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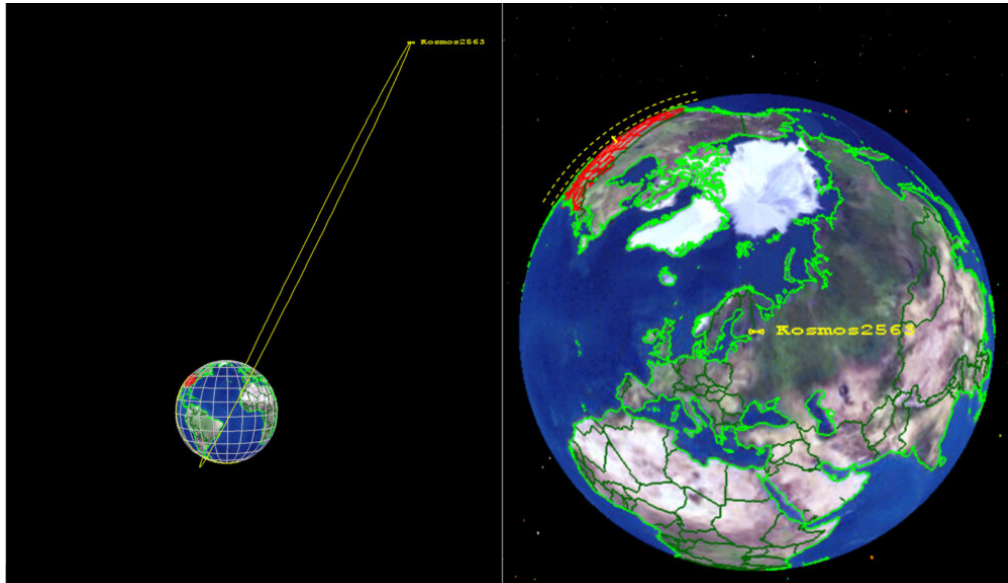
16.07.2024



Natylie Baldwin

Destabilizing the US-Russian Nuclear Balance

Natylie Baldwin interviews Theodore Postol of MIT on the implications of reports that Ukraine recently struck a radar used by Russia's nuclear early-warning system.



Tundra Orbit at Apogee & View of Earth from Apogee 01. (Theodore Postol)

With the Biden administration having given Ukraine permission to use U.S.-made weapons to strike military targets inside Russian territory and Ukraine reportedly having hit a radar in

southern Russia that is part of its nuclear early warning system at least once in recent weeks, a new level of escalation threat has arisen between the U.S. and Russia.

Russian President Vladimir Putin responded by warning that Russia will essentially consider the U.S.-led West to be a direct belligerent if it provides satellite, intelligence and military help to facilitate any long-range missile attacks by Ukraine on Russian territory.

I talked to Theodore Postol, professor emeritus of science, technology and international security at the Massachusetts Institute of Technology, about these recent escalatory events and their implications. The discussion took place between June 5 and July 5 of this year by Zoom and email.

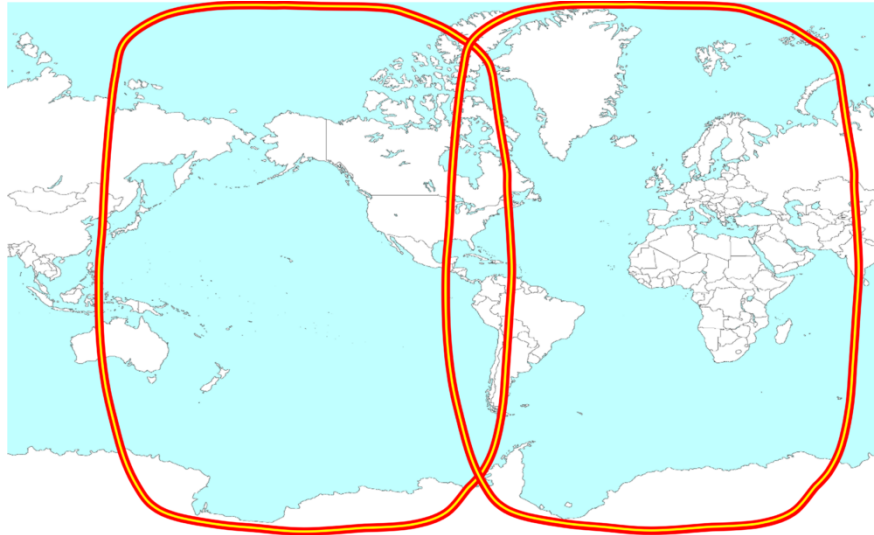
Natylie Baldwin: In response to the recent reports of Ukrainian drone strikes on radars in southern Russia that are part of their early detection system regarding incoming nuclear attacks, you told the Schiller Institute:

“The Russian satellite-based early warning system is very limited and cannot be used to cover the blind spots created by damage to the radar. The Atlantic, Pacific, and Northern radar warning corridors are more important, and the Russians also have radars in Moscow. However, the radars in Moscow will only see threats at a later time, resulting in yet shorter warning and decision-making times — thereby increasing the chances of a catastrophic accident... They will almost certainly choose to operate their nuclear strike forces at a higher level of alert, which will further increase the chances of accidents that could lead to an unintended global nuclear war.”

Can you talk more about how Russia’s early warning system is limited, especially compared to the U.S., and specifically how that escalates the danger of accidental nuclear war?

Theodore Postol: Well, I think the tremendously important difference, and it’s not minor, is the fact that the Russians do not at this time have satellites that can provide them with *global* warning and surveillance of missile launches — hopefully they will, it looks like they’re trying to launch something, but they’ve had big delays. But hopefully it will begin to solve this problem, although we have not seen this problem solved over the last over 20 years. So, the United States has satellites in space in geosynchronous orbits.

A geosynchronous orbit is at an altitude above the earth that basically is inclined at the equator of the Earth. So it’s in the plane of the equator of the Earth. And it’s at an altitude so that it rotates around the Earth every 24 hours. That’s what a geosynchronous orbit is.



(Theodore Postol)

So, basically, if you're in a geosynchronous orbit, you look down at the Earth and you are always over the same location of the Earth because the Earth is rotating once every 24 hours and your orbit is rotating once every 24 hours.

So a geosynchronous orbit is ideal for all kinds of satellites, communication satellites. So you only have to point at one, you know, from the ground and it only has to cover the same point on the ground without rotating a lot from space. But this also turns out to be an ideal orbit for a satellite that's looking down and trying to see things on the ground.

Now, the problem with a geosynchronous orbit is that it has to be very high in space typically around 40,000 kilometers so that altitude, which is required — because as you go to higher and higher altitudes the rotation rate of the satellite slows — and so you need to reach the right altitude where the rotation rate of the satellite coincides with the rotation rate of the Earth.

Because that altitude is so high, the Earth is quite far away, so you don't have a lot of high-resolution capability. A typical what's called spy satellite or reconnaissance satellite might be at 200 or 400 kilometer altitude rather than 40,000.

And the reason for that is you want to get close to the earth so your cameras can see smaller objects.

Now, what makes the American system unbelievably useful is we can see the entire surface of the Earth.

So, for example, if we had a radar that detected an incoming ballistic missile from, let's say, Russia, it looked like it was coming from Russia, we would immediately be able to look down at the entire planet and see that nothing else was going on, that there weren't missiles

launched from other areas. So we would immediately be able to tell that this is not a general attack if it's an attack at all.

So this system, which gives you a global presence, a global ability to monitor, gives you tremendously more information than you would get with radars because the radars are limited to line of sight. In 1996, there was a significant accidental alert of the Russian early-warning system because they saw a single rocket, but they could not see the rest of the Earth. So they had no way of knowing whether this was the beginning of a nuclear attack.

And now I think that many people have overstated the danger at that time from this accidental alert because at that time the situation between the United States and Russia was very, very calm. Yeltsin and Clinton were — with respect to presidents — there was no sense that the United States or Russia, there was no incentive for either of them to attack each other.

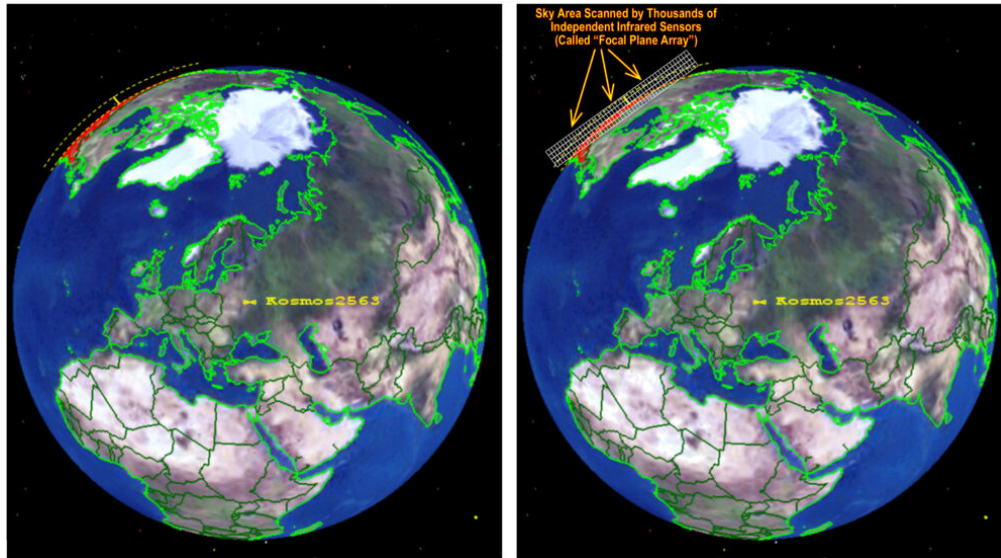
There was, at that instant in time, it seemed like we were going to actually become constructively engaged with each other. Of course, that hasn't happened, but that's another discussion.

But now, if the Russians saw, let's say, a few incoming ballistic missiles, which may or may not be a general attack, they would have no way of knowing whether this was the beginning of a very large-scale attack or something very small. The reason for that, of course, would be they have no global information and they have no idea what is below the radar horizons of all their other early warning radars that will, at some time, just break through their radar fans at a time too late for them to take a retaliatory action.

So the global satellite-based system is a very, very stabilizing and critical piece of the early warning system because — one way to state this is that it gives you situational awareness which sounds kind of mundane but that mundane information could be critical in determining whether or not you inadvertently take action to retaliate to an attack that's actually not occurring.

So the fact that the Russians do not have this space-based early warning system is very serious and really presents a major problem.

I had lots of contacts in Russia because I was working with the Russians on an infrared early-warning project that was supposed to be being done with the United States [RAMOS – Russian American Observation Satellites]. As usual the United States reneged on an agreement for a program with the Russians. And I was doing everything in my power to try to get the Pentagon to follow through on the agreement it had reached with the Russians.



Tundra Earth-Limb With & Without Array Pixel Files. (Theodore Postol)

Baldwin: I just want to clarify one important point: In discussing the deficiencies in Russia’s nuclear early-detection system, you often reference information you became aware of in the 1990s. Can you confirm that there is recent data indicating that this deficiency — a lack of a geosynchronous global satellite early-warning system — has not been rectified by Russia as of 2024? Where is that data coming from?

Postol: The answer to your question is simple. The North American Aerospace Defense Command (NORAD) publishes orbital data on all satellites that are in orbit. These data are typically published in the form of “Two Line Elements,” which provide all of the parameters needed to reconstruct the orbits of satellites at any time.

Since satellites can drift from their orbital positions, NORAD publishes revised two-line elements for every satellite in its catalog called regular business days (not on weekends). Hence, to analyze a specific satellite’s orbits, all that is needed in principle [are] the NORAD two-line elements for that satellite.

There is a very substantial body of information that supplements and builds on NORAD’s two-line element data. This includes a very large, well-informed, and energetic community of people who actively track and study everything they can find about satellites in orbit.

It is also of interest that the Russians have openly talked about their early-warning satellite system as consisting of satellites in both Molniya and geosynchronous orbits. [There is] a highly informative article by Anatoly Zak, a deeply knowledgeable historian of Russian space programs, [in which he] discusses the extraordinary efforts and unfortunately serious

failures of the part of the Russian space-program that is dedicated to building in early warning system.

In reading of this history with the informed eyes of an individual who understands the extremely demanding technologies required to build look-down space satellite systems reveals that Russians are certainly aiming at this capability but have not yet achieved it.

As such, a comprehensive technical understanding of the demands of spaced-based ballistic missile early_warning detection and the history and choices made by Russia in its planning to deploy and its actual deployments overwhelmingly indicates that Russia is still limited to Earth-limb viewing technologies in their satellite systems.

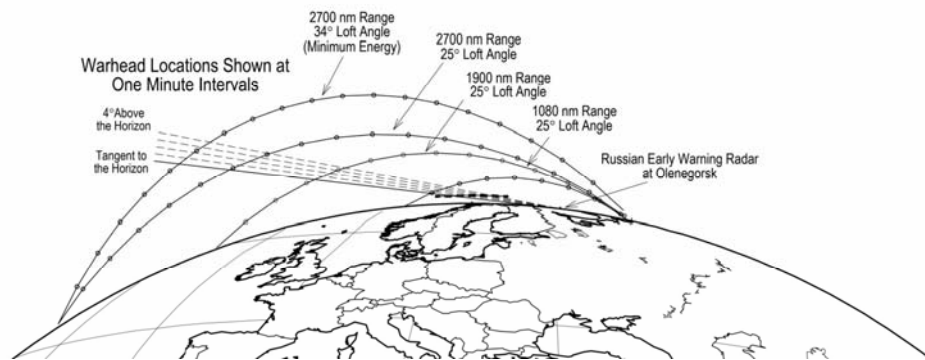
If the Russians start launching into geosynchronous orbit, we will know after there are at least two or three occupied locations whether or not the satellites are Earth-limb viewing.

If they are Earth-limb viewing, they will be at the same geosynchronous locations of the Prognoz satellite constellation, which was ultimately canceled because of extremely high false alarm rate. We will just have to see and hope for the best.

Baldwin: Can you also discuss the role of decision-making time? How long does the president of the U.S. have to make decisions around responding to a believed nuclear attack compared to the Russian president and what is the process for assessing the threat before it gets to the respective president on either side?

Postol: The two figures below show the situation with regard to early warning times associated with a postulated U.S. SLBM attack on Moscow. Since Russia does not have satellites that can look straight down at the earth and see ballistic missiles when their rocket motors ignite, the only way it can detect the approaching attack is when the ballistic missiles pass through the radar search fans of Russian early warning radars.

The figure below showing the actual trajectories of postulated ballistic missile launches shows the location of ballistic missiles at one-minute intervals.



(Theodore Postol)

The first point on each trajectory indicates roughly where the ballistic missile will complete its powered flight when its rocket motors shut down. After that first point, every additional point shows the location of the ballistic missile at one second intervals as it coasts towards its target. There are significant uncertainties on how fast the radars can determine the presence of incoming attacking missiles as they break through the radar search fan. Nevertheless, approximate numbers are good enough given only uncertainties associated with assessing such an attack.

The table below shows the amounts of time consumed by different operations associated with detecting, assessing, and responding to an attack.

**THE DOOMSDAY MACHINE DICTATED BY US NUCLEAR FIREPOWER
AND RUSSIAN EARLY-WARNING SHORTFALLS**

**Estimated Time Needed to Carry Out Nuclear Launch-Operations
No Matter What Response Is Chosen**

Time Needed to Carry Out Basic Nuclear Weapons Launch-Operations

Time for attacking missiles to rise over the horizon into the line-of-sight of early warning radars	1 minute
Time for radars to detect, track, and characterize detected targets, and to estimate the size and direction of motion of targets	1 minute
Military and civil command conference to determine response	1 to 3 minutes
Time for command and unit elements of silo-based forces to encode, transmit, receive, decode, and authenticate a launch order	2 to 4 minute
Time for missile crews to go through full launch procedures	1 to 3 minutes
Time for launched missile to reach a safe distance from its launch-silo	1 minute
Total time consumed in unavoidable and essential operations	7 to 13 minutes

NOTES:

If a short time-line attack is attempted against Russia, a Russian response aimed at launching silo-based missiles before nuclear weapons detonate on them would require time for several technical operations. Time would also be needed by political leadership to assess the situation and decide whether or not to launch the silo-based missile force. The amount of time available for decision-makers to assess the situation and decide whether or not to launch silo-based nuclear forces is the difference between the time it takes for warheads to arrive at targets and the time needed to carry out operations no matter what response is chosen.

(Theodore Postol)

Roughly two or three minutes will be needed for the radar to detect and estimate the direction and speed of the incoming ballistic missiles. This information would be immediately reported through command links to the highest-level military officers in the Moscow command center. In all likelihood, they would have to alert the highest-level officers and bring them into a “conference.” Depending on the scenario, this could also consume several minutes.

The assessment of the situation would then have to be sent to Russia’s president — who may or may not be immediately available to get the message.

If the attack assessment is incorrect, a decision by the Russian president to retaliate would be indistinguishable from a decision to destroy Russia, so it is reasonable to assume that the president will want as much information as possible.

If a decision is made to retaliate, messages would then have to be sent out to missile facilities. The missile facilities would need to go through some process of verifying the accuracy of the launch order and going through procedures to actually launch the missiles. Even under the best of conditions it is likely that this process would take another two or three minutes.

Finally, the missiles must be launched at least one minute before the arrival of attacking warheads, as once the missiles leave their protective silos and are in flight, they would be extremely vulnerable to the blast waves from the attacking warheads.

Since warning times are potentially as short as seven-to-eight minutes, depending on the trajectories of attacking SLBMs, it is clear that there is no way to reliably guarantee that a nuclear response could be ordered by top political leadership of Russia. Russians are certainly aware of the situation and have certainly taken measures to assure that a retaliation would happen with a high degree of certainty.

This near certainty of retaliation would be implemented by pre-delegating launch authority to missile units in the field and dictating strict conditions under which these pre-delegated launches could occur.

For example, if there are any indications of nuclear detonations in the sky of Russia or on the ground, this could be detected by special sensors that could then transmit this information to missile launch installations. Obviously, this is not an ideal situation, and it would be in everybody's interest to take cooperative measures to [reduce] the chances of an unforeseen set of circumstances leading to an accident.

Baldwin: What is the likely sequence of events that would occur if Russia responded with nuclear weapons to a false alert of a western attack due to their limited detection system? Would there be any space for stopping a spiral toward omnicide?

Postol: Because the timelines are so short, and the warning and communications systems are so fragile, it is difficult to see how anybody could stop the uncontrolled escalation if an accident occurred.

Baldwin: What are the implications of the fact that Ukraine's armed forces could not have pulled off this attack on Russia's early warning radar system without U.S. assistance?

Postol: I have no way of knowing whether or not the Ukrainians received critical information from the United States. The Ukrainians have been using the Starlink satellite system for communications between various military units as well as for other purposes.

The Starlink satellites are a dense constellation of low-altitude satellites that are designed for communications with systems on the ground. There is good reason to believe that the Ukrainians could use this system to communicate with a long-distance drone on a mission to attack a Russian early-warning radar. The locations of the radars are very well-known and easily identified by simply using Google Earth.

As such, it is not clear to me that the Ukrainians had to have the advice and support of the United States to perform this mission. Having said this, it is clear that the United States government does not have complete control over the Ukrainian leadership.

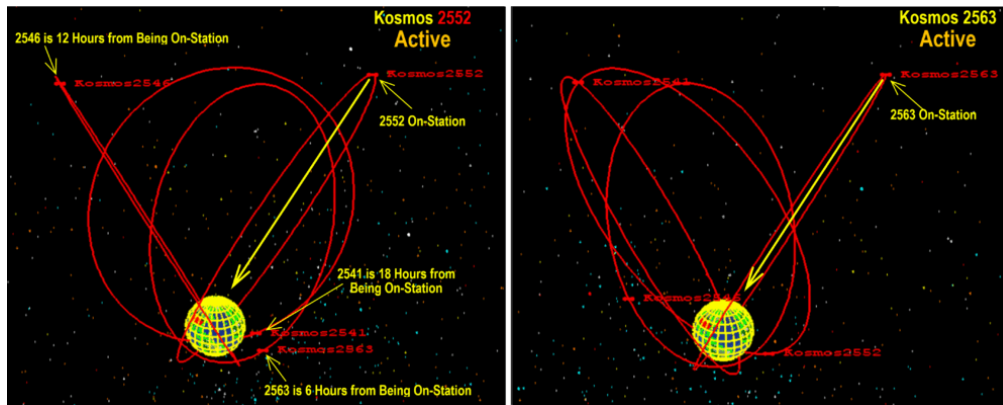
A very large part of the current Ukrainian leadership are known supporters of the Stepan Bandera ultranationalist ideology which was most prominent in Ukraine during the 1930s. The current admirers of Bandera would certainly know that Bandera's followers were key figures in the brutal murders of between 60,000 and 100,000 Poles living in Western Ukraine in 1943, and also were actively involved in the murder of well over 30,000 Jews at Babi Yar in 1941.

Plus many other Bandera followers actively joined Ukrainian SS units that not only fought against the Russians, but just as importantly were engaged in mass killings of people who are not considered "racially pure" Ukrainians. These people were put in positions of authority during the U.S. sponsored Maidan Coup in February 2014.

The U.S. is now reaping the benefits of having played a major role in allowing ultranationalist extremists to gain control of the Ukrainian government. The reasons for choosing these people were simple, expedient, and standard U.S. operations for overthrowing governments that do not adhere to U.S. political demands.

The most extremist elements are the best choice because they are violent, willing to use violence, well organized, and ruthless relative to other political groups of choice. This is why the U.S. put [Augusto] Pinochet in power in Chile, and the shah in power in Iran.

The problem with this approach to "diplomacy" is that besides supporting murderous nondemocratic regimes, the U.S. can really lose control of those they have put in power.



Tundra Satellites Spaced 12 Hours in All Four Orbits (Theodore Postol)

Baldwin: This next question is admittedly asking you to engage in some speculation, but you have stated publicly that you have spoken to some of the currently serving officials in the executive branch of the U.S. government so I am interested in your opinion on this.

There was an Austrian military analysis of the recent Ukrainian strikes on Russia’s early-warning system that suggested that it could have been a warning by the West since there was no military value to the attacks for Ukraine. As Russia expert Gordon Hahn has said — if the Austrian military thinks this is a credible interpretation, one can only imagine how this looks to Russia’s military/security organs.

First question: As Russia is militarily winning in Ukraine and the U.S. is on a course to suffer an eventual embarrassment and loss of face in this conflict that it played a huge role in provoking, is it possible that the U.S. is probing Russia’s nuclear defenses and indicating that it is willing to go nuclear to save face?

Postol: As incompetent as U.S. leadership has been, I do not believe they would knowingly try to provoke the Russians into some form of nuclear attack against the West. They may be foolish and reckless enough to say things to the Russians that they know, or should know, will lead to a reaction.

One of the most astonishing of many things that [U.S. Secretary of State] Antony Blinken has said to [Russian Foreign Minister] Sergei Lavrov was that United States reserved the “right” to put nuclear-armed ballistic missiles in Ukraine.

Blinken made this statement to Lavrov in January 2022, shortly before Russia invaded Ukraine in February 2022. Imagine a Russian Foreign Minister telling John Kennedy in 1962 that the Russians reserved the right to put nuclear-armed ballistic missiles in Cuba, rather than indicating that Russia was willing to negotiate.

When you look at how the Biden administration has conducted its policies in Ukraine, it is hard to understand what their intentions are and whether or not they have given any thought

to what they are doing. Nevertheless, I do think that they do not want to nuclear war with Russia.

Baldwin: Ironically, many in the West thought Putin would be the one to go nuclear if faced with possible defeat — is it possible that the U.S. is the one who is more of a threat to do this?

Postol: The only time I believe there might have been [a] danger that Putin would use nuclear weapons was when it initially appeared that Russia might catastrophically be losing the war with Ukraine.

Baldwin: In a presentation you gave in March of 2022, one of the things you talked about was what the results of a nuclear war would be in terms of death and destruction. You showed some harrowing images of the victims of WWII fire bombings which would be similar to what the firestorms resulting from a nuclear blast would do to people.

As a Generation X-er, I remember the threat of nuclear war being talked about when I was growing up and it was featured regularly in popular culture. Even our leaders — whether you liked them or not — seemed to understand how much a nuclear war must be avoided.

You stated at the beginning of the Ukraine war that you thought Biden was doing a good job of making it clear that he didn't want to escalate to a direct confrontation with Russia. Since then, it seems like we've been experiencing the frog-in-boiling-water phenomena of the Biden administration eventually giving in to more escalatory actions. Do you think our current leaders have lost their fear of nuclear war? If so, why?

Postol: I do not think that Biden has lost his fear of nuclear war. I do think that Biden is suffering from some form of terrible debilitating and degenerative disease like dementia or Alzheimer's.

I would be surprised if either Blinken or [National Security Advisor Jake] Sullivan did not understand that nuclear war with Russia would be a catastrophe for the United States and the world.

However, both Blinken and Sullivan are so isolated from reality that I do not rule out them inadvertently making decisions that lead to a nuclear catastrophe through escalation.

Blinken and Sullivan have presided over one of the biggest foreign policy disasters that the United States has had since the end of the Cold War. Their mindset is incomprehensible to me and wholly disturbing. You may be in a position to understand my current thinking due to your heartbreaking situation with your mother.

Imagine that a deeply loved individual started showing the signs of mental deterioration. Obviously, it would lead to tremendous pain, stress and sadness for all involved. But then

imagine allowing that person to put at risk the lives in your community by encouraging them to drive a delivery truck! This is what the people surrounding Biden are doing.

Biden is clearly mentally incapacitated, yet the people around him have sought to conceal this terrible and horrifying condition from the American electorate.

The people around him must know that this is only the beginning of something that will be far worse. Yet they have so little concern for the future of our country and its citizens that they are willing to put a man into the office of president who is incapable of doing the job.

They are willing to do this even though the nation is facing multiple existential crises. Yet all these people surrounding Biden seem to care about is how they can maintain their privileges of power.

I am sorry for this diversion into our nation's social situation, but I think the dangers we face of a possible nuclear war have much more to do with the frightening [domestic] social and political circumstances at the moment.

If people in power have absolutely no understanding of reality, then the situation is dangerous because they have no way of knowing how to make sound choices. Unfortunately, there are many other examples of delusional leadership from history.

Natylie Baldwin is the author of *The View from Moscow: Understanding Russia and U.S.-Russia Relations*. Her writing has appeared in various publications including *The Grayzone*, *Antiwar.com*, *Covert Action Magazine*, *RT*, *OpEd News*, *The Globe Post*, *The New York Journal of Books* and *Dissident Voice*. She blogs at natyliesbaldwin.com. Twitter: [@natyliesb](https://twitter.com/natyliesb).

July 14, 2024

By **Natylie**

Baldwin

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