

Technological advances and increased globalization are calling into question long-held assumptions about the use of air power. Non-state actors capable of leveraging new technology – such as cheap precision guided missiles and drones – present a new challenge for air forces of advanced industrial states. Traditional powers must understand these emerging capabilities and the momentary advantages they create if they are to take steps to nullify them.\*

## The Abqaiq attack – a gamechanger for aerial defense

[The September 14 drone attacks](#) on the most important Saudi oil and gas facilities marked the culmination of over two decades of technological developments: for the first time, a relatively weak state was able to project air power a significant distance inside an adversary's homeland and cause damage on a strategic level. Capabilities which used to be the exclusive preserve of advanced industrialized states – such as continuous overhead observation and long-range precision strike – are within the grasp of small states and non-state actors. This will have long reaching implications for the Middle East region, and will upend many of the [long-term – and exceedingly expensive – plans](#) which a number of states have based their security upon.

### Development one: persistent observation

Commercial developments in electronic miniaturization, rapid computation, cheaper and smaller satellites, and free or near-free global communications have revolutionized commerce. They are now revolutionizing security and warfare as well.

In World War Two, obtaining overhead imagery of an enemy's positions was a major undertaking. It required the dispatch of aircraft with advanced cameras, a significant wet film capacity, the ability to process and print chemical film rapidly, and then the resources provided by a group of highly trained aerial photograph interpreters to locate, analyze and assess potential enemy targets. Aerial photograph interpretation was something of an art: entire professional careers were devoted to honing techniques to determine the size of smokestacks based on the shadows cast at a specific time of day.

In times of war, nations with industrialized air forces devoted a significant amount of men, airplanes, and money to acquiring and analyzing overhead imagery. Airplanes (at some significant risk) went

out before a strike to locate and classify a target, and returned after a strike to determine if the target was destroyed or needed to be attacked again. All of this involved large amounts of resources in a time of war.

Today, imagery of civilian and military targets is available to almost anyone anywhere in the world with an internet link. Commercial overhead software such as Google Earth provides the ability to acquire geo-located imagery in near real time at no expense; for those willing to spend a few hundred dollars, even more accurate imagery is readily available.

The significance of this development cannot be understated. The imagery available to a shoeless radical with a cheap phone in a Niamey café is now better than what was among the most closely held capabilities of the Cold War states.

## Development two: long-range strike capabilities

Last fall's drone attacks on Saudi Arabia ushered in a new age of a medium-level power conducting a successful long-range strike into an adversary's interior. Again, this is a development which would have been unthinkable twenty years ago.

Nations used to require bomber aircraft and well-trained pilots to deliver explosives over distance with any degree of precision. Now, drones and cruise missiles can fly at relatively low level (thus avoiding radar) and can be guided cheaply via commercial GPS or another satellite-enabled navigation system. Commercial drones are being developed which can carry a payload of up to 250 pounds and can operate even if jamming is present.

Most air defense weapons systems in the Middle East – such as Patriot, Iron Dome and Terminal High Altitude Area Defense, or THAAD, are designed to defend against ballistic missiles, artillery shells, and rockets which fly on a parabolic trajectory. While not a simple task, it is possible to acquire ballistic missiles with radar, extrapolate their trajectory, and then launch an interceptor missile to destroy the incoming missile. These systems are not designed for and not suited to acquiring and intercepting a low-level guided threat such as a drone or a cruise missile.

[Almost every nation and most transnational actors \(such as ISIS\) have developed drone attack technology.](#) In some instances, these are merely commercial hobby drones with mortar shells

attached; in others they are reverse-engineered or functionally designed larger drones which either explode at altitude to spread shrapnel (as has been used by the Houthis in Yemen) or fly into a target and explode. Increased commercial drone technology will become increased military technology almost instantly: Small countries, weak countries and sub-national groups now have the strike capability which used to be the preserve of a developed nation.

## Security implications

These developments have profound implications for security in the Gulf and elsewhere. No facility is immune from aerial attack; no security professional can think in only two dimensions. Discarded or underutilized techniques such as camouflage, using decoys and hardening facilities will become necessary to defeat the new threat.

Measures which can disrupt the drone observational and control cycle – such as the use of obscurants, dazzlers and jammers – will become a key factor in this new era of warfare. Electronic countermeasures such as “spoofing” to disrupt GPS signals or take command of a drone may well be more effective than any kinetic or ballistic countermeasures.

Whatever solutions are used, they are unlikely to remain effective for long. Because democratization in air power is driven by the rapid pace of computational capacity, the measure / countermeasure cycle is compressing to the point where it will resemble the effort to defeat computer viruses – a constant cycle of updating and modifying hardware and software to nullify each threat and the reaction to each threat.

The era of two-dimensional static security is drawing to a close. Those who grasp this and adapt quickly and effectively are those who will be secure: others will forever be reacting to the last attack and suffering the blows of the next.

*Dave Des Roches is an associate professor at the Near East South Asia Centre for Strategic Studies at National Defense University in Washington DC. He was previously the director responsible for defence policy concerning Saudi Arabia, Kuwait, Qatar, Bahrain, Oman, the UAE and Yemen in the Office of the Secretary of Defence and had a 30 year career in the active and reserve Army.*

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