The Vision of Space Exploration – Life in the Universe
Hispanics in Engineering National Conference

Speech by
Eng. Orlando Figueroa
Engineering Department
NASA Goddard Space Flight Center
Orlando.Figueroa-1@nasa.gov

Closing dinner of the Hispanics in Engineering National Conference

It is a real privilege to be able to share this evening with all of you, at this very special event. Congratulations on the success of the conference and many congratulations to the Polytechnic University of Puerto Rico as they celebrate its 40th anniversary. You should be very proud of the many years of service to further higher education in the island.

I take advantage of every opportunity I have to promote and advocate my beloved engineering profession, particularly with the Hispanic communities, and more so when it means coming back home. I will not ruin your dinner with statistics. It is fitting however, that I mention the fact that Hispanics are now the largest minority group in the U.S., and growing, and that despite the progress achieved in many fronts, we are also the community with the highest rate of school dropouts, and remain under representation in post-graduate studies. Clearly, a statistic that to me is unacceptable, and that we must find ways to arrest and turn around. I would love nothing more than to be able to say that science, math and engineering served as the inspiration and catalyst to turn the trend around, for the sake of knowledge and our wellbeing, as well as for security and economic reasons. Turning this trend around is of utmost importance, and an imperative.

You never know what event will spark the motivation of our youth to further themselves, and to forge a future where they can make a difference. To me, it has always been a matter of basic principles. I am proud to say that I am where I am today because many people cared; none more than my parents of course, who taught me that: 1) if you want something you have to earn it through hard work, 2) where there is a will there is a way, 3) education is the ticket to the future and 4) treat everyone the same way you want to be treated. Whenever the noise of busy days brings chaos into my work, I always go back to those principles to remind myself of the things that matter most.

I will be talking today about the Vision for Space Exploration, sharing the perspective of someone who believes that more than a vision it is an undeniable reality, and an imperative. I will do so through examples that are close to my heart, because I am proud to say that I have been part of them.

I want you to imagine us talking about extending the human presence beyond Earth boundaries, and throughout the solar system with the same passion, and in the same matter of fact way as we talk about politics or other events throughout the world. We will pepper the solar system with robotic emissaries, and then follow with humans. We will start by revisiting the Moon before the end of the next decade, and then to Mars and beyond. As we do this, we will promote and invite international and commercial participation for the purpose of furthering science, and for security, and economic reasons. The exploration of Space for peaceful purposes is indeed the next frontier.

Why? There are multiple reasons, and some people resonate with some more than others. To me it has evolved to understanding our place in the Universe, and life within it. There is something innate about living organisms, an instinctive need to explore to ensure their survival. In its simplest expression organisms explore in search for food, for protection, and to satisfy the need to perpetuate. They do it with

tenacity and incredible resilience. Humans explore for the same reasons. But armed with the ability to reason and connect events and experiences, we also explore out of thirst for knowledge. We search for facts and truths, and to achieve other levels of satisfaction and well being. We want to experience with as many of the senses available to us to understand and see for ourselves.

To restrain this expression of who we are is to incarcerate our spirit, and to deny ourselves the right and satisfaction that comes from knowing, understanding, and by having been there. A favorite model of this natural wonder is to observe a two or three year old. Those of you who are parents know that to just tell them stories about how things work is never enough. The more you tell them, the more they want to know. Their drive to spend every waking minute exploring their surroundings is without fear and limitless.

Lucky for us this instinctive thirst for knowledge is not lost, for otherwise we wouldn't have discovered the continents, conquered the west, learned to fly, or learned that the Earth was neither flat, nor the Center of the Solar System or the Universe. We have much to learn about our place in the Universe, and I consider myself privileged to be part of the generation that consciously helped pave the way.

Whether our instinct and desire to explore and discover takes us on a voyage of adventure in search for "new worlds" to trade with, or into the microscopic world of a Petri dish, or the depths of the Ocean, or the vastness of Space, the motivation is the same. Whether we want to experience it from the safety of a laboratory while robots do the work as our emissaries, or decide to take the laboratory with us, the motivation is the same... a thirst to explore, to know, understand, and to experience for ourselves.

When I was growing up just a few miles from here in Villa Palmeras, I used to look forward to my parents driving expeditions around the island. I used to enjoy looking at the Moon, and into the dark star studded skies and wonder what's out there. I heard it when President Kennedy asserted that we would land a man on the Moon and bring him back safely. I got to see it and experience it with my own eyes. In addition to the early morning cartoons, one of my favorite programs on TV was the National Aeronautics and Space Administration Report. They were half hour documentary snippets of discoveries in space and aeronautics research. I was in love with rockets, and airplanes and space travel, and fascinated by the questions that NASA scientists and engineers asked themselves. I wanted to be part of that experience. At the time I had no clue in what role, but I wanted to be part of it.

That dream was fueled by my parent's non-negotiable principles (the ones I told you about earlier), and the encouragement to continue dreaming without limits. I was blessed with teacher mentors that accepted no less from others and me. Cut of those dreams and efforts, the opportunity to join NASA as an engineer came along. I learned rather quickly that NASA was also full of dreamers; people who gave of themselves unselfishly to the noble cause of the peaceful exploration of space.

In my job I've had the privilege to work with scientists and engineers who without knowing became my mentors and heroes. These were individuals that either asked or enabled the questions about Earth, the planets, the origins of the Universe, the Big Bang, and the birth of the first stars and galaxies. I worked on the instruments that this year brought the Nobel price to NASA scientist Dr. John Mather, and to University of Berkeley Dr. George Smoot.

The course of history has been altered, and many of the science books of my youth have been re-written. And I, a Puerto Rican Hispanic engineer of modest background, was there to witness it and to contribute to that history in a big way. Today, the journey continues; asking the simplest, yet most profound questions: What's out there, where does all that surrounds us (including ourselves) comes from, what is our destiny, are we alone in the Universe?

The search for answers to these questions begins with our own planet as a frame of reference. We explore our planet from the vantage point of space to

understand how this complex system works, and how life within it either supported or impacted by it, and how do all of its parts interact. We have come to learn that life is incredibly resilient. We may not know exactly how it started here on Earth, but we do know that once it did, it found ways to adapt to survive, even in the most extreme of environments.

There is a lot about Earth that we don't understand. Earth's early history, and the evidence of conditions that led to the emergence of life were wiped by cataclysmic events, and the natural recycling that follows them. But luckily our neighbor planets individually or collectively can hold many of the clues to our past.

For example, Mars continues to give us clues of a past that was warmer and wetter environment, like Earth's is today. The fearless and it looks like immortal rovers continues to explore, while other robotic missions are added to the family with ever more sophisticated instruments to search for some form of indication of pre-biotic or biotic activity.

The Galileo mission revealed the Icy moons of Jupiter (Europa, Ganymede and Calisto), where liquid oceans are believed to exist under an icy crust. The Cassini mission orbiting the Saturn System has shown evidence of pools of hydrocarbons in Titan, and perhaps water sources in Enceladus.

Today the conditions in these places may not be optimal for life as we know it, but if not now, as our Sun expands, the conditions at these locales will change, perhaps creating more favorable conditions for life to evolve and be sustained in some form.

Beyond our star, there are trillions of stars. We have evidence of planets (in the mid hundreds by now) orbiting these stars. We are developing technologies that some day will let us detect Earth size planets in just the right orbit for the conditions to be friendlier to life. In the not too distant future we will find out whether these planets have an atmosphere similar to ours, and whether there is evidence of biological activity, or perhaps other civilizations.

We are living a Vision for Space Exploration. I have been painting the canvas all my life in dreams, and continue to do so today with the same impetus that drew me to be an engineer and to be part of NASA. I continue to look up in wonderment every time I see a new image of the Space Telescope revealing new, or colliding galaxies; and images of the Chandra observatory showing merging black-holes that were just theories when I was growing up. I look forward to the first images of the James Webb Space Telescope, as it peers deep 13.7 billion years into space and time, looking for evidence of the formation of the very first stars.

The vision for space exploration has refocused and reminded us, that the exploration of space is a journey not a race. It is a highway that will take us to unimaginable destinations to explore, to discover, to know and to understand. Robots will pave the way and open the doors. Humans will follow to take the human experience and knowledge to these destinations. We are starting at the Moon to develop the technologies, skills and know how, and then continue on to Mars, asteroids, and who knows where after that.

If I leave you with a parting thought is to repeat where I started. Expanding our knowledge through exploration and discovery is part of who we are, and an imperative for our survival as a civilization. It depends upon committed people like you and me, joining forces in a vision that is bigger than ourselves, because we believe that it is important to our future. The future however, depends upon a long term commitment to motivating, mentoring, and being an example to the next generation of explorers. You never know what will spark their imagination to become a scientist, a mathematician, an educator, or an engineer. They need to hear from us that yes they can. I challenge you to take ownership of this awesome responsibility.

Once again, thank you for the opportunity to let me share these thoughts with you. It has been a privilege. Enjoy the rest of the evening...