Theodore Postol: The Secrets of Russia's Oreshnik Missile

MIT Professor and Pentagon advisor Ted Postol outlines the strengths and limitations of the Oreshnik missile, and debunks some of the myths. Follow Prof. Glenn Diesen: Substack: https://glenndiesen.substack.com/ X/Twitter: https://x.com/Glenn_Diesen Patreon: https://www.patreon.com/glenndiesen Support the research by Prof. Glenn Diesen: PayPal: https://www.paypal.com/paypalme/glenndiesen Buy me a Coffee: buymeacoffee.com/gdieseng Go Fund Me: https://gofund.me/09ea012f Books by Prof. Glenn Diesen: https://www.amazon.com/stores/author/B09FPQ4MDL

#Glenn

Welcome back to the program. We're joined again by Theodore Postol, a professor emeritus at MIT and an expert on nuclear weapons and their delivery systems. He's also worked at the Pentagon. Thank you for coming back on. Oh, it's a great pleasure to be here.

#Theodore Postol

I've been off the air for a little while, and it's a pleasure to be back. Yeah.

#Glenn

I'm glad to have you back. So, the reason I really wanted to speak with you is to get, I guess, a professional assessment of this new Russian weapon—at least what we know about it so far. Of course, they haven't let you inspect it, but there are still ways of gathering information. We saw the first test launch with a dummy warhead, and now a second one—an Avangard hypersonic missile launched from Russia into western Ukraine, which was evidently a warning to NATO not to escalate the war any further. But a lot of questions still remain to be answered.

That is, how powerful is the weapon? Why is it such a dangerous weapon? To what extent is it a game changer? You get the idea that the Russians might have an incentive to oversell it, while the Europeans have an interest in underselling it—to be more dismissive, so as not to suggest the Russians have too much of an advantage. So it would be nice to have a professional take on this. That's where you come in. I was wondering if you could tell us a bit about it—what this weapon actually is.

#Theodore Postol

It's always a mistake to dismiss a powerful weapon. But I think there have been both overstatements and understatements on each side. This attack on Lviv has given us some additional insights. So what I might—well, in fact, let me just put on my first slide and we'll—I'm calling this little discussion "Updated Insights from the Oreshnik Attack of January 8 on Lviv." As usual, I've benefited greatly from my collaboration with a colleague of mine, Chris Kabusk—I've spelled his name clearly in an email for him. But I think we now have a much clearer understanding of this weapon. Not a full understanding, and I'll point out where we still have things to learn about it.

And it may not be pleasant when we learn these things, but we'll see. The first thing to keep in mind is that it's a very powerful conventional weapon—but it is a conventional weapon. That is to say, it's delivering munitions. Right now, it appears they mostly do damage by kinetic impact. I'll discuss this in greater detail. If they take the submunitions that this weapon launches—and I'll describe what I mean by submunition—and add high explosives to them, they could increase the damage-inflicting capability per submunition. But it's not going to be a game changer. The only game changer would be if they put nuclear warheads on top of the Oreshnik.

And that, of course, is the ultimate game changer. Like any ballistic missile with significant payload capability, this can certainly deliver nuclear weapons, and I'll briefly talk about that possibility. But I think the fact that the Oreshnik can deliver a nuclear weapon is not especially relevant, given all the nuclear weapons that can already be delivered. It doesn't add any new twist to the mix, other than ultimate catastrophe—and probably the end of modern civilization because of the escalation that would follow. So this is the main concern I have from a policy perspective. I'll talk, of course, about the technology with regard to the Oreshnik.

The important point I want to make here is that this is not a nuclear response to an Oreshnik missile attack. That's just a conventional missile attack—it could not possibly be proportional to respond with a nuclear weapon to the conventional use of this missile. My concern is really that there's been so much hype around the capability of this missile. Many people talk about it as having sub-nuclear capability, or being "nearly nuclear." It's not close to that, and I'll explain why. I'm not trying to downplay it as a powerful conventional weapon—I'll discuss that—but my main concern is that the misunderstanding among policymakers could lead to a completely uninformed decision, to believe that you should respond proportionally with a nuclear weapon to an Oreshnik attack.

No way that would be justifiable, and I'll explain why. That's the important policy point here. This is not a weapon that approaches the strike power of a nuclear weapon—very, very important. That's the bottom-line message. The hypersonic submunition attack of November 21 on Dnipro showed us that it has at least 36 submunitions, and it seems to have six what I might call "buses." By a bus, I mean a small powered vehicle that carries about six munitions. Each of these munitions probably weighs around 70 or 80 kilograms, somewhere in that range. The missile is not a two-stage missile, despite all the discussion that's been going on.

It's a one-stage missile. It seems, based on comments and information now being released by the Russians, that it's the first stage of an old intermediate-range missile that was, interestingly enough, a big motivator for the Intermediate Nuclear Forces Treaty. This is the SS-20 missile. It was a two-stage missile that carried three warheads, and it was a major factor driving the INF talks in 1986. Ultimately, it was removed. So what appears to be the case is that the Russians have taken the first stage and used it to mount dummy submunitions that can come in at very high speed and impact. They create the effect of an explosion simply because they hit the ground so hard.

And the kinetic energy from the impact gets converted into a kind of explosive energy. I'll talk a little more about that. So here's what the transporter-erector-launcher for the SS-20 looks like. You can see the first stage is probably in this section here, the second stage in this section, and this extended region—where the three warheads are contained, without even a shroud—is probably in this section. If you're carrying only one stage, then you only need a vehicle with maybe four wheels to carry it, and that's what we see here. This is an image, allegedly, of an Oreshnik in Belarus.

And the vehicle is much shorter. It's the one stage of an SS-20, sometimes called a Pioneer, and it weighs around 26 tons. In my earlier calculations—which I haven't updated because it's not really important—I guessed they were using the first stage from an ICBM, maybe around 35 tons. But the difference between 26 and 35 tons isn't significant for the level of analysis we're doing here. The effects are general enough that it doesn't make a big difference. Now, we have missile debris that gives us hints about the configuration of the Oreshnik.

And the reason this missile debris hits the ground at a relatively low speed and isn't pulverized or literally vaporized when it hits—though it may have been traveling at Mach 10 earlier—is that it doesn't actually hit the ground at Mach 10. It hits the ground at maybe Mach 0.2 or Mach 0.3, you know, around 150 kilometers per hour, like an automobile hitting a wall. The reason for that is easy to understand if you know the dynamics. If you have an object that's tumbling, the aerodynamic drag will be tremendous unless it keeps its orientation and has very low drag—in technical terms, a high ballistic coefficient. If it tumbles, it's going to slow down at a tremendous rate.

And it'll hit the ground at rather low speeds. In fact, I'll show you an image of what I'm pretty sure is an actual submunition. I'm only guessing, but I think it may have been deployed—maybe there was an accident when it was deployed—and it started tumbling. Instead of hitting the ground at three kilometers per second, it probably hit at about 150 kilometers per hour, 0.2 or 0.3 kilometers per second—very slowly. But we got an image of what the munition looks like, and it looks pretty much like I was guessing it would. Still, we'll see. I could be totally wrong. We'll be constantly updating this as we get more debris.

Again, the debris isn't vaporized because it's part of the missile that's been tumbling. This looks like the front end of the missile. The man gives you a good sense of scale. If this is the first stage of an SS-20, it should be about 1.8 meters. We have very good dimensional information on that particular missile. Here's a diagram I first showed in my earlier talk on this subject, taken from Russian

catalogs. In this case, the missile appears to be two stages, but it's not—it's a single-stage vehicle. I'll update this a bit more in the next version of this, if anyone's foolish enough to listen again.

Anyway, here's what looks like pieces of one of the six buses on this vehicle. The bus—this is a propellant section here, and this is a shroud here. The shroud is separated by about a meter, I'm quite sure, from the propellant section. The propulsion section is a canister filled with hot, high-pressure gases. It's not a rocket motor, exactly—it's just a high-pressure chamber. It has six arms, and at the end of each arm is a nozzle. You can see a nozzle, and there are valves that control how much gas goes to each nozzle. And this vehicle is traveling toward the ground. Let me… here.

This vehicle is—here, I show icons of submunitions, but the icons should really represent six separate buses. Each of these buses contains about six—sorry, contains six submunitions. And we know this, and I'll explain why shortly. So, this is the high-pressure gas-generating set. There's the nozzle with the flow control. What happens is the canister is pushed off the vehicle—the rocket stage—and it's oriented downward. It maneuvers using these low-pressure jets. It has almost no total velocity capability, but it doesn't need it. You don't want it. You just want to maneuver it so you can separate and place six munitions on a particular target of concern within a footprint on the ground.

So it can attack up to six independent targets with a cluster of six of these submunitions. Here is an updated—well, not totally updated—but, you know, I've been working in real time with new data. Here I've put in icons of what I think these munitions look like. I think we have a reasonable first guess of what their shape is. I won't get into a discussion of that for now. For people who are more interested, I could discuss this in another talk. We know that they hit the ground at about three kilometers per second. Now, this is an important point. I've gotten some emails from people who are trying to be helpful, suggesting that this munition would penetrate deep into the ground and go after underground bunkers.

It's just not the case. When this munition hits the ground, it's going to impact and compress very fast. Its energy will be converted into thermal energy—heat—and it's going to vaporize. All of this metallic material, probably tungsten, will be superheated to a very high temperature and expand violently outward. In a general sense, it's going to look like an explosion. I'll show you that with actual videos. Here's what the munition looks like. Notice that it has a slightly extended body, a cone-like structure in front to keep aerodynamic drag low, and a kind of skirt.

And the reason for the skirt is that you want aerodynamic forces on the back of the vehicle so the center of pressure is moved backward. Otherwise, it would tumble end over end. If it did, they'd all hit the ground at about 150 kilometers per hour. They have to stay oriented vertically as they enter the atmosphere. Here's an image of what I'm guessing is an actual submunition. This thing is probably two and a half to three feet long. Notice the section in the back here where it's probably sitting on a nub—there are likely six nubs where the vehicle rests. And there's probably a very small explosive cap that detonates and gently pushes the vehicle off.

That's my guess. There are lots of ways to do this—it's not necessarily right. But notice these two objects here; those are probably very small rocket motors that cause the thing to spin up. You push it off, spin it up, and you do that because you want it to remain stable. So we have what looks like a piece of one of these submunitions. For some reason, this one started tumbling. Instead of hitting the ground at Mach 10, it hit at maybe Mach 0.1 or 0.2. It just hit the ground and buckled up. That's basically what we're seeing. The flight trajectory, as I mentioned, is very high—and this is important too.

It's very high. First of all, it's only traveling seven or eight hundred kilometers. And when the Russians talk about it—they say this, not just me—they say it takes 15 to 17 minutes for the submunitions to reach their target. The reason for that is that this thing is lofted on a very high trajectory. You could use the velocity to get things to the target in a very short time, but then they would re-enter the atmosphere at a low grazing angle. And because they re-enter at a low grazing angle, they would slow down substantially. And if they slow down substantially, they're going to hit the ground at speeds that are not hypersonic.

So what you want to do is loft this thing so it comes in through only a very small part of the atmosphere, and it stays at a very high, hypersonic speed. For example, if this were an ICBM warhead coming in, it would be on a very shallow trajectory. It would start out at about seven kilometers per second, not three or four kilometers per second as shown here. But it would be traveling at a grazing angle, and in fact, a very high-performance strategic warhead would hit the ground at about the same speed as these submunitions—around three kilometers per second.

So atmospheric drag is a really important factor here—it really determines what happens. The first attack was from Kapustin Yar to Dnipro, and the other one was from somewhere in eastern Belarus. That’s a guess; I have no idea exactly where. Roughly the same speed, same distance, and it landed in Lviv. From the videos of the attack, we could see that several targets were hit with clusters of six submunitions. Again, we have no information about the damage, so we just have to speculate about what we can.

So if we look at this—this is a high-definition video from Dnipro. The reason it's a good one—there are others—is that this particular camera had high resolution. You can see the streak of each of these submunitions coming in. This is Dnipro, not Lviv. The important thing is that they're moving really fast, around Mach 10. So they create a track, and that track is probably due partly to the wake and partly to the slow speed of the camera. The object is moving across the camera’s field of view while the camera is exposed. We don’t know exactly what’s causing the streak, but we do know it’s a combination of the wake and the slow frame speed of the camera. If we look at a similar situation, this is at Kwajalein Atoll in the Pacific.

And what we have here are three video frames of an ICBM warhead coming in and hitting the ground at this atoll. Okay? So here is one-thirtieth of a second—this is the beginning. One-thirtieth of a second later, you can see things are getting very bright, then even brighter still. Another third of

a frame second later, and then I've jumped about three or four frames so you can see the outcome of all these light-producing events. Everything is at a very high temperature from the impact and all the kinetic energy being converted at the surface of the Earth into an explosive gas that's expanding outward. You see this looks like an explosion—you see a cloud. The impact in Lviv has similar characteristics. We don't actually see the impact point, but if we look, these frames are, I think, roughly a tenth of a second apart.

I'm sorry, I put this thing together quickly. So, if you look here, you can see the sky becoming slightly brighter as this munition comes through the clouds. This is the cloud top, and you see it gets brighter and brighter and then dims. This is exactly the same phenomenon, except you can't see the explosion on the ground—but it's the same thing. It's depositing all of its energy into the ground at the point where it hits. So, let's take a look at a video. Okay, what you're going to see here is a video taken at Kwajalein Atoll in the Pacific during a Peacekeeper ICBM test. The warhead is coming in at about a 30-degree angle relative to horizontal, so it's not coming in nearly vertically like an Oreshnik submunition would. And you can see when it arrives—okay, now it's real.

See the first arrival? See the second one coming in behind it? You can see there's a big debris cloud here—this looks like an explosion. All the energy is deposited into the surface. Now we'll see it in slow motion, just to give you a sense. You see a tremendous amount of light being generated because all that kinetic energy is very quickly converted into an explosive, super-hot gas from the warhead. And now we'll see the same thing happening here—see the flashes in the sky? You can see the bright flash at high altitude because it's going through the cloud structure, and the clouds are dispersing the light. Here again, you see the same thing happening.

This is basically the same phenomenon you saw with the ICBM, except here there's cloud cover, so you see a bright flash as the munition passes through the cloud layer. The effects of this kind of impact are—well, not simple, but straightforward. You have this munition coming in so fast that it hits the ground faster than the speed of sound in the solid material. Because it's compressing faster than the speed of sound, all the energy gets concentrated into a small volume. If it were coming in more slowly, the energy would be spread out, because the whole vehicle could react to the initial impact and slow down as a single body.

But it comes in so fast that it just crunches up, and in the process of crunching up, it gets heated to a very high temperature. This is what a hypersonic impact does. It doesn't produce a hole like a penetrating munition. People who mistake this for a penetrating munition—well, a penetrating munition can't come in at hypersonic speeds. If you have a bomb that's designed to penetrate into a tunnel below, that bomb will hit the ground at a high speed, maybe Mach 3 in the air, which is still a high speed.

Mach 3 is slow relative to the speed of sound in the metal casing, which is about Mach 5. So the whole metal casing stays intact and pushes its way into the ground. What you have are explosives in the bomb and a fusing system that senses when the bomb is slowing down. It estimates the location

underground because it knows when it first hit the surface and started decelerating. It can estimate its depth and then detonate. Earth-penetrating bombs have to be non-hypersonic, and this is a point that constantly confuses non-experts. If you claim to be an expert, like my friend Martyanov, and you mix the two up, you get it wrong.

But if you know what you're talking about, you understand that the shock—when it's hypersonic, it has to be hypersonic—means that when the arrival is hypersonic, all the energy gets concentrated because of the crushing-up effect in a very small volume. That raises the material in the initial object to a very high temperature, which essentially vaporizes, and that vapor violently expands outward, looking like an explosion. We saw that. We saw that in the video. So it's not simple physics, but if you know what you're talking about, that's what it is. And these are just arithmetic. People want slides—they know where to get them from me. Basically, this shows that the speed of slowing down gives you an impact speed of about three kilometers per second.

If the munition has a high enough ballistic coefficient—which depends not only on its mass but also on its physical shape—and it’s not tumbling, right? If it tumbles, it’s going to slow down very fast. What I would have liked to do, but didn’t have time because I’ve been so busy, is the same calculation for an ICBM warhead. In some future version of this, I might do that just to give you an idea. You see it slow down tremendously because it’s coming in at a reentry angle of about 30 degrees. This one is coming in at around 70 degrees to the ground because of the lofted trajectory. And you get a crater—two, three, maybe four meters in diameter.

This is not going to be a gigantic crater like people are talking about. It's not going to look like a FAB-1500 crater. A FAB-1500 crater is about 45 meters in diameter—ten times the size. So if you want to worry about a weapon that's going to dig a big hole, you worry about the FAB-1500. That's because it's an explosive weapon. It comes into the ground; it's not traveling very fast, but it has all that energy in the form of explosives. This munition’s energy is kinetic, and it disperses within a much smaller volume because the munition only weighs about 70 or 80 kilograms.

And depositing all that energy—70 or 80 kilograms of equivalent explosives—will not give you a crater 45 meters in diameter. It’s just that simple. Now, this doesn’t mean it’s not a very effective weapon, because the fact of the matter is we’re talking about one submunition. So if I go ahead and show you what the effects are—let me just give you an idea—the effects of the submunitions are to spread out. Instead of the explosive energy being concentrated in a single volume, the submunitions spread that destructive energy into a thin layer on the ground. So what we’re looking at here is the White House, with a depiction of a postulated submunition delivery—six, meaning 36 submunitions—on the ground around the White House.

Now, this cluster is postulated to be maybe about 100 or 150 meters in radius. It could be 50 meters in radius, so it could be a really small cluster of these munitions. And you can imagine the tremendous amount of damage these munitions would do to this building. What we don't know at this time—what we don't know—is the capability, the accuracy of this munition. In other words, can

I deliver six munitions into this part of the White House with enough accuracy so they don't fall over here on the federal building, the Treasury building, which is next to the White House? In other words, do I have the precision to put six munitions through this planform rather than this? My guess is yes, because I have this long descending trajectory, which is nearly vertical.

Once the munitions are released, they're traveling in a straight line. The only thing that disturbs their accuracy is—well, they come off with maybe a precision of plus or minus 10 meters because of their GPS accuracy. The deployment itself shouldn't add another plus or minus 10 meters to that. So the whole group of munitions should come in with about a 10-meter average lateral uncertainty. Then they're going to hit the atmosphere, and the wind will move them as they travel through it, because they'll drift with the wind. But you know the wind speed to some extent, so you can compensate for that. That's typically done with ICBMs, and there's no reason the Russians wouldn't do the same with this Oreshnik.

You don't have exact data on the wind, so maybe it adds another 10, 15, or 20 meters of uncertainty. So maybe you deliver, you know, with 20 or 30 meters precision, the cluster of munitions. I'm just guessing. We may know in the future—we may see attacks where they do this. And so you might have a munition cluster here and a munition cluster there. Those are things you can do. Or you can have all six munition clusters in one place. The amount of damage this weapon can do is not trivial. It can do a lot of damage by conventional means. But it's specialized. I would not want to be in a targeted building where this was the target. But it's not a nuclear weapon. Just to underscore this, here is…

#Theodore Postol

Here is the blast wave—this is the cluster of munitions we talked about earlier. You can see it, the little red lines and markings. It could be smaller; in fact, my guess is it could be a lot smaller depending on what the targeting—the attacker—wants to do. But if you ask what area could be destroyed by a one-kiloton nuclear warhead, you'd be destroying an area maybe one-third or one-fourth the diameter of this little yellow circle, doing heavy damage. If you had a one-kiloton warhead, this is the area that would be destroyed from the effects of blast and fire. If it were a 10-kiloton warhead, this is the area that would be destroyed. A 75-kiloton warhead—this is the area. Now, the Oreshnik could easily carry three or four 150- or 200-kiloton warheads, or even more.

So it could destroy a whole city—multiple areas of a city. If it were nuclear-armed, it would be a totally devastating nuclear weapon. But that's not what it's intended to be. All this confusion over what is a nuclear weapon versus what is a conventional weapon has the potential to be misunderstood. We think we may have evidence of actual impacts. This comes from the work my good friend Kabusk did on the Dnipro attack. This may have been an impact—things were knocked around inside the building where we think an impact may have occurred. What happened in these cases is the munition came in, hit a roof, a wall, or a floor of some kind.

Well, there's not much mass in the roof, so it punched through. In the process of going through the roof, it slowed slightly, and the front end, for a very brief moment, got compressed, creating the effect of a small explosion—sort of like a minor blast as it broke through. It kept going and eventually hit something solid, like the ground, and released most of its energy as kinetic energy, then exploded. So it was the effect of maybe 80 or 100 kilograms of explosive energy somewhere inside the structure. That's not necessarily going to knock all the walls down or completely destroy the building.

And depending on whether it went into a basement and detonated there, and whether the shockwave got dissipated or not, this is a guess at what the damage inside looked like. So these are not superweapons. They're significant because there are lots of them, and they can be clustered, and they can do a tremendous amount of damage against a target when you know what you want to hit and what you want to do. So that's the updated Oreshnik capabilities. For those of you who want the real science, not the fake science, here's an example of a structure that was probably hit by a submunition. The submunition basically went through the roof. There's no energy loss, no mass to slow the submunition—it's like a bullet going through glass. There's nothing to cause it to stop.

So there was probably a flash of light, a small amount of energy, a bit of a shockwave created by the vaporization of a small part of the front end of the submunition because it was traveling so fast. Then it went further in and hit the ground or a basement in the building and thermalized—got converted from kinetic energy to thermal energy. It acted like 70 or 80 kilograms of high explosive munition. You can see it knocked out the interior, knocked out windows, and caused general damage inside. But it didn't blow the walls down or anything like that; it just wasn't enough of an explosion. So I think that's the situation you have with these munitions.

And it's just a matter of kinetic energy being converted into explosive energy—thermal energy. It can be improved slightly by adding explosives to the system. I did some work on this, but unfortunately I haven't finished all the analysis. So here's some of what I did. The explosive people use that's a bit more energetic—about twice as energetic as TNT—is called tritonol. Tritonol is a mix of TNT and aluminum. Aluminum gives off a lot of energy when it combusts. TNT gives off a lot of oxygen because it's a chemical molecule that creates more oxidizer than it actually needs. The propulsive energy in TNT isn't all converted to explosive energy because there's more oxidizer than there is propellant.

So what you do is add a little aluminum to it, and that increases the yield by about a factor of two. Tritonol is an explosive people like to use. Now, what you can also do is take tungsten powder and add that. What's the advantage of tungsten powder? Well, the density of explosive tungsten powder is much higher than the density of tritonol. If I have a munition that I'm packing full of explosives and it's tungsten—well, tungsten has tremendous density; I'm forgetting the exact number—but if I'm hollowing this thing out and putting explosives in, I want those explosives to be very dense, because the munition has to have an overall aerodynamic characteristic of a high ballistic coefficient.

So that's probably where the tungsten–aluminum–TNT idea, where people were talking about a tungsten-based explosive, comes from. And we may see it. I mean, you know, it's not science fiction—it's chemistry. I'm not a chemist, so maybe there's a chemist in the audience who'll have something more to say to me and write me a note. I'll be happy to give you credit for it. So basically, we could see some marginal improvements in the explosive submunition delivered. But the real proof of the pudding will be the ability to deliver tight clusters with high precision on targets. And that will be something else to contend with if this thing is used in those cases.

And in fact, if you listen to some of the statements Putin made, he talked about this having very high destructive capability if the whole payload is put on a structure. In other words, you take all six buses with the six submunitions each, target them all on one structure, and you just, you know, turn it into a mess. So anyway, that's Oreshnik—Oreshnik debunked. I'll be waiting for all the mail from people who want to tell me I'm downplaying what the Russians could do. I'm not. I'm simply describing this weapon and its capabilities. And nobody should say they're justified in responding with a nuclear weapon to such an attack. It's not a nuclear weapon.

#Glenn

So what's the main advantage of this weapon, then, if you compare it to a regular ballistic missile or a nuclear weapon? What makes it so distinctive?

#Theodore Postol

Well, it's different. I mean, is it more destructive than an Iskander? It's comparable. An Iskander hitting a structure is going to do a lot of damage—it's got a bigger warhead. It might do somewhat less, somewhat more damage; you'd have to do a very detailed analysis, the kind of analysis a weaponeer would make. But it's like choosing between general-purpose bombs and incendiary bombs—you choose your munition depending on the kind of damage, the level of damage, and the kind of target you're shooting at.

So if you had a very, very hardened structure where troops are fighting from it, I would choose a FAB-1500 or an Iskander. If you had a building where you wanted to spread the damage out more uniformly but still do very heavy damage across the whole structure, then I'd choose, you know, an Oreshnik. And would it be bad? It would be bad no matter what you were hit with, if you were hit with a significant munition. These munitions are very lethal. You know, it's easy for me to talk about it from my office here, but it's very lethal stuff.

#Glenn

But besides the size and destructiveness of the warhead, is part of how this missile is assessed also about how fast it travels?

#Theodore Postol

Well, the psychological impact—I mean, the whole sky is lit up. I don't think people should underestimate that. When the sky lights up, you know, like the hammer of God coming down on you, it has a real psychological effect on people in the target area. That's also useful from the attacker's point of view. Whether it's worth it, you know, in terms of the level of destruction, is still comparable.

#Glenn

How difficult is it to intercept the Oreshnik?

#Theodore Postol

There's no interception. This thing is not interceptable. People who talk about intercepting it—there's just no way. And the reason you can't intercept it is because of the trajectory it takes. It has a very high trajectory and releases the warhead at a very high altitude. You see, again, where the—well, I'll go here.

#Theodore Postol

So the munition accelerates to nearly four kilometers per second in about a minute. If you're in the defensive area, what can you do about it? Then it coasts to a very high altitude—close to 750 kilometers. I mean, that's tremendous. It reorients itself at some point; it can do that anywhere along the trajectory, and then it deploys the canisters. So now you have six separate canisters moving away from the main body. How are you going to reach them? This thing is coming in at four kilometers per second, and it only takes minutes to arrive. You're going to launch interceptors, but those interceptors will also take minutes to get out.

They're only traveling at maybe a couple of kilometers per second. By that time, the canisters will have released the submunitions. So where's the defense? There is none. There's no way you can put together a defense against this thing. It's a pipe dream—something someone who hasn't done any simple arithmetic might come up with and make a claim about. It's just not true. The speeds and distances simply don't allow you to launch any interceptors at it. And once the submunitions are off, what are you going to do—try to hit a submunition traveling at three and a half kilometers per second above the atmosphere?

You're going to launch an interceptor at each submunition? It's ridiculous. There is no defense against this. So it does have that effect. And, you know, an Iskander potentially could be intercepted. But I think if you look at the situation with the Iskander, it really can't be intercepted, because the Russians know—and we know—that if you maneuver intentionally, as the Iskander can do, the Patriot interceptor won't be able to match the lateral motions of the incoming Iskander. And

hence, it won't be able to intercept it. That's why the intercept rates are so low. So the Iskander is potentially interceptable, with a low probability of intercept—but not zero.

But the Iskander has a zero probability of intercept. The Iskander is not something that could be easily intercepted either. It's basically a missile that's nearly impossible to intercept with current systems—or with any new systems I can imagine. I've been asked to go to Poland in March to give a talk at a missile defense conference, and I've tried to tell the people organizing it, at a military university there, that I'm going to disappoint the audience—because what I'm going to tell them is that you can't do any kind of missile defense against these ballistic targets.

You can shoot down airplanes and drones. Hypersonic missiles—no. The speeds of these things are just too high. The closing speeds are far too great for a standard interceptor like a Patriot, or anything that resembles an air defense interceptor, to maneuver and hit. There's just no way to do it. There's no technology for that. You can't see the target early enough to maneuver, and you can't track it with enough precision to know exactly where it is as it's coming at you from far enough away. You just don't have time to react. It's that simple. Hypersonic missiles are not going to be subject to air defense intercepts.

#Glenn

Well, this is interesting because Putin recently commented that the United States or NATO forced his hand in developing this weapon. So essentially, Washington became the author of it. The Russians had been warning ever since Bush withdrew from the Anti-Ballistic Missile Treaty back in 2002 that if NATO established a ballistic missile defense or strategic defense system, their main concern was that it would be an effort by NATO to turn nuclear weapons from a defensive deterrent into an offensive weapon—by building a massive missile defense system capable of intercepting Russia's retaliatory capabilities after a first strike.

So, you know, this doesn't mean that NATO is planning a first strike, but it's always dangerous to give one side the illusion or assumption that they have these capabilities—that they can climb up the escalation ladder in this way. But anyway, the Russians said this is unacceptable, which is why they began developing these missiles in the first place. So is the main idea that if they strap a nuclear warhead on this hypersonic missile, then the deterrent is safe?

#Theodore Postol

I think a nuclear warhead would be fine. You don't need an Avangard to deliver nuclear warheads, because the decoys will defeat any of the exo-atmospheric defenses we're building—well, that we Americans are foolishly building. This thing operates well outside the atmosphere, so any object, whether it's a balloon or a heavy warhead, is going to travel the same way. There's no aerodynamic drag to affect its motion.

#Glenn

So decoys are very effective. So what's the purpose of this "Golden Dome" that Trump wants to invest all this money in? It's fiction—pure fiction.

#Theodore Postol

Maybe I should give a talk on the Golden Dome. Have I talked about the Golden Dome for you?

#Glenn

We spoke previously about the Golden Dome—leave a link in the description, because I thought that was fascinating. But I was wondering how that could interact with the Oreshnik. But I think...

#Theodore Postol

There's no question that neither Trump nor Hegseth—our Secretary of War, I guess—had any idea what they were talking about when they mentioned this Golden Dome. They were basically saying that the United States was going to launch 1,500 satellite interceptors into low Earth orbit to intercept a single ICBM somewhere on the surface of the Earth, because these things are moving. So Hegseth is standing there like—well, he's a fool. The guy's a fool, aside from all the other issues raised by his behavior. And then he says it's going to stop cruise missiles. Ridiculous.

It's going to stop airplanes? Ridiculous. It's going to stop ballistic missiles? Well, if you can launch enough interceptors—and by the way, there are easy countermeasures—because if I launch 100 ICBMs from a silo field, then you'd need 150,000 satellites in orbit to engage them in principle. In practice, the system is so cumbersome. These guys were sitting in a living room somewhere, didn't ask a single question—any question—about what's involved technically here, and just shot off their mouths. Not unlike, I might say, Mr. Biden, who said that by putting massive economic sanctions on Russia, he was going to cut the economy of Russia in half.

He obviously never asked anybody who was an expert in economics what the result would be of trying to do that. He obviously never asked anybody. So Biden is just as reckless, because what we know—you know better than I do, in fact—is that what happened is Russia just turned its economy toward BRICS. The BRICS countries just traded normally. The big loser was Europe, which lost the ability to trade with Russia. The Russian economy got a big influx of extra capital because, instead of spending money buying high-technology European goods, people turned to China and bought goods from China, with almost no impact on their quality of life.

In fact, maybe it was even an improvement, because it was cheaper to get higher-quality technology devices from China. And as a result, the Russian economy grew. Now, I don't have a high regard for many economists, but there are guys like Jeffrey Sachs who do know what they're talking about. I'm

sure if somebody had asked Jeffrey Sachs—if Biden had asked Jeffrey Sachs—what the effect of massive sanctions would be, he would have told them, "Not very much. In fact, it might even help them." So when people want to look at Biden and say, "Well, he was more responsible and knew what he was doing," that's not so clear to me. But I'm just a physicist, not an economist. Maybe you should get Jeffrey on and have him talk about this issue. But the press—totally brain-dead people. And this is what people like Putin are concerned about.

If you listen to Putin carefully, he's really worried that he's going to have to deal with a president who has no idea what he's doing, and that he might launch nuclear weapons against Russia, thinking he can achieve something that's a fiction. That's why Putin has so carefully tried to make it clear that any attack on Russia would be suicidal. He's not just talking about the Perimeter system—what's sometimes called the "dead hand." He's talking about Poseidon, this underwater nuclear drone. He wants even the most imbecilic American president to understand that attacking Russia and trying to rely on missile defenses would still result in suicide. That's what he's trying to make clear. And I think his actions are pretty clear, to me at least. I don't see any inconsistencies in what he's doing. He's one of the few adults in the room, as far as I can see.

#Glenn

Well, Professor Postol, thank you so much for this fascinating insight. No, but as you said, I think it's misinformation and the stupidity of politicians.

#Theodore Postol

Yeah, stupidity on a scale that's real.

#Glenn

But it's become a huge problem—a massive security threat. So it's good to get a proper understanding of what these weapons can do and what they can't do, though.

#Theodore Postol

Rhetoric merits talking about somebody doing stupid things and ruining their economy—you know, like he was saying about Venezuela. I mean, what's he doing to Germany? Anyway, I must say, I'm only a physicist, but I'm hoping you'll apprise me of the truth.

#Glenn

Well, this is another thing—the arrogance. You see the same leader, after everything he's done, has no problem lecturing other countries about how to run an economy, how to manage human rights, how diplomacy should be done. I mean, it's really crazy that there's no self-reflection here. But... yeah.

#Theodore Postol

That's why we're all in danger. And that's why Putin is so carefully laying out the threats—because he doesn't know what to expect. He can't predict what these guys are going to do, because they're not informed, they're not rational, and they're reckless. That's what he's dealing with. That's the way I perceive Putin, and that's how I interpret his statements.

#Glenn

Well, if they pump out thousands of these hypersonic missiles like a sausage machine, that will definitely change a lot of the strategic picture. And all our air defense systems and missile defense have to be rethought, which is, again, the main purpose of this. Yes. Well, thanks again, as always. Thank you so much, as always.