

FULL SPECTRUM AIR DEFENCE

INTERVIEW

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In terms of air defence, what are some of the lessons we are learning in the Ukrainian war?

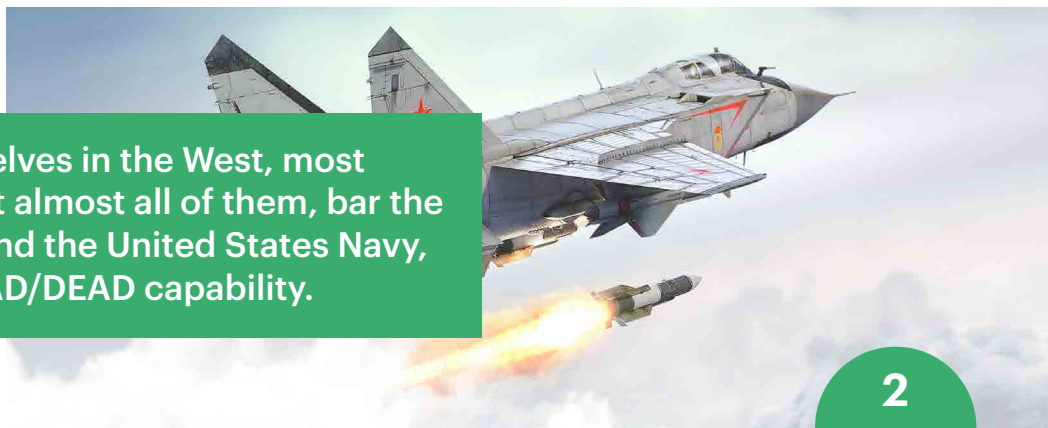
The biggest lesson from the Ukrainian air war for Western air forces and ground forces, is just the power of mobile, survivable medium- and short-range air defence to deny freedom of action to air forces that cannot do serious SEAD/DEAD, so suppression or destruction of enemy air defences. There's a remarkable degree of mutual denial of operational capability in the air on both sides in Ukraine and that's primarily because neither side has a serious SEAD/DEAD capability. SEAD/DEAD, of course, is really hard against fixed structures, early warning radars.

Long-range SAM batteries, things like S-300s or 400s, which we tend to focus on when discussing SEAD, that's not necessarily the hardest thing. Because those systems, although they're mobile, they still have setup and scoot times. You might be able to surprise them or fix them in place and then hit them with standoff munitions, but that inability to get after things like the SA11, the BUK, or, in the Russian case, SA-17 modernised version, SA-15 Tor, SA-8 Gecko, which the Ukrainians are using a lot.

There are quite short popup and illumination times for engagements with these systems. That gives certainly aircraft very limited time to pick them up and then try and get into a launch-acceptable range with a relatively high probability of kill munition before they power down and then move again. That inability to get after them has just meant that medium-altitude operations over most of Ukraine, or high-altitude ones, have proven prohibitively costly for both sides.

If we're honest with ourselves in the West, most Western air forces, in fact almost all of them, bar the United States Air Force and the United States Navy, don't have a credible SEAD/DEAD capability. And so, this really should shine a spotlight for us on the limitations that we have in terms of air superiority against an opponent that has, even in a relatively poorly integrated, mobile air defence system.

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Are these lessons here to stay?

I think that the lessons from Ukraine will be probably the guiding principles for future force design for any state that is looking at peer state-on-state war fighting as a planning contingency, for the better part of the next decade, if not more. We saw the degree to which relatively minor conflicts in comparison, things like Nagorno-Karabakh in Syria, aspects of the war in Libya, were taken and micro analysed and force development trends teased out, even where they were relatively tangential in terms of direct relationship.

Here you have direct clash of armoured forces, direct clash of air forces, ground-based air defence and relatively modern air forces, at least on the Russian side. The whole gambit of combined arms warfare in open country and urban areas, potentially amphibious warfare being tried, and failing. And so, this is probably going to be the dataset for lessons learned for militaries across the world for the foreseeable future.



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How does the full spectrum air defence story change in the Chinese context?

There are huge error bars which we have to put in place whenever we're assessing the Chinese, in terms of practical military capability. Because they are so much more opaque about exactly how their systems work. They have far less user data, both for them, so they probably has less idea about how well their system work than the Russians did, which is interesting. But also, we have less idea because, unlike the Russians who like going in and smashing up their neighbours and opportunistically going into Syria.

Of course, the West has done lots of expeditionary warfare, there's plenty of data on how its systems work. Russia has also done a lot of war fighting, whether it be Georgia, Chechnya, Abkhazia, in Georgia of course, a little bit of stuff in Transnistria, Syria, a little bit of stuff in Libya, Wagner around the world. There's a lot of data on it and we also have huge exercises like Zapad to look out on a fairly regular basis.

The Chinese, it's much, much more opaque. They haven't really done any expeditionary war fighting in any relevant time scale. Where they do have large exercises, they don't really shout about them in the way that the Russians do, so we have much less idea of how well their systems work. That's both in terms of their platforms and in terms of their command systems, their architectures, their doctrine.

Broadly speaking, when you look at Chinese air defence systems, the impression is that the Chinese are ahead of the Russians, for the most part, on radars. Ahead of the Russians for the most part on command systems, on datalinks. They have access to much better microelectronic components, so they're able to miniaturise and take advantage of modern digital capabilities within their system construction in a way that the Russians have always struggled.

They're probably behind the Russians in terms of missile capability, at a kinematic level, if nothing else. Seeker heads wise, the Chinese probably have the advantage. Certainly they've deployed imaging seekers in their air-to-air missiles, that is their Fox-2s, and in their MANPADS, whereas the Russians have not yet managed to do that. They've also deployed AESA, radar-equipped air-to-air Fox-3s and the PL-15, which again, the Russians have not managed to do.

They're pushing the envelope in terms of missile kinematics as well for SAMs, things like HQ-9, HQ-16, generally shorter ranged than their Russian equivalents. This may be partly because Chinese seeker heads have traditionally been heavier, but it may also just be that they place less of a premium on those really extreme range shots, doctrinally. In terms of the way they link it all together, A, it's a moving target to assess because the portative of up-to-date information means you're always trying to play catchup with whatever the latest leak is.

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When things do leak, it's generally because the CCP wants them to leak. It's very, very hard to assess with any credibility. But if the Chinese aren't currently much better than the Russians at linking together their maritime, ground-based and air-based sensors and shooters into a common air picture that they can use, than the Russians, then they will be soon. Because they have the hardware and the electronics manufacturing base and the funding to really go after that. And now, of course, they also have an open lesson from Ukraine as well, on the dangers of not getting this right.

Fundamentally, what they're trying build seems to be much closer to what the US Navy or the US Air Force operates. And so, they're probably significantly better than the Russians at it from an architecture point of view

now, and they will certainly be much better than the Russians whenever they choose to instigate some sort of conflict, but it involves a potential direct clash. It's worth remembering that also, there's the anti-status quo power, they have control of the timeframe. They can choose when they're ready to challenge and where. The timetable is kind of theirs to decide when they're ready or not.

But, of course, it is worth remembering that the Chinese military is still a very siloed organisation. The PLA and PLAAF and the PLAN and PLANAF are all still run separately. They still exercise separately. They still have a lot of bureaucratic competition that probably goes beyond the level of competition for budgets that you see in interservice rivalries in most Western countries.



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Obviously one of the big things when talking about China's naval power, as you've touched upon, from our side, does FSAD require a radically new approach in the naval context?

Full spectrum air defence is arguably most at home as a concept in the naval domain because any US naval surface warfare officer or Royal Navy surface warfare officer would tell you that air defence has to be full spectrum. And a full spectrum air defence network is exactly what a frigate, let alone a task group, creates. Because it has multiple different layered systems that handle different parts and different targets that's within the air defence spectrum, linked together by a common fire control architecture that sequences it all and makes sure it interacts.

All the different shooter elements and sensor elements interact as a

unified hull to provide full spectrum air defence. Arguably, the maritime domain is where we're closest to FSAD in real life. It's hard not to describe something like a US Navy carrier battlegroup with corporate engagement capacity, CEC, all up and running, particularly within NIFC-CA, Navy Integrated Fire Control-Counter Air, their NIFC-CA construct, as anything other than full spectrum air defence. They're linking together all of their airborne sensors, shooters, all of the platforms in terms of the missile platforms, gun platforms for close-in weapons systems. And now, increasingly, directed-energy weapons systems on their ships.

The vulnerability of aircraft carriers is clearly of huge interest to both aircraft carrier operating nations and those who are worried about aircraft carrier operating nations. There's a couple of things that to me speak volumes on this.

So, yes, the US Navy is already playing, I would say, in full spectrum air defence. US Air Force, US Army less so. But then again, they're closer to it than probably anybody else. Again, just the layers upon layers of connectivity that the US Armed Forces bring to a fight, obviously that's the key to making any sort of full spectrum air defence network work. It is connecting everything together with a low enough latency time, with a high enough data fidelity and compatibility to actually use the different sensor and shooter assets within your network. And the US are kind of the only people who can really do it at the moment.



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Continuing on FSAD on naval. FSAD is obviously deeply tied to the survivability of the carrier fleets. Some argue that the age of the carrier is over, others say that this is overblown. Thoughts?

The vulnerability of aircraft carriers is clearly of huge interest to both aircraft carrier operating nations and those who are worried about aircraft carrier operating nations. There's a couple of things that to me speak volumes on this. The first one being that every major carrier operating country, bar the Russians, and they've talked about it, it's just they don't have the money, everybody else is building new carriers. So, clearly, countries that have them feel they still have utility because there are next-gen carrier programmes in full swing.

Whether it be the UK's, Ford class for the US, the replacement for the Charles de Gaulle for the French, the Chinese pushing ahead with their Type 003s. The Indians looking for new carriers. The Italians, I believe, refreshing theirs, or they have a plan to do so, at least. Clearly people who have them view carriers as very relevant going forwards,

Equally, huge amounts of money being poured into advanced anti-ship weaponry, particularly by the Chinese. But it's ballistic and cruise, they have this multiple-axis salvo approach, theoretically speaking, to naval

warfare. The idea being that if you fire enough different sorts of missiles that come in at different flight profiles, different speeds, ideally from different directions, then you can overwhelm the air defences of a carrier group. There's probably more channels of fire, better coordinated, in a US carrier battlegroup than in any other air defence network on earth.

And so, there's a question of how advanced that system actually is in its war mode, shall we say. The US, I'm sure, are very, very cagey about revealing the full capabilities of those systems. But then there's also the question of just magazine depth. Interceptor missiles are both very expensive, particularly the longer range things, SM3, SM6 are enormously expensive weapons. They're also large and they're competing for limited vertical launch space with offensive capabilities. Whether that be harpoon, TLAM, a range of potential hypersonic land attack capabilities.

There's the question of the affordability of defensive magazine size. Also, the magazine size itself and whether in a peer conflict, the naval side that can't as easily resupply and is having to

do the technically more demanding thing, which is defence in a missile offence versus defence equation, will simply run out of missiles to defend itself earlier than the opponent will run out of missiles to throw at them. And, therefore, have to retreat and refit because, also, you can't really reload Mark 41s at sea. There's a bunch of interesting things that are going on in that. It is still unbelievably hard to hit an American carrier at sea.

But it is also worth remembering, on the other side of that equation, for the aircraft carrier advocates, who will constantly talk about how vulnerable air bases are, look at Ukraine, look at Syria, you see every time their airbases get hit. The response to that could be made that airfields get hit a lot and the craters are filled in and they are operating again within hours. Airfields don't sink when you hit them and they also don't have to pack fuel, aircraft, munitions and propulsion together in a pretty small, confined space, comparatively speaking, in the way that aircraft carriers must. There is a vulnerability trade-off. Yes, it's moving, but of course if you hit it, it tends to do a lot more damage to a carrier than to an airbase.

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