A Warning to Us from The Solar System

This is a transcript of "SDE Update: Asteroid 2012 DA14 Flyby," a 25-minute LaRouchePAC-TV video posted on Feb. 14.

I'm Benjamin Deniston with the LaRouche science team, the Basement Project, and I want to talk about two highly significant events that are occurring at the beginning of 2013.

First, there is the extremely close passage of a near-Earth asteroid on Feb. 15, 2013. I want to discuss that specific situation, and focus on two challenges that that situation expresses and poses to all the inhabitants of this planet. But I want to do it from a rather unique standpoint, which is that March 23, 2013 is the 30th anniversary of Ronald Reagan's announcement of the SDI [Strategic Defense Initiative].

Now the SDI, as pioneered by Lyndon LaRouche, as supported by Edward Teller, and as posed to the Soviet Union on March 23, 1983 by Ronald Reagan, was the option for what Teller called "the pursuit of the common aims of mankind," the concept that nations, and at that time, the superpowers of the world, should actually collaborate in science-driver programs, tackling new challenges. In the case of the SDI, obviously eliminating the threat of nuclear weapons, as Ronald Reagan posed that to the American people in 1983, but doing it in an open, cooperative program with the leading powers of the world. That principle of the SDI was never actually implemented, and we're suffering the effects of that today.

Ben Deniston: "Right now we're basically flying blind through the Solar System, traveling through this dense population of bodies, unaware of when the next collision might occur."

What I want to address with this case of the asteroid flyby, and the questions that this poses to all the inhabitants of the planet, actually goes to the same issue: of nations collaborating to address the questions that threaten the entire planet, all inhabitants of the planet; finding the common challenges that mankind as a whole must tackle, and focusing the scientific, political, and potentially military resources available to nations such as, today, the United States, Russia, and China in particular, and focusing our efforts on overcoming these common challenges. And making that the leading strategic framework of the world.

So I want to take the case of this asteroid, known as 2012 DA14, to illustrate what we're talking about here.

Asteroid 2012 DA14

What you have here (**Figure 1**) is an image of an orbital animation that you can pull up from the NASA Jet Propulsion Laboratory website. We have an animation of 2012 DA14, starting in June 2012. And we're going to let the animation play out, to see where the orbit of the asteroid in blue ends up, relative to the Earth.

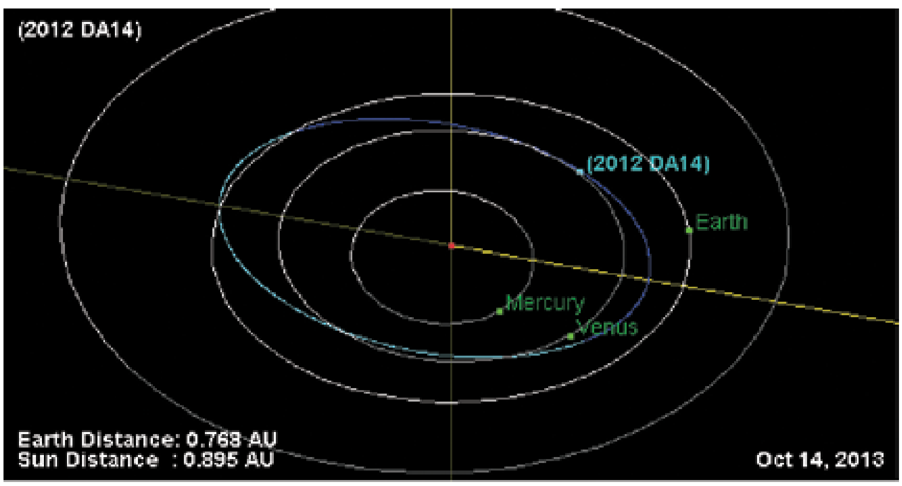
As I mentioned, on Feb. 15, we have an extremely close pass by the Earth. We know for certain that it's not going to impact the Earth, thankfully. NASA knows that they have a good enough understanding of the orbit of this asteroid, that it will not impact the Earth. But it will come extremely close.

Here's an image (**Figure 2**) of the different satellites' orbital positions around the Earth. In low Earth orbit, you have the International Space Station, for example. There are obviously many, many other satellites and orbiting bodies here. If you move a bit farther out, you get the location of our GPS satellites, which give us our GPS capability on a day-to-day basis. Going out a little bit further, you have what's called the geosynchronous satellites. These are often communications satellites; they orbit the Earth at the same rate that the Earth itself rotates on its axis, meaning that they maintain a position above one location on the Earth, which makes it useful for communications and different things.

So this asteroid, 2012 DA14, is actually going to pass within our satellites. It's going to pass so close to the Earth, that it's actually going to come closer to the Earth than some of our own satellites that we utilize on a day-to-day basis. So when you're watching your satellite television, you're getting a signal from a satellite that's actually farther away from the Earth than this asteriod's going to be when it flies by.

So that's an extremely close pass. There is perhaps a very slight chance that it might impact a satellite (satellites are very, very small targets, so this is not very

FIGURE 1



NASA/JPL

FIGURE 2

likely, but it's worth pointing out that that is a possibility, given that this thing is passing within this range of the Earth system).

This particular asteroid is a relatively small asteroid; it's about 50 meters in diameter. To put that in perspective, the asteroid or comet that we believe led to the extinction, or helped lead to the extinction, of the dinosaurs was about 10 kilometers across. So there's a whole range of scale of objects that you're dealing with. And this particular asteroid is not something that we would be concerned would have an entire global effect. We're looking for objects that could cause an extinction-level event, and that's a big challenge, especially with issues like comets. But this particular asteroid is not something that might wipe out civilization as a whole; but if it were to impact, the location of impact would be devastated. And if that were to have an impact over a densely populated area, it would be incredibly devastating on a local scale.

For example, at Purdue University, some specialists did a study of how much energy this particular asteroid would release if it were to impact, and they think it would be around 4 megatons of TNT, which is a measurement often used for energy release: comparing it to equivalent amounts of TNT. This would be the size of decent-sized thermonuclear explosive device, which is 250 times the energy released by the bomb that was dropped on Hiroshima at the end of World War II. That's 500 times more than the energy of the bomb that North Korea just tested underground. So this is a huge amount of energy, and we do know that objects of this size do impact the Earth, and, speaking on longer time-scales, frankly, relatively frequently.

You have a famous case in 1908, where an asteroid or a comet, which we believe was of a similar size, around 30-50 meters in diameter, came into the atmosphere and impacted the Earth over the Tunguska region of Siberia. This is often referred to as the Tunguska Event, where you had a massive explosion in the atmosphere, and this explosion was due to the fact that this asteroid was coming in so fast, that when it entered the atmosphere, it heated up so quickly, that it literally exploded, and sent a blast wave, an intense blast, down onto the Earth, as depicted in this artist's illustration (**Figure 3**). These things are moving at tens of thousands of miles per hour, at incredible speeds. It exploded before it even had a chance to hit the ground. And the explosion then sent a blast wave down to the Earth (thankfully, this

FIGURE 3

Artist Don Davis's rendition of the explosion of an asteroid or comet over the Tunguska region of Siberia in 1908.

was an uninhabited region of Siberia in 1908). And it leveled trees over an area of 2,000 square kilometers, from the effects of this relatively small asteroid.

Here (**Figure 4**) is one of the images from an early expedition that went out and investigated the effects.

So even these relatively small bodies can have huge effects. And if you take an area of this size, 2,000 km^2, and you impose that over any major metropolitan area—San Francisco, London, New York City—this could devastate an entire metropolitan area if one of these impacts were to occur above a region like that.

We know it's not going to impact the Earth in this case, but we should take it as a warning, and we should know that there are many, many objects out there of this size, smaller, and larger, that we have not yet discovered.

That would be the first challenge I wanted to discuss, being posed to all the inhabitants of this planet, by this close flyby on Feb. 15.

FIGURE 4

This photo, taken in 1927, gives a sense of the damage done over a large area around the Siberian Tunguska region.

Now if we go, again, to NASA's JPL web page, we can pull up close flybys of the Earth. Go to "Close Approaches," and you can generate your own table of when asteroids are going to make a close flyby of the Earth. So to illustrate this, if we take any asteroid that's going to pass within a distance of ten lunar distances—so ten times the distance of the Earth to the Moon—how many asteroids do we know of that are going to pass that close to the Earth within the next year? And you can generate the table (**Figure 5**); and according to NASA's best estimates, we can see here that there are about 13 close approaches over the next year that we know about, the top one being the case of 2012 DA140. So this is our forecasting capability, based on our current understanding of the distribution of asteroids in the inner Solar System, based on how many we know about and how accurately we understand their orbits.

Now, let's do a test. That's our forecasting capability. How does that compare with our "hindcasting" capability? If we take the amount of asteroids that have made this same relatively close pass, within ten lunar distances, over the *past* year, which means that we might have seen them right after they passed by, or two days before they passed by. This would include examples where we didn't necessarily know they were coming two months, three months, four months, a year ahead of time. But maybe right as they passed by, we say, "Oh, there's one flying right by." So this is comparing our forecasting vs. hindcasting capability. And if we generate this table (**Figure 6**), you get a very different result: 219 close passes.

What does this tell you? It tells you that our ability to forecast the asteroid population currently, is not anywhere comparable to what's actually out there. What we can forecast a year ahead of time is nowhere near what we actually observe, let alone what we don't yet observe.

So this is to illustrate the point that we need to dramatically improve our forecasting capability. And to do that, we need to get a better understanding of what the distribution is throughout the whole Solar System, the whole inner Solar System especially. And right now, that is a challenge that nations should be collaborating on and taking up, to expand our understanding of what the total distribution of these asteroids is.

And these are just statistical estimates from a relatively small sample. They think that maybe we've discovered about one half of 1% of the total distribution of near-Earth asteroids that are in this 50-100-meter size range, the Tunguska Effect size range, objects that could have a major effect, that could devastate a small region of the planet if they were to impact. So for every one that we know of, there are about 200 out there that we don't know of. This is a huge challenge that we need to take up. There are literally hundreds of thousands of these bodies out there that we don't know about. And we need to make a serious effort to go out there and find

FIGURE 5

Forecast of Near-Earth Object Close Approaches

NEO Earth Close-Approaches
Between 1900 A.D. and 2200 A.D. limited to encounters with reasonably low uncertainty

NEOs (Near-Earth Objects) | no H limit
Sort by date | Ascending Sort
Future (within a year) | Nominal dist. <= 10LD
20 rows per page max. | show full table | Display Table

The table below shows **12** close-Earth approaches by NEOs (Near-Earth Objects) sorted by **date**.
Only those close approaches within **10 LD (Lunar Distances)** occurring **on or after 2013-Feb-16 UT and within a year** are included.
Column headings described below

Object	Close-Approach (CA) Date (TDB) YYYY-mmm-DD HH:MM ± D_HH:MM	CA Distance Nominal (LD/AU)	CA Distance Minimum (LD/AU)	V relative (km/s)	V infinity (km/s)	N sigma	H (mag)
(2013 CE82)	2013-Feb-17 16:39 ± < 00:01	4.6/0.0118	4.6/0.0118	13.17	13.16	401	24.7
(2013 CZ87)	2013-Feb-19 04:51 ± 00:01	7.0/0.0180	6.9/0.0178	6.94	6.92	144	25.9
(2007 EO88)	2013-Mar-18 20:50 ± 01:45	4.4/0.0114	2.9/0.0075	10.65	10.63	1.54e+05	26.4
(2010 GM23)	2013-Apr-13 23:00 ± 2_06:15	3.9/0.0099	0.9/0.0022	13.14	13.12	6.16e+04	24.7
(2006 BL8)	2013-Jul-26 02:35 ± 1_23:55	9.3/0.0239	1.3/0.0034	11.51	11.50	2.09e+03	24.8
(2003 DZ15)	2013-Jul-29 15:56 ± 1_02:32	7.6/0.0196	6.9/0.0178	14.54	14.53	1.17e+04	22.2
277475 (2005 WK4)	2013-Aug-09 05:02 ± < 00:01	8.1/0.0207	8.1/0.0207	8.38	8.36	7.67e+04	20.1
(2011 JY1)	2013-Nov-13 19:49 ± 19:12	8.2/0.0210	4.8/0.0124	12.10	12.09	1.14e+04	24.4
(2001 AV43)	2013-Nov-18 16:43 ± 06:23	2.9/0.0074	2.7/0.0068	3.61	3.51	6.77e+03	24.4
(2011 YD29)	2013-Dec-28 15:35 ± 17:28	6.1/0.0157	6.0/0.0155	6.70	6.68	4.14e+04	26.2
(2012 BX34)	2014-Jan-28 16:07 ± < 00:01	9.6/0.0247	9.6/0.0246	10.00	9.99	6.49e+04	27.6
(2006 DP14)	2014-Feb-10 19:05 ± < 00:01	6.2/0.0160	6.2/0.0160	27.13	27.13	1.16e+05	18.8

FIGURE 6

Actual Near-Earth Object Close Approaches Feb. 15, 2012 to Feb. 15, 2013

The table below shows 200 of **222** close-Earth approaches by NEOs (Near-Earth Objects) sorted by **date**.
Only those close approaches within **10 LD (Lunar Distances)** occurring **between 2013-Feb-16 UT and a year prior** are included.
Next/Last Page (rows 1 to 200 shown) Column headings described below

Object	Close-Approach (CA) Date (TDB) YYYY-mmm-DD HH:MM ± D_HH:MM	CA Distance Nominal (LD/AU)	CA Distance Minimum (LD/AU)	V relative (km/s)	V infinity (km/s)	N sigma	H (mag)
(2012 DW43)	2012-Feb-17 12:07 ± 05:46	9.5/0.0244	8.9/0.0228	8.81	8.79	20.1	26.5
(2012 DJ14)	2012-Feb-19 23:21 ± < 00:01	7.2/0.0184	7.0/0.0180	13.84	13.83	105	25.7
(2012 DY13)	2012-Feb-20 22:43 ± < 00:01	0.3/0.0007	0.3/0.0007	17.21	17.00	910	28.0
(2012 DF4)	2012-Feb-21 07:04 ± < 00:01	3.4/0.0086	3.3/0.0086	16.17	16.15	1.04e+03	25.8
(2012 DX)	2012-Feb-21 18:19 ± < 00:01	2.0/0.0050	2.0/0.0050	10.60	10.55	1.03e+04	27.1
(2012 DJ54)	2012-Feb-22 16:36 ± < 00:01	1.5/0.0038	1.5/0.0038	5.45	5.32	684	28.5
(2012 DZ)	2012-Feb-22 23:03 ± < 00:01	2.5/0.0065	2.5/0.0064	16.46	16.44	469	26.1
(2012 DM32)	2012-Feb-23 03:17 ± < 00:01	6.7/0.0172	6.7/0.0172	8.39	8.37	616	26.2
(2011 CP4)	2012-Feb-23 14:02 ± < 00:01	9.1/0.0234	9.1/0.0234	30.47	30.47	1.18e+07	21.1
(2012 DY)	2012-Feb-24 08:16 ± < 00:01	9.2/0.0237	9.1/0.0235	9.37	9.35	264	26.6

This is only the top part of a large chart, showing 200 actual close-Earth approaches.

them, determine what their orbits are, and track them, to make sure nothing impacts the Earth.

So that's the first challenge posed to the inhabitants of this planet by this flyby.

What Do We Do About It?

Now the second issue is that, say we know one of these is going to impact. Say we're able to determine that we think in some period of time, in a month, in two months, in a year, we think one of these asteroids is actually on a trajectory to hit the Earth. Based on what I just discussed here, our forecasting capability is very poor currently, especially for these smaller bodies. So in all likelihood, the amount of warning time we would have for an object like this is very short—maybe up to a year would be good, but a lot of these things we don't see until right before the flyby, maybe months, maybe weeks before the flyby.

So the challenge posed by this is, what would it take to actually go out and stop an object from intersecting the Earth? If we think it is on an impact trajectory, what would it take to stop that impact? Especially when you have short warning times. When you have long warning times, it's an easier issue to deal with; but if you have short warning times, it becomes much, much more of a challenge.

This is a subject of a study that NASA's conducting, and a couple of people whom we've interviewed on LaRouchePAC TV, have taken up the challenge of how to address this specific issue of short warning times to stop an impact. And the reason this is so difficult, as they discuss, is that the speeds involved are so great—again, imagine something traveling at 28,000 miles per hour, or about 8 miles in one second. Now, if you're trying to hit that object with something, if you're trying to run a spacecraft into it, to slow it down, or if you're trying to hit it with a thermonuclear explosive device, so it doesn't intersect the Earth, you have to intersect something that's moving at 8 miles in one second. Now if that object is only 50 meters across, this poses a very real challenge to NASA and the scientific community, to figure out how to accomplish this.

I'll play a short clip of an interview with two experts (**Figure 7**), a professor at Iowa State University named Bong Wie and a scientist at NASA Goddard named Brent Barbee, who have been deployed by NASA to study how to overcome this challenge:

FIGURE 7

LPAC-TV, http://larouchepac.com/node/24563

Ben Deniston interviews Brent Barbee (center) and Bong Wie about their "Hypervelocity Asteroid Intercept Vehicle" concept, Nov. 14, 2012.

Brent Barbee: For our study, we want to be ready to deal with short warning-time scenarios; we want to be able to launch, essentially, just about any time. So that means that our system has to be designed to come in fast at the asteroid, a high relative velocity at the time that we intercept the asteroid. So we're not going to carry propellant to slow down, because physics dictates that that mount of propellant would be huge. So our system is designed to come in in excess of 5 kilometers per second, 5, 10, 15, 20, up to 30 km per second relative velocity at impact.

Deniston: For our audience, that means tens of thousands of miles per hour.

Barbee: That's right. As a reference point, 7 km per second is on the order of about 20,000 miles per hour. So when we're coming in, the asteroid starts off as this little, tiny dot that the cameras on the spacecraft can barely see, a few million kilometers away, and then within a matter of hours, we're down to the last few minutes and the last few seconds, and we cover hundreds of kilometers within a matter of a minute or so. So there's very little time for the spacecraft to react. So we have to design a robust, onboard guidance, navigation, and control system that can successfully hit the relatively small asteroid traveling in the huge volume of space, traveling at such high relative velocities.

These are the types of challenges that are posed to all the inhabitants of this planet by the close passage of this asteroid on Feb. 15, 2013.

Strategic Defense of Earth

This should be seen in the light of Lyndon LaRouche's work on the Strategic Defense Initiative. Not because this is the same, exact threat as nuclear missiles, which is a threat that mankind still has to overcome, by developing cooperative defensive systems that can eliminate this threat—but because it poses the same principal challenge to mankind. We're living on one relatively small planet, flying through a much more populated region of the Solar System than people even realize.

As I said, there are hundreds of thousands of these near-Earth asteroids out there, most of which we have not yet found. So right now, we're basically flying blind through the Solar System, traveling through this dense population of bodies, unaware of when the next collision might occur. And we're not taking the efforts we could be taking to initiate real science-driver programs, typified by a full expansion of NASA, unleashing NASA to cooperate with other nations, to cooperate with Russia, to cooperate with China, to give mankind the full capabilities needed to tackle these threats and defend the entire planet Earth.

So right now today, that's what this flyby, and that's what the anniversary of Reagan's announcement of the SDI, should be bringing to the minds of people. Is mankind going to take that moral, cultural step to recognize our existence as one humanity, one mankind, on one planetary body, faced with a whole array of common threats? And are we finally going to take *that* as the principle that we have to collaborate and organize international relations around? Are we going to take that as the central issue that will now define international and strategic relations?

We've now been given a warning by the Solar System by this Feb. 15 passage. The challenge now is to actually act upon that warning, and get the type of collaborative program needed to move mankind out into space, and give us the capabilities to handle these types of challenges.

And with that, I encourage you to fight for this program, fight for the type of change that we need, and we will continue to bring you more updates on larouchepac.com about these and related events.