http://nationalinterest.org/print/blog/the-buzz/syria-the-s-400-the-most-dangerous-game-cat-mouse-earth-20200

Syria and the S-400: The Most Dangerous Game of Cat and Mouse on Earth

Sebastien Roblin

4/15/2017

Could the S-400 potentially shoot down U.S. war planes?

Russia and the United States are once again squaring off over Syria following the use of nerve gas in Khan Sheikhoun on April 4 and a U.S. cruise missile strike on Shayrat Air Base on April

6. This has led to renewed speculation over whether the potent S-400 surface-to-air missiles Moscow has deployed in Syria could effectively counter future U.S. air operations. The S-400, after all, has the range to shoot down aircraft operating over most of Syria, as well as parts of neighboring Turkey and Israel.

Could the S-400 potentially shoot down U.S. war planes? Yes! Could the SAM systems withstand a concerted U.S. campaign to suppress them? No! The more pressing question is, under what circumstances would Russian troops actually fire missiles at American aircraft?

Moscow would have a lot to lose from *intentionally* starting a war. The anti-aircraft missiles, however, might be authorized if a local commander believes Russian forces in Syria are under attack.

Both sides have been careful to avoid direct hostile fire against each other. For example, Washington notified Moscow in advance of the strike on the Shayrat Air Base. Russia, for its part, did not attempt to shoot down the Tomahawk missiles as they approached the airbase, most likely at Putin's command.

But accidents in target identification are extremely common in war. For example, U.S. warplanes accidentally hit Syrian troops in September 2016, killing sixty-two. U.S. Special Forces narrowly avoided being hit by a Russian air strike on March 1, while three Turkish soldiers were not so fortunate [4] on February 3. And U.S. warplanes accidentally killed eighteen members of an allied Syrian force this week.

The tension following the Shayrat attack caused Russia to publicly close the communication channels used to deconflict Syrian airspace. Fortunately, this appears to have been a mere rhetorical ploy. Moscow announced that communications would soon reopen.

Nonetheless, it is possible to conceive of a variety of worrying scenarios in which U.S. missiles or aircraft are perceived as targeting Russian forces, causing the SAMs to go into action. Responsible national leadership might be able to step in and prevent an escalation to war.

At any rate, the S-400s in Syria serve primarily as a deterrent. Like brandishing a pistol to scare off a teeming mob, the S-400s in Syria are meant to intimidate potential adversaries because of their potential to inflict harm—but in the event they actually open fire, are unlikely to evade retribution.

Russia has spent decades developing multilayered air-defense systems, each tier of weapons capable of handling different targets at varying altitudes and ranges. The bottom layer is made up of point-defense vehicles capable of engaging low-flying aircraft at short ranges as they approach frontline troops or key installations, a role performed in Syria by Russia's Pantsir S-1 (NATO codename: SA-22 Greyhound) air-defense vehicles. One level up, there are medium-range missiles that can strike targets at higher altitudes a few-dozen miles away, such as the Buk-M (SA-17 Grizzly) missile involved in the Malaysian Flight MH 17 incident.

The S-300 and -400 family of missile systems, starting with the S-300P first deployed in 1978, constitute the long-range end of the spectrum. The have the range to be considered anti-access/area-denial (A2/AD) weapons capable of denying the airspace of an entire region, and can also, in theory, take out incoming cruise missiles and shorter-range ballistic missiles. A specialized missile-defense variant, the S-300V4, was deployed to the Russian naval base at Tartus in October 2016.

In the last decade, Russia has also begun fielding the evolved S-400 Triumf missile system (SA-21 Growler), which can launch 40N6 missiles with a maximum range of up to 250 miles, at up to six times the speed of sound. This means the S-400 battery stationed at the air base in Latakia can threaten the airspace over nearly all of western and central Syria, and even directly over the airbase in Incirlik, Turkey, where a large chunk of the U.S. Air Force's combat power in the region is based.

However, the 40N6 missiles are designed to engage less agile adversaries than supersonic fighters—think AWACS, refueling tankers and other airliner-size targets. Fighters would instead be targeted with slower (Mach 2.9), but more maneuverable 9M96E2 missiles, which have a maximum range of seventy-five miles. There is also an intermediate 48N6DM missile with a range of 160 miles.

An S-400 battery can deploy in five to ten minutes and supposedly engage up to thirty-six targets at a time. However, the S-400s are not ideal for hitting low-flying aircraft using the terrain to mask their approach—that's a job for nearby Pantsir-S1s.

The S-400 launch vehicles and the accompanying radars are road-mobile, and competent commanders will reposition the batteries periodically so that they are not easy to locate and destroy. Furthermore, they are designed to network with friendly radars, helping minimize the time the battery's own radars are active and exposed, and improving their resilience to an adversary's electronic warfare.

Despite being untested in combat, the S-300 and -400 command a lot of respect among NATO aviators. Several NATO members happen to possess older S-300 systems, and their pilots have practiced against them in exercises. Presumably, the S-400 will prove a tougher customer. Most U.S. pilots believe the S-300 and -400 pose a serious threat to the mostly nonstealth aircraft flying sorties over Syria as part of the anti-ISIS coalition. Israel is also famously concerned that Damascus may acquire its own S-300 SAM systems, making the denial of this weapon a major foreign-policy objective.

The U.S. and Israeli air forces have dealt with surface-to-air missile-defense networks before in Suppression of Enemy Air Defenses (SEAD) operations. Early SAM suppression missions undertaken by American and Israeli "Wild Weasel" aircraft in the Vietnam and Yom Kippur Wars sometimes delivered results, but also incurred substantial losses. In 1982, Israel launched Operation Mole Cricket 19 targeting Syrian SAM sites using nearly a hundred F-15 and F-4 Phantom fighters supported by E-2 radar planes. In a matter of hours, they succeeded in knocking out thirty Syrian SAM sites without losing a single airplane, demonstrating how a

combination of electronic warfare and standoff antiradiation missiles could be used to methodically take apart even an integrated air-defense network.

Since then, U.S. air power has succeeded in suppressing air defenses in Iraq, Yugoslavia and Libya. While twenty-eight U.S. warplanes were shot down in the 1991 Gulf War by flak and air-defense missiles, losses to SAMs in the subsequent conflicts were minimal.

Of course, U.S. aviators mostly encountered poorly trained crews using older missile systems. The S-400 battery in Syria is undoubtedly the most serious SAM threat that U.S. military pilots have faced in a long time. It's impossible to predict with certainty how a SEAD operation against these new systems would fair. Ultimately, the outcome of a clash would not be a simple matchup of plane versus missile battery, but instead would pit a complicated array of U.S. military assets against an integrated network of air-defense radars.

To begin with, U.S. warplanes can launch several types of air-launched antiradiation missiles designed to locate active radar stations, notably the AGM-88 HARM which has a ninety-mile range, and the AGM-158, which can traverse up to six hundred miles on the extended-range variant. These could target the radars an S-400 depends on from beyond its optimal range against fighter-type targets. RC-135W Rivet Joint electronic-warfare planes could also assist in detecting the electromagnetic activity around hostile radar sites, making them easier to eliminate one by one from a distance. A common SEAD tactic is to use forward aircraft to bait the defenders into turning on their radars and opening fire—thereby allowing the antiradar missiles to locate their targets.

Targeted radar operators can quickly turn off their radars to shake off the approaching missiles, but many antiradiation missiles will still find the last-detected position of a radar emission. A deactivated system also can't fire back—unless it can network with redundant friendly radars that aren't under attack.

The U.S. Air Force also operates a variety of stealth planes that are very difficult to target with radar-guided SAMs. The B-2 and F-35 can carry HARM missiles to aid in dismantling air defenses, while the F-22 would have to get closer to employ its GPS-guided Small Diameter Bombs with a range of forty-five miles.

Stealth fighters are not *entirely* invisible to radar. Russian defense officials are quick to point out that low-bandwidth radars can track the position of stealth fighters at some distance. However, such radars are not precise enough to provide targeting lock. On the other hand, an S-400's high-band targeting radar *can* target a stealth plane at short range, which may be as far as a few dozen miles. Thus, one tactic for countering stealth radars is to use tracking data from a low-band radar to cue a targeting radar to "ambush" a stealth fighter that passes briefly within firing range. This technique was improvised in the field by Serbian Col. Zoltan Dani to shoot down an F-117 Nighthawk stealth fighter in 1999.

Theoretically, the S-400 is designed to use this tactic even more effectively with its capable low-bandwidth observation radar and its ability to network with friendly systems. Therefore, pilots of

stealth planes would need to carefully avoid the "bubbles" in which they can be targeted by high-band radar, while systematically peeling away enemy radar one by one.

Another way of saturating an air-defense battery would be to target it with long-range cruise missiles. As these are generally programmed to hit a specific location, they are not ideal for hunting a mobile weapon system such as the S-300 or -400. Furthermore, the S-400 is designed to shoot down cruise missiles, albeit not at the maximum 250-mile range. However, a barrage of missiles might catch a battery before it can react, or at least saturate it with targets, forcing it to choose between staying and place and firing back, or abandoning its firing position.

Lastly, the U.S. Navy could employ its EA-18G Growlers—modified F-18 Super Hornets equipped with ALQ-99 jamming pods—to suppress a battery's radars. While Growlers by themselves might not completely shut down hostile radar, they could significantly degrade detection and targeting ranges, allowing the other platforms, including stealth fighters, to get close enough to deliver their weapons. The Growlers can also carry HARM missiles, and are being upgraded to share sensor data in order to generate faster targeting solutions against hostile radars.

Air-defense and counter-air-defense tactics entail an extremely complex game of cat and mouse. However, the key point to remember regarding the Russian SAMs in Syria is simple. Neither side has anything to gain from a U.S.-Russia shooting war over Syria, and it would be insane to deliberately start one. Thus, the primary concern should remain how to avoid triggering one by accident. This is not reassuring, given the intensity of Russian and U.S. operations in Syria and the frequency of accidents and near-misses so far by both sides' aircraft. The move to formally reopen communications channels that nominally broke down last week is vital for mitigating those risks.