



# Science and UAPs

**Beatriz Villarroel**

Nordic Institute for Theoretical Physics &  
Stockholm University (Sweden)

# Washington D.C. 1952 UFO flyover



UFO sightings over Washington:

19 - 20<sup>th</sup> of July 1952

26 - 27<sup>th</sup> of July 1952

UFOs seen on multiple airports radar,  
by pilots and stewards.

536 UFO reports in July 1952 (compare  
to ~15 sightings per month during  
in 1948 - 1951)

# Washington D.C. 1952 UFO flyover



UFO sightings over Washington:

19 - 20<sup>th</sup> of July 1952

26 - 27<sup>th</sup> of July 1952

UFOs seen on multiple airports radar,  
by pilots and stewards.

536 UFO reports in July 1952 (compare  
to ~15 sightings per month during  
in 1948 - 1951)



USAF press conference

*"Temperature inversions"*

*"Misidentified aerial phenomena"*

*"No threat to national security."*



# Who am I



- Assistant professor at Nordita (Stockholm University) since Aug. 2023.
- Born in Uppsala, Sweden (Swedish national).
- PhD in astronomy from Uppsala University in 2017.
- Postdoc positions at ETH Zurich and international postdoc shared between Instituto de Astrofísica de Canarias and Stockholm University (Nordita).
- L'Oreal-UNESCO For Women in Science *International Rising Talents* prize 2022 (one of fifteen women worldwide).
- Research topics: Active Galactic Nuclei, transients and **Searches for Extra-terrestrial intelligence (SETI)**.
- Principal investigator of VASCO and ExoProbe projects.
- Advisory board member of the **Sol Foundation** and SUAPs.





- Strong historical support for 2004 Nimitz case, Washington 1952 “flap”, etc.
- Tens of thousands of recorded cases, supported by report case files, testimonials, videos and photos, etc., since the 1940s.
- Pentagon UFO report (2021): multiple UAP cases that cannot be explained across multiple sensors. Pilots and groundbased personnel report encounters with unknown aircraft.



CNES/GEIPAN

# Where does science stand on UAPs?

- Scientific evidence for UAP as a phenomenon is missing:
  - Government data is often classified.
  - Civilian scientists only very recently engaged in the question → too little data.
- **Little funding and huge stigma** – many academic journals will not even consider reviewing UAP papers.
- **Academic researchers risk their careers.** UAP not established as a scientific discipline.
- **The UAP/extraterrestrial (ET) hypothesis:**
  - There exist **billions of potentially habitable exoplanets** similar to Earth in the Milky Way! Building blocks of life (amino acids and main components of DNA and RNA molecules) found on meteorites. Life might be abundant.
  - Humans have the technology to send a probe to another star.

# NASA UAP Panel Summary 2023

- A panel of 16 experts from relevant fields.
- Road-map for how to study UAPs.
- There is a need of a centralized reporting system for UAPs.
- Appointment of a UAP research director.
- Some unidentified objects were acknowledged, e.g. silver orb over Mosul.



# Methods for studying UAPs

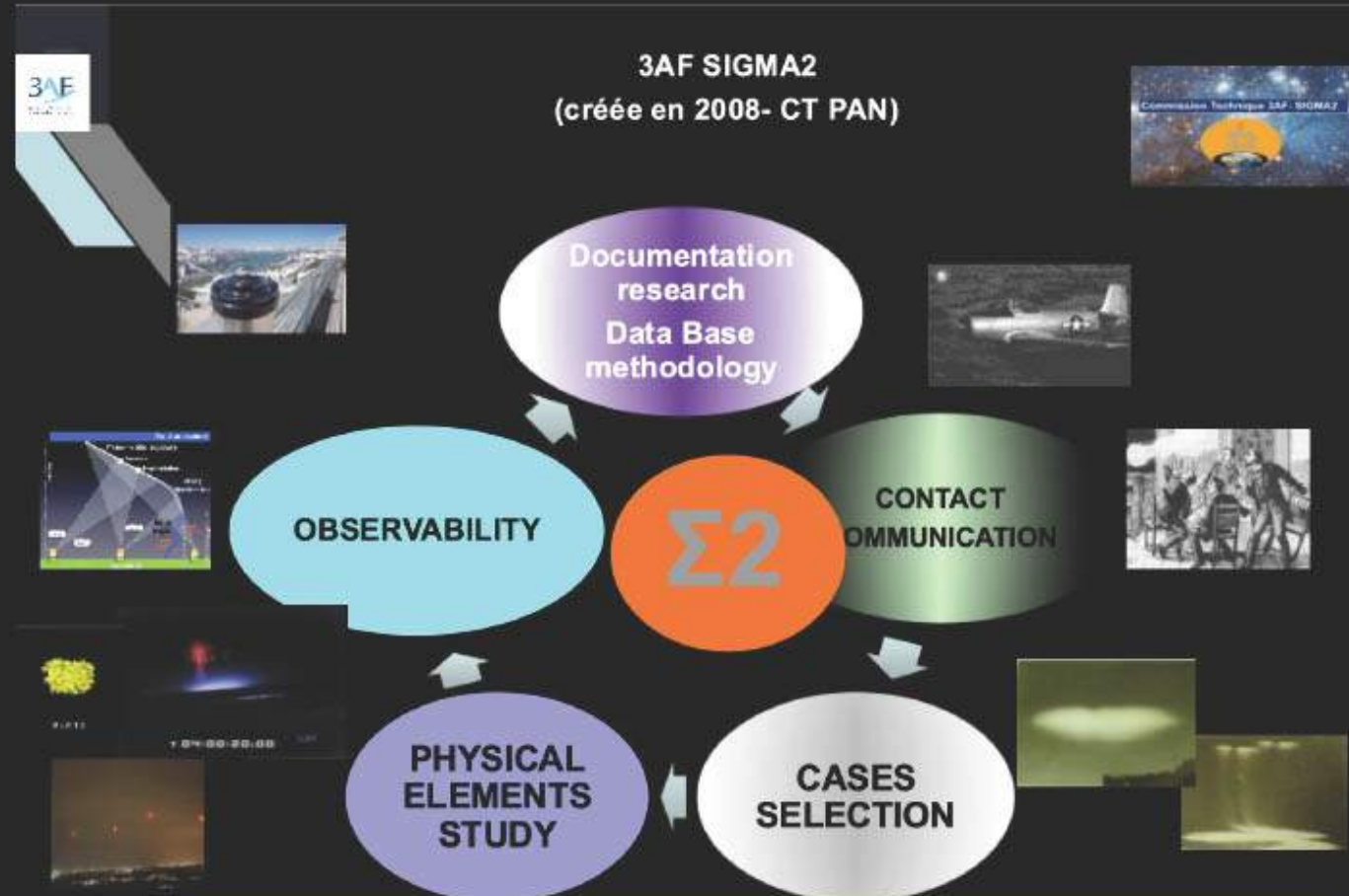


# Method 1: \* case studies of UAPs

## 3AF Sigma-2



Luc Dini

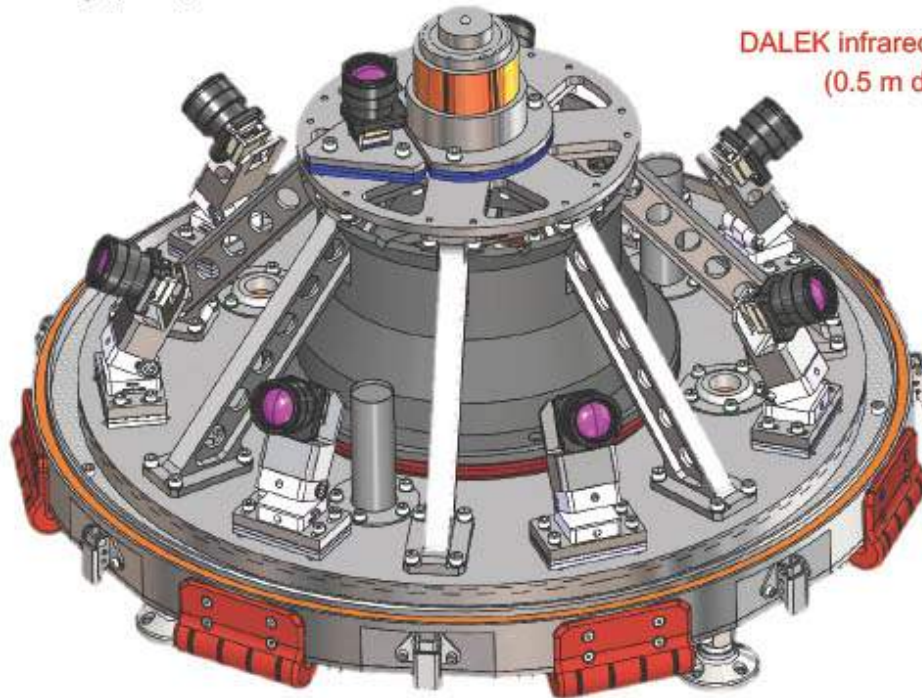


SIGMA2 is a group of multi disciplinary experts (pilots, astronaut, engineers in missiles, air defense, optronics, radar, EM, ball lightning, directed energy physicists) gathered in a scientific society to study UAP cases



# Method 2: Detection and characterization of every moving object in the sky

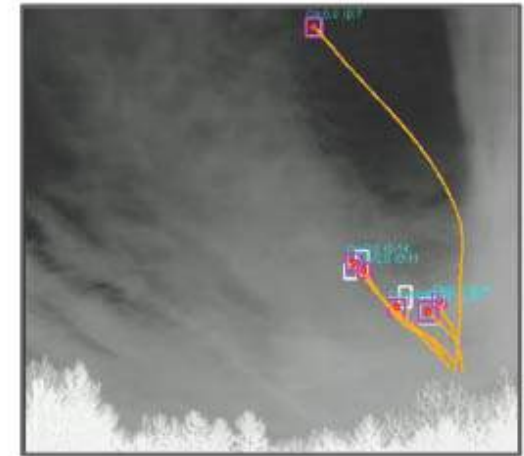
Harvard University  
Cambridge, MA, USA



DALEK infrared camera array  
(0.5 m diameter)



2. Training of AI detection models

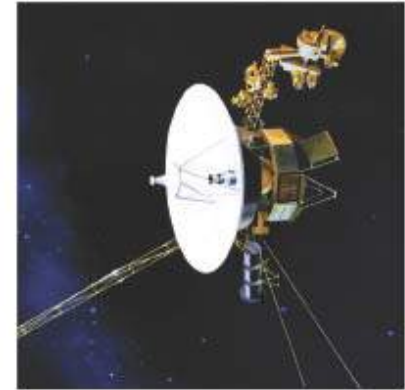
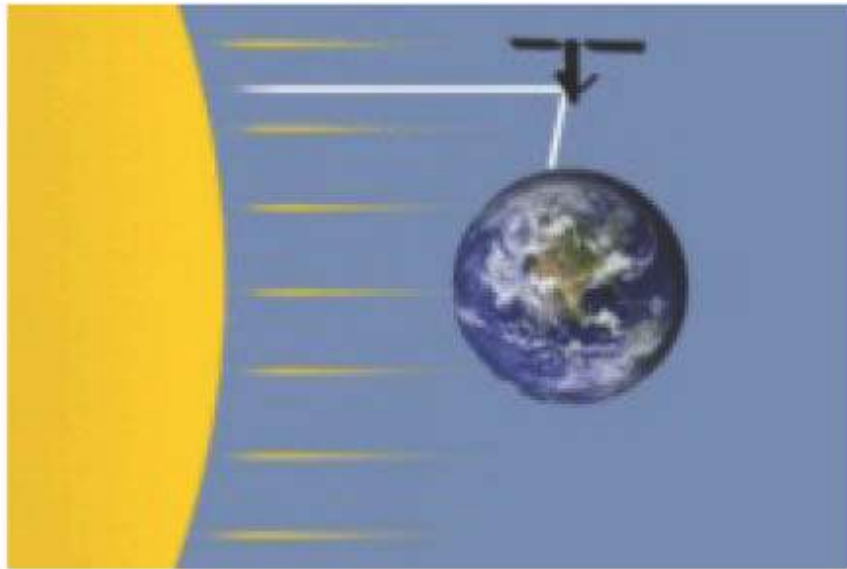


1. Design, calibration, testing, and integration of instruments for multimodal ground-based observatories.

3. Real-time detection and tracking

## Method 3. Artificial objects can produce short flashes.

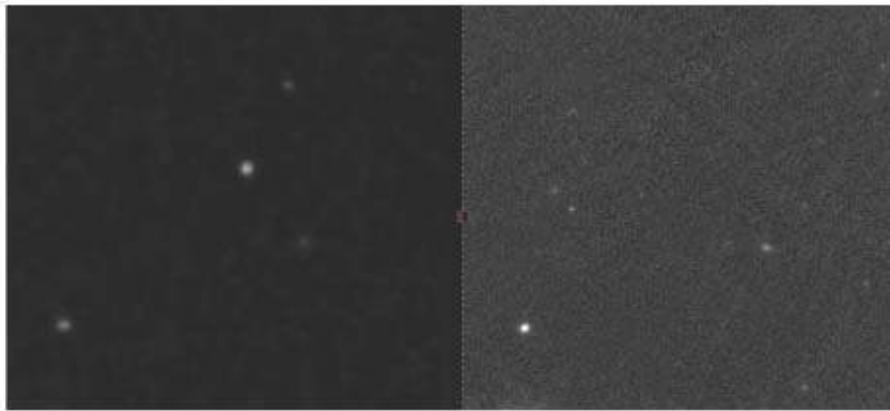
**Flat, reflective (artificial) objects (cm - dm) at high altitude (at 36 500 km ) produce subsecond flashes or “transients”.**



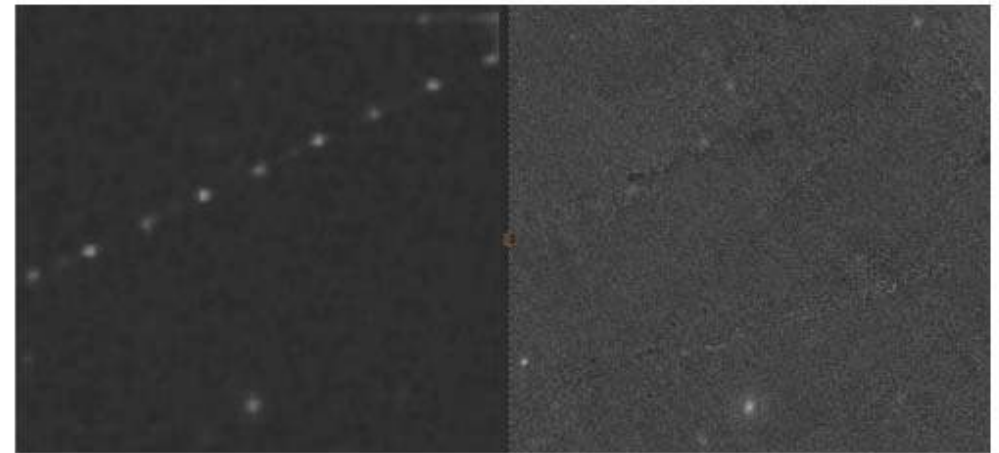


# Use pre-Sputnik images to search for non-human (artificial) objects

Multiple transients



Transients along a line (at least 4 transients in a line)



Triple transients from rotating dish  
(Deil et al. 2009)



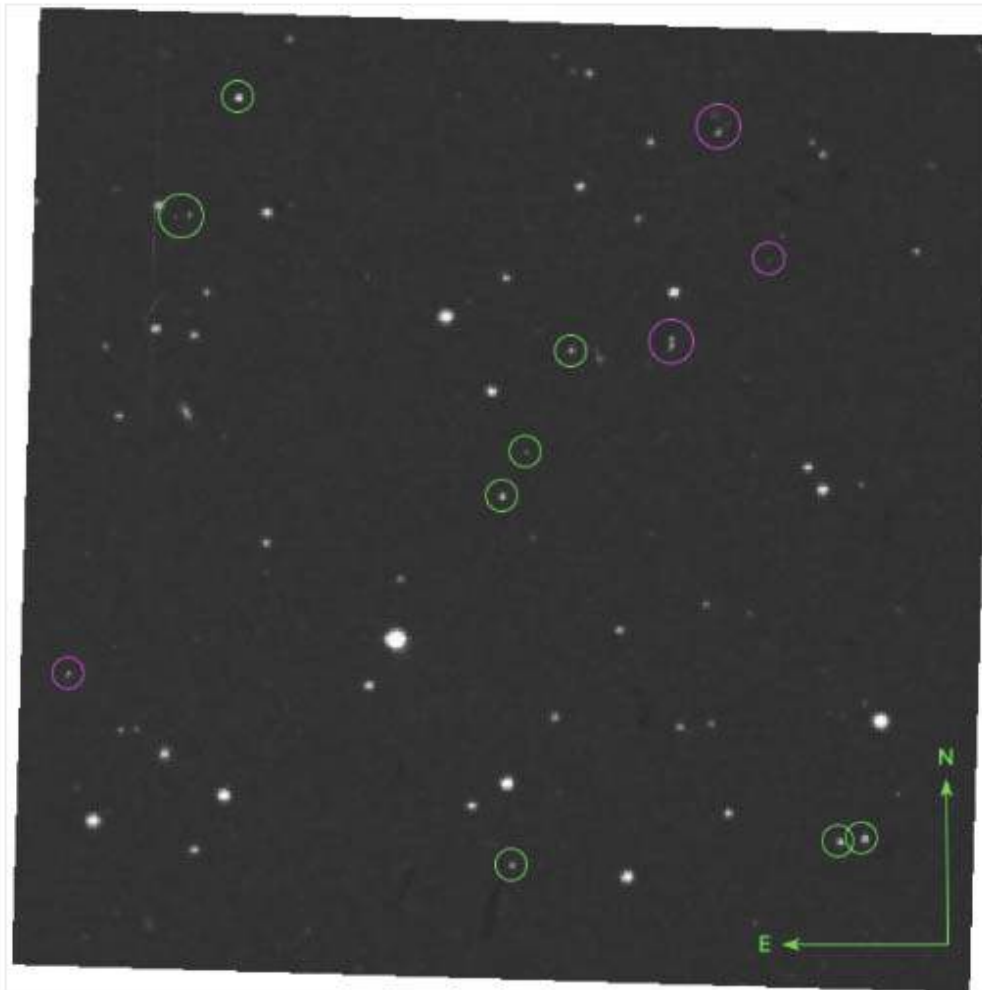
Villarroel, Mattsson, Guergouri et al.,  
2022, Acta Astronautica





**Before**

**After**



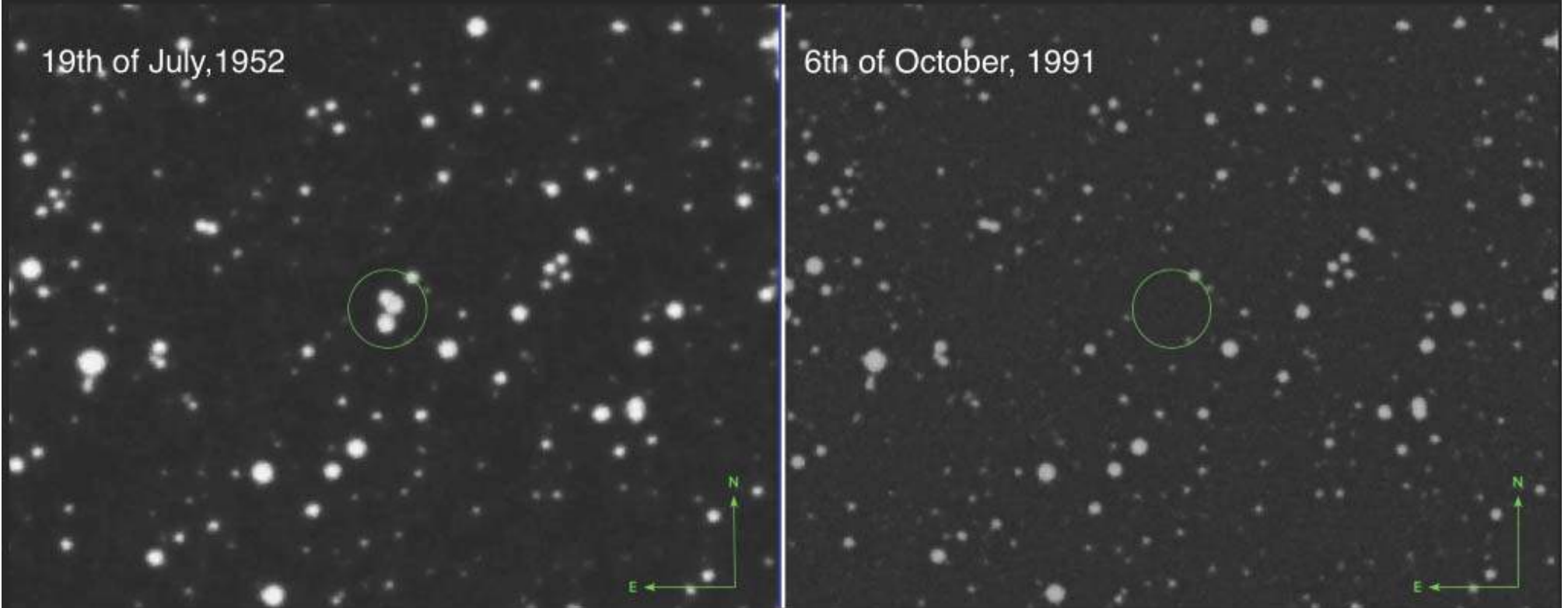
**12<sup>th</sup> of April  
1950**

Villarroel, Marcy, Geier et al. 2021,  
Scientific Reports (Nature journals)



Enrique Solano

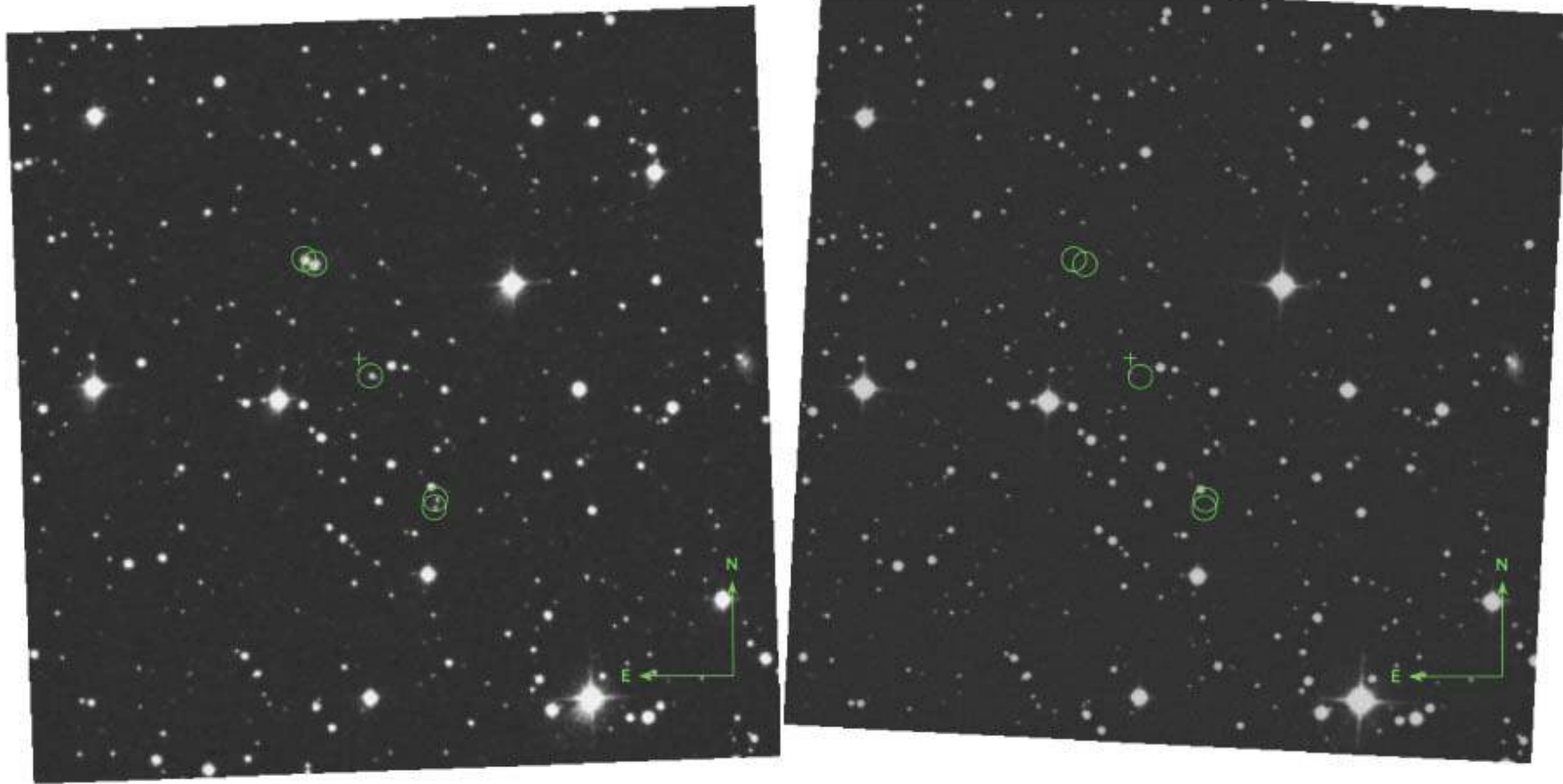
# 19<sup>th</sup> of July 1952



Solano, Marcy & Villarroel et al., 2023,  
*Monthly Notices of the Royal Astronomical Society*

# More examples!

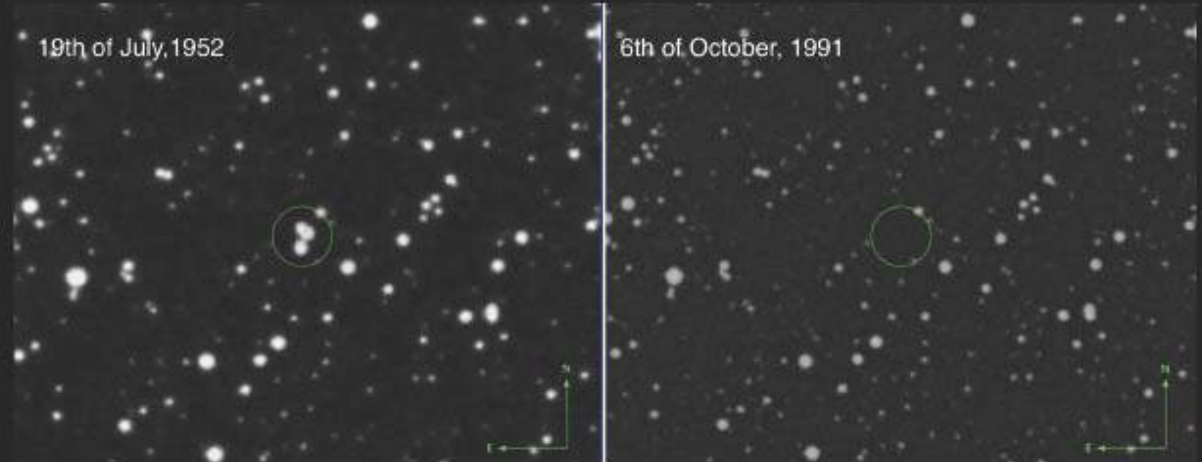
Observation date: 1952, 27<sup>th</sup> of July



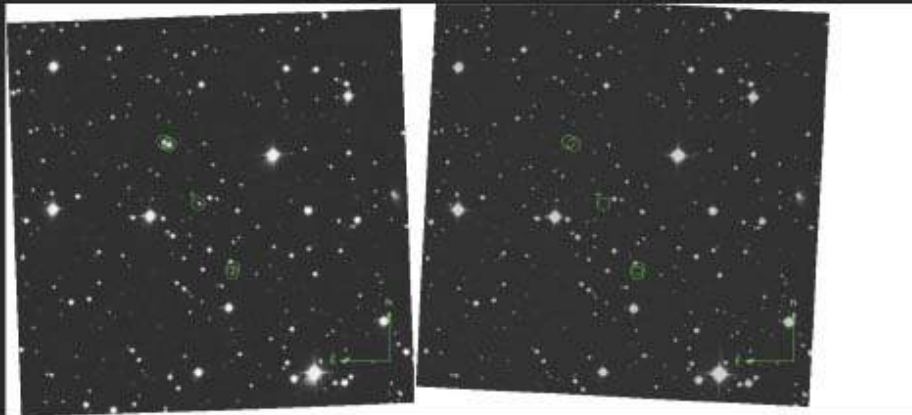
Alignment,  $p \sim 0.0001$

Villarroel, Solano, Guergouri et al., arXiv:  
2204.06091 (note: unpublished so far)

# Just a coincidence...?



Observation date: 1952, 19<sup>th</sup> of July



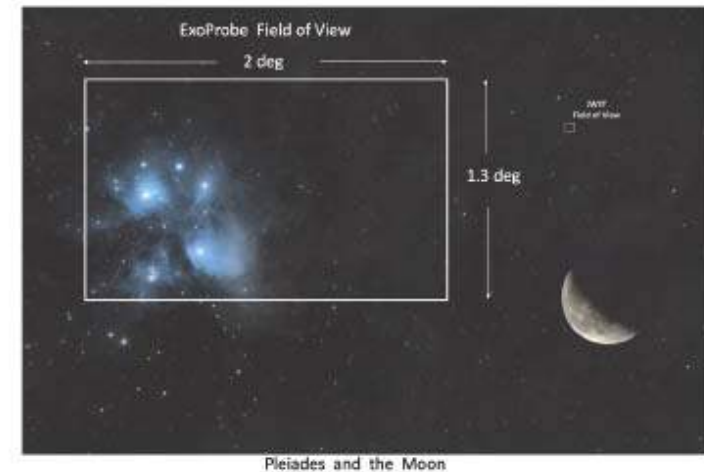
Observation date: 1952, 27<sup>th</sup> of July



# ExoProbe: a Global Network of Wide-field telescopes

- **Goal:** find short flashes (reflections and emissions) from non-human artificial objects.
- **Search strategy:** Search for fast  $\sim 1$  s flashes associated with flat, highly reflective artificial surfaces.

**Detect – validate – localize – characterize – and bring down an non-human artifact to the Earth.**



Widefield telescopes  
High-speed cameras

## Step 1: Verify + localize a probe

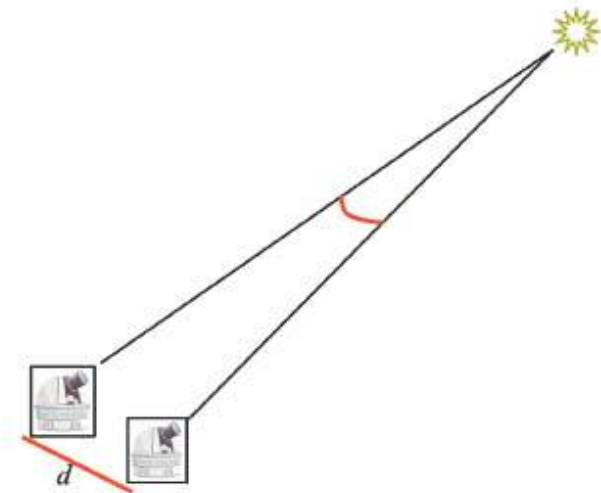
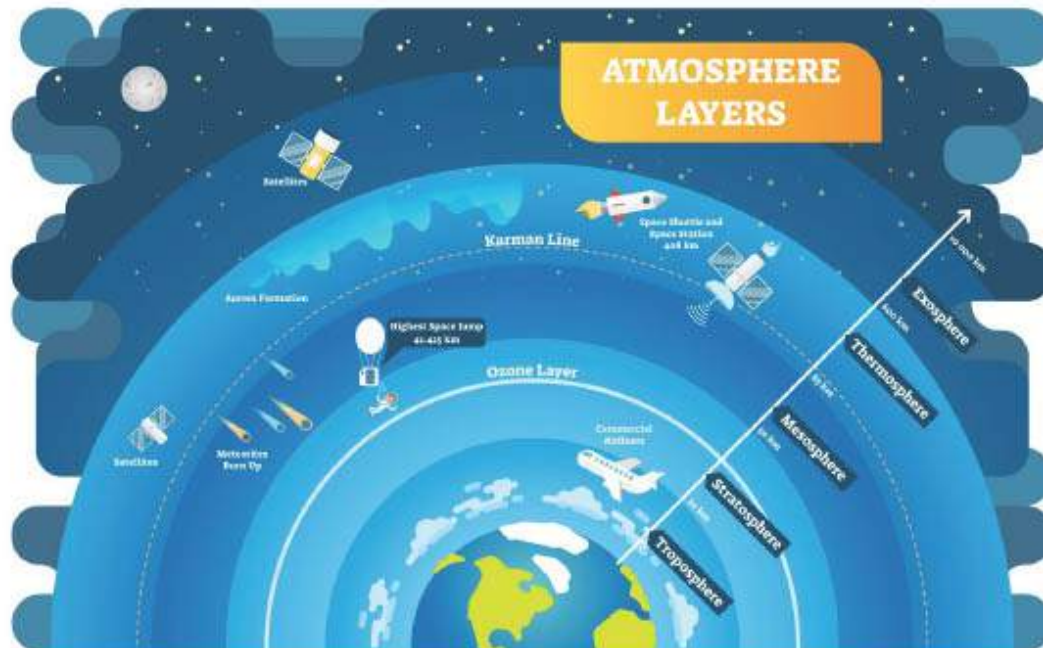
Verification: Detect flash in multiple synchronized telescopes.

Determine the distance to the object.



## Step 2: Stay outside the atmosphere

(Determined by the baseline  $d$  between two telescopes.)



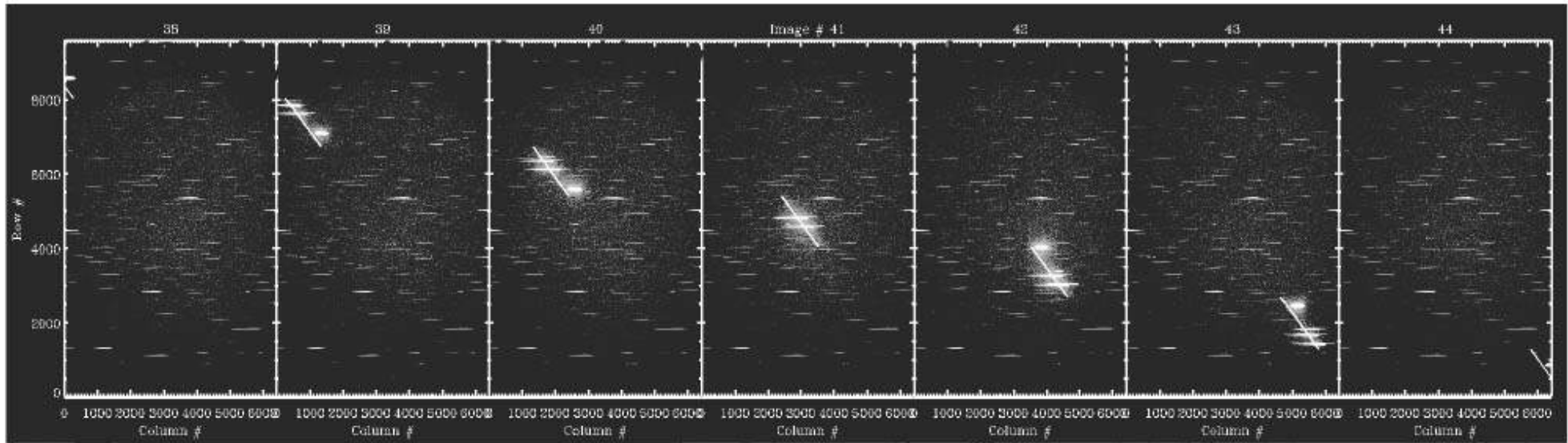
### Step 3: Remove satellites and human space debris



Note: Artist's impression; size of debris exaggerated as compared to the Earth

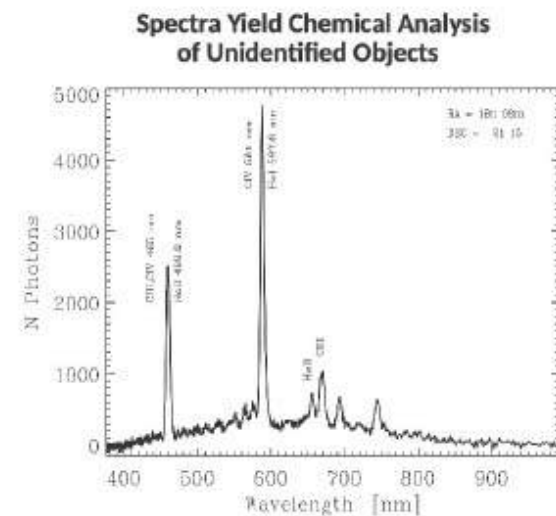


# Step 4: Characterize the object!



Example 1: real-time spectroscopy. The movie shows an unidentified aircraft moving through the field of view.

Example 2. Spectra – chemical composition of the source. Reflection (Solar spectrum) vs emission.



Step 5: If ET probe detection successful...

Activate the space garbage collectors!



In September 2023, Osiris-REx brought a sample from an asteroid about at a distance of 300 million kilometers.





All credits for the figure/animation: Hichem Guergouri

Scientific studies are urgently needed to understand the origin and nature of UAP observations.



Scientific studies are urgently needed to understand the origin and nature of UAP observations.

**What can E.U. do to help the scientists?**

Merci!