

**CARNEGIE INTERNATIONAL
NONPROLIFERATION CONFERENCE
THE SPACE NUCLEAR NEXUS**

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MICHAEL KREPON: Welcome, everybody. I'm Michael Krepon, the cofounder of the Stimson Center. Thanks for coming here. We have a very distinguished panel. If you look on page 38 and 39 of your program guide you will find short bios of Phil Coyle, Pavel Podvig and Dingli Shen, which will relieve me of the time burden of repeating what's on the printed page. We're also going to have a special guest appearance. Later in the session by Alexei Arbotov who has just completed some analytical work on space with some policy prescriptions that will be of interest. And I'm going to take five minutes of our time to put a few ideas out into the public domain also.

But first I want to get us started with Phil Coyle, senior advisor to the president of the World Security Institute. We all know him from the excellent work he did when he was at the Department of Defense working on operational test and evaluation issues. So Phil, you're first up.

PHILIP COYLE: Thank you, Michael. I appreciate you all coming. I have some slides I'm going to go through quickly here. I'm going to touch quickly on each of these areas: the history of this nexus, how it arises and occurs operationally day to day, some of the arms control and nonproliferation of the nexus and then how both sovereign countries and the international community as a whole might look at these questions and deal with them in the future.

There's a lot of different places where you could start this history, but I chose to keep it pretty simple and start it in the early '60s when both the United States and the then Soviet Union were working on systems that made a space nuclear nexus. For example, the Soviet Union had its FOB system, Fractional Orbital Bombardment system, that President Khrushchev spoke about publicly in both '61 and '62, and which the Soviet Union built to overcome what they saw as a U.S. advantage in forward basing with the bases we had in Turkey, Europe and Asia.

Reportedly, it was deployed briefly around 1968 but then phased out fairly quickly thereafter under both the Outer Space Treaty and under SALT.

Around the same time the United States was working on its NIKE Zeus and Thor ASAT systems. Thor system was actually deployed from Johnson ATOL in the Pacific, and of course the United States later had its Safeguard ABM system which was nuclear, and the early Reagan SEIO was also nuclear. And Brilliant Pebbles which followed was non-nuclear, but raised lots of concerns because originally it was going to be thousands of satellites, later a thousand or so.

Operationally, day by day today there's a nexus because of the defense support program satellites, the missile warning satellites for example were used to detect the North Korean launch the other day, and two programs that are billions of dollars over budget and years behind schedule: SIBERs High which is to replace the DSP satellites and the space tracking and surveillance system, used to be called SIBERs Low, both of those systems are having acquisition problems.

And to the extent that such systems might lead to false alarms, they can be the source of nuclear misunderstandings that could escalate quickly.

Operationally there's also a nexus day to day in other command and control and communication satellite systems and sensor systems, both on the ground and in space. And in the United States the trend is for these systems to become more intertwined because of joint interoperability it desires cost and complexity and also working with Coalition partners. And again there's an opportunity for false alarms here as we saw with Japan announcing the Korean launch before it took place.

There is of course also a proliferation nexus. Space launch capabilities can translate into long-range missile capabilities, what many people are worried about with North Korea and with Iran and vice versa. And as it turns out, early nuclear weapons states were also early space satellite states and capability in space and/or nuclear weapons can be viewed as establishing national prestige as we saw the United States react so quickly to Sputnik.

This is just a list of the first nuclear test on the left and the first satellite launch by a few countries, which don't line up perfectly but you see that there's a little bit of a connection there. However, over 50 nations have launched perfectly peaceful satellites and had satellite programs that were perfectly peaceful. There doesn't have to be a nuclear nexus, and for most countries there isn't.

I don't know if you can read this from the back of the room; this is a list of some selected early anti-satellite tests, ASAT tests, notably tests that go back to the late '50s and early '60s. The Nike-Zeus test that I referred to early, the U.S. Thor which had 18 tests between '64 and '75 and was deployed briefly at Johnson ATOL. The Russian Cosmos ASAT tests, and the U.S. laser ASAT test, and then of course the more recent China and U.S. Navy ASAT shoot-downs.

More generally between the '60s and the '80s both the United States and the USSR developed and tested ground-based and airborne ASAT systems. However, there has been no deployment of space-to-Earth or space-to-space attack systems. Brilliant Pebbles that I referred to earlier and the NFIRE, the Near Field Infrared Experiment, both have raised concerns in the Congress, and those programs have been limited both in what they can do and funding because of those concerns.

And it's worth noting that commercial launch vehicles can be adapted to have ASAT capabilities whether they are intended for that from the first place.

As Paul Stares has pointed out a couple of times, there is a kind of symbiotic relationship between space, nuclear and ABM programs, partly because the technology arises similarly and partly because they are intertwined sometimes in terms of their purposes.

And in recent years this has been heightened by the Rumsfeld Commission Report 2001 but until Rumsfeld became secretary of defense that warned of a space Pearl Harbor. Then a couple years later when Iraq tried to jam U.S. satellites, Air Force Secretary James Roach declared that the war in space had begun. I don't agree with him, but he saw that jamming as an example of the war on space even though it took place from the ground.

And then the commission that's looking at EMP threat has put out two reports which have raised alarms about this issue.

Increasingly, perhaps especially in the United States, space is viewed as a strategic asset and "critical national infrastructure" and especially during the past eight years in the United States U.S. satellites and the space they occupy has been regarded by many as sovereign territory. Of course the United States doesn't own space; it's not ours. And to make this point, other nations have pushed back in various ways.

The things that help of course are codes of conduct, rules of the road, concern about space debris and trying to manage and control space debris, and we have a long tradition in a number of treaties, SALT, CFE, START and so forth, of non-interference with various national technical means of verification. And those are of course often in space, those means.

And so conduct relative to nuclear weapons and conduct relative to space, they both involve the perception of and acknowledged and observed practices to control space and keep it a peaceful place and also recognizing that there are taboos if there is interference with that.

As with nuclear weapons, space policy and diplomatic initiatives that strengthen these codes of conduct and the rules of the road and taboos all in my view go in the right direction. And in the extreme, policies that cause space to be viewed as sovereign territory I think can lead to escalation and even to the use of nuclear weapons in retaliation against an attack against space satellites.

Russia and the United States are especially important here. As of the end of 2007 together Russia and the United States had launched more than 3,000 military satellites where the rest of the world had launched less than 100. And so as is the case with nuclear weapons, both America and Russia need to lead.

What are some possible future initiatives? We'll talk about this more. One could be no further ASAT testing. That is a comprehensive ASAT test ban treaty. You all can imagine problems with that. We could try to prohibit development or deployment of space-to-Earth attack weapons or space-to-space attack weapons. Transparency and consultative measures, especially with respect to commercial space launch vehicles and payloads, could be helpful. Also important outlawing any destructive methods against manmade space objects; I think that might be a workable kind of treaty.

I'd like to think that we won't ever have dedicated ground-based ASATs and perhaps there should be a treaty against that. But if the day ever comes that we do we certainly don't want them on hair-trigger alert. And finally you might have a no-first-use kind of treaty having to do with space attack weapons.

So in conclusion in my view not since the development of the atomic bomb has the United States, Russia, and the international community had an equivalent opportunity and incentive to show leadership for restraint in the development for a new class of weapons, namely weapons in space.

Thank you very much for your attention.

(Applause.)

KREPON: Phil, you are a model of conciseness.

Pavel Podvig is with us. We are delighted to have him here. He's at CSAC at Stanford University. Prior to that he was at the Center for Arms Control Studies at the Moscow Institute for Physics and Technology. We have come to rely on him as an interpreter of strategic developments in Russia. Pavel.

PAVEL PODVIG: Thank you, Michael. Thanks for coming. And my thanks for these very good introduction and outline. I will try to paint a picture where things stand in Russia far as I can tell, and I think we will have the benefit of Alexei Arbatov joining us later, and he would speak about some specific arms control proposals.

I would start by saying that space and military uses of space and the relations of space with the strategic forces has been a traditional issue in Russia going back to the Soviet Unions times, and the concerns rose mostly in the late '70s, early '80s, though many of you would remember there was quite a bit of attention to so-called strike weapons in space. And the Soviet Union paid a lot of attention to those, especially in relation to the Strategic Defense Initiative.

But there are all kinds of concerns about military support systems, the reconnaissance satellites, communication and others, and certainly many in Russia know the kind of talk about space-dominance that you hear in some quarters in the United States. So as a result of that, there is a fairly lively discussion in Russia in the military and around in the security circles fueled largely by the fact that there is a strong tradition of strategic air defense in the Soviet Union. There has always been the sense that you could do a lot in protecting air defense and now its air and space defense.

And there was for a long time an organizational home for this kind of thinking. In the Soviet time there was Air Defense Forces, a separate service of the military. And now they are scattered around, but there are still people whose thinking was formed by those experiences.

So as a result, the discussion actually goes mostly in the direction of occasional calls for integration of old space and air defense into one very robust system. Again a lot of attention is paid to the notions of space as a military frontier and usually the assumption is that the United States would have some superiority in space and would have some even offensive assets in space or support or satellites that would support other missions. So there is this notion of space defense is really fairly popular in Russia these days.

Occasionally you get a call for a SAT development, a general here or there would say, oh, we'd really love to see some ASAT capabilities. The complicating factor, of course, in all this discussion is the U.S. missile defense plans and those parts of the plan that assume there would be some space based deployment of some elements of missile defense in space. So

that certainly gives people who are advocating paying closer attention to space in Russia, gives them additional arguments in support of their positions.

Again, there is a tradition in the military and defense industry, and people who are arguing that ASAT's capabilities are stabilizing because if you target the kind of missile defense systems, that's a good thing to do. So there's, again, I just want to give you a sense of what the thinking is. As you can imagine, the Chinese and U.S. anti-satellite tests conducted over the last years fueled those arguments, and now you can imagine it is now much more difficult to make an argument that there should be some constraint on ASAT capabilities because the U.S. does it, China does it, so why should Russia not do that?

It would be actually be fairly difficult to do that in practical terms. In terms of actual programs and developments, things are not very good for either space weapons or ASAT in Russia because most of the industrial and organizational infrastructure that supported those programs has been scattered around, and we don't have either the military service dedicated to this kind of thing but also Russia does not have a unified ministry in the defense industry that would carry enough weight to lobby for this kind of a program.

Besides, looking from the other direction, Russia, the discussion about ASAT and space, military uses of space, is actually influenced by the fact that Russia doesn't really have a lot of space assets to protect. The integration of military satellites into the actual military operations is actually not very good.

Again, on a positive note, access to space is basically controlled largely by the space forces, by Roscosmos, the civilian agency, to a certain extent the rocket forces, and none of those institutions actually has great interest or any real investment in any kind of an ASAT capability or any weapon-in-space developments.

However, things may change, and we should keep in mind that there are things on the shelves of all those design bureaus because in the '80s the Soviet Union was involved in a number of space-related projects. There were a few projects to develop kinetic kill and co-orbital ASAT. There was a project to turn the Moscow Missile Defense into the NASAT system. As you can imagine, people would be willing to dust off those and try to move them.

We've seen how that worked with missile defense with the ABM treaty once the treaty disappeared, then gradually you'd see all kinds of people in the industry and military pushing their projects and arguing that should be a response to missile defense deployment. I think that dynamic could, if we allow the sedation in space kind of deteriorate if we don't establish a set of rules. I think that logic may take off and we may see people pushing their favorite projects forward.

But the good news is that there is quite a bit of support for a diplomatic solution, for some kind of rules and regulations there. There is support in the political level, in the foreign ministry. We know there's a draft treaty jointly with China that Russia suggested, ACD. Mr. Arbatov would talk more about other ideas also are out there.

Overall, if you look at the situation in Russia, I think you could say Russia is kind of ambivalent about this, and it has quite a bit of concerns about unchecked developments in

space, so we could probably rely on Russia to be a cautious force in that whole sedation and actually be supportive of developments that would limit military uses of space. But it is important that those institutions in Russia that stand to benefit from regulations and limits, like the space forces, to a large extent the civilian space agency, so that they should be given support in terms of encouragement of their efforts to reach a diplomatic solution.

Let me stop here.

KREPON: Thank you, Pavel.

There is only one Dingli Shen, although there seem to be three of them. He is so active both at his home base at Fudan University and as a commentator and as an analyst. So Dingli, welcome.

DINGLI SHEN: Thank you for your kind introduction. I was a fellow to the Stimson, one year was president. I am grateful and remain grateful to your periodical award to make all of us safe. I'm going to make a few points on the nexus between nuclear and space dimensions. And at the outset I would again and again repeat that those are my personal views. My government never told me how many nuclear weapons we have.

(Laughter.)

And they have no interest in telling me about this and would hate me if I tell you how many we have and would hate anything I were to say to make our – for instance yesterday I said, let's race with America to ratify CTBT in the first place. That's not the Chinese government's position. That's my personal position, and I possibly will be hated.

Well, my government has been opening toward not to persecute me, and I could compromise with it because I want to present a good China without neutralizing our legitimate national security. Let's do some discussion. Smaller nuclear weapons that lead; we could also wait a bigger nuclear superpower to lead.

So for this nexus, first why China has had a nuclear weapon, why we have made a "satellite experiment," quote, unquote. I would not tell this is ASAT stuff as my government refused to consider it ASAT. It's "satellite experiment." So why we might have a rationale to do it. And how we need to talk to America and other countries to make all of us to understand and have some mutual agreed code of conduct.

China initially thought a nuclear weapon are bad, to kill people, but we are happy. It's very controversial. Certainly nuclear weapon has played a role in Japan's decision to surrender. And it's very controversial, but we have not openly stated to that effect, and many Japanese and some Americans would be unhappy to hear this. But when talk to Chinese public, they consider that Japan deserves that.

That's not my view. I would say there are many Chinese – (inaudible) – that Japan deserved that.

But we still consider nuclear weapons bad because U.S. used this to coerce China in 1950s. That turned China's view that nuclear weapon is not determining, not a real tiger to have a change. We use to say it's a paper tiger, and after receiving the coerce China changed its view. We thought we need to have this. And we are as smart as America, and we quickly did it. And we acquired nuclear weapon capability.

I would now say that without the U.S. coerce of the 1950s we would have never developed the nuclear weapon, I would not say. China may have, another reason we are coerced by Soviet Union, et cetera, all to have a bigger profile in the world of politics. But at least the history told us towards the U.S. coerce.

And then our argument is that we are against nuclear weapon; we want to have a total elimination, destruction of all nuclear weapons, and want a CTBT, we want to have award submitted to ban all such weapons. We want to have a nuclear weapon ban. We want to have something like a CWC, NWC, nuclear weapon commission to ban, including banning also China.

Then we also say that shouldn't take place until the two nuclear superpowers should start their motion, and we were to follow, and to which extent we were to follow our government had a different statement at different time. We used to say when the U.S. and Soviet Union were to reduce to 50 percent of their current level, that can current level in 1980, namely reducing from 20,000 deployed strategic weapon to 10,000, we will do. And China has not been doing, and we have changed our position, and we add new conditions, three halts and one reduction. So U.S., Soviet Union need to halt their nuclear weapon production, weapon testing and deployment outside with their territory and to dramatically reduce their strategic arsenal.

And this is more, a higher bar that would make China to join at a later time. But still the U.S. and President Obama would aggressively addressing the issue of ratification of CTBT, possibly reducing the present deployed strategic arsenal to 1,000 or 1,500 in a few years. The question again was facing China, what will be our new turn? Of course you can expect China would have a turn, until U.S. would have reduced to as low as China. We are a great country. Why we have to join the U.S. has been as many times as ours?

But at that time, other country would ask China to tell, how many you have to make a fair ballgame? But even if China were to tell how many we have, China would still say, if we have 20 you have to cut to as low as 20 strategic system to entice us to join. And I don't think that's realistic U.S. will do.

But as there is no rule to tell that China is inferior, China should be treated an equal. China's 1.3 billion people, four or five times many more than America, should join at a lower level in the first place or to follow. So China should have good reason why we will not join until U.S. would reduce to as low as that of China.

That will be something 10 years later. I don't think that would happen now. But if President Obama initiated were to give a warning call to China how we should address our modernization. And we could waste our resource by doing something unnecessary, viewed

10 years later. We could do some qualitative but not quantitative because the number would be cut.

At the same time, China has seen that the asymmetric strategic balance between China and the U.S. could change in the U.S. favor. U.S. might have thousands deployed or in stockpile. U.S. under Clinton's targeting plan, he has allowed 300 to 500 specific weapons to target against China. Even U.S. and China have made a de-targeting plan but internally it's understood U.S. has allowed that many. Probably with the implementation of STAR2 or follow up U.S. would have less nuclear – (inaudible) – to be allocated on China. But China understood that would be far more than all China can allocate.

Reportedly China has some 20, 30 strategic system. And that's not symmetric. But China thought it has political wisdom to deal with international relations. China only needs to hedge. And China understood that U.S. is sane. U.S. would not attack China without a good reason. U.S. would not legally support Taiwan's independence. U.S. would not launch nuclear weapon first against China for some purpose. And the U.S. has no confidence to wipe out all China's existing strategic system without a fear that any one of them might survive. So U.S. is held check, very asymmetric curry.

So we can feel comfortable with those 20, 30 or even more. No one knows exactly, and that's my leadership would know. But if missile defense were to be built with Clinton's plan, 250, that could pose a formidable threat to China. Even if U.S. were to use 4 to intercept, there possibly can kill U.S. a huge amount of confidence. Even China would have a first strike, U.S. can basically take all of them out. Even though the U.S. were to consider that as against potential North Korean's ICBN or Iran's intercontinental striking capability, we consider it's nonsense. North Korea, so shooting another space projectile has failed. But doing this even 10 years ago was even more ridiculous. We were on the U.S. side to help America to defend American legitimate security if someone were to – (inaudible) – against America like al Qaeda. But when North Korea, Iran, 10 years ago had no such capability, and couldn't acquire it in 20 years, we consider that 250 must have an eye on China. And we cannot trust America.

And we should have built up by good increasing the number of our strategic system, moderately. To tell we can do. We are no longer limited by our capacity. This time we have more capacity, more technology, more money. I'm not sure we have enough determination. And we don't want to offend America by present an unnecessary perception by America that we are hostile. So we are doing very moderate, but we are building up in terms of quantity and quality, especially to be sure that our system will be more survivable, so it's a mobile system, so it's a next generation SSBN, and some solid fuel system to make them survivable, but very moderately.

So that's China's approach. The Bush government has deployed – (inaudible) – system in California already, and probably this is still within what we can feel comfortable. We don't need to race with that. But if America would honor their space strategy to build a system to assure America can access to space and at the time of need America has ability to deny the access to space by any other country, that's a very imperialistic strategy. I feel ashamed for the Republicans, the democratic America would allow this statement to be written into military doctrine.

Space is nobody's, that space shall be used peacefully by all nation. No single country should ever say they should have capacity to deny any other country to enter the space for a certain purpose including civilian peaceful purpose. America should not tell. America should say, we should work with all nation to deny any vicious use of space by any nation. That's what America should tell, cooperation to reduce the threat to all nations, including America. U.S. should defend China's legitimate security. China should support Americans fighting against a terror.

So I hope President Obama would change this rhetoric, and those rhetoric could only produce counterproductive outcome. Threat China, if China's buys argument, makes China to spend its available resource wisdom and expertise to build. And I think we are doing, regrettably. And that made our effort to make space cooperate peaceful futile if we were to do this, even in a limited case. And that would make America to justify why America were to do.

So I would end by saying with the change of the White House leadership, time for America to think how to make America safe, salute international cooperation, not unilateral effort.

So U.S. can do for a while, but other nation like China, Russia, India all have a huge amount of resource, money, technology and humankind; engineers can do. It's a matter of time. U.S. can lead for 10 years and we were to follow. Then after 100 years we would have destroy all this kind of bad weapon system as we try to do now to deep-cut U.S. and Russia and at the future time medium nuclear weapon state. I think in a century's time, hopefully starting from 1945, we can legally remove all those kind of weapon and replace by another secure system that were to make us to fear such a kind of threat and alternative threat.

So I would urge U.S. should have a statement to restrain as much as possible. That would entice my government to hedge as less as possible. That would make the world to feel encouraged. It's truly a change. Otherwise major country don't trust the hedge. China want to spend some money to hedge against the worst case, and America want to hedge against China, al Qaeda, or other behavior actor. And that's not constructive.

And I don't hope my government were to do something it does not want to do. Do some things that America is doing. And to make China less credible in tabling out this kind of, draft a treaty. We and Russia joint proposed again February 12 last year. We should jointly make effort that U.S. legitimate concerns should be addressed. U.S. should not be attacked by those weapon, intercontinental. China, U.S. should jointly assure any such threat toward America; and China, U.S. should work together to shoot down any such threat toward China as well. And we should develop our economic, financial cooperation to find finesse on the question with Taiwan that this issue would only be addressed peacefully. Thank you very much.

(Applause.)

KREPON: Thank you, Dingli. I'm going to take five minutes and then we'll open the floor to questions. As Phil Coyle has said, nuclear weapons are intimately connected to

space. Attacks on or interference of space assets in a crisis between major powers is therefore very risky business. There has been no successful use of ASAT capability in crisis or conflicts to date.

I think it's important to analytically distinguish between crises between major powers and crises or warfare between a major space-faring nation and a small state. In the latter case, we know that there was an inconsequential effort by Saddam to interfere with the U.S. GPS system. In such circumstances, is this the beginning of a trend in asymmetric warfare or an object lesson in futility to be continued.

But we do know whether it's a crisis between major powers or a conflict between a major power and a small state that the first successful act, the first successful attack on a satellite, will be a very significant event in the history of combat. And it's unlikely to be an isolated event.

If there is uncontrolled escalation as a result of an ASAT attack, then the losses can be incalculable. Many, many brilliant people worked on deterrence theory, and they postulated some of them that escalation dominance and escalation control was achievable in nuclear combat. These plans were not very convincing to a lot of us. How much trust can we place in escalation control or escalation dominance in the event of warfare in space? It's not hard to mess up space by relatively simple means.

So shooting our way out of this dilemma of satellite vulnerability and satellite essentiality is not a wise option in my view. But that means we still have to deter others against making unwise decisions.

So how do we do that? Our experience with nuclear deterrents, the space nuclear nexus, may not be the best guide. In order to signal deterrence, we and the USSR tested nuclear weapons in excess of 1700 times, on average of once per week between the Cuban missile crisis and the fall of the Berlin Wall. In order to signal deterrence, we and the Soviet Union deployed many thousands of nuclear warheads ready to go in a moment's notice.

We don't have to do this for space, and we haven't done this for space. Deterrence of space warfare takes far less effort. There have been a few dozen ASAT tests as Phil has indicated, only a handful of destructive ASAT tests since the Space Age began over a half century ago.

Now, it's worth noting that two of these rare occurrences of destructive ASAT testing have happened pretty recently, Chinese and U.S. shoot-downs of satellites. And Russia may be next as Pavel has suggested could happen.

A small number of dedicated ASATs have been deployed in the distant past, and these were moth-balled. Why such uncommon restraint? I think there are two big reasons, and there are other reasons that others might add. But one reason is that the superpowers didn't need to demonstrate space deterrence with dedicated ASATs and dedicated testing of ASATs and thousands of deployed ASATs because there were so many other ways to mess up satellites, through non-dedicated means, through military capabilities and technologies developed and fielded for other purposes.

I think another reason was that both superpowers recognized that attacks on satellites invited nuclear exchanges. So we have a lot to work with here in terms of avoiding an arms race in space.

Despite the intense superpower competition back then, satellites enjoyed a protected status tacitly and explicitly through treaty provisions, again, as Phil has indicated. In my view this historical record suggests that, despite all of the changes in space since the Soviet Union dissolved and despite concerns about a new space Pearl Harbor, with wise policies we can still avoid turning space into a shooting gallery.

So how best can we do this? I'm going to talk only about two diplomatic initiatives that may be worth consideration, and Alexei, when he comes in, will add to this conversation. The two diplomatic initiatives I'm going to ask you to consider are not mutually exclusive. Working with other nongovernmental organizations, the Stimson Center has proposed a model code of conduct for responsible space-faring nations. A key provision in this model code of conduct is: No harmful interference against man-made space objects, no harmful interference.

We can define "harmful" or choose not to define "harmful." It's an interesting conversation. It's a lot easier to talk about definitions of "harmful interference" than it is to talk about definitions of space weapons.

I think very importantly the 27-member European Union last December has endorsed this concept of a code of conduct and has issued their own model code of conduct in draft. And the European Union is taking this model code of conduct on the road for reactions. Where there are no rules, there are no rule-breakers. So I believe negotiating a code of conduct, clarifying responsible behavior in space, would help isolate and facilitate appropriate actions against nations that carry out irresponsible acts.

If you want the details of Stimson's code of conduct and the EU code of conduct, you can find them on our Web site at the Stimson Center. The three worst man-made debris causing events in the history of the Space Age have occurred since 2007. Think about that, the debris consequences for normal operations in low Earth orbit. We don't know when we are approaching the end of a cliff here in terms of making a crucial zone of space operations out of bounds.

There's a climate change analogy here, if you will, with respect to space debris. Three worst man-made debris-causing events have occurred in the last three years. And more can come. You recall that people had to scramble out of the international space station into an escape module last month to avoid a five-inch piece of debris from a 1993 GPS launch. And this is not going to be an isolated incident. Manned space operations in low Earth orbit are in jeopardy now, not just U.S. operations, not just the shuttle, not just the international space station. The Chinese manned space operations will also be jeopardized for a long time to come because of the debris population up there. Debris does not recognize U.S. preeminence in space. Debris represents a clear and present danger to all space operations now in low Earth orbit.

Destructive ASAT tests are a major contributor to the debris population. In my view it makes sense for space-faring nations to seek a verifiable ban on destructive testing against man-made space objects. This is as close to excellent verification as you can get. It's a narrow-banded treaty. It's something that is in the interest of all space-faring nations. I wonder if opportunity exists to negotiate a code of conduct for responsible space-faring nations and a verifiable ban on destructive testing against man-made space objects.

So if you still need to do something against meteors, you're entitled to do so. Either or both of these diplomatic initiatives may well be achievable. There's a window of opportunity, but only if among other things Russia and China do not insist on more sweeping accomplishments. So with the opening of the discussion or a negotiation on space diplomacy initiatives, evolved toward a renegotiation of the ABM Treaty – that's a big question in my mind because that could be a very long negotiation.

With that, I will open the floor to questions or comments. Please identify yourself. Francois, it's great to see you again. Up here in front?

Q: Francois Geneuve (sp) from France. Thank you, Michael. It's a great pleasure to be here and to meet with you again. As a matter of fact, with your last phrased you have almost preempted on my question, which was about the ABM Treaty. I would like to make one point in addition to what has been said. For years we have been living in space with two navigation systems, GPS and GLONASS. And so in the coming years we will have hopefully a European Galileo. There will be a Chinese navigation system, and I expect other nations to follow, India and others. That being said, all those objects are becoming potential targets, and we need to address that.

Yesterday, Mr. Orlov had suggested that probably Russia will try to create some linkage between a new follow-up to the START Treaty to missile defense. And here I come back to the ABM Treaty. The ABM Treaty was a treaty, a tricky product of the Cold War. The question is not to come back to the ABM Treaty. But it is maybe to come back some kind of multilateral agreement on limitations of missile defense and especially space activities related to missile defense. This could be one of the basis for more than a code of conduct about space, but really a treaty limiting the activities in space and creating an obligation of activities which as you mentioned could not be considered as harmful or as potentially harmful in the case of tests.

So I would like to have your views from Russia, China on those issues. Thank you.

KREPON: Pavel, if Russia does want a quick start follow-on which suggests they won't discuss missile defenses there, does that mean we're going to discuss missile defenses in the space negotiation?

PODVIG: Well, sir, I think certainly there is in Russia a strong sense that somehow missile defense should be limited again. Russia always supported the ABM Treaty, so I wouldn't be surprised if kind of an end time missile defense provisions would sneak into any discussion of space. Whether that would be a deal-breaker or would actually prevent any progress on meaningful limits in space, I don't know. It would depend. My take is that you

could actually come up with some reasonable limits on space activity along the lines that Michael suggested and still leave the missile defense issue open.

KREPON: Dingli?

SHEN: I think those legitimate concern to view the missile defense and it will be taken care of. There are proliferation of missiles. That is threat to America and a threat to China as well. Sooner or later when technology decision are cost effectiveness available we may build our own missile defense. We already have – (inaudible) – the missile defense, and we could do national missile defense as well.

It's only up to assessment – (inaudible) – perception and there's cost effectiveness. So let me first make it clear – (inaudible) – with America for such a perception. We need to find a solution. The best solution is to address the source. Nobody is going to build such a missile or use them responsibly. But in case – (inaudible) – diverted their intention to future time, and we need to hedge.

An ABM does not disallow U.S. and Soviet Union not to do some limited missile defense. So I think at the future setting probably there will be an overall addressing of strategically deeper reduction and some permit of limited point defense or area defense, limited in terms of area defended or the number of weapons as interceptor. In order to assure that our legitimate concern would be addressed, but at the same time as most of you know incentive for destabilizing such a balance of strategic offense and defense, and that could help both U.S. and Russia to feel comfortable and to make China to feel where it is becoming more stable and enticing China to be engaged at a future time.

KREPON: Phil?

COYLE: Many of you will remember that President Reagan and President Gorbachev at Reykjavik came very close to agreeing to get rid of nuclear weapons. Gorbachev made a condition that the United States should stop research. That's all he asked, for it to be stopped, stop research on missile defense for five years. Secretary of State Schultz is supposed to have said, "We'd be giving away the sleeves from our vest," meaning missile defense that didn't work anyway and so we'd be giving away nothing; we should agree to what Gorbachev has proposed. But unfortunately President Reagan said no. I thought it was a terrible blunder, perhaps also for Gorbachev to have proposed it in the first place, since it was sleeves from the vest.

But I think it would be even worse if the United States and Russia make that same mistake again now in the context of renewing the STAR treaty. I think linking missile defense and nuclear weapons again as happened at Reykjavik would be a big mistake.

KREPON: Greg and then Bruce. So come on up here, please. Please introduce yourself.

Q: Greg Tillman, Arms Control Association. I wonder if I could invite a little bit of clarity on what the existing space regime is with regard to the North Korea space launch. We seem to have a disagreement between China, Russia and the United States on whether

the U.N. resolution proscribes this launch or not. There's also the question of whether or not the earlier U.S. military claims that it could or should shoot down this declared space launch would be consistent with the Outer Space Treaty which argues that peaceful uses of space should not be interfered in. What are your thoughts toward both the North Korean launch and a generic launch of a country putting something in space which obviously has military applications to a missile development program?

KREPON: Who wants to go first? Okay, Phil.

COYLE: I've been surprised at this conference that people have referred to the North Korean launch as a ballistic missile test, I guess because it failed. It turned out to have a ballistic trajectory, but it was well-known in advance that it was not intended to be a ballistic missile test.

So that means that it wasn't actually prohibited by the U.N. resolution, which prohibits North Korea supposedly from testing ballistic missiles. But that wasn't what they were doing this time. You can argue about other times, but not this time. So I've been surprised that people in this conference have referred to it as a "ballistic missile test," because I don't believe it was.

And arguably the Outer Space Treaty would say that North Korea and any other country that wants to launch a satellite can do that, that space is supposed to stay free for all.

I thought Admiral Keating and others saying in advance that we could shoot down this missile was irresponsible, not only because of the Outer Space Treaty but I thought it was a total bluff. What if we would have missed? You know, the late night comedy shows would have never forgotten it. It would have just gone on forever and ever. I don't think the U.S. military would have ever taken that chance, and I read where the Obama administration looked at it that way also.

KREPON: Dingli?

SHEN: There is international treaty to allow peaceful use of space if it is a satellite to use for communication. For civilian communication at least. 1718 do not allow them to shoot ballistic missile. The ambiguity is base technologies, rocket technology is basically the same. So best for – you disagree. I could be wrong. So 1718 could be written more clearly. At this time of sensitivity even not allow North Koreans peaceful use of space. We still have the opportunity to write another U.N. Security Council resolution to disallow some country that could develop a dual-use technology. But it's up to the game whether we want to do how major power can reconcile their interests in order to attain.

And it's unclear how this game would proceed.

KREPON: Has Alexei come in the room without my noticing? Bruce, you're next.

Q: Hi. I'm Bruce McDonald with the Strategic Posture Review Commission. And I'm the author of the recent Council on Foreign Relations report on China's Space weapons and U.S. security. I wanted to start out by saying that I agreed a whole lot with most of what

Michael said. We disagree a little bit on the question of deterrence, but so much else, but that's all right, because so much else of what you are advocating is just so good and needs to be said, and you've done great work in the area of codes of conduct and so forth over the years.

But that in a way is kind of the opening to my question. The Russian and Chinese proposal about a ban on all space weapons, when you read it I see a few potential loopholes. But that's not what concerns me the most about it. There is a huge verification issue associated with it. But that's all right. I mean it's good to get the dialogue going; that's one thing we absolutely need to do is to get a dialogue going.

But what I ask of my Chinese colleagues about how we should address the verification issues, the response tends to be something like, well, there's some grudging reluctant admittance that, yeah, there are some big verification issues. And then in a way that I guess maybe we in the United States should feel complimented by, they'd say, you guys are so good about space things, you'll figure it out.

I would that that were true. So I wanted to follow up, Michael in particular, on your comment, and ask the panel-members. My sense is in the nuclear era we had to crawl before we walked and walk before we even run a little bit. Look how long – Jim Goodby and others points out that half a century and more in nuclear testing area.

When I suggested the idea to some of some even baby steps in the space area, a response I've gotten from some people in Russia and China – and they have their talking points like U.S. government officials have theirs too – but the response is, no, no, no, we have to go for the equivalent of general and complete disarmament.

So I guess my question is: How feasible is it, realistic is it, and I hope it is feasible and realistic, to suggest these more, lesser, early-to-intermediate steps, Michael such as exactly you've pointed out, the idea of codes of conduct, that sort of thing? And in particular what I believe is absolutely excellent idea of a ban on tests of kinetic energy, ASATs, or as one person in the Air Force even suggested to me, why not broaden it a little bit more and ban all actions that end up creating debris from low Earth orbit on up?

Is it feasible to believe that Russia and China might end up agreeing to something like that?

KREPON: There are a couple people in this room with memories long enough to remember. Alexei, come on up here. You're next – long enough to remember that the very first verification proposal ever made was Eisenhower's proposal to have a satellite payload observation, back in 1950-something, '57 or '58. We're still waiting for that one to happen, and I suspect it's not going to happen anytime soon.

So the verification challenges are just huge for all-encompassing proposals. So I would like us to think small. Pavel, go ahead.

PODVIG: Just very briefly, sort of taking your suggestion that we should start with simple things. I think for example, the obvious place to start is to actually declare the

missions and parameters of orbit, which has been done, but there are problems there. To do it in a more timely way, actually ask or require all countries that launch their payloads into space to supply more information about the flight plan and orbits and actually maybe even the maneuvers, which could actually go a long way toward keeping the harmful activities under control. That could be done. It would not require all the difficult issues of actually going there and physically inspecting. That could be reasonably open and simple to implement.

Q: Russia would agree to something like that?

PODVIG: Russia could – I mean, yeah. Russia has its own space surveillance assets and I don't see a reason why there would be strong objection to that in Russia. It won't be very easy, but I think it's doable.

KREPON: We have only five minutes left, and we are grateful that Alexei has left his previous panel to join us because he and some colleagues have done some important analytical work and have some policy prescriptions that we thought you'd like to hear about. So Alexei, come on up here.

ALEXEI ARBOTOV: Thank you, Michael. I apologize for this intrusion, but I could not but say a few words on the subject since we have been dealing with space issues including the work that was done together with Michael and other experts on the code of conduct draft proposal, which I think was very useful and important.

This year in the program of Moscow Carnegie Center we just finished a very big book dedicated to problems of space. It's called "Space Weapons Diplomacy Security," and it covers many subjects including the history of usage of arms space for peaceful and military purposes. The present situation, various approaches with respect to controlling space, SDI Initiative, Soviet response to SDI, for the first time in open literature described in great detail how many programs really the Soviet Union started in order to counter potential Strategic Defense Initiative, and so on.

But this book is now in production, will be published very soon. It will be in Russian. We usually translate our Russian books into English with an interval of about half a year, sometimes one year. This time due to financial reasons it may take much longer time. So I wanted just to give you one proposal which I think is some added value of this book.

I think you have covered a lot of issues and problems of controlling weapons in space. There are two principal models of addressing the issue. One model is a sweeping agreements, which will cover everything, based on the 1963 test ban treaty and 1967 space treaty. There is another approach which is more like START approach, SALT approach, ballistic missile defense, which goes phase after phase in steps, very practical, with a lot of definitions, with verification procedures which are lacking in 1967 treaty.

So which way to go? We tried both, but recently the sweeping approach was tried again and again, and I think that when we get to practical matter of controlling the sweeping approach will not be a workable approach.

We have to take into account asymmetric interests of states with respect to space weapons. In particular Russia and China – Chinese, I don't know whether my Chinese colleagues would agree with that or not – Russia and China perceive anti-satellite weapons as potential asymmetric counter to American space-based systems which support new conventional warfare, in particular precision-guided systems which are used so efficiently and which are viewed with concern by both Russia and China, and also potential ballistic missile defense deployed in space.

Anti-satellite systems are asymmetric response that China and Russia may put forward against it. So I think that any agreement, if it is confined only to ASAT weapons will not be acceptable either to Russia or to China. We have to use the practice of SALT and start negotiations where asymmetric concerns were balanced against each other.

So to make a long story short, the proposal is that the first agreement should be very practical, quite limited, but very useful and important. And it will be banning destructive tests against satellites and destructive tests from space-based platforms against ballistic missiles and their elements of the trajectory of flight.

That will cover both American concern about its space assets and Russian and Chinese concern about American space support systems and potential American ballistic missile defense. We cannot ban those systems because they are so numerous and they overlap so much with each other and with other systems. But we can ban testing, and that would slow down and maybe eventually stop this dangerous development of arms race in space and against space.

KREPON: Thank you, Alexei. Our time is up. So please join me in thanking all of our speakers.

(Applause.)

(END)