



Skinakas Observatory – A window to the Universe



IA-FORTH: a “boutique” institute focused on excellence

«Άνδρες γαρ πόλις και ου τείχη» - Θουκυδίδης
“It is men & women who define a city, not its walls” - Thucydides



H.F.R.I.
Hellenic Foundation for
Research & Innovation

Vassilis Charmandaris

Director, Institute of Astrophysics FORTH & Skinakas Observatory
Professor, Department of Physics, University of Crete



IA-FORTH Personnel & Key Figures

□ Current Permanent Personnel

- ✓ 4 Researchers & 5 Univ. of Crete Affiliated Professors
- ✓ 1 Technician & 1 Univ. of Crete dedicated technician for Skinakas Observatory

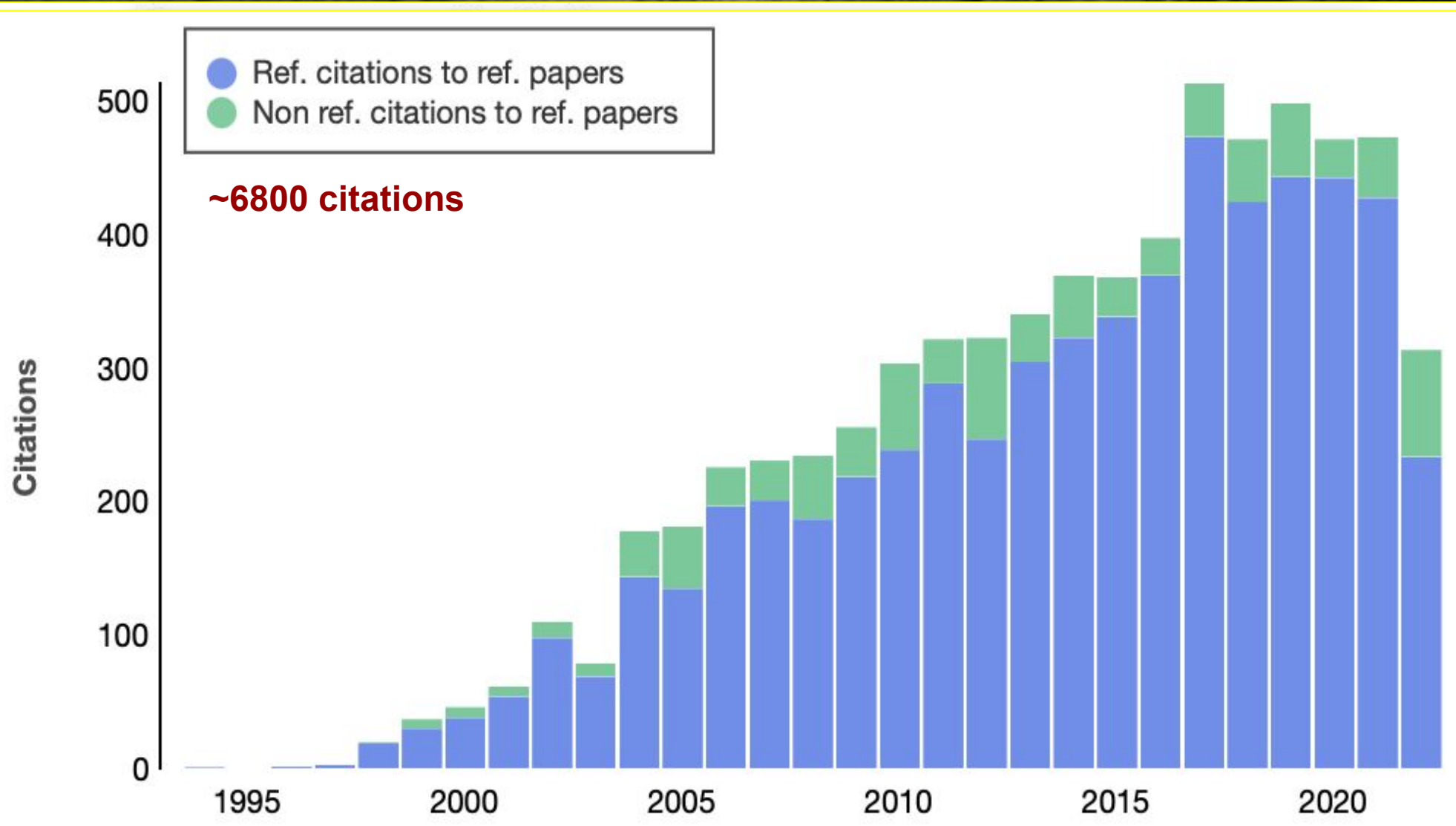
□ Current Soft Money Personnel

- ✓ 1 Secretary & 1 IT support & 2 Engineers for Observatory support & 1 Astronomy PO officer
- ✓ 8 postdoctoral researchers
- ✓ 13 PhD students – 3 MSc students

□ **Success is (partly) due to the international profile of IA-FORTH**

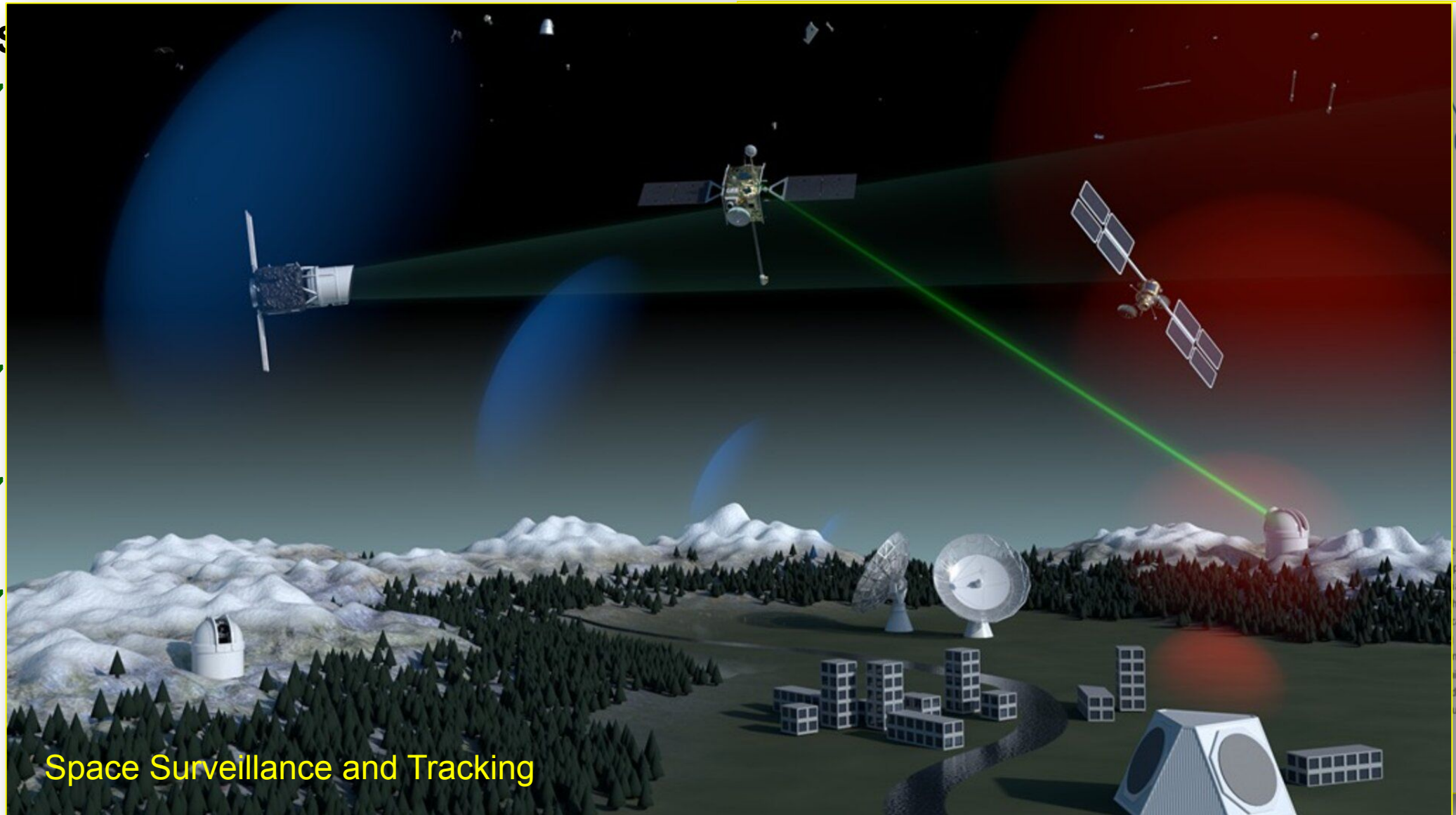
- ✓ 734 refereed papers (3 in Nature & 2 in Science) – highest per astrophysics researcher in Greece
- ✓ **Thanks (also) to Crete we attract excellent scientists from all over the world, to work with us or come for short/long visits**
- ✓ Awarded 3 ERC Grants (1 Starting + 2 Consolidator + 2 other scientists graded A but not funded)
- ✓ Awarded ~11.1MEuros in competitive funding (EC, ESA, national funds)
- ✓ **Maintain strong collaborations with leading institutes across the globe, ie:**
- ✓ Trained 19 PhDs + 31 Postdocs (15 outside Greece)
- ✓ **France: CEA-Saclay & Obs. de Paris**
- ✓ **Germany: MPE, MPIfR**
- ✓ **UK: Oxford, Cambridge**
- ✓ **USA: Caltech, Harvard, Cornell**
- ✓ Skinakas Observatory production: 248 papers + 15 PhD theses (non only from Crete)

IA-FORTH – Skinakas Observatory



IA-FORTH – Skinakas Observatory Upgrades

-
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- ✓
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Space Surveillance and Tracking

782

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IA-FORTH – Skinakas Observatory Upgrades (2)

□ Skinakas Observatory New Building

- ✓ Current Status (as of July 2022)
- ✓ Dome was placed in October 2021
- ✓ Full construction completed in June 2022

□ Robotic Telescope 0.6m (f/8) with a 29'x20' FOV

- ✓ Upgrades in software & guiding in Germany
- ✓ Reinstalled in May 2022 (past 2006-2013)
- ✓ Educational Activities (D-Space & LaScil)
- ✓ Rapid follow-up of transients
- ✓ Monitoring of astrophysical objects
- ✓ Astrophotography (amateurs of Tuebingen area)
- ✓ Applied research (satellite monitoring EU-SST)



IA-FORTH – Skinakas Observatory Upgrades (3)

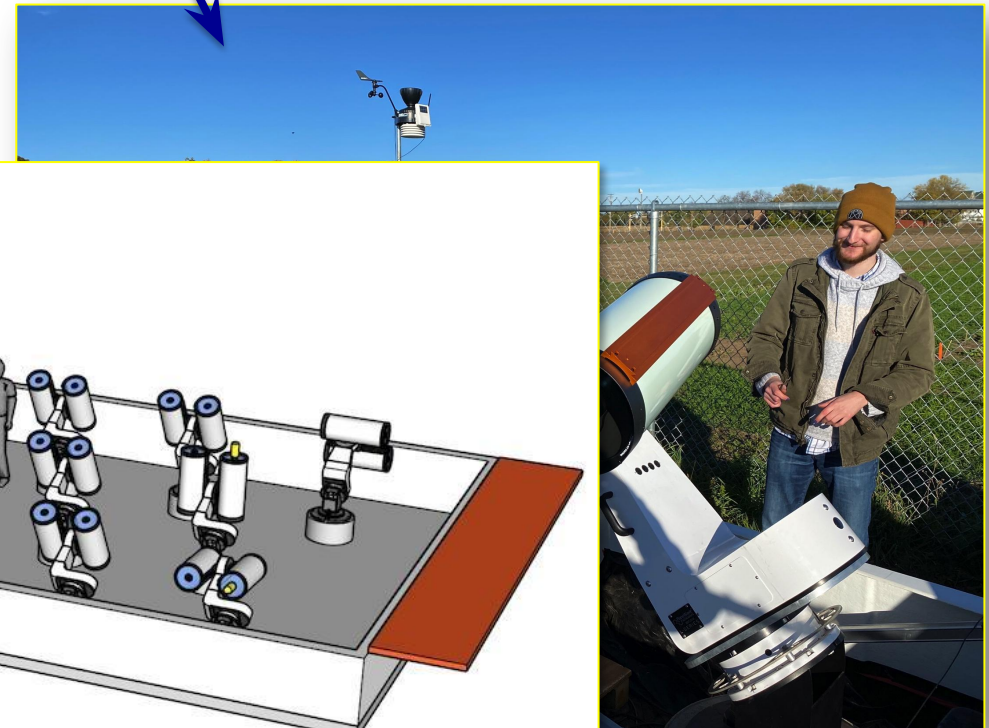
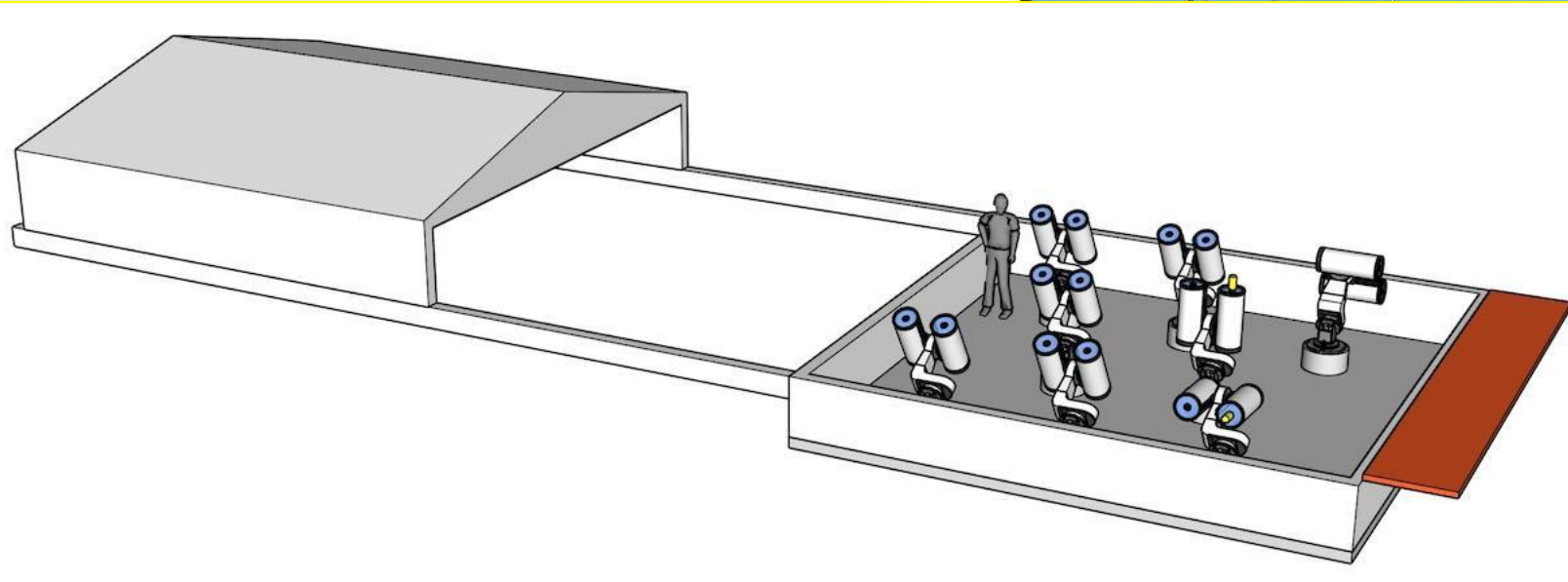
▣ New Skinakas 1.0m Robotic Telescope (to be named “200+”)

- ✓ Secured 325kEuros from UoC structural funds in 2019
- ✓ Additional 520kEuros was awarded in April 2022
 - ✓ Private donation from Committee “Greece 2021”
- ✓ Order placed in June 2022 to ASA Astroysteme
- ✓ Expected delivery in 18 months (operational in 2024)
- ✓ Polarimetry of transients (via RoboPol)
- ✓ Add applied research component (satellite monitoring test-bed for ESA’s laser telecom projects – Scylight, synergies with quantum optics & telecom at FORTH)
- ✓ Contribute to covering operational costs of facility

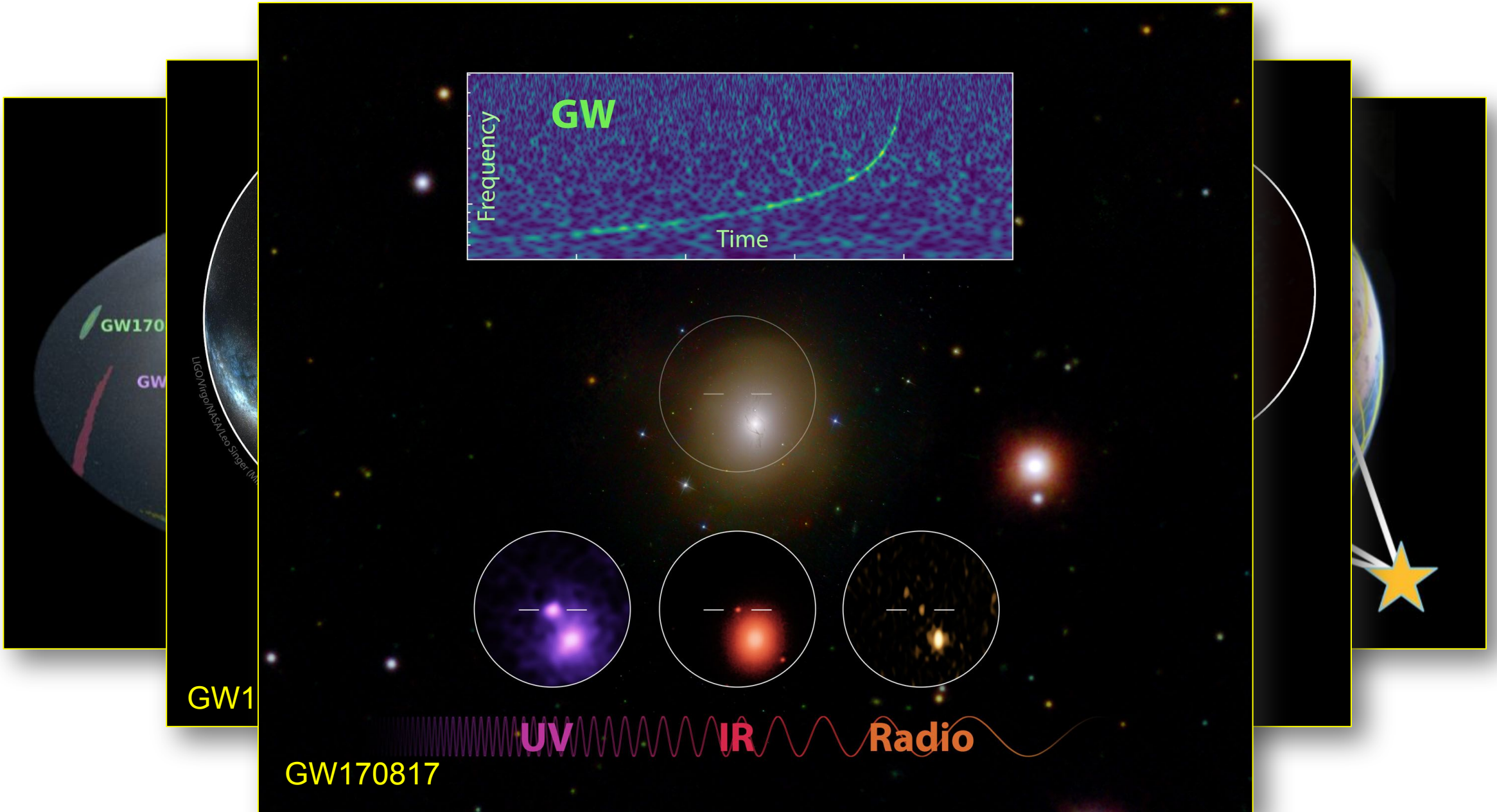


IA-FORTH – Skinakas Observatory Upgrades (4)

- ❑ Installation of TURBO: 16 x 11inch telescopes in pairs on 8 mounts: 120 sq deg FOV
 - ✓ TURBO: “Total-Coverage Ultra-Fast Response to Binary Mergers Observatory”
 - ✓ Rapid pointing: within 2sec to any point on the sky. (GW, X-ray, SNe follow up & localization)
 - ✓ Two mirror sites: Skinakas Observatory, Crete & Magdalena Ridge, New Mexico (USA)
 - ✓ **PI Prof. P. Kelly**, Univ. of Minnesota (USA) - To become operational in fall of 2023
 - ✓ A 350,000 Euros NSF investment at Skinakas Obs.
 - ✓ Additional ~60,000 Euros from IA-FORTH funds



IA-FORTH – Why aim for GW



IA-FORTH – Skinakas Observatory Upgrades (5)

▣ Repairs of road to Skinakas peak

- ✓ Secured 640kEuros from Region of Crete towards the full repair of ~ 5km paved road to Skinakas peak
- Contract awarded and construction, supervised by the town of Anogeia, commences June 2022

▣ Construction of 85 seat visitor center & 5.3m dome

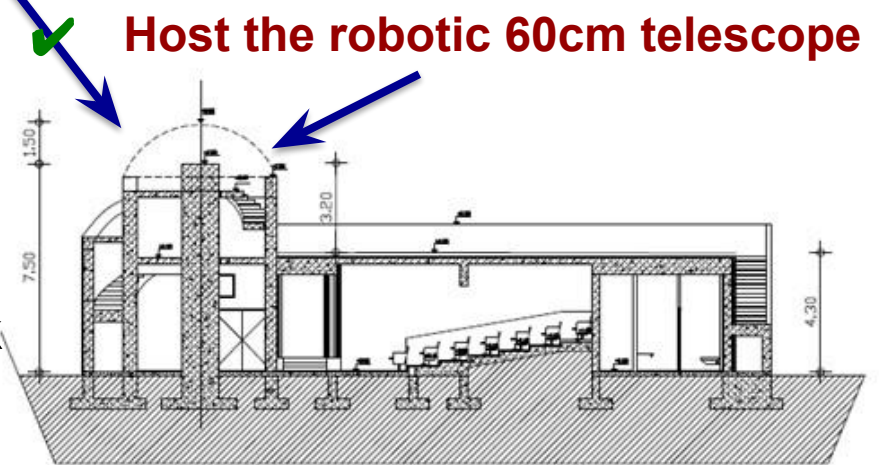
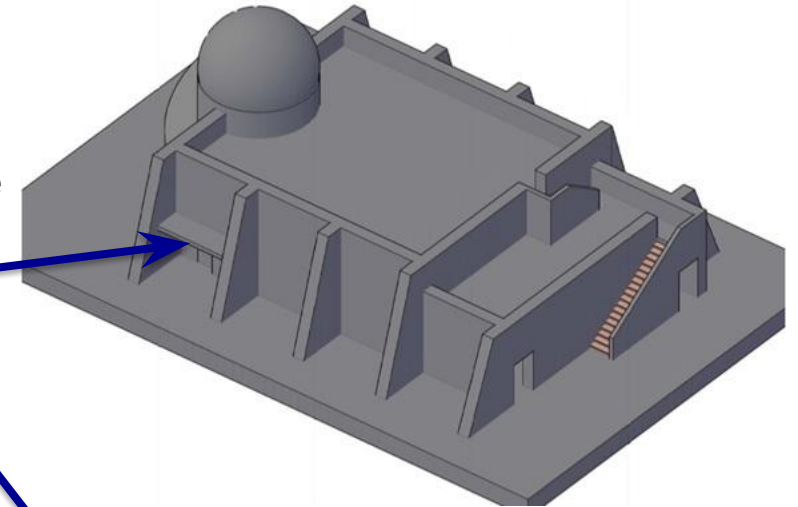
- ✓ Awarded 983kEuros from the state (under the auspices of “Greece 2021”)
- ✓ Construction, supervised by the town of Anogeia, to begin in August 2022

▣ Connecting Skinakas Observatory to electric grid

- ✓ Support from Hellenic Electricity Distribution Network Operator has been formally requested. Expected formal approval in fall 2022 and works in spring 2023

▣ Connecting Skinakas with fiber optic network

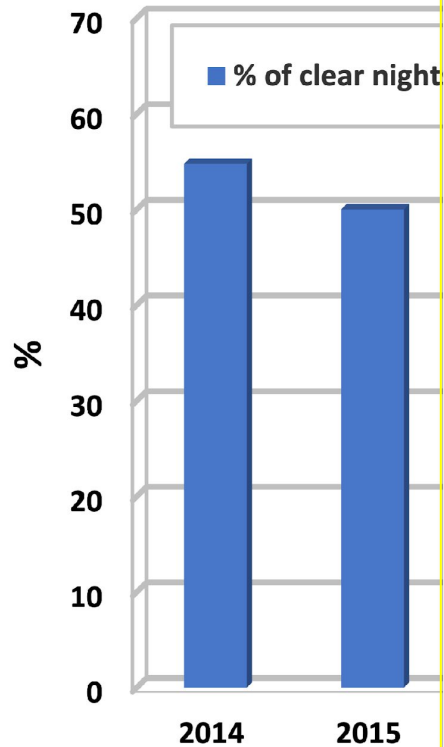
- ✓ Planned via Helas/Euro-QCI context: to begin in 2023



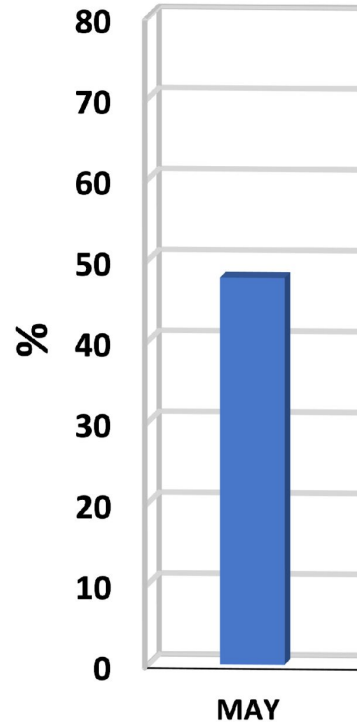
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IA-FORTH – Skinakas Weather (1 of 3)

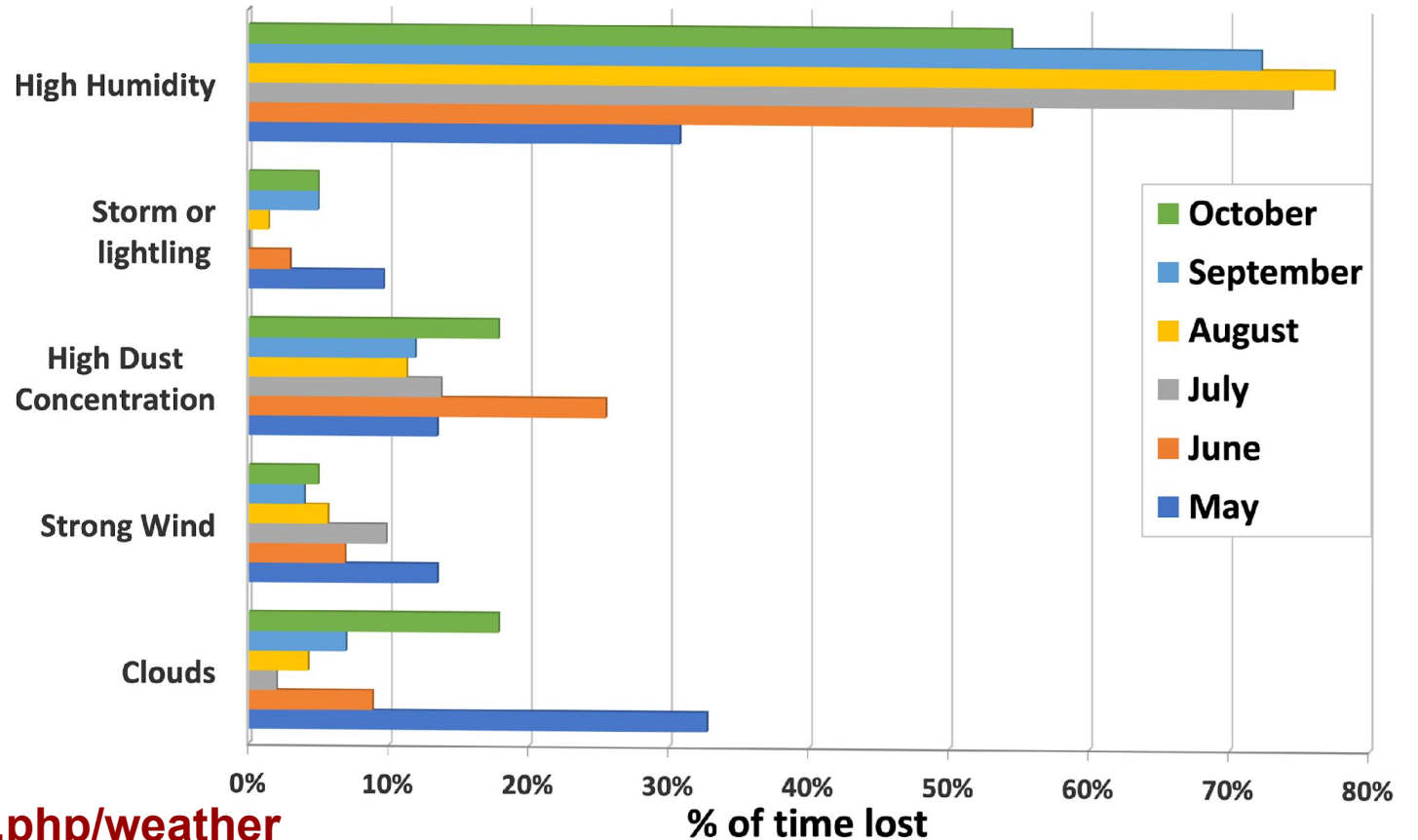
Fraction of Clear Nights at Skinakas Observatory
May 1st to October 31st Observing Season



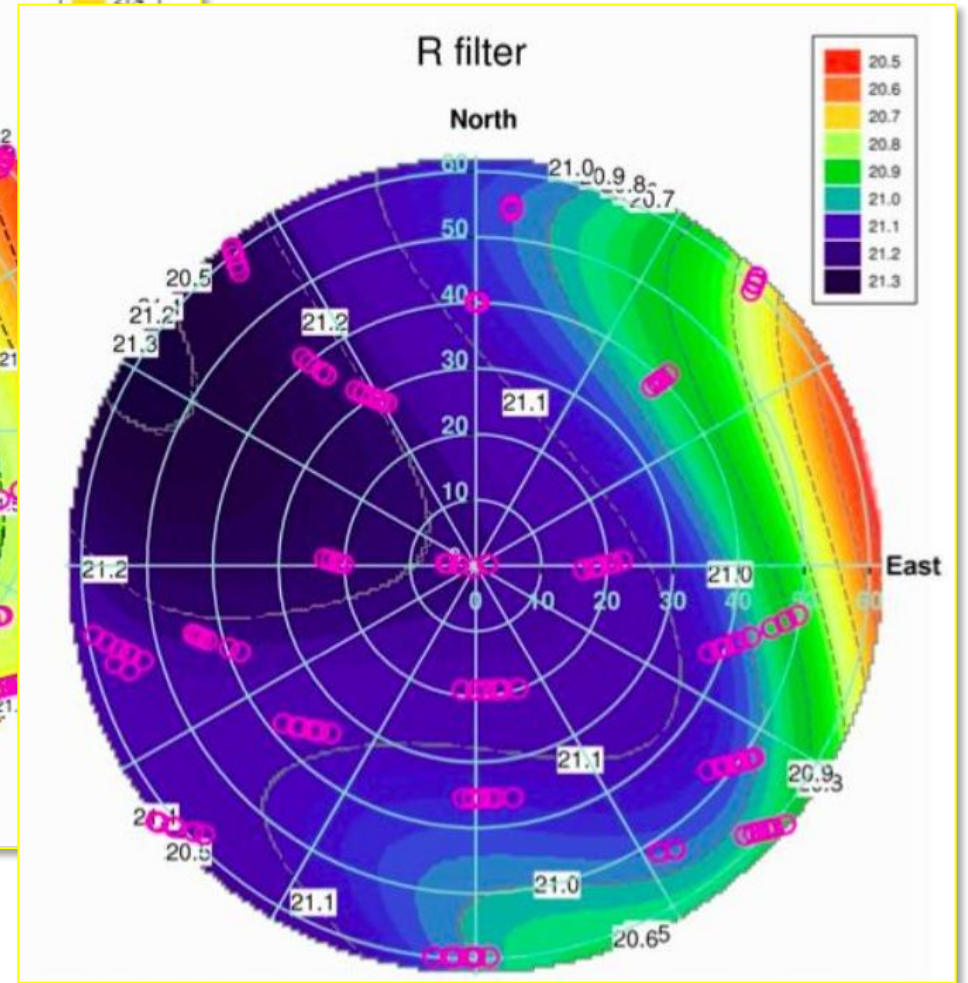
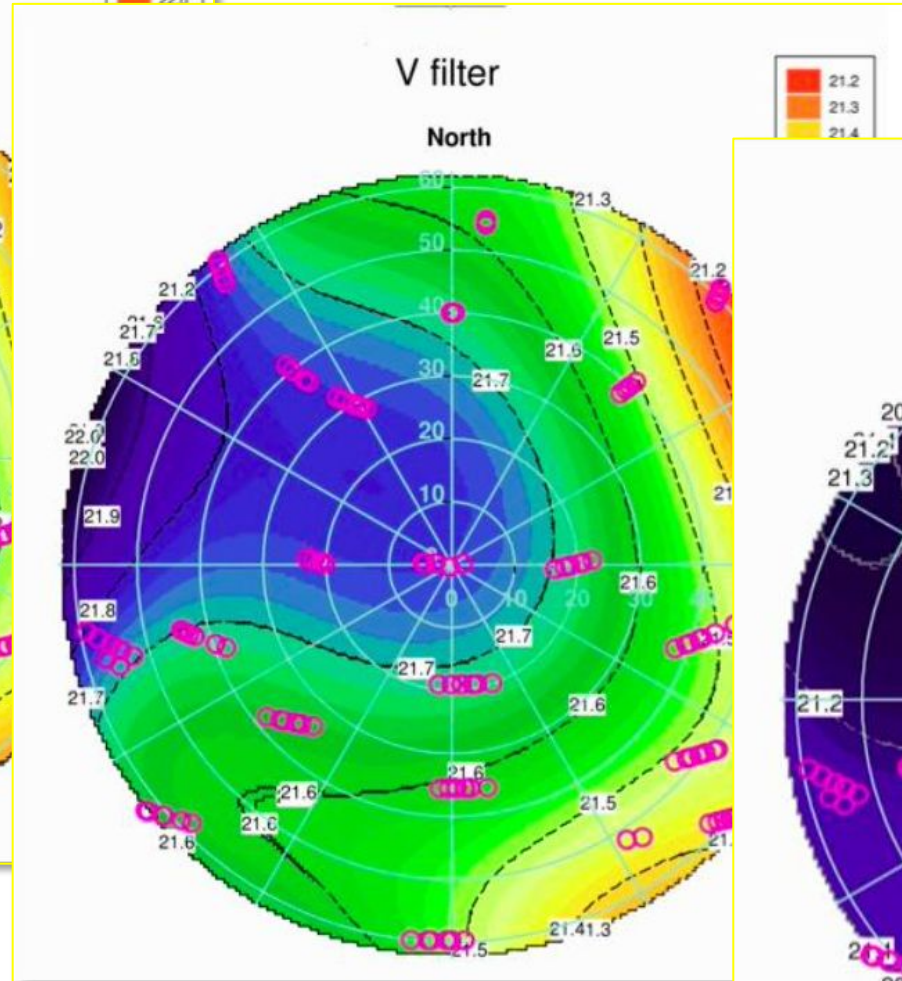
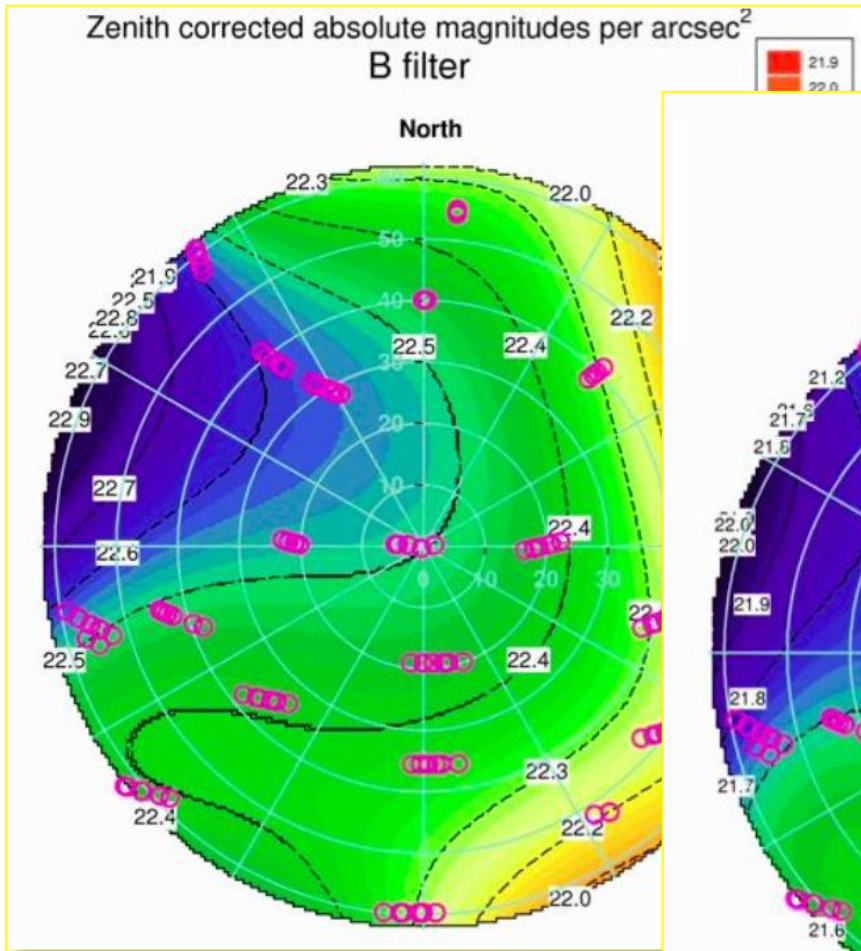
Fraction of Clear Nights at Skinakas Observatory



Reason for lost time per month at Skinakas Observatory
2014 to 2021 Observing Seasons

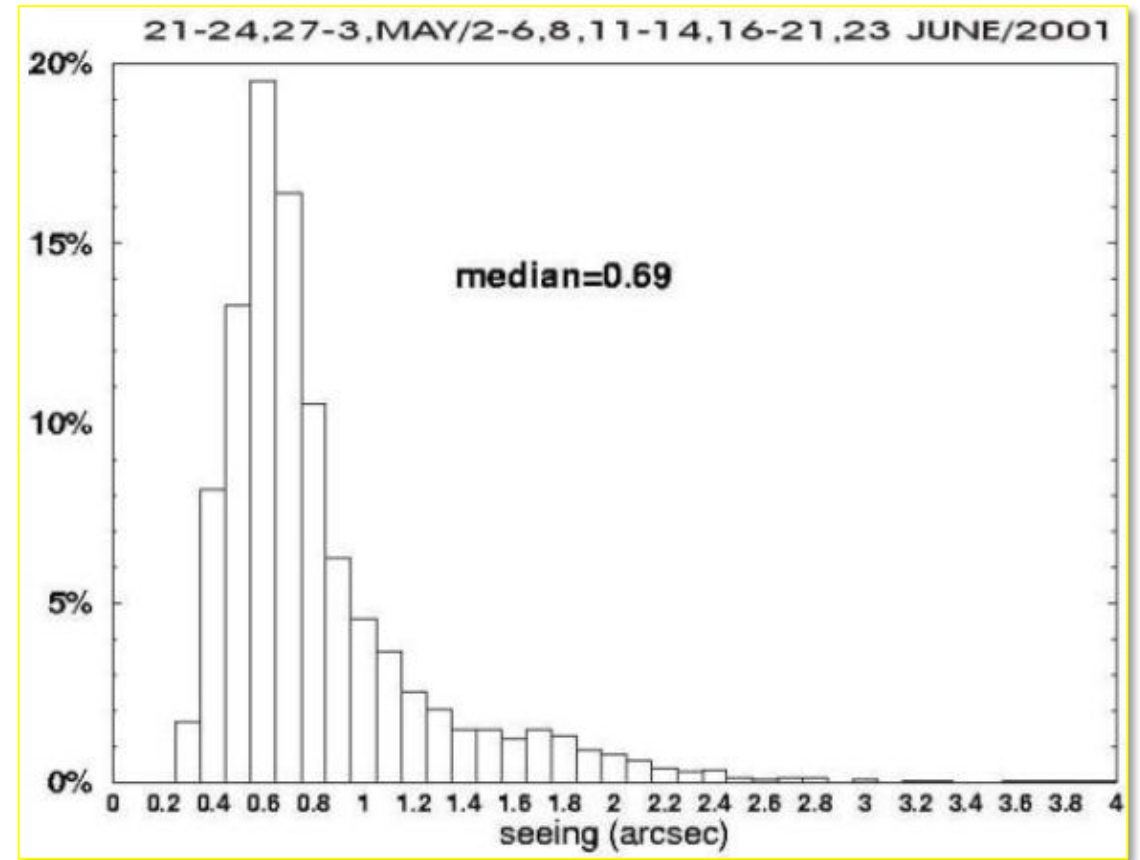
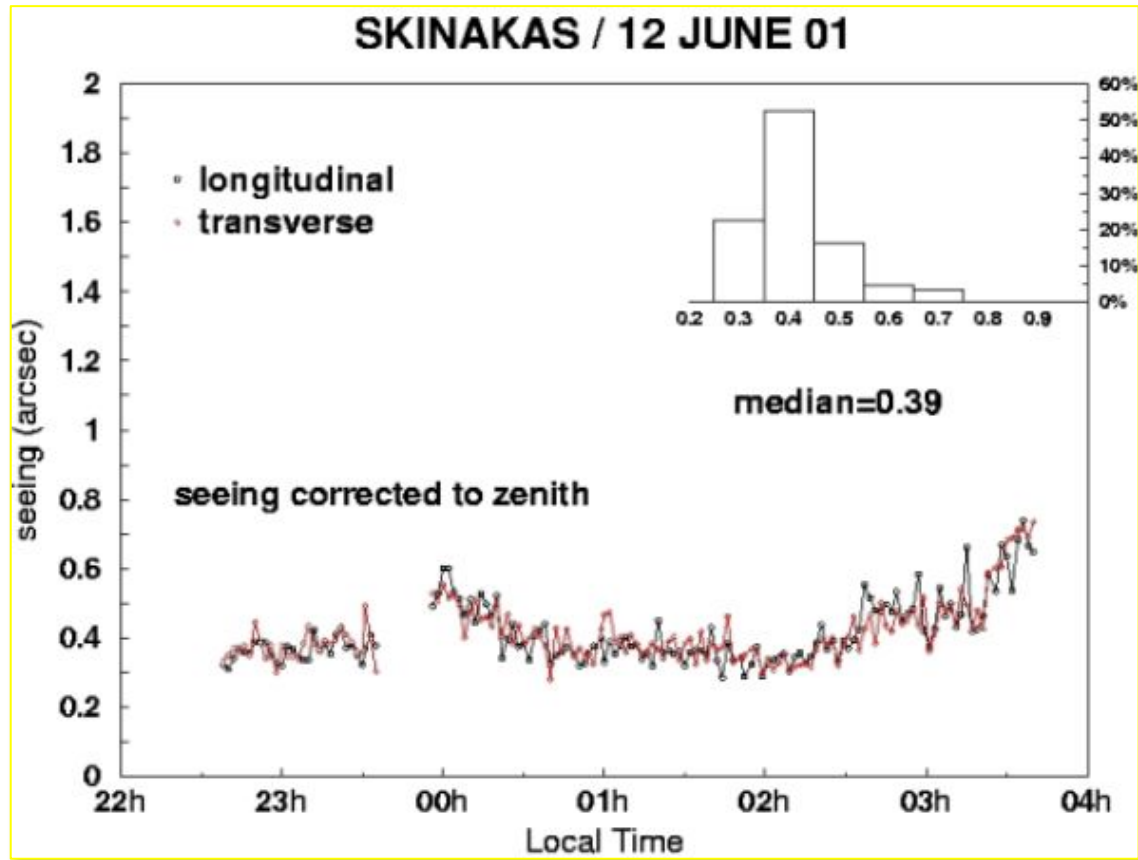


IA-FORTH – Skinakas Weather (2 of 3)



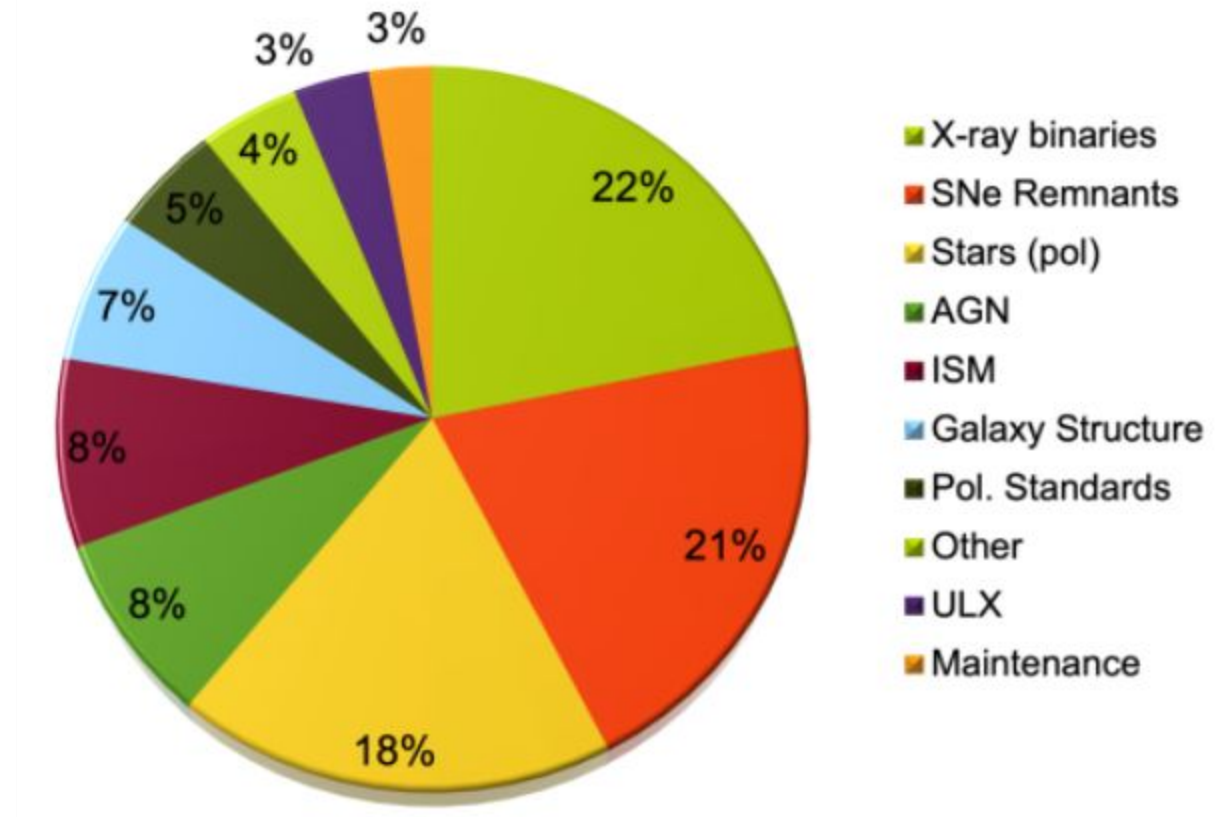
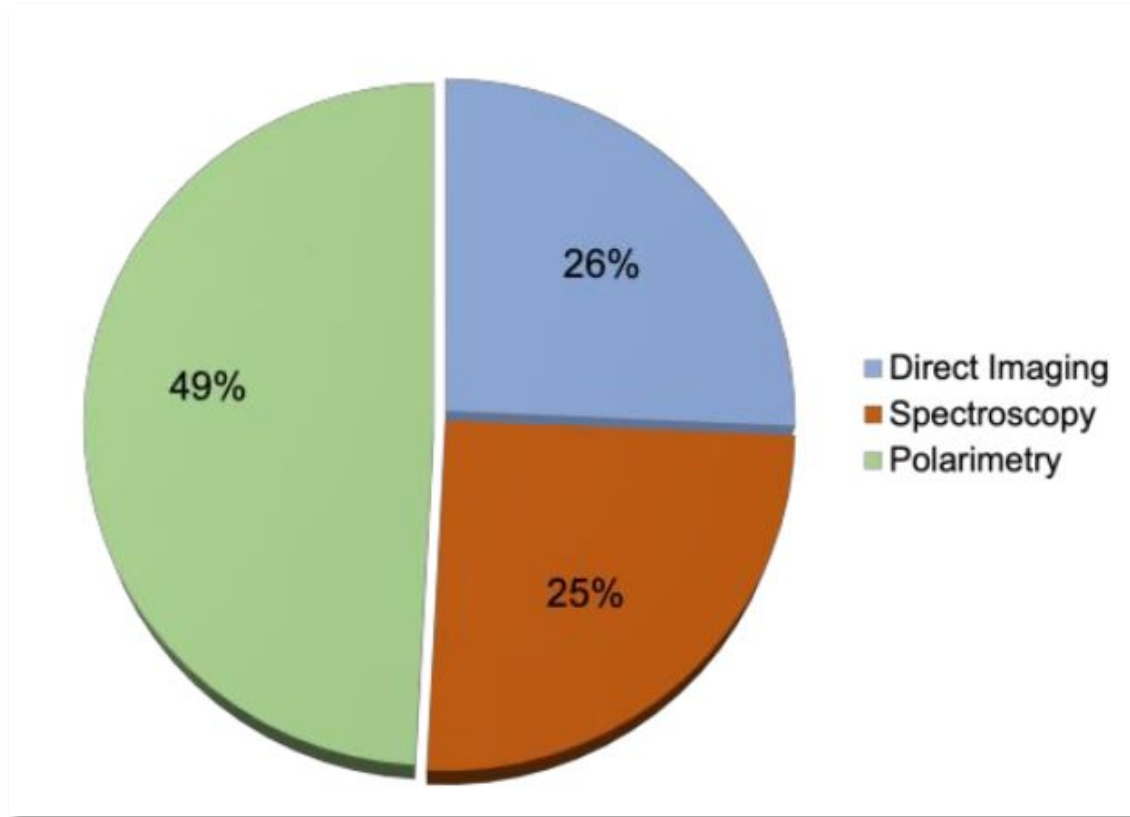
The average night sky surface brightness towards zenith was found to be $B=22.36\pm0.16$, $V=21.60\pm0.14$, $R=21.07\pm0.14$

IA-FORTH – Skinakas Weather (3 of 3)



Measurements of seeing using DIM for 47 nights in 2001

IA-FORTH – Skinakas Observations in 2021



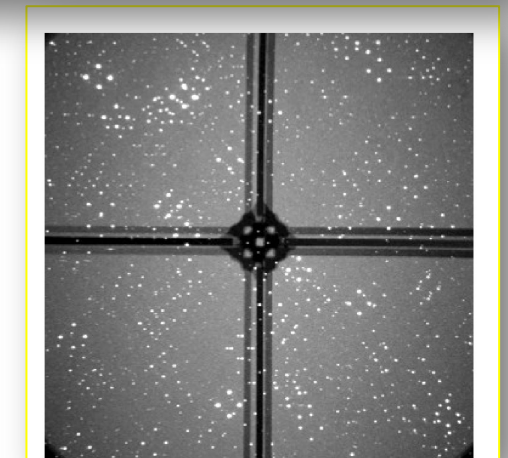
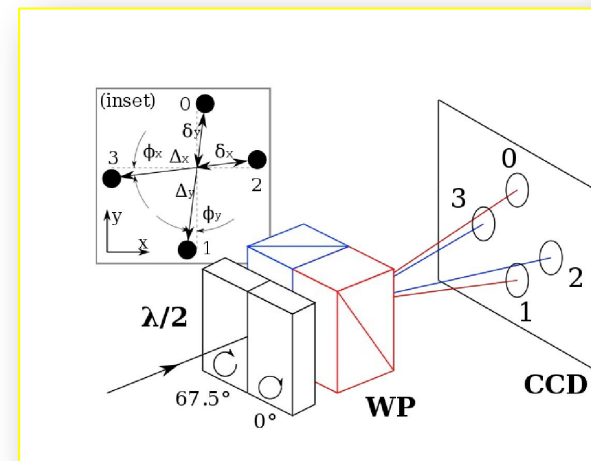
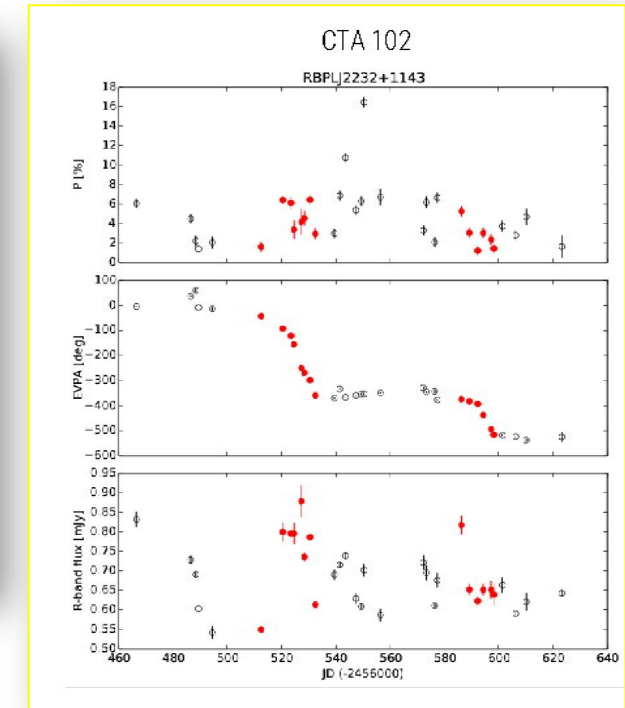
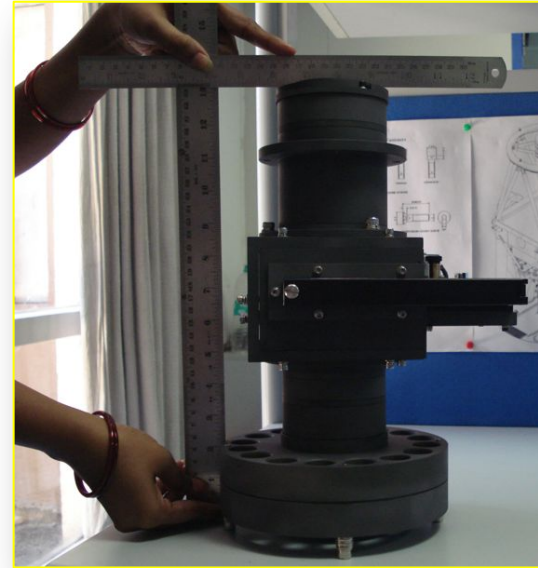
✓ Type of observations during 171 nights in 2021

Skinakas Observatory Science: Robopol

▣ Robopol (PI V. Pavlidou)

- ✓ Robopol:
- ✓ Crete/Caltech/MPIfR/IUCAA/NCU
- ✓ No moving parts
- ✓ low systematics
- ✓ high sensitivity
- ✓ @ Skinakas since 2013
- ✓ 34 refereed papers

- ▣ Blazar monitoring
- ▣ GRBs & Be/X-ray binaries
- ▣ Advent of PASIPHAE/WALOP



<http://robopol.physics.uoc.gr>

Skinakas Observatory Science: PASIPHAE

▣ Galactic B-field tomography with Stellar polarizations (PI K. Tassis)

- ✓ Measure stellar optical polarizations using innovative WALOP optopolarimeters (0.1% accuracy in systematics)

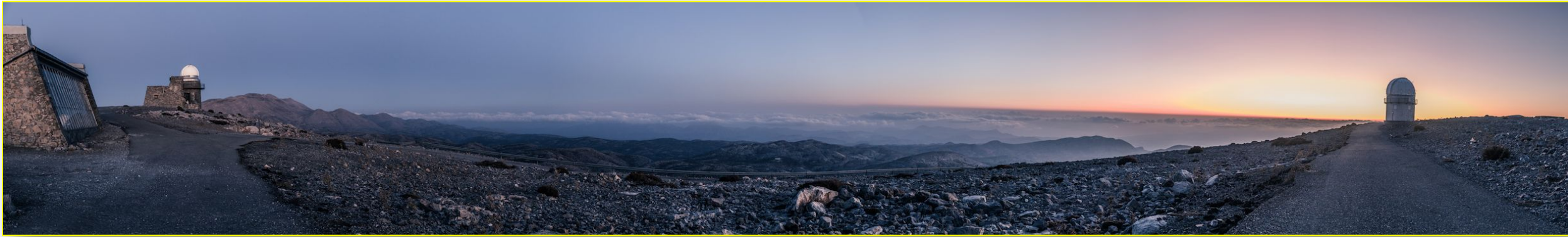
Decadal Survey on Astronomy & Astrophysics 2020

Our view of the Milky Way's ISM has been hampered by seeing it in projection. As a result, we have little information about volume density; observed quantities are line-of-sight averages; constraints on kinematics are highly incomplete; and studies of the 3D magnetic field are compromised. We are on the verge of a revolution, enabled by Big Data methods to exploit the stellar distances provided by Gaia, to construct a backbone for a 3D view of the ISM. Photometric and spectroscopic surveys plus Gaia distances already have been used to create spatial maps of dust extinction. High-resolution optical spectroscopy of absorption lines (NaI, KI, CaII, CH, CN, C₂) toward stars of known distances would allow the gas to also be dissected in 3D; 21 cm emission components can then be associated with optical absorption lines at the same velocity. Large surveys of stellar polarization (e.g., PASIPHAE) and filamentary HI features can outline the spatial structure of the magnetic field. Early results from these approaches are spectacular. For example, the 3D structure of the Orion A molecular cloud has been found

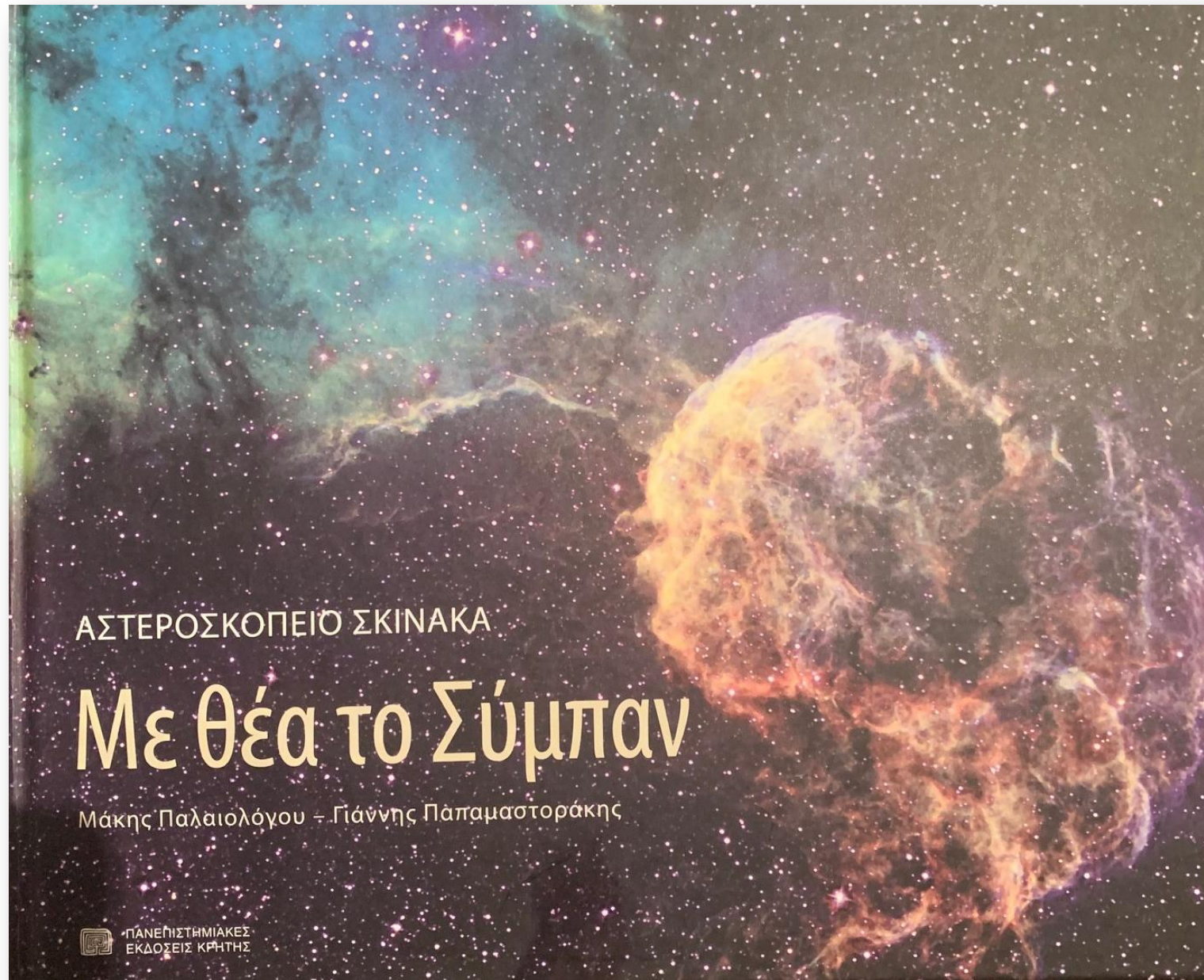


<http://pasiphae.science>

Skinakas Observatory – Visit on Monday 4 July 2022



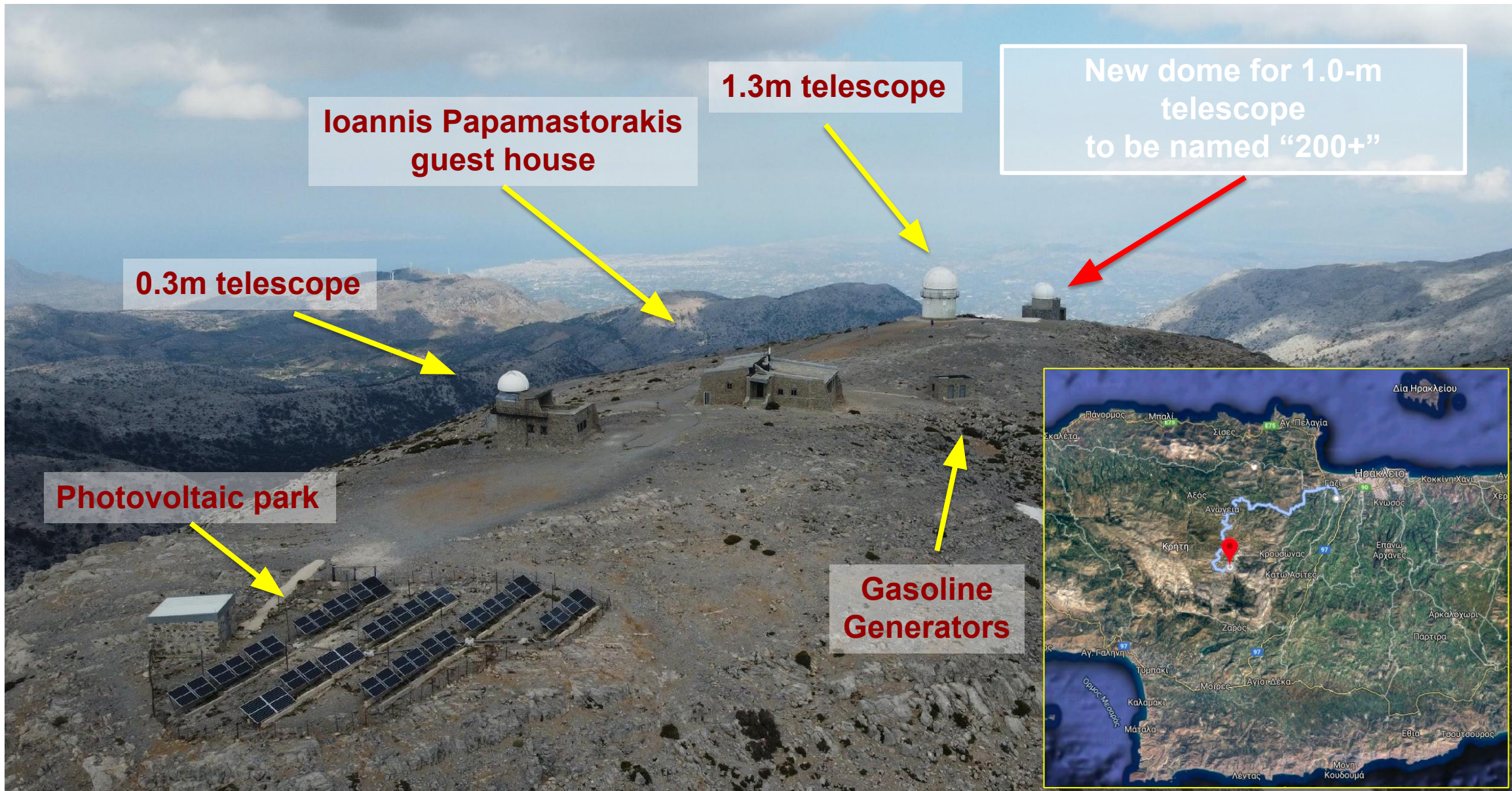
Skinakas Observatory in Pictures



IA-FORTH: The sky is not our limit...



<http://skinakas.physics.uoc.gr/en>



**Ioannis Papamastorakis
guest house**

1.3m telescope

**New dome for 1.0-m
telescope
to be named "200+"**

0.3m telescope

Photovoltaic park

**Gasoline
Generators**

