IAC2021

INTERNATIONAL ASTRONAUTICAL CONGRESS 2021

Welcome to the 72nd International Astronautical Congress 2021
25-29 October 2021, Dubai, United Arab Emirates

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For the very first time, the IAC will open its doors to the global space community in the United Arab Emirates, the first Arab country to host the IAC since its establishment in 1950. The United Arab Emirates' interest in astronomy and space sciences dates back to the 1970's, when His Highness Sheikh Zayed bin Sultan Al Nahyan met with the NASA team responsible for the Apollo moon landing. This encounter sparked a national focus on space that began almost three decades ago, eventually leading to the birth of a national space sector. The IAC 2021 Host Organization – the Mohammed Bin Rashid Space Center (MBRSC) – member of the IAF since 2012, was established by the Dubai Government to serve as one of the main pillars to drive the establishment of the knowledge economy and sustainable development in the UAE.

SYMPOSIUM A4

Title

50th IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps

Description

This symposium, organized by the International Academy of Astronautics (IAA), deals with the scientific, technical and interdisciplinary aspects of the Search for Extra-Terrestrial Intelligence (SETI) including a discussion of all kinds of contacts. The technical side is not limited to the microwave window, but includes also optical and any kinds of radiation. The interdisciplinary aspects include all societal implications, risk communication and philosophical considerations of any kind of discovery or contact.

IPC members

- Coordinator: Dr. Claudio Maccone, International Academy of Astronautics (IAA) and Istituto Nazionale di Astrofisica (INAF), Italy;

SESSIONS

Title	Date	Room
1. SETI 1: SETI Science and Technology	2021-10-26 09:45	Sheikh Rachid A
2. SETI 2: SETI and Society	2021-10-26 14:45	Sheikh Rachid A

IPC members

- Co-Chair: Dr. Andrea Melis, INAF - Istituto Nazionale di AstroFisica, Italy;
- Co-Chair: Dr. Beatriz Villarroel, Uppsala University, Sweden;
- Rapporteur: Dr. Franck Marchis, SETI Institute, United States;

PAPERS

Order	Time	Paper title	Mode	Presentation status	Speaker
1	09:45	Breakthrough Listen: Green Bank Telescope Observations, Analysis, and Public Data	10	confirmed	Dr. Steve Croft
7	09:55	Breakthrough Listen Search for Intelligent Life in the Galactic Plane with the Parkes Telescope	10	confirmed	Ms. Karen Perez
10	10:05	From Dust to Technosignatures: Searching for Stellar Occulters with Machine Learning	10	confirmed	Dr. Daniel Giles
13	10:15	Search for nanosecond optical transients with TAIGA-HiSCORE array for the SETI problem.	10	confirmed	Ms. Alexandra Krivopalova
17	10:25	The Drake equation and SETI in the JWST era	10	confirmed	Dr. Amri Wandel

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Review Article

Interstellar space biology via Project Starlight

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Space biology
Planetary protection

ABSTRACT

Our ability to explore the cosmos by direct contact has been limited to a small number of lunar and interplanetary missions. However, the NASA Starlight program points a path forward to send small, relativistic spacecraft far outside our solar system via standoff directed-energy propulsion. These miniaturized spacecraft are capable of robotic exploration but can also transport seeds and organisms, marking a profound change in our ability to both characterize and expand the reach of known life. Here we explore the biological and technological challenges of interstellar space biology, focusing on radiation-tolerant microorganisms capable of cryptobiosis. Additionally, we discuss planetary protection concerns and other ethical considerations of sending life to the stars.

A Roadmap to Interstellar Flight

Philip Lubin
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arXiv:1604.01356
submitted to JBIS April 2015
JBIS Vol. 69, pp. 40-72 Feb 2016
Current version 15–w7-4 (10/18/16)

Abstract – In the nearly 60 years of spaceflight we have accomplished wonderful feats of exploration that have shown the incredible spirit of the human drive to explore and understand our universe. Yet in those 60 years we have barely left our solar system with the Voyager 1 spacecraft launched in 1977 finally leaving the solar system after 37 years of flight at a speed of 17 km/s or less than 0.006% the speed of light. As remarkable as this, to reach even the nearest stars with our current propulsion technology will take 100 millennium. We have to radically rethink our strategy or give up our dreams of reaching the stars, or wait for technology that does not currently exist. While we all dream of human spaceflight to the stars in a way romanticized in books and movies, it is not within our power to do so, nor it is clear that this is the path we should choose. We posit a path forward, that while not simple, it is within our technological reach. We propose a roadmap to a program that will lead to sending relativistic probes to the nearest stars and will open up a vast array of possibilities of flight both within our solar system and far beyond. Spacecraft from gram level complete spacecraft on a wafer ("wafersats") that reach more than ¼ c and reach the nearest star in 20 years to spacecraft with masses more than 10^5 kg (100 tons) that can reach speeds of greater than 1000 km/s. These systems can be propelled to speeds currently unimaginable with existing propulsion technologies. To do so requires a fundamental change in our thinking of both propulsion and in many cases what a spacecraft is. In addition to larger spacecraft, some capable of transporting humans, we consider functional spacecraft on a wafer, including integrated optical communications, imaging systems, photon thrusters, power and sensors combined with directed energy propulsion. The costs can be amortized over a very large number of missions beyond relativistic spacecraft as such planetary defense, beamed energy for distant spacecraft, sending power back to Earth, stand-off composition analysis of solar system targets, long range laser communications, SETI searches and even terra forming. Exploring the nearest stars and exo-planets would be a profound voyage for humanity, one whose non-scientific implications would be enormous. It is time to begin this inevitable journey far beyond our home.

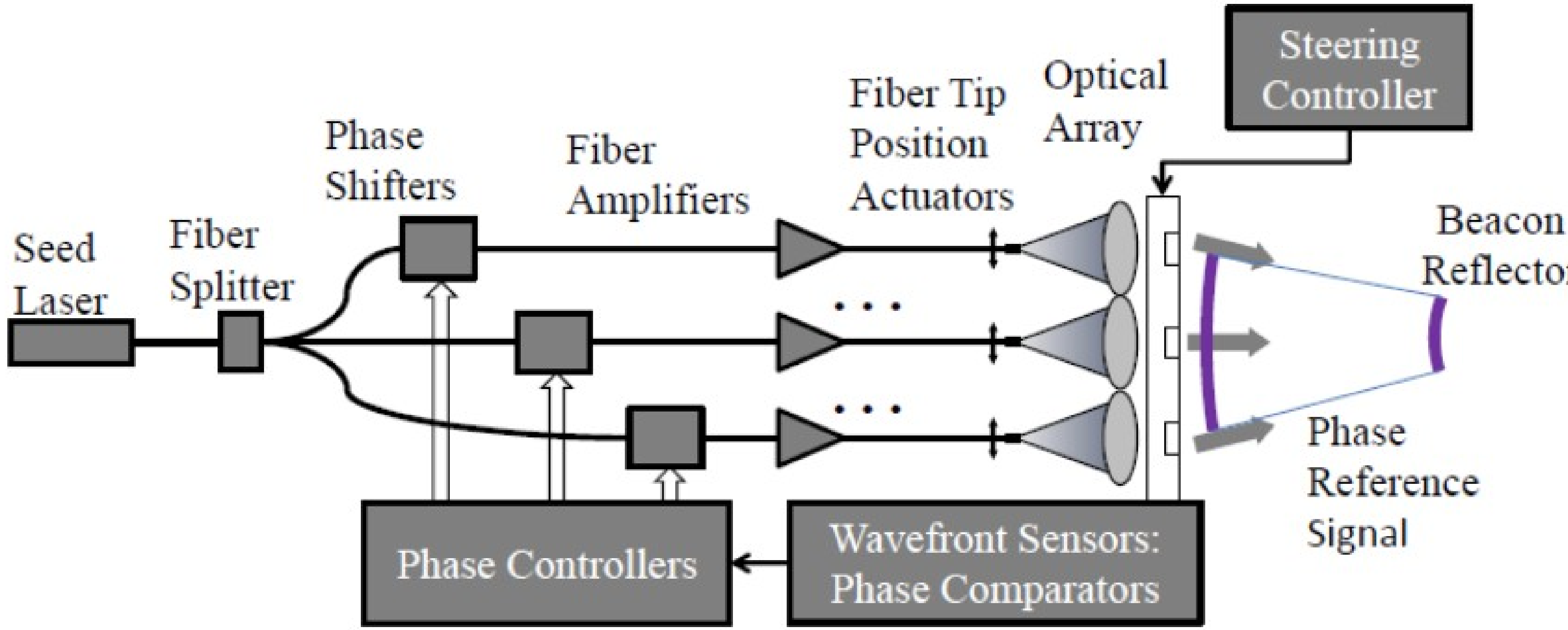

Figure 10 – Schematic design of phased array laser driver. Wavefront sensing from both local and extended systems combined with the system metrology are critical to forming the final beam.

6 - Implications of the technology to SETI - The same laser used to drive the probe can also be used as a beacon to "signal" other planetary systems as well as establish extremely long range "communications" systems with data delays modulo the speed of light. We discuss this in detail in detail in Lubin et al 2015 (JBIS) and Lubin 2016. The implications for SETI searches are quite profound. A similarly "advanced" civilization like ours would be visible across the entire visible universe (horizon). This implies that optical SETI searches can not only search nearby planetary systems but could search the entire universe for similar or more advanced civilizations. If the current Kepler statistics (~1 planet/star) on the abundance of suitable planets is scalable to the entire universe, this would imply of order 10^{22} planets within our horizon. We show in Lubin 2016 that even ground based searches using modest existing apertures can detect civilizations with technology at our current technology level (though not yet deployed) at relatively high redshift. Pondering the number of possible planets this allows us to search for has profound implications [27].

arXiv:2110.15217

VASCO interface: http://ml-blink.org

A glint in the eye: photographic plate archive searches for alien visitations

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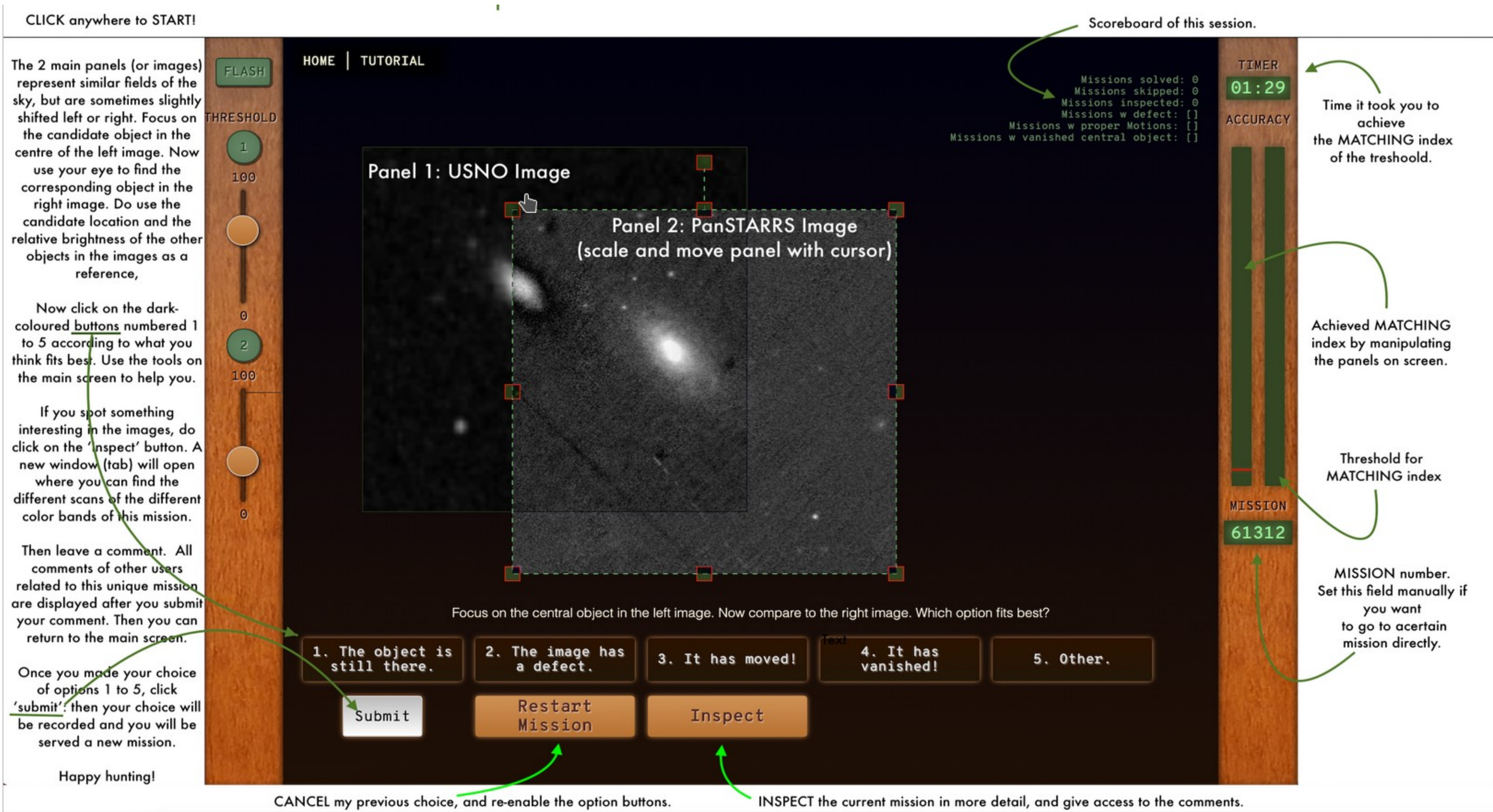
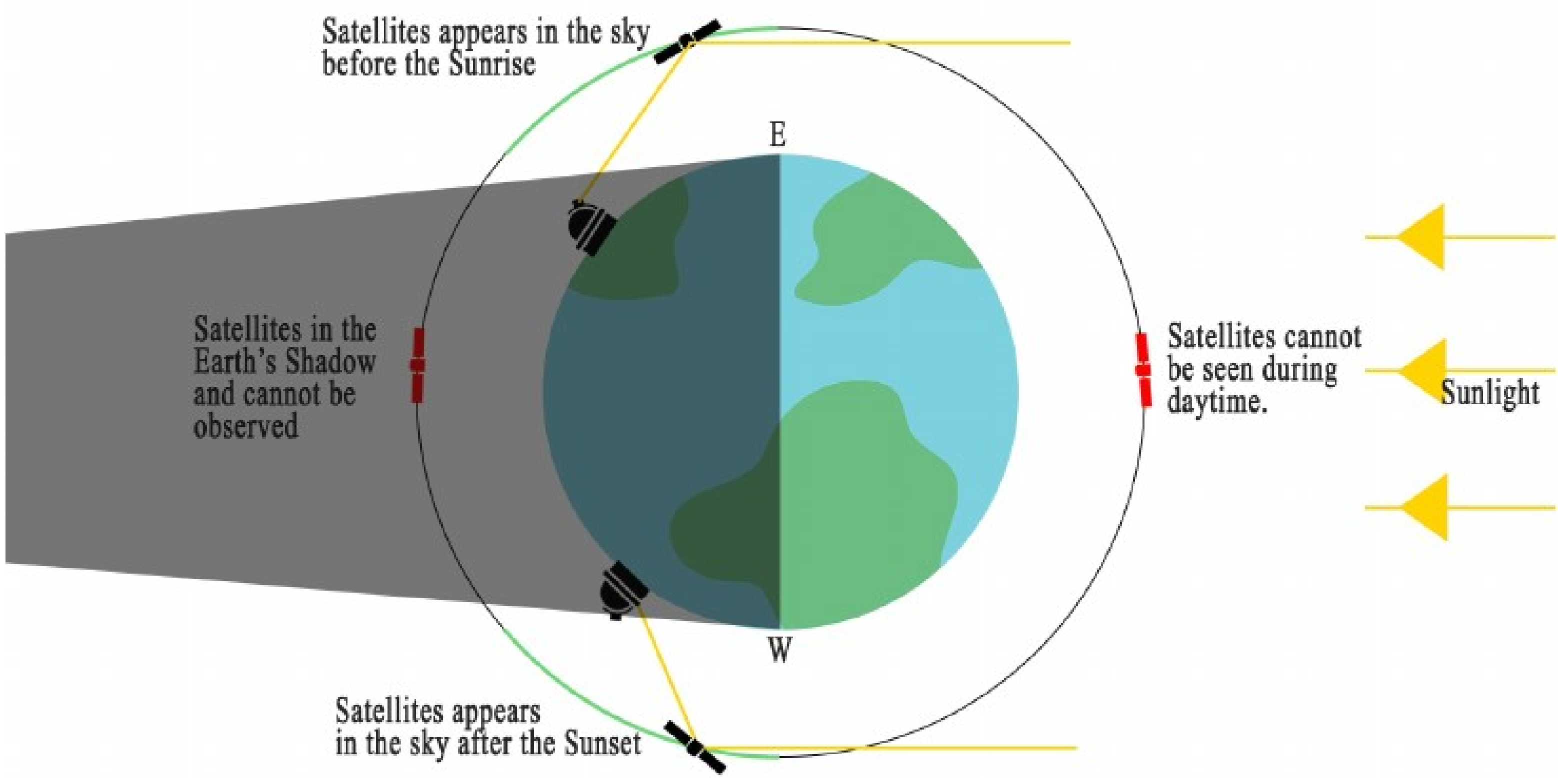
ABSTRACT

An advanced extraterrestrial civilisation that has discovered the Earth might have sent probes here. In this paper, we present a simple strategy to identify Non-Terrestrial artefacts (NTAs) in geosynchronous Earth orbits (GEOs). We show that even the small pieces of reflective debris in orbit around the Earth can be identified through searches for multiple transients in old photographic plate material exposed before the launch of first human satellite in 1957. In order to separate between possible false point-like sources on photographic plates from real reflections, we include calculations to show that at least four or five point sources along a line within a $10 * 10$ arcmin^2 image box are a good indicator of NTAs, corresponding to significance levels of 2.5 and 3.9σ. The given methodology will be used to set an upper limit to the prevalence of NTAs with reflective surfaces in geosynchronous orbits.

Keywords: VASCO — transients — SETI — glints – probes


CLICK anywhere to START!
Scoreboard of this session.
The 2 main panels (or images) represent similar fields of the sky, but are sometimes slightly shifted left or right. Focus on the candidate object in the centre of the left image. Now use your eye to find the corresponding object in the right image. Do use the candidate location and the relative brightness of the other objects in the images as a reference,
Now click on the dark-coloured buttons numbered 1 to 5 according to what you think fits best. Use the tools on the main screen to help you.
If you spot something interesting in the images, do click on the 'inspect' button. A new window (tab) will open where you can find the different scans of the different color bands of this mission.
Then leave a comment. All comments of other users related to this unique mission are displayed after you submit your comment. Then you can return to the main screen.
Once you made your choice of options 1 to 5, click 'submit', then your choice will be recorded and you will be served a new mission.
Happy hunting!
FLASH
THRESHOLD
1
100
0
2
100
0
HOME | TUTORIAL
Missions solved: 0
Missions skipped: 0
Missions inspected: 0
Missions w defect: []
Missions w proper Motions: []
Missions w vanished central object: []
Panel 1: USNO Image
Panel 2: PanSTARRS Image
(scale and move panel with cursor)
TIMER
01:29
ACCURACY
MISSION
61312
Time it took you to achieve the MATCHING index of the treshoold.
Achieved MATCHING index by manipulating the panels on screen.
Threshold for MATCHING index
MISSION number. Set this field manually if you want to go to acertain mission directly.
Focus on the central object in the left image. Now compare to the right image. Which option fits best?
1. The object is still there.
2. The image has a defect.
3. It has moved!
4. It has vanished!
5. Other.
Submit
Restart Mission
Inspect
CANCEL my previous choice, and re-enable the option buttons.
INSPECT the current mission in more detail, and give access to the comments.



Satellites appears in the sky
before the Sunrise
E
Satellites in the
Earth's Shadow
and cannot be
observed
Satellites cannot
be seen during
daytime.
Sunlight
W
Satellites appears
in the sky after the Sunset

Figure 5. Triple glints. An example of repeating glints in a red POSS-I image from 1950s. The left column shows the POSS-I image, and the right column the Pan-STARRS image (> year 2015). The example is from Villarroel et al. (2021) and uses the VASCO citizen science web interface.