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Some Challenging Questions, Conclusions, and Recommendations

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The data presented in this report raise a number of challenging questions to those who are responsible for insuring that aviation safety is at the highest levels possible given the practical, day-to-day realities they must face. Other questions are presented to the world's science community. The third and final section of this chapter presents the major conclusions and recommendations made by the contributors to this work.

I. Questions to Aviation Authorities

Given that this report and others cited here have pointed out the existence of rare but real phenomena and perhaps even unidentified solid objects that fly in close proximity to all kinds of airplanes in many nations at all hours of the day and night and at all flight altitudes why haven't any American aviation officials taken them seriously? There are several clearly defined actions that could be taken to better prepare in-flight and ground personnel for such encounters and thereby improve safety. These actions are briefly mentioned here and also in the third section of this final chapter.

All but one of the present authors of the pilot sighting reports in (3.1) agree that aviation officials in their own nations have not taken seriously the aerial encounters and near-misses that their own pilots are experiencing.[1] By not encouraging pilots to report such incidents these officials are sending a subtle message to them that it's not OK to talk about them. In addition, by not providing a dedicated space on incident and near-miss pilot reporting (PIREP) forms that is labeled "unusual" or "anomalous objects or phenomena" on which to report their sighting, these officials are actually discouraging pilots from reporting them. None of the scores of FAA mandated forms [listed elsewhere, (FAA, 2000] that are supposed to be used to report and investigate aircraft accidents and incidents included any clearly identified place or means for

[1] Several noteworthy exceptions include: The Comite de Estudios de Fenomenos Aereos Anomalos (CEFAA) that operates under the authority of the Chilean General Directorate of Civil Aviation (DGAC); Groupe d'Etudes et d'Information dur les Phenomenes Aerospatiaux (GEIPAN) in France; the Oficina de Investigacion de Fenomenos Aereos Anomalos (OIFAA) in Peru; and the Comision Receptora e Investigadora de Denuncias OVNIs (CRIDOVNI) in Uruguay.

reporting sightings of UAP. If the FAA believes that they will receive such reports from their Aviation Safety Reporting System (ASRS) because it is both voluntary and confidential they are wrong. The current climate of ridicule and professional demeaning of aircrew that surrounds this subject in America is so powerful that it has effectively stifled most such pilot reports as we have shown elsewhere based upon a search of near-miss data within the ASRS database (Haines, Section IID, 2000).[2]

In his review of U.S. aviation sightings, Roe (2.2.7) has said, "A "blind spot" may be responsible for the limited official acceptance of the existence of spherical UAP." Seeking the basis for this particular blind spot should be of as much interest to the psychiatrist and clinical psychologist as it is to the economist.[3] To some, it borders on clinical denial.[4]

Another question we can pose to aviation officials is, "Can you afford to simply wait for an accident to occur before taking any positive action?" While a proactive approach toward UAP and aviation safety may cost money and even political support from certain political bodies, can the ongoing state of inaction and passivity toward the problem of UAP really be justified? If the governments of Chile, France, Peru, and Uruguay can establish official study commissions (made up of civil aviation, academic, military aviation, and private organizations) to investigate the safety implications of UAP why can't the U.S.A., England, Germany, Spain, Russia, and others?

II. Questions to the Science Community

Considering the documentation that is presented (and cited) here concerning the reality of what we call unidentified aerial phenomena (UAP) in our atmosphere why hasn't science taken any serious interest in pursuing research to find out what lies behind it? Back in 1969, forty one years ago, Dr. James McDonald, Professor of Atmospheric Sciences at the University of Arizona, wrote a paper entitled Science in Default: Twenty-Two Years of Inadequate UFO Investigations. He wrote, "No scientifically adequate investigation of the UFO problem has been carried out during the entire 22 years that have now passed since the first extensive wave of sightings of unidentified aerial objects in the summer of 1947…. In my opinion, the UFO problem, far from being the nonsense problem that it has often been labeled by many scientists, constitutes a problem of extraordinary scientific interest."

While it is beyond the scope of this report to explain in detail why scientists remain in default to this day, several possible reasons are offered here. The first has the same roots as those described above with regard to public officials, viz., fear that undergirds an almost irrational denial that there is a problem. We suggest that many scientists are afraid that their professional reputations somehow will be sullied; this fear is transmitted quietly but effectively to other (particularly younger) scientists until the climate within academia has become almost homogenously negative.

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[2] This search was done in late 1999 and should be updated.

[3] Why the economist? Because he tries to understand the economic impact of adverse publicity on aviation profits.

[4] A general working definition of this dysfunction is where facts that are accepted by most people are not accepted by people who cannot tolerate the intellectual, social, or emotional consequences of accepting the same facts themselves. People in this dysfunctional state can generate elaborate intellectual and very convincing reasons for their denial.

The second reason that scientists give for not being willing to take a serious look at the evidence for UAP is false and hollow. Many academic scientists hide behind the excuse that, "I would be glad to study it if only there was something to study!" Their excuse, however, is not supported by the huge volumes of narrative (and other) evidence.[5] What these scientists really mean is that the data that is available on UAP is not in a format that is acceptable to them, already conforming to their own scientific specialty. And so they find skillful ways to avoid the subject altogether. We acknowledge that simply presenting scientists with more eyewitness accounts will have dubious value in attracting their serious attention.

Lack of adequate funding for such research, lack of personal time, and preexisting commitments are other more understandable reasons why they do not want to get involved.

As NARCAP's Executive Director has written, "If the (UAP) data were taken at face value as compared with (the quantity and quality of) any other phenomenon there would be no question that UAP exist and are in need of further study. Yet, Society decides what is real and eventually concedes to Science's assertions. (For example) …the world was flat until there was permission to consider it round." Determining what is fact and what is knowledge then, requires both a Social sanction as well as a Scientific sanction. So the question remains, when will Science catch up with Society in regard to UAP?

What about government scientists? They are typically not permitted to work on UAP "studies" of almost any kind for a number of reasons, some of which are purely political in nature others economic. The ridicule factor that still surrounds this subject has permeated the thinking of Congress men and women to such a degree that it is political suicide to take the subject seriously. A hidden consequence of this is that unclassified government programs will not be funded if they even hint of this taboo subject.

Scientists working in private industry are also not officially allowed to work on UAP topics unless they can convince their management that there is a high likelihood of an economic payoff resulting from their work. To these industries the risk to reward ratio is simply too great in most cases; the result is that industrial scientists shift their research into more "acceptable" areas.

This leaves the thousands of scientists working within various Departments of Defense around the world. Controversy continues over the question whether any of them are working on the UAP problem per se. It is impossible to know for sure. But if they aren't some of them should be because flight safety is an important aspect of national security.

Now that NARCAP has shown that flight safety is affected in several ways by certain unknown atmospheric phenomena (Haines, 2000; Haines and Weinstein, 2001) the so-called hard sciences should be strongly encouraged, if not mandated, to get involved. The phenomenon is so complex that there is room for all of the specialties of science and technology, engineering and social

[5] Scholarly, refereed articles like those published in Spanish in the excellent journal *Cuadernos de Ufologia, scientific proceedings such as the International Project Hessdalen Workshop (2006)* and the American *Center for UFO Studies, the Journal of Scientific Exploration*, and technical reports prepared by the *National Aviation Reporting Center on Anomalous Phenomena* (www.narcap.org) provide meat for those who are hungry for facts with which to begin or continue their studies. Several references cited at the end of this paper provide additional factual information in different languages.

science. Consider the following.

In his review of the aerodynamics of spheres Lemke (2.1) makes it clear that this three-dimensional form is not well suited to sustained flight in the atmosphere. Nevertheless, some of the data presented here indicates that spheres have been seen by pilots at all altitudes (3.1) as well as by people on the ground (3.3.1) over sustained periods of time. Shouldn't this fact be of interest to aeronautical engineers who are presently designing UAV?

In his discussion of spherical luminosities Spalding (2.2) raises the possibility that some yet undiscovered, self-contained, and self-luminous phenomenon follows airplanes in flight because of the presence of an ionosphere-to-ground conduction ("air thread") channel that already exists or that can be formed quickly by a sufficient quantity of ionizable gaseous species. He argues that the earth's ionosphere is very likely the source of the electrical charge needed to power such a mechanism and that this mechanism would likely explain such things as ball lightning, earthquake lights, swamp lights, and other self-luminous spheres that have been seen at ground and flight levels. He rightly calls for focused laboratory research along this line. Such assertions are testable and should be of interest to several scientific disciplines including atmospheric physicists, meteorologists, electrical engineers, and related fields.

Teodorani (2.4) opens an interesting discussion of thermal, electrical, and magnetic energy as possible mediators of interference with airplane systems and systematically traces various outcomes that are possible. Atmospheric physicists and aeronautical engineers should be interested on both basic and applied grounds. He also raises a fundamental question, "How can this research improve?" How can an elusive aerial phenomenon such as spherical UAP be captured so that it/they can be measured under controlled conditions and thereby permit the construction of numerically based models? The first of two parallel approaches that he suggests should be of interest to statisticians: Collect and analyze reliable statistical data from (many) eye witnesses to see what patterns and valid details may be discovered. His second approach is to collect and analyze raw data of the phenomenon in question in the field (where they are most likely to manifest) using multi-wavelength, multi-mode instrumentation. This second methodology should appeal to geophysicists, geologists, geochemists, atmospheric physicists, meteorologists, and others? His first approach (collection of statistical data) will involve a great many reports generally of low reliability while the second approach (detailed field studies) will involve almost the opposite. Yet both can be of value.

Teodorani (2.4) also presents a number of valuable optimizations (both strategic and tactical) that he believes will help scientists build solid, testable physical models. These optimizations include: methodology – use of standardized, off-the-shelf hardware and independent, highly trained observer teams; portable measurement instruments - (cf. his list of 19 specific items); site specific monitoring stations – located where there is a high probability that the phenomenon will reappear; military aircraft (and pilots) - serving as data collection platforms because of their array of special onboard electromagnetic sensors; civilian aircraft (and flight crew) - serving as similar (if more limited) data collection platforms; air traffic control hardware and personnel – can obtain radar tracks of both the UAP and airplane in order to seek patterns of their interactions; astronauts – particularly those on board the international space station are in a position to obtain high quality data on UAP should they approach the station; other eye witnesses on the ground – can provide useful (if non-scientific) information about UAP when the data is screened by experts and when a sufficient amount of related sighting data becomes available to carry out (inferential) statistical studies. Again, there is much of value here for those serious scientists who want to make breakthroughs in these difficult areas.

Some of the present eye witness reports of spherical UAP are particularly intriguing from the standpoint of the possibility that some “intelligence” is involved either on-board the “object,” on the ground, and/or elsewhere. Several reports of this nature presented in (3.3.2) should be of great interest to those who plan tactical defense systems. Paper 4.3 - that reviews something of what we now know about ball lightning (BL) and earthlights - makes it clear that while some UAP may actually have been BL there is another (rather large) class of UAP that far exceeds the size and velocity of BL. Electrical engineers and physicists should be particularly interested in such distinctions.

Finally, the strange spheres that have continued to appear on photographs (3.2; 3.3.2) as well as on the Google-Earth website (5.1) raise challenging and important questions for scientists and technologists. For if these spheres are all photographic artifacts[6] of some kind then they pose no threat to flight; finding this out should greatly relieve the aviation world. On the other hand, if these spheres are real objects having mass (however small) then their presence in the atmosphere poses a definite threat to flight safety. Even if these spheres are only optical images in the virtual sense of the word their nearby-presence to airplanes could lead to unplanned, impulsive, dangerous flight control inputs by the pilot.

Everyone would agree that far more physical data is needed on spherical UAP than now exist in order to establish its/their various physical parameters (mass, density, electrical charge, chemical makeup, magnetic, and other properties). But if the science community will not even examine what data does exist because of pre-existing biases, fear of ridicule, or other reasons there is little hope of making the kind of breakthroughs that will be required for us to understand the core identity of these UAP.

III. Conclusions and Recommendations

Many of the authors of the preceding chapters recognize the dangers to aviation that are posed by UAP and have commented on these dangers. The editor and Mr. Roe, Executive Director of the National Aviation Reporting Center on Anomalous Phenomena (NARCAP) share these same concerns. Indeed, our concerns led to NARCAP’s establishment ten years ago. It is through this report that all of us want to unite in our concerns in order to bring the possibility of these dangers to the attention of the aviation world so that something effective will be done about them. Here are our recommendations to aviation officials working at all decision-making levels. They are presented in three general categories: administrative-legal, procedural, and technical.

<u>Administrative-Legal</u>. Any civil aviation accident has such huge financial consequences these days (largely through insurance claims and to a lesser degree through fines and penalties and adverse publicity) that airlines seek a cause or multiple causes for the accident for which they will not be held liable. Whether a claim (in court) has ever been made that a UAP caused an airplane to crash

[6] Photographic artifacts are produced within the camera or image processing and not in the three-dimensional aerospace world.

is not known although there are several possible candidates discussed elsewhere (Haines, 2000). Nevertheless, if this should occur someday with incontrovertible proof concerning the involvement of a UAP then the courts must decide the outcome. If UAP are judged to be naturally occurring – so-called acts of God - such as wind shear or other weather phenomenon then airlines have less to fear in litigation. If, on the other hand, UAP are discovered to be intelligently controlled or otherwise artificial, then quite a different legal judgment could be made, one whose outcome can only be guessed at. It makes good sense to this writer then that we should try to discover the core nature of UAP sooner than later if, for no other reason, to obviate some of these problems that are associated with aviation accident litigation.

Federal and international aviation officials have the responsibility to see that public air travel is as safe as is practically possible. How can they do this if they overlook even very low probability of occurrence events such as UAP? How much more evidence is needed to convince them that the subject should be taken seriously?[7]

Related to this is the problem of funding future UAP research.[8] We have heard aviation officials claim that there are too many other areas of study that have higher priority at this time and that there simply isn't any money available to support such "far out" speculative areas of study. In short, "We can't fund everything … anyway, accident statistics don't justify any such research."[9] But if a jumbo jet should crash because of impact (or other negative interaction) with a UAP the total financial burden will be enormous (along with the negative publicity and political fallout that will occur) and our present warnings (then as hindsight) suddenly will come clearly into focus. The total financial burden of such a disaster is likely to be orders of magnitude greater than the cost of doing the research now.

In carrying out their air safety mandate federal and international aviation and Transportation Safety Administration officials have the responsibility to encourage all pilots, air traffic controllers, and other aviation ground personnel to report *anything* that is out of the ordinary and that might affect safety. We must ask, in the wake of the 9-11 disaster in America that led to the establishment of the TSA, should *security* from a very small human element (i.e., terrorists) be given so much more emphasis over *safety* that is related to the far more ubiquitous and still unknown UAP element?

<u>Procedural Recommendations</u>. All civil aircrew training programs must be pre-approved by the Administrator of the FAA (A.I.M., FAR 142, Para. 142.37) and must include a curriculum that is to be taught to student pilots. The Federal regulation specifies that this curriculum must include a syllabus, minimum aircraft and related training equipment for the proposed curriculum, minimum

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7 There are many books and journal articles on this subject that can be accepted with confidence. The interested reader will find them in the reference sections of most of the papers in this report.

8 If money were made available for serious investigations of UAP some scientists and engineers would line up quickly.

9 The Boeing Company's <u>40th edition of the Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2008</u> placed two (2) fatal accidents out of 91 total in the "unknown or undetermined" category with 120 people killed during the period 1999 through 2008. Also, the largest category of fatal accidents was in the loss of inflight control with 1,926 on-board fatalities and 65 other fatalities. Were any of these fatal airplane accidents caused by UAP? Do federal accident investigators look for very low probability of occurrence phenomena (such as UAP) as possible or probable contributors to these accidents?

instructor and evaluator qualifications and a curriculum specifically for them, and several others. If a brand new UAP-oriented curriculum were to be proposed for approval: a) Who could teach it in a manner that would ensure maximum effectiveness? b) What kinds of aerial UAP encounters should be included in this new curriculum and why? and c) Would the FAA Administrator accept the totally novel curriculum in the first place without having any prior basis for its validation?

Aviation practices develop slowly and cautiously over decades of flight such that the sudden introduction of a UAP-encounter curriculum would probably shock the entire system, particularly if there was no clearly presented justification for it. Unfortunately, it usually takes an aircraft accident to provide such a justification (after the fact) as a number of tragic events of the past have shown: wind-shear-related crashes, incidents involving volcanic ash at high altitude, bird-strikes, etc.

Nevertheless, NARCAP believes that enough is known about the “usual” flight behavior of UAP to be able to plan an effective special pilot recurrency flight training curriculum for use in airline flight simulators. If UAP encounters occur with approximately the same frequency in one’s flying career as does wind shear (for which airlines require periodic simulator training) shouldn’t similar kinds of special training be required for coping with a UAP encounter? It is a fact that modern flight training simulators lend themselves very well to such virtual image generation and dynamic control.

But even if airlines do not implement special simulator encounters with UAP it is still “…advisable to prepare aircrews for potential spherical UAP encounters by informing them that various shaped UAP actually do exist.” (cf., 2.2.7) If Federal Aviation Administration officials, airline and union officials will do this it will have a significant impact on the willingness of pilots to report their sightings to authorities.

The in-flight and ground-level photographic evidence presented here (3.2.1; 3.2.2) could be interpreted as strong support for aircrew to have cameras available in the cockpit if for no other reason than to provide objective confirmation that they really did see something unusual. Another justification for having photographic evidence is the scientific value such images might provide.

Technical Recommendations. Aviation today involves a highly technical, costly, and complex array of operations and hardware. One such technology that the government aviation officials rely upon very heavily is that of radar. In his discussion of radar characteristics of spheres Shough (2.3) asserts that various investigators (including NARCAP) have shown that there are certain limitations on efficient radar detection of both natural plasma spheroids and hypothetical spherical devices and that they pose a potential risk to air safety. He recommends several things:

1) That the FAA data-collection procedures should be carefully audited (particularly radar detection capabilities) to prevent altogether, or at least react to in a timely manner any failure to prevent future conflicts between UAP and code traffic in controlled airspace.

2) That long-wavelength, rapid-update acquisition and target-following radars, tailored for short-lifetime UAP detection and bypassing the limitations imposed by ADT and MTI signal processing filters in traffic control, be deployed to monitor busy low-altitude airspace volumes. Such a dedicated raw radar product could be made optionally available to controllers in real time alongside

precipitation and wind-gust display overlays *via* the integrated ITWS (thus complementing, not compromising, the functionality of the ATC signal processing).

3) That indirect safety benefits might accrue from the non-real-time study of transient UAP detections by existing ATC radar systems. However, mere routine analysis of past radar data logs would not necessarily provide data useful for research. Past experience indicates (e.g. Haines, et al., 2007) that combing FAA datasets for plots of low probability of detection UAPs that may be characterized by small RCS and short lifetime is likely to be inconclusive.

4) That NARCAP should recommend that a study be performed by radar engineers for presentation to the FAA on the cost and practicality of automatically saving raw analogue (i.e., pre-filtered) pulseform data at the radar head, prior to digital plot-extraction and MTI filtering, for detailed non-real-time analysis. This would place no pressure either on the restricted transmission bandwidth that exists between the radar head and controller display or on the controller's real-time vigilance, but would make the primary echo pulseforms of transient UAP phenomena available for scientific research. Such data could also provide vital data for investigations by aviation safety boards in the event of air accidents related to UAPs.

5) That the FAA should undertake a study of the ability of the traffic control system to respond effectively to possible meter-scale UAP radar hazards when there is a conflict between nearby sensors operating at different wavelengths.

6) That the FAA should ensure that Air Traffic Control managers familiarize radar room staff with the possible radar characteristics of short-duration, sub-meter-scale plasma spheroids, e.g., slow-moving, variable, radar cross-section primary echoes on short tracks.

7) That both ATC personnel and air carriers should maintain up-to-date reviews of: a) literature in relevant areas of meteorology, plasma dynamics, and plasma stealth technology, b) information on government and private-venture UAV development programs; and c) reliable sources of research in the field of atmospheric anomalies.

In this same regard, Roe (3.1.6) states, “The majority of spherical UAP reports involve initial visual detections by aircrews. It is uncommon for ATC to detect spherical UAP and vector aircraft around them though, in some instances, spherical UAP are detected on radar after aircraft request radar confirmation.” Findings such as these emphasize the need for improved radar technology that can detect small spherical objects flying within the airspace of all major airports.
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It is hoped that this report may provide encouragement to aviation officials to take this subject seriously and to move forward in a proactive manner following the various recommendations provided here.

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