

# **Educating Astrosociologists: The Need to Bring Outer Space into Social Science Classrooms<sup>1</sup>**

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## **Abstract**

When officials in the space community speak about utilizing space as a teaching tool to encourage students to become the new scientists and engineers of the future, they inevitably narrow their scope of attention to the natural sciences. They rarely, if ever, think about the growing importance of training *social scientists* to fulfill their important responsibilities that will undoubtedly arise in the future. While the training of natural scientists does indeed represent a high priority, it remains vital to recognize that a new priority now exists. We can no longer afford to continue neglecting the *other* branch of science in our preparations for exploring space in the next fifty years. Astrosociologists study the relationship between outer space and society – between the cosmos and humanity – and therefore it becomes more relevant to humans and their societies the farther we venture into outer space as well as the more that space influences us here on the Earth. Future missions will require the input of social scientists to cover subjects that fall outside the normal bounds of the space and engineering sciences. If we take the long-term view, it becomes clear that we must begin to train astrosociologists to participate alongside traditional members of the space community. To accomplish this, we must bring outer space into the classrooms of prospective social scientists (and, in fact, expose all students to astrosociology). The potential contributions of social scientists to the space program should be emphasized to offer an alternative for students unwilling to pursue careers as natural scientists and engineers. If the Vision for Space Exploration (VSE) results in the involvement of both fundamental branches of science, then astrosociology can help to make this a social reality for the benefit of all through the creation of a well-rounded understanding of issues related to outer space *and society*.

## **Introduction**

The author founded the field of astrosociology by uploading the original web pages for *Astrosociology.com* on July 15, 2003 in part to put this new field on the academic map; that is, to establish and develop a subfield of sociology that would finally focus on space. For the first fifty years of the space age, in contrast, the space community focused almost exclusively on matters

involving engineering and space science ramifications. They did utilize *human factors* in the form of the machine-human interface, but sociology was hardly ever considered. During this time, most sociologists never fully appreciated the contributions they could make to help better understand issues related to “space and society.” The “sociology of outer space,” while not unheard of, never developed into anything meaningful (Katz 1985) despite the important work of social scientists in this area. They were “doing astrosociology” over the last thirty years or so without the proper recognition from the colleagues within their disciplines or the benefit of a single field to unite their efforts.

This finally motivated me to begin working on getting astrosociology known as a subfield within sociology. I soon became aware that it would also develop as a more general multidisciplinary social science field. The initial response within sociology was deafeningly quiet. Then a few critics appeared on the internet, taking mostly sarcastic tones with my proposal to develop this new field. They amounted to very few individuals (less than two hands full). Indifference in the sociological community continues to characterize the greatest response by sociologists. However, negative reactions most certainly exist among the silent hordes as do positive ones. In fact, I have heard from more supporters than detractors thus far among the responders who contacted me to support astrosociology.

The status quo could not continue in my mind. The time had come to stop staring at the ground. The time has come to raise our heads as members of the sociological discipline, observe the stars, and to recognize the importance of the cosmos above us. Moreover, the time has come to make the connections between outer space and society; that is, to recognize the significance of the space-related phenomena (or *astrosocial phenomena*) that have influenced social change and our improving lifestyles since the time human groups began working on space missions. As we

celebrate the fiftieth year of the space age in 2007, it is well past the time to replace our traditional refusal to pay attention to astrosocial phenomena by applying a healthy dose of the sociological imagination in their direction. Social life includes *all* aspect of human behavior in groups. Why do matters such as behavior in the aerospace industry and the influences of astrosocial phenomena that result in social change merit exception from this general rule?

At the national level, it outwardly appears as though very little accomplishment exists within the sociological discipline. This macro-level pattern seems discouraging. At the micro level, however, the potential for grassroots development of astrosociology simmers beneath the surface among social science students equally fascinated by space as those who pursue space science or engineering careers. It is important to remember that students interested in space may also favor a sociological or other social science perspective. The types of valuable research efforts accomplished in the past by only a few intrepid social scientists must now be encouraged at a much greater scale so as to allow the multidisciplinary field of astrosociology to flourish. My personal experiences make me suspect that astrosociology is ready to develop soon at an increased pace. The lack of enthusiasm for astrosociology at the national level (within the ASA) remains the largest hindrance to progress. Even this obstacle will likely prove to be a temporary situation when viewed in the rear view mirror of history.

This essay focuses on five needs related to the successful development of astrosociology. Each one is interrelated with the others as they are each part of the overall strategy that needs development in order to ensure the long-term success of astrosociology. As things stand today, elements of the requirements listed below have begun development on a limited scale. This effort will require greater levels of support from larger entities such as prominent individuals and organizations from the academic, corporate, and space advocacy sectors of society. As these

objectives receive fulfillment on an increasing basis, it then becomes possible for astrosociology to develop into a notable subfield and multidisciplinary field. These objectives cannot become accomplished easily, especially on a large scale (e.g., in several universities across the country). Nevertheless, this type of outcome must become a major goal when looking at the development of astrosociology with a long-term perspective.

| <b>Table 1</b><br><b>Objectives for Astrosociology</b>   |
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| <p><u>Objectives Necessary for the Development of Astrosociology include:</u></p> <ol style="list-style-type: none"><li>(1) demonstrate both the significance and relevance of outer space (and thus astrosociology) to members of the sociological (social science) discipline(s);<ol style="list-style-type: none"><li>a. convince members to stop treating <i>outer</i> space as a fringe area of study (i.e., eliminate the so-called “giggle factor”);</li></ol></li><li>(2) establish astrosociology in the curricula of high schools, colleges, and universities;</li><li>(3) persuade educators and others to actually utilize outer space to excite sociology students in the classroom (that is, move beyond the STEM model);<ol style="list-style-type: none"><li>a. and, in the process, cultivate astrosociology majors/minors;</li></ol></li><li>(4) motivate established social scientists already studying space-related phenomena to refer to themselves formally as “astrosociologists;” and:</li><li>(5) inspire interested parties to contribute to space projects in formal collaboration with the space community as both theoretical and applied astrosociologists.</li></ol> |

The objectives in Table 1 represent a difficult challenge for current astrosociologists, yet they are vital for the development of their new field. They must occur on a large scale at some point. The second and third objectives are keys to the future of astrosociology as students who

start out as astrosociologists will comprise and make possible the greatest level of growth of the field. Astrosociology can only become successful if these objectives find support among existing professors and university/college administrators at various levels. The fourth goal is an essential “stop gap” measure that will allow astrosociology to develop in its initial stages through the advocacy of practicing astrosociologists. The fifth objective is a vital requirement that becomes possible once members of the sociological and space communities recognize their mutual need to interact.

With the indifference among most members of the social science community continuing, support from the space community allows for the development of the field outside of traditional academic organizations (e.g., the American Aeronautics and Astronautics Association (AIAA)). Once the members of both communities fully appreciate their complementary needs and the potential fulfill those needs, then meeting of the fifth goal will allow for the legitimacy of the field to establish itself. (In fact, an early building block of this process – collaboration with the space community outside normal channels – has begun on a modest scale already). The wheels of progress are turning at this point, but they do require at least some greasing from the social science community.

In order for the development of astrosociology to persist well into the future, then, students must embrace this new field and devote their careers to it. Mainstream sociology has always distained “outer space” as a legitimate topic of inquiry since the time the Soviet Union launched its first Sputnik satellite. *Astrosociology* is the deviant entity in this scenario because its inception defies history and the status quo (i.e., sociological tradition). Sociologists entrenched in their traditional fields such as sexism and family have reason to protect their turf. A new successful subfield may indeed siphon off some of their funding and attract students who

might otherwise select their topic.

Astrosociological “deviants” are likely to bear the ill effects of this tradition in the early days of astrosociological development. Nevertheless, the only way to sustain astrosociology, or any other new field, is to overcome the deviant label in large measure by introducing it into the courses and curricula of sociology (and other social science) programs on a nationwide, and indeed worldwide, basis. Social change in academia is often difficult. The key basis for the acceptance of a new subdiscipline has nothing to do with the potential consequences to the discipline (e.g., siphoning off of existing subfields). Rather, such important decisions should always focus on the relevance and of the topic and whether it fills a missing niche in the sociological perspective. Perhaps needless to assert, astrosociology is both relevant to social life and fills a fifty-year old niche.

### **The Significance and Relevance of *Outer Space***

What does outer space have to do with sociology? Why is it significant or relevant? If one reviews the history of our discipline, you would most likely conclude that sociology has almost nothing concrete to contribute to the study humans in outer space or involving it indirectly. The most obvious conclusion that one can take from sociology’s absence is that outer space has very little to do with everyday social life.

Does such a conclusion make rational sense? In fact, it is quite simple to demonstrate that such a conclusion is erroneous. Space exploration would be impossible without human participation and, additionally, social organization. One person cannot build or even launch a space shuttle, for instance, so a social group – an organization – is required. The scientific study of space phenomena – that is, space sciences such as astronomy – provides members of a society

with a sense of accomplishment and connection to the rest of the universe. It puts humanity in the proper perspective and enriches its societies' cultures. That is why ancient cultures studied the heavens and why we continue to do so today.

The very fact that NASA is a federal agency that focuses on outer space within the social organization of American society attests to the presence of space activities and thus their impact society and its citizens. The same societal influences exist in other societies with a formal space agency. Furthermore, the accomplishments of space agencies indirectly affect *all* societies on the planet in various ways. Though many tend to downplay their significance, technological spinoffs and technology transfers from the space program contribute to social change; often in very significant ways. The high standard of living that Americans enjoy appreciably owes its existence to space science and technology. Many of the concepts and tangible engineered products used for the space program were adapted over the years for use for commercial and specialized industrial applications. Examples include the miniaturization of computer chips and components, MRI machines and a great number of other medical advancements, cellular telephones, satellites, and advances in flight safety. Even some advocates downplay this contribution – yet the space program's contribution to social progress remains a significant source of technological and scientific advancements that affect the average person.

Another reason involves the fact that the aerospace industry is composed of real workers who contribute to the space program. These people are not fictional spacefarers or even limited to the few professional and wealthy astronauts witnessed during the history of the space age thus far. The aerospace industry itself employs thousands of people and adds billions of dollars to our national economy. Outer space is integrated into the mainstream economy, and thus to society, despite sociologists' tendency to recognize this connection or view it as significant. While some

research in the study of NASA and aerospace companies in the form of organizational analysis has occurred in the past, the unique character of space and its impact on society did not receive attention. These organizations were treated as any other social structures. The contribution of astrosocial phenomena was completely overlooked.

The larger culture favors space exploration to a noteworthy extent, though there is some confusion among members of the general public as to the actual cost of the space program. Many citizens erroneously believe that our nation spends over twenty percent of the national budget. However, when informed that it is only seven-tenths of one percent of federal expenditures, the average person tends to support NASA and its efforts. When translating this to the student population in the United States, one can infer that most students also support the space program. As such, a great many students would probably pursue a career in astrosociology if given the opportunity (which currently does not exist).

Space advocacy groups represent important subcultures that provide guidance for space policy decisions and keep the public informed about both proper and improper activities within NASA as well as other organizations. The support of advocacy groups can help to publicize the existence of astrosociology to the public, academics, and space community professionals. This collection of subcultures exists in society and thus represents a target for sociological inquiry. Their existence also adds credence to the argument that astrosociology covers a large purview of topics not currently addressed by our discipline in an organized manner.

### **Definition of Astrosociology**

When sociologists and other social scientists conduct research that somehow relates to outer space, they are doing astrosociology because they bring the sociological (or other social

science) perspective to bear in some way on social or cultural phenomena of interest that happen to involve outer space in some way. Astrosociology is thus defined as the scientific study of *astrosocial phenomena* (i.e., social and cultural patterns related to outer space). While astrosocial phenomena exist in space, of course, they currently exist on Earth most commonly. Very few people have traveled into space but many deal with space on a daily basis. Examples of such individuals include astronomers, cosmologists, SETI researchers, aerospace workers, and even astrosociologists.

As implied, this field exists as a dichotomous entity. Astrosociology is a sociological subdiscipline, to be sure, but it is also a multidisciplinary social science field. In this broader context, the definition of astrosocial phenomena requires expansion. In a broader definition that transcends sociology, astrosocial phenomena relate to patterns of human behavior related to outer space. The major focus is the intersection between space and society at all levels of social reality/analysis (i.e., micro, middle, and macro). Incorporated is everything that affects the human condition. The scope of astrosociology therefore includes the types of patterns and phenomena studied by social scientists/humanities scholars in the disciplines of psychology, social psychology, anthropology, economics, political science, communications, history, and so forth. In this case, they specialize in space-related phenomena.

From within the space community, the study of astrosociological topics involves space scientists, engineers, and architects who prefer to focus on the relationship between space and society/human behavior in combination with their specific fields. These individuals assist greatly in establishing formal collaborative ties to astrosociology. Indeed, many of them may eventually come to call themselves *astrosociologists* if they decide to focus most strongly on astrosociological issues. By establishing permanent relationships between astrosociologists and

interested parties from the space community, it becomes possible to instill legitimacy to the field of astrosociology. Although this part of the development comes from the space community side, sociology and the other social sciences must inevitably concede astrosociology's relevance and legitimacy at some point based on the mainstream scientific activity continuing on this front. There is a good chance that people and organizations from the space community may begin to request consulting with astrosociologists. It has begun already in this author's experience.

### **Theoretical and Applied Astrosociology**

Theoretical astrosociology follows the most common path of traditional sociology by focusing on the scientific method comprised of theory and observation, and most importantly, the interaction between the two. Fundamentally, theory remains the major focus. The creation and testing of hypotheses that reflect components of theoretical frameworks remain the focus while any application of theoretical implications is secondary, if contemplated at all. In other words, the main purpose of research is to test and either accept or refute elements of theories.

As with applied sociology, *applied astrosociology* is defined as the application of astrosociological knowledge (or astrosocial knowledge) toward solving a practical space-related problem or a traditional (terrestrial) social problem utilizing space-related assets (including astrosocial knowledge). In space, an example could involve the regulation of social life in a space settlement or "space society." Another example is seeking to save humanity by seeking to discover asteroids and comets that may potentially harm or destroy the human species (and its societies). In serious scenarios, the deflection or redirection of a cosmic body may prove necessary to attempt. On Earth, an example already underway involves gaining knowledge about the formation of hurricanes through observations from space – partly to save human lives

through improved forecasts and evacuation patterns.

The application of astrosocial knowledge is not possible unless such knowledge develops within the astrosociology community, of course. It must exist first! This process involves the understanding of astrosocial phenomena to an extent in which it could be applied to solve practical problems. Attaining this level of understanding requires dedicated astrosociologists who specialize in the application of findings in this new field to improve both terrestrial and extraterrestrial conditions. In space, the involvement of social scientists in space missions and space settlements would enhance their potentials to succeed. Applied astrosociology will become vital for the interaction between the social science and space communities.

### **Still the Forsaken Frontier...**

Is astrosociology a threat to the *sociology of science and technology* because it takes away some of its traditional purview? It seems like a weak argument because no subfield of sociology has taken astrosocial phenomena seriously. Sociologists interested in science and technology strongly tend to focus on terrestrial examples that do not involve outer space. The areas of theory and research now covered by astrosociology have traditionally fallen through the cracks – nobody voiced concern during the first fifty years of the space age. I literally forced astrosociology upon our discipline by simply declaring its existence – in stark contrast to the prevailing status quo. The resounding indifference that resulted from my unusual declaration suggests that space remains largely a taboo among sociologists. Outer space is still sociology's forsaken frontier (Pass 2004c). At the very least, the traditional state of affairs reflects the absence of any formal way for students to pursue astrosociology as a major.

Why should our discipline avoid space research? Is the space program not part of our

society and culture? In fact, the aerospace industry is important to our national economy. New trends may reflect the growing significance of spacefaring society. For example, the growing trend involving construction of spaceports represents a potentially important expansion of material culture relevant to astrosociology. Additionally, space tourism and the serious study of what I have termed “space societies” (or space settlements/colonies) outside of our discipline indicate the strong growth potential of astrosociology.

More nations are getting involved, and their peaceful intentions are by no means assured. The militarization of space remains a real possibility. For example, China destroyed one of its old satellites with a missile. The military is still involved in our space program and definitely in those of other nations. Will we go back to a Star Wars program as a way to defend our space assets? A space-based defensive system may prove necessary. These types of issues have implications for social life and the fact the sociology ignores them is quite peculiar.

As space issues become more and more pervasive and impactful, failure to study them will result in sociology becoming grounded in traditional, and often less relevant matters, and leave it unprepared to focus on astrosocial phenomena. Such a scenario will make sociology less important as astrosocial phenomena drive more social change – and this possibility should be of concern to the discipline. To the extent it continues to be unaccounted for by the sociological imagination the relevance of sociology will decline overall. Does it make sense for humanity to move toward a spacefaring future while sociology fails to grasp this fundamental social pattern? Perhaps our greatest hope to avoid such a scenario involves the pursuit of astrosociology by students who recognize the true significance of this new field. As mentioned earlier, the attraction of students to astrosociology or their repulsion away from it will largely determine the future of the field. The first generation of supporters will need to do all they can to fight against

tradition and make astrosociology available in colleges and universities – even if the first attempts are set up as trials.

### **Bringing Astrosociology into the Social Science Classroom**

Not every student is destined to become a member of the space community or more generally destined to pursue one of the natural sciences. No argument exists here that challenges the argument that an adequate number of natural scientists, technologists, mathematicians, and engineers during any given generation is important for the advancement of a post-industrial society. These subjects result in a work force composed of diverse occupations necessary for the advancement of society in important area related to science and technology. “STEM” subjects do seem to be in short supply for the next generation. A greater number of students must indeed receive encouragement and inspiration to pursue them. Bringing outer space into the classroom helps to make this possible.

However, as we venture farther into outer space and astrosocial phenomena affect humans and their societies more greatly on the Earth. Does it continue to make sense to continue our pattern of inattention toward astrosocial phenomena? Does it make sense not to bring space into the social science classroom in order to motivate students to pursue sociology and other social sciences? If space is a good motivation tool, then *all* students should benefit. Even as the space community begins to recognize the value of the social sciences, sociology continues to ignore its great potential in this area of theory and research. As a positive benefit, the education and training of astrosociologists would result in an increased number of sociology and social science major who may otherwise decide to pursue traditional subdisciplines or never focus on the social sciences at all.

## **A Limited Survey of *Introduction to Sociology* Students**

One important question to ask is whether or not students would be interested in taking one or more astrosociology courses. Put another way, can students interested in sociology and other social sciences receive motivation to pursue them by bringing space into the classroom in the same way that NASA motivates potential space scientists and engineers? An important preliminary step is to survey students to determine if an interest in astrosociology exists as part of the overall pattern found in the national population. It is probably best to survey much younger students than those in the first year of college, those this opportunity is the one presented to me before leaving my social science department. Others in lower grade levels should conduct surveys in their social science classroom to augment the preliminary findings presented here. Still, these results are encouraging.

These students are neither not sociology majors nor minors. They have taken an *Introduction to Sociology* course to fulfill their general education requirements. The nearly unanimous response that they would probably take an astrosociology course is all the more remarkable due to this fact. These students do not necessarily favor a social science perspective, as most are freshmen and uncertain about what discipline to pursue. Still, the combination of “outer space and society” interests them. Astrosociology brings something new to the traditional choices of subdisciplines students may consider. These respondents seem more astute about the need to study space issues from a sociological perspective. Sociologists content with the status quo should heed this message: *Students are indeed interested in astrosociology!* If this small sample of *Introduction to Sociology* students at a community college is any indication at all (as reflected in Table 2), then our discipline can help itself attract an increased number of students

and become more in tune with student attitudes as well as their future course needs.

| <b>Table 2</b><br><b>Responses to Final Exam Extra-Credit Question<sup>2</sup></b>   |   |  |   |                      |
|--|---|--|---|----------------------|
| <b><u>Semester</u></b>   | <b><u>Interested in</u></b><br><b><u>Astrosociology</u></b> | <b><u>Not interested</u></b><br><b><u>in</u></b><br><b><u>Astrosociology</u></b> | <b><u>Not interested</u></b><br><b><u>in</u></b><br><b><u>Astrosociology,</u></b><br><b><u>But...</u></b> | <b><u>Totals</u></b> |
| <b>Spring</b><br><b>2005</b>   | <b>13</b><br>(29%)  | <b>00</b><br>(0%)  | <b>04</b><br>(.09%)   | <b>17</b><br>(38%)   |
| <b>Fall 2005</b>   | <b>07</b><br>(16%)  | <b>02</b><br>(.04%)  | <b>02</b><br>(.04%)   | <b>11</b><br>(24%)   |
| <b>Spring</b><br><b>2006</b>   | <b>16</b><br>(36%)  | <b>01</b><br>(.02%)  | <b>00</b><br>(0%)   | <b>17</b><br>(38%)   |
| <b>Totals:</b>   | <b>36</b><br>(80%)  | <b>03</b><br>(.07%)  | <b>06</b><br>(.13%)   | <b>45</b><br>(100%)  |
| <b>Note:</b> All percentages in table are based on student response totals in each category in relation to the entire population of students. All percentages are rounded to the next highest integer. |   |  |   |                      |

As part of final exams proctored to students in three Introduction to Sociology classes during the Spring 2005, Fall 2005, and Spring 2006 semesters. The purpose of the optional question provided was simply to determine the interest level of students in taking an Introduction to Astrosociology course (which does not exist) at the college. This question was an extra credit item that was offered along with second extra credit item. Students were given the option of responding to either question though not both of them.

The preliminary data presented in Table 2 reflect a substantial level of interest among the students in my three classes. Each of the three classes included a These students express even higher interest than the sixty-percent found in the most recent 2006 Gallup Poll. Even those who

expressed they were uninterested stated that they would probably “give it a try” if they possessed extra units unneeded for their required courses. Moreover, it is important to emphasize once again that most of the respondents were freshmen in a community college and therefore taking this sociology course as part of their general education requirements. It is safe to say that most came into the class with no plan to select sociology as their major.

The results in Table 2 regarding student’s interest in taking an astrosociology course demonstrate a strong overall interest in connecting the normally disparate concepts of “outer space” and “society” and making this topic the focus of a new introductory course. The frequency table results indicate the potential for a vast change in the near future – a change that challenges a status quo content with focusing on traditional subfields though unwilling to look to the future of social life beyond the limited view of terrestrial concepts and variables. It seems a safe assumption that humanity is moving into outer space as the future unfolds. It behooves the sociological discipline to move with it. Our discipline must progress beyond its twentieth century worldview and prepare itself to contend with the expansion of societies and social groups into the solar system.

This small pilot study represents the first attempt to determine the interest of college students in the study of astrosociology. If it is at all indicative of the entire college/university level of interests, and it coincides with populations of students at lower educational levels, then this new field possesses great potential to develop within academic programs. The data presented here, even if only in the form of frequencies, certainly provide a great deal of hope for the future of astrosociology. These responses represent good examples of an overall strong interest in an *Introduction to Astrosociology* class. If these results hold up, new generations of sociologists will possess a more open mind toward the significance and relevance of this new

field to their own lives, and thus their willingness to expand the traditional boundaries of sociology in a dramatic manner.

These students do not seem to have a problem with the relationship between space and sociology! Their short answers to the essay question, beyond the purview of this paper though soon to be reported elsewhere – indicate that students are open to exposure to astrosociology. It is unclear how many would actually pursue this subfield professionally though astrosociology could well become a popular major within sociology and other disciplines. Potentially, a large pool of potential astrosociologists exists among students at all levels of education.

How many undeclared students would be inspired by space? How many would choose or switch to sociology programs so they could major in astrosociology? Sociology as a discipline could well benefit from an infusion of new recruits who would otherwise pursue traditional (and crowded) subdisciplines or entirely different disciplines.

## **Moving Beyond the “STEM” Fields**

NASA’s promotion of the so-called STEM fields (i.e., once again, science, technology, engineering, and mathematics) represents a laudable effort, to be sure, as post-industrial societies must depend on a large cadre of students to pursue them in order for progress to occur, but it is also shortsighted in the sense that its exclusion of the social sciences continues a status-quo tradition that will fail to meet future needs. The “S” in “STEM” refers to the natural/physical sciences and *not* the social sciences.<sup>3</sup> This designation refers to the old approach common during the space age. Both NASA and advocates of improved education at all levels of concern must realize that the future of space exploration cannot succeed nearly as well without a formal collaboration between to the natural sciences and social sciences. And the sociological discipline

needs to formally enter the space age.

If the limited data presented here are indeed indicative of students' high level of interest in the "outer space and society" connection, it is logical to assume that the need to bring astrosociology into classrooms is far from an implausible notion. Many students would pursue astrosociology as majors and minors at the post-secondary level. At lower levels, educators could expose younger students to the connection between their own lives and the cosmos.

The next fifty years will be different than the previous fifty years. Space exploration, as well as living and working in space, will require the efforts of all types of scientists. Social scientists will increasingly become relevant as (1) we send social groups in space to exist there either temporarily or even permanently and (2) space activities influence people and societies on the Earth at increasing levels. For example, the establishment and operation of *space societies* (i.e., colonies/settlements in space) requires the participation of social scientists. Astrosociology was established in large part to coordinate the education and training of social scientists that specialize in issues related to outer space. This process has not yet begun, however, as no formal *Introduction to Astrosociology* course yet exists.

Equating space as only relevant to the STEM fields misses the value and thus necessity of adding sociological and other social science contributions to the future accomplishments in space and understanding humanity's future on the planet Earth.

We must open ourselves up to more-inclusive possibilities for the future. Rather than utilizing space exploration to stir the imaginations of only potential space scientists[, mathematicians,] and engineers among our youth, we should also do so to motivate all potential scientists. As an additional step, we must utilize space exploration to encourage potential *astrosociologists* to follow a different, though related, path. In order to ensure the greatest, most comprehensive understanding of humanity's destiny in space, we must encourage students in the physical sciences and engineering disciplines, who serve as the usual targets, *but also* those in the social and behavioral sciences...[as well as] the humanities to become involved in the study of astrosocial phenomena. This implies that government

agencies and private organizations should bring the inspirational effects produced by outer space into social science classrooms. It will prove in our best interests to make funding available for astrosociological programs as well as for [the conventional targets of educational improvement] (Pass 2006b).

Practical benefits on terrestrial soil include new considerations of applying space assets to the solution of social problems, especially those that affect the Earth and human societies on a global scale (Pass 2006).

### **Communicating the Importance of Space Exploration**

How do we bring outer space into the social science classroom? Perhaps sociologists and others must first learn of the importance of space exploration before they will become willing to add astrosociology into their existing courses and curricula. If this is the case, astrosociologists will need to communicate this message to the members of the sociological discipline and the members of every other social science as well as humanity fields.

From a sociological perspective, there is abundant evidence that societies that fail to expand outward, to explore unknown frontiers on the Earth, tend to decline partly as a result of their isolationist tendencies. Space currently stands out as the next great frontier along with the depths of the vast terrestrial oceans. Exploration can take many forms. Exploring unknown territories is probably the first type that comes to mind. However, scientific exploration in space or anywhere else also creates benefits for societies, including their vitality and thus their long-term viability. Space exploration in particular provides a culture with goals and inspires the citizenry with its often remarkable discoveries from daring missions.

Today, the value of space exploration remains murky in minds of most members of the sociological community. My experiences at sociology conferences seem to confirm that sociologists are, on average, less inclined to value space exploration than the general public.

Many of those who take a firm stand against space exploration possess incorrect knowledge about the subject. These individuals often become much more supportive when their misperceptions are corrected with facts. For example, many people believe that the space program receives comparable funding to the defense department when, in fact, NASA receives less than one percent of the federal budget annually. How is it possible to correct these types of erroneous beliefs on a large scale? One answer comes from the arena of education.

Based on the NASA's STEM education programs, many students will enter college having been exposed and inspired by space in their classrooms. It is probably safe to assume that these students would be more open to astrosociology. Thus, a greater number of space-literate citizens will result because many young people oriented toward the social sciences will choose to integrate space into their studies. Those who pursue the field of astrosociology would especially develop the capacity to communicate the importance of space exploration in oral and written formats. In the long run, it seems that astrosociology's future is probably assured.

## **Conclusion**

No doubt exists that STEM education requires its due attention. The training of natural/physical scientists, engineers and technologists to meet the future needs of post-industrial societies represents a serious challenge in order to ensure American scientific and technological preeminence through continuous progress in these areas. This strategy will support space exploration and well as a broad range of other areas in science and technology. When it comes to space exploration, however, one caveat exists. This strategy must not seek to produce STEM graduates to the detriment of astrosociology graduates – especially once astrosociology programs begin to function and attempt to attract students.

The developing field of astrosociology allows for social scientists that focus on space – and teach as a vocation -- to mentor their students who wish to study astrosocial phenomena. In the end, NASA and the space community, and society itself, will benefit from the work of these new astrosociologists. Without the input of social scientists, many of the new areas of research, though historically not a priority, will arise without anyone to fill the scholarly voids that arise. We should recognize our future needs now so that we may become prepared in the near future. Otherwise, our efforts in space will either (1) struggle forward without the ability to generate much sophisticated knowledge about their effects on society or (2) even decelerate due to this lack of critical knowledge and the resulting inability to take advantage of it. Alternatively, the utilization of applied astrosociology based on sophisticated knowledge garnered by professional sociologists and other social scientists can indeed gain in the evolving practical applications.

STEMA, where “A” stands for “astrosociology” and thus represents the missing social science perspective, needs to replace the unadulterated concentration on the natural sciences so that students interested in outer space from within *all* disciplines and fields can study their areas of interest without the current requirement to pursue a natural science, technology, engineering, or mathematics major. If so inclined, students can pursue sociology and study issues related to space exploration because the opportunities exist and contribute to the changing nature of the space age in the future.

One goal stands supreme from an astrosociological perspective: educate and train *all* relevant scientists. This pertains to the traditional STEM-oriented students, of course, but it also involves motivating and supporting students who prefer a social-scientific perspective *and* desire to study astrosocial phenomena. Humans in space will necessitate a formal collaborative structure between members of the space community and the social science community (Pass

2006d). As things currently stand, the social sciences find themselves ill equipped to answer the call should the space community require assistance with the human-related mission planning and operations monitoring assignments that will arise. Very few astrosociologists currently exist and no interested students receive support within their programs to study astrosociological subject matters. Sociology needs to take astrosociology seriously, recognize its merits, and commence to incorporate it into its existing programs.

Based on my personal experiences, sociology and the other social sciences need to take a much broader view of social life that extends beyond terrestrial societies and into outer space. They need to recognize their potential contributions as important for the future of humanity in space environments – just as sociology has proven invaluable in the study of terrestrial social environments. First of all, above all else, the social sciences (and sociology in particular) must stop regarding space research as a fringe topic – its forsaken frontier (Pass 2004c). It needs to overcome its traditional bias. With that accomplished, progress becomes inevitable as the space community has already begun the process of recognizing the importance of bringing in the social sciences, and astrosociology in particular.

Thus, the creation of programs for aspiring astrosociologists in the near future confounds tradition. It shatters a longstanding status quo characterized by the evasion of issues related to outer space as if they were not part of the social and cultural milieu. Can the current movement to develop astrosociology overturn tradition in this area to the point that courses and programs actually become available for interested students? Today, this is only a dream. In the meanwhile supporters must advocate the merits of astrosociology and encourage students to pressure their professors and advisors to allow them to study astrosocial phenomena. Pressures from both the inside of departments initiated by faculty and students and pressure from the outside initiated by

non-educators together possess a chance to force social change in our own discipline. Some day, I expect it to become a reality – but only following much work and sacrifice.

## Notes

1. This paper was presented at the PSA 2007 conference in Oakland, CA as part of the *Pirate-Professors, Deviant Departments & Disappeared Programs* session. (Astrosociology represents a hypothetical subject area for sociology programs as none yet include any aspect of it in their curricula!)
2. The question on the three final exams read as follows: (2) *Would you be interested in a course called **Introduction to Astrosociology**? This course would focus on issues associated with the relationship between space exploration and society, including the influences of space activities on social/cultural change and the future development of human societies on Earth and eventually in space itself. Please explain the reasons for your interest or lack of interest in astrosociology.* (The responses of students are not presented in this paper). The alternative question number one related to the effectiveness of public education.
3. See NASA's Office of Education website, specifically its commitment to STEM subjects at the higher education level. Notice that there is no mention of the social sciences. Retrieved on 07/11/06 (<http://education.nasa.gov/divisions/higher/overview/index.html>).

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