Benjamin Deniston

From the SDI to the SDE: Managing the Inner Solar System

Representing the LaRouchePAC Basement Science Team, Benjamin Deniston addressed the March 23 Schiller Institute conference, "A New Paradigm To Save Mankind: After 30 Years: The Need for the Principle of the SDI Today!" Other conference speeches can also be found in the March 29 and April 5 issues of EIR. Videos of the full conference are available at www.schillerinstitute.com. Deniston, whose speech was titled, "Let Us Pursue the Common Aims of Mankind within the Territory of the Inner Solar System," was introduced by Helga Zepp-LaRouche.

I want to open with a reference to the very dramatic impact over Russia, on Feb. 15 (**Figure 1**). It's been referenced a number of times. But this was the largest asteroid impact we've had in over 100 years. And frankly the object, although being a larger object to us, was relatively small compared to the types of objects floating around the Solar System, that we're going to have to contend with. This one was about 17 meters across. When it came into the Earth's atmosphere, it hit the atmosphere at such a fast speed, the estimates are around 40,000 mph! That was the speed of this object, and when it impacted the atmosphere, it was like hitting a brick wall, and it literally exploded, and sent a blast wave down.

As we all know, there were over 1,000 people injured, structural damage to a number of cities, broken windows and damaged buildings; but we should just emphasize that we're very lucky that no one was killed by this impact. This was *just* on the borderline of something that could have been a major tragedy. And as was said, we had no warning. There was no warning this was coming; we were basically blindsided.

Now, if this thing had been maybe 20 meters across, 25 meters across, maybe 30 meters in diameter, just a little bit larger than it was, this could have leveled the entire city of Chelyabinsk, and it could have been a tragedy, in which many people were killed.

EIRNS/Stuart Lewis

Benjamin Deniston told the conference: "Mankind must go out and manage and develop the entire territory of the inner Solar System."

The point is, this is a wake-up call for the entire world. It happened to hit over Russia, but it could have hit anywhere: It could have hit Mexico City; it could have hit Berlin; it could have hit New York; it could have hit Washington, D.C. So it underscores the existential importance of the proposal for an international Strategic Defense of Earth.

The Russian Proposal

That proposal was put forward in the Fall of 2011, by Dmitri Rogozin, [who then became] the Deputy Prime Minister of Russia. And he proposed, in the context of the tensions around the U.S. forward placement of ballistic missile systems, that the United States and Russia should collaborate, openly, on both missile defense systems, and also on defending the entire planet from asteroids, comets, and meteors, and other threats coming from space.

FIGURE 1

LPAC

Since this proposal was offered, it's been echoed and promoted by an array of top-level Russian officials, and the most recent expression of this was a very large and important meeting in the Upper House of the Russian Parliament, where an array of all the relevant officials came forward, discussed the issue, and you saw a repeated emphasis on the fact that this needs to be international, that no one nation has the capability of doing this, and that this would be a perfect basis for U.S.-Russian cooperation.

Unfortunately, the United States government has been foolishly silent on this issue of U.S.-Russian strategic cooperation on planetary defense, defending the Earth. Now, this idea of uniting nations in a defense of Earth—in a defense against missiles, and also a defense against asteroids and comets, as one program—is not a new idea. The general concept for U.S.-Russian strategic cooperation on both of these issues does go back to the early 1990s, in particular associated with the efforts of Dr. Edward Teller, and an array of other top military, defense, and scientific officials of both the United States and Russia. And some of this discussion came forward in a series of international conferences in the early '90s, held in Erice, Italy; Lawrence Livermore Lab in the United States; and ironically, Chelyabinsk, Russia; and a number of other locations.

But the basic reality of the matter is as true today as it was then: No single nation, alone, currently has the capability to defend civilization from being threatened or potentially eliminated by these cosmic threats. And a true Strategic Defense of Earth will require open collaboration between the largest and more forward-oriented nations. And we've been emphasizing that that list must focus on the United States, Russia, China, and India, as the largest and most forward-oriented nations in the world.

The Inner Solar System

Now, any true, comprehensive defense of Earth immediately directs our attention to the entire volume of the inner Solar System. You're dealing with orbiting bodies; you're immediately dealing with a territory that covers the entire inner Solar System, a region spanning beyond the orbit of Mars, within the orbit of Venus; and this entire region must become accessible to mankind's influence, if we're actually going to be able to defend life in the Solar System.

There are generally two approaches to dealing with this challenge. The first one, which tends to dominate most policy discussions, is what you could call a practical view of the problem, and that's based upon the concept of mankind attempting to remain essentially an Earth-based species, somewhat blindly reaching into space from an Earth-based mode of existence. We might send out some satellites, maybe even have some small manned missions into space, but essentially, the idea is, we're living here on Earth, and we're just poking around in what remains an underdeveloped and foreign territory, which is basically alien to the perceived realities of daily life here on Earth.

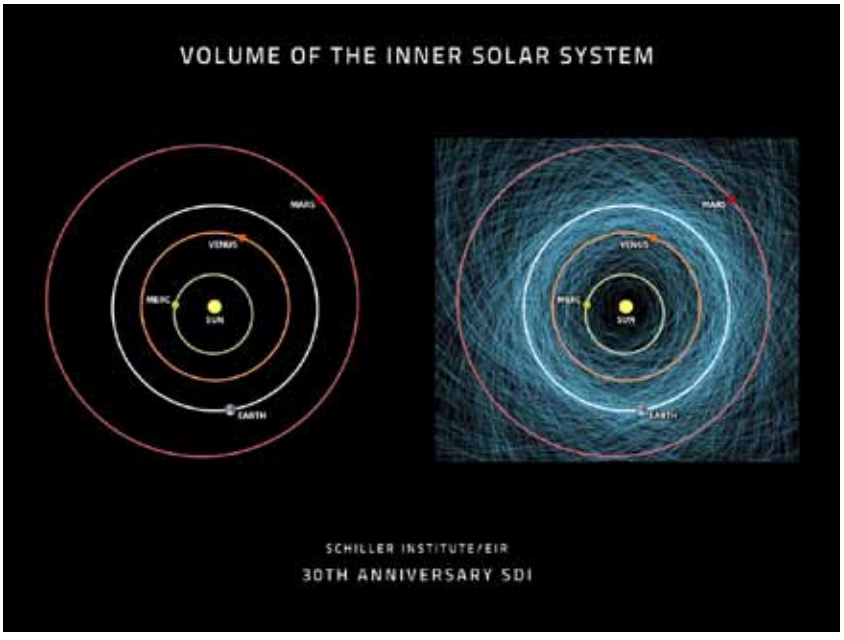
Now, in this view, the inner Solar System is, as the saying goes, "out of sight and out of mind." The perceived identity of the human individual in society, in this idea, is likewise fixed to the idea that the individual believes mostly in just what he or she experiences here on Earth. Now, I would emphasize that this impact over Russia, although we're lucky it was not much worse, forewarns of the existential failure of that view.

The second, more hopeful view, is that mankind must go out and manage and develop this entire territory of the inner Solar System. This does not mean we're going to go send people to live on Mars tomor-

row; we're not ready to do that. But it means we must rapidly expand our understanding and access to the entire inner Solar System. It means we must come to view the Earth from the vantage point of the processes of the entire Solar System, and we must view the human individual from the standpoint of his or her contributions to forever acting upon and changing those larger processes. And the point is, this is what mankind naturally does, and this is what mankind must naturally continue to do.

For example, on Earth, when we're dealing with river systems, if we're dealing with wild rivers, we don't just let them run wild; we build massive dams, we hold back and tame threatening river systems which would otherwise periodically cause catastrophic flooding, and major loss of life: We control these systems. And we must apply this same outlook to the Solar System as a whole: And we must look to the floods of asteroids, comets, and meteors permeating our Solar System, and we must control these, for our own defense, and our own benefit, gradually reshaping the inner Solar System to be more conducive to the requirements of life.

FIGURE 2



LPAC

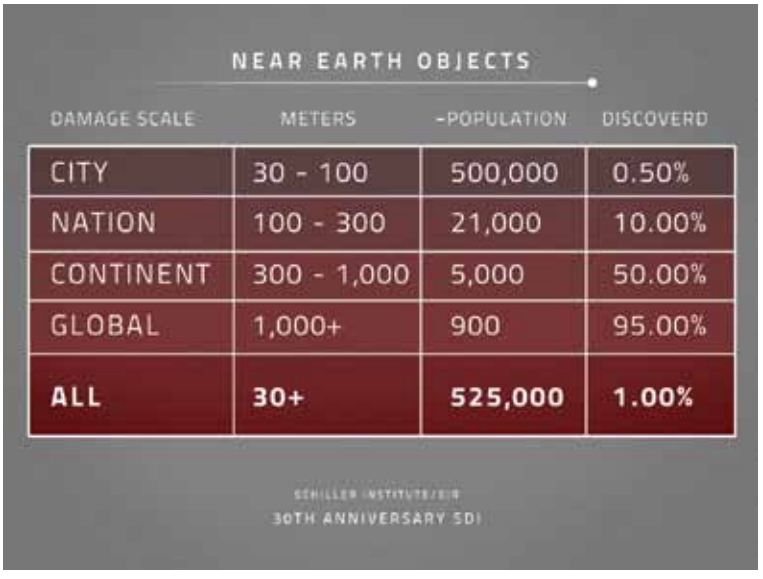
The Asteroid Population

To make this point clear, I'm going to give a brief sketch of what we do and do not know about the asteroid danger. We can go to the next image (**Figure 2**). Now the point is, that even in our immediate neighborhood of the inner Solar System, we still know frankly very little. On the one side, you see the basic standard view of the inner Solar System with the orbits of the four inner planets, something most people are familiar with. On the other side, you see the same image, but you have thousands of orbits of asteroids added on to the picture, and it looks pretty dramatic.

However, this is nothing compared to what we actually need to discover. What you should be able to see in the blue orbits on your right here, is only a very small percentage of the total asteroid population. Currently, NASA, by its best estimates, believes that we presently know about 1% of the total number of asteroids, just in this inner Solar System region, which could potentially pose a threat to the Earth.

Go to the next slide (**Figure 3**): Here we have this broken down into different size ranges, and you can see the correlated effects, of were one of these to impact, what would be the region of the damage of an impact. So you

FIGURE 3

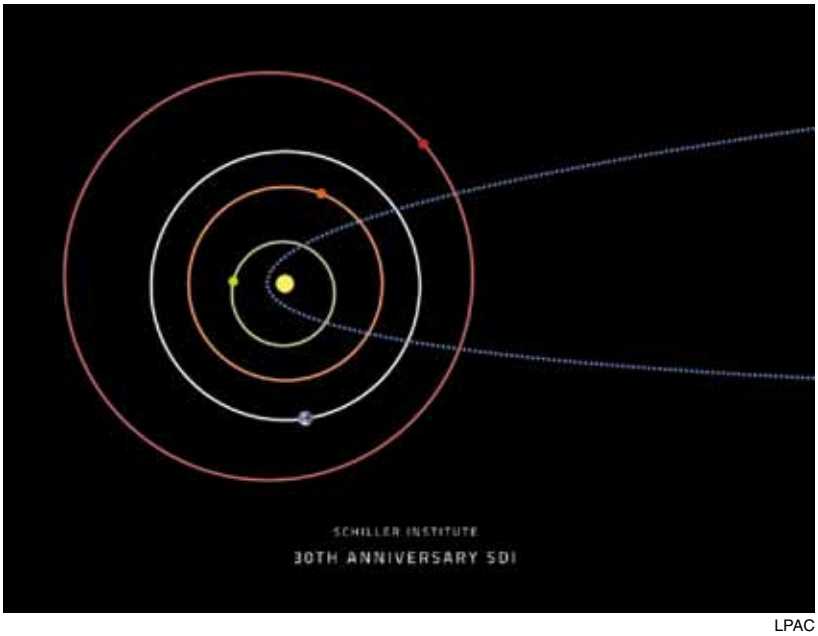


LPAC

have everything from smaller objects, again, larger than the one that hit on Feb. 15, but which could take out an entire city, to those that would take out a nation, to a continent, and to some that would have global catastrophic effects.

As you can see, we've done a decent job in finding the very big asteroids, specifically, but we're very, very far from understanding the total population. For asteroids ranging from 30-100 meters across, which are large enough to level an entire metropolitan area, we have a useful reference for this, which is what happened in 1908, with what's referred to the "Tunguska impact," where an object that they believe was somewhere between 30 to 50 meters across—so within even the smaller range of this smaller size range—impacted over Siberia, and leveled trees, completely leveled the territory over an area of 2,000 sq km, which is the size of any major metropolitan area.

FIGURE 4



LPAC

So, again, if any of these were to impact over any major city, there would be basically nothing left—and we know less than 1% of the population of these objects, just in our immediate neighborhood in the inner Solar System! And currently, as of today, the most likely scenario for another impact, would be one where one of these would hit with little or no warning. Maybe, ideally, you might have a couple days' warning, if anything.

The vast majority of the asteroids that have been discovered were found mostly with ground-based telescopes, and ground-based telescope systems, that were designed to find these larger objects, which are much easier to see. However, currently, we're reaching the limit of what these ground-based capabilities can find, and we're in desperate need of expanding our space-based observation systems, to find all of these potentially threatening bodies.

Now, I don't have the time to review all of the current, ongoing and proposed efforts, but there are a number of things on the table, coming from amateur astronomers, from private foundations, from governments—there's some international activity—some of it is very good. But the bottom line remains that nothing that is presently on the table, either as an active program, or a program that's being designed and built and supported, would have the capability of actually systemically finding all of these threatening objects, and providing enough warning time to defend the Earth.

And I also have to emphasize, that in looking at this table, when this issue comes up, the discussion quickly falls to statistics: What's the likelihood of this impact? What's the likelihood of that impact? What's the estimated population level? And it must be emphasized, that estimations and statistical approximations are *not* principled knowledge, and they do not represent any ability to forecast what will and won't happen in the Solar System.

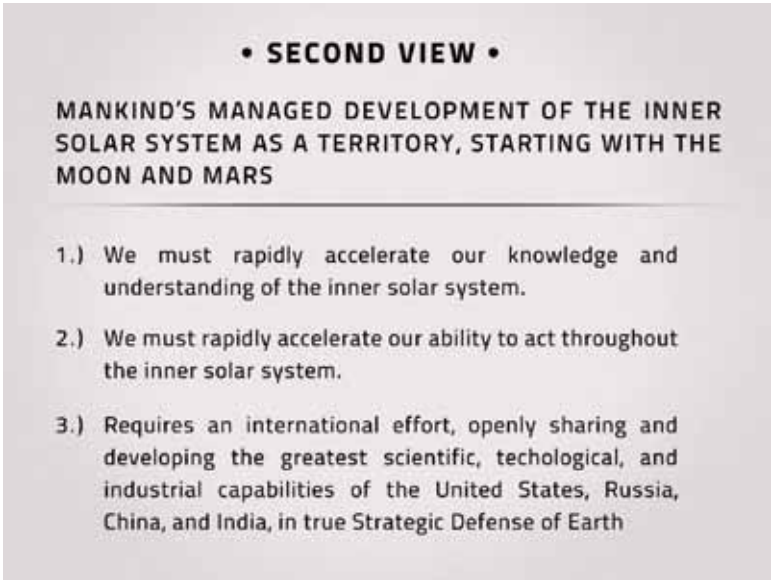
And just to put it on the table, I want to highlight the work that's going on the Basement, being led by my associate Jason Ross,[1] in leading up what you might call an anti-statistical approach, to this challenge of the asteroid and comet threat, based upon the work of Johannes Kepler and Carl Gauss, in pursuit of a forecastable knowledge of the structure of the Solar System as a whole.

Long-Period Comets

Let's go to the next slide (**Figure 4**). Now, none of this discussion, and really, none of the current activity

1. Ross presented this in the March 20, 2013 LPAC Weekly Report, and posted the related material on a page, including a written report, "Asteroid Harmonics: Research Update."

FIGURE 5



LPAC

that's going on in nations or internationally, even begins to address a second issue, which I'm just going to touch on, which is the issue of long-period comets, which potentially pose an even greater challenge than that of asteroids. Although they're less frequent, they come from a different part of the Solar System; they come from the farthest depths of the Solar System, where they're presently impossible to see with our current technologies. And they also generally come in much faster, and are much larger. So, for all we know as of today, there could be a comet heading towards the Earth that's three years away, and we would have no idea. And with our current technologies, any attempt to deflect one of these objects would take much longer than three years, especially if it were a decent-sized comet.

And here, you see illustrated a typical orbit of a long-period comet, whose eccentricity stretch is way past the orbits of the inner planets. Your orbits are mostly circular; even a lot of the asteroid orbits are somewhat elliptical, but still circle around the Sun. These long-period comets have extremely eccentric, extremely elongated orbits. So, if for example, this were the size of the orbit of Pluto, with the Sun in the center, you could have these comets that would take orbits like this, that will spend the vast majority of their time, way out, in the distance of the Solar System. We have no capability of seeing objects when they're that far away, and we have no warning time for these types of objects.

What We Know, and What We Don't

So, with just a brief sketch on what we do and do not know, the question is what does this mean for the idea of the Strategic Defense of Earth? And if we go to the next slide (**Figure 5**), I'm going to focus on the second viewpoint, the second of the two contrasting viewpoints from my opening; the second being that: the implications for a Strategic Defense of Earth, mean mankind must manage and develop the entire inner Solar System as a territory, starting with the Moon and Mars. And this means we must first rapidly accelerate our knowledge and understanding of the inner Solar System.

Second, we must rapidly accelerate our ability to act throughout the inner Solar System, throughout the entire territory.

And third, this will obviously require a major international effort, openly sharing and developing the greatest scientific, technological, and industrial capabilities of the United States, Russia, China, India, and other nations, if we are to have a true Strategic Defense of Earth.

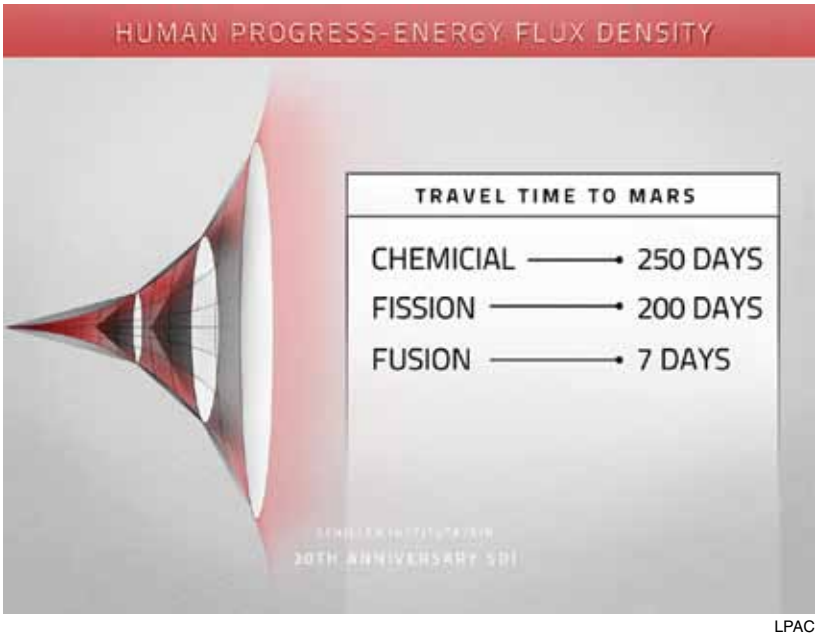
Currently, we have no tested defense system. If we want to go out and actually stop an asteroid from impacting the Earth—change its orbit, slow it down, blow it up, whatever we need to do to stop an asteroid from impacting the Earth—we have not tested anything. We have not demonstrated any comprehensive system to stop these impacts. There are some existing technologies that could be used, which, theoretically, under certain specific scenarios—there are many drafted proposals for other specific scenarios—but when it comes to an actual case where this would have to happen, currently, these are all just on paper. And beyond even what's been discussed, there are many threats that are not even being considered: The idea of deflecting these smaller asteroids, or the idea of deflecting these long-period comets, is not even on the agenda of discussions for planetary defense, on the major national-international levels.

So, we go to the next slide (**Figure 5**): There are a number of potentially feasible methods we could utilize to prevent an impact. As of today, there are only two methods that are probably feasible with the current technology, one being basically running a spacecraft into the object, to slow it down; and this would require, most likely, many years of warning time before impact,

so you could slow it down just enough by running into it, so that it would eventually miss the Earth, five, ten years later. Or, we could utilize a thermonuclear device in one of a number of ways, to either slow it down or break it up.

There's a lot to go into on this discussion, I can't obviously get into all the details here. But what would and wouldn't work, and what you would want to do, would depend on a number of factors: the size of the object, what the object is made out of, the nature of its orbit, and how much warning time we have. And I should just mention that these two methods—this came out in a National Research Council report on planetary defense, in 2010—that despite all the discussion of the different methods we could potentially use, and there's a lot of wild ideas out there, for different methods we could potentially use, there are only two that are really feasible: the kinetic impact and the thermonuclear explosive device.

FIGURE 6



LPAC

We Have Lost 20 Years

It should be emphasized that back in the early '90s, when Dr. Teller and others were getting involved in this issue, that was also the state then. We haven't advanced in 20 years. Twenty years ago, at an international conference at Los Alamos Lab, part of the conference was a technology assessment, and they wanted to assess what technologies they had at the time; what technologies would they expect to be developed in 20 years; and what technologies would exist in 30 years. And 20 years later, we haven't developed *any* of the technologies they expected to be developed in 20 years. In terms of planetary defense, we're still at the broad-based technology of 20 years ago!

Now, instead of going into the details—we have a report put out by *21st Century* magazine, which goes through a lot of the nitty-gritty, the specifics and details on planetary defense—but for the limited time I have here, I'm going to focus on what we could call the determining factors in planetary defense. And that goes to the fact that human progress in general, and human survival, has always depended upon, and will always depend upon, increasing what we call the energy-flux density of the human species. And this consideration of what is the energy-flux density we can wield, per capita, of power for our scientific capabilities, subsumes the idea of planetary defense and space exploration generally.

To give one example, we're currently limited by chemical propulsion systems, to travel around the Solar System. And quite frankly, to draw an analogy, chemical propulsion is basically the equivalent of the covered-wagon days of Westward expansion, with the oxen pulling the covered wagons that moved to the West. There's a lot of advanced stuff that's done, a lot of advanced mathematics and engineering involved in doing these missions, but in terms of our actual capabilities in space, we're at the equivalent of the covered-wagon days' expansions into the West!

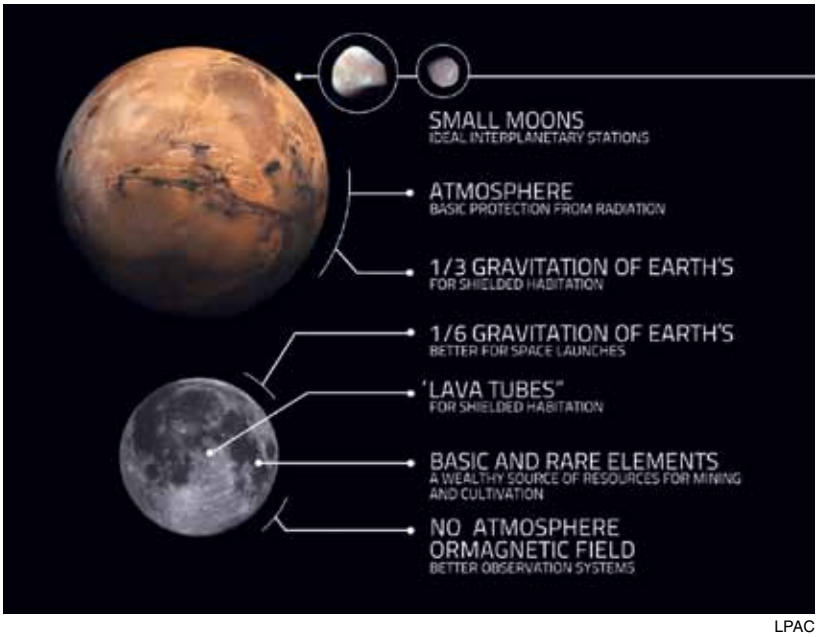
In the United States, when we wanted to develop the West of the North American continent, we built railroads, we built new cities, we built irrigation systems, we developed the entire territory. It's a completely different concept than just sending out one mission, and coming back. So now, for travel to Mars, for example, as you can see here, using chemical propulsion, the standard propulsion systems that exist today, it's a 250 day trip (**Figure 6**). And your departure time comes only once every two years. So not a lot of flexibility in our ability to move around in the Solar System.

This is for a trip to Mars, but if you have to go and intercept an asteroid, you have similar constraints.

Long travel times, narrow windows when you can launch, so it's a very limited capability we have. As our organization has presented a number of times, if you move to nuclear fission you can slightly improve that, but if you go fusion, if we go to a thermonuclear-fusion-propulsion system in space, you're talking about the ability to cut a Mars trip down to the order of days! And this would completely revolutionize our ability for planetary defense as well.

So the point is, mankind's efficient access to, and ability to act within, the entire Solar System, absolutely depends upon the development of higher-powered sources: thermonuclear fusion especially, with an eye towards matter-antimatter reactions. This is the only way to ensure that we can provide quick and efficient access through the entire inner Solar System, both for defense and for exploration. This obviously allows for quicker intercept times to go meet a threatening object; we can deliver a larger mass, and large payload to that object, and we can apply a greater density on-site, for whatever density of energy to that object, for whatever deflection means we desire.

FIGURE 7



LPAC

Managing the Territory

Next slide (**Figure 7**). Ultimately, what we have to do to ensure the defense of Earth, is, we have to develop these systems, in conjunction with the development of the Moon and Mars as our outposts in the inner Solar System; and this takes us again, to our second viewpoint on planetary defense: that of mankind managing the territory of this inner planetary region.

The natural benefits of the Moon make it an ideal location for industrial development, a launching point for easy access to the Solar System; the lower gravity makes for easier launches; there are abundant resources on the Moon that can be developed on-site, to develop an industrial capability on the Moon itself, so we don't have to lift material up off the Earth; we can just take it from the Moon itself. We have certain structures, such as these lava tubes, which provide great shielding for bases. And of course, the close proximity to the Earth makes it possible for remote and automatic control of Moon-based systems from the Earth, so this doesn't have to be manned by people all the time.

However, this is a step, and Mars is our major outpost for mankind to begin to truly manage and develop the inner Solar System for the defense of Earth. Compared with other planetary bodies, Mars clearly provides the best gravitational, atmospheric, and proximity considerations, for mankind's expansion into the Solar System.

So a true success in the Strategic Defense of Earth depends upon inverting the currently prevalent sense-perceptual view of mankind on Earth, where we're basically blindly reaching into space. We have to replace this view with a second view: that of understanding the Earth from the standpoint of mankind as a creative force in the entire inner Solar System, managing and developing this as a new territory. We must unite key nations in an international effort to this effect, and pursue what Dr. Edward Teller called "the common aims of mankind."

So, with issues such as these, defending all of human civilization from threats from space, we have to respond with boldness, and even reinterpret some of the most ancient directives given to mankind from the standpoint of the challenges of today. So, I would say, we must "be fruitful and multiply, we must replenish the Solar System and subdue it, and have dominion over all that moveth therein."