Syrian Air-Defense Capabilities and the Threat to Potential U.S. Air Operations

by Chandler Atwood **(/experts/chandler-atwood)**, Jeffrey White **(/experts/jeffrey-white)**

May 23, 2014

ABOUT THE AUTHORS

Chandler Atwood (/experts/chandler-atwood)

Chandler P. Atwood, a major in the United States Air Force, was a visiting military fellow at The Washington Institute from 2013-2014.

Jeffrey White (/experts/jeffrey-white)

Jeffrey White was an adjunct defense fellow at The Washington Institute, specializing in the military and security affairs of the Levant and Iran.

Brief Analysis

The regime's air defenses have been weakened by the war, leaving room for low-risk air operations that could achieve important military and humanitarian objectives with reasonable investment of resources.

On May 17, the Syrian regime lost Lt. Gen. Hussein Ayoub Ishaq, its top air-defense commander and one of the highest-ranking military officials killed since the conflict began in 2011. Although it is unclear exactly what impact the general's death will have on the war, the loss will likely come as a psychological blow that further degrades the morale of the air-defense forces. Given this development and the effects of three years of fighting, what kind of threat does the regime's air-defense system represent now?

OVERVIEW

One oft-cited risk of any U.S. or allied air operation in Syria is the regime's potential ability to defend its airspace. Built and maintained with Russian assistance to confront Israel's air force, Bashar al-Assad's air-defense system appeared to be formidable -- at least on paper -- before the onset of the armed rebellion.

Since then, the system's ground-based capabilities, including surface-to-air missiles (SAMs) and antiaircraft guns, have been reduced by a combination of factors: attrition of equipment, forces, and critical leadership; disruption of routine training and maintenance; probable neglect; diversion of personnel and equipment to support operations against the rebels; and rebel seizure of key deployment areas in northern and southern Syria.

As for air-based capabilities, the Syrian air force -- once one of the largest in the Middle East -- is not believed to pose a serious risk to air operations. Over the past three years, it has suffered from pilot desertions/casualties, poor aircraft maintenance, and lack of the kind of pilot proficiency training needed to effectively impede a sophisticated strike package. Syria's aging Soviet fighter aircraft require extensive maintenance and spare parts to remain mission capable, a process that has been neglected during the war. The regime has devoted much of its remaining air capabilities to rudimentary -- yet lethal -- bombardment and basic resupply operations in support of its counterinsurgency campaign.

Nevertheless, the regime's air defenses retain some capability, especially in the Damascus area, where ground-based defenses tasked with protecting key leadership positions and military facilities are dense and overlapping and have more modern or upgraded SAM systems. A U.S./allied air operation over that area would require extensive planning, support, and air assets (strike, surveillance, reconnaissance, support). In contrast, air operations over the highly contested southern and northern parts of Syria would not require a large campaign to destroy the regime's remaining local air-defense assets. That goal could also be achieved with relatively limited risk, setting conditions for an international humanitarian assistance campaign or efforts to find a diplomatic solution to the conflict.

CURRENT CAPABILITIES

Prior to the war, the regime's air defenses included 22 early-warning sites, 130 active SAM sites, around four thousand air-defense guns, and a few thousand man-portable air-defense systems (MANPADS). This allowed for dense coverage of major cities and economic centers closest to Israel, especially the coastal region, central-western Syria (Homs, Hama), the Damascus area, and the south. Northern and especially eastern Syria, which are much less heavily populated, were less heavily defended.

Syrian air defenses are still well equipped today but have sustained considerable setbacks. Many systems have likely been maintained poorly, and their operators are probably distracted by the war and inadequately trained and exercised. Although the August-September 2013 chemical weapons crisis and the threat of U.S. strikes may have given the regime incentive to improve readiness, no significant air-defense exercises appear to have been conducted in some time. Equipment, personnel, and facilities have been lost in the course of the war or diverted to fighting the rebels, and a number of early-warning radar and air-defense sites in the north, in the Damascus area, and adjacent to the Golan Heights have been overrun by opposition forces, creating gaps or weakening coverage. Furthermore, the regime's air defenses are not properly integrated to ensure seamless and timely command, control, and communications (C3) against all types of threats. The system is capable of successfully engaging predictable and benign targets but is probably not agile enough to counter a well-orchestrated surprise attack.

For example, the June 2012 shoot-down of a Turkish RF-4E reconnaissance jet showed that Syrian air defenses can still engage certain targets. Yet this was an isolated incident that occurred under ideal conditions against a single close-range, benign target. When confronted by a coordinated airstrike operation, regime forces would likely exhibit pervasive air battle mismanagement, including delays in detection and timely coordination of engagements to the unit level. Their ability to conduct sustained air-defense operations under attack is also questionable. Many missile support facilities have been lost or damaged in the course of the war, and the lines of communication over which redeployment and resupply operations would have to take place are under constant rebel threat.

Even so, the regime does retain small numbers of advanced systems that are technically capable of taking out multiple simultaneous targets, including cruise missiles and highly maneuverable fighter aircraft. After Israel's unimpeded 2007 airstrike on the nuclear reactor at al-Kibar, Syria invested heavily in modern Russian systems to bolster its air-defense network. The focus was on upgrading the network's backbone, composed of Soviet-era SAMs from the 1950s and 1960s, including SA-2s, SA-5s, and SA-6s. Serious steps were also taken to upgrade the regime's SA-3s into a more mobile and digital system. In addition, Damascus acquired more sophisticated tactical SAMs, such

as three batteries of the very capable SA-17 and three dozen of the close-range SA-22 systems that reportedly downed the Turkish jet in 2012.

COMBAT OPERATIONS

Syrian air defenses are probably not prepared to counter a limited strike that exploits their lack of systems integration. This Achilles heel derives from the regime's antiquated, semiautomated "man in the loop" C3 system, its overreliance on vulnerable communications networks, and its centralized air battle management construct. Given these issues, there would be significant lag time between initial detection of intruders by early-warning radars and the issuing of engagement orders to various air-defense sectors and air bases. Moreover, outdated early-warning radars and the C3 network's susceptibility to electronic attack would likely prolong this delay even further, forcing individual units or elements into isolated and autonomous operations and making them more susceptible to attack and jamming.

These vulnerabilities have already facilitated multiple strikes by Israeli aircraft since 2007 and increasingly since 2013. The al-Kibar strike was conducted deep inside Syrian airspace, albeit in the northeast sector where air defenses are minimal. As part of that mission, Israeli fighter jets are said to have evaded air-defense sites near the Syria-Turkey border and along the coast with sophisticated electronic deception capabilities, opening a route from the Mediterranean Sea to the nuclear facility far inland.

Israel has also reportedly conducted around a half-dozen airstrikes on military targets during the current conflict, including within the vicinity of the heavily defended capital. These limited strikes surprised the Syrians and were effectively unimpeded. According to U.S. media reports, last year's attacks on Damascus-area weapons caches were conducted by fighter aircraft employing standoff weapons, which can be launched without penetrating Syrian airspace or the densely overlapping air defenses protecting the capital. Such weapons were likely used to avoid the risk of operating in range of those defenses.

IMPLICATIONS

If the United States and its allies decided to launch air operations against Syria, they would face varying conditions depending on the campaign's scope and intent. Notably, the regime's air defenses could not effectively impede limited surprise attacks relying on standoff munitions. Such attacks would be analogous to the reported Israeli strikes against specific, well-defined targets.

Air operations over the highly contested southern and northern parts of the country, such as Aleppo, Idlib, and the so-called Southern Front, would not require a large campaign to achieve localized air superiority. Allied operations to destroy the remaining air defenses in these areas could be conducted with limited risk while reaping several potential benefits, such as weakening regime military capabilities, supporting the provision of humanitarian assistance, altering the balance between moderate and extreme rebel groups, and enabling drone operations to gain intelligence and strike high-value targets.

The capital air-defense sector still poses a credible threat to allied air operations. Where air defenses densely overlap and incorporate more sophisticated mobile SAMs (e.g., upgraded SA-6s and SA-3s or more modern SA-17s and SA-22s), the threat level increases and would pose a formidable challenge in the early stages of a campaign. To further complicate matters, these forces would likely disperse in the event of attack, remain dormant during initial operations, and then reappear in new locations to engage unaware aircraft.

To dismantle the Damascus-area integrated air-defense system (IADS) and enable follow-on operations, allied forces would need to conduct an air campaign involving electronic, cyberwarfare, and ISR (intelligence, surveillance, and reconnaissance) capabilities; standoff weapons for use against C3, fixed SAM, and early-warning radar sites; and,

most likely, stealth aircraft to carry out strikes on the more advanced SAMs around Damascus. Given that U.S. forces have successfully conducted campaigns against very similar (and equally disjointed and degraded) air-defense systems, they could likely achieve air superiority in one to two weeks with zero to minimal casualties.

Going forward, U.S./allied air operations in Syria must be weighed against a number of operational scenarios, using a clinical, up-to-date assessment of the regime's capabilities in those scenarios. It is far too simple to say that the Syrian air-defense network is either a major threat or no threat. Some operations with potentially important objectives, such as degrading regime military capabilities and supporting humanitarian missions, could be conducted at relatively low risk and with reasonable investment of resources. In short, U.S. air action in Syria does not have to be all or nothing.

Maj. Chandler Atwood, USAF, is a visiting military fellow at The Washington Institute. Jeffrey White is a defense fellow with the Institute and a former senior defense intelligence officer. The conclusions and opinions expressed in this document are those of the authors; they do not reflect the official position of the U.S. government, Department of Defense, U.S. Air Force, or Air University. ❖

RECOMMENDED

BRIEF ANALYSIS

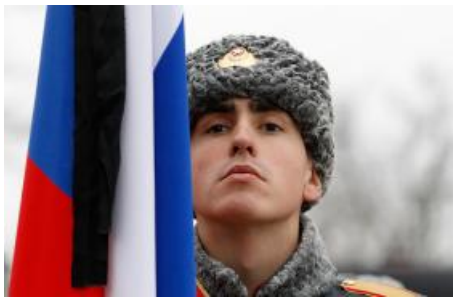
Khamenei Breaks His Silence on the Nuclear Negotiations

Feb 17, 2022

◆

Omer Carmi

(/policy-analysis/khamenei-breaks-his-silence-nuclear-negotiations)



ARTICLES & TESTIMONY

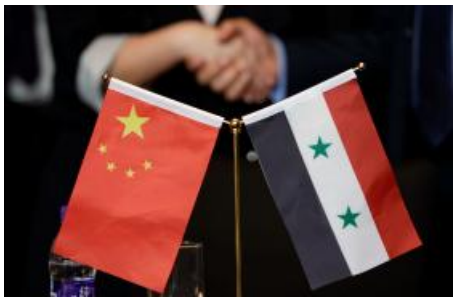
The Ukraine Crisis Isn't Over: Russia Has Lied About Troop Withdrawals Before

Feb 16, 2022

◆

Anna Borshchevskaya

(/policy-analysis/ukraine-crisis-isnt-over-russia-has-lied-about-troop-withdrawals)



ARTICLES & TESTIMONY

As China Thrives in the Post-9/11 Middle East, the US Must Counter

Feb 16, 2022

◆

Jay Solomon

(/policy-analysis/china-thrives-post-911-middle-east-us-must-counter)

TOPICS

Military & Security (/policy-analysis/military-security)

REGIONS & COUNTRIES

Syria (/policy-analysis/syria)