THE UTIAS NEWSLETTER

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The UTIAS UFO Project

by Rod Tennyson, Professor Emeritus, UTIAS

Background

The surge in international interest in UFOs (unidentified flying objects) began around 1947, shortly after World War 2 (WW2). Many historical books document the host of sightings around the world, but little is known about the Canadian activities in this field that took place as early as 1950. Many Canadian government agencies were involved in documenting sightings reported by the public, including the Department of Transport (DOT), the Defence Research Board (DRB), the National Research Council (NRC) and the Department of National Defence (DND).

Canada's official entry into the investigation of this UFO phenomenon started with Mr. Wilbert Smith, who headed up Project Magnet in 1950. While Smith's main research interest focussed on geo-magnetism at the federal Telecommunications Division of DOT in Ottawa, he was keenly interested in the UFO phenomenon. Subsequently, he was officially authorized by a DOT Deputy Minister to make a detailed study of this phenomenon, called Project Magnet. Smith is quoted as saying that research into the earth's magnetic field could lead "to something which may well prove to be the introduction of new technology." He also noted "this is borne out by the investigations which are being carried out at the present time in relation to flying saucers." Smith believed that UFOs might be operating on geo-magnetic field effects. Mr. Smith went so far as to establish a government experimental detection facility in Shirley Bay to monitor anomalies in the local magnetic and radiation fields. Although he observed one dramatic change in a magnetic field detector, it was never explained. Eventually, Smith produced an 'unofficial' government report on his work that probably led to the subsequent involvement of the DRB, and other members of the DND in assessing the UFO phenomenon.

It was Dr. Omond Solandt, Chairman of the DRB, who initiated a formal request to set up a government committee to "see if we can make anything out of these flying saucer reports" in 1952. It should be noted at this point that Dr. Solandt was a good friend of Dr. Gordon Patterson, Founder and First Director of the University of Toronto Institute for Aerophysics (UTIA), the forerunner of UTIAS. DRB funded much of the early research at UTIA, and helped finance the relocation from the Downsview airfield and construction of UTIA at its current site.

The committee Dr. Solandt formed was called, inexplicably, "Project Second Story" under the chairmanship of Dr. Peter Millman, who worked at the NRC Dominion Astrophysical Observatory in Ottawa. It is interesting to note the membership of this committee since it indicates a strong government interest in the UFO subject at that time; members included representatives from the Directorates of Air and Naval Intelligence, Military Operations and Planning and members of the DRB. After several meetings spread over the year, the committee concluded that the situation did not warrant a large scale official investigation. Millman himself, however, concluded that there were indeed a number of unexplained cases, and recommended that the international community should establish a standard format for recording and reporting sighting. This committee essentially disbanded after 1953. Curiously, Mr. Smith, who had compiled a file on UFOs, was not a member of this committee.

Throughout the following years, DND maintained a UFO file based on reports submitted to the government from the public, and in some cases, actually sent investigators to interview witnesses to such sightings. In fact, DND investigators visited specific sites where 'landings' had reportedly occurred. These

reports remained confidential and not available to the Canadian public. In 1968, the files were turned over to NRC under the oversight of Dr. Millman, who now worked in the Upper Atmosphere Research program at NRC. These reports were retained at NRC in what was called the "Non-Meteoritic Sighting File." NRC's main task in this field, as Millman saw it, was to remain a government repository for public sightings, with no field or investigative work undertaken by NRC.

UTIAS Project UFO

In the 1960s, UFO sightings around the world increased exponentially, with many occurring in Canada. One remarkable story was reported concerning a close encounter with a UFO in the wilderness bush of Manitoba. Follow-up stories emerged that the witness had suffered serious illness from his encounter with the UFO. Although Canadian government files were accumulating many of these reported sightings, it appeared that no apparent 'scientific' field investigations were being conducted when 'physical evidence' was reported.

To add to this UFO frenzy, the U.S. established "Project Blue Book" and enlisted the aid of Dr. Allen Hynek, a well-known astronomer from Northwestern University, Illionis, to investigate American sightings. He originally debunked the existence of UFOs. In fact, one of his famous remarks attributed some sightings in a wilderness area as nothing more than an illusion caused by swamp gas. As many of us know, he changed his mind about UFOs and in fact became a strong advocate of the notion that there must be some substance to many of these stories. He in fact established a ranking of the types of UFO incidents he was investigating: those of the first kind (sightings), those of the second kind (some physical evidence, such as photographs) and encounters of the third kind---actual physical contact which would include abductions (the subject of a well-known movie of a similar title in which Dr. Hynek served as a consultant).

Thus Dr. Patterson decided to establish a core of aerospace scientists to investigate sightings in Canada. I was delighted when he asked me to lead our investigative group in these early days of UFO sightings. Two of my colleagues, Dr. Stan Townsend and Dr. Ray Measures, agreed to work with me. Interestingly, none of the senior professors at UTIA wanted to become involved, perhaps for obvious reasons. However, the three of us, being junior Assistant Professors, thought it would be a great learning experience to find out more about this subject, and to collaborate with U.S. scientists such as Dr. Hynek and Dr. James MacDonald. Dr. MacDonald, noted for his in-depth UFO reports, pleaded with the United Nations and the U.S. Air Force to formally support research on UFOs. Dr. McDonald had served in the U.S. Navy Intelligence section during the war, 1942-45, and was the Director of the Institute of Atmospheric Physics at the University of Arizona. In 1968, he visited UTIAS to review his case for the existence of UFOs. Later, in 1971, we learned of his mysterious death in the Arizona desert.

The Institute also had a working relationship with the Canadian National Research Council in Ottawa, which had access to DND sighting reports. Thus, our first task was to visit NRC and review DND files that were not open to the public. I recall that Prof. Barry French accompanied us on that visit since he was intrigued by what the DND might have on file. As soon as we arrived on site, we were asked to sign a non-disclosure agreement that would prevent us from ever disclosing any of the contents of the files we were about to read, subject to severe penalties for non-compliance. We all agreed somewhat reluctantly, since it put us in a position of not being able to even talk to our boss, Dr. Patterson, about what we had read. Suffice it to say, even 40 years later, there was a great deal of investigative information that could not be made public since many of the comments made by the interviewers from different government agencies might be subject to legal action. On the other hand, there were some cases with photographic evidence that were termed "unexplainable."

As a result of this first foray into the world of confidential information, we agreed to inform the 'Doc,' our friendly name for Dr. Patterson, that we saw nothing that should dissuade us from following through with our plans, at least for a year, to see what evidence we could accumulate.

Over the next year or so, we were deluged with phone calls about sightings, photographs and on occasion reports of physical evidence that had to be investigated.

Some phone calls actually resulted in a visit by at least two of the committee members when we felt there was a real opportunity to hear about a 'high probability' sighting. At this point, I should mention that we received many reports of individuals 'communicating' with aliens, but there was little we could do other than listen politely and move on to other calls.

One particular phone call came from an Ontario Provincial Police station in Whitby, requesting the UTIA team to come out that night to speak with one of their patrol officers who had seen UFO lights flying down the length of Lake Ontario, parallel to the highway. The officer had been so entranced by these lights, as

he tracked them along the highway, that he hit an embankment and flipped his car. Dr. Ray Measures and I went out and met the officer, whom we interviewed in a jail cell; not that he had been arrested, but it was the only private space available there at that time. We believed he had seen these lights and we told his commanding officer that we had also received other calls from people who seen similar lights flying at high speed over the lake. Later the next day, we found out through contacts we had with the Canadian Air Force that it was common practice for fighter aircraft to attempt to penetrate US air space over the lake in joint exercises undertaken by the U.S. and Canada. The lighted aircraft would be visible, and then at a certain point in the exercise, the lights would flash out, giving the impression of the 'UFO' vanishing at high speed. After that, we received no more calls from the OPP.

One particular Class 2 sighting involved a colour slide of a grey coloured elongated object that cast a cloud on the forest trees below, as well as reflecting sunlight off parts of its surface. This slide was submitted to our group by a forester in northern B.C. It was found to be authentic, based on an analysis performed by DND in Ottawa, (prior to the computer age)….. in other words, the slide was clearly and provably undoctored, and the object's size was consistent with the shadow on the trees…not a photograph of a tossed disc, which we often received as 'evidence' of a flying saucer. We might have dismissed this sighting as being an unusual cloud except for the fact that the forester had noted that after a few minutes, the object suddenly flew off and disappeared. This was a 'sighting' that we could not explain.

One interesting case that we solved related to what is known in the UFO literature as 'angel hair.' We were sent spherical-shaped clumps of metallic strips (about 4 in. in diameter) found in a deserted area of a farmer's field in northern Ontario. It turned out, after analyzing the composition of the strips, to be aluminum radar chaff, based on measurements we made of their individual length and width. These clumps of radar chaff were dumped during war games between the U.S. and Canada when Canadian fighter aircraft attempted to penetrate U.S. airspace undetected across the lake at night This was a non-scheduled exercise to test U.S. readiness. Clumping of the chaff occurs when it is stored in canisters in a hanger and becomes damp over time. When the canisters are slit in flight to produce a floating cloud of radar-reflecting chaff, it can fall to earth as clumps. Knowing the strip dimensions apparently allows the calculation of the wavelength of the radar being used - much to the dismay of the U.S. military. We were quickly informed not to publish this data. Consequently, not wanting to antagonize DND, we kept quiet about this information and reported only that the material was aluminum foil, not some alien material. We were never pressed to explain where it came from.

We analyzed many sightings and physical evidence, including, for example, ground circles in remote fields, and we interviewed many people who claimed to have seen a UFO. Our UFO program was phased out following the publication of a significant UFO report by Dr. Edward Condon. Condon was a well-known and respected physicist from the University of Colorado hired by the USAF Office of Scientific Research to perform a comprehensive review of all sightings logged in their Blue Book files. We visited Condon in Colorado prior to the publication of his findings, to get his assessment on this phenomenon. In the end, his conclusions essentially laid to rest the reality of alien space craft visiting earth, based on the data he had at hand, although he had to admit there were several cases that were both credible and unexplainable. His report resulted in the closing of Project Blue Book in 1969, as well as our program at UTIAS. Later, however, Dr. Hynek formed a Center for UFO Studies (CUFOS) in 1973 under his direction, and purchased the UFO files from NICAP when it folded shortly after the Condon report. Hynek died in 1986, but CUFOS still exists today.

Occasionally, we hear of Members of Parliament asking the government to release specific UFO files, and to open the books on any classified documents pertaining to UFO reports. Most cases that are classified remain so due to legal and privacy

Life After UTIAS

Canadian ROBO at NASA

by Tim Braithwaite, UTIAS Alumnus

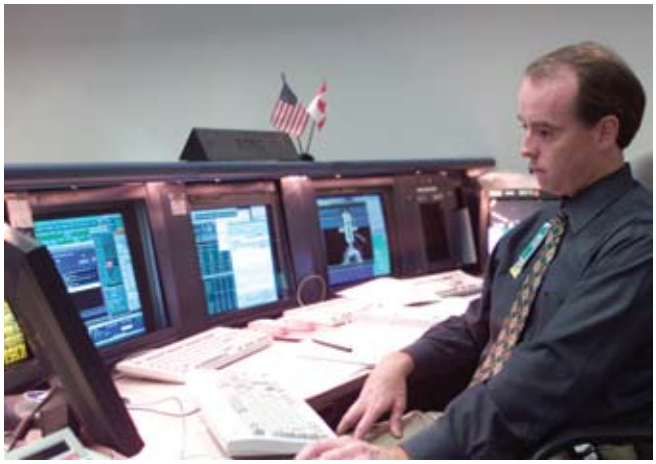
I spent 1986-1988 at UTIAS working with (Institute Director) Dr. Rod Tennyson and Dr. Don Morison learning about the space environment and operating an atomic oxygen simulator. A few years later I was at Spar Aerospace (now MDA Space Missions) in Brampton, working as a reliability, maintainability and operations engineer, focusing on the maintenance of the Mobile Servicing System (MSS). In that role I got to develop the early MSS maintenance procedures and participate in the testing of those procedures as a guest diver in NASA's Weightless Environment Training Facility. Although already

certified as a Great Lakes diver, I still had to pass the surprisingly rigorous swimming and diving tests to qualify to work in that NASA facility, and took the written scuba exam at JSC on April 19th 1993 in the only room in the building with a TV. That happened to be the day the FBI raided a compound in Waco Texas. News coverage of the resulting fire had the volunteer fire-fighters on staff glued to the glass pane in the door, looking at the TV which was on but muted. I was so focused on the exam, I didn't clue in until afterwards.

In 1995 I joined CSA and moved to Houston to help establish the joint Canadian-US robotics flight control team for the ISS. Several years later, as the first "ROBO" (ISS Robotics Operations Officer) certified to work in NASA's Mission Control, I was assigned as the Lead ROBO for the first shuttle flight to the ISS with Space Station robotics, designated "5A.1". On this flight in March 2001, we worked with the ISS Expedition 2 crew to deploy and check out the 2 Canadian-built Robotics Workstations. The next year I was again Lead ROBO for Flight "UF-2" on which the MSS's new mobile base, the MBS, was deployed and checked out.

In addition to overseeing the commissioning of the MBS, our UF-2 team suddenly found itself planning the first (and so far, the only) replacement of one of Canadarm2's joints, which had developed a short circuit a few months earlier. Having worked on MSS maintenance earlier in my career at Spar, this was a great fit. By the time it was over, the flight was a great success, and in addition to seeing all our mission objectives completed it was tremendously rewarding to have our ISS robotics flight control team recognized and to be personally asked to climb the ladder to hang a mission plaque in NASA's ISS "front room" in Mission Control.

I still live in Houston and am currently CSA's Operations Liaison Manager (JSC), acting as the interface between the real-time ISS operations and program support teams in NASA's Mission Control and the Canadian Space Station Program.



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Launching the FREJA Spacecraft

by W.F. (Tory) Payne, UTIAS Alumnus

The year was 1992. I had exercised my prerogative as president of Routes AstroEngineering to support a launch of our UV imager on the Swedish spacecraft called FREJA. Thus I was off to China! After a stopover in Narita (Japan), I landed in Bejing. The first sign that greeted arrivals was a hopeful welcome to the host city for the 2000 Olympics - premature, but telling of the future. I met up with the rest of the launch support team comprised of engineers and technicians from Sweden, Denmark, Germany, the US, and Canada. We were off the next day by Chinese charter turboprop to the middle of the Gobi desert.

We landed at a fighter jet base north of the Silk Road and boarded a classic steam train to travel further north to an army base where we were to be housed for five weeks. The site was at the end of a river that flowed from the Himalayan Plateau and eventually disappeared into the ground a little further north. The accommodations were good and the food was excellent. This was partly because the CGWIC (China Great Wall Industry Corporation) wished to sell their launch services to international customers. (The initial Globalstar constellation was to be launched over the next few years).

The FREJA spacecraft and launch support equipment was flown from Sweden in a DC 8 which landed at the airbase and was then brought to an integration area. This integration area was fitted with additional environmental control by means of air conditioned portable tents. The payloads were all checked out and then the entire spacecraft was loaded into a 'piggyback cabin' that supported and contained it.

The launch site was about 15 km north of the base, accessed by both road and rail. The stages of the launcher were

On right: W.F. (Tory) Payne P.Eng., Ph.D. (UTIAS '71)

brought by rail to the launch site. We were permitted to watch the stacking of the stages and payloads from the launch pad - an extraordinary opportunity. The entire assembly did not even take the whole morning, which astounded the two American air force officers that accompanied us on this campaign. One has to remember that this was an ICBM launch pad and the drills to prepare and launch a scientific payload were not very different. One notable part of the preparation was the organizational method used. Different teams were assembled into units which paraded in double time onto the pad to perform their tasks. Each group was dressed in different coloured coveralls - gray for hydraulics, yellow for electrical, and so on.

The FREJA magnetospheric research satellite was launched on October 6, 1992 as a "piggyback" payload on a Long March 2C (CZ-2C) rocket from the Jiuquan Satellite Launch Center in China. The satellite was in an orbit between 601 and 1756 km at 63º inclination. FREJA was a sun-pointing spinner with a 2.2 m diameter and 214 kg mass. The Swedish Space Corporation was the Prime Contractor to the Swedish National Space Board. FREJA imaged the aurora and measured particles and fields in the upper ionosphere and lower magnetosphere. For more information on FREJA go to http://www.ssc.se/?id=6251

Undergrad Aircraft Design Fly-Off & Aerospace Option Graduation

On April 9, 2009, The Honourable David C. Onley, Lieutenant Governor of Ontario, attended the fly-off for the fourth-year Aircraft Design course at UTIAS. The fourth-year students in the Aerospace Option of the Engineering Science program at the University of Toronto designed and built remote-controlled aircraft in various configurations in their capstone design course. Fly-off pilot Jack Humphreys test flew the aircraft. At a luncheon reception for the graduating Aerospace Option students, the Lieutenant Governor addressed the class. He fondly recalled arriving unannounced at UTIAS in the 1970s and receiving help with calculations that were required for what ultimately became a bestselling novel called "Shuttle." The Lieutenant Governor's presence made this a day to remember for the graduating class.

The Honourable David C. Onley, Lieutenant Governor of Ontario above with UTIAS faculty members; below with the '09 graduating class

A Message From the Director

UTIAS Update

Craig Steeves joined our faculty in January 2009, the fourth talented Assistant Professor hired in the past two years. Craig comes to UTIAS via UBC, Cambridge, Princeton, and the University of California at Santa Barbara. The primary purpose of his research is to improve the efficiency and performance of aerospace systems by closely integrating enhanced functionality into lightweight structural systems. He will reinvigorate our research programs in materials and structures and will contribute to our Sustainable Flight Initiative dedicated to finding technological solutions to reduce the impact of aviation on the environment.

Our partnerships with industry and government continue to be strengthened. For example, we have extensive collaboration with MDA, the Canadian Space Agency, Bombardier Aerospace, Pratt & Whitney Canada, NORCAT, Quanser, General Atomics, and ITER. Professors Groth and Gulder are members of a consortium partially funded by Sustainable Technology Development Canada (STDC) to demonstrate an innovative, low-emission technology for gas turbine engines used in aviation. The consortium includes Pratt & Whitney Canada, the National Research Council, Goodrich Corporation's Turbine Fuel Technologies Division, Hamilton Sundstrand Corporation, United Technologies Research Center, and INCO Ltd. Professors Martins and Zingg are involved in collaborative projects with Bombardier and Pratt & Whitney through the recently formed Green Aviation Research and Development Network (GARDN).

The STDC and GARDN projects are of direct relevance to the UTIAS Sustainable Flight Initiative, which is gaining momentum. In May 2008, UTIAS hosted the first UTIAS-MITACS International Workshop on Aviation and Climate Change, which brought together the world's leading researchers, including three members of the Nobel-prize-winning Intergovernmental Panel on Climate Change, in a wide range of areas related to the quest for technological solutions to reduce the impact of aviation on climate change. Participants were from government, industrial, and academic organizations, including Boeing, Shell, Pratt & Whitney Canada, NASA, Bombardier Aerospace, Cranfield, Cambridge, MIT, Stanford, the Universities of Michigan and Illinois, the Swedish Defence Research Agency, and, of course, UTIAS.

In the previous newsletter, I argued that UTIAS (and other universities) should be more engaged in planning and executing a national aerospace R&D strategy along with government and industry. We have made some progress in this direction, as several UTIAS faculty are engaged in the Canadian Aerospace Environmental Technology Roadmap planning exercise, along with numerous partners, including the Aerospace Industries Association of Canada, the Institute for Aerospace Research and many participants from industry and academia.

Finally, our primary emphasis continues to be on our undergraduate and graduate students. There are currently 34 undergraduate students in third year and 38 in fourth year in the Aerospace Option of Engineering Science at the University of Toronto. Moreover, UTIAS had 13 MEng, 61 MASc, and 48 PhD students enrolled in its graduate programs this year, a total of 122 graduate students. The extremely high quality of these students bodes well for the future of aerospace in Canada.

UTIAS is committed to playing its part as Canada's leading academic aerospace department to conduct fundamental and applied research while educating the next generation of highly-qualified aerospace engineers and scientists. With the recent infusion of talented young faculty at UTIAS, we are well placed to build on the excellence associated with UTIAS past and present. With the help of stakeholders such as our alumni and industrial partners, we will expand and strengthen or mission to deliver nationally and internationally recognized excellence in aerospace research and education.

An Editorial on Funding for Fundamental Research

"No modern society can survive in a vital form without access to that capital stock of knowledge and skills which it is the university's prerogative to preserve and disseminate, its mission to expand."

Dr. Leslie Harris, former President of Memorial University

Many readers are probably aware of the recent public discussion surrounding the funding of research in Canada. A letter signed by over 1750 Canadian researchers was sent to the Prime Minister and the Leader of the Opposition in response to recent decisions by the Canadian government related to research, especially the most recent budget. There have been numerous editorials and op-ed pieces on the subject of funding for research, particularly in the context of recent funding increases south of the border. From these it is clear that there exists a profound misunderstanding of the role and value of fundamental research.

There are some who connect the current situation to the present government, but the underlying problem predates this particular government. I also hasten to point out that there are many programs, such as the Canadian Foundation for Innovation and the Canada Research Chairs program, that are of immense value to universities. Moreover, the inadequate support for fundamental long-term research stems from some well-intentioned policies. For example, it is sensible to promote

the commercialization of some university research. It is also reasonable to tie some funding to industry support, since this demonstrates a degree of relevance and potential for commercial impact. Finally, it makes sense to target some funding toward research in specific strategic areas. However, such programs should not be funded at the expense of fundamental research. Already both the private sector and government laboratories conduct considerably less fundamental research than in the past. If such research is not conducted at universities, then it will not be conducted at all.

So what is the case for fundamental research? To start with, fundamental research contributes to the education of graduate students, who become highly qualified in advanced areas, especially in technology and science. Moreover, it informs the teaching of undergraduates in research-intensive universities. For tomorrow's economy, it is essential that a portion of our population be educated in a research-intensive environment. It is well understood by media and government that the dependence of economic development on highly educated people will continue to increase. Yet despite this widely-held belief, fundamental research and post-secondary education remain underfunded. Besides its role in education, long-term research generates the new knowledge that will drive future innovation and economic development. Commercialization is important, but what will we commercialize twenty to thirty years from now? Research in strategic areas is vitally important, but one requires a broad base of expertise to be in a position to address the strategic areas of the future. Collaboration with industry brings university research to practical application, but industry of necessity must focus on the short to medium term. Only governments are in a position to fund truly fundamental long-term research. A careful balance between government support for strategic, applied, and fundamental research is needed. In Canada this balance has tilted much too far away from fundamental research, yet another example of the currently prevailing trend toward short-term thinking.

The NSERC Discovery Grants program is the most important source of funding for long-term research in natural sciences and engineering in Canada. Its budget has not kept pace with inflation and the increased number of applicants. The direct result is lower success rates, reduced start-up funding for young researchers, and reduced funding for established researchers. The indirect result is that many researchers are forced to conduct short-term research to survive, further reducing the quantity and quality of long-term research in Canada. Diversion of funds from programs requiring industrial matching to the Discovery Grants would be welcomed by many in the research community. Furthermore, I propose provincial matching of each researcher's NSERC Discovery Grant. This would provide a great boost to fundamental research, a draw for excellent researchers and students, and would add minimal bureaucracy and no additional review procedures. The Ontario government currently invests in university research. Matching Discovery Grants would provide an ideal mechanism for some of this investment and would make Ontario the envy of the rest of Canada, at least to researchers.

One of the difficulties faced by the research community in advocating for increased funding for fundamental research is that it is justifiably perceived as a group protecting its own interests. It is also understandable that the general public does not connect the various technologies it benefits from, such as aircraft, to fundamental research. Everyone has heard of the Wright brothers, but few are aware of the work of pioneers like Samuel Langley and Otto Lilienthal, who paved the way for the Wright brothers. More recent aviation research pioneers like Richard Whitcomb are completely unknown outside of aeronautical circles. Therefore, it is critical that those who benefit directly from academic research and are well aware of its value, namely industry and alumni, help to advocate for it at every opportunity, especially in dialogue with the media or with the government. Since our self advocacy is inherently suspect, the research community relies on the direct beneficiaries of university research to help in convincing the federal and provincial governments that a reasonable level of funding for long-term fundamental research is vital for a prosperous future.