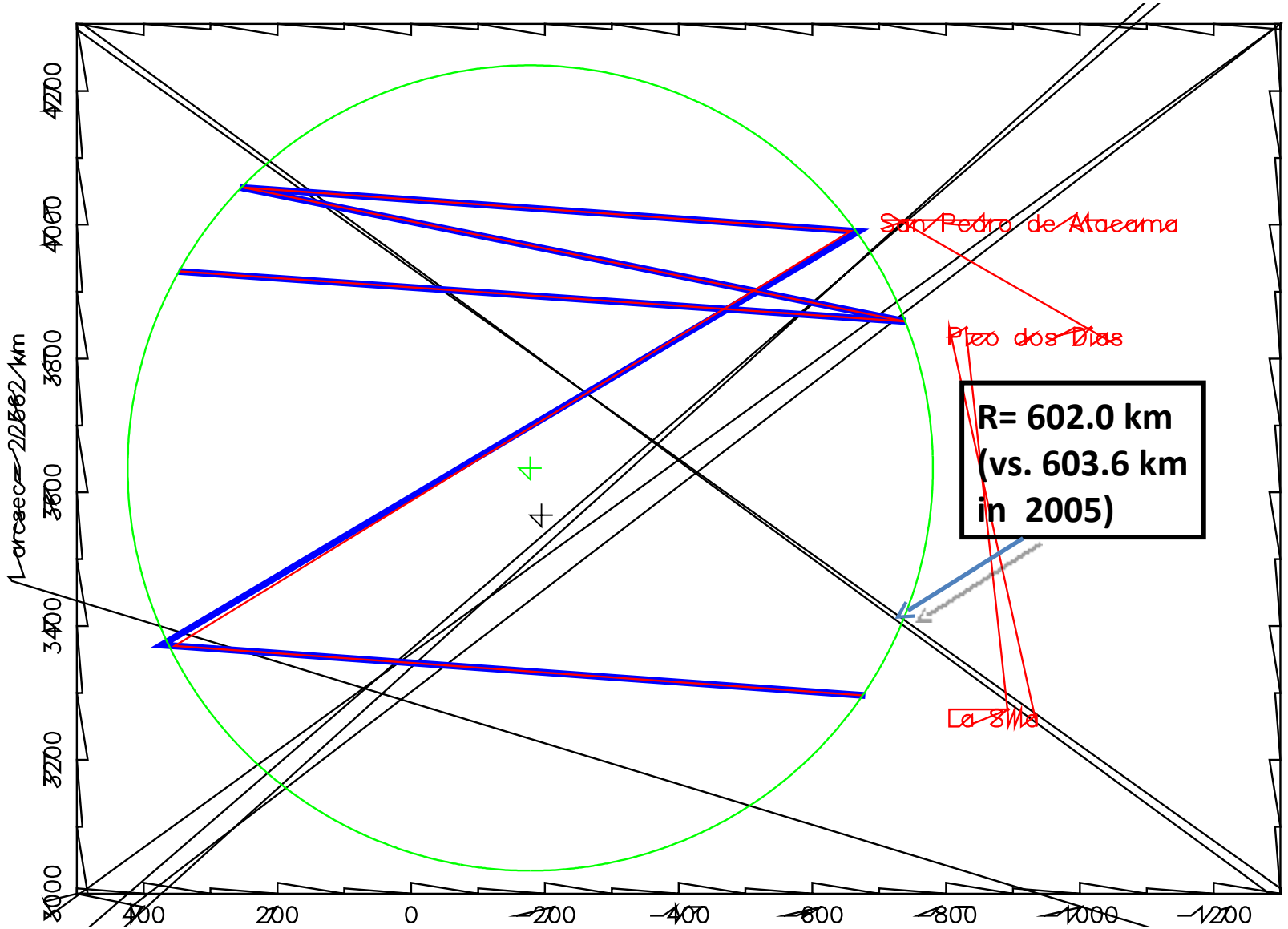


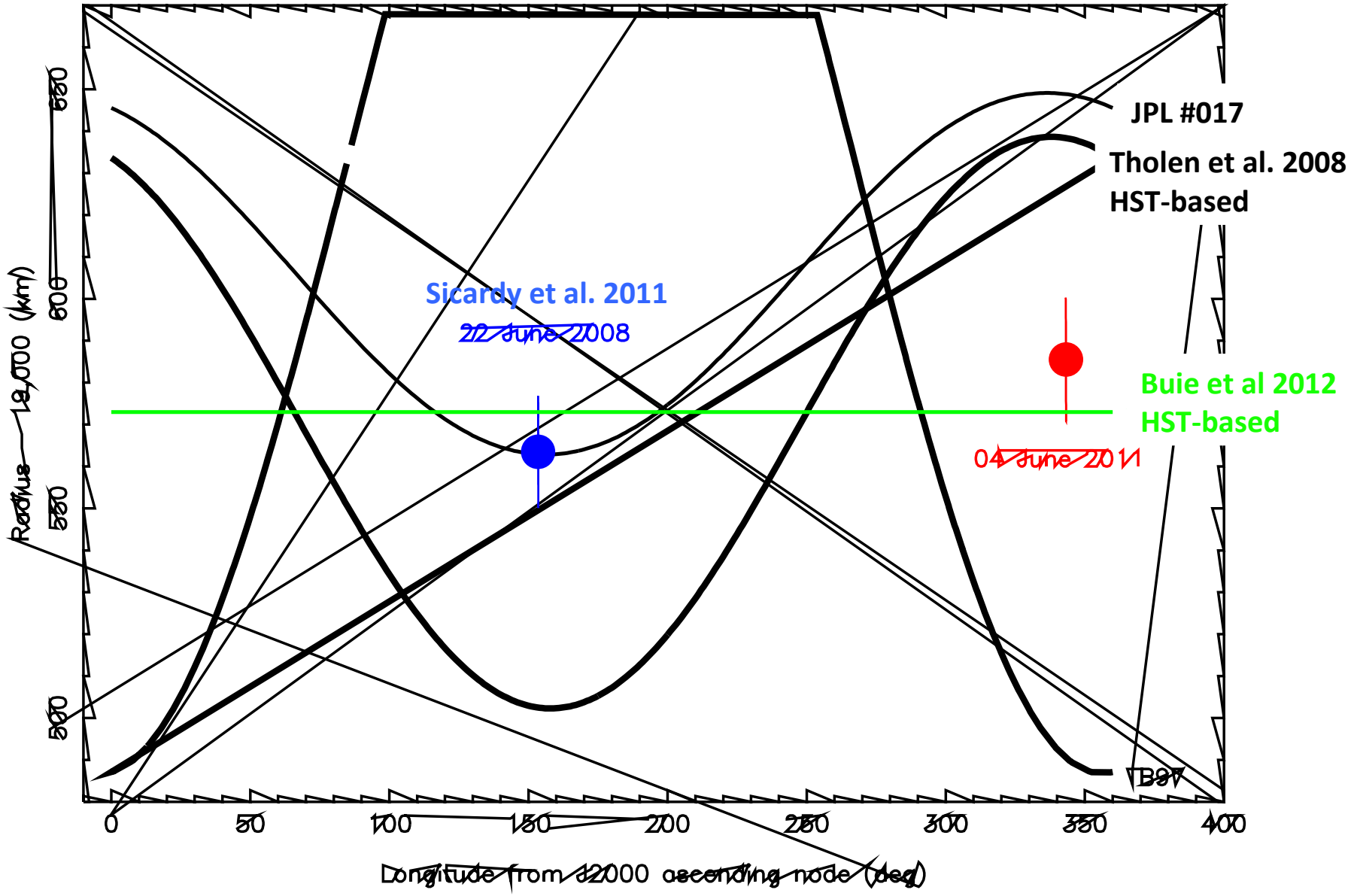
circumstances of the double occultation of 04 June 2011: Pluto

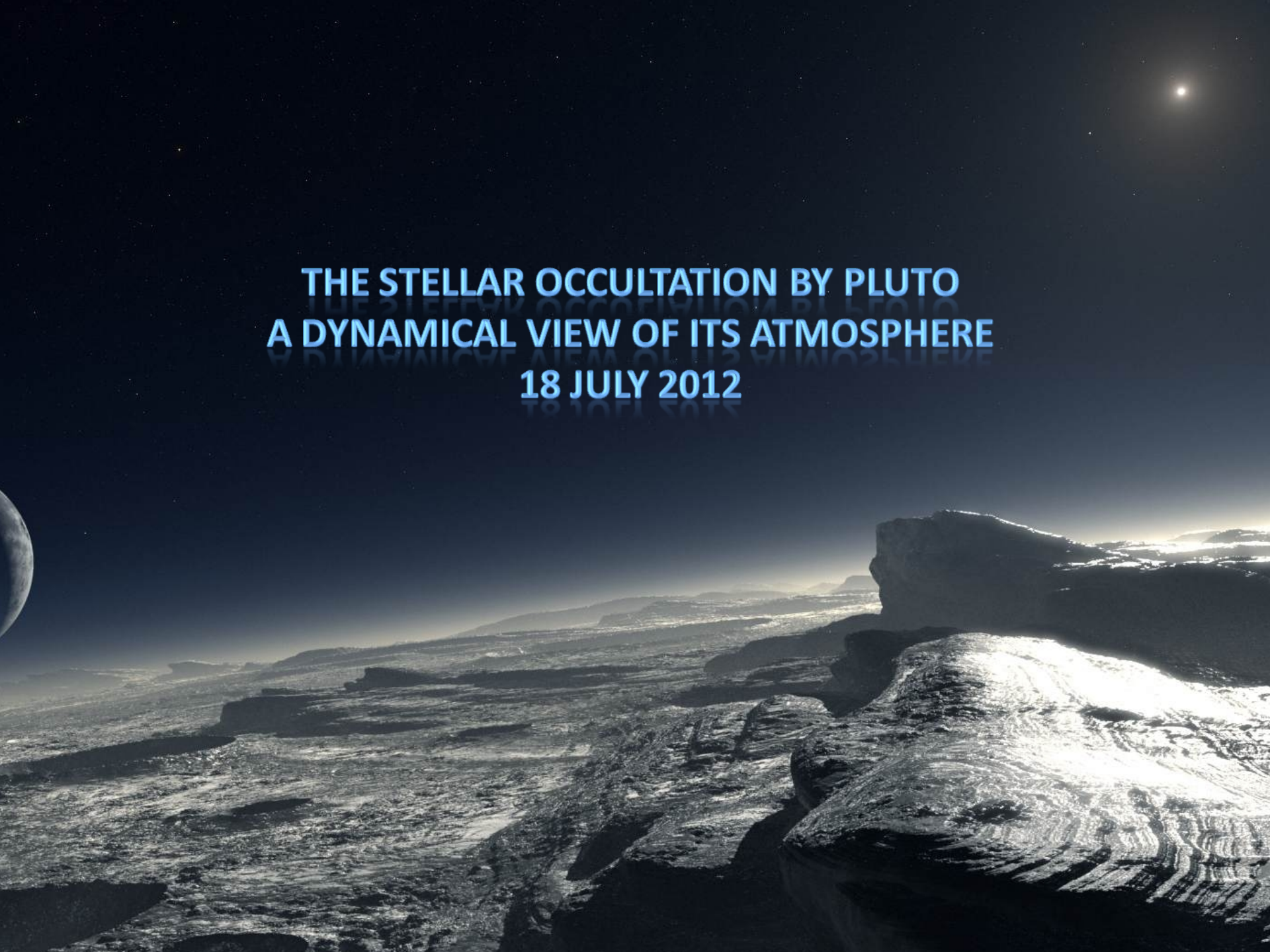



the double Pluto/Charon event 4 June 2011, S. America
Charon/airless
Pluto/atmosphere
San Pedro de Atacama/Chile 50cm
Pico dos Dias/Brazil 160cm
La Silla/Chile 60cm
Santa Martina/Santiago/Chile 40cm
1.2
1
0.8
0.6
1.98×10^4
2×10^4
2.02×10^4
2.04×10^4
2.06×10^4

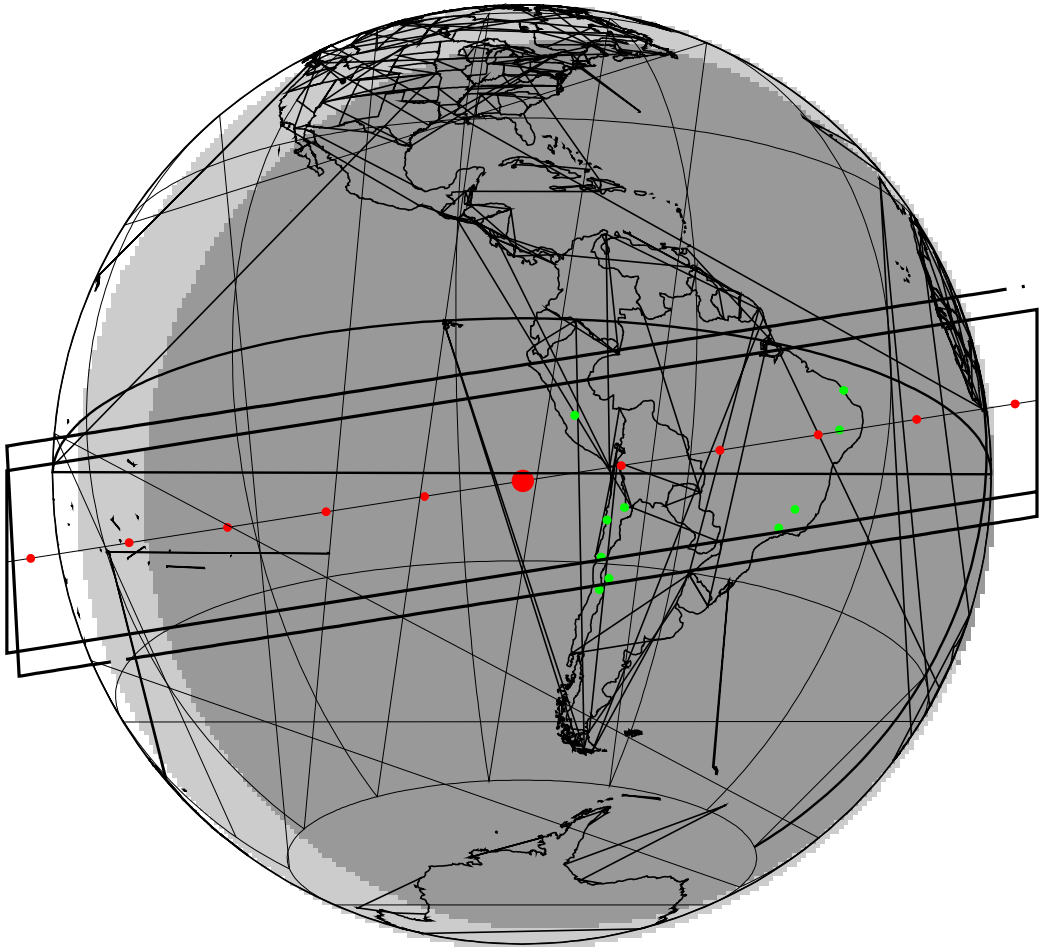
the double occultation of 04 June 2011: Charon



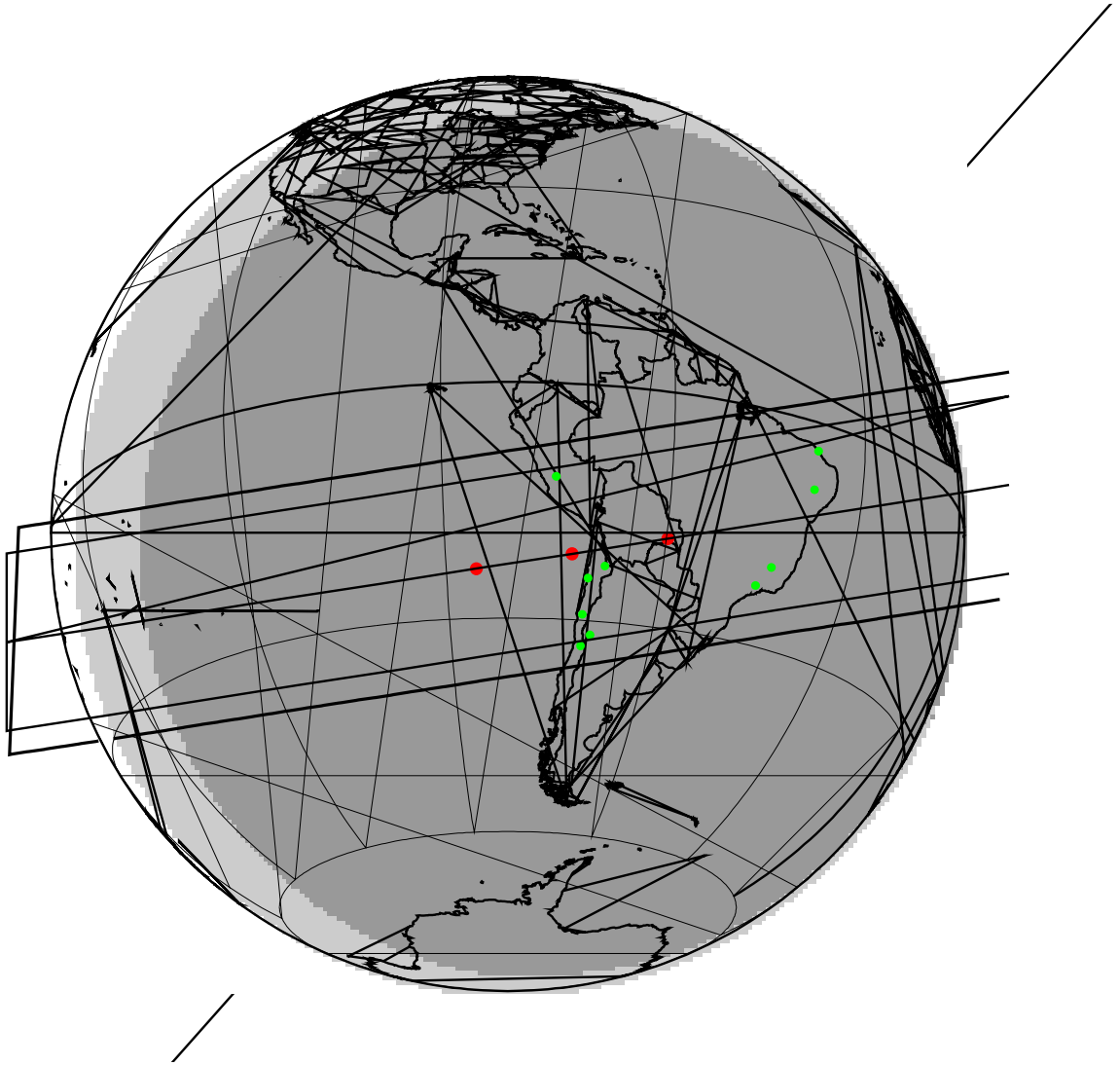

JPL #017
Tholen et al. 2008
HST-based
Sicardy et al. 2011
22 June 2008
Buie et al 2012
HST-based
04 June 2011
B97
Radius (km)
Longitude from J2000 ascending node (deg)


THE STELLAR OCCULTATION BY PLUTO
A DYNAMICAL VIEW OF ITS ATMOSPHERE
18 JULY 2012

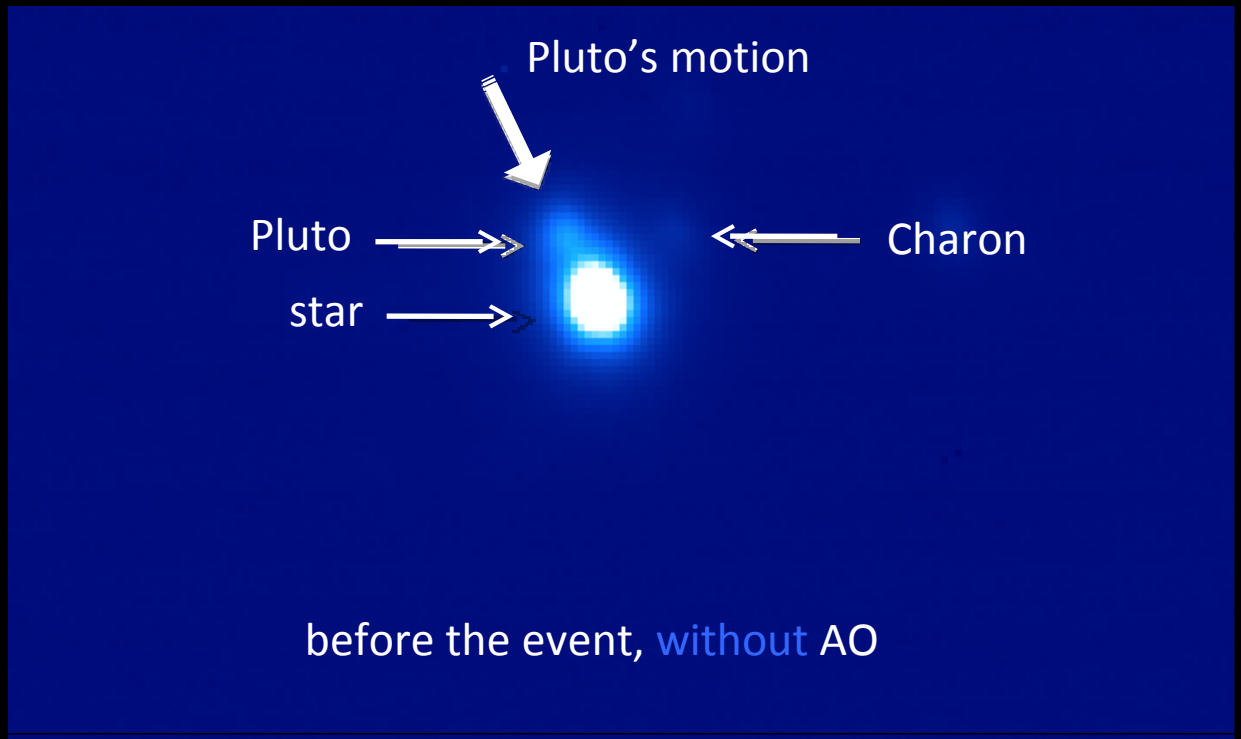
Predicted ~ one week before

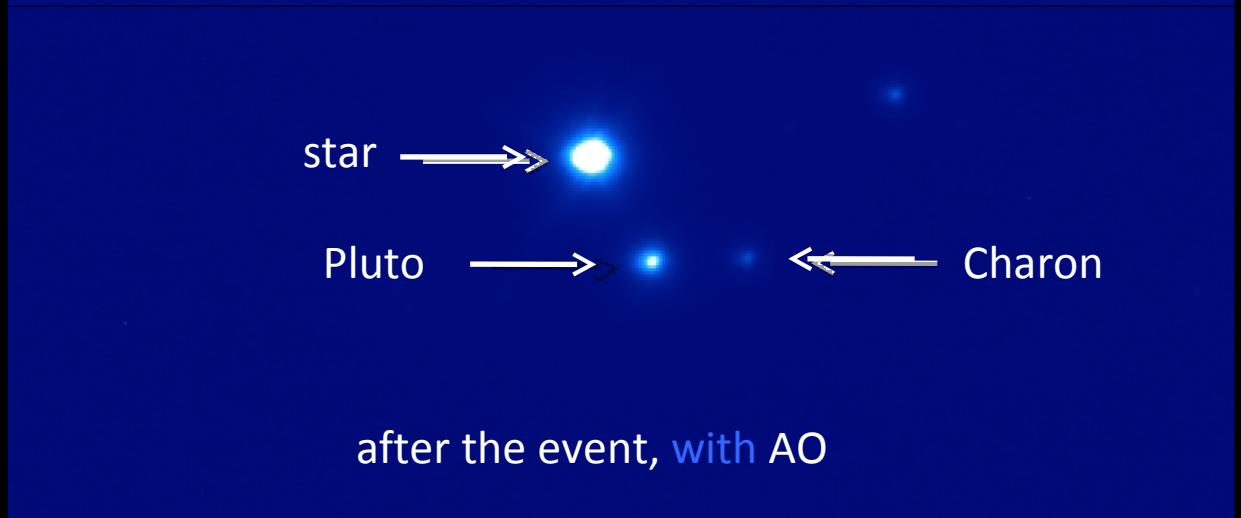


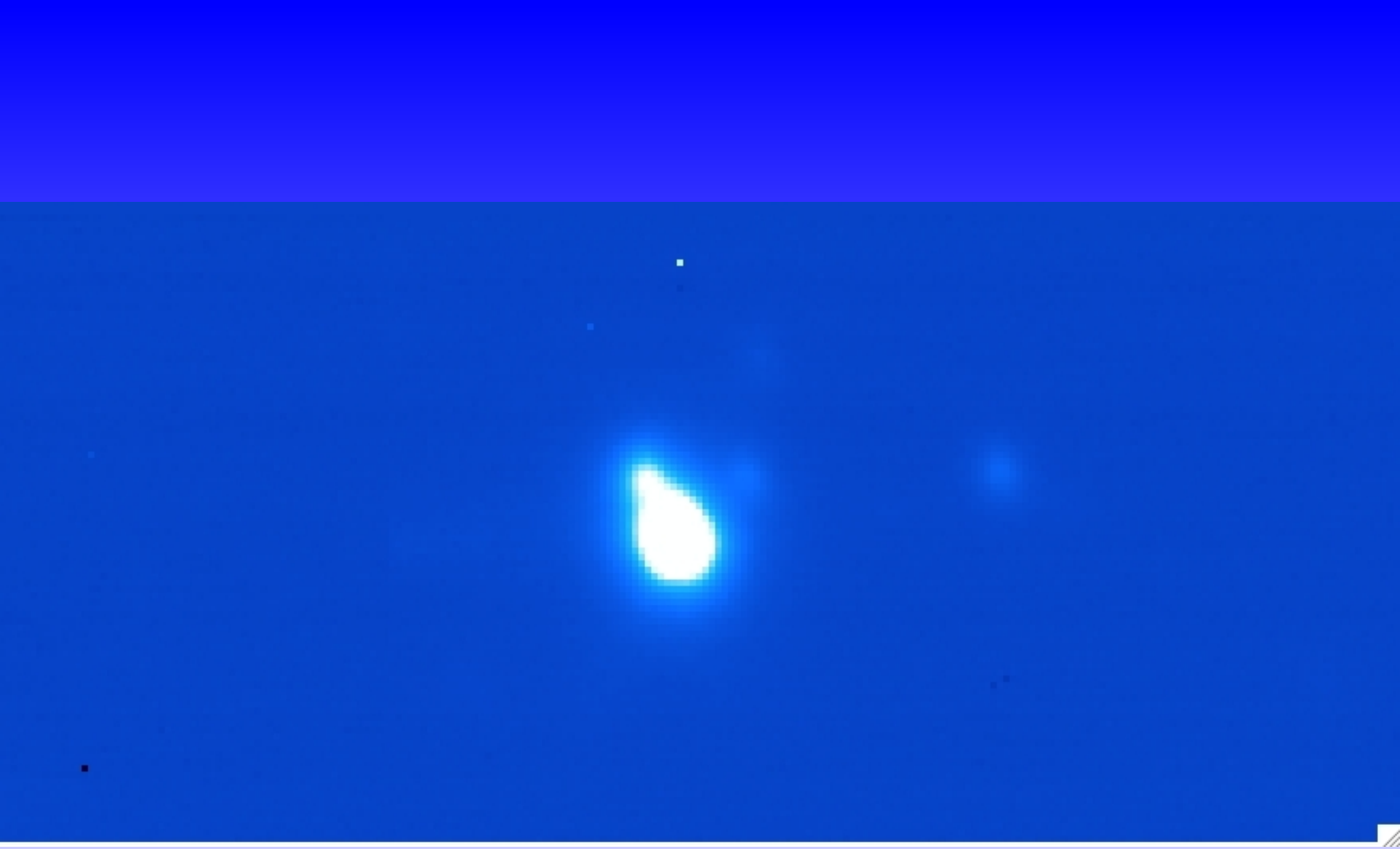
Observed

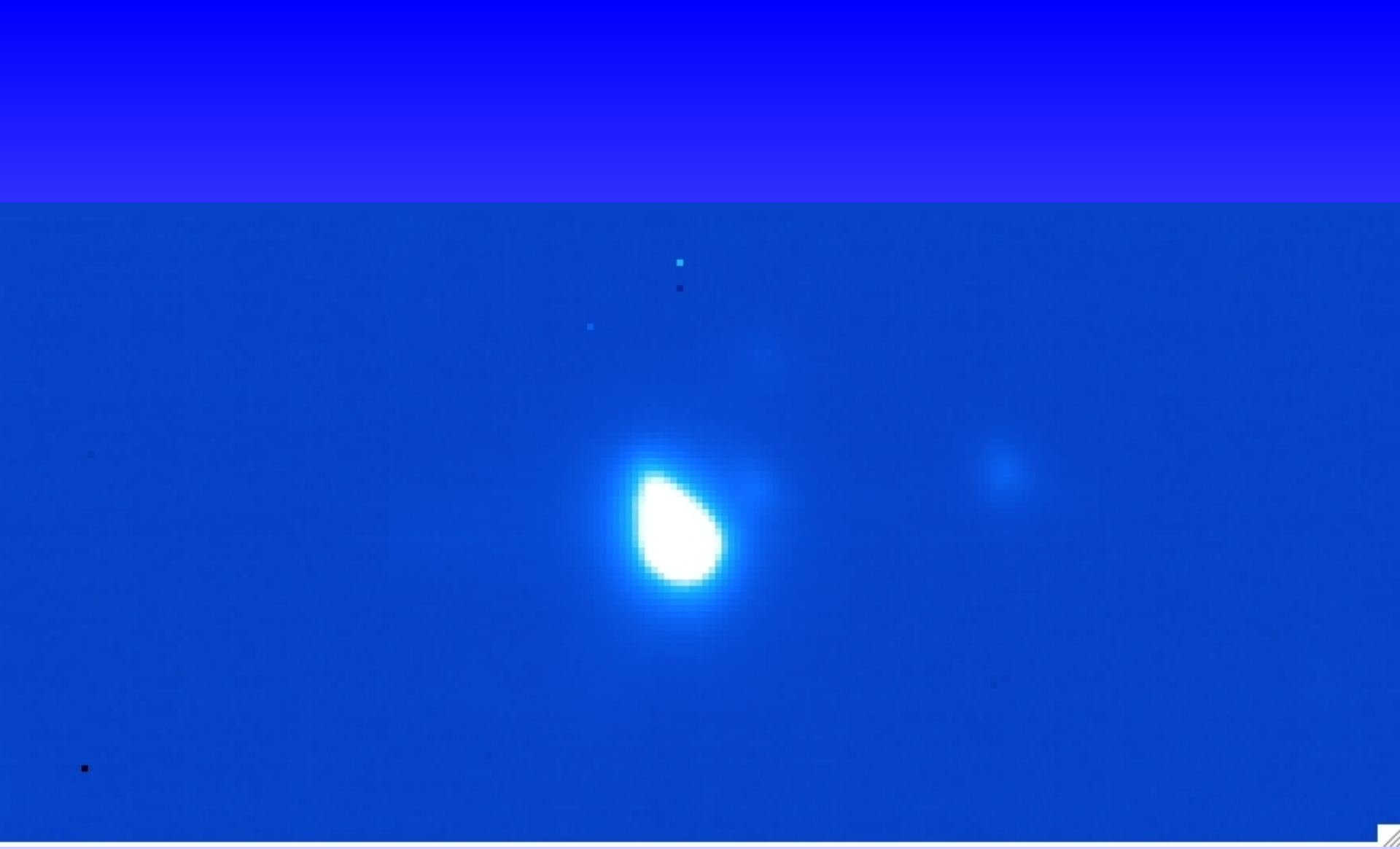


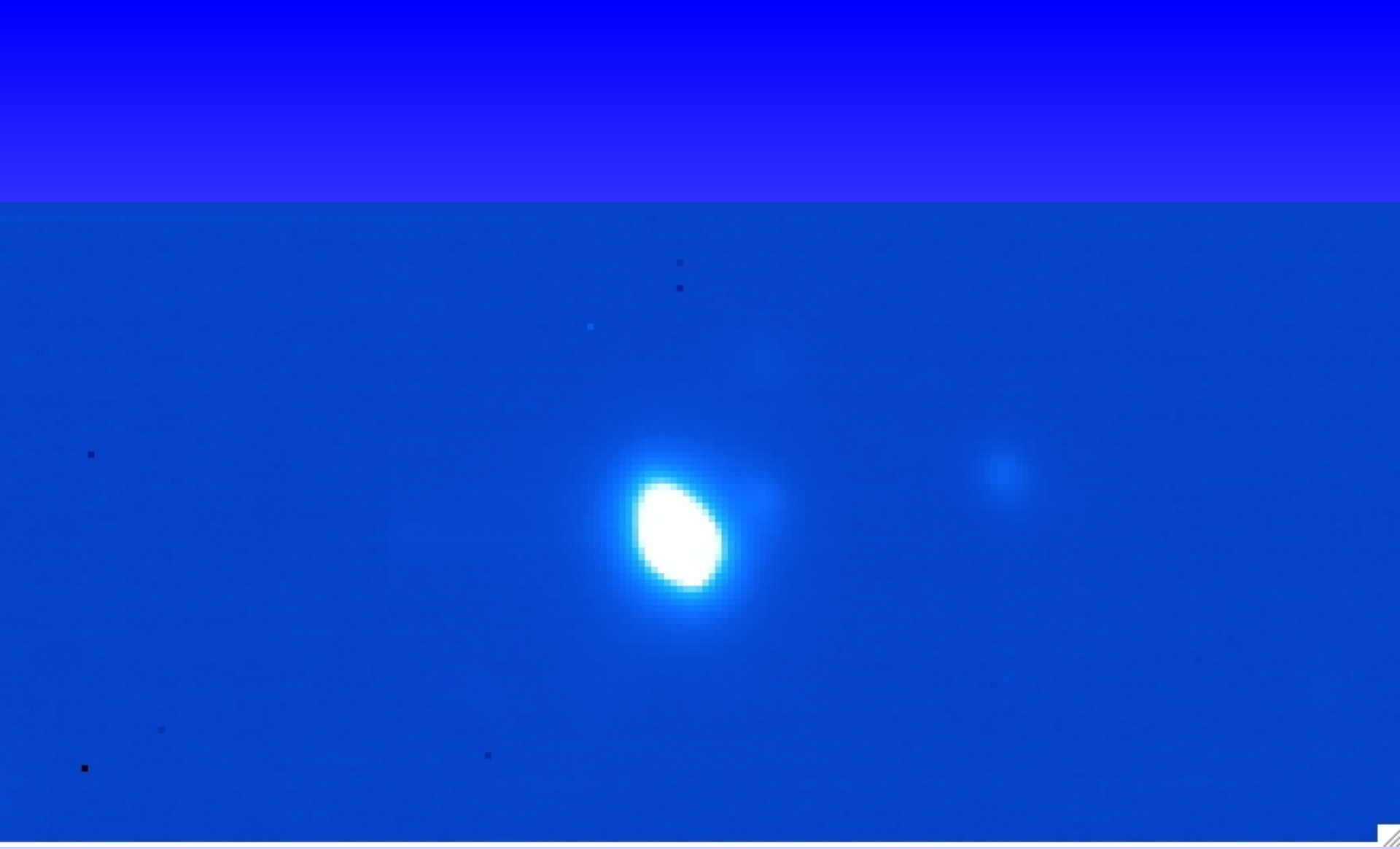
Pluto stellar occultation, 18 july 2012
ESO Very Large Telescope, NACO, H band

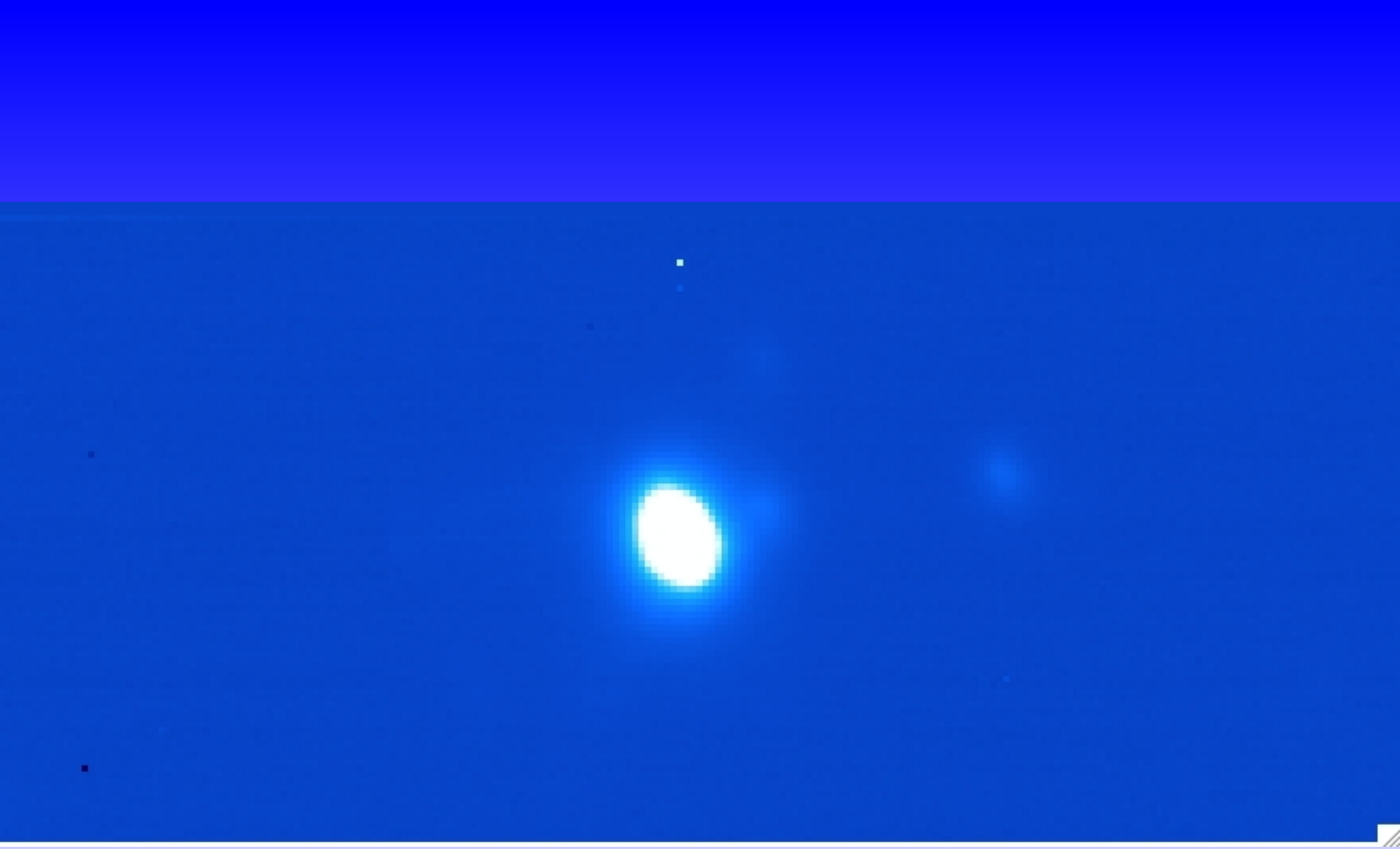


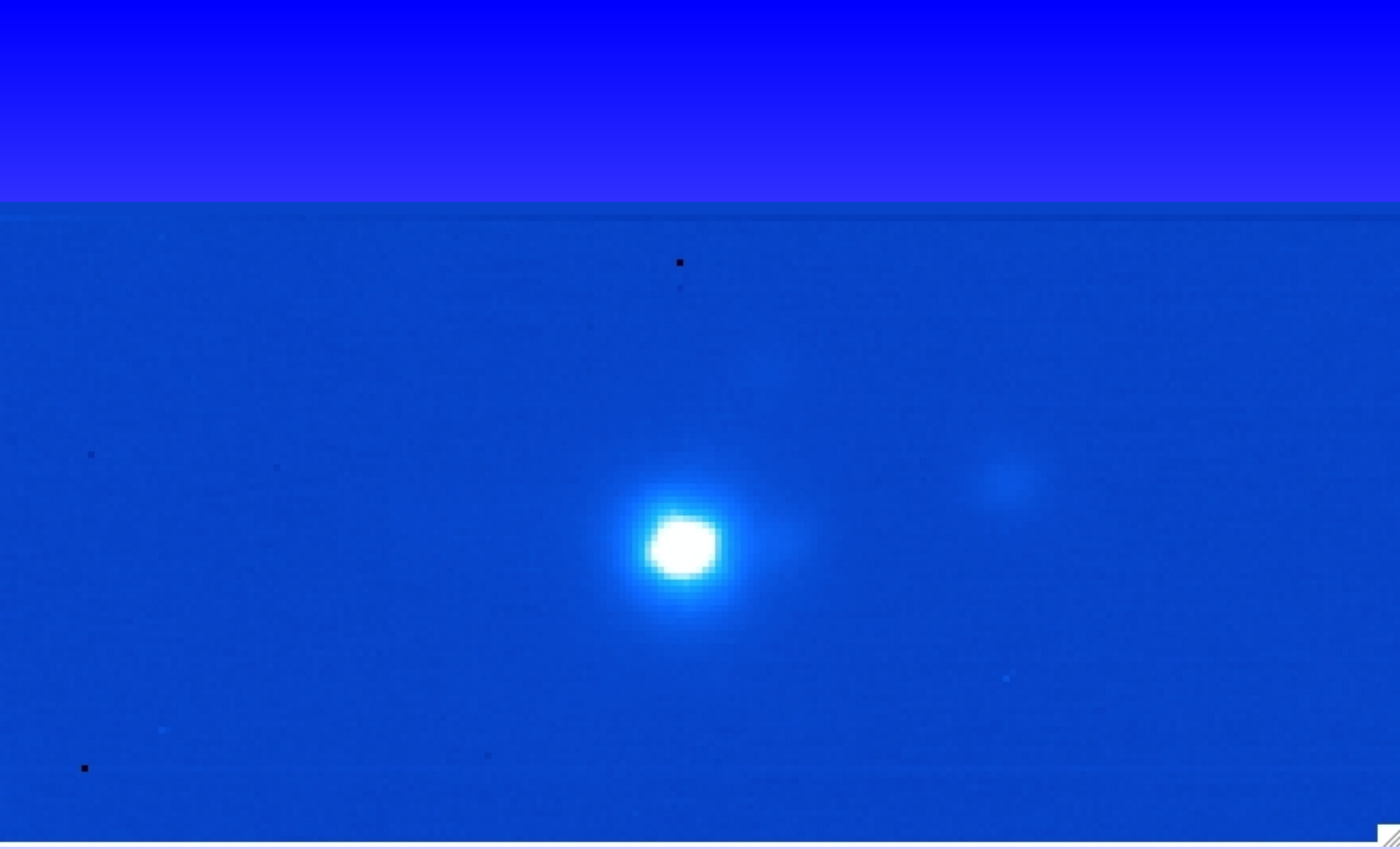


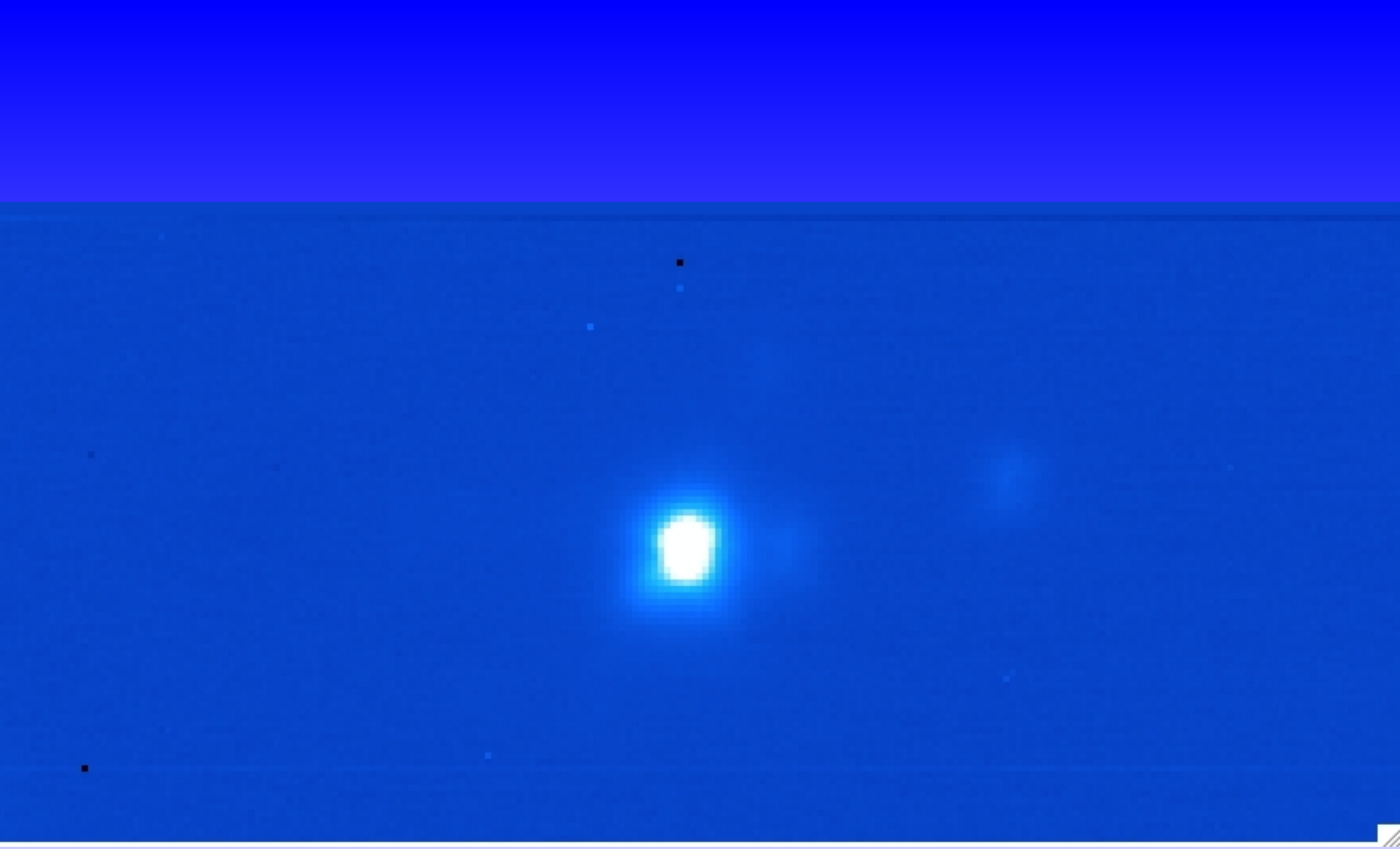


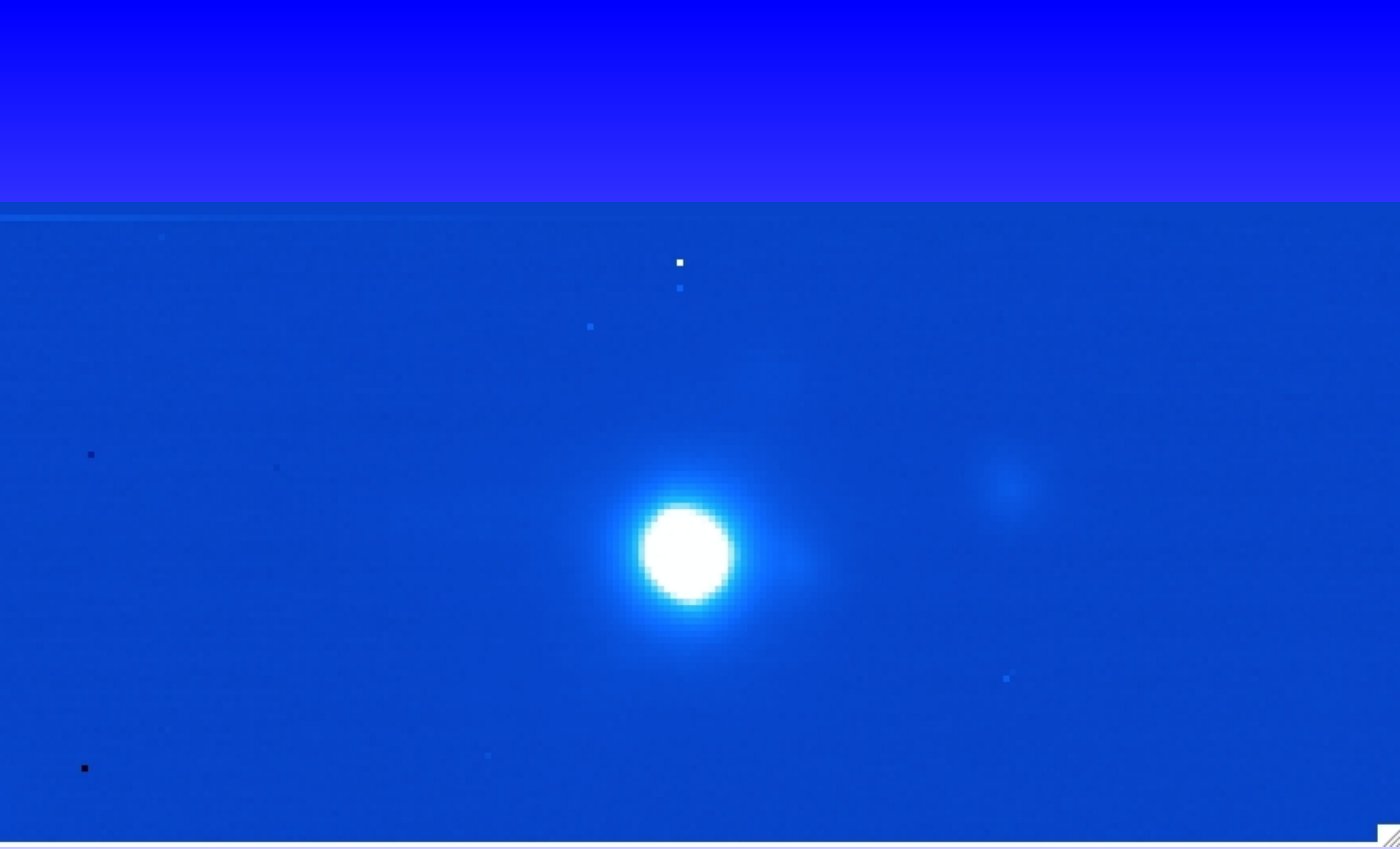


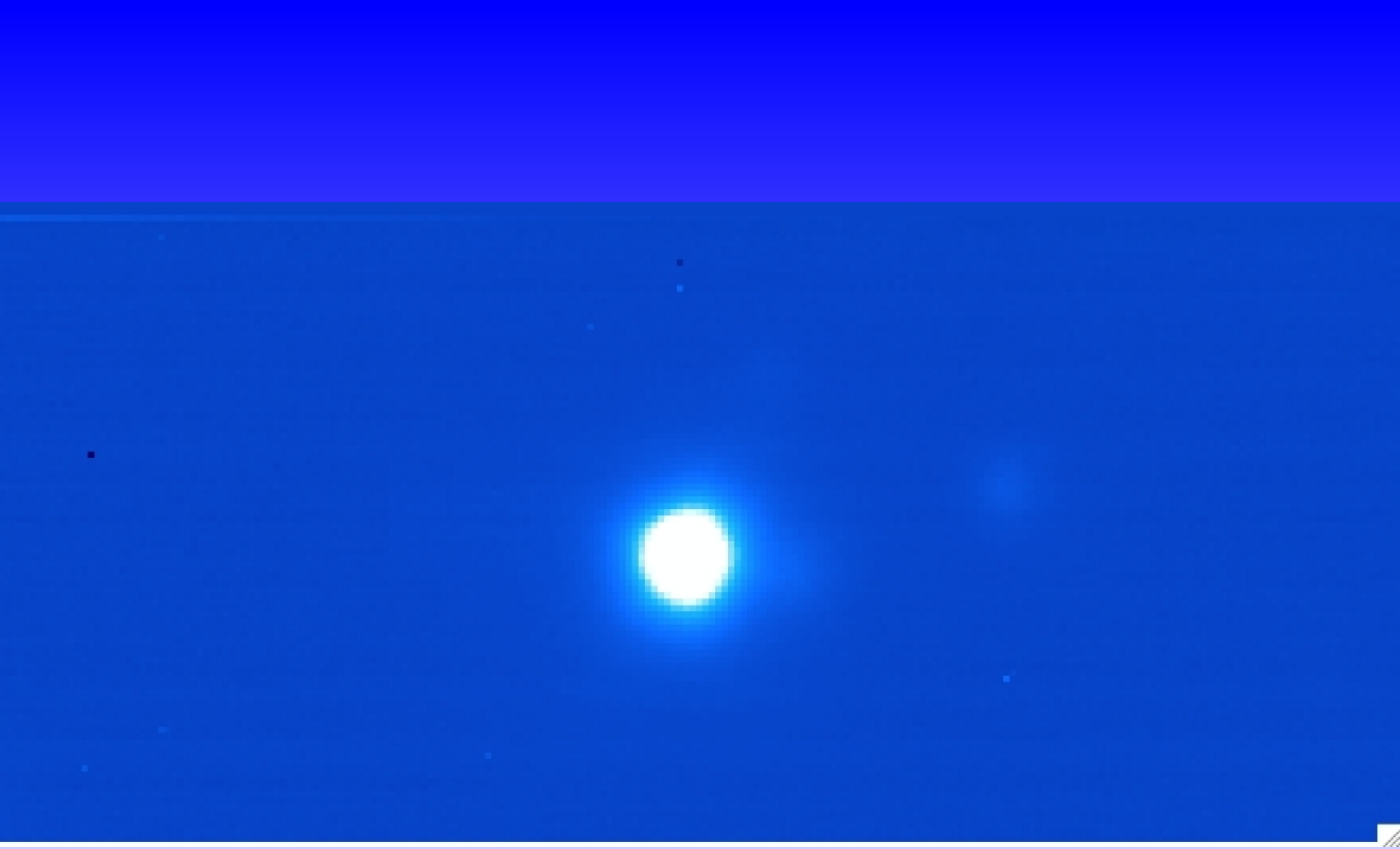


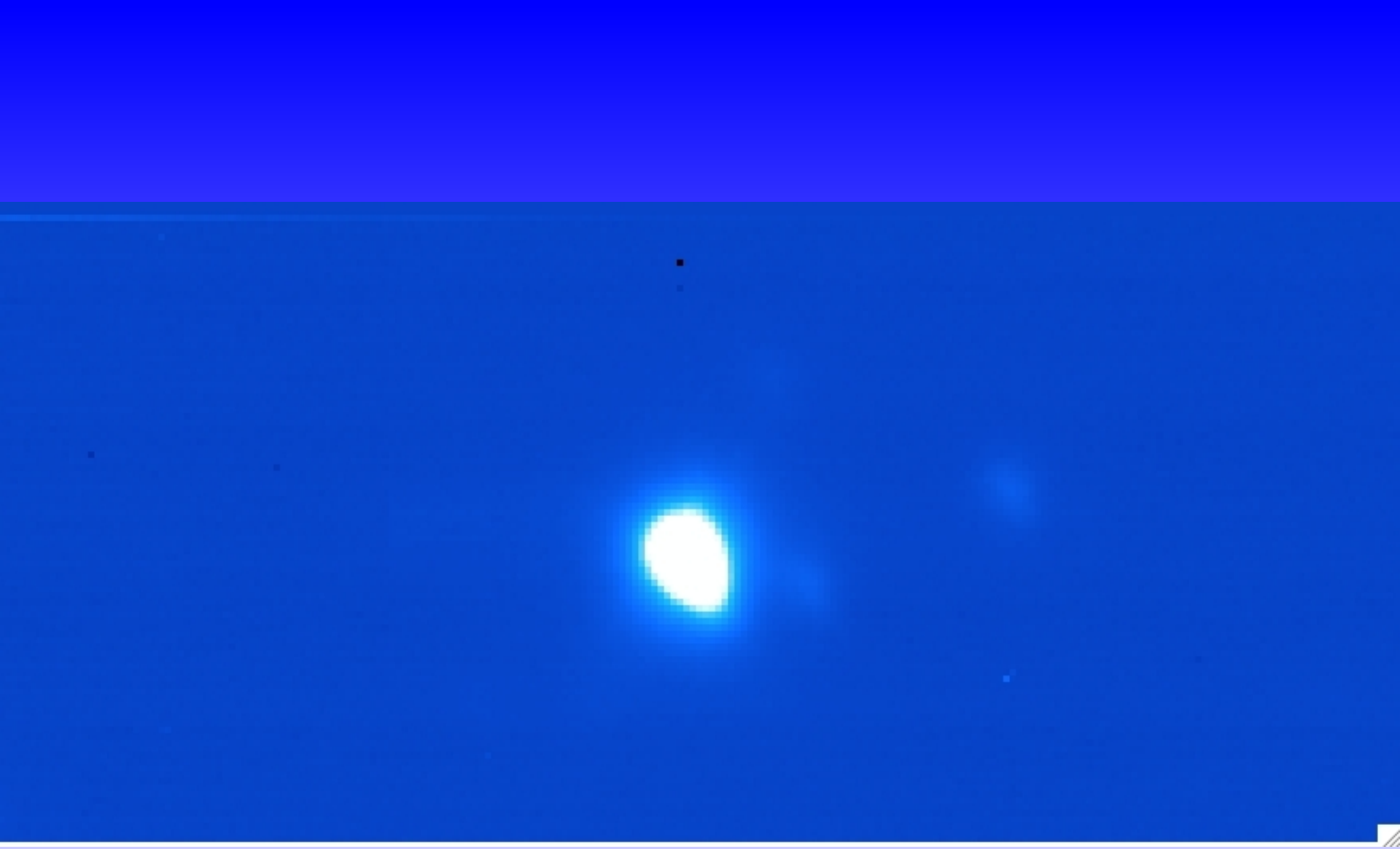


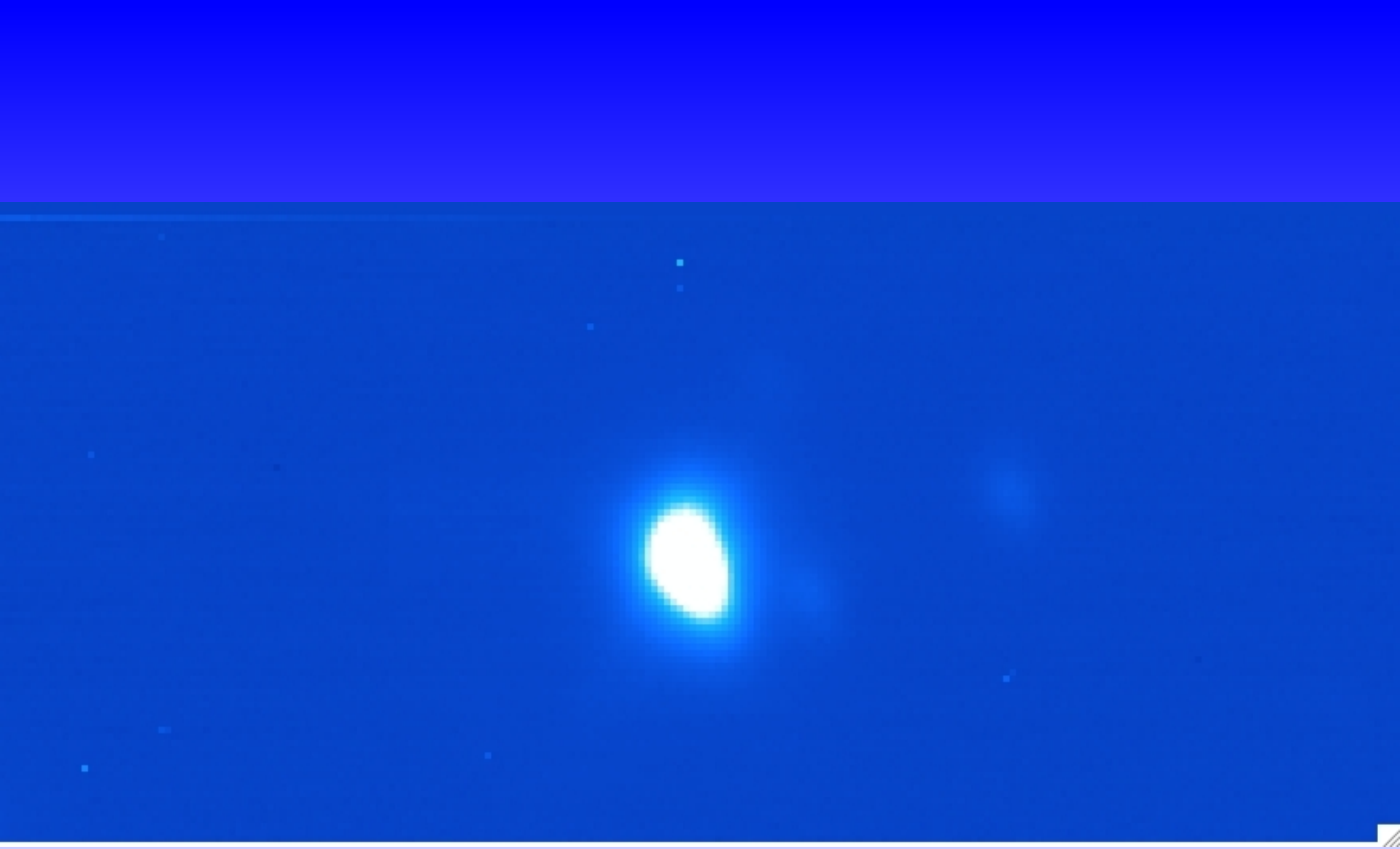


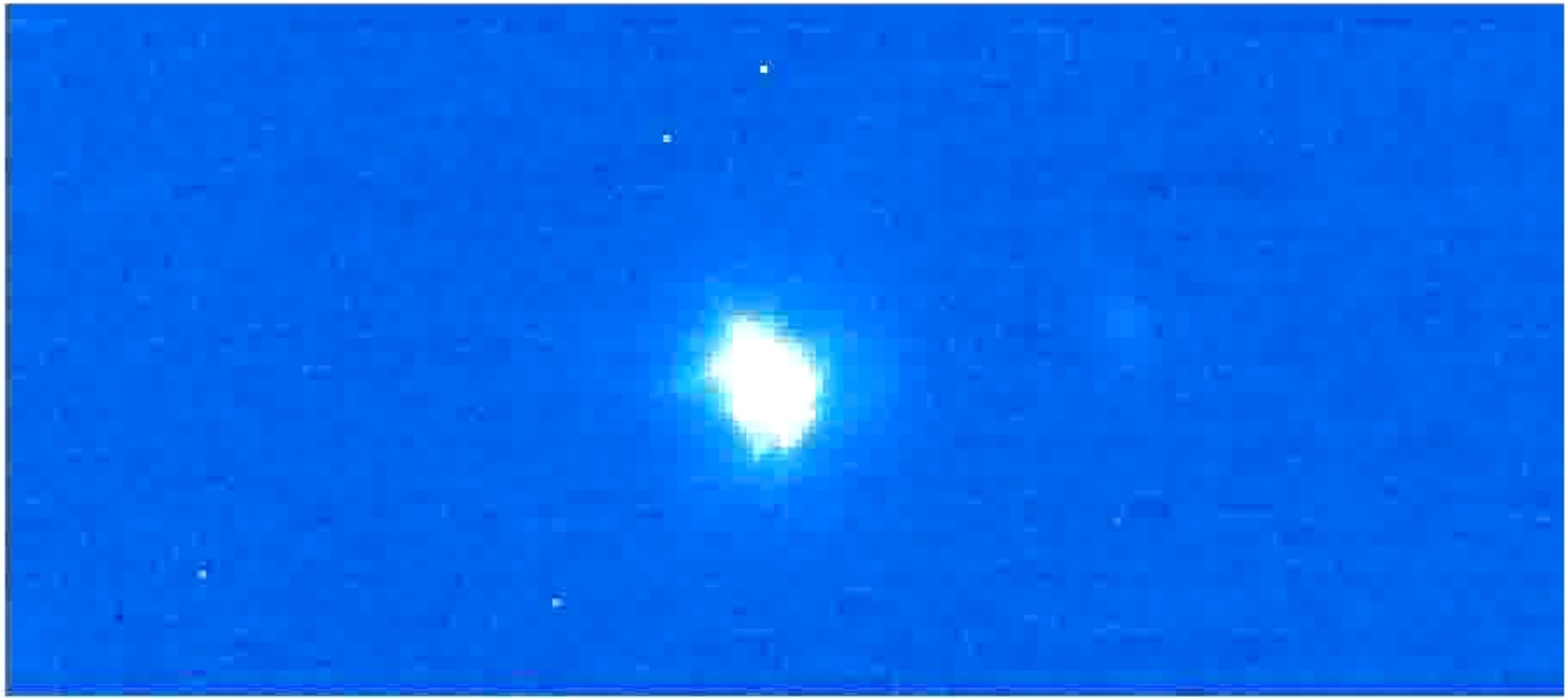


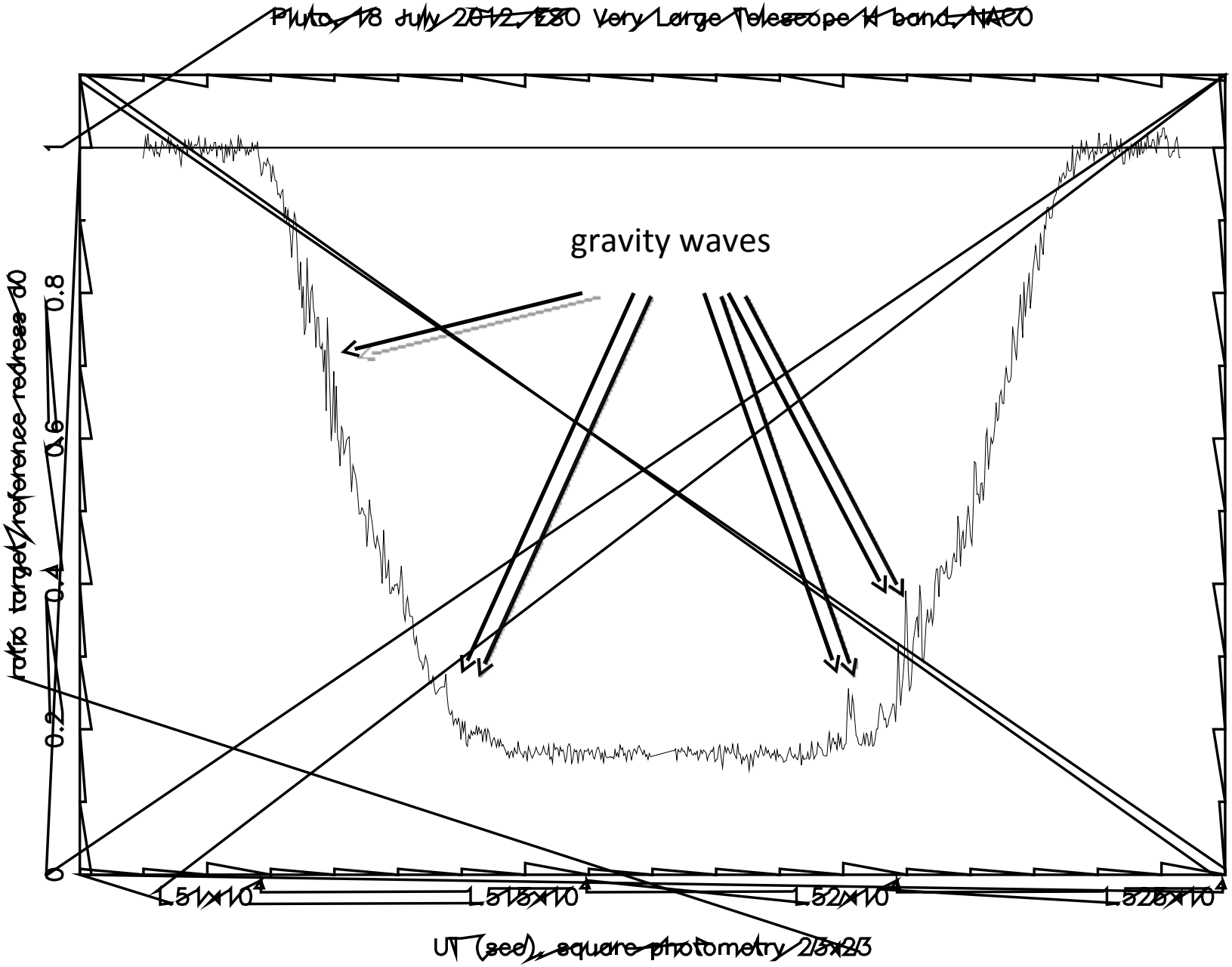


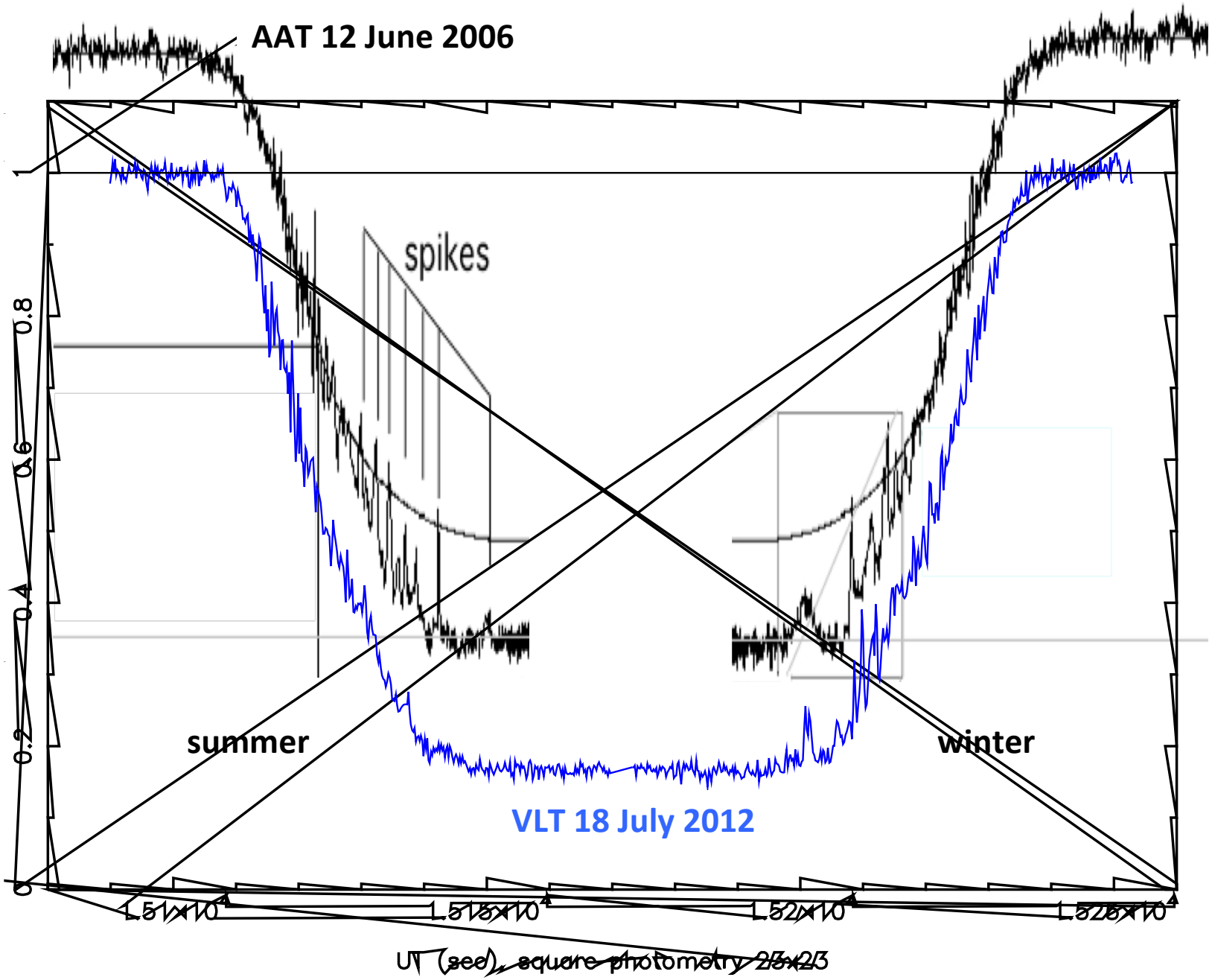









Pluto, 18 July 2012, ESO Very Large Telescope H band, NACO
gravity waves
ratio target/reference reduced 10
1
0.8
0.6
0.4
0.2
0
1.51x10^4
1.515x10^4
1.52x10^4
1.525x10^4
UT (sec), square photometry 23x23


AAT 12 June 2006
spikes
summer
winter
VLT 18 July 2012
1
0.8
0.6
0.4
0.2
0
1.51×10
1.515×10
1.52×10
1.526×10
UT (sec), square photometry 25x25