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Extraterrestrial Life in the Thermosphere: Plasmas, UAP, Pre-Life, Fourth State of Matter

R. Joseph[1*], C. Impey[2], O. Planchon[3], R. del Gaudio[4], M. Abu Safa[5], A. R. Sumanarathna[6], E. Ansbro[7], D. Duvall[8], G. Bianciardi[9], C. H. Gibson[10], R. Schild[11]

[1]Astrobiology Research Center, California, USA
[2]Department of Astronomy, University of Arizona, Tucson, USA
[3]Biogéosciences Laboratory, University of Burgundy, Dijon, France
[4]Department of Biology, University of Naples Federico II, Naples, Italy
[5]Department of Applied Physics, Palestine Polytechnic University, Hebron, Palestine
[6]Department of Research and Innovation, Eco Astronomy International Research Center, Tetouan, Morocco
[7]Space Exploration Ltd., Boyle, County Roscommon, Ireland
[8]Department of Zoology, Oklahoma State University (Emeritus), Stillwater, USA
[9]Department of Science and Medicine, Università Degli Studi di Siena, Tuscany, Italy
[10]Center for Astrophysics and Space Sciences, University of California (Emeritus), San Diego, USA
[11]Center for Astrophysics, Harvard-Smithsonian (Emeritus), Cambridge, USA
Email: *Cosmology@Cosmology.com

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Abstract

"*Plasmas*" up to a kilometer in size and behaving similarly to multicellular organisms have been filmed on 10 separate NASA space shuttle missions, over 200 miles above Earth within the thermosphere. These self-illuminated "plasmas" are attracted to and may "feed on" electromagnetic radiation. They have different morphologies: 1) cone, 2) cloud, 3) donut, 4) spherical-cylindrical; and have been filmed flying towards and descending from the thermosphere into thunderstorms; congregating by the hundreds and interacting with satellites generating electromagnetic activity; approaching the Space Shuttles. Computerized analysis of flight path trajectories documents these plasmas travel at different velocities from different directions and change their angle of trajectory making 45˚, 90˚, and 180˚ shifts and follow each other. They've been filmed accelerating, slowing down, stopping, congregating, engaging in "hunter-predatory" behavior and intersecting plasmas leaving a plasma dust trail in their wake. Similar life-like behaviors have been demonstrated by plasmas created experimentally. "Plasmas" may have been photographed in the 1940s by WWII pilots (identified as "Foo fighters"); repeatedly observed and filmed by astronauts and military pilots and classified as Unidentified Aerial—Anomalous Phenomenon. Plasmas are not biological but may

represent a form of pre-life that via the incorporation of elements common in space, could result in the synthesis of RNA. Plasmas constitute a fourth state of matter, are attracted to electromagnetic activity, and when observed in the lower atmosphere likely account for many of the UFO-UAP sightings over the centuries.

Keywords

Extraterrestrials, Plasmas, Dusty Plasmas, Extremophiles, Life in Space, Abiogenesis, Origins of Life, RNA World

1. Introduction: UAP & Extraterrestrial Electromagnetic Plasmas

Interstellar space and the upper atmosphere of Earth are permeated by plasmas [1]-[5]. Plasmas are believed to constitute a fourth state of matter [2] [6] [7] and may represent a form of pre-life or inorganic non-biological life [8]-[13]. As detailed in this report (**Figures 1-26**) pulsating glowing "plasmas" up to a kilometer in size, and behaving similarly to simple multicellular organisms, have been filmed over 200 miles above Earth within the thermosphere, by ten separate space shuttle missions STS-48, STS-75, STS-80, STS-96, STS-101, STS-106, STS-115, STS-119, STS-123 [10] [14] [15]. These plasmas descend into the lower atmosphere of Earth, and when observed may have been classified as an "Unidentified Aerial Phenomenon" [9] (or as some prefer "Anomalous Phenomenon").

As documented in this report, these plasma-like entities have been photographed congregating in the thermosphere above (**Figure 4**, **Figure 5** and **Figure 26**) and diving into massive thunderstorms below (**Figures 14-17**); gathering around satellites generating electromagnetic pulses into the space medium (**Figure 1**, **Figure 3**, **Figures 10-13**, **Figures 18-23**); approaching and appearing outside the windows of NASA's Space Shuttles [10] [14] [15]; changing velocity and direction, and making sudden 45 degree to 90 degree turns, and following and even colliding and intersecting one another (**Figures 9-13**, **Figures 23-26**).

These glowing pulsating plasmas in the thermosphere grow in size, replicate, are attracted to, and make contact and intersect one another often releasing kilometers-in-length plasma-dust trails in their wake (**Figure 12**, **Figure 23** and **Figure 24**). Yet others engage in what appears to be hunter-predatory behavior; tracking, then accelerating and piercing other plasmas that may be several dozen kilometers distant, even striking and intersecting up to ten or more at varying distances from one another (**Figure 9**, **Figures 11-13**, **Figures 23-26**). They display all the characteristics of life-like plasmas as defined by Alfvén [12] [13], Teordorani [16], Lozneanu and Sandulovicіu [17] and Tsytovich, *et al.* [11] [18].

Although plasmas in the thermosphere engage in behavior, in all respects,

plasmas are not biological entities, and their actions are mediated by electromagnetic and other non-biological factors including the incorporation of radiated dust. Plasmas may have high or low density, high or low temperatures, may be stable or unstable, and consist of positively and negatively charged particles, ionized atoms of gas; and whose basic interactions are electromagnetic [1] [2] [3] [5] [6] [12] [13].

In the upper atmosphere, plasmas are believed to react and possibly form in response to intermittent turbulence, geomagnetic storms, coronal mass ejections, solar flares, eclipses, the waxing and waning of sunlight, atmospheric waves, radiation from radio transmitters and heating facilities, and the incorporation of dust; all which affect the shape, velocity, and behavior of plasmas [3] [5] [7] [19].

As detailed by Teodorani [16] Ivan *et al.* [20] Lozneanu, Sanduloviciu [17] Tsytovich, *et al.* [18], plasmas can form complex life-like shapes as well as a nucleus that may acquire DNA-like capabilities. For example, space is permeated by dust; and when a plasma incorporates dust grains, the plasma acquires an electric charge that sucks in electrons which attract positively charged ions giving rise to "plasma crystals" which also contain organic matter including fragments of carbonaceous chondrites.

Electrostatic forces and the polarization of the plasma cause these plasma dust crystals to twist, spin, and form helical structures that can evolve into a double helix similar to the double helix of DNA. Teodorani [16] argues that these helixes can then be replicated in other crystals and that the self-organizing ability of these crystals can affect other plasmas which may also form a plasma dust-crystal helix. Although theoretical, this exchange of electrical charges could be likened to horizontal gene transfer. However, there is no evidence plasmas contain DNA, nucleotides, or amino acids.

These extraterrestrial "plasmas" filmed in the thermosphere may represent a non-biological form of pre-life before the acquisition of RNA and then DNA [21]. Further, when they descend into the lower atmosphere they would likely be classified as UFOs and UAP when observed (**Figures 14-17**, **Figure 27**).

2. Plasmas, Space Shuttles, Astronauts, Fighter Pilots, UFOs, UAPs

These plasmas may have been first photographed in the 1940s (identified as "foo fighters") by U.S., Japanese, and German pilots (**Figure 27**); and observed by astronauts beginning in the 1960s; and may have been recently filmed by military pilots and classified as "Unidentified Aerial Phenomenon" [9] [16] [21] [22] [23] [24]. Given the attraction to electromagnetic and other powerful sources of energy and their responsiveness to radio signals and sources of heat [5], it is likely these plasmas may account for at least some of the anecdotal UAP sightings (as recorded by U.S. Dept. of Defense "unidentified anomalous reporting system") over nuclear power plants, the areas above and surrounding Hiroshima

and Nagasaki—destroyed by atomic bombs in 1945—and Fukushima Prefecture—site of a major nuclear power plant accident in 2011—and for numerous reports of UAPs approaching and following airplanes [14] [15] [16].

These plasmas have been filmed swarming toward and congregating by the hundreds around satellites generating electromagnetic activity into the thermosphere (**Figure 1**, **Figure 3**, **Figures 10-13**, **Figures 18-23**); and observed approaching and appearing outside the windows of NASA space shuttles [10] [14] [15]. For example, STS 75, while filming these plasmas recorded a garbled conversation with NASA's mission control and reported that plasma was approaching the shuttle. NASA dismissed the sightings as "just reflections". The STS 75 Commander disagreed: "*I'm looking out in front of the orbiter. No, there are three objects. The one down at the bottom is the one we initially saw… It started over window eight then quickly moved toward the upper windows. We tracked it through windows one, two, three, four—and now its outside window five—it's moving away.*" And then Mission Control changed the subject [10] [14] [15].

STS 115 reported and filmed a similar encounter, the Commander describing them as translucent, flexible, not a solid object, metallic but not made of metal, and giving off light and glowing. Before NASA's mission control changes the subject, the STS 115 Commander states: "*The best way I can describe it as some kind of reflective cloth—some type of metallic looking type of cloth—a structure which is definitely not rigid—it's not a solid metal structure*" [10] [14] [15].

"Not a solid metal structure" rules out wreckage and space junk as does their ability to change shape and direction, speed up and slow down, and produce a glowing illumination within which a nucleus (void) can often be discerned—as illustrated by freeze-frame photographs (**Figures 5-8**, **Figure 14**, **Figure 15**, **Figure 22**) from STS film footage provided to the first author by NASA following a "Freedom of Information Request". Fact is: these UAP were observed by U.S. astronauts hurtled into space in the 1960s—(e.g. "*oval shaped like a series of ellipses*")—prior to the littering of space with any spacecraft or satellite wreckage; observations which rule out "space junk".

On May 15, 1963, while riding a Mercury capsule on his final orbit of a 22-orbit journey around the world, astronaut Gordon Cooper reported a "*glowing, greenish object*" that was "*rapidly approaching*". On June 4, 1965, astronauts Ed White and James McDivitt spotted a huge "metallic object" approaching the Gemini orbiter.

In December of 1965, Gemini astronaut James Lovell reported a "*Bogey at* 10 *o'clock high*." Capcom: "*This is Houston. Say again* 7." Lovell: "*We have a bogey at 10 o'clock high*." Capcom: "*Gemini* 7, *is that the booster, or is that an actual sighting*?" Lovell: "*We have several, actual sightings. We also have the booster in sight*."

The flight crew of Apollo 11—as reported by Buzz Aldrin in a 1982 interview—saw outside the spacecraft "*something out there that was close enough to*

be observed by the three of us; *and*, *what could it be*? *Mike got out the telescope…it was oval-shaped like a series of ellipses*; *but when you sharpened the focus*, *it had an L-shape*. *That didn't tell us very much. Obviously*, *the three of us were not going to blurt out*: *hey Houston*, *we got something moving alongside us*, *and we don't know what it is*. *We couldn't do that because we knew the transmissions would be heard all over the world… It was very big*, *and coming closer*, *so we cautiously asked Houston about the final stage of the rocket*, *the S-IVB which had been jettisoned two days earlier*." *Apollo* 11: "*Do you have any idea where the S-IVB is with respect to us*? *Mission Control*: "*Apollo* 11, *Houston*. *The S-IVB is about* 6000 *nautical miles from you now*, *over*."

3. British Defense Ministry: UFOs/UAPs = Buoyant Electrically Charged Magnetic Phenomenon

The British Ministry of Defense [24] conducted a multidisciplinary analysis of UFO-UAP phenomenon based on information collected over 30 years and concludes: "*Credited with the ability to…accelerate to exceptional velocities and vanish*, *they can reportedly alter their direction of flight suddenly and clearly can exhibit aerodynamic characteristics well beyond those of any known aircraft or missile—either manned or unmanned…*"

"*…they are comprised of several types of rarely encountered natural events within the atmosphere and ionosphere…the events are almost certainly attributable to physical*, *electrical and magnetic phenomena in the atmosphere*, *mesosphere and ionosphere*. *The fact that the objects reportedly have the manoeuvre and acceleration attributes of an inertia-less vehicle reinforces the hypothesis that they are buoyant charged bodies*." e.g., electromagnetic plasmas.

4. Plasmas Have Life-Like Cellular Properties: Pre-Life, Plasma-DNA, Fourth Domain of Life?

Nobel Laureate Hannes Alfvén [12] [13], argued that electromagnetic plasmas permeate space throughout the universe and this solar system, and are formed by and can generate and are attracted to electromagnetic fields. These plasmas have life-like properties including cellular structure and cellular walls consisting of electric currents.

According to Alfvén [13]: "In order to understand the phenomena in a certain plasma region, it is necessary to map not only the magnetic but also the electric field and the electric currents. Space is filled with a network of currents which transfer energy and momentum over large or very large distances. The currents often pinch to filamentary or surface currents. The latter are likely to give space, as also interstellar and intergalactic space, a cellular structure."

Alfvén [12] [13] also proposed that the inner and outer layers of a plasma differ in positive vs negative charges. Radiation is generated between these boundaries and this forms the plasma. However, these layers also consist of plasma,

what Alfvén referred to as "ambiplasma". He states that ambiplasmas may live for long periods of time and that the double layers act to repel plasma clouds of the opposite type, but combine clouds of the same type, such that plasmas may repel or be attracted to one another and exchange energy—exactly as documented in this report and described (somewhat whimsically) as "hunter predator behavior" (**Figure 9**, **Figures 11-13**, **Figures 23-26**).

As documented here, "plasmas" in the thermosphere engage in all the behaviors of experimentally created plasmas as reported by Alfvén [12] [13] and others [11] [12] [16]-[20]; including glowing, pulsating, shape-shifting, colliding, and possessing a nucleus or "void" (**Figures 5-8**, **Figures 14-16**, **Figure 22**).

It is well documented experimentally that plasmas are self-organizing, engage in complex behaviors similar to simple multicellular organisms, take the shape of spheres, ovoids, helixes, and often have a central nucleus (or void) protected by electrical double layers consisting of an inner layer of negatively charged electrons and outer-layer of positively charged ions [12] [13] [16] [17] [18] [20].

As documented in the attached Figures, the glowing plasmas reported here and photographed in space also have a variety of shapes; and some specimens pulsate (perhaps as a means of propulsion) and have one or more nucleus voids [14] [15]. Moreover, like those observed in the thermosphere [10] [14] [15], plasmas generated experimentally can grow in size, replicate, are often attracted to one another, and appear to exchange dust-laden electromagnetic energy [9] [17] [18].

Tsytovich, *et al.* [11] [18] argue that because of electromagnetic activity and massive quantities of dust, interplanetary and extra-galactic space provides an ideal environment for the generation and nourishment of life-like plasmas. Interplanetary space is permeated by dust, and over 5200 tons (4700 metric tons) of space dust falls to Earth each year [15]. Plasmas—especially under conditions of micro-gravity [11]—interact with and incorporate dust which becomes charged with electromagnetic energy thereby inducing mutual attraction [18] [25] [26] [27] [28]. The interactions with dust lead to dust-plasma-self-organization which in turn is fed by external sources of electromagnetic radiation.

Hence, these plasma-like entities may be laden with dust—including from carbonaceous chondrites—which are topologically and dynamically controlled by plasma fluxes and plasma charges between the grains and plasma layers. The plasma and the charged dust particles suspended in the plasma, interact as a coordinated whole and behave as a plasma [11] [26] [27] [28].

If plasma crystals also form—and contain nucleotides and amino acids found in space and carbonaceous chondrites (at least 92 amino acids so far discovered)—it is possible they may have the potential to behave like RNA or (less likely) DNA [16] [18]. This leads to the possibility that some plasmas could produce an internal "RNA-world" and achieve a form of "pre-life" if permeated by plasma-crystal-dust that incorporates a sufficient number of amino acids, nucleotides, and other elements commonly found in space and carbonaceous

chondrites: fragments of which break off and shatter upon striking the upper atmosphere.

As summed by Tsytovich, *et al.* [18] "these interacting complex structures exhibit thermodynamic and evolutionary features thought to be peculiar only to living matter" and "exhibit all the necessary properties to qualify them as candidates for inorganic living matter that may exist in space." Lozneanu and Sanduloviciu [17] have proposed that these plasma-like cellular entities constitute an extraterrestrial form of life completely "different from life as we know it."

5. Life-Like Plasmas in the Thermosphere

In support of the data and theories proposed by Alfvén [12] [13], Tsytovich, *et al.* [11] [18], Lozneanu and Sanduloviciu [17] and Teodorani [16], plasma-like entities (plasmas) engaging in simple life-like behavior have been filmed and observed via the naked eye, and filmed during 10 different Space Shuttle Missions including approaching and appearing outside spacecraft windows, and swarming toward satellite tethers generating electricity into the space medium [10] [14] [15].

For example, and as documented by freeze frame footage presented in this report: during mission STS-75, over a period of dozens of hours, plasmas approached and congregated by the hundreds around a satellite-tether 12-miles in length generating electro-magnetic force fields and electricity and electron beams into the thermosphere (**Figure 1**, **Figure 3**, **Figures 10-13**, **Figures 18-23**). Observational data captured on film by missions STS-75, STS-80, STS-96, and STS-106, documents these plasmas also congregate above and descend into thunderstorms [10] [14] [15] which can produce anywhere from 130 million volts to 1.3 billion volts; with a single lightning bolt producing up to 1,000,000,000 joules of energy.

As documented by film footage (see [14] [15]) and freeze-frame photos reproduced in this report and processed via Fotor image enhancement software: these shape-shifting glowing plasmas have at least four morphologies: 1) spiral-cylindrical, 2) cloud, 3) "donut" (nucleated), 4) and bulbous-cone. Based on their proximity to a tethered satellite (STS-75), some specimens may be up to several kilometers in length or diameter. All plasmas appear to be self-illuminated and give off a surrounding glow (best depicted in **Figures 5-8**, **Figure 14**, **Figure 17**) which is typical of plasmas as they shed electrons.

Astronauts have observed these plasma-like structures engaging in complex behaviors, including approaching the space shuttles and experimental satellites generating electromagnetic activity; and have described them as "*definitely not rigid*" and "*not a solid metal structure*" [10] [14] [15] and "*oval shaped like a series of ellipses*." And yet, they have metallic coloration according to eyewitness reports by astronauts; possibly silver, which might also account for any reflective properties.

Figure 1. From STS footage: electrified satellite tether (12 miles in length) approached by plasmas.

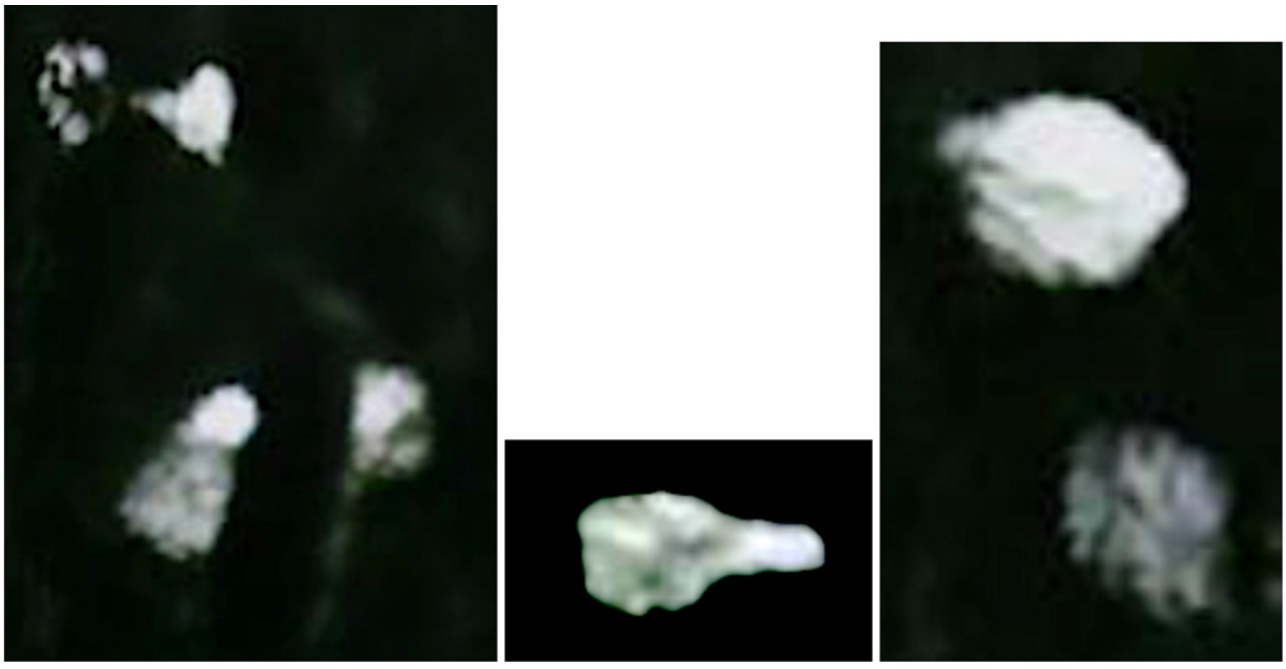


Figure 2. Freeze frame STS footage (see **Figure 1**): Plasma-like entities up to 1 km in size. Freeze frames processed via "Fotor" image enhancement software.

Figure 3. Plasma-like entities up to 1 km n size moving about and surrounding the electrified tether 200 miles above Earth in the thermosphere. Filmed by STS-75.

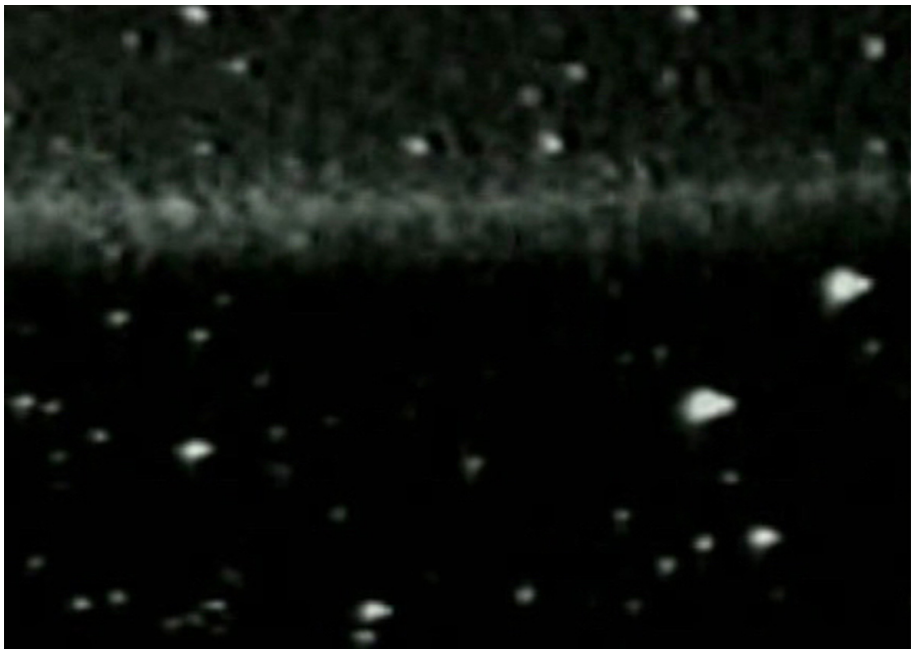


Figure 4. Hundreds of cone- and cloud-shaped glowing plasmas (with an internal nucleus, **Figure 5** and **Figure 6**) filmed by STS-80, 200 miles above an electric-thunderstorm.

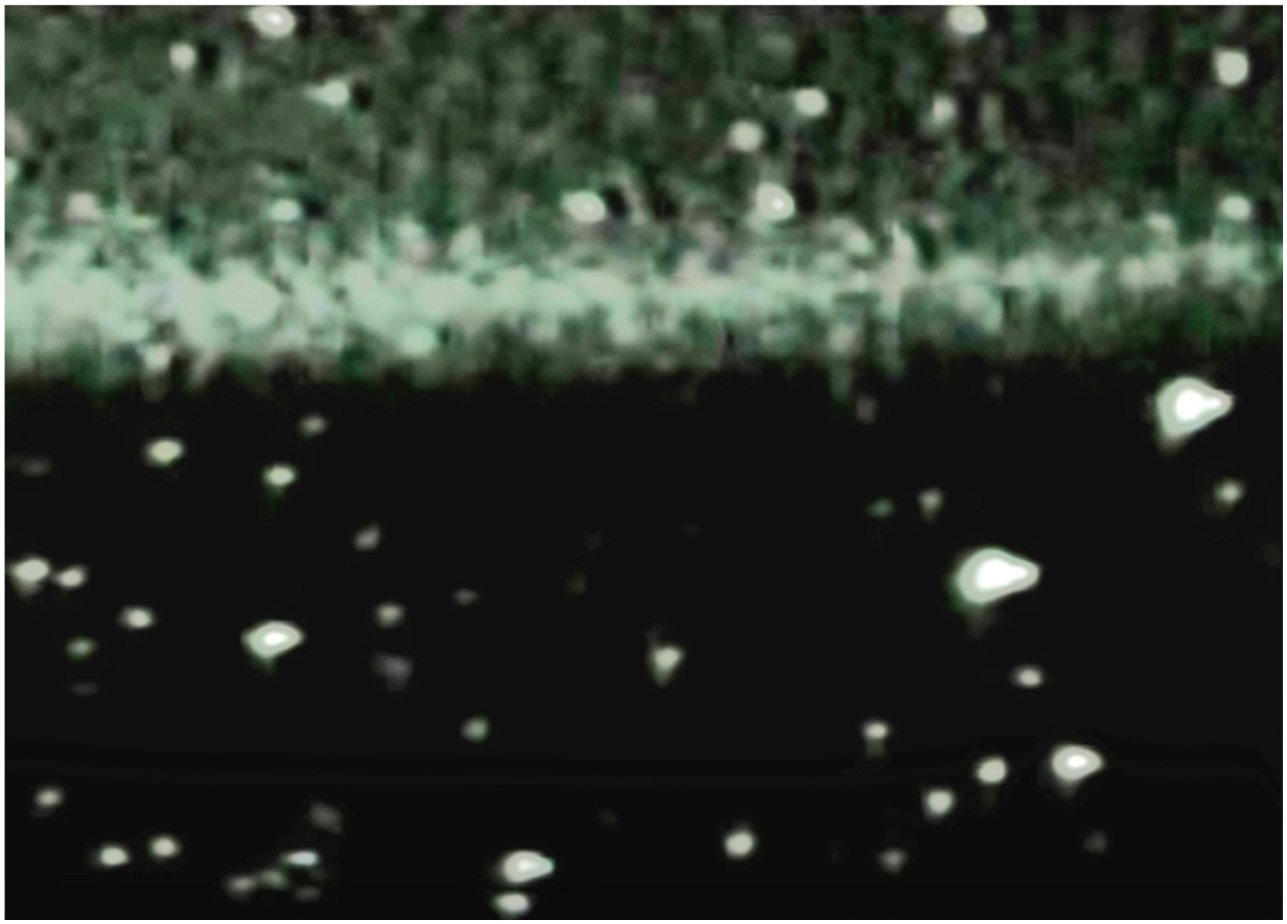


Figure 5. Hundreds of cone- and cloud-shaped glowing plasmas with an internal nucleus filmed congregating 200 miles above an electric-thunderstorm by STS-80. Processed via Fotor software.

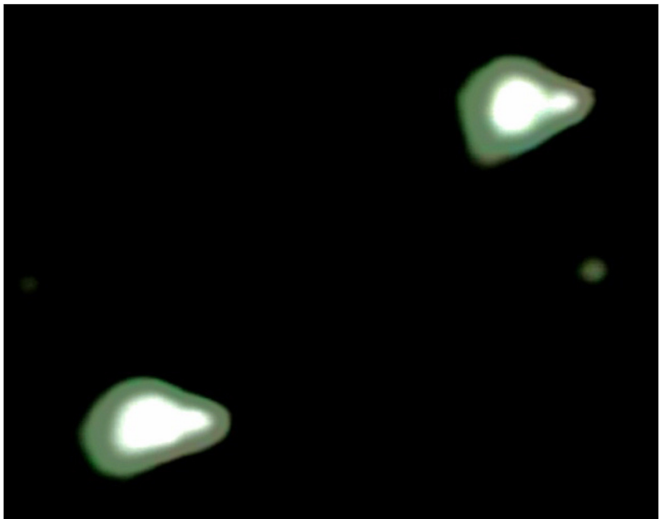


Figure 6. Two glowing pulsating plasma with an internal nucleus, up to 1 km in size, filmed 200 miles above an electric-thunderstorm by STS-80 (from **Figure 4**). Processed via Fotor filter software.

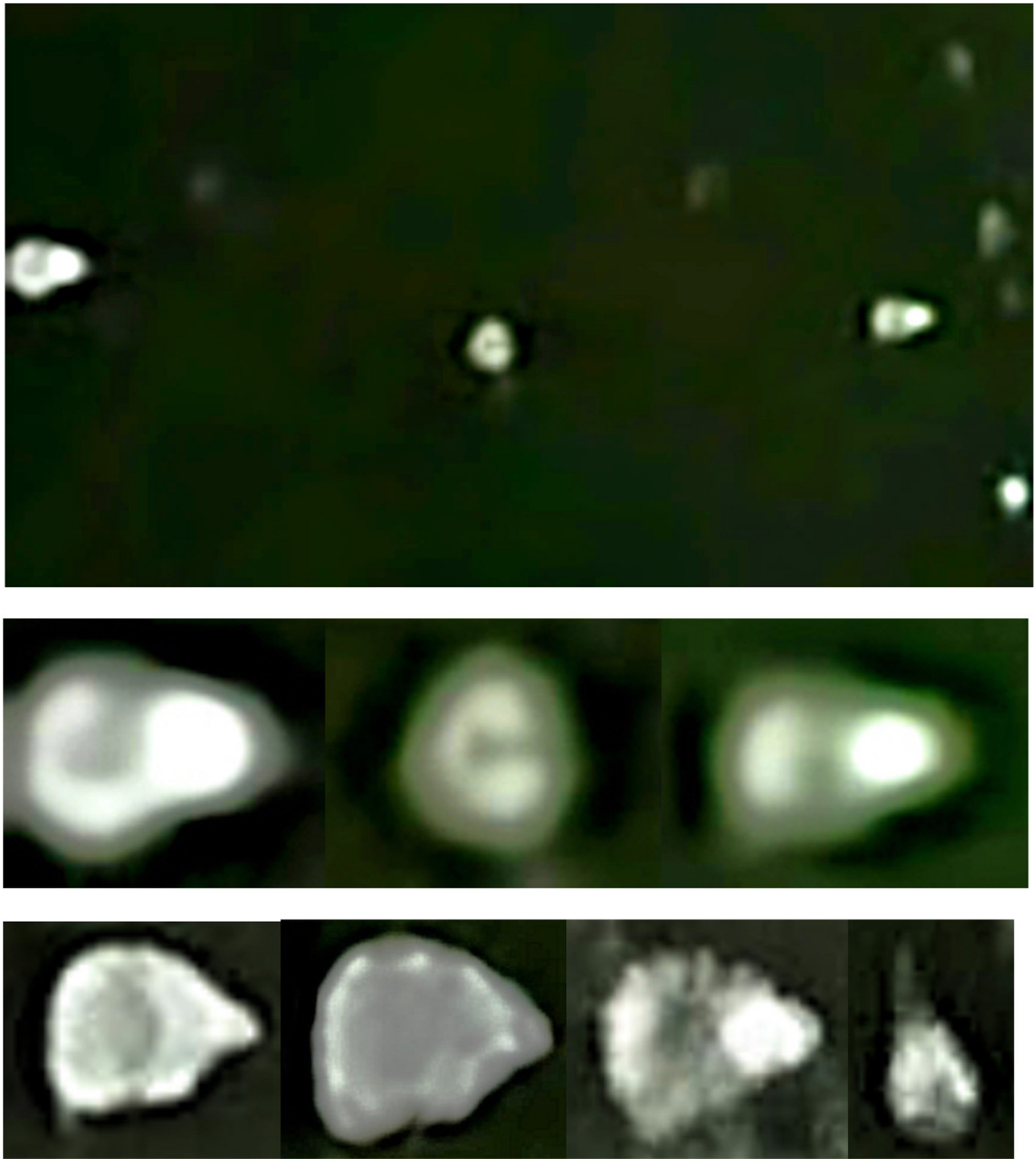
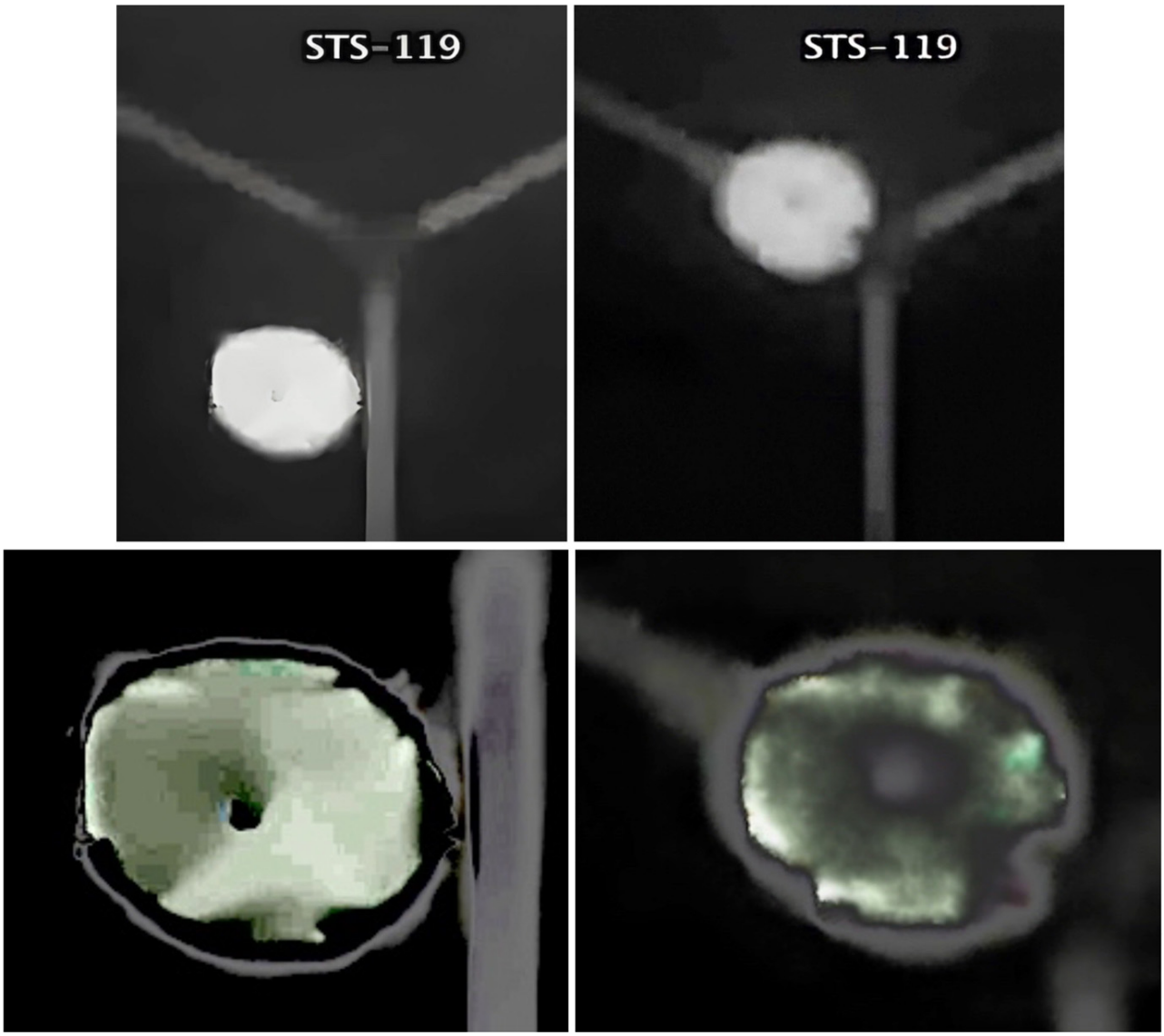


Figure 7. Cone-donut-nucleated and spiral glowing plasmas filmed by shuttle mission STS-75. These plasmas change shape and have a variety of dimensions and are up to 1 km in size. (see: https://www.youtube.com/watch?v=Yb67zM1Sh-Q/ http://www.youtube.com/watch?v=DARcIIc4pCw).



Figures 8. Donut-shaped glowing pulsating plasmas with nucleus, moving in an anterior direction, filmed by shuttle mission STS 119. (see: https://www.youtube.com/watch?v=Yb67zM1Sh-Q/http://www.youtube.com/watch?v=DARcIIc4pCw).

6. All Other Explanations Ruled Out: Not Wreckage, Not Debris, Not Ice

It is highly improbable that these entities are kilometer-in-diameter blocks of ice or "space junk". Not only do they lack solidity or rigidity, but they pulsate with light, slow down, stop, hover in place, turn and follow one another, and may target and make contact with each other, sometimes leaving a trail of particles several kilometers in length in their wake. Moreover, they were viewed by astronauts in the 1960s—before space was littered with wreckage and none of which were described as resembling "ice".

It is completely improbable that these structures, including what appears to be a nucleus, are illusions created by sunlight and the telescopic lenses employed by the shuttle crews. Although a flashlight can illuminate while simultaneously

creating a darkened area upon any object of focus, no flashlights were employed in obtaining these images. Hundreds of these specimens were filmed in the camera's field of view—and not just one structure but hundreds of specimens were viewed with the naked eye including flying alongside and appearing outside the windows of several space shuttles. Like plasmas generated in a laboratory, the plasmas of the thermosphere engage in life-like behavior.

A variety of behaviors and movement patterns have been observed, Their directional trajectories and patterns of movement are also sometimes "fluid-like" as if passing through currents of water—an observation consistent with that of Alfvén [12] [13] and others [3] who likened the movement of plasmas as similar to waves in a fluid. Marino and Sorriso-Valvo [3] argue that from a macroscopic perspective, plasmas move about as if they are in water because they have various properties similar to gasses; *i.e.* "buoyant charged bodies" [24].

However, they also engage in non-fluid behaviors. For example, plasmas in the thermosphere will accelerate in a straight line, strike other plasma-like ovoids, turn 45 degrees, and accelerate and strike yet another—behavior that could be likened to hunter-predatory behavior (**Figure 8**, **Figures 11-13**, **Figures 23-26**). Dusty plasmas created experimentally, will also hunt down, collide, and cannibalize energy from other plasmas.

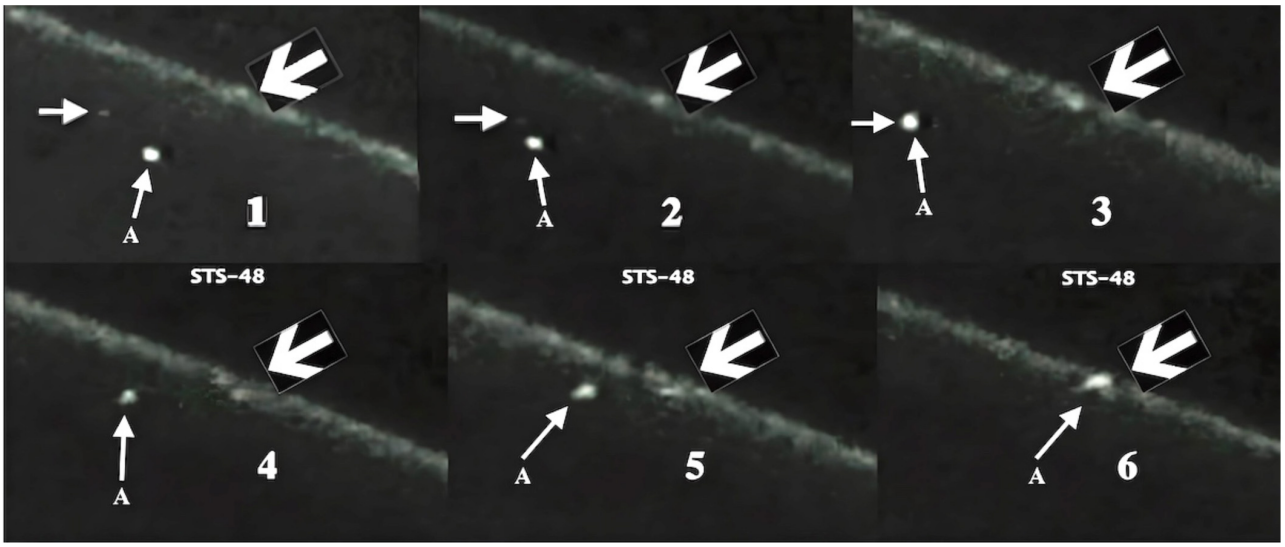


Figure 9. STS-48. Hunter-Predatory energy cannibalizing behavior? Cone-shaped plasma along the rim and angle of movement are indicated by white arrow. Central plasma travels in a straight line then turns at a 45 degree angle, rapidly accelerates and intercepts one, then a second plasma along the rim.

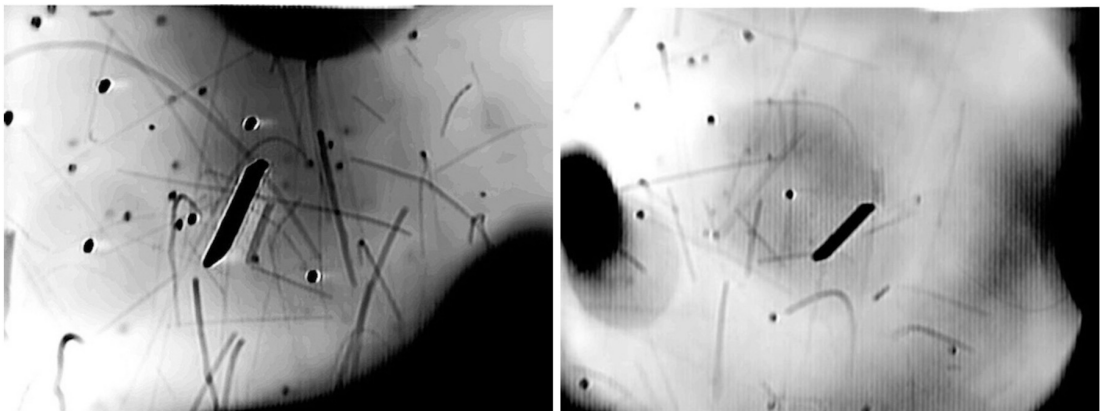
7. Analysis of Flight Path Velocity Vectors

The tethered satellite system (TSS-1R) was designed to generate electromagnetic force fields, electricity, and electron beams into the surrounding space medium. Further, this tether was generating electromagnetic activity [14] [15] while hundreds of structures later began swarming toward and gathering around it. As documented here and elsewhere [14] [15], these "plasmas" were filmed engaging

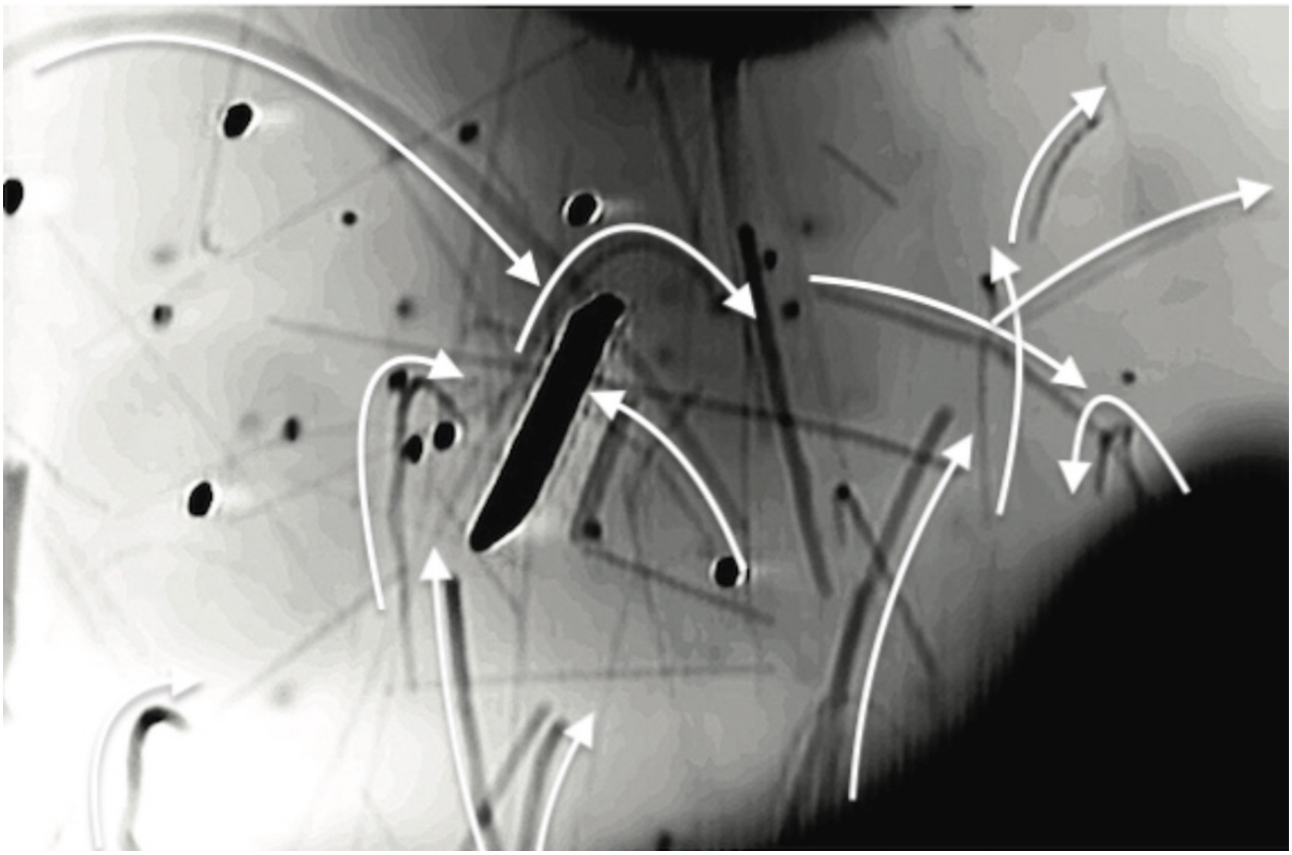
in complex interactions with one another, and contacting and moving upon the tether which was conducting electricity up and down its length and generating electron beams.

As previously reported [14] two stable sequences of film footage from the STS-75 satellite imagery with durations of 20 seconds and 53 seconds were subject to computerized analysis. Flight path trajectory, velocity, and tracking plots were calculated for stable sequences employing "RegiStax" astronomical image enhancement software which is sensitive to fast-moving objects. Plasmas were tracked and the flight paths and parameters trajectories were plotted for individuals within the entire group of plasmas as they approached and moved away from the electrified tether (**Figure 10(a)** and **Figure 10(b)**).

The length of the flight path as determined by "RegiStax" is directly proportional to that object's speed. The faster the structure moves, as captured by STS-75 film footage, the longer the line marking its trajectory (**Figure 10(a)** and **Figure 10(b)**). Individual plasmas travel at dramatically different velocities, directions, and trajectories some making turns and shifts ranging from 45 degrees to 180 degrees, as indicated by the curve and length of the plotted flight path trajectory which is also a measure of velocity.



(a)



(b)

Figure 10. (a) Flight path trajectory, velocity, and tracking plots based on analysis of 20 second (left) and 53 seconds (right) of stable sequences of film footage from the STS-75. (b) Computerized analysis of flight paths and velocity, based on 20 seconds of stable sequences of film footage from STS-75. Many object display 45˚, 90˚, and 180˚ shifts in trajectory, alter their speed, stop, hover, accelerate, make sudden or slow turns around the electrified tether.

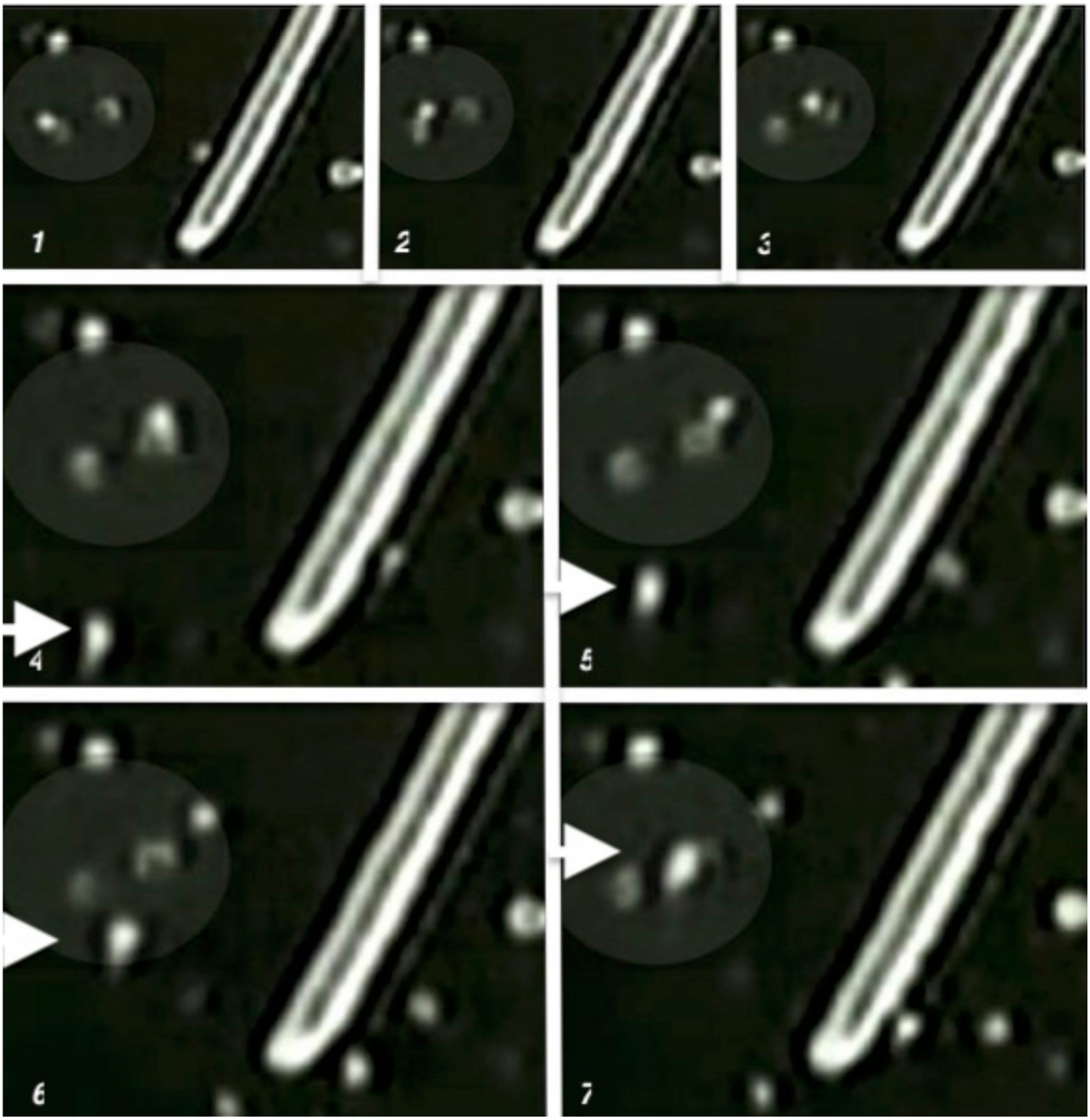


Figure 11. Extraterrestrial plasmas have approached an electrified tether 12 miles in length generating electromagnetic impulses into the space medium. Although innumerable plasmas remained relatively stationary, others move toward and make contact and then continue their flight path. Based on the length of the tether, these plasmas may average 1 km in size. Filmed by STS-75.

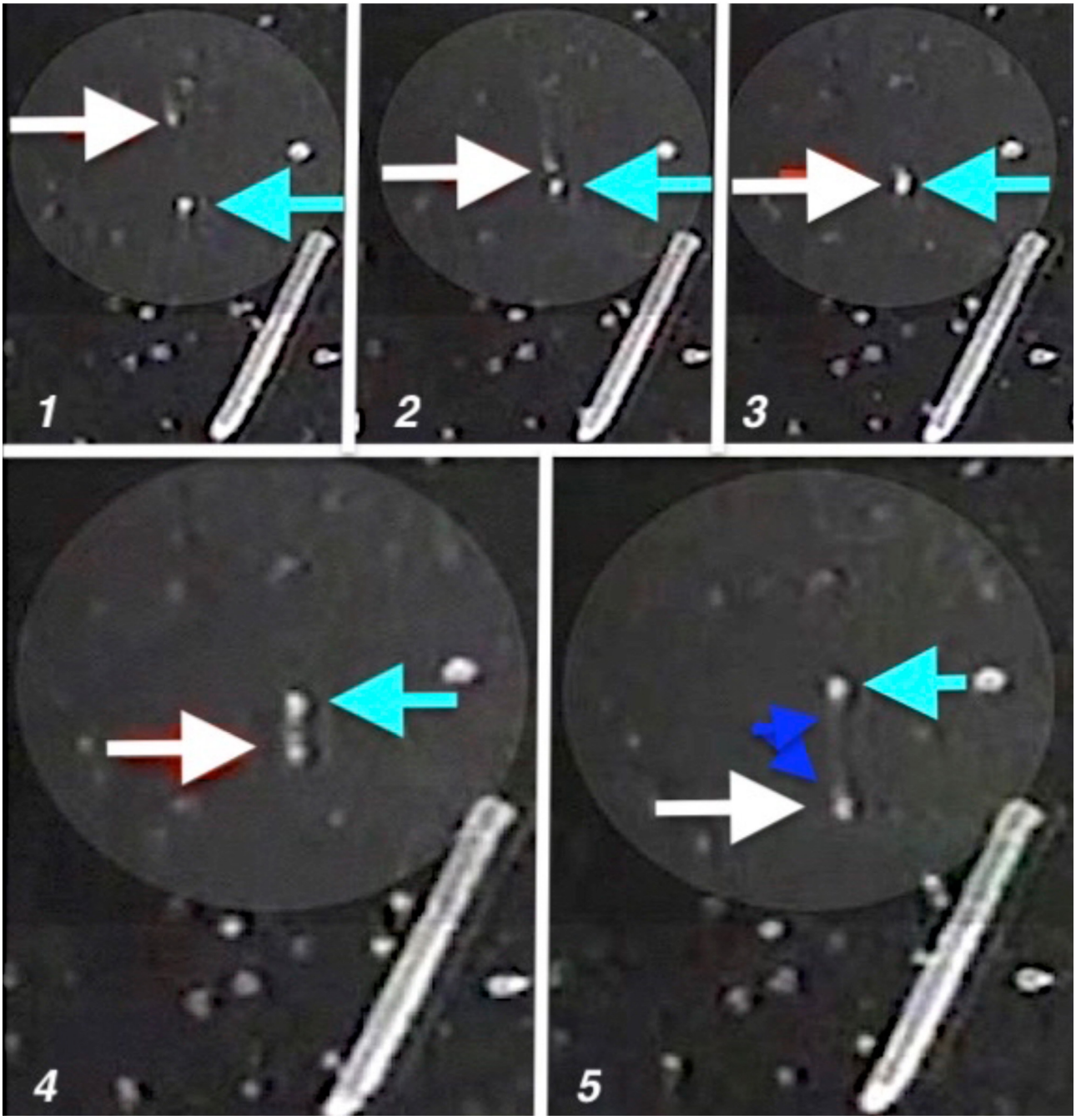


Figure 12. Extraterrestrial plasmas contacting, intersecting one another and leaving a plasma trail in their wake. These are examples of "collisionality" and "energy cannibalism." Filmed by STS-75.

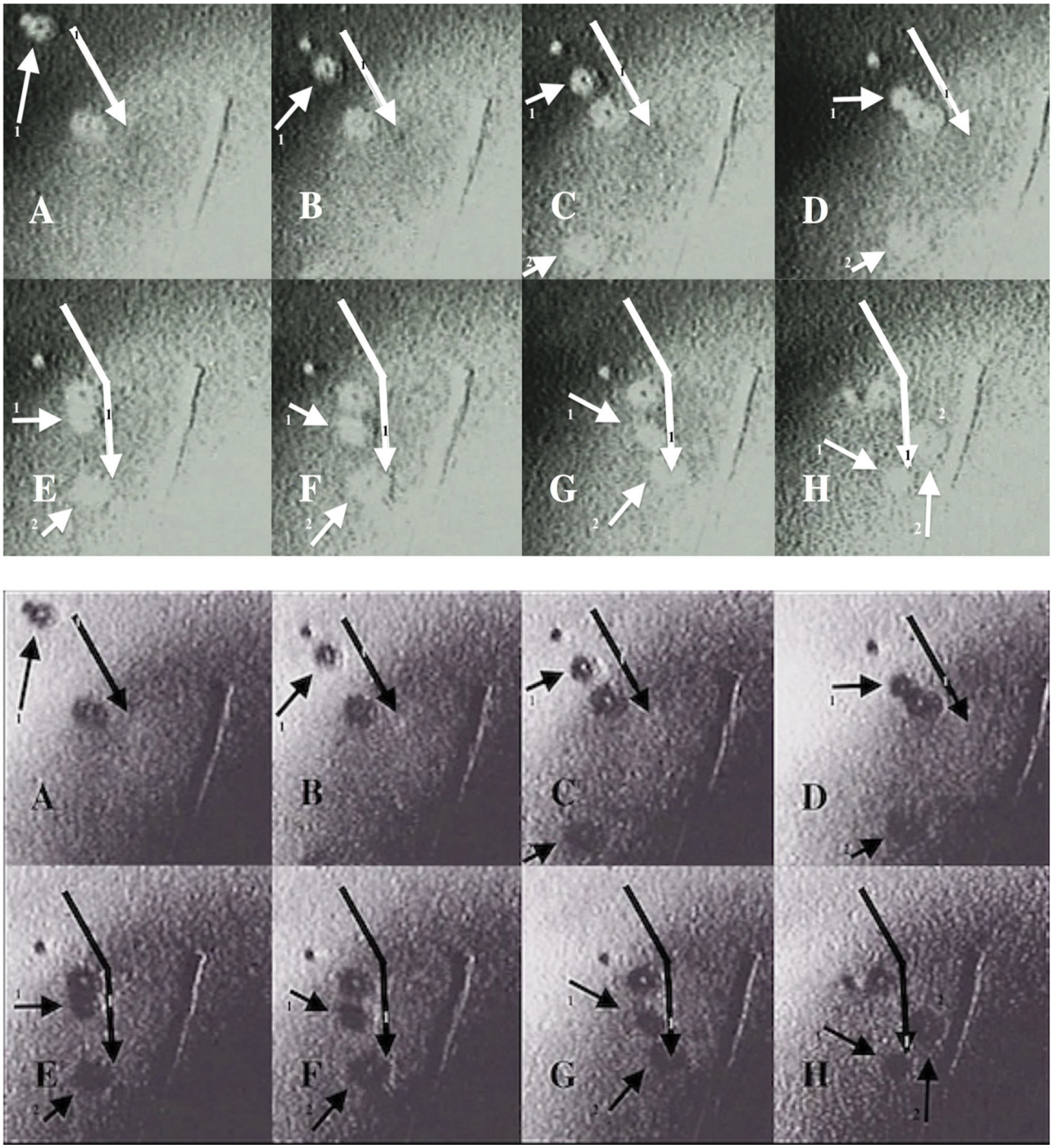


Figure 13. (Top) Donut-Cloud shaped (1-arrow) plasma (kilometers in size) in upper left hand corner approaches similar D-structures and electromagnetic (elongated) satellite-tether and then changes direction at a 15 degree angle and collides with another plasma (2-arrow) coming from a different direction. Filmed by shuttle mission STS-75. (bottom) Negative images (of top photos) of plasmas approaching and interacting and piercing one another.

8. Attraction to Thunder Storms: UAP in the Lower Atmosphere

Plasmas have been filmed by missions STS-96 and STS-106, approaching, then descending from the thermosphere into hurricanes and thunderstorms, or

emerging from waning storms and streaming back into space. Plasmas approach from different directions and speeds, often forming groupings of two or more, then descend and disappear into the thunderclouds in the lower atmosphere (**Figures 14-17**).

In consequence, when observed from the ground, these plasmas would be classified as UFOs and UAP. Thus, it appears that many UFO and UAP sightings are not observations or evidence of extraterrestrial spacecraft piloted by alien robots or humanoids, but of plasmas that have been attracted to powerful sources of electromagnetic activity in the lower atmosphere.

Typical of plasmas in the thermosphere, plasmas descending into the lower atmosphere appear to "*accelerate to exceptional velocities*" "*alter their direction of flight suddenly*" "*exhibit aerodynamic characteristics well beyond those of any known aircraft or missile*" and "*have the manoeuvre and acceleration attributes of an inertia-less vehicle*" and resemble the "*buoyant charged bodies*" that have been classified as UAP [24].

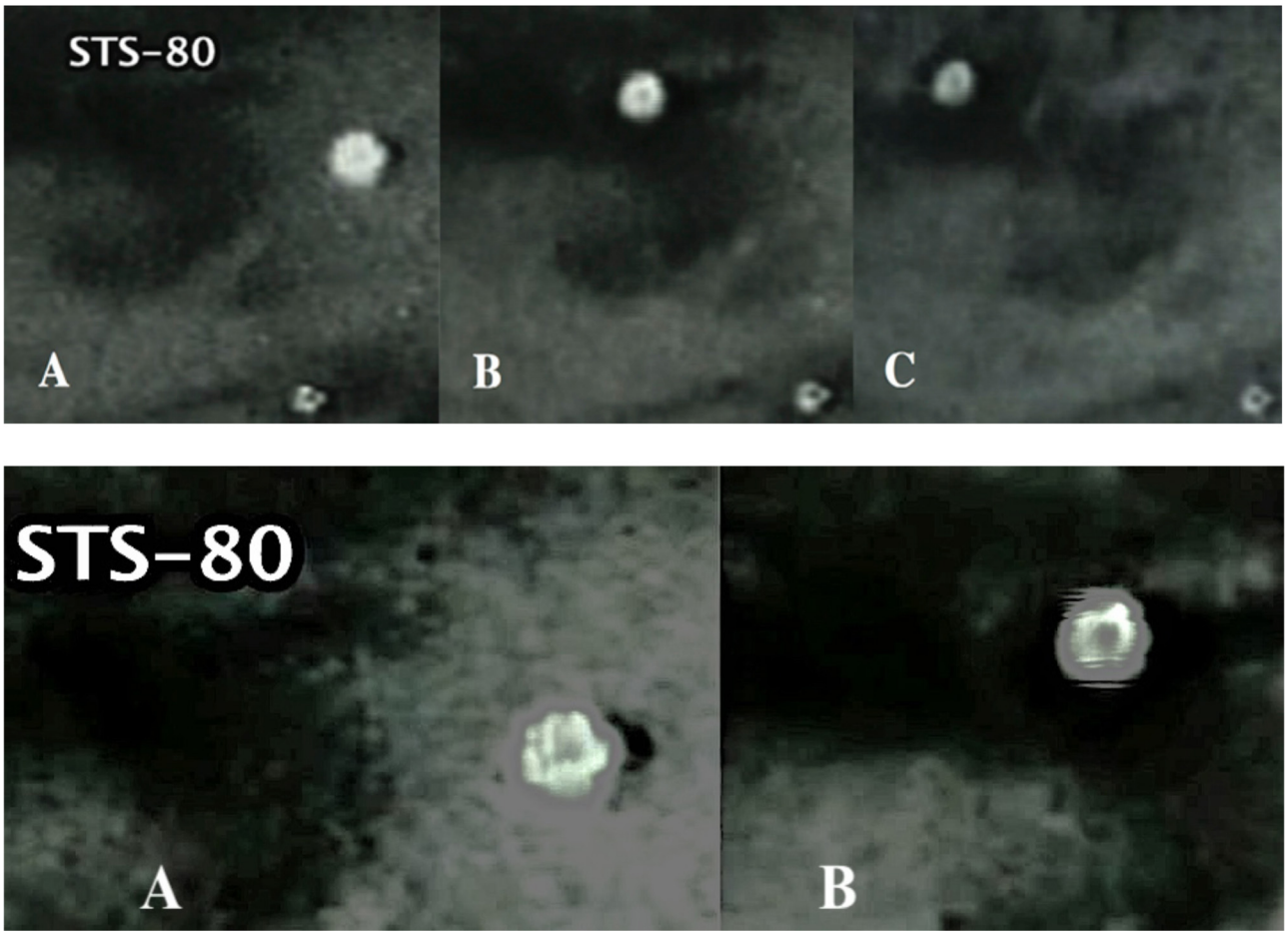


Figure 14. Shape-shifting plasma with nucleus descending into a thunderstorm. Estimated size: approximately 1 km in diameter. Filmed by shuttle mission STS 80. (see: https://www.youtube.com/watch?v=Yb67zM1Sh-Q/ http://www.youtube.com/watch?v=DARcIIc4pCw).

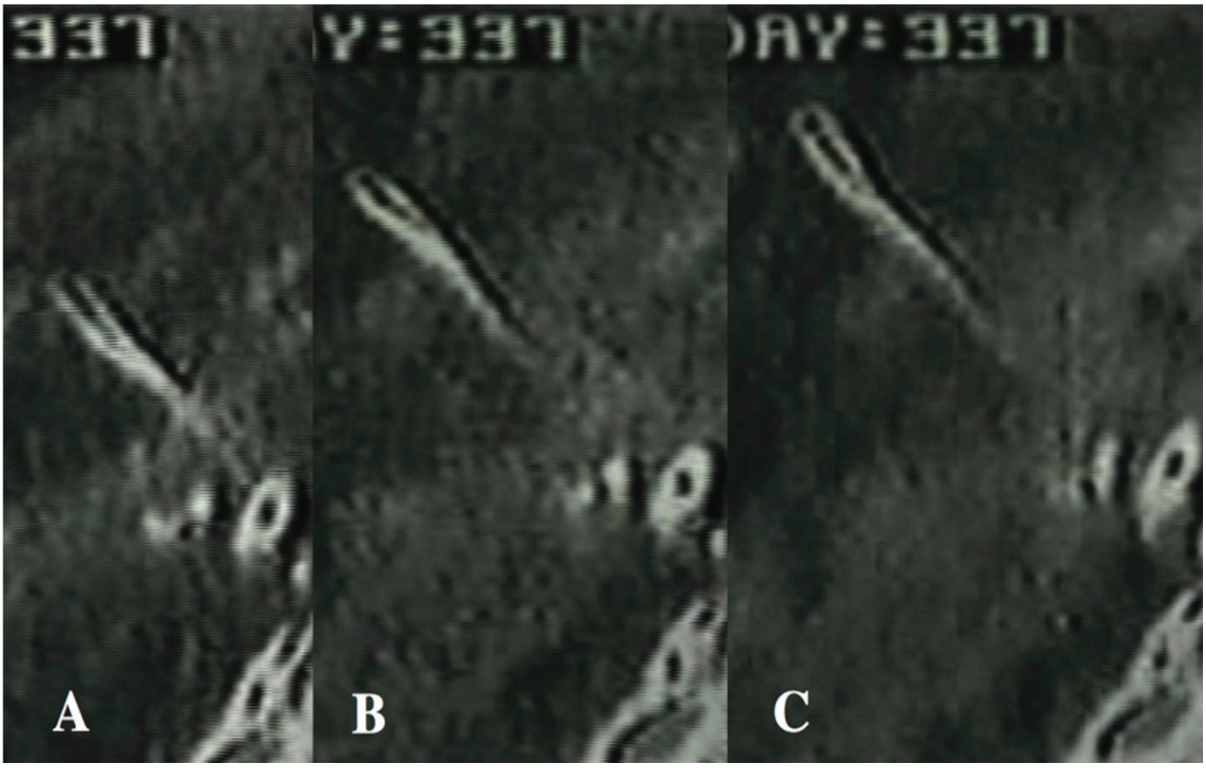


Figure 15. Moving, wiggling plasma with multiple voids-nucleation, filmed by shuttle mission STS-80, 200 miles above Earth.

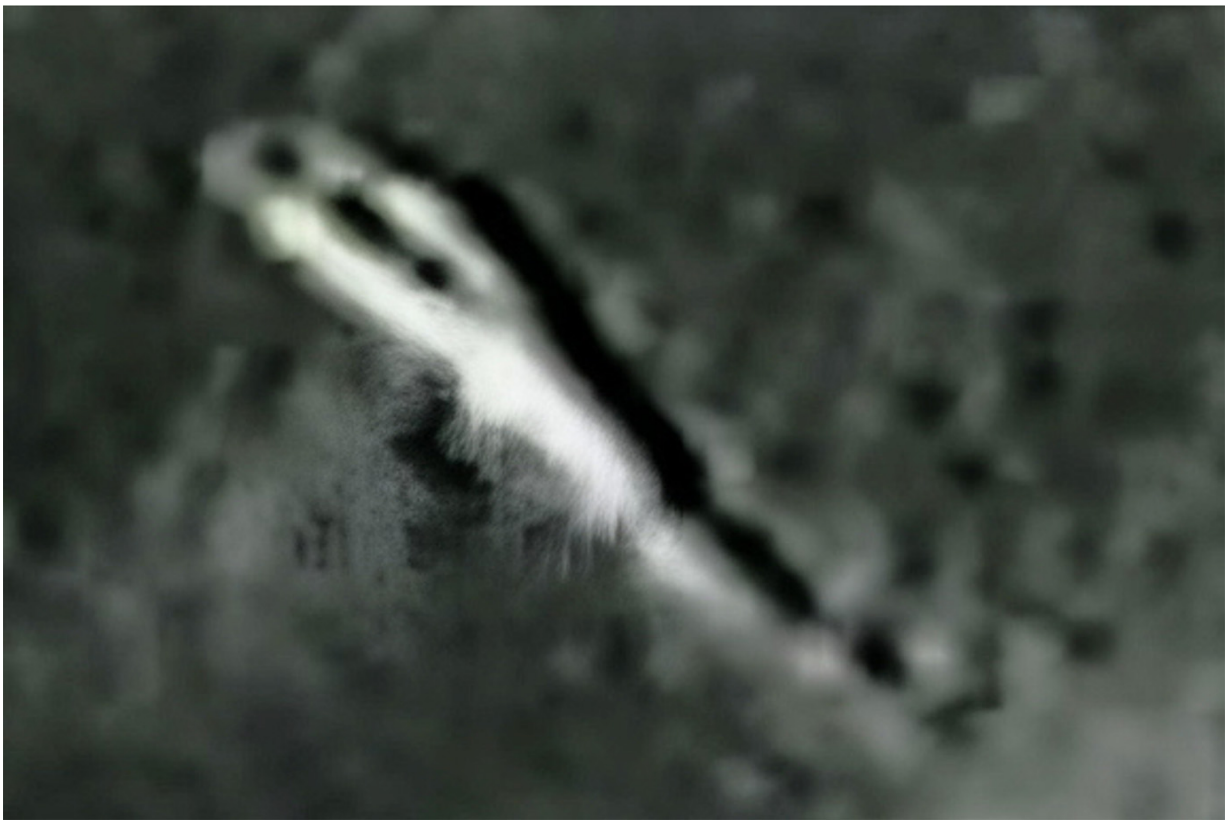


Figure 16. Elongated plasma descending into thunder storm, possibly engaged in electron transfer and the generation of magnetic fields and electric charges and currents. From shuttle mission STS-80.

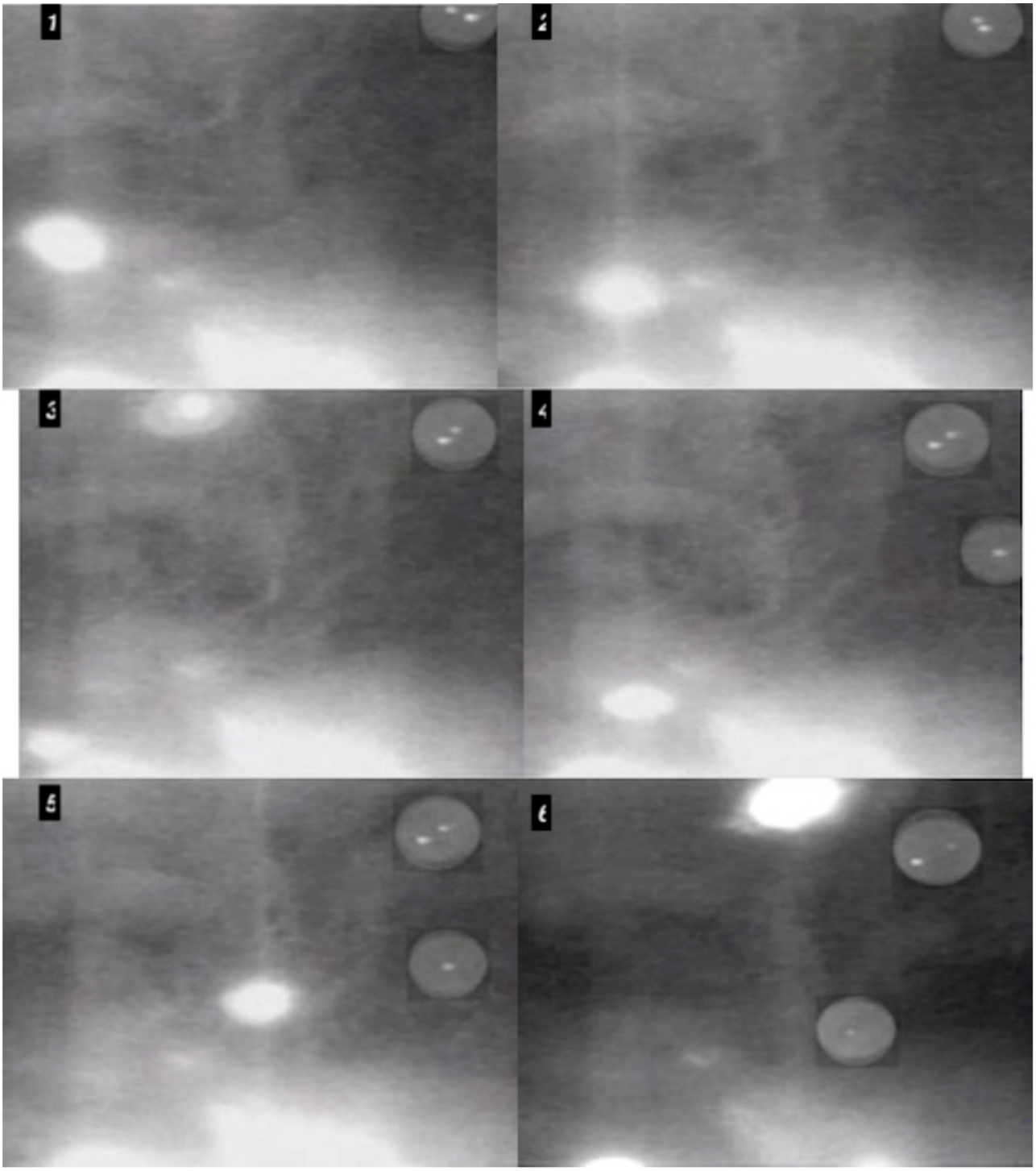


Figure 17. Cloud and conical shaped specimens in the thermosphere approaching a violent thunderstorm raging 200 miles below. Filmed by STS 96.

9. Hundreds of Plasma Swarm Toward an Electromagnetic Tethered Satellite STS-75

In February 1996, the Space Shuttle "Columbia" conducted experiments to determine the effects of microgravity on electromagnetic pulses transmitted into

the space medium of the ionosphere. This was accomplished via the deployment of the "Tethered Satellite System Reflight (TSS-1R)" 296 kilometers over the Earth. Upon deployment, TSS-1R began generating electromagnetic force fields, electricity, and electron beams into the surrounding space medium via the tether linked to STS-75.

Upon being deployed at a distance of 19 kilometers, the tether broke but continued transmitting a continual stream of up to 3500 volts into the ionosphere. Following every 90-minute orbit the Columbia would re-encounter and film the TSS-1R. For the first several orbits nothing unusual was noted by the crew of STS-75 other than a few faint pulsating glows at a far distance from the tether. Hours later the crew reported they were being followed and paced by at least three bright, pulsating objects which appeared outside the windows of the Columbia [14] [15].

Subsequently, over the next several orbits the crew observed and filmed dozens of these pulsating objects, then several orbits later, hundreds—up to a kilometer in size—swarming toward the TSS-1R, from multiple directions—as documented here (**Figure 1**, **Figure 3**, **Figures 10-13**, **Figures 18-23**). These glowing, pulsating, luminous structures were observed to change speed and direction, interact with one another, congregate together, slow down, and then make physical contact with the tether which was continuing to transmit over 3000 volts into the surrounding space medium.

They were filmed engaging in complex interactions and turning, following, intercepting, and passing through one another (**Figures 11-13**, **Figure 23**, **Figure 24**, **Figure 26**)—sometimes leaving a stream of illuminated particles in their wake (**Figure 12**, **Figure 23**, **Figure 24**, **Figure 26**). Furthermore, they were glowing, pulsating with light, and turning colliding with other plasmas that had also turned; engaging in behavior referred to as "collisionality".

It is important to emphasize that the crew of STS-75 viewed these specimens with the naked eye and with binoculars and the telescope. Crews provided eye-witness descriptions.

Nor did the shuttle crew identify these plasmas as space junk or ice. They also rejected and disputed NASA's suggestions that these were "reflections", a "rocket booster" or the "Mir" space station. One crew member referred to them as a "UFO". Another pointed out that several of these specimens had approached the windows, were circling the shuttle, and moving from window to window!

Observational and computerized analysis documents that these specimens displayed behaviors and morphologies completely atypical of space junk, meteors, or crystals of ice; and were certainly not illusions created by sunlight and the camera. Instead, their actions and morphology were typical of plasmas. Dusty plasmas, for example, also oscillate ("heartbeat instability"), producing a glow and bright flashes—such that the plasma pulsates with light—exactly as observed in the thermosphere.

It is also well documented that plasmas react to turbulence, geomagnetic

storms, coronal mass ejections, solar flares, eclipses, the waxing and waning of sunlight, atmospheric waves, and fluctuations in the electromagnetic environment—typical of fluctuating conditions in the thermosphere—and all of which can affect the shape, form, velocity, interactions, and behavior of plasmas [1]-[8] [11] [12] [13] [17] [18]. Their behavior is primarily controlled by electromagnetic activity, which, as reported here, was being transmitted into surrounding space.

Figure 18. (Left) The tethered satellite is released while generating electricity and electromagnetic activity into the surrounding space-medium in the thermosphere. (Right) the tether breaks, still generating electromagnetic-activity. Filmed by STS-75.

Figure 19. Hours later after the tether broke away from the space shuttle, pulsating plasmas began approaching the tether which is still generating electromagnetic pulses into the space medium. The tether is approximately 12 miles in length. Filmed by STS-75.

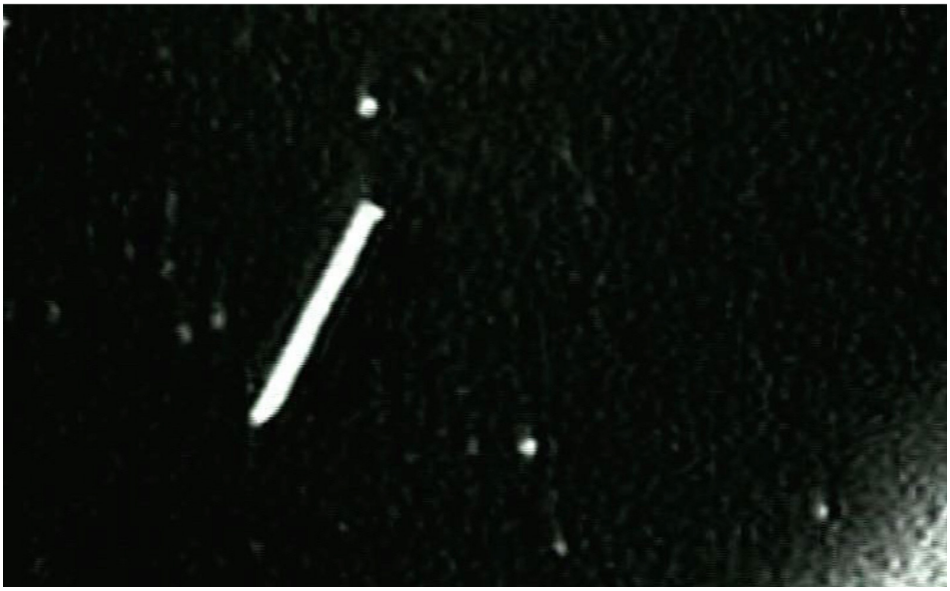


Figure 20. Twelve hours later, pulsating plasmas begin approaching the tethered satellite which is still generating electromagnetic pulses into the space medium. Filmed by STS-75.

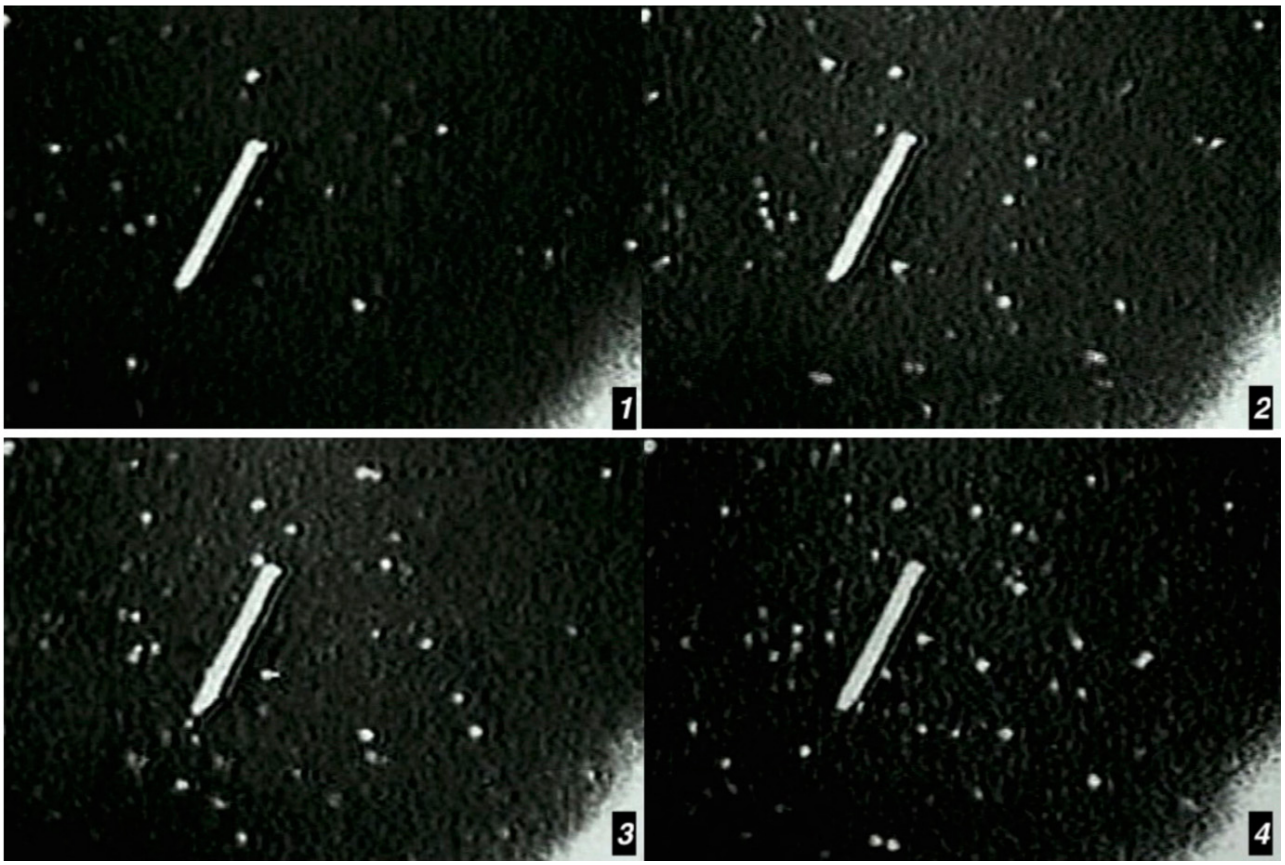


Figure 21. Nearly 24 hours after the electromagnetic-tethered satellite began generating electromagnetic pulses dozens, then hundreds then thousands of pulsating extraterrestrial plasmas approached and gathered close by. The tether is approximately 12 miles in length. Filmed by STS-75.

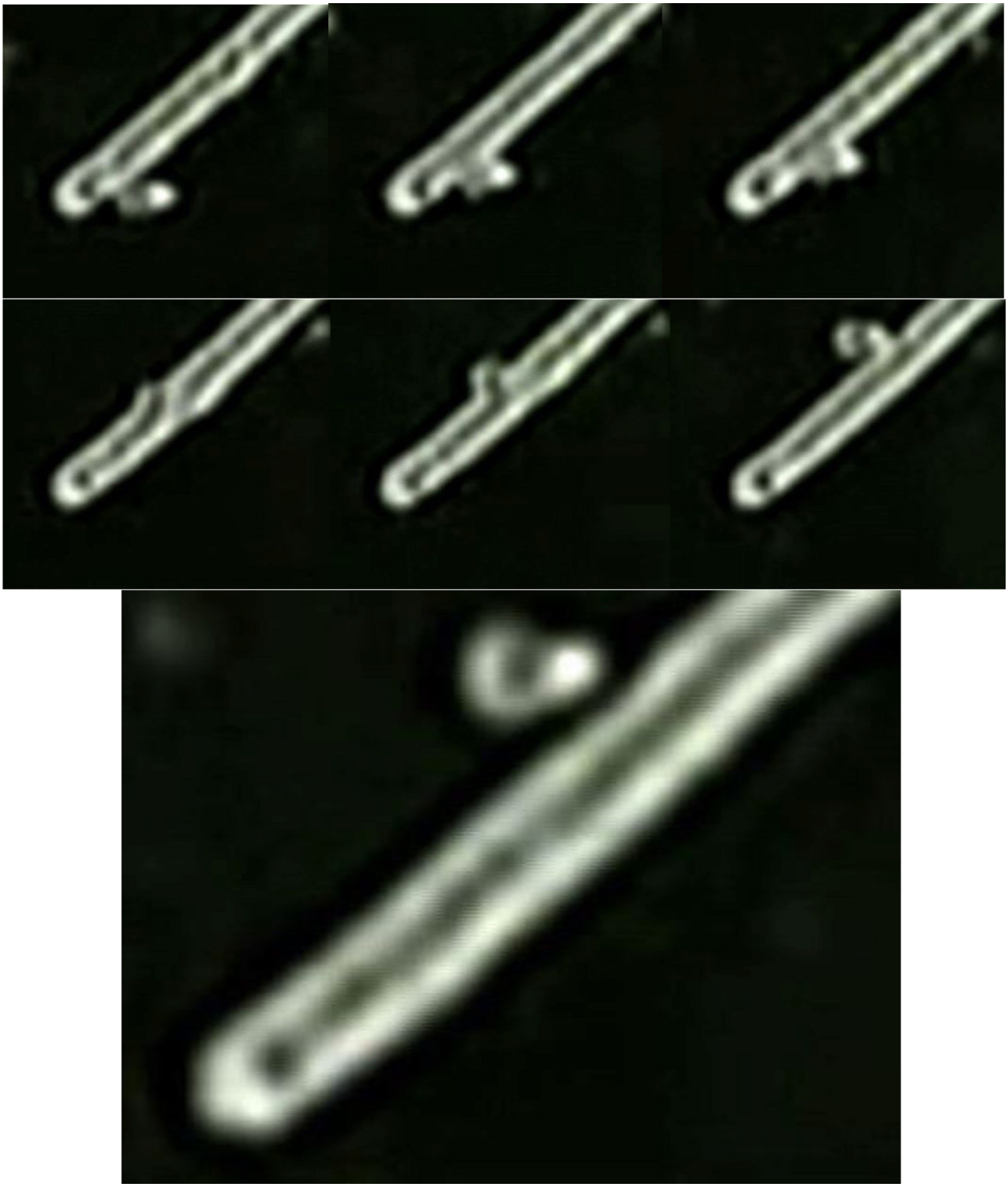


Figure 22. Cone shaped plasma approaches and then makes contact with the electrified tether in the thermosphere, slides along the length and then emerges continues to remain close Based on the length of the tether, this specimens is approximately 1 km in size. Filmed by STS-75.

10. Plasma Contact Seeking & Plasma Tails

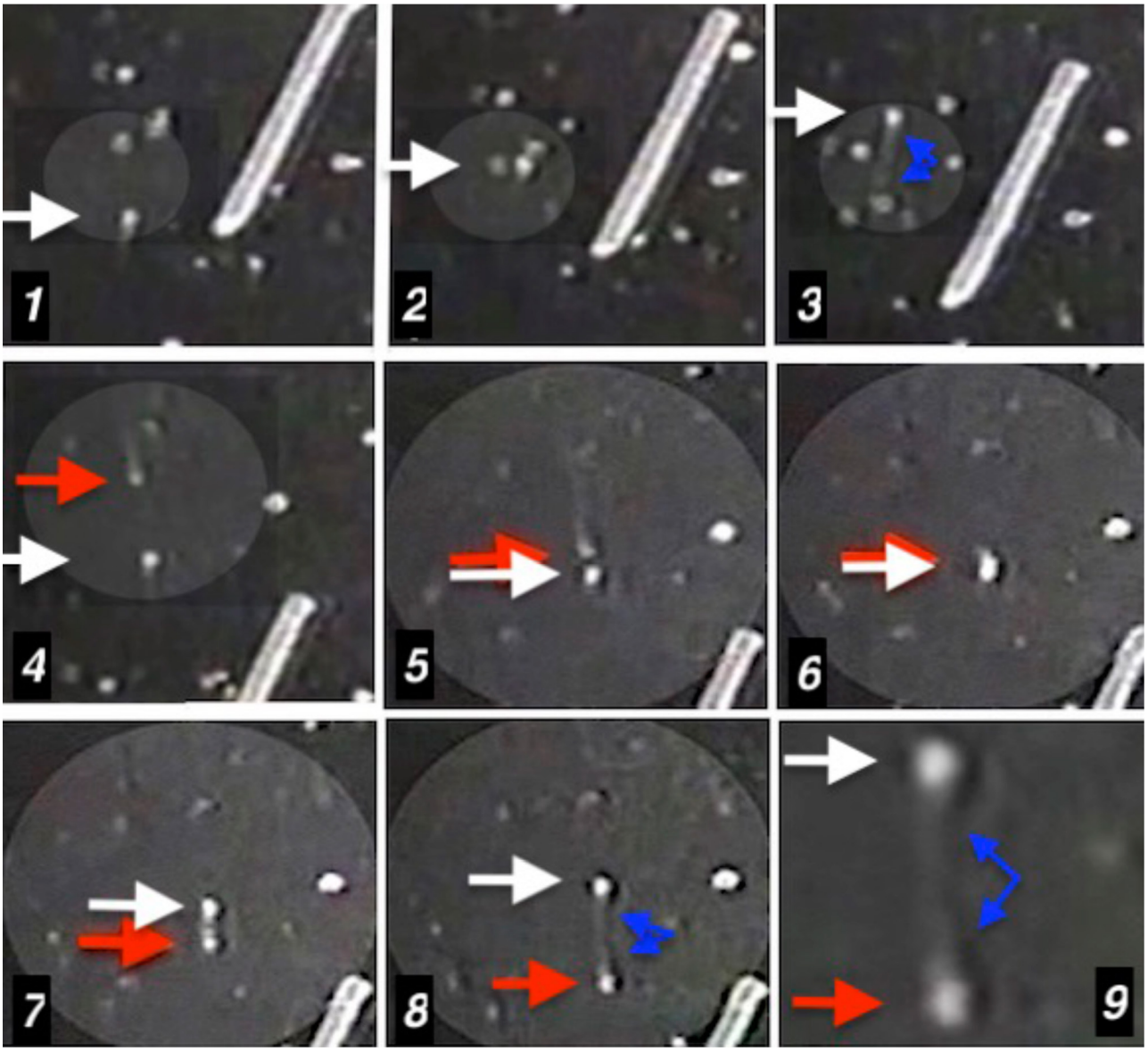


Figure 23. Extraterrestrial plasmas that approach and make contact with others and which leave a plasma-like cloudy trail in their wake after they make contact. Yet hundreds more have stopped near the tether and remain stationary and unmoving. The blue arrows point to "plasma tails". These are examples of "collisionality" and "energy cannibalism". Filmed by STS-75.

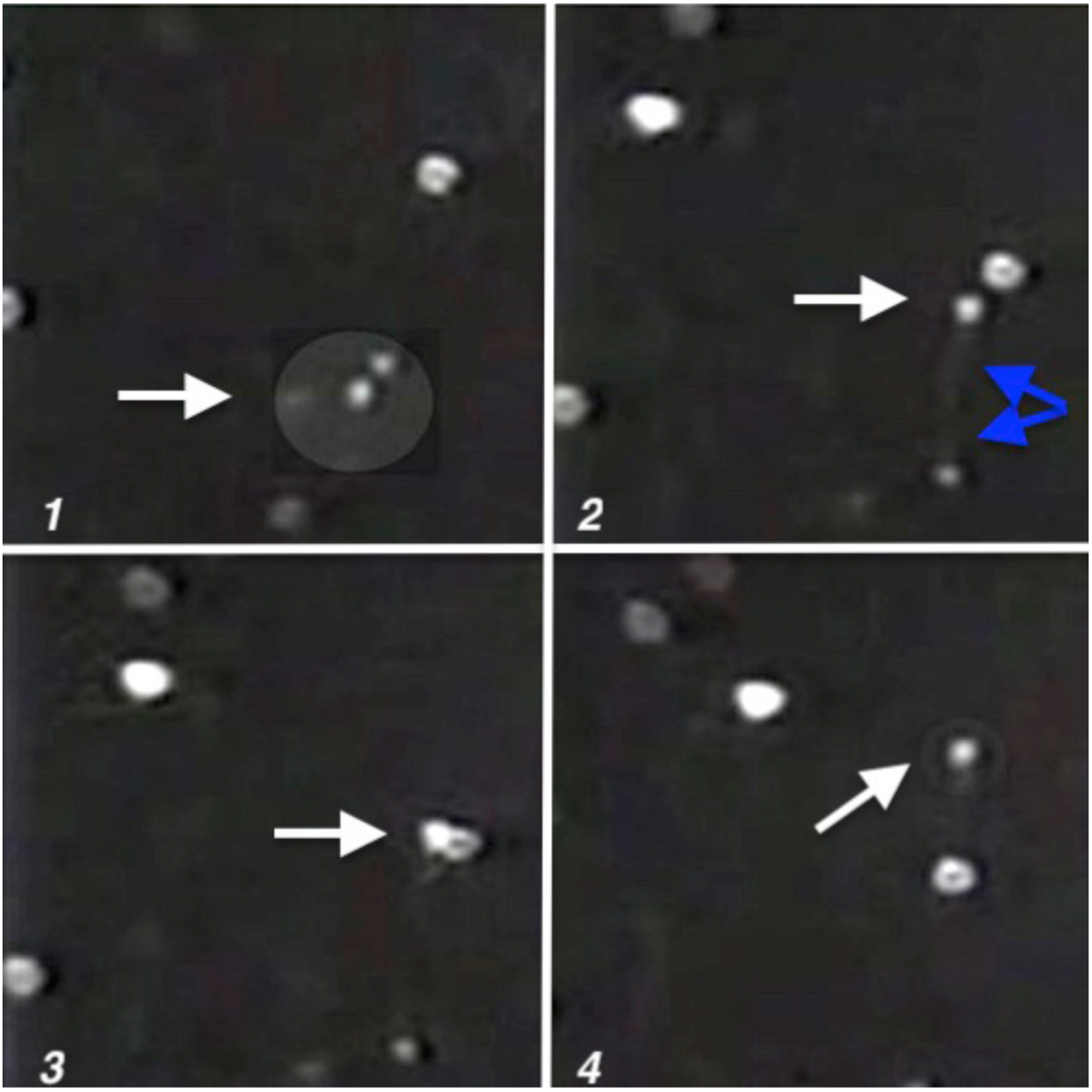


Figure 24. Extraterrestrial plasma that rapidly approach and slow down and make contact with and then pass by leaving a plasma-dust tail in their wake as indicated by the blue arrows. These are examples of "collisionality" and "energy cannibalism". Filmed by STS-75.

11. Hunter Predators: STS-48

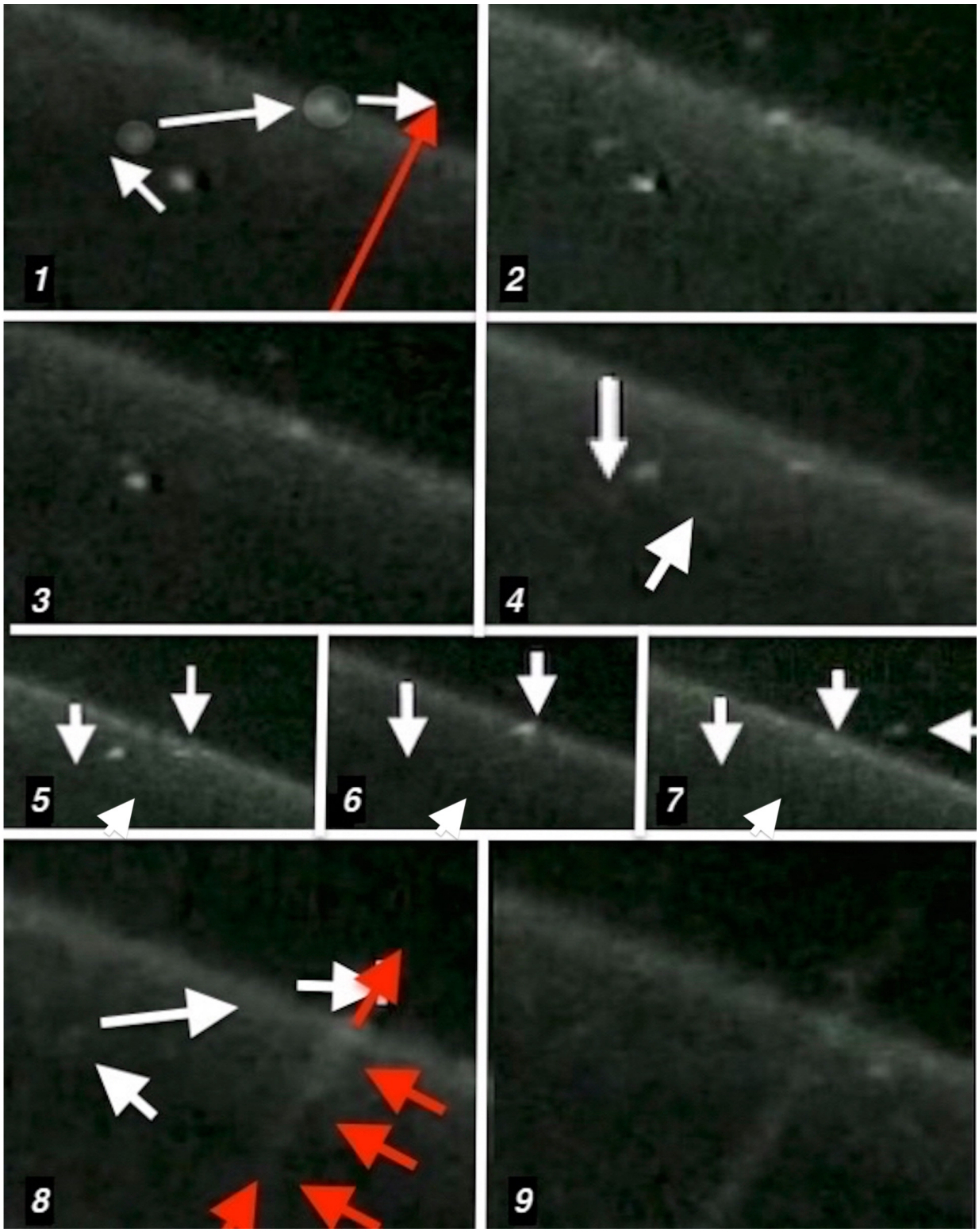
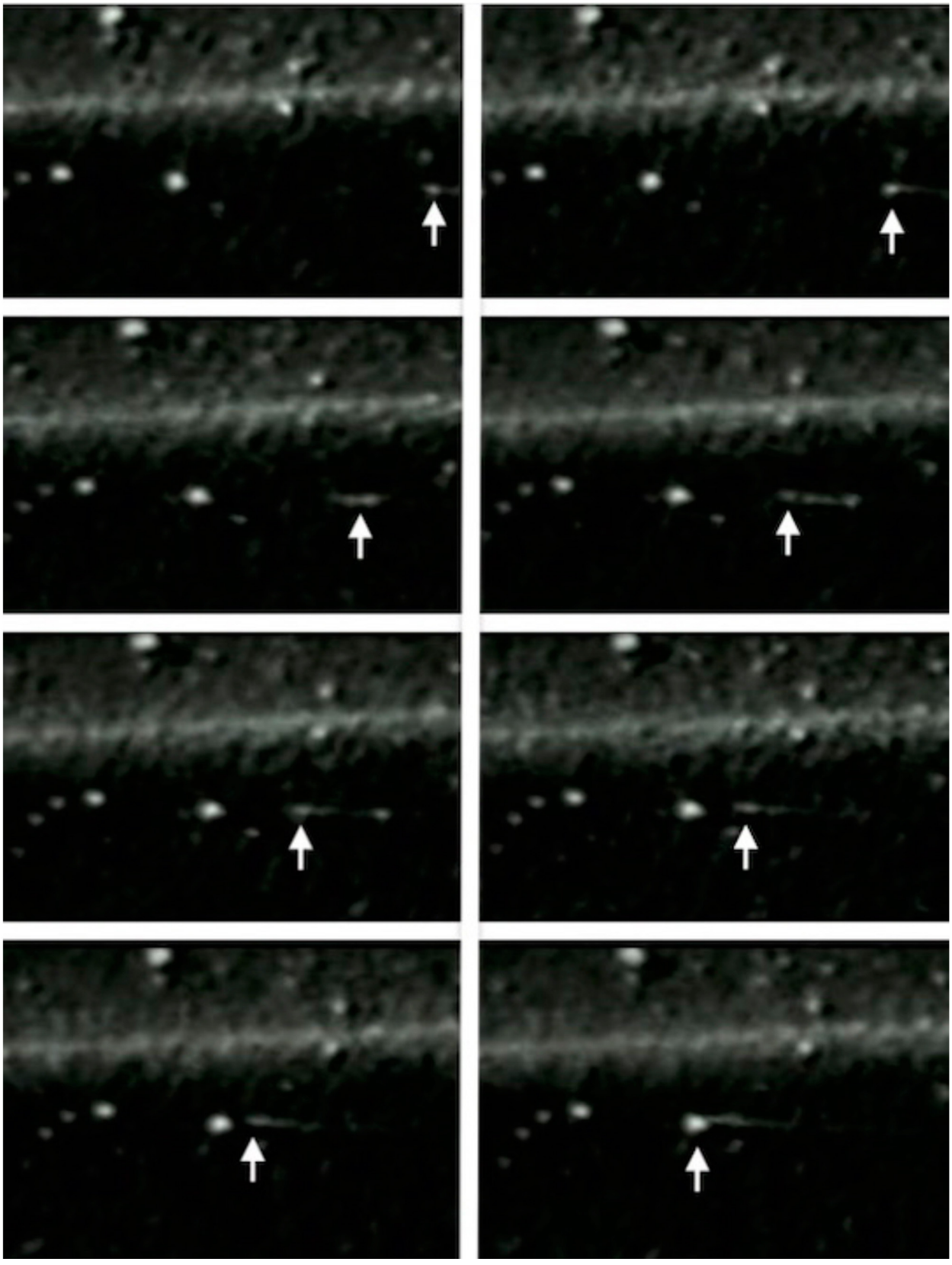
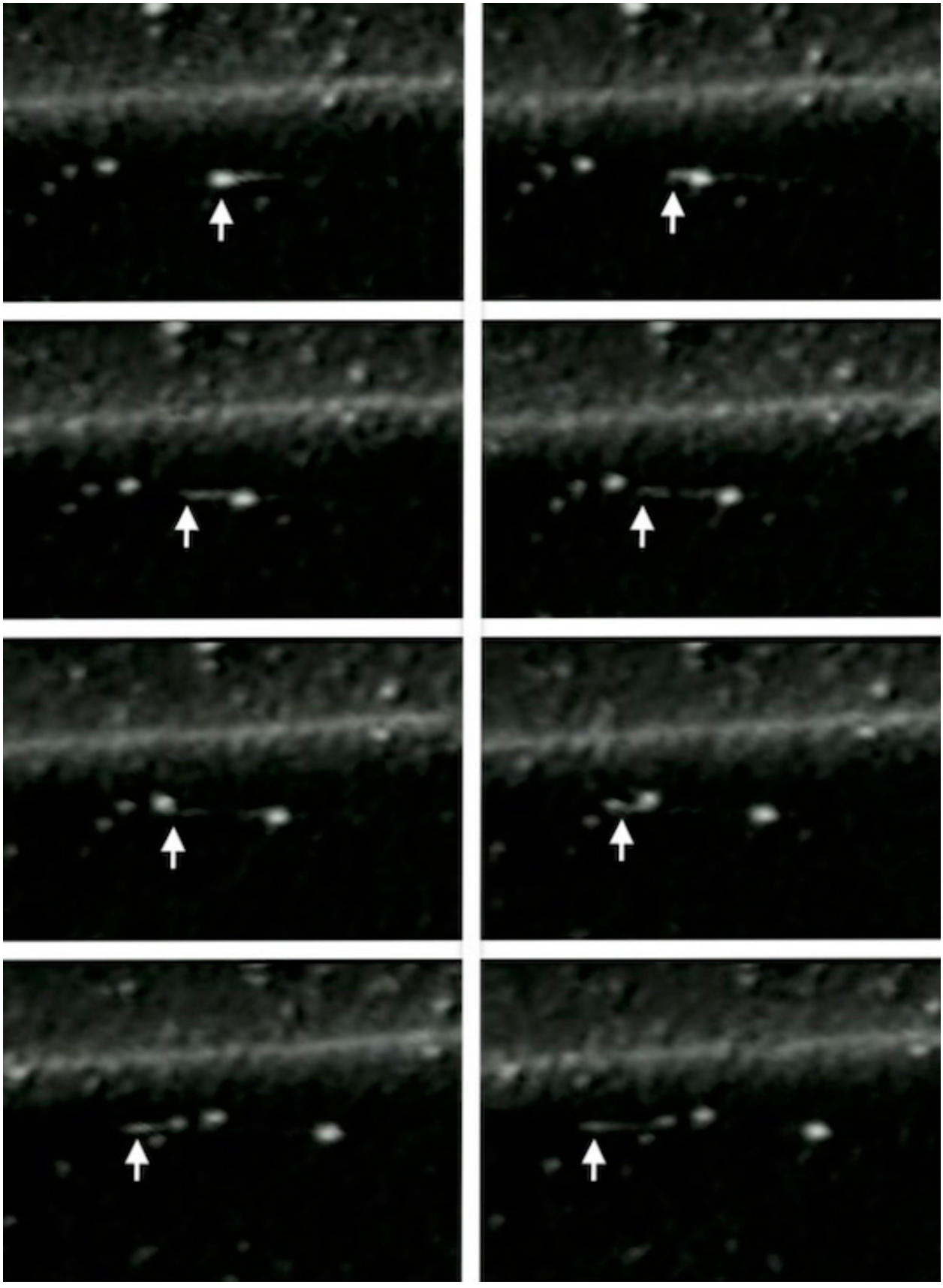


Figure 25. STS-48. Hunter-Predatory behavior. Cloud-like plasmas targets (1, 2, 3) and intersects a second plasma to its upper left, then (4) make a 90 degree right turn in trajectory and accelerates toward plasmas upon the rim (5, 6) and upon intersecting these plasmas turns about 10 degrees and continues into space, only to be intercepted (8) by something moving at hypersonic speeds which obliterates it (9).

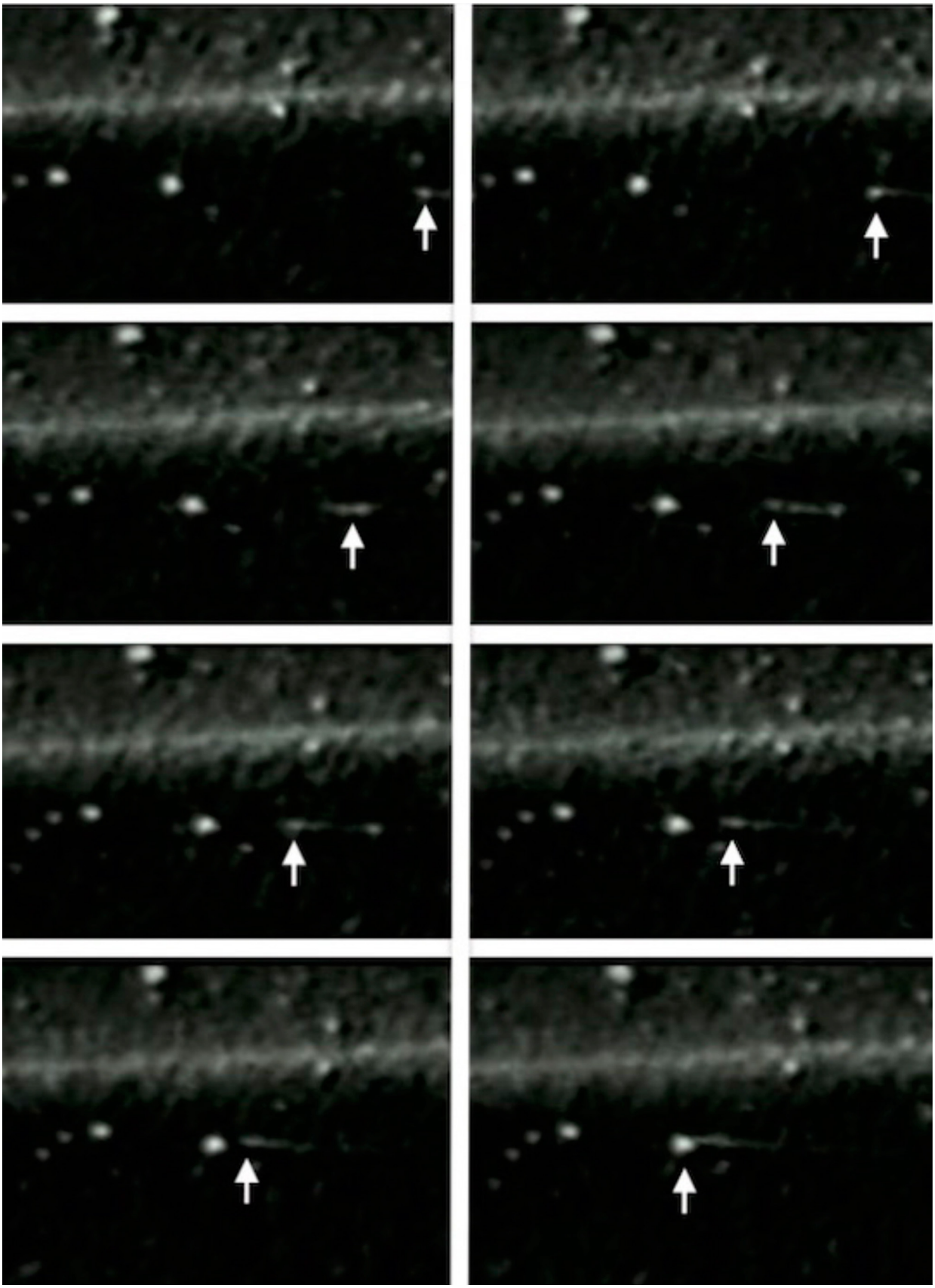
12. Hunter Predators: STS 80



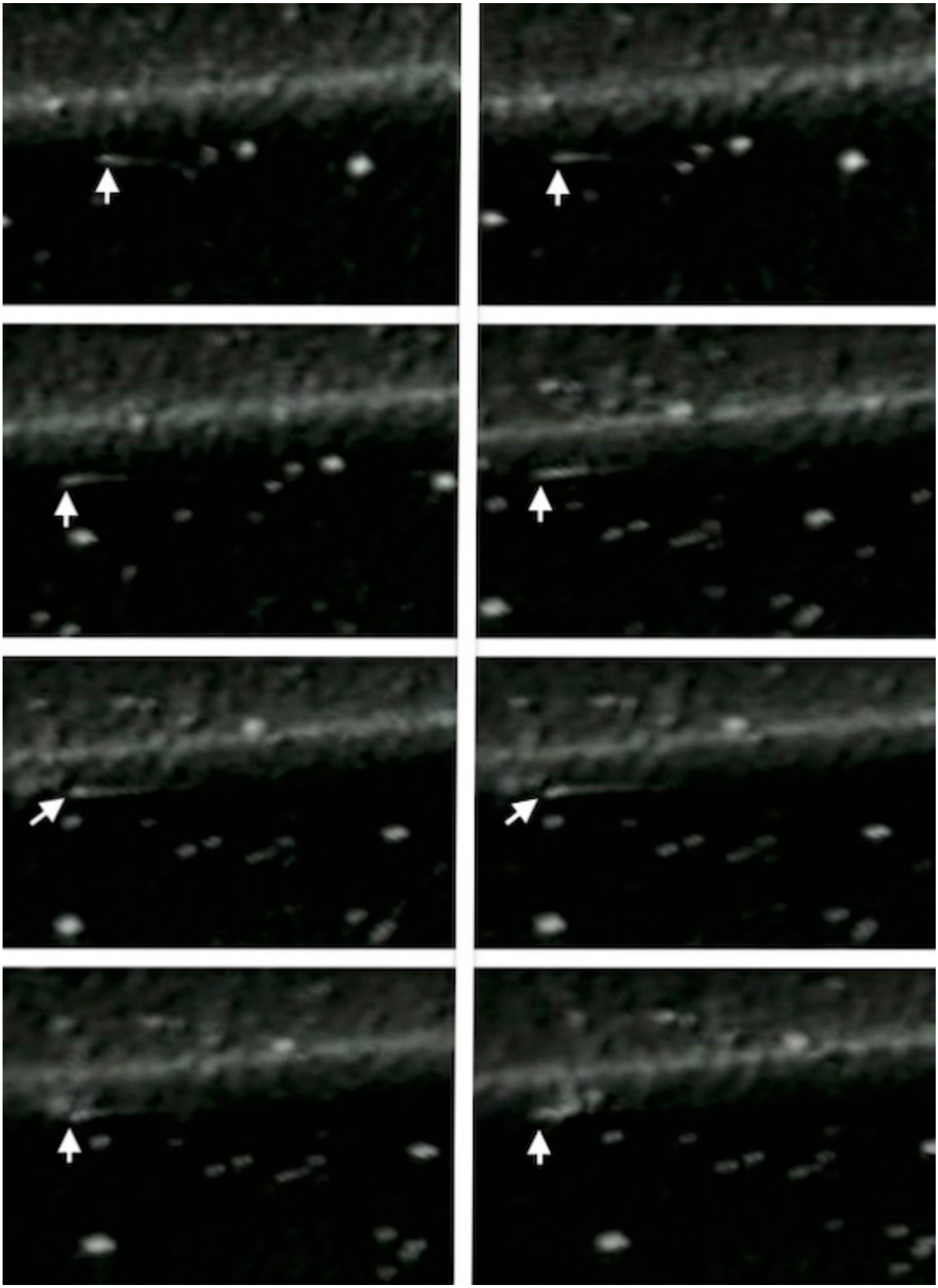
(a)



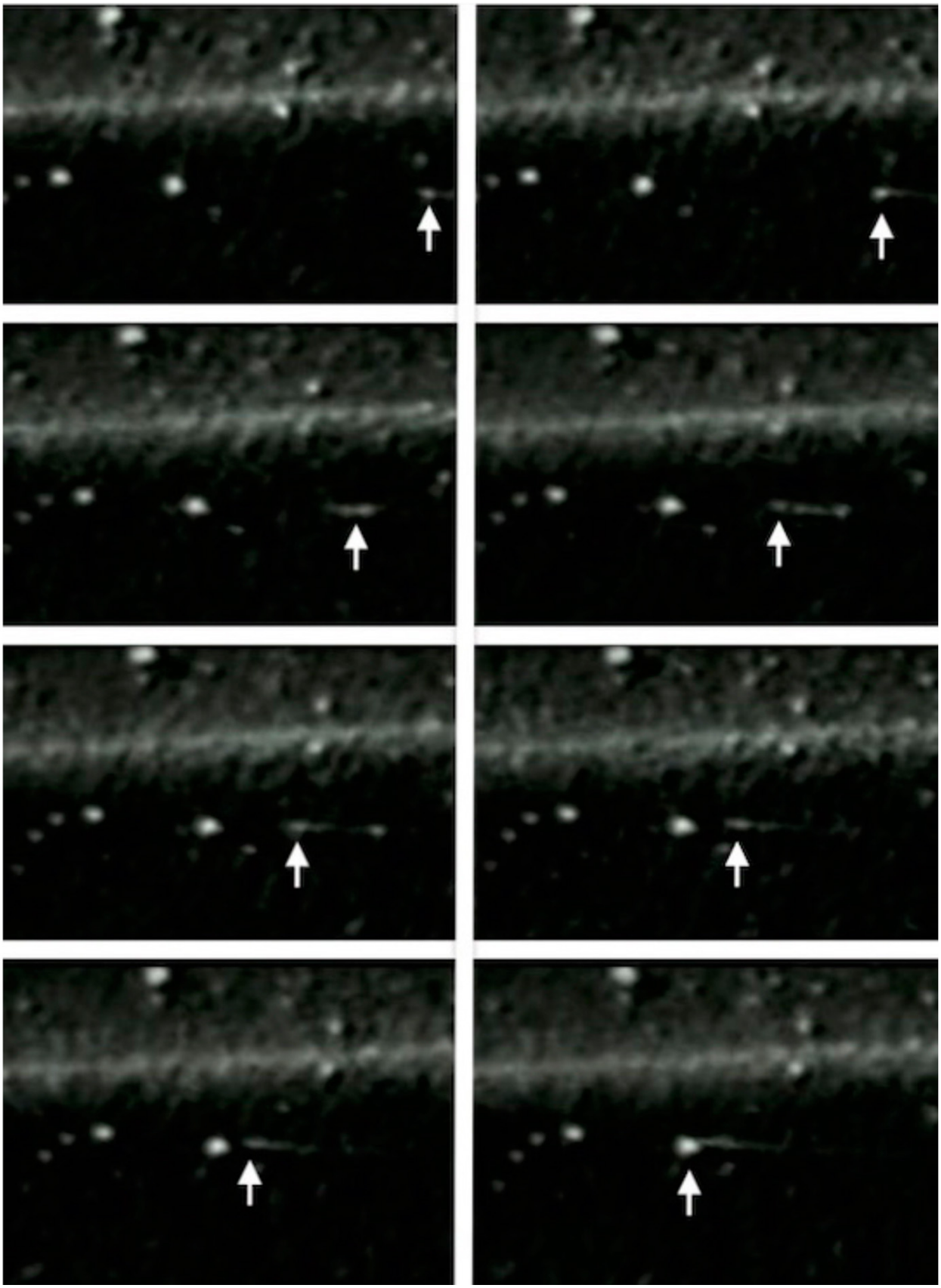
(b)



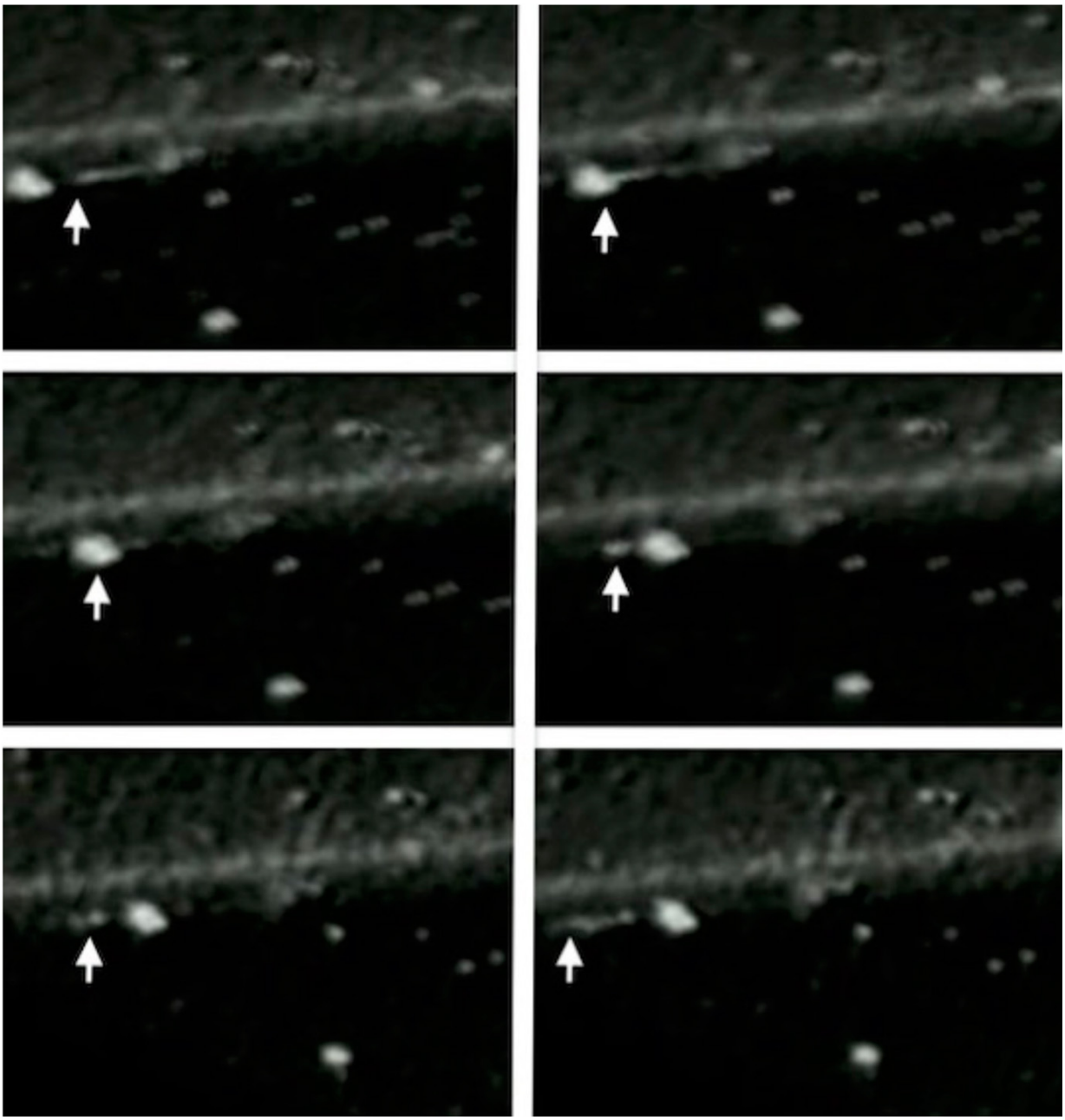
(c)



(d)



(e)



(f)

Figure 26. (a). STS-80. Hunter-Predatory behavior 200 miles above a thunder storm (see **Figures 26(a)-(f)**). (b). STS-80. Hunter-Predatory behavior 200 miles above a thunder storm (see **Figures 26(a)-(f)**). (c). STS-80. Hunter-Predatory behavior 200 miles above a thunder storm (see **Figures 26(a)-(f)**) (d). STS-80. Hunter-Predatory behavior 200 miles above a thunder storm (see **Figures 26(a)-(f)**). (e). STS-80. Hunter-Predatory behavior above a thunder storm (see **Figures 26(a)-(f)**). (f). STS-80. Hunter-Predatory behavior. Cloud-like plasma targets and intersects seven different plasma of varying in shape 200 miles above a thunderstorm. Note the plasma-trails often left in its wake and the fact that it changes shape and size, and its movements are not in a straight-line trajectory but slightly changes direction to insert these other plasmas (see **Figures 26(a)-(f)**). It is likely that these interactions are not "purposeful" in the biological-sense and are not driven by an intelligence (as we know it); but are due to differences in electromagnetic and electrical charges that exert attractive influences. That some plasmas are drawn to one another (a head-on-collision) can be explained by differences in electromagnetic charges. However, why others remain stationary as another plasma turns and accelerates directly at and penetrates those unmoving plasmas (like "shooting ducks in a row"), cannot be explained with certainty, but represent energy cannibalism or energy exchange.

13. Plasma Development and Behavior in the Thermosphere

Observations and computerized analysis demonstrates that these plasmas speed up and slow down, hover in place, pulsate as they move, display dramatic shifts in velocity and trajectory, and engage in behaviors similar to simple biological organisms and typical of plasmas. However, these are not biological organisms. All their interactions can be explained by electromagnetic activity and the charges of their internal and external environment.

The space shuttles (when they were in operation from 1981 to 2011) and the International Space Station orbit within the thermosphere. This region above Earth has a distinct atmosphere [29] [30] [31] [32] and maintains other dynamics which support and promote the formation of plasmas [3] [4] [5] [7] [19]. For example, dust and atmospheric particles in the thermosphere are electrically charged due to radiation [33] and plasmas in space contain large amounts of dust.

In addition, residual levels of oxygen and other diluted gases are present in the thermosphere [29] [30] [31] [32], all of which absorb solar radiation thereby providing a range of temperatures, up to 1500˚C (2730˚F), which vary according to solar activity [5] [34] [35]. These temperature absorptions also promote the development of plasmas and plasma-cellular structures, as well as enabling movement and simple behavior [3] [4] [7] [11] [12] [13] [17] [18] [20].

The major external push/pull forces acting on these plasmas are those based on negative vs positive charges in the outer plasma membranes and dust particles in reaction to electromagnetic activity in the surrounding space medium [1] [2] [3] [5] [6] [12] [13] and include fluctuations in temperature, sunlight, and these electrified particles—all of which contribute to the creation of turbulence and atmospheric tides which can enable movement including changes in speed and direction [2] [3] [4] [5] [7] [19] [36].

As detailed by Bakhmetieva, Grigoriev [5], Chatterjee [2] Marino, Sorriso-Valvo [3], and Chian and colleagues [4], solar winds and turbulence are major cross-scale energy transfer mechanisms that affect plasma behavior via an interplay of propagating waves, nonlinear waves, magnetic reconnection, emission of radiation and particle energization. Additional factors include coronal mass ejections, solar flares, geomagnetic storms, daylight, heat sources, and radio waves; all of which can differentially or collectively influence plasmas depending on their location, properties, and dust composition [37]. It is these electromagnetic interactions, coupled with their pulsations, that enable these plasmas to navigate, propel, accelerate, slow down, and turn.

14. Dusty Plasmas in Space

Plasma consists of ions, electrons, neutral gas molecules, photons, and electric fields: a collection of elements that are exchanging mass, momentum, energy, electrons, and dust. Space is filled with dust, including the remnants of carbonaceous chondrites, with sizes ranging from macromolecules to pebbles. Because

plasmas incorporate dust [37] [38] [39] plasmas in the thermosphere should be considered "dusty plasmas".

When dust is exposed to UV radiation and immersed in plasma, there will be collective and individualized effects on plasma mass, charge, speed of movement, and behavioral dynamics; and the dust plasma will exhibit a variety of shapes [37] [39] [40]. Dust plasmas can appear as spirals, rotating cylinders, bulbous with double voids, and in the shape of clouds that may descend into the lower atmosphere. For example, in the mesosphere (layer of atmosphere below the thermosphere), those interacting dust-plasma dynamics can produce Noctilucent clouds which can sometimes be viewed at sunset [41]. It is also likely that plasma clouds that are embedded in lower atmosphere storm clouds, or which drift alongside, might be indistinguishable with the naked eye.

Dusty plasmas are conglomerations of electrons, ions, neutral gas, radiation, and electromagnetic fields that contain dust ranging from a few nanometers to a few micrometers [37] [39]. These dust particles are charged and contribute to the creation of voids (nuclei) within the plasma [38] [42] [43] [44]. These voids affect behavior.

As noted, plasma in the thermosphere will turn and follow or may collide with other plasmas. The attraction and repulsion and reciprocal and non-reciprocal interactions between plasmas including asymmetric acceleration and collisionality depend on their degree of magnetization which can differ dramatically between plasmas [37]. Hence, not all plasmas, even in the same group or vicinity, will behave the same.

Further, when subject to electron depletion, dusty plasmas may engage in charge cannibalism [37] [40] (hunter-predatory behavior). In addition, following collisions and cannibalism, bound electrons are emitted and scattered after impact—possibly producing glowing plasma-dust trails [40] as documented in **Figure 7**, **Figures 11-13**, **Figures 23-26** as well as flashes of pulsating light.

Electron density reduction vs accumulation and the dust charge (negative dust vs positive ions in the plasma) contribute to plasma stability (and calmness) vs instabilities in shape and behavior (e.g. rotational, spheroidal, and carousel instability, polarity switching). Therefore, plasmas may merge and/or split apart and engage in non-reciprocal attractive forces and the transfer of energy when they make contact [37] [39]. As also observed in the thermosphere.

The voids (nuclei) within the plasma are generally associated with the dust-free region and can range from dim to bright and have a variety of sizes and shapes including those that are "eye-shaped" [37] [43] [45] [46]. Dusty plasmas with voids-nuclei may also oscillate ("heartbeat instability") between contraction and expansion—and sometimes the contraction phase is signified by a bright flash—such that the plasma pulsates with light. Further, those dusty plasmas with at least two voids (bright and dim) likely exhibit maximal self-excited oscillation which in turn may result in propulsion [37] [38] [44] [45] [46].

Moreover, when electrons are emitted this can create a "glow" (afterglow).

The amount of light emitted is determined, in large part, by particles that are shed and the amount of electron discharge and reduction in or increase in electron density (via charge cannibalism [37] [40]). Likely, the glow may also be produced via the transition from bipolar charging to a more dominant role of ions in particle charging [37] [47] [48]. Via all these interactive forces, dusty plasmas will glow, oscillate, pulsate with light, and can display a range of motions (behaviors), e.g. swarming, aligning, congregating, clustering, crowding; all of which contributes to collective or individualized behavior including pursuit, head-on collisions and energy cannibalism [37] [38] [39]—(e.g. hunter-predator behavior) exactly as observed in the thermosphere.

15. Carl Sagan: Extraterrestrial Atmospheric Extremophiles of Jupiter

Carl Sagan theorized about the possibility of life in Jupiter's upper atmosphere and detailed the growth, metabolism, movement, and behavior patterns of these hypothetical upper atmospheric Jovian organisms. Sagan and Salpeter [49] argued that these atmospheric Jovians would have the "metabolic and photosynthetic parameters typical of terrestrial algae…but…adapted to the Jovian environment." "The best terrestrial analogy seems to be the surface of the sea." Likewise, it has been noted, with side-by-side film-footage comparisons that the plasmas of the thermosphere engage in behaviors similar to simple marine organisms [14] whereas plasmas sometimes behave as if they are floating on water.

Sagan proposed three ecological niches within Jupiter's upper atmosphere populated by species adapted to those atmospheric environments, *i.e.* primary photosynthetic autotrophs ("Sinkers"); larger organisms which might be either autotrophs or heterotrophs ("Floaters"); "Scavengers" which could be considered similar to Floaters; and "Hunters" which are the most intelligent and hunt Sinkers, Scavengers and Floaters.

Sagan hypothesized that Floaters and Sinkers could obtain free energy from sunlight and were "filled with gas", which provided buoyancy and a means of propulsion, thereby enabling them to move about and engage in various behaviors. Sagan and Salpeter [49] also hypothesized that these upper atmospheric "Hunters" could grow to be many kilometers in size.

Likewise, in the upper atmosphere of Earth, there are plasmas that "hunt" and those that appear to simply hover in place (floaters), and those that "sink" into the lower atmosphere to "graze" on and "scavenge" electromagnetic energy released within thunderstorms.

16. UFOs, Plasmas & Foo Fighters of WWII

The "plasmas" filmed by ten different shuttle missions change shape and can be up to a kilometer or more in size. Many also engage in different behavior that could be likened to Carl Sagan's "Hunters" "Floaters" "Sinkers" and "Scavengers." As documented by STS-80, STS-119, and STS-75, "plasmas" descend into

thunderstorms as single plasmas, or in groups of two, three, or more, followed by yet others; such that entire "fleets" of plasmas may descend into the troposphere which extends from ground level to 10 km (33,000 feet) above the surface. It can be predicted that these plasmas might also be attracted to the radio signals, sources of heat [5], and electricity generated by propeller- and jet-propelled aircraft; and when observed, classified as UFOs, "bogies" "UAPs" or, as was common during the second world war: "Foo fighters".

Figure 27. (Top) A U.S. Coast Guard photographer, Shell R. Alpert, took a photograph through a window screen showing three cloud-like formations over the "Winter Island" Salem, Massachusetts, Air Station at 9:35 a.m. on 16 July 1952. (Official U.S. Coast Guard photograph). The Air Station had radio radar and conducted sea rescues, and its facilities served amphibious helicopters and seaplanes. The weather and temperature at that time was between 88˚F to 91˚F with a dew point of 65 to 67.68 (muggy and lots of moisture in the air). According to the Weather. gov, "As a general rule, the surface dewpoint needs to be 55˚F or greater for a surface-based thunderstorm to occur." As can be seen from the photograph, the sky was dark and overcast--perfect weather for thunderstorms.

In the 1940s, pilots reported being confronted, toyed with, and challenged by UFOs-UAPs that were white and silver, often glowing or translucent, and shaped like clouds, donuts, balls, spheres, etc. [16] [22] [50] [51] [52] [53] [54]. Allied pilots called them "Foo Fighters". Hundreds of pilots and flight crews described the "Foos" as on fire, glowing, and sometimes changing colors from silver-white to red-orange.

For example, as reported by Allied Supreme Headquarters and numerous news media outlets, including in 1944, by the New York Times: "Airmen of the

American Air Force report that they are encountering silver colored spheres in the air…either singly or in clusters. Sometimes they are semi-translucent… There was no information available as to what holds them up like stars in the sky, what is in them, or what their purpose appears to be" [53].

According to the official military reports the Foos were incredibly fast, capable of amazing maneuvers and impossible turns, and would ride alongside, above, below, and directly in front of U.S. fighter planes which proved incapable of shooting them down [50] [51] [52] [54]. Initially, Allied Pilots thought these were German secret weapons. However, German pilots also observed these fast-moving round glowing objects, as did Japanese pilots. The Foos were attracted to the planes. The Foos sometimes flew in groups that surrounded the planes or followed close behind. Typically, they would vanish after "toying" with warplanes [9] [22] [50] [51] [52] [54].

17. US Jet Fighter Pilots Encounter Plasma UAP?

On June 25, 2021, the Office of the Director of National Intelligence [55] released a 9-page redacted intelligence report, titled "Preliminary Assessment: Unidentified Aerial Phenomena" which assessed "the threat posed by unidentified aerial phenomena (UAP) and the progress the Department of Defense Unidentified Aerial Phenomena Task Force has made in understanding this threat." The focus of the report was the over 120 incidents of extremely unusual aerial phenomena witnessed by Navy pilots and foreign militaries in the last two decades [56] [57].

Quoting this report [55]: "*UAP…appeared to remain stationary in winds aloft, move against the wind, manoeuvre abruptly, or move at considerable speed, without discernible means of propulsion. In a small number of cases, military aircraft systems processed radio frequency* (*RF*) *energy associated with UAP sightings*." According to this U.S. government report [55], UAP have no visible engine or infrared exhaust plumes, but were capable of hypersonic speeds beyond "*the sound barrier without a sonic boom*." Many of the observations were recorded on video, including one taken by a fighter jet's camera in early 2015 that shows a whitish oval object about the size of a commercial plane, that looked like an oblong cloud but was described as a giant Tic Tac. It was moving at hypersonic speeds over the ocean as pilots expressed amazement. In audio recordings, one pilot exclaims: "*There's a whole fleet of them*".

Official film footage released by the U.S. government indicates that when the "tic tac" was filmed in color, the object was "white" and gave off a bright glow. Yet another UAP is a megalithic object resembling a glowing "spinning top" (*i.e.* a "flying saucer") that shifts in orientation from the right to the left (**Figure 28**, **Figure 29**).

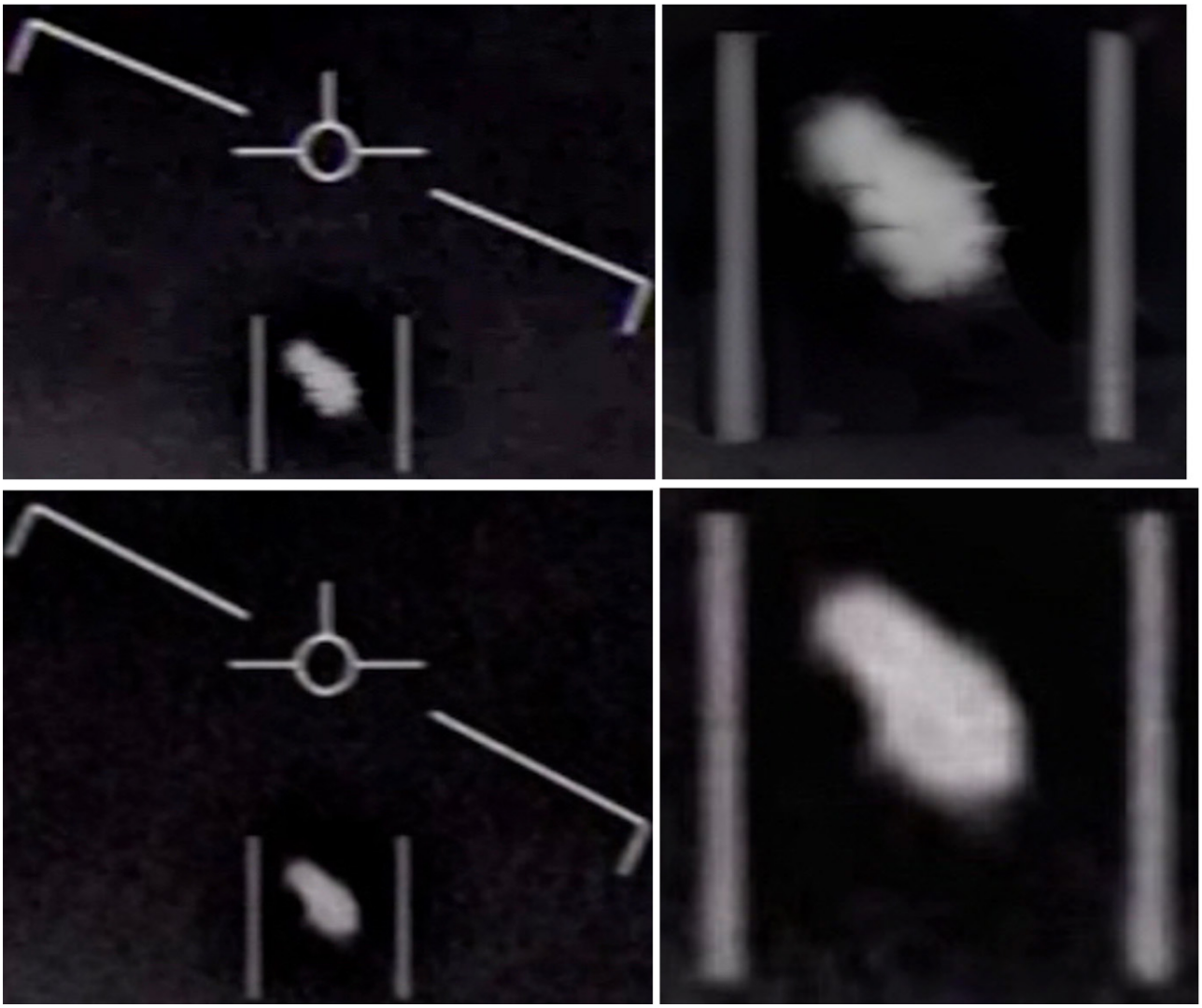


Figure 28. "UAP" filmed by US Navy Pilots in 2015.

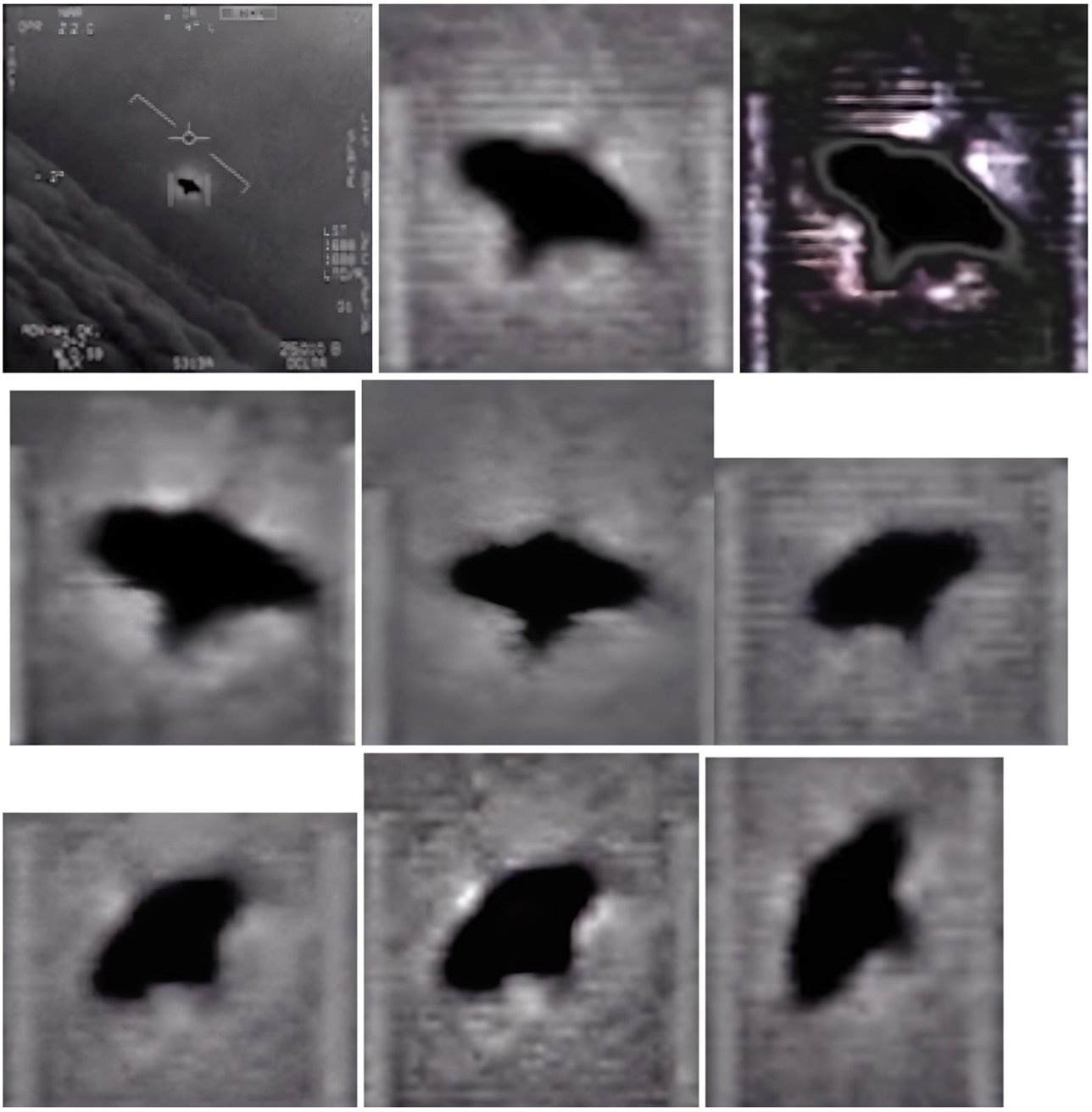


Figure 29. "UAP" with a silhouette glow, shifting orientation from right to left. Filmed by US Navy Pilots in 2015. (Top row middle, right, processed with Fotor image enhancement software).

18. They Came From Outer Space?

As noted the tethered satellite system (TSS-1R) was generating electromagnetic activity and ionizing the surrounding space medium [58] [59]. Over the next 24 hours, plasmas began appearing and engaging in complex interactions with one another and contacting the tether. But where did these plasmas come from? Deep space? Or were they dispersed throughout the thermosphere, and only gathered when a source of electromagnetic activity was discovered?

It is not unreasonable to ask if the TSS-1R may have generated and created

these plasmas. Upper atmosphere plasmas are electromagnetic entities that are believed to form in response to geomagnetic storms, solar flares, coronal mass ejections, the waxing and waning of sunlight, atmospheric waves, and other sources of magnetic activity [3] [5] [7] [19] [39]. TSS-1R ionization of the space medium may have either reduced or increased the number of electrons of dust and various nearby particles, ionizing these dust particles, molecules, and atoms that coalesced into plasmas [37] [39]. These specific plasmas may have been generated nearby and contained charged particles that assumed various cellular shapes and moved about the tether and each other; i.e. they did not come from deep space, they were formed in near-space.

As discussed, hundreds of plasmas were filmed by the crew of STS-80, above thunder-lightning storms, during daylight hours. Some began making 45-degree and 90-degree turns while slowing down, and then descending into the storm. The question: where did they come from?

Perhaps they were attracted to the storm from a great distance in deep space via the generation of charges between Earth and the ionosphere. Coupled with the power and force of lightning, electromagnetic waves may travel rapidly around the planet and into space—thus alerting plasmas to a source of electromagnetic activity [39]. They could then follow the waves, from deep space, back to Earth. Because these waves are reflected back to Earth via the ionosphere, and bounce back into space (referred to as "Schumann resonance"), plasma could be alerted and directed from deep space to the source and arrive singly, in pairs, or in herds, from a variety of directions.

Alternatively, they may have been created locally, above the storm, via the generation of charges between Earth and the ionosphere which can trigger EMFs up to 250 Hz. Since ionization can be induced by strong electromagnetic fields, this may explain why hundreds of these plasma-like entities appear above thunderstorms. That is, perhaps they were created above the storm and then descended. The problem with that explanation is plasmas have been filmed exiting these storms and returning to the thermosphere and then moving outside of camera view.

19. Electromagnetic Dusty Plasmas "Metallic" Air-Bubble Cellular Structure

These plasmas appear to be unique extraterrestrial entities completely different from "life as we know it." Although the particles of dust embedded within are carbon-based, and despite their cellular structure and what appears to be a pulsating nucleus, there is no evidence these plasmas are biological or possess RNA or DNA—though it is possible plasma-crystals within the plasma nucleus may have some DNA-like properties [11] [17] [18].

Nobel Laureate Hannes Alfvén, in his monograph, "Cellular Structure of Space" [12], argued that electromagnetic plasmas naturally assume a cellular structure and can create cell walls consisting of electric currents that divide segments of "space into compartments with different magnetization, temperature,

density, etc." Alfvén [12] [13] also proposed that plasmas have at least two cellular layers, an inner and outer layer that differ in positive vs negative charges and which create double-layer expanding and contracting compartments or pockets similar to "air bubbles."

According to the May 1808 Transactions of the Swedish Academy of Sciences (TSAS), on May 16, 1808, the sky over the village of Biskopsberga, Sweden, became rust-red overcast and was soon filled with an increasing number of flying spheres resembling translucent "air-bubbles" and "soap-bubbles" that engaged in strange and frenzied behaviors. K.G. Wettermark, secretary of the Swedish Academy of Sciences, and farmers working in their fields reported observing numerous spherical translucent objects, like "air bubbles", that would speed up, slow down, chase after each other, and change colors. According to the TSAS, "The phenomenon continued uninterruptedly, for more than two hours, during which time millions of the same bodies continued to appear in the west, one after another in a disorderly manner, and continued their activity in a manner exactly the same".

Wettermark reports that he observed one of the translucent "air-bubble" spheres strike the ground. When he approached it was in the process of disintegrating and changing colors. He reports that as it lay flat and thin upon the ground it looked "gelatinous" and like a "cobweb" and then slowly dried up and disintegrated into nothingness as other "air-bubbles" spheres continued their frenzied activity in the sky.

The description of the frenzied "air-bubble" gelatinous cobweb spheres observed over Biskopsberga bears no similarity to stringy clumps of airborne spider webbing (which is white and does not change colors or disintegrate upon touching a hard surface). Certainly, farmers would recognize a spider web when they see one. By contrast, over the centuries UAP are commonly referred to as spheres.

It is unknown if the Biskopsberga spheres were cellular plasmas with "air bubble" pockets enclosed by translucent gelatinous "cobweb" "thin" double cellular walls. Cobwebs, however, consist of silk which is a shimmering prism-like reflective substance that reflects and refracts incoming light at different angles producing different colors including metallic-looking cloth. UAP have been described similarly. As summed up by the Commander of STS 115: "*The best way I can describe it is as some kind of reflective cloth—some type of metallic looking type of cloth—a structure which is definitely not rigid—it's not a solid metal structure*" [14] [15].

UAP and Foo fighters have also been known to change colors; and have been likened to electromagnetic air bubbles, *i.e.* "*buoyant charged bodies*" [24].

20. Plasma Shape-Shifting & Automata vs Individualized Intelligent Behavior

STS-96 filmed several dozen different self-illuminating plasmas flying from all directions and at different speeds toward and into a raging storm in the lower

atmosphere. STS-80 also filmed hundreds of these structures above and descending into a storm. Some plasmas slowed their speed of descent and changed direction as they descended. These plasmas pulsated with light even when photographed at night and before sunrise. In the case of STS-75, they glowed when the tether and satellite were still shrouded in darkness. Although possibly reflecting sunlight, their glow also appeared multi-directional. Likewise, UAP photographed by U.S. Navy pilots also gave off a glow as did hundreds of plasmas that congregated around the electromagnetic-electricity-generating satellite tether.

The behavior of these plasmas, as documented in this report, including their oscillating movements, pulsations, attractions, repulsions, collisions, plasma trails, and their glow, are mediated by electromagnetic activity and the differential electrical-polarizing charges of voids, dust particles, and other plasmas in the space medium [37]-[48]. The self-illumination, their seeking of association with sources of electromagnetic activity, and their interactions with these sources strongly support the hypothesis that these entities are electromagnetic plasmas and can be classified as a "Fourth State of Matter" the other three being solid, liquid, and gas.

Plasmas may have different electromagnetic properties which cause them to become distinct and compartmentalized, as they consist of electrically charged particles that differ from one another regarding magnetization, density, and temperature. Plasmas, as documented in this report, also have distinct behavioral patterns that are most likely affected by their electrical properties and those of other plasmas located at a distance or nearby; and this may also cause them to interact—as documented experimentally with dust plasmas [37]-[48]. They also shed a plasma tail after they contact one another and then move away as documented in this report, and this is likely due to the shedding of electrons and dust.

The ratio of neutral particles to ionized particles, the presence size and number of voids, dust particle charges, electron depletion, and so on, can also create a wide spectrum of plasma characteristics, types, and behaviors, due to the interactions between the charged and neutral particles. Furthermore, the type and amount of dust may differ, with some plasma containing fragments from chondrites that shattered upon striking the atmosphere. Hence, plasmas might assume different shapes and colors as well as engage in behavior patterns that differ from other plasmas; or they may behave similarly [1]-[7] [17] [18] [19] [20] [37] [39] [40] [43] [44] [45] [46]. Some plasmas engage in what appears to be "individuality" others as a herd.

Not all plasmas engage in the same behavior—with some changing direction to strike another, or with others also speeding toward a "head-on" collision, and then both intersect or make contact—as yet other plasmas remain unmoving—then continue along the same path or change direction [37] [39] [40] (**Figure 9**, **Figures 11-13**, **Figures 13-24**). This "collisionality" may be a form of energy exchange or energy cannibalism. What is noteworthy is that some "targets" re-

main motionless, often along the same line of trajectory as a single plasma speeds through space piercing one after another and slightly altering course to strike yet another stationary target, and often changing in shape and size after penetration (**Figure 25** and **Figure 26**).

Although some plasmas show evidence of "individuality" and engage in "hunter-predatory" energy cannibalism, this does not prove their behavior is purposeful or directed by "intelligence." Rather, it appears their actions may be little more than "automata" and involuntary. Plasmas have unique characteristics differently influenced by electromagnetic activity, dust and electron density and charges, and their own "cellular" electromagnetic composition [37] [39]. On the other hand, and as discussed in section 21, we cannot rule out the possibility there may be "outliers" that have evolved beyond automata.

21. Speculation: Pre-Life, Non-Biological Life, Origins of Life, Acquisition of RNA, DNA?

Plasmas are considered a fourth state of matter. Can they also be considered a form of pre-life, or a non-biological fourth domain of life? Are they alive? Might some dusty plasmas represent a step between non-living and living matter [8] [9] [10] [11] [12] [13] [17] [18] [19] [20] [23]? According to Alfvén [12] [13], these complex gravity-free plasmas naturally self-organize into stable spheroid, cloud-like, and corkscrew-shaped structures and contain cellular membranes.

Experimentally created plasmas are sometimes observed to have a nucleus (or void) at their center [11] [12] [18] [20] [38] [42] [43] [44]—much like many of the plasmas observed in space. If that nucleus contains plasma-carbonaceous-chondrite-dust-crystals, might those crystals confer RNA and then DNA-like properties on the plasma? In computer simulations of the reduced gravity of space, plasmas bonded together, forming electrically charged corkscrew-shaped assemblies that resemble strands of DNA. According to V.N. Tsytovich [11] of the Russian Academy of Science, "These complex, self-organized plasma structures exhibit all the necessary properties to qualify them as candidates for inorganic living matter." Tsytovich, *et al.* [11] [18] and Teordorani [20] argue that the conditions necessary to generate these living plasma are common in space; and that plasma may be a common extraterrestrial form of (abiogenic) life.

It is reasonable to ask: might a transition from non-biological plasma-cellular to biological cellular occur following the acquisition of organic matter, proteins, amino acids, nucleotides, etc. if that leads to the fashioning of RNA then DNA within the plasma's dust-crystal nucleus? Can dusty plasmas in space acquire RNA then DNA and achieve life?

It is well established that common elements in the known universe which are essential to life include hydrogen, oxygen, carbon, nitrogen, sulfur, calcium, and phosphorus [reviewed in [21] [23] [60] [61] [62]); all of which are continually irradiated by ions which can generate small organic molecules [37] [61] [62]. Seventy-three extraterrestrial and nineteen terrestrial amino acids have so far

been in identified in carbonaceous chondrites [60] [61] [62]. These molecules and amino acids, once incorporated into a plasma, could evolve into larger complex organic molecules and compounds. Moreover, interplanetary dust is carbon-rich [39]. Further, glycine and tryptophan have been identified in the interstellar medium [61] [62]. Tryptophan is an essential for protein formation. Thereafter, the combination of hydrogen, carbon, oxygen, nitrogen, cyanide, and amino acids, they could combine to create adenine which is an RNA-DNA base, as well as other nucleotides.

Polarized radiation induces asymmetric photochemistry leading to homochirality and the induction of chiral asymmetry which can produce an excess of L-amino acids, which in combination with tryptophan (discovered in the Perseus Cloud star system by Susana Iglesias Groth, an IAC scientist), could lead to the formation of proteins, nucleobases and then RNA—all of which could take place within plasmas located in the thermosphere. RNA can store genetic information encoded in the order of its monomers, the ribonucleotides, as well as catalyze its polymerization and self-replicate [21] [23] [61] [62]. Oxygen and phosphorus could ladder RNA-DNA base pairs together.

Consider the following: Dusty plasmas may contain or generate carbon [37] [39]. Dust particle surfaces within the plasma can serve as sites for the formation of new molecules [37]. Dust and debris from carbonaceous chondrites that shattered upon striking the upper atmosphere would contain amino acids and other compounds [61] [62] that might be incorporated within individual plasmas; and these acids and compounds would be subject to ion chemistry [37]. These particles, if they combine, could grow up to several centimeters within the dust-induced plasma void-nucleus, leading to electrically charged lattice- and corkscrew-shaped assemblies [11] [18] [20] [37] of nucleic and amino acids. These could form enzymes and proteins that begin catalyzing reactions within the plasma cell membrane giving the membrane adhesive stability and conferring movability; and leading to the generation of self-replicating RNA-like polymers and protein enzymes (polynucleotides) that resemble RNA but are chemically simpler and can act as a catalyst.

To speculate: this molecular-protein-amino acid complex and the building blocks of nucleotides and other vital prebiotic molecules could have been exogenously incorporated into the confines of a plasma-dust-crystal nucleus. Hypothetically, this combination could have led to the first RNA world (within a dusty plasma), followed by DNA-based life.

However, it must be emphasized that experimentally produced plasmas do not contain any of the precursors to the formation of a single nucleotide. Nevertheless, plasmas with plasma crystals or which contain a plasma-dust nucleus (void) appear to have life-like as well as shape-shifting and behavioral capabilities [11] [18] [20]. They can arrange themselves into orbs, balls, and rings, display swarming behavior, change shape, and engage in group vs individual behavior [37]. The behaviors include targeting, tracking, dramatically altering their trajectory, and accelerating to intersect other plasmas that hover in place or which

are coming from the opposite direction. To speculate: perhaps it is these "hunter-predators" who are the evolutionarily advanced outliers that exist between non-life and life and within which evolved an RNA world.

How long can a plasma live? What is the lifespan of a plasma in space? Unknown. However, it is likely all require electromagnetic energy to survive, for in its absence, they lose their stability and coherence and "die".

22. Suggestions and Locations for Capturing—Filming Plasma UAP

As documented in this report, plasmas in the thermosphere are attracted to sources of electromagnetic activity including tethered satellites generating electric pulses into the space medium. Therefore, it is possible to scientifically study and examine these plasmas as they form, congregate, and interact. This can be accomplished via the launching of a tethered satellite generating electromagnetic pulses and equipped with multiple cameras with infrared, x-ray, telescopic, and other sensory capabilities; *i.e.* an alien-hunting satellite. If this same alien-hunter satellite is equipped with an electrified net, perhaps it would be possible to attract and capture an extraterrestrial plasma.

In addition to satellites, there are locations on Earth where plasma-like atmospheric anomalies have been observed to occur with some frequency—such as Hiroshima and Nagasaki, Japan, and the Hessdalen valley in central Norway [63] [64] [65]. These locations could serve as sites for specially equipped observatories dedicated to detection, identification, and analysis.

The "Hessdalen lights" for example, have been regularly observed since the 1930s, and are believed to be dusty plasmas [16] [63]. They are characterized by oscillating lights, buoyancy, rapidly changing colors, collisionality, and the ability to hover, move slowly, make rapid turns, and accelerate to hypersonic speeds. If they are plasmas, they may be attracted to this area because the sediment of the Hessdalen valley includes crystal rocks and quartz that have intense (piezoelectricity) electromagnetic charge densities [65].

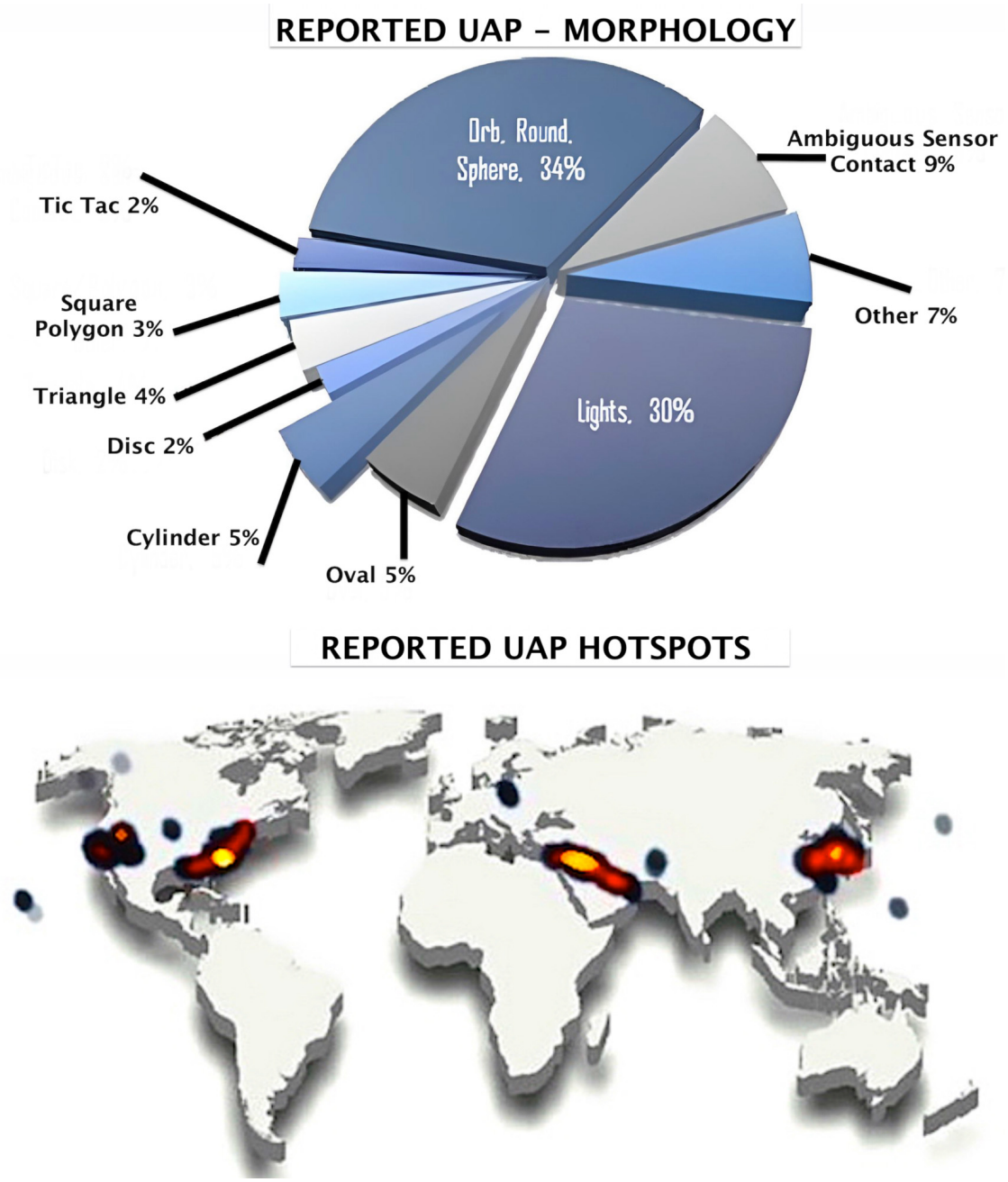


Figure 30. UFO/UAP "hot spots" of frequent observation and types as reported to and by the U.S. Dept. of Defense. Cleared for open publication April 17. 2023. Dept. of Defense [66].

According to the U.S. Dept. of Defense "unidentified anomalous reporting system" [66] UAPs are commonly observed around nuclear power facilities, and the areas above and surrounding Hiroshima and Nagasaki—destroyed by atomic (nuclear) bombs in 1945—and Fukushima Prefecture—site of a major nuclear power plant accident in 2011 (**Figure 30**). Eye witness accounts and photographs depict these UAP as glowing, translucent, spherical, or shaped like clouds, and colored silver or white, with the ability to hover in place, make sharp turns, and accelerate to hypersonic speeds.

23. Not All UAP Are Plasmas

It must be stressed that some UAP appear to possess technology far superior to any current technological capabilities—as admitted by the Office of the Director of National Intelligence [55]: "*UAP appear to demonstrate advanced technology*."

In 2023, Ryan Graves, an F-18 pilot [9] reported to the U.S. Congress that he and his squadron have repeatedly observed UAPs which he described as "*dark grey or black cubes…inside of a clear sphere, where the apex or tips of the cubes were touching the inside of that sphere*." He also concluded these UAPs demonstrate "*advanced technology*." As of this writing, plasmas that are "*dark grey*" shaped like "*black cubes*" have not been observed in space, or created experimentally--though they may appear dark if filled with dust.

Former Navy Commander David Fravor also observed "*vehicles*" (UAP) with "*superior*" "*technology*." While commanding a squadron of F/A-18F fighters, Commander Fravor reported that "advanced radar" detected "*multiple vehicles*." He and three others spotted a "*white Tic Tac-looking object*" "*above the white-water area*." "*There were four of us in the airplanes watching this thing for roughly five minutes*," he reported. The encounter was filmed. Based on detailed analysis, Commander Fravor, a graduate of the Top Gun naval flight school, reported that "*the technology that we faced is far superior to anything that we had*."

24. Summary

The "plasmas" observed in the thermosphere engage in behaviors similar to simple multicellular organisms; a phenomenon also observed among plasmas generated experimentally. Plasmas are electromagnetic entities that have cellular characteristics and display distinct behavioral patterns which are affected by their electrical properties; and this causes them to interact and behave individually or collectively. Because plasmas in the thermosphere are attracted to electromagnetic activity and descend into thunderstorms and the lower atmosphere, they likely account for at least some of the numerous reports of UFOs/UAPs over the last several thousand years including the "Foo fighters" observed by German, Japanese, and Allied pilots during WWII, and at least some of UAPs recently reported by jet pilots.

Numerous credible eyewitnesses, often military pilots and astronauts, as well as the British and U.S. governments have expressed the concern that some UAP might possess "advanced technology." There is no evidence that plasmas have technological capabilities.

According to U.S. Dept. of Defense and other government agencies, the majority of UAP can be attributed to man-made or natural atmospheric phenomena without providing any reproducible evidence to support these conclusions or any testable explanation as to the origin of any atmospheric conditions that can account for UAP sightings. In this report, we have provided that testable repro-

ducible evidence: plasmas in the thermosphere that descend into the lower atmosphere. The findings in this report can therefore explain why numerous anomalous and unusual phenomena have been observed worldwide for thousands of years. However, given that the U.S. Dept. of Defense has classified and refuses to release an unknown number of military videos depicting UAP [66] it is reasonable to suspect that some UAP might be from extraterrestrial civilizations where humanoids evolved on worlds much older than our own.

Nevertheless, prior to the publication of this report, there has been a dearth of reproducible data making it impossible to draw definitive, scientific conclusions about UAP. Furthermore, given that witnesses are ridiculed for reporting on UAP this negativity creates an almost insurmountable obstacle to collecting data on these phenomena. In consequence, there has been no "hard" evidence published in the peer-reviewed scientific literature to support an extraterrestrial origin for UAP, until the publication of this report. We have provided hard compelling and reproducible findings and data—photographic, video, and experimental—as well as detailing a means to detect, attract, photograph, film, examine and study UAP phenomenon in the thermosphere.

The plasmas depicted in this report are electromagnetic phenomenon, and are estimated to be up to a kilometer (or more) in length or diameter. Plasmas in the thermosphere have been observed to change shape and grow larger or smaller. Plasmas can also be less than a few centimeters in diameter. Unless created in a laboratory, or they gather in large herds in the lower atmosphere and interact or accelerate to hypervelocity, the smaller plasmas are far less likely to be observed or detected. Are plasmas alive? Just as a plasma represents a "fourth state of matter" which is neither gas, liquid, or solid, plasmas that form or gather in the thermosphere may also represent an alternate state of life that is not carbon-based and has no genome. Since they can take cellular forms, these plasmas may also represent a form of pre-life, their cellular structures and nucleus and plasma-dust-crystals providing the framework for the incorporation, synthesis, and organization of the elements and amino acids necessary to produce RNA, leading to the emergence of DNA-based life. To speculate, these plasma-like entities could have originally provided the basis for life to begin. Therefore, whereas prior to this report, all abiogenic scenarios have been speculative at best, the findings provided here provides a data-based testable theory that can explain how life began.

It is important to stress that there is no evidence that plasmas in space contain RNA, DNA, or the capacity to generate the proteins, amino acids, and nucleotides necessary to create or reproduce life "as we know it". Instead, these plasmas represent a fourth state of matter and when observed in the lower atmosphere likely account for many of the UFO-UAP sightings over the centuries.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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