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Description of document: National Aeronautics and Space Administration (NASA)
Internal Document: A paper entitled: Thoughts on UFOs,
by David Spergel Ph.D. 2021 (?)

Requested date: 02-December-2021

Release date: 23-June-2022

Posted date: 15-August-2022

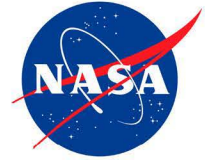
Source of document: FOIA Request
NASA Headquarters
MS 5-R30, Freedom of Information Act Office
300 E Street, SW
Washington, DC 20546
Email: hq-foia@mail.nasa.gov
[Online FOIA Public Access Link \(PAL\)](#)

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National Aeronautics and Space Administration

Headquarters

Washington, DC 20546-0001



June 23, 2022

Reply to attn. of: **Office of Communications**

Re: NASA FOIA Tracking Number **22-HQ-F-00623**

This is our final response to your Freedom of Information Act (FOIA) request to the National Aeronautics and Space Administration (NASA), dated December 2, 2021, and received in this office on June 16, 2022. Your request was assigned the above-referenced tracking number. You seek A copy of the unpublished NASA -internal document entitled: "Thoughts on UFOs", written by Princeton University astrophysicist David Spergel.

In response to your request, we conducted a search of NASA's Offices of Information Technology using the search terms "Thoughts on UFOs" and "David Spergel".¹ That search identified records responsive to your request. We reviewed the responsive records under the FOIA to determine whether they may be disclosed to you. Based on that review, this office is providing the following:

- 5 page(s) are released in full (RIF);²
- 1 page(s) are released in part (RIP);
- page(s) are withheld in full (WIF);
- page(s) are duplicate copies of material already processed;
- page(s) not provided were referred to another entity.

NASA redacted from the enclosed documents certain information pursuant to the following FOIA exemptions:

¹ If you are dissatisfied with these search terms, please provide NASA with additional terms you deem appropriate.

² All page counts are approximate numbers.

Exemption 6, 5 U.S.C. § 552(b)(6)

Exemption 6 allows withholding of “personnel and medical files and *similar files* the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.” 5 U.S.C. § 552(b)(6)(emphasis added). NASA invokes exemption 6 to protect third party personal email addresses.

Fees

Provisions of the FOIA allow us to recover part of the cost of complying with your request. In this instance, because the cost is below the \$50 minimum, there is no charge.

Appeal

You have the right to appeal my action regarding your request. Your appeal must be received within 90 days of the date of this response. Please send your appeal to:

Administrator
NASA Headquarters
Executive Secretariat
ATTN: FOIA Appeals
MS 9R17
300 E Street S.W.
Washington, DC 20546

Both the envelope and letter of appeal should be clearly marked, “Appeal under the Freedom of Information Act.” You must also include a copy of your initial request, the adverse determination, and any other correspondence with the FOIA office. In order to expedite the appellate process and ensure full consideration of your appeal, your appeal should contain a brief statement of the reasons you believe this initial determination should be reversed. Additional information on submitting an appeal is set forth in the NASA FOIA regulations at 14 C.F.R. § 1206.700.

Assistance and Dispute Resolution Services

If you have any questions, please feel free to contact me at Alyssa.k.bias@nasa.gov or (202) 358-4664. For further assistance and to discuss any aspect of your request you may also contact:

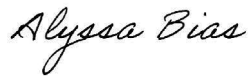
Stephanie Fox
Chief FOIA Public Liaison
Freedom of Information Act Office
NASA Headquarters
300 E Street, S.W., 5P32
Washington D.C. 20546
Phone: 202-358-1553

Email: Stephanie.K.Fox@nasa.gov

Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services it offers. The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, e-mail at ogis@nara.gov; telephone at 202-741-5770; toll free at 1-877-684-6448; or facsimile at 202-741-5769.

Important: Please note that contacting any agency official including myself, NASA's Chief FOIA Public Liaison, and/or OGIS is not an alternative to filing an administrative appeal and does not stop the 90 day appeal clock.

Sincerely,

A handwritten signature in cursive script that reads "Alyssa Bias".

Alyssa Bias
Government Information Specialist

Enclosure(s)

[EXTERNAL] Thoughts on UFOs

From: david spergel <(b) (6)>
To: Thomas H. Zurbuchen <thomas.h.zurbuchen@nasa.gov>, Zurbuchen, Thomas H. (HQ-DA000) <thomas.h.zurbuchen@nasa.gov>
Sent: June 12, 2021 8:30:09 PM EDT
Received: June 12, 2021 8:30:43 PM EDT
Attachments: Microsoft Word - Extraterrestrial or Terrestrial origin.docx.pdf

Attachment

1. Microsoft Word - Extraterrestrial or Terrestrial origin.docx.pdf

Type: application/pdf
Size: 867 KB (887,863 bytes)

Attachment #1

Microsoft Word - Extraterrestrial or Terrestrial origin.docx.pdf

Original view

3 pages (displayed on pages 4 to 6)

Thoughts on UFOs

David Spergel

The recent publication of observations of unidentified flying objects (UFOs) has stimulated a revived interest in the possibility of extraterrestrial visitors. This note describes possible hypotheses about the nature of UFOs, outlines key observables, and then suggests possible observing programs with an emphasis on approaches that will lead to interesting science even if UFOs have terrestrial origin.

What are they?

The most conservative hypothesis is that these UFOs are built by humans: experimental vehicles under development by the US military or by foreign militaries. In the past, famous UFO sites (e.g., Area 51) have turned out to be test sites for advanced technologies. Some of the “triangular shaped” objects that are capable of rapid accelerations and high speeds do seem remarkably similar to descriptions of hypersonic vehicles that are currently under development by the Army, [Navy](#), [Air Force](#), [DARPA](#) and the [NSA](#). The [Indian](#), [Chinese](#) and [Russian](#) military are all developing their own hypersonic vehicles. DARPA’s HTV-2 had test flights over a decade ago so that the recent appearance of flying triangular shaped objects that can reach high speeds seems consistent with this hypothesis. There is also extensive work on developing [drone swarms](#) by many nations (including even Armenia) whose properties match some UFO reports.



Image of the Indian HGV-2, one of many hypersonic vehicles that are being tested and deployed.

Another possible explanation for some of the events are natural phenomena such as [Ball lightning](#) or St. Elmo Fire. Plasma physicists and atmospheric physicists are still struggling to fully understand these phenomena. Recent work associates these events with lightning induced quasi-stable plasma effects (see e.g., [Skyrmion origin of ball lightning](#)). Some of the events could be optical illusions due to multiple reflections in airplane windows or atmospheric effects.

The most exciting hypothesis is that some of the UFOs are extraterrestrials visiting the Earth and studying the planet and its life forms. Aliens capable of interstellar space travel are not likely to be using technologies that are familiar to us (e.g., solar sails or hypersonic airbreathing vehicles). They would only be detectable if they wished to be seen. For example, they would likely want to miniaturize their probes and not likely to have familiar-looking vehicles. Given astronomical timescales, alien life is likely either a billion years less advanced than human life or a billion years more advanced technologically. As [Clarke's third law](#) states, "any sufficiently advanced technology is indistinguishable from magic".

Observables

What are the observables that can distinguish between these hypotheses? We would like to characterize the UFO events: What is their duration? What is the amplitude of the observed accelerations and velocities? How frequent are these events? Are they associated with weather phenomena? Where do the events occur? What are the properties of the objects? Do they have a surface or are they a plasma? Observations that can answer these questions can help identify the UFOs.

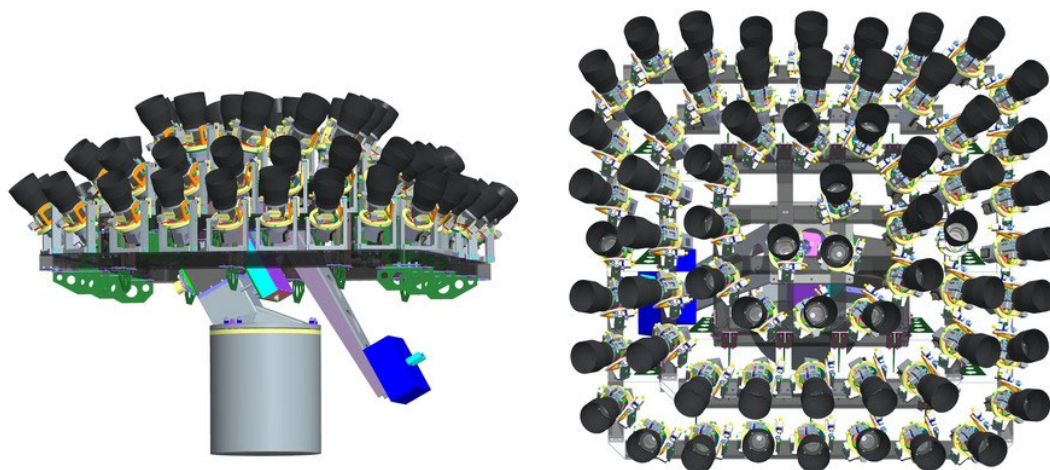
Potential observational program

An observational program that monitors the sky for rapidly moving objects and for time-variability would likely be able to help address the origin of these UFOs. Ideally, these telescopes would be monitoring much of the sky continuously so that they could simultaneously observe the events reported by pilots.

There are several existing observing programs that could be used to extrapolate to an all-sky monitoring program. In the optical, the [ASAS](#) telescope and the [HATPI](#) project monitor a significant fraction of the sky. ASAS operates a network of telescopes in South Africa, Texas, Hawaii, and Chile. HATPI uses a series of small cameras to monitor most of the sky visible from Chile. Currently, HATPI cover $\frac{3}{4}$ of the visible sky and detects 1% variations in 13th magnitude stars within 30 seconds. The approximate cost of HATPI was ~\$5 million, so that a program of making multiple copies of HATPI would not be overwhelmingly costly. This network would complement the Vera Rubin Observatory by enabling constant monitoring of transients, would detect transiting planets, and would be able to observe UFOs in clear weather. The telescopes are currently designed to operate at night and there would need to be significant modifications in the software for day-time operations. The biggest cost for these telescopes would be developing the software optimized for detecting fast moving objects and the ability to sort

through enormous databases and not be dominated by planes, birds, and human-made satellites.

Model of HATPI telescope



Microwave observations would be able to detect the thermal emission from objects in orbit or in the upper atmosphere. For example, consider a 0.5m telescope operating at 2mm with modern detectors. A one-meter diameter object at 20 km moving at 10 km/s subtends $10''$ and moves $2'$ in a millisecond. With a temperature of 300K, the UFO would appear as a 0.1K source. [Modern detectors](#) have noise variances of $\sim 1 \text{ (mK)}^2 \text{ s}$, so sources are > 10 sigma in a single detector in 1 millisecond. It would potentially be possible to build a set of small microwave telescopes that could monitor the sky and detect any moving satellite or plane. If these were also equipped with polarizers, they could be used for CMB polarization measurements. In the past year, CMB experiments have been repurposed to look for [astrophysical transients](#) and [planet IX](#). They have not been used to look for rapidly moving objects.

Another possibility would be to monitor the sky at radio wavelengths using observatories based on the design of [CHIME](#) or [HIRAX](#). These radio telescopes are already monitoring much of the sky (from Canada and eventually from South Africa) searching for [fast radio bursts](#).

Downward-looking satellites could also monitor the earth's atmosphere for fast moving events. One potential approach would be to design "hitchhiker" instruments for satellites that could be downward looking. There are likely national reconnaissance organization capabilities that can already monitor the Earth for fast moving planes and rockets and existing earth science observations likely contain data that could be used to look for anomalous fast-moving objects.

For all these observational approaches, one of the challenges would be to balance the desire to protect national security with the desire to reassure the public that all the relevant information on UFOs was being revealed. Any observing program that could detecting UFO would also detect other flying objects including many classified satellites.