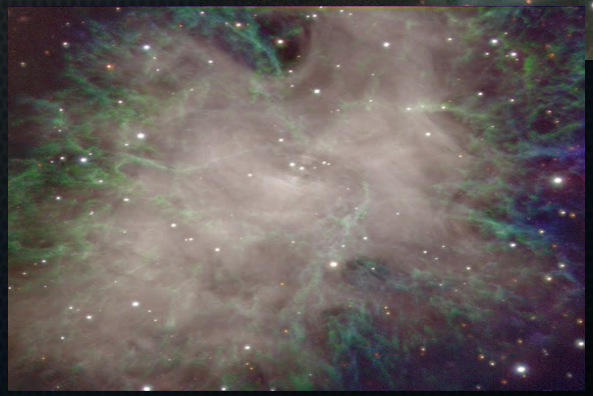
Gaia transient follow-up from the National Observatory of Athens

Emmy Paraskeva
National Observatory of Athens

IAASARS

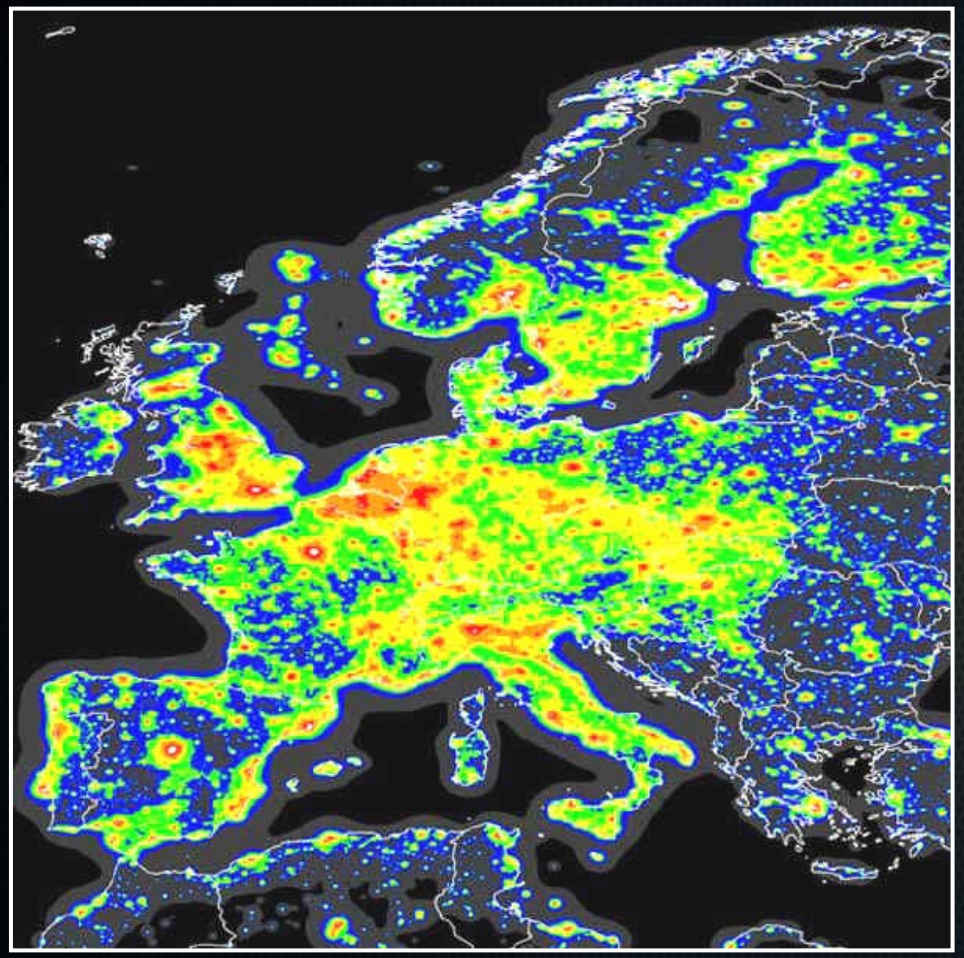
THE SCIENCE

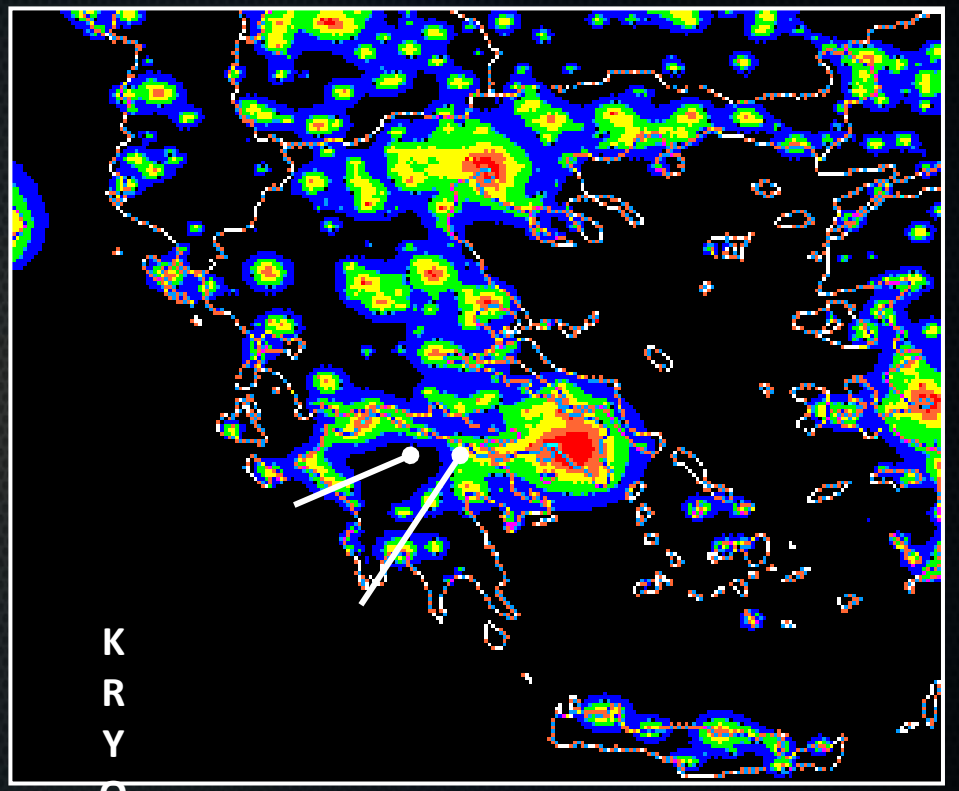
- Exoplanets: photometry observations
  Nebulae, supernovae, massive stars, lunar impact events, expansion history of the Universe
  Resolved stellar populations: beyond the Local Group
  The physics of galaxies… and much more!
- Synergies with OPTICON
- Discovery potential:
  Opening new parameter in high cadence observations throughout Europe
- Current project: NELIOTA



Aristachos images

Observatories operated by NOA

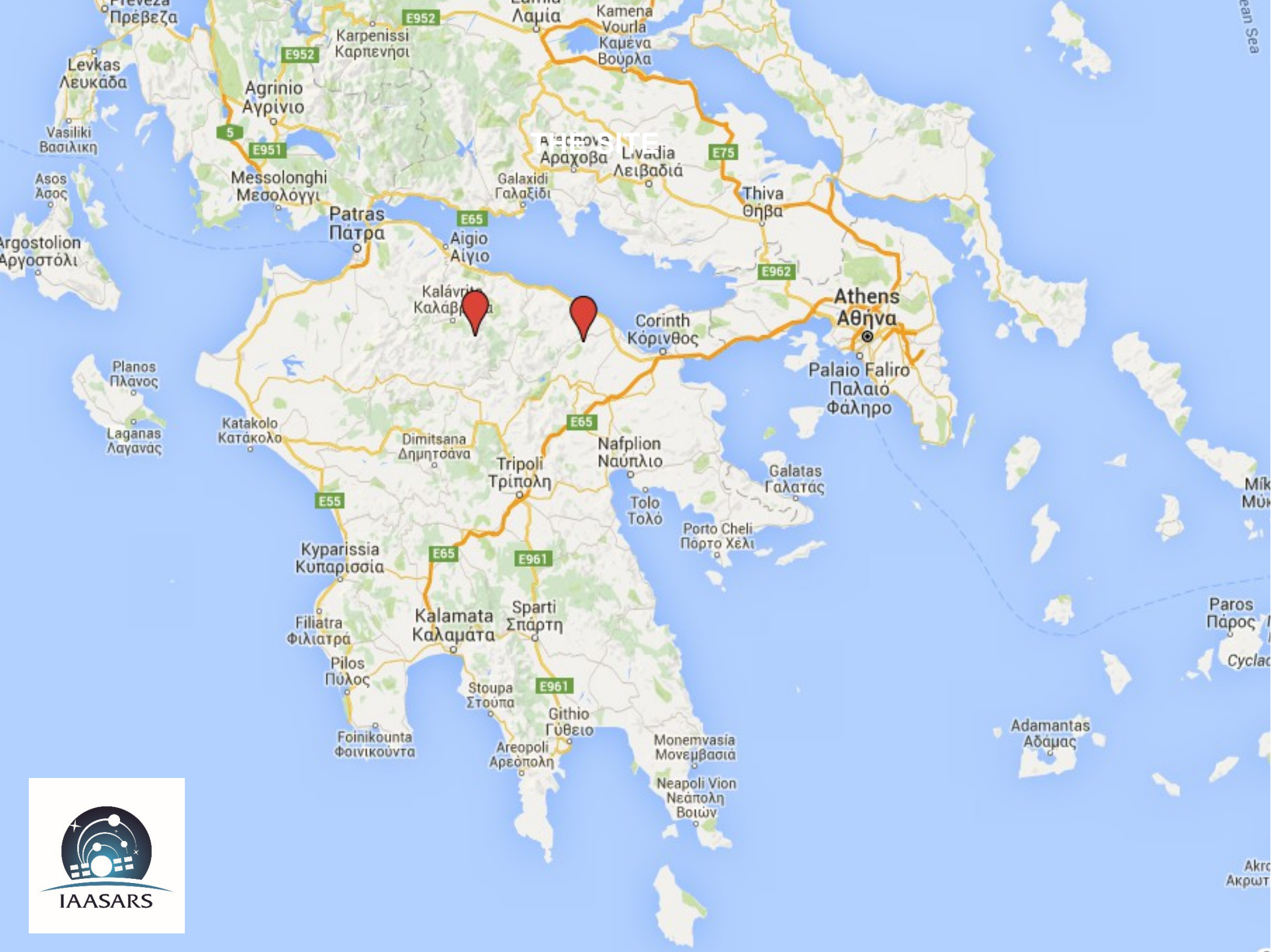




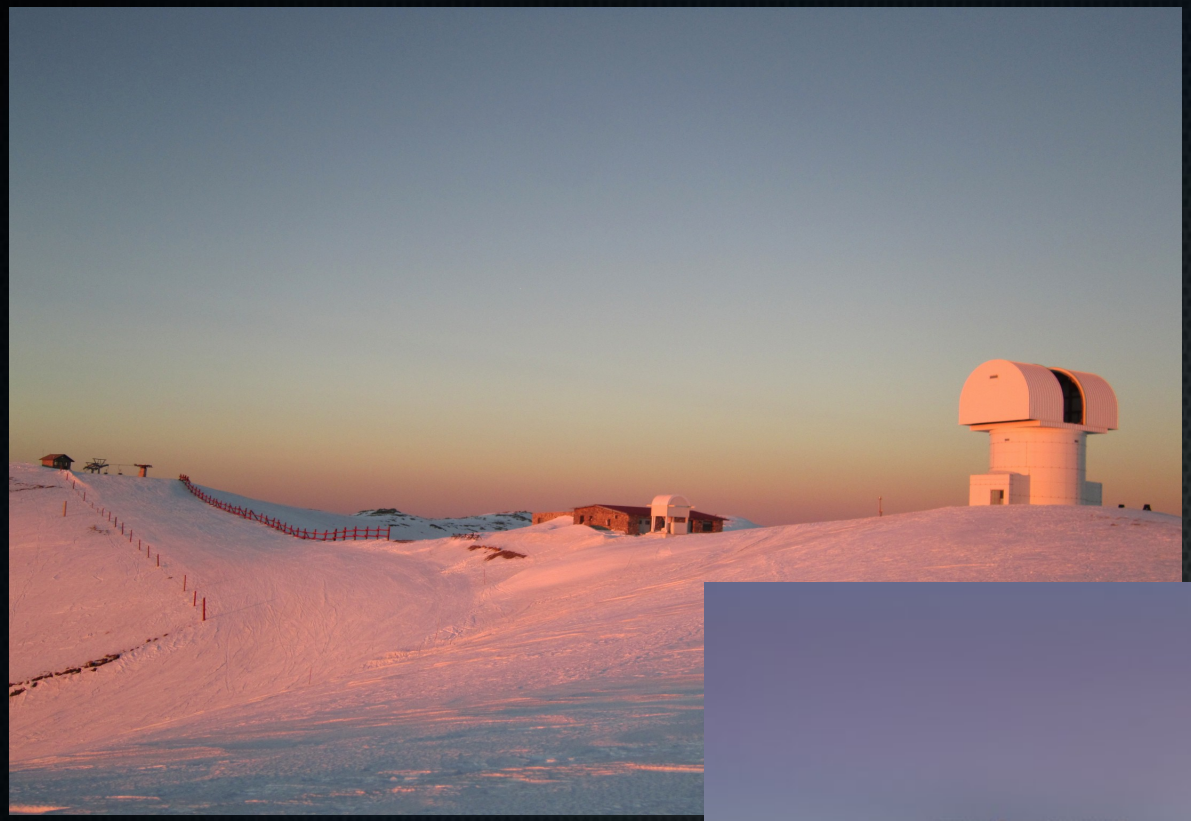
HELMOS OBSERVATORY

KRYONERI OBSERVATORY

IAASARS


Πρέβεζα
Karpenissi
Καρπενήσι
Λαμία
Kamena Vourla
Καμένα Βούρλα
Levkas
Λευκάδα
Agrinio
Αγρίνιο
Vasiliki
Βασιλική
Messolonghi
Μεσολόγγι
Asos
Άσος
Galaxidi
Γαλαξίδι
Αράχοβα
Livadia
Λειβαδιά
Thiva
Θήβα
Patras
Πάτρα
Aigio
Αίγιο
Argostolion
Αργοστόλι
Kalávryta
Καλάβρυτα
Corinth
Κόρινθος
Athens
Αθήνα
Palaio Faliro
Παλαιό Φάληρο
Planos
Πλάνος
Laganas
Λαγανάς
Katakolo
Κατάκολο
Dimitsana
Δημητσάνα
Tripoli
Τρίπολη
Nafplion
Ναύπλιο
Galatas
Γαλατάς
Tolo
Τολό
Porto Cheli
Πόρτο Χέλι
Kyparissia
Κυπαρισσία
Filiatra
Φιλιατρά
Kalamata
Καλαμάτα
Sparti
Σπάρτη
Pilos
Πύλος
Stoupa
Στούπα
Githio
Γύθειο
Foinikounta
Φοινικούντα
Areopoli
Αρεόπολη
Monemvasia
Μονεμβασιά
Neapoli Vion
Νεάπολη Βοιών
Adamantas
Αδάμας
Paros
Πάρος
E952
E951
E65
E962
E75
E55
E961
5
IAASARS

Helmos Observatory



Mount Helmos

IAASARS

2.3m Aristarchos telescope

Primary Mirror Diameter:

Constructed by:

IAASARS

OPTICON

ZEISS
Carl Zeiss Jena GmbH
Astronomical Instruments

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

IAASARS

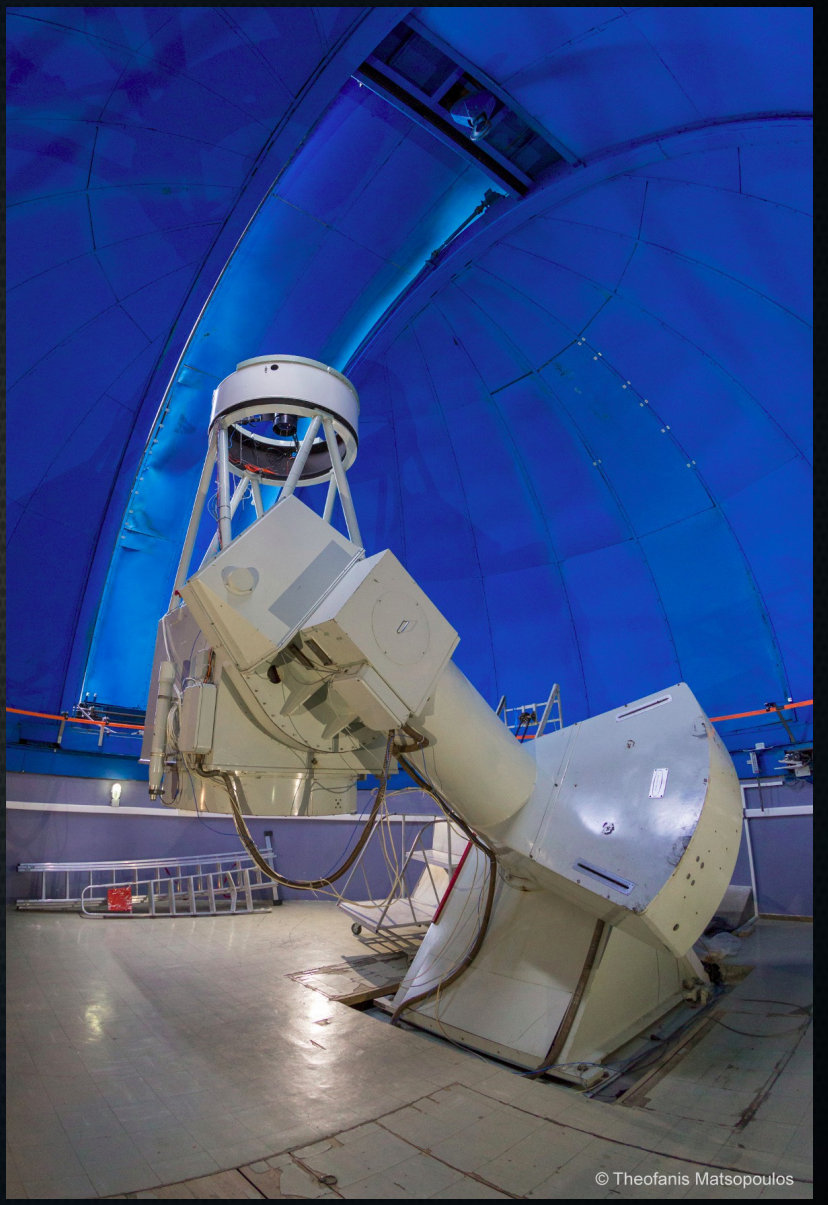
Kryoneri Observatory

IAASARS

M
o
u

1.2m Kryoneri telescope

- Primary Mirro



IAASARS

esa

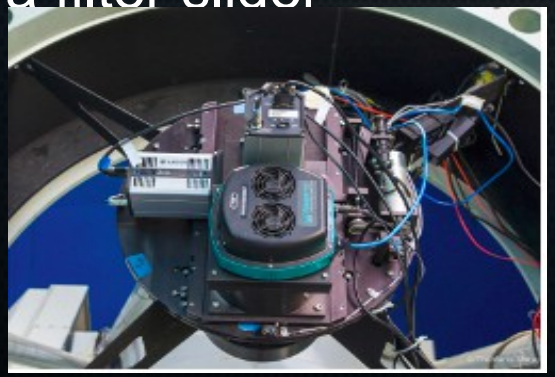
neliota

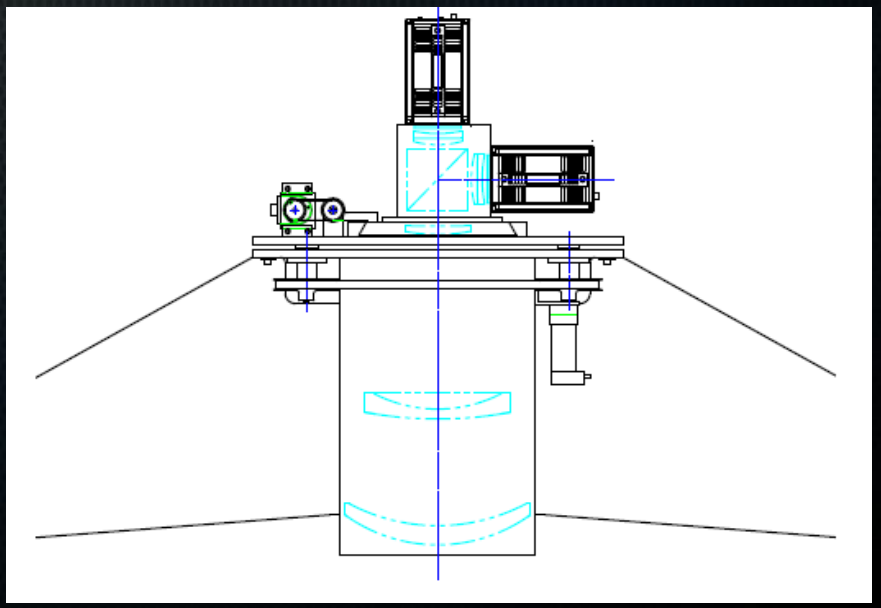
Kryoneri instrumentation

- **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 are mounted in front of the cameras
- **f/3.1 direct science focal plane**

  FOV: 1.4 degrees, large format camera and a filter slider

March 1st 2017



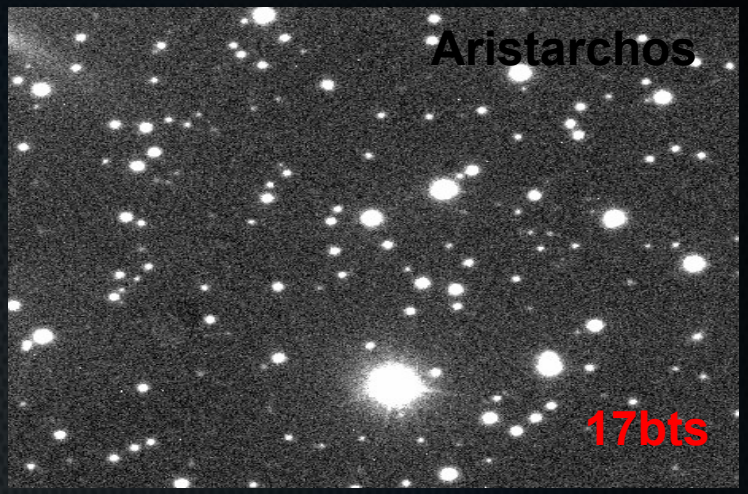


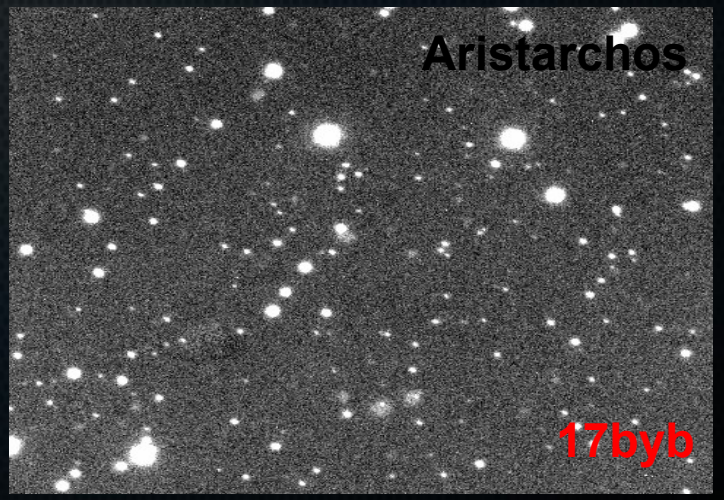
IAASARS

Gaia transient follow-up

Objects	Telescopes	Filters
Gaia16aye	Aristarchos/Kryoneri	V, R, I/R, I
Gaia16bnz	Aristarchos/Kryoneri	V, I/R, I
Gaia17bbt	Aristarchos	V, R, I
Gaia17bol	Aristarchos	V, R, I
Gaia17bts	Aristarchos	V, R, I
Gaia17bvp	Aristarchos	V, R, I
Gaia17bwh	Aristarchos	V, R, I
Gaia17byb	Aristarchos	V, R

September 2016-present

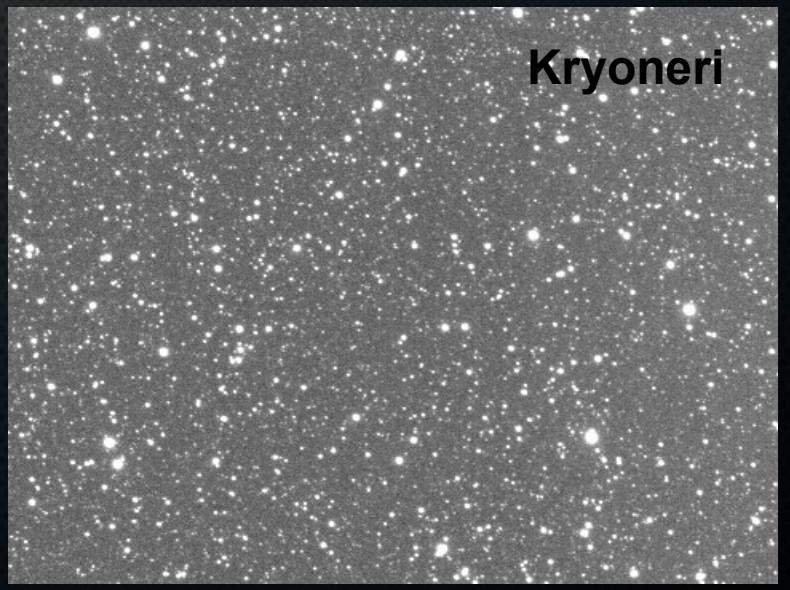




IAASARS

Gaia16aye follow-up

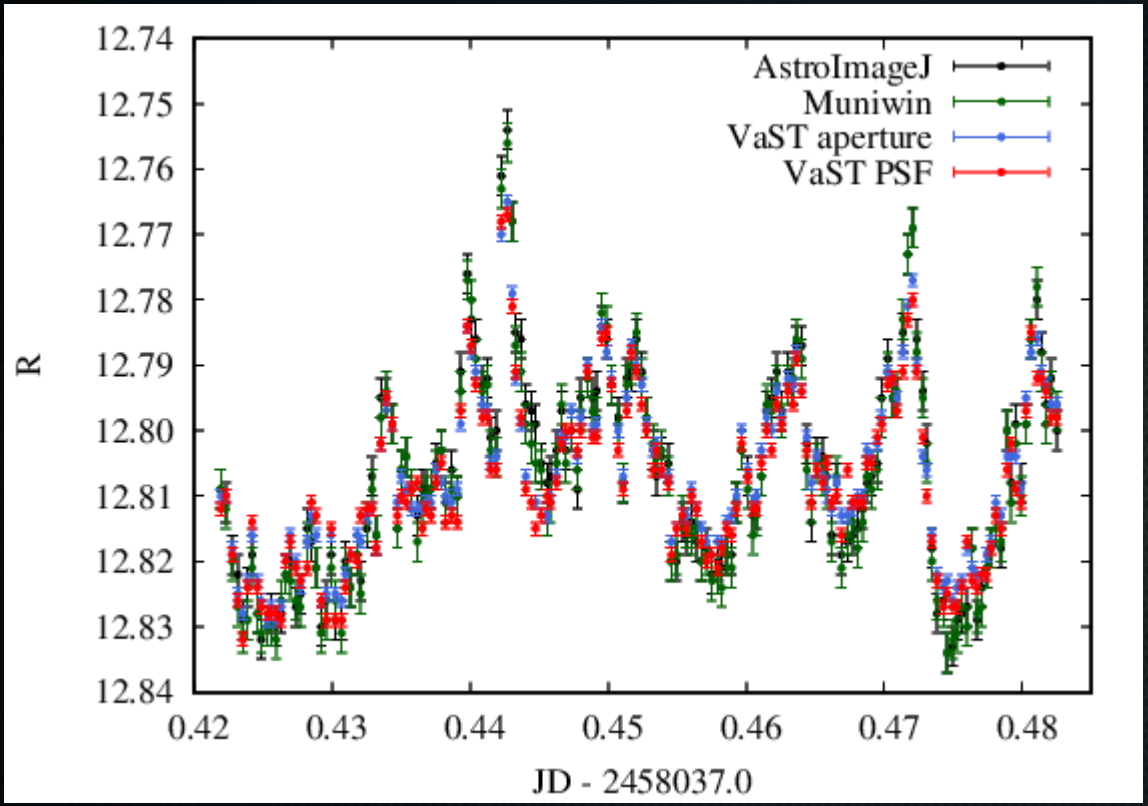
~20 nights

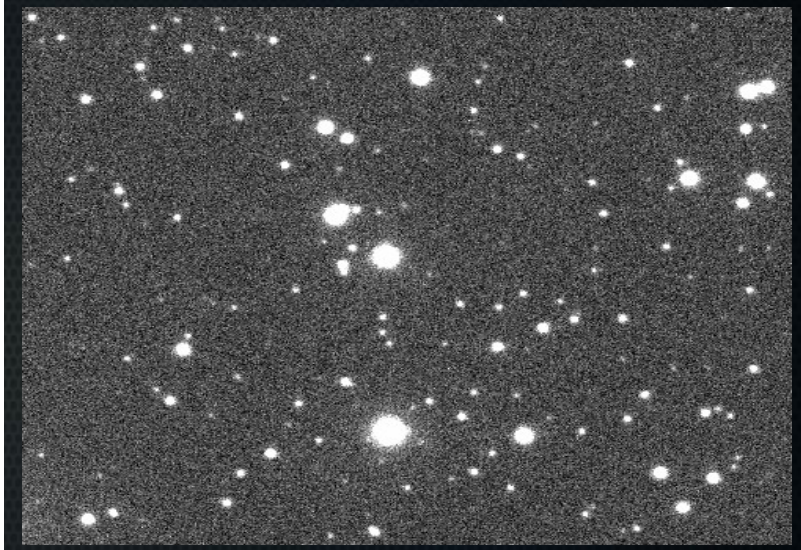


IAASARS

Microlensing event

Gaia16bnz follow-up





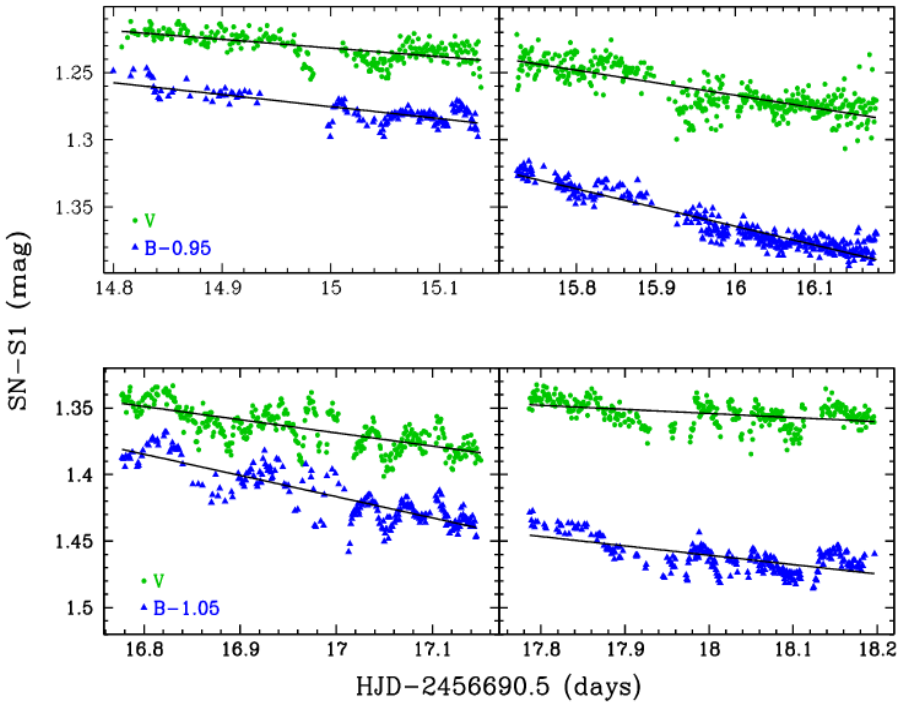
Sokolovsky & Lebedev (arXiv:1702.07715)

IAASARS

Cataclysmic variable?

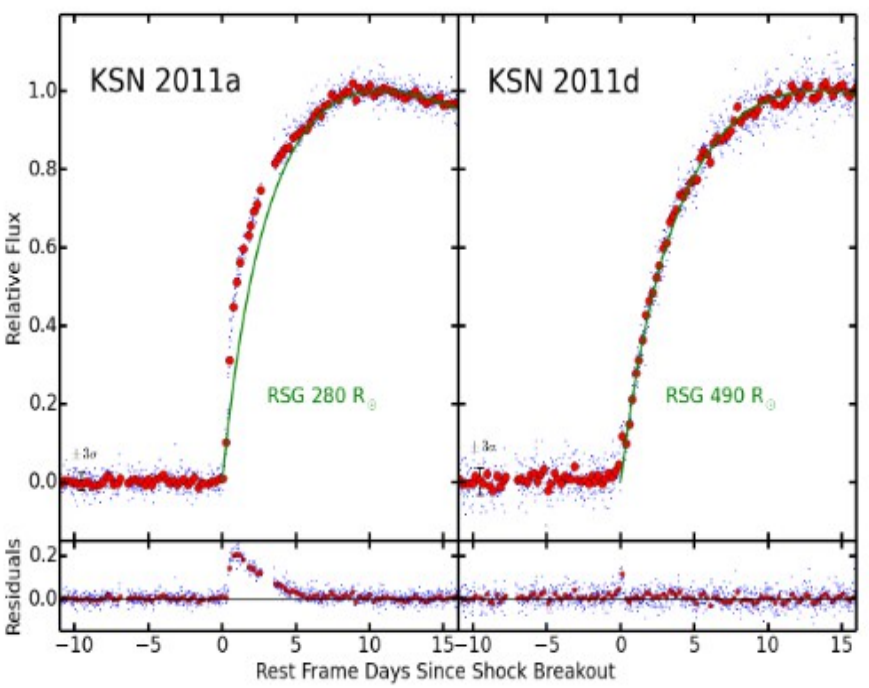
Motivation for early high cadence observations

Aristarchos observations



Bonanos & Boumis 2016

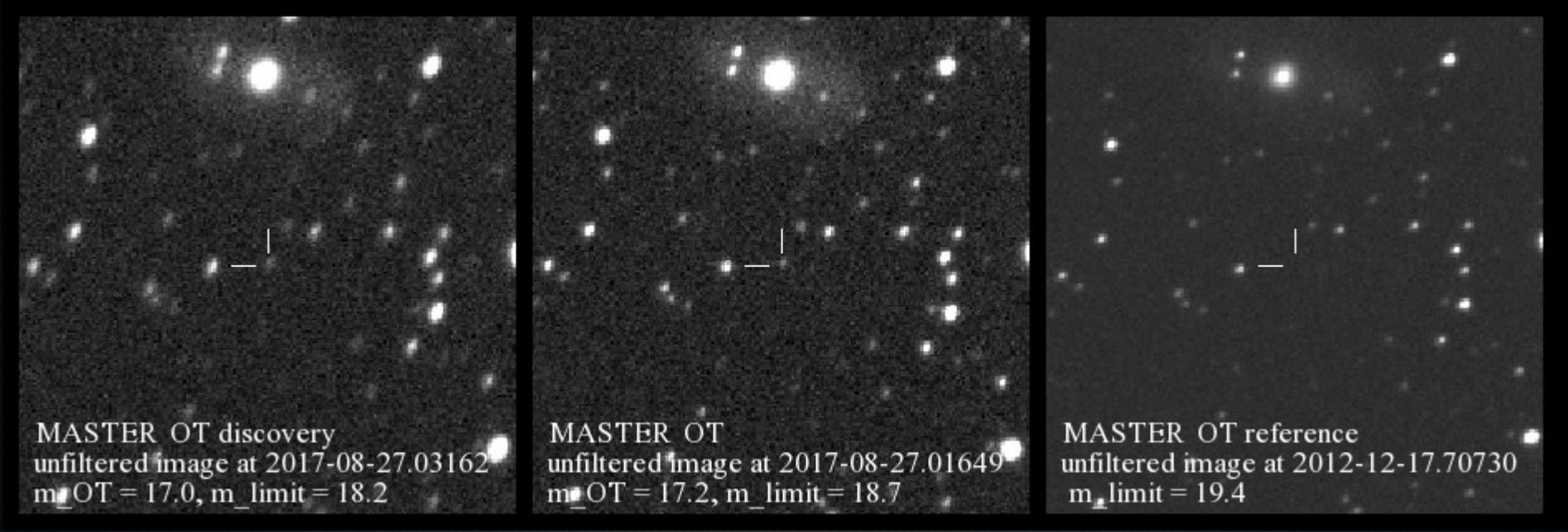
Kepler mission



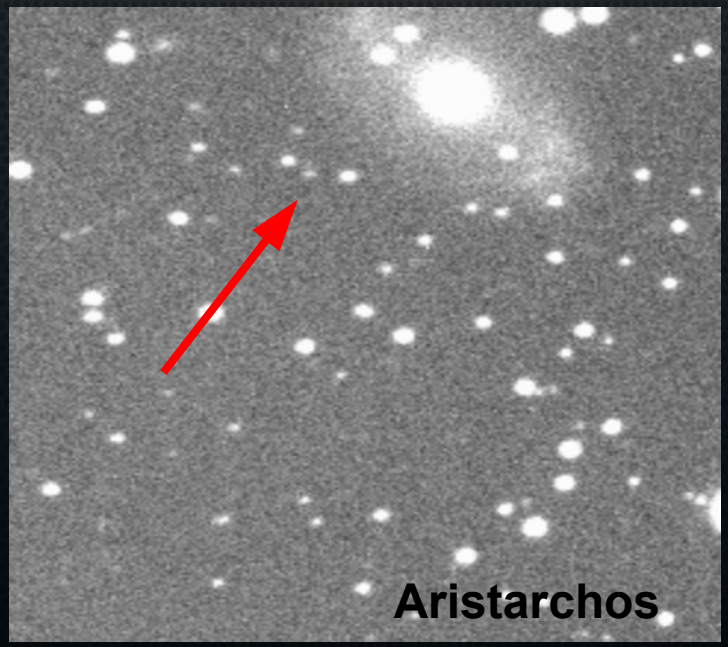
Garnavich et al. 2016

IAASARS

AT 2017gpn - SN IIb



- Exposure time: 20s
- Cadence: 25s
- Observed on 31/8 and 1/9 - at maximum



Thank you!

IAASARS

INDEX

ARISTARCHOS TELESCOPE

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)

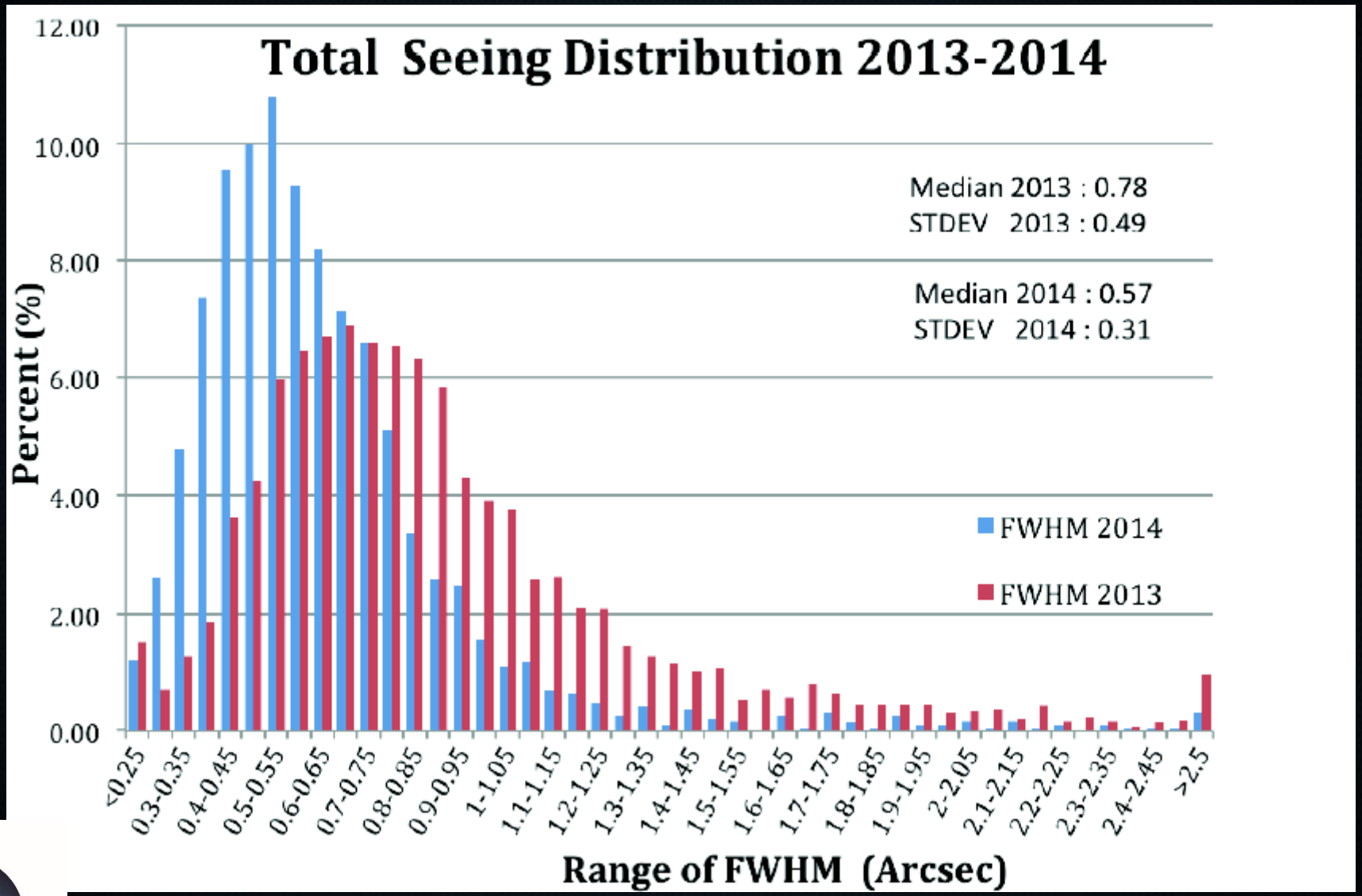
Parameter	Value	Parameter	Value
Range of movement:	+/- 200 deg (in azimuth)	Resonant frequencies:	16 Hz (fork), 21 Hz (tube)
Range of movement:	+/- 90 deg (in altitude)	Total weight capacity:	up to 300 kg of instrumentation
Rate of movement:	max 2 deg per second (in azimuth)	Cassegrain weight capacity:	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		

WEATHER STATISTICS

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**

IAASARS

SEEING STATISTICS



IAASARS

SCIENCE WITH OPTICAL TELESCOPES

NELIOTA is an activity launched by the European Space Agency (ESA) at the National Observatory of Athens in February, 2015. It aims to determine the distribution and frequency of small near-earth objects (NEOs) by monitoring lunar impact flashes.

IAASARS

esa