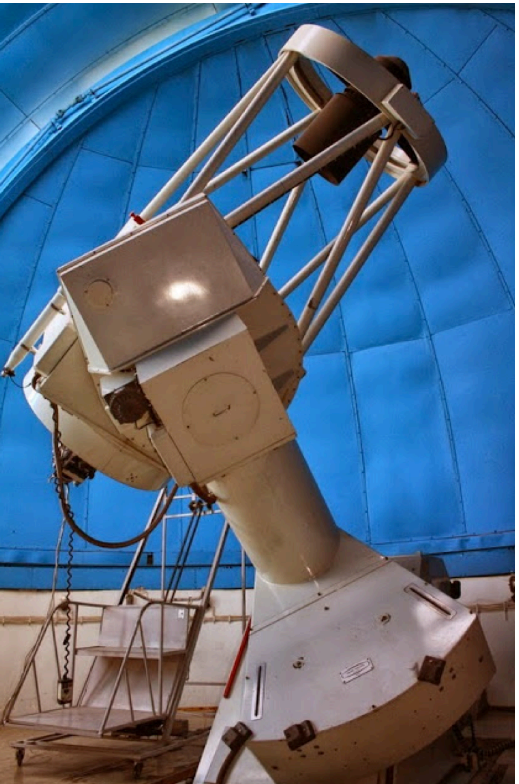
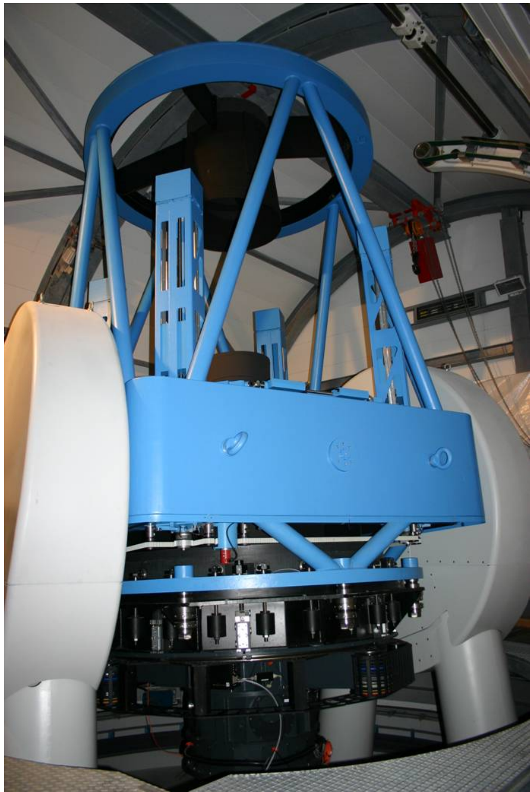
Observing Facilities at the National Observatory of Athens

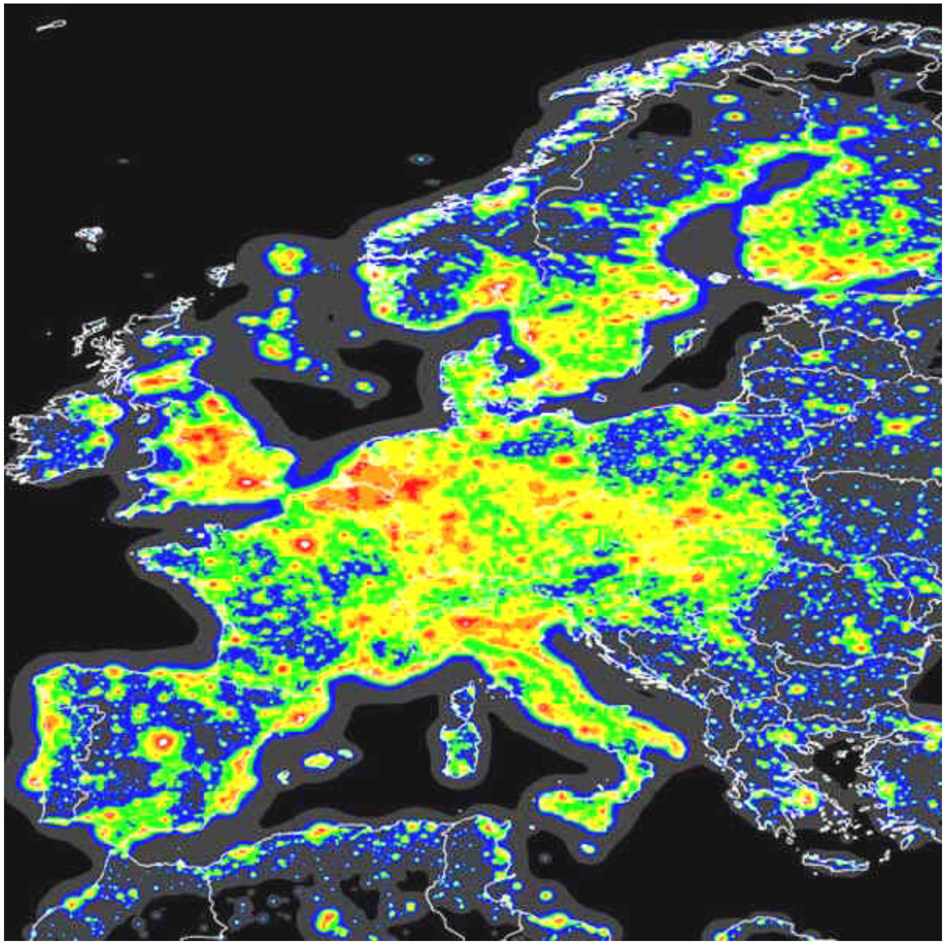


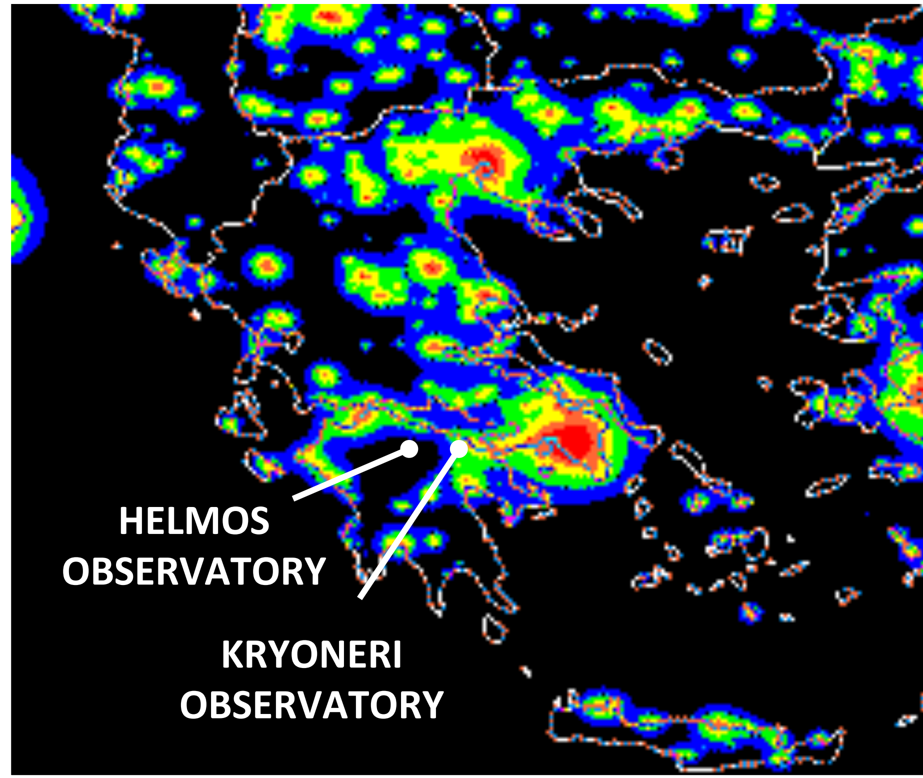
Gaia Science Alerts Workshop
November 11, 2015

Alceste Bonanos
National Observatory of Athens, Greece



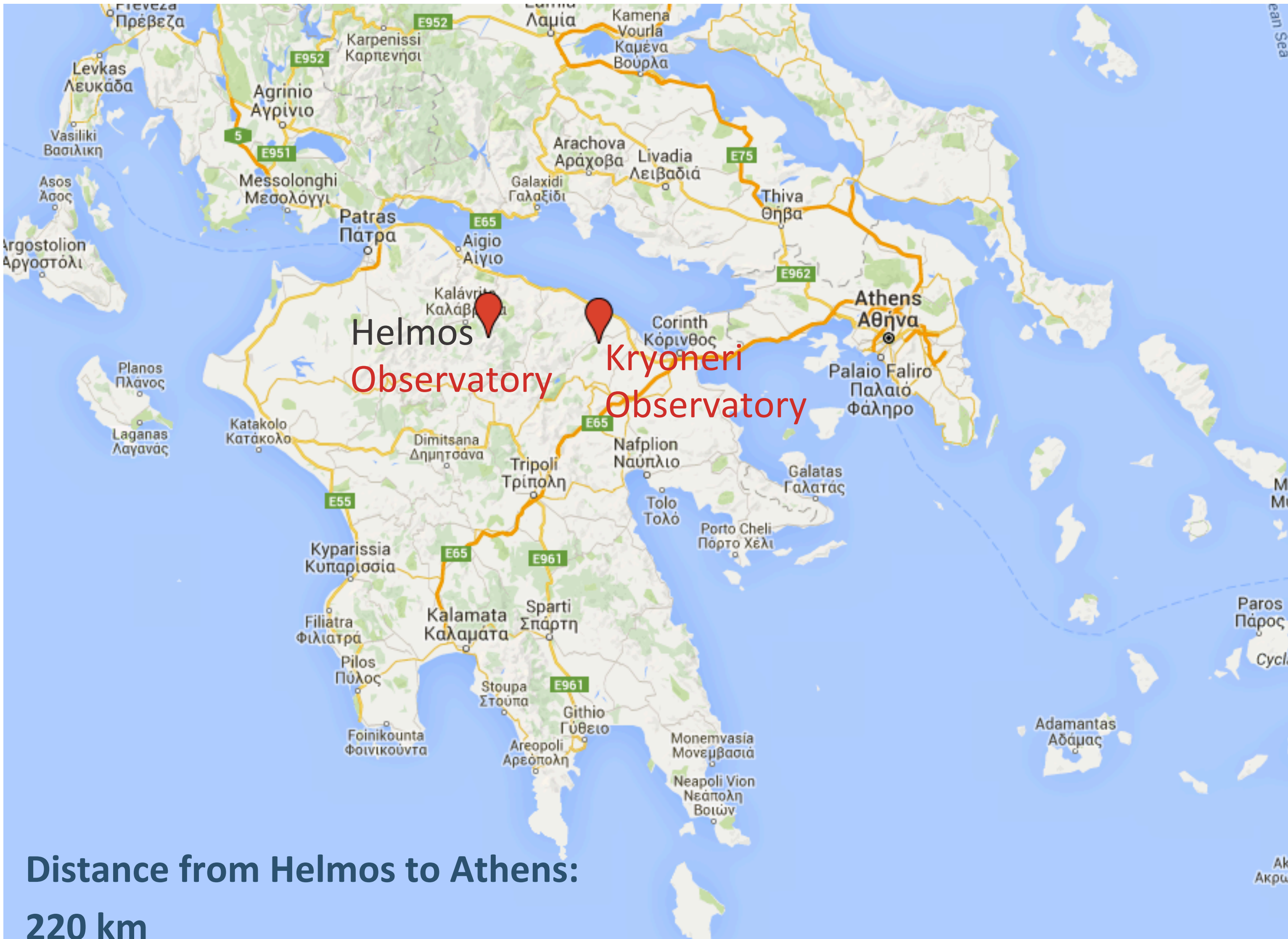
OBSERVATORIES OPERATED BY NOA





Cinzano et al., 2001, MNRAS, 328, 689

OBSERVATORIES OPERATED BY NOA



Distance from Helmos to Athens:

220 km

HELMOS OBSERVATORY

Mount Helmos, 2340 m elevation, 22°11’46” E, 37°59’04” N

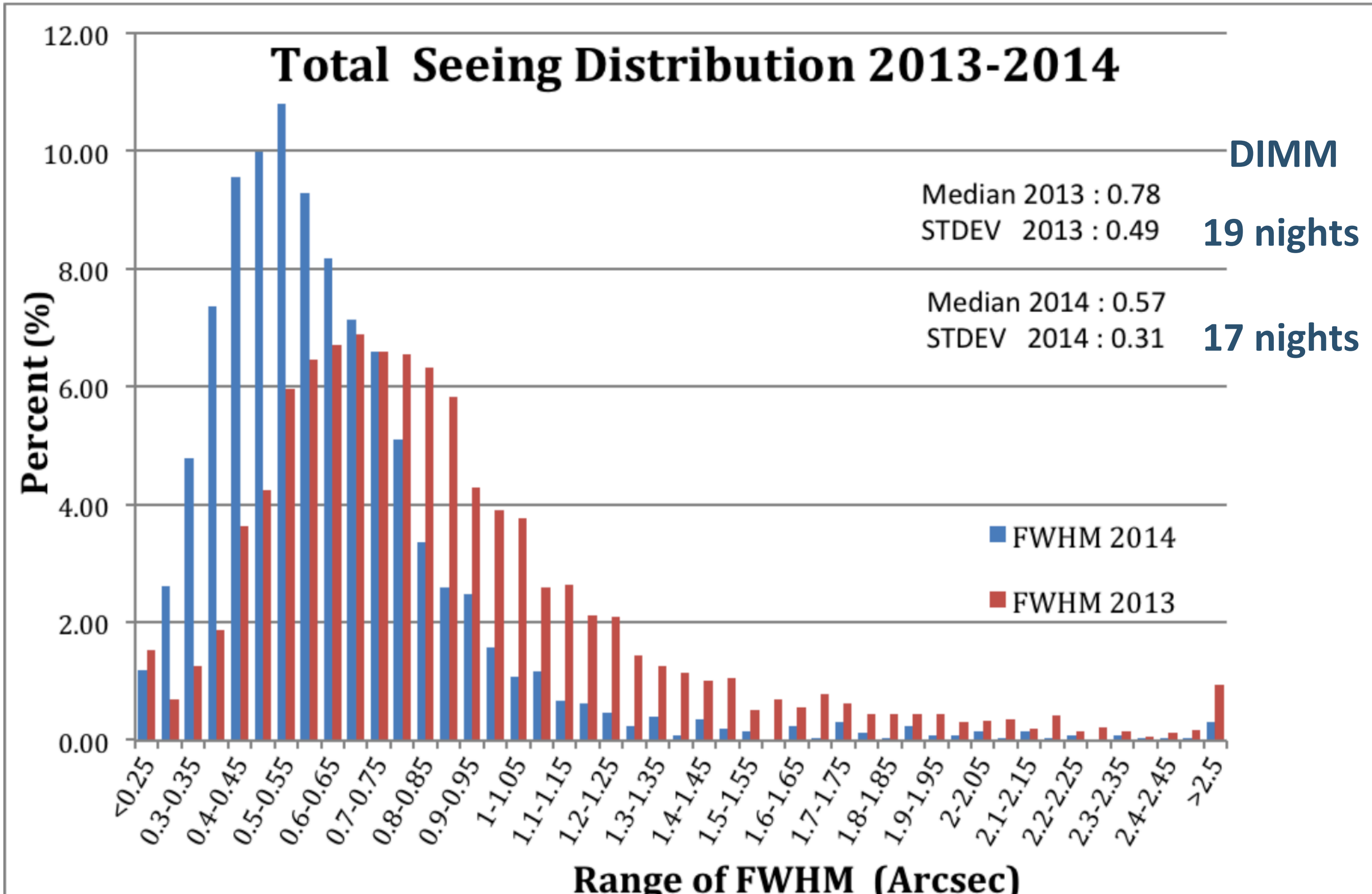
Helmos Observatory

Mount Helmos, 2340 m elevation, 22°11’46” E, 37°59’04” N

Weather Statistics (2014)

Months	Obs. time (hrs)	Total time (hrs)	Fraction (%)	Clear fraction (%)
January	123.13	385.18	32.0	32.0
February	100.10	322.25	31.1	31.1
March	101.78	321.35	31.7	31.7
April	46.25	273.27	16.9	16.9
May	94.87	249.92	38.0	38.0
June	64.00	142.68	44.9	40.1
July	137.13	242.23	56.6	56.6
August	178.05	270.92	65.7	65.4
September	87.37	286.95	30.4	29.4
October	108.62	343.95	31.6	27.6
November	172.68	365.58	47.2	32.9
December	86.80	394.48	22.0	15.0
Summer	670.03	1536.65	**43.6**	**42.0**
Winter	630.75	2062.12	**30.6**	**26.7**

SEEING STATISTICS

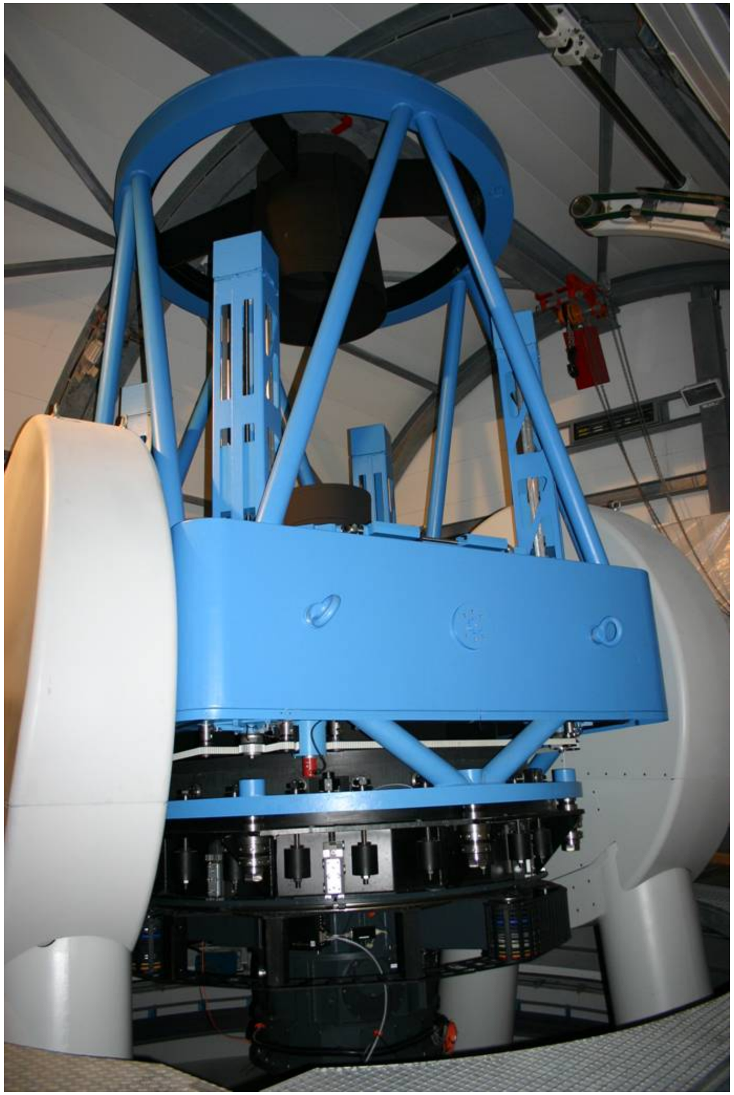


DIMM

19 nights

17 nights

Aristarchos 2.3m Telescope



Primary Mirror Diameter: 2.3 m

Focal ratio: f/8

Type: Ritchey-Chretien

First light: 2007

FOV RC corrected: 1.04 deg

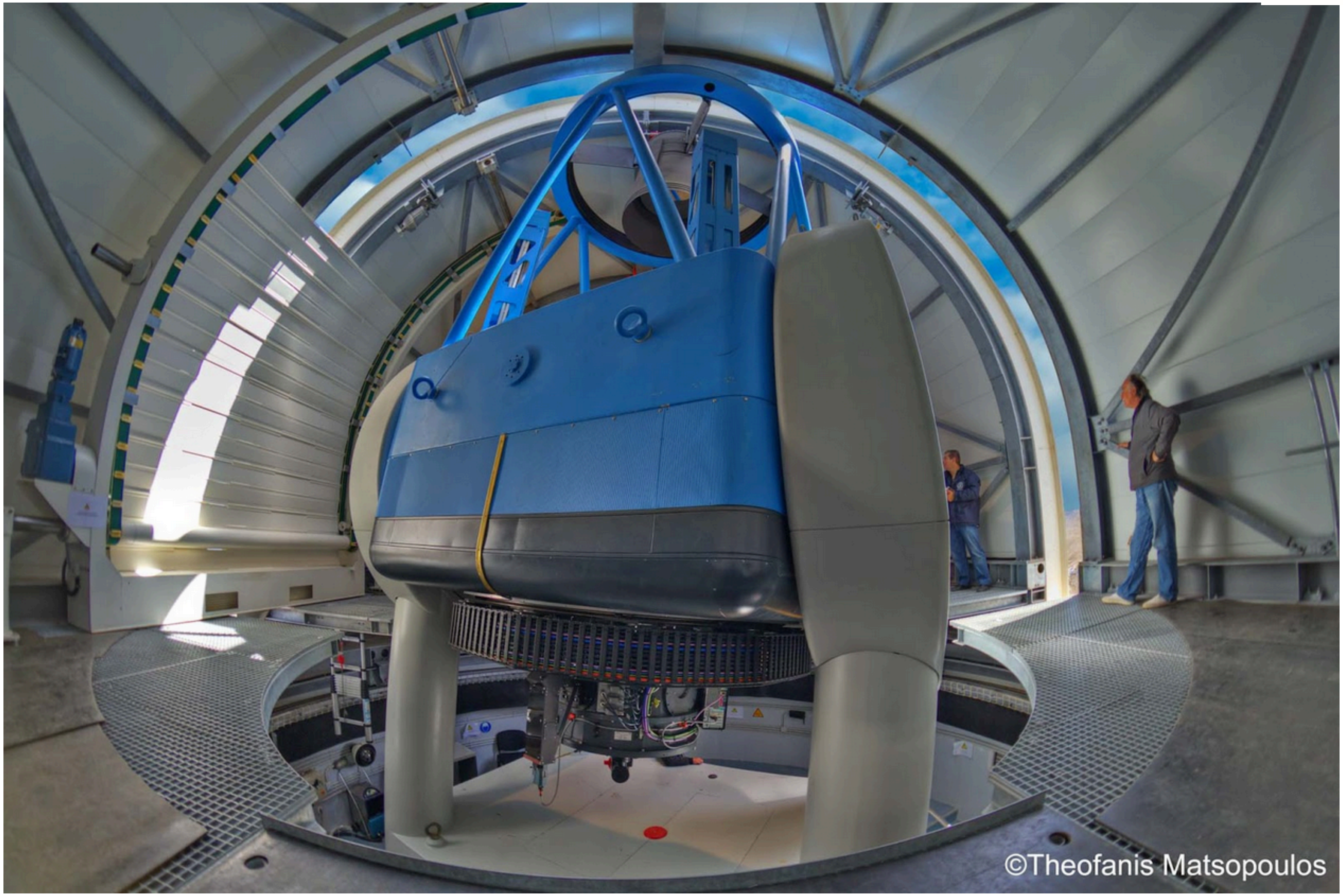
FOV uncorrected: 10.1’

Image quality on-axis: <0.35” (80% encircled energy)

Constructed by: ZEISS Carl Zeiss Jena GmbH Astronomical Instruments

http://helmos.astro.noa.gr/

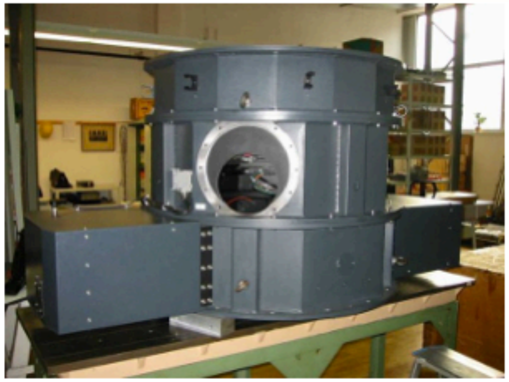
ARISTARCHOS 2.3M TELESCOPE



ARISTARCHOS 2.3M TELESCOPE

IAASARS

Acquisition and Guiding Unit (AGU)
Module 1: 2 off-axis autoguiders
Module 2: 4 side ports for instruments (uncorrected field)
Module 3: 1 main port for science instruments (RC-corrected field)

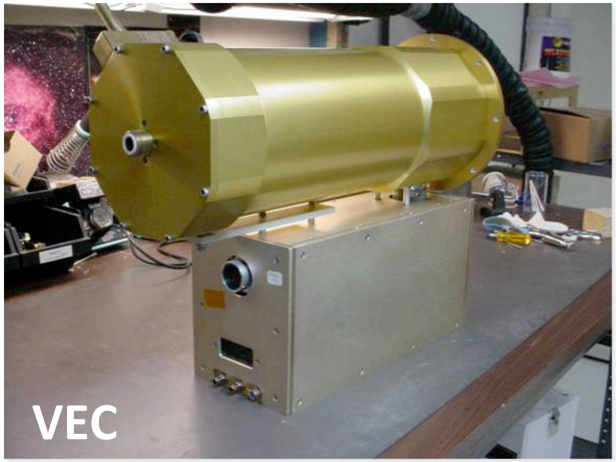


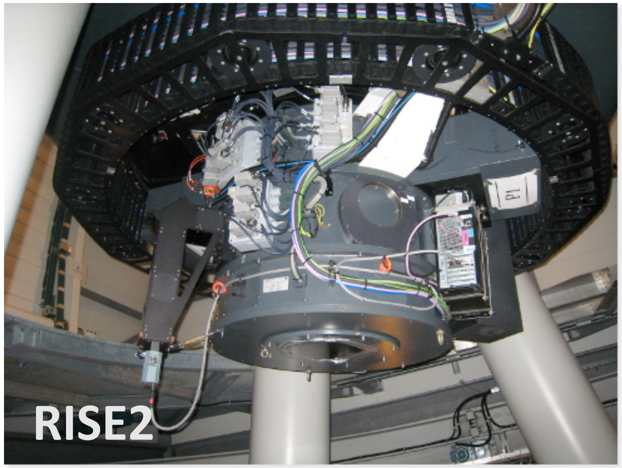
Control System	
Manual Mode	
Automatic Mode	Including advance activity scheduling
Remote control mode	Including planetarium mode
Levels of safety	3 (software, signal, hardware limits)

Parameter	Value	Parameter	Value
Range of movement:	+/- 200 deg (in azimuth)	Resonant frequencies:	16 Hz (fork), 21 Hz (tube)
Range of movement:	+/- 90 deg (in altitude)	Total weight capacity:	up to 300 kg of instrumentation
Rate of movement:	max 2 deg per second (in azimuth)	Cassegrain weight capacity:	up to 300 kg of instrumentation
Rate of movement:	max 2 deg per second (in altitude)	Side port weight capacity:	up to 100 kg of instrumentation
Pointing accuracy:	<4" up to zenith distances of 70 deg	Operating temperature range:	-10 C to +35 C
Tracking accuracy:	<0.5" in 10 min, 2" in 1 hr (open loop)	Operating humidity range:	up to 80% relative humidity
Tracking accuracy:	<0.25" in 10 min, 0.5" in 1 hr (closed loop)	Wind tolerance:	up to 15 m/s (in operation)
Rotator tracking accuracy:	0.25" in 10 min, 0.5" in 1 hr	Earthquake resistance:	up to 2 m/sec^2 in any direction
Radius of zenith blind spot:	2 deg		

ARISTARCHOS IMAGERS

Instrument	Detector	Filters	FOV	Scale ("/pixel)
LN CCD	e2V 1kx1k	table	4.8'x4.8'	0.28
LN2 CCD	e2V 2kx2k	table	5.5'x5.5'	0.16
MES-AT	e2V 2kx2k	table	4'.8x4'.8	0.27
VEC	4kx4k Fairchild	table	10'x10'	0.17
RISE2	Andor DW485 1kx1k	broad-VR	10'x10'	0.60

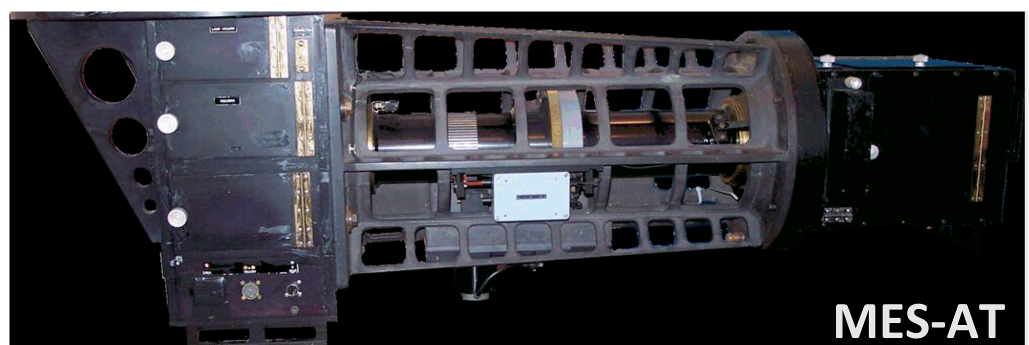




Aristarchos Spectrographs

Instrument	Wavelength range (Å)	Dispersion	Slit Length	Detector
ATS	4009-7257	-	Fiber: 10" on sky	Alta U47 1kx1k
MES-AT	3900-7500	-	5.8'	2kx2k

gratings	option 1 (RED)	option 2 (BLUE)	option 3
(grooves/mm)	1200	1200	600
(arcsec)	≡ 10	≡ 10	≡ 10
spectral range	5736.9-7071.8 Å	4309.8-5768.8 Å	4009.0-7257.0 Å
resolution	1.3 Å	1.4 Å	3.2 Å
dispersion	103 Å mm^{-1}	95 Å mm^{-1}	245 Å mm^{-1}
centered wavelength	6441.6 Å	5074.1 Å	5691.5 Å



KRYONERI OBSERVATORY

Mount Kyllini, 930 m elevation, 37˚58’19" N, 22˚37’07" E

Kryoneri 1.2m Telescope

Primary Mirror Diameter: 1.2 m

Focal ratio: f/8

Type: Cassegrain

First light: 1975

Constructed by: Grubbs Parsons Co., Newcastle

http://kryoneri.astro.noa.gr/

NELIOTA: ESA's New Lunar impact Monitoring Project at NOA

http://neliota.astro.noa.gr/

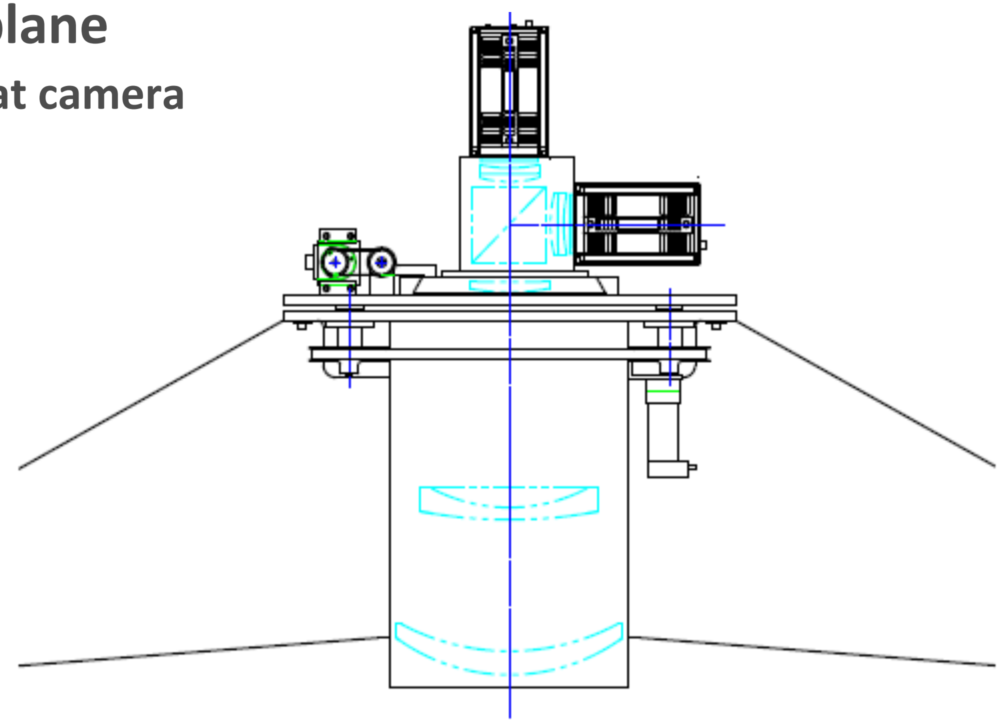
2/2015-11/2018

Goal: *Establish an operational system at the National Observatory of Athens to conduct a lunar impact monitoring campaign, which will help determine the distribution and frequency of small NEOs.*

Technical Officer: Vicente Navarro (ESAC)
PI: AB (NOA)

Kryoneri Prime Focus Instruments

- **f/2.8 optical corrector with a dichroic beam splitter**
- **Lunar imager with two fast-frame sCMOS cameras**
  - **Zyla sCMOS 5.5 cameras, FOV: 17'x14', pixel size: 6.5μm (0.4")**
  - **frame rate: up to 40 fps**
  - **R and I filters will be mounted in front of the cameras**
- **f/3.1 direct science focal plane**
  - **FOV: 1.4 degrees, large format camera and a filter slider are needed**



PROOF OF CONCEPT – SN 2014J

IAASARS

Evidence for Rapid Variability in the Optical Light Curve of the Type Ia SN 2014J⋆,⋆⋆

A. Z. Bonanos and P. Boumis

IAASARS, National Observatory of Athens, GR-15236 Penteli, Greece
e-mail: bonanos@astro.noa.gr

Received November 26, 2014; accepted October 25, 2015

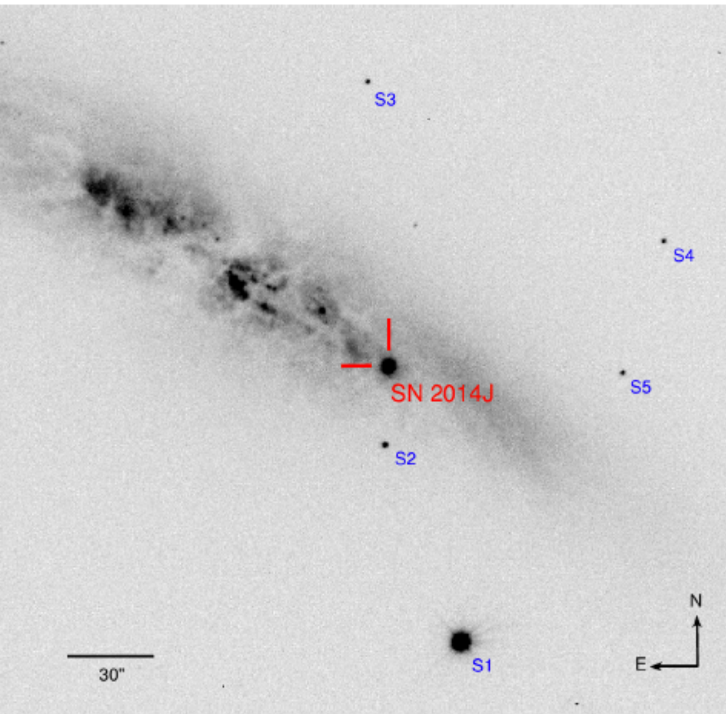
ABSTRACT

We present results of high-cadence monitoring of the optical light curve of the nearby, Type Ia SN 2014J in M82 using the 2.3m Aristarchos telescope. B and $V-$band photometry on days 15–18 after $t_{max}(B)$, obtained with a cadence of 2 min per band, reveals evidence for rapid variability at the 0.02–0.05 mag level on timescales of 15–60 min on all four nights, taking the red noise estimation at face value. The decline slope was measured to be steeper in the $B-$band than in $V-$band, and to steadily decrease in both bands from 0.15 mag day^{-1} (night 1) to 0.04 mag day^{-1} (night 4) in V and from 0.19 mag day^{-1} (night 1) to 0.06 mag day^{-1} (night 4) in B, corresponding to the onset of the secondary maximum. We propose that rapid variability could be due to one or a combination of the following scenarios: the clumpiness of the ejecta, their interaction with circumstellar material, the asymmetry of the explosion, or the mechanism causing the secondary maximum in the near-infrared light curve. We encourage the community to undertake high-cadence monitoring of future, nearby and bright supernovae to investigate the intraday behavior of their light curves.

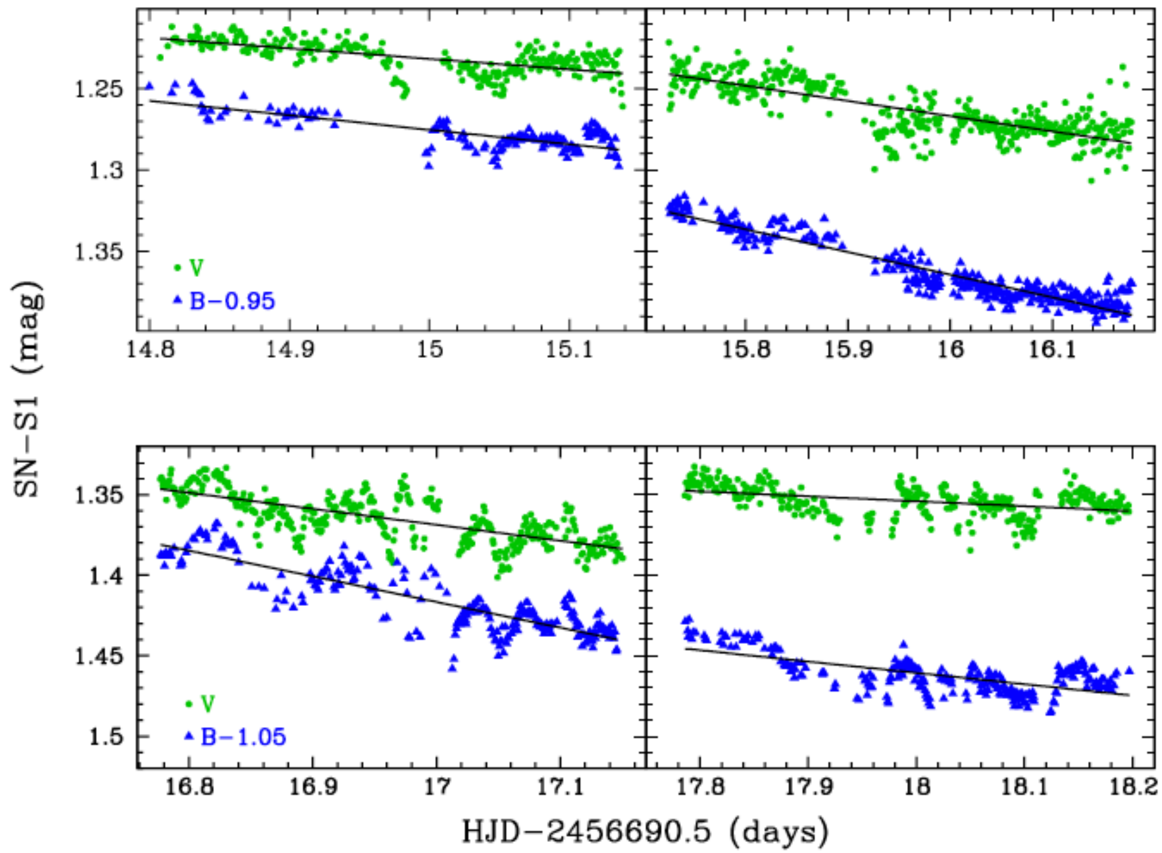
Key words. supernovae: individual: SN 2014J – supernovae: general – Galaxies: individual: M82

A&A, in press (arXiv:1507.01011)

PROOF OF CONCEPT – SN 2014J



February 15-18, 2014



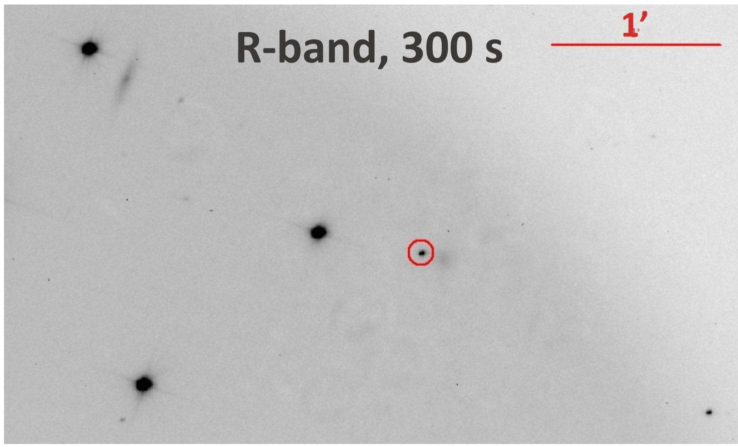
- 5 sec (V) & 20 sec (B) sequences
- 3-6 mmag precision
- 0.02-0.05 mag variability

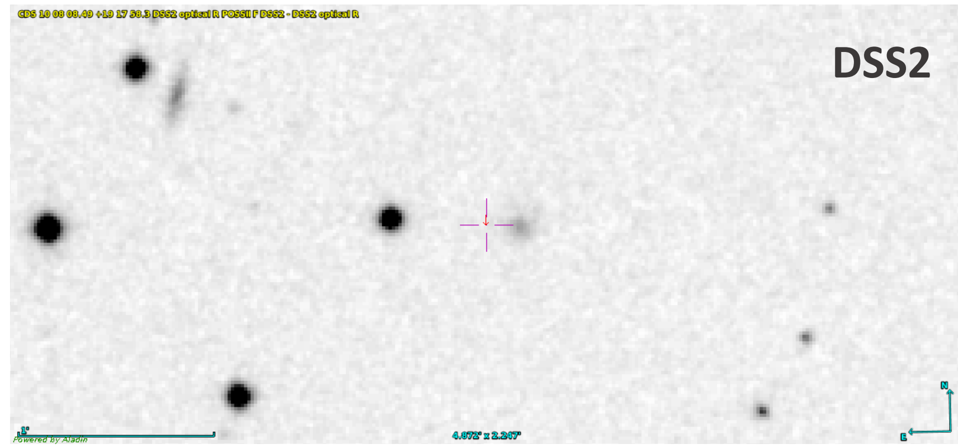
Bonanos & Boumis, A&A, in press (arXiv:1507.01011)

Proof of Concept-Aristarchos/LN CCD

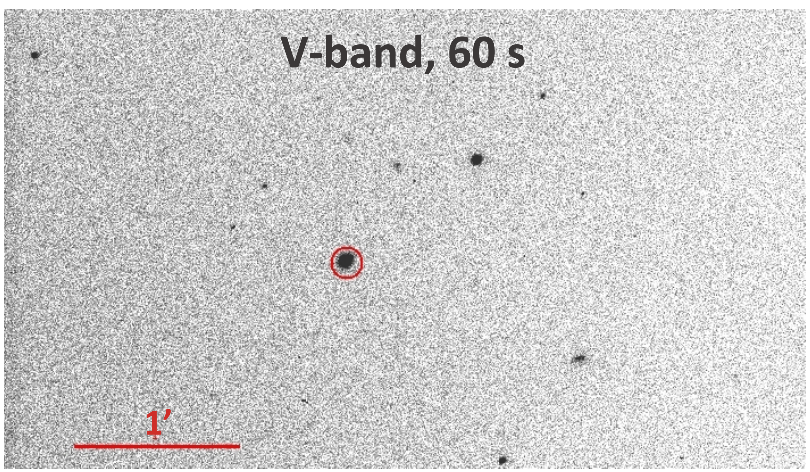
IAASARS

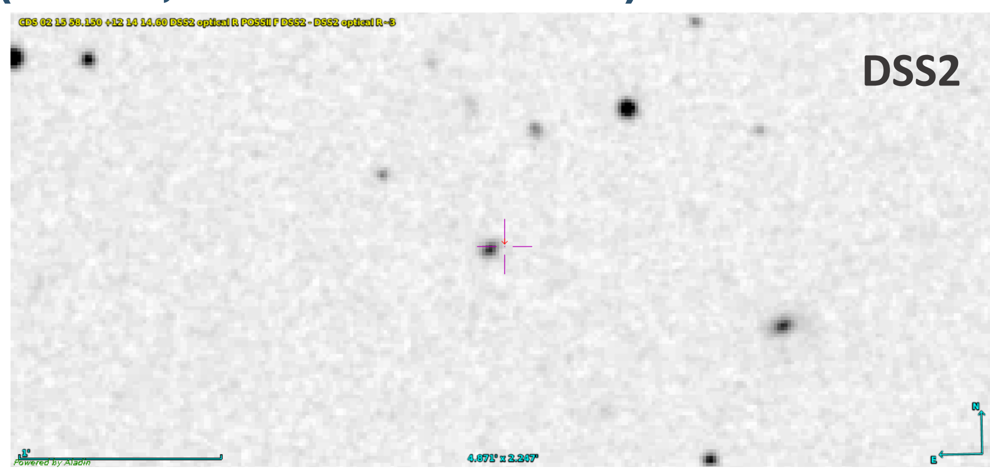
ASASSN-15rb (type unknown, 16.7 mag on Oct 12)





ASASSN-15rw (type Ia, 15.5 mag on Oct 24)



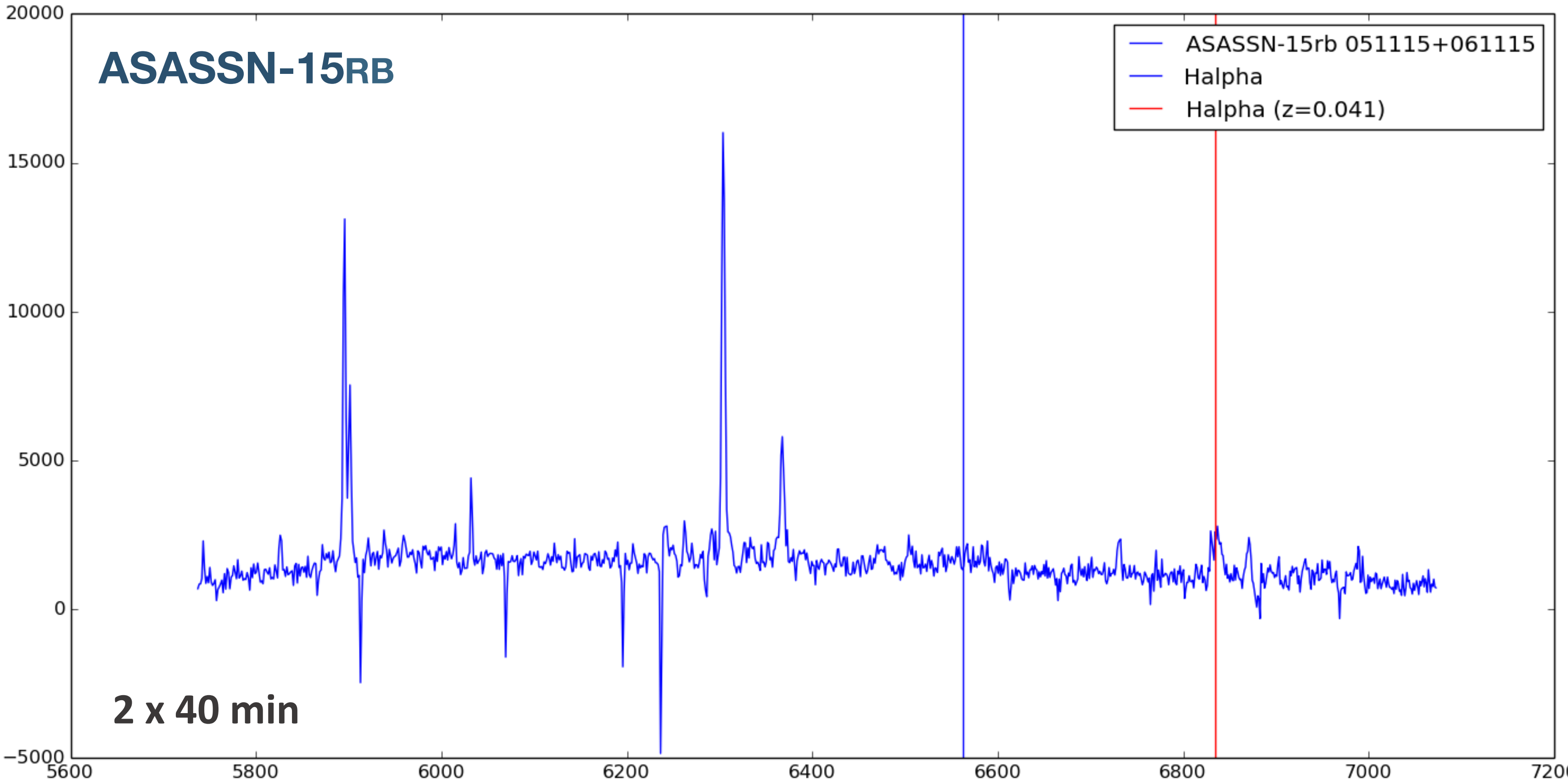


M. Kourniotis, Nov 5, 2015

Proof of Concept-Aristarchos/ATS

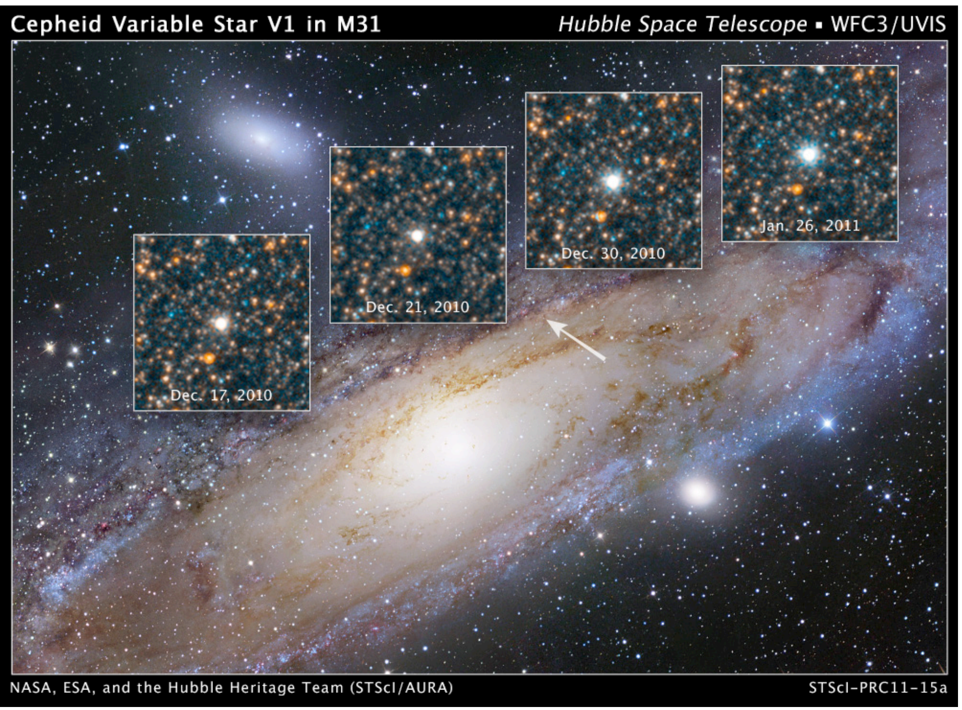
IAASARS

M. Kourniotis, Nov 5, 2015



Wavelength (Angstroms)

HUBBLE CATALOGUE OF VARIABLES (HCV) ESA PROJECT AT NOA



+ Transients in HSC

4/2015-3/2018

Goal: *Define a system to extract and validate variable sources in the Hubble Source Catalog, & make them available to the community via a catalog (the HCV).*

- *30 million sources in HSC (Whitmore et al. 2015)*
- *112 instrument & filter combinations*
- *25 yrs of imaging (WFPC2, ACS, WFC3)*
- *1% of sky*

Technical Officer: Antonella Nota (STScI)
Project Scientist: AB (NOA)

CONCLUSIONS

IAASARS

Both telescopes of the National Observatory of Athens could potentially participate in Gaia Science Alert follow-up observations starting in Summer 2016.

Telescope	Instrument	FOV	Limiting Mag	Availability & Comments
Aristarchos 2.3m	LN2 CCD	5.5'x5.5'	~23	June-October, UBVRI filters
Aristarchos 2.3m	Aristarchos Transient Spectrometer (ATS)	10" fiber	~16	June-October, R~ 1500-5000
Aristarchos 2.3m	RISE2	10'x10'	~23	June-October, VR wide filter
Kryoneri 1.2m	Lunar Imager	17'x14'	~19 (30 sec)	Summer 2016 onward, RI filters

THANK YOU! QUESTIONS?

http://eas.unige.ch/EWASS2016/

SUPERNOVA REMNANTS

AN ODYSSEY IN SPACE AFTER STELLAR DEATH

6 - 11 JUNE 2016, CHANIA, CRETE, GREECE

Scientific Topics

- Radiation studies from gamma-rays to radio in Galactic and Extragalactic SNRs
- The search for the binary companions of SN progenitors in SNRs
- Pulsar winds nebulae (including Crab flares)
- Magnetic fields in SNRs and PWNe
- Collisionless shock waves in SNRs
- Jets and Asymmetries in SNe and their Remnants
- SNRs as probes and drivers of galaxy structure
- SNe and SNRs cosmic ray acceleration
- SN ejecta – abundances, clumpiness
- SNe and SNRs with circumstellar interactions

Invited Speakers

R. A. Chevalier (USA)
J. Vink (Netherlands)
E. Amato (Italy)
C. Badenes (USA)
G. Dubner (Argentina)
P. Ghavamian (USA)
W. Kerzendorf (Germany)
S. - H. Lee (Japan)
M. Lemoine-Goumard (France)
I. Leonidaki (Greece)
L. Lopez (USA)
R. McCray (USA)
D. Milisavljevic (USA)
D. Patnaude (USA)
W. Reich (Germany)
S. Reynolds (USA)
S. Safi-Harb (Canada)
N. Soker (Israel)
T. Temim (USA)
S. Van Dyk (USA)
B. Williams (USA)

Scientific Organizing Committee (SOC)

P. Boumis (co-chair), J. Raymond (co-chair), T. Bell, W. Blair, K. Borkowski, A. Decourchelle, R. Fesen, D. Green, R. Kothes, A. Rest, P. Slane

Local Organizing Committee (LOC)

P. Boumis (co-chair), A. Bonanos (co-chair), D. Abartzi, S. Akras, J. Alikakos, A. Chiotellis, M. Kopsacheili, M. Kourniotis, I. Leonidaki, A. Liakos, M. Pliatsika, S. Williams

http://snr2016.astro.noa.gr