Air Intelligence Tradecraft and Doctrine

Air threat zone matrix

by Capt Christopher A. Denzel

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It's April 2020. VMM-365(Rein) is embarked with the 24th MEU, deployed in the southern Mediterranean, and VMM-266 is deployed with Special Purpose MAGTF Crisis Response Africa (SPMAGTF-CR-AF) and is forward-staged to their Sigonella, Italy, spoke. The Islamic State (IS) has spent the last five years expanding its operations in North Africa and has launched a number or major attacks on Europe from its strongholds in Libya. NATO is preparing to conduct security operations to contain IS on the African continent. The MEU and SPMAGTF have composited and have been tasked with seizing one of the main airfields along the coast in order to facilitate logistics and close air support (CAS) support of our allies. The mission is not a short one, and the composite MAGTF expects to execute sustained operations ashore, primarily focusing on supporting NATO forces operating from Ghadames to Tobruk in different sectors of responsibility. In a video teleconference between the two squadron staffs, the commanders agree that they will need significant support from their intelligence sections to support aviation operations across such a sprawling area of operations (AO).

The MEU ACE commander says,

> Deuce, we're going to need to understand the threat across a large battlespace. We'll primarily be providing CAS, aerial delivery, quick reaction force, and tactical recovery of aircraft and personnel (TRAP) capabilities across an area of responsibility almost 800 by 200 nautical miles. I know the threat varies significantly across that area and with major coalition operations about to kickoff, the threat picture is going to be changing daily. We need to stay on top of it.

The SPMAGTF ACE commander chimes in,

> Seconded. With two full squadrons of MV-22s, we have the legs to route around any areas of higher threat if we have to. The question is: where are they? When I was in Afghanistan and Iraq, we routinely used a tool that depicted air threat zones as green, yellow, red, or black. It allowed us to select minimum threat routing in mission planning as well as identify when we needed to provide escorts to any assault support missions heading into the red or black zones. You two put your heads together and see if you can't come up with something like that. It needs to be accurate, predictive, and current. I don't want to be briefed with a slide that never changes—we know the threat will change day-by-day and week-by-week. Let's find a way to show that.

"Yes, Sir," both air intelligence officers reply. After the meeting ends, the two lieutenants stay behind. "You have any idea what he's talking about?" The MEU ACE intelligence officer responded:

> I think so. I know the SPMAGTF in CENTCOM (U.S. Central Command) used something like that a few years ago, and I know that sort of thing was common a decade ago in Iraq and Afghanistan. But, I have no idea how to make one of those, and I don't think we're tasked-organized for a product that large, even with our two shops combined. Those products used to take a Wing (Forward) G-2 to build and maintain. We don't have that sort of manpower.

The SPMAGTF ACE intelligence officer asked:

> We've both been to Air Intelligence Officers Course, Weapons and Tactics Instructor Course, and Expeditionary Warfare Intelligence Course, and they don't teach anything like that. Where do we start?

The Current State of Air Threat Zone Matrices

Despite more than a decade of use, there exists in the Marine air intelligence community neither a definition of an air threat zone matrix (ATZM) nor any well-developed resource for

understanding and creating them. ATZMs have seen extensive use in Operations IRAQI FREEDOM, ENDURING FREEDOM, and now INHERENT RESOLVE. And yet, the Marine Corps air intelligence community lacks a foundational definition and understanding of the ATZM, the elements that comprise it, and the principles that make it effective.

Since at least 2004, thousands of air intelligence Marines and aviators alike have gained experience as users of ATZMs, but only a tiny handful have any experience as creators and maintainers. This leaves the community with an "I know it when I see it" mentality that is insufficient for future operations like the hypothetical one previously illustrated. The community has yet to capture lessons learned, concepts defined or explored, and best practices. If future air intelligence sections are to support their units and commanders with what has, over the years in Iraq and Afghanistan, become a standard air intelligence product, the community needs to establish an accepted definition of ATZMs and guidance for creating them. The community can go further and explore their application to less enduring mission sets (a MEU or SPMAGTF planning for or executing contingency missions and preparations for branches and sequels, which may see the scope of a limited mission dramatically increase in size) and explore methods that can enable even small squadron intelligence sections to generate and maintain ATZMs in large, dynamic battlespaces, such as the scenario we began with.

Almost no resource is available for air intelligence Marines to learn about ATZMs, their capabilities and limitations, or considerations and procedures for building and implementing them. A search on classified networks will turn up a handful of historical examples from Iraq and Afghanistan. Such a search will also turn up the draft of a presentation on ATZMs from the Center for Marine Expeditionary Intelligence Knowledge, which provides some limited guidance. The MAGTF Command Element Training and Readiness (T&R) Manual mentions ATZMs under the event "Evaluate the Threat." Unfortunately, it merely states: "Create Threat Models that include: ... air threat zone matrix." The *Intelligence T&R Manual* goes only a little further. It states, under the event Direct Step 4 of the Intel Preparation of the Battlespace (IPB) Process: "Identify threats to aviation operations for each course of action." The administrative instructions for the event read: "In supporting aviation operations, identification of air threat zones and associated metrics (Black-Green) are required in order to support threat mitigation criteria for each type/model/series."

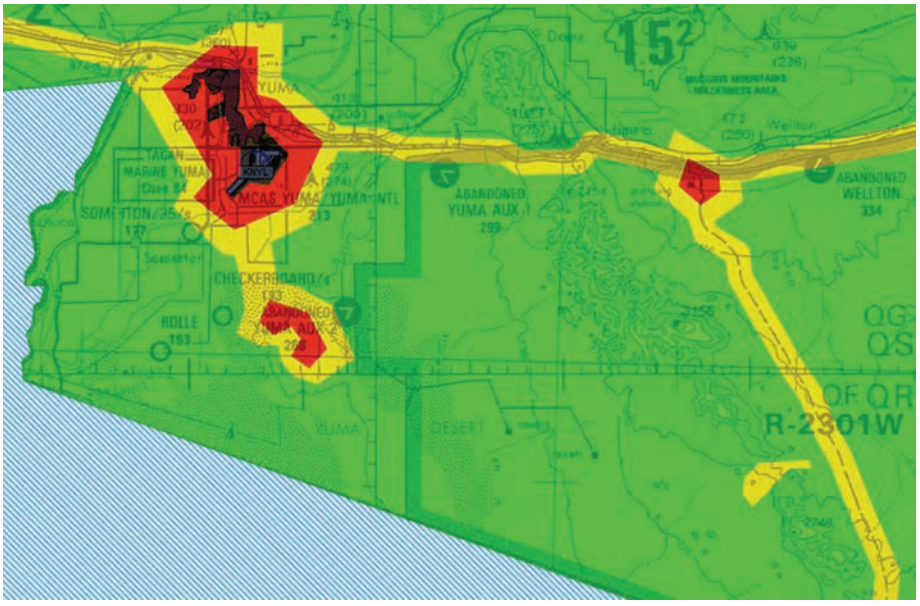

Figure 1. Notional Yuma air threat zone matrix.

If you're still asking yourself, "What exactly is an air threat zone matrix?" then you've hit upon the problem: there is currently no answer. Despite more than 11 years of use and being a component of T&R events, there is no official or unofficial description of what it is, what it should do, or how to build one.

The shortest, technically correct answer is that an ATZM is a structured analytic technique (SAT) for evaluating the air threat. In their book *Structured Analytic Techniques for Intelligence Analysis,* (Washington, DC: CQ Press College, 2010), Richards Heuer and Randolph Pherson define a SAT as,

> a step-by-step process that externalizes the analyst's thinking in a manner that makes it readily apparent to others, thereby enabling it to be reviewed, discussed, and critiqued piece by piece or step by step.

Based on some historic uses, one can go further to suggest that it is a fused operations and intelligence product that enables operational aviation threat mitigation measures (such as employment of escorts or certain tactical flight profiles) in assessed air threat environments. Beyond this, the air intelligence community needs to get creative and come up with a more comprehensive answer.

The Need for ATZMs

The ATZM is a critical tool for air intelligence for a number of reasons. The first is that the core of our ACE is a highly capable airframe designed from the ground up to mitigate the threat and break the kill chain. While it does this in a variety of ways, one of the most effective (although least exciting) methods is simply having the range and speed to avoid the threat altogether by flying an indirect route around it. MV-22Bs, for instance, give the MAGTF commander unprecedented ability to range objectives farther afield, faster, with less exposure to the threat than with conventional rotary-wing assets (threat avoidance navigation is of course a tactic available to all aircraft but is most obviously demonstrated by the MV-22B given its unique capabilities

and recent employment). The threat component of this, however, is only achieved if the intelligence section can estimate where those threat areas are. ATZMs are one of the most comprehensive ways to depict that estimation, especially across the vast area of operations the MV-22B enables the MAGTF commander to operate in.

When time does not permit detailed objective area analysis (e.g., within the Rapid Response Planning Process cycle or an immediate launch mission like TRAP), ATZMs can also help with threat mitigation by facilitating the threat-aware placement of initial points, battle positions, holding areas, selection of routing control points (sometimes called spider points), and other control measures.

ATZMs can also facilitate this process during deliberate planning. When building objective area diagrams or routing slides, the neat, uniform, 1-km grid squares of the map can often lull planners into placing these control measures wherever they may be geometrically convenient. When he lacks a geographically correlated threat assessment (i.e., visually depicting both threat areas and known/assessed threats on the map), there is no reason for a planner not to draw straight lines between points A and B. But by overlaying that uniform grid with air threat zone assessments in the form of an ATZM, such control measures can often be repositioned in lower threat areas: hostile towns can be avoided; terrain masked avenues of approach become readily apparent; known early warning networks can be skirted outside of detection range; in short, the intelligence section provides a comprehensive intelligence assessment in the most readily usable form for the aviators planning the mission.

Furthermore, ATZMs facilitate the prioritization of limited assets for the commander. In the scenario at the beginning of this article, the MAGTF has 12 to 13 escort/CAS assets (3 UH-1Ys, 3 to 4 AH-1W/Zs, and 6 AV-8Bs) to escort 28 assault support aircraft (24 MV-22Bs and 4 CH-53Es). Visually depicting to the commander the higher threat areas that assault support missions are flying into or through allows him to prioritize and time those limited escort assets to provide ample threat mitigation measures and maintain a high tempo of assault support missions (some of which may not require escort). This becomes especially important when matching the range and time on station of fixed- and rotary-wing MAGTF assets with tiltrotors.

Traditionally, ATZMs have only applied to established battlespaces like Afghanistan and Iraq. Within the new normal, MAGTFs already find themselves supporting more Phase 0 (shape) and Phase I (deter) operations. These are less likely to provide the time and large MAGTF footprint that have facilitated ATZM development in the past. As the Marine Corps shifts its attention from long-term counterinsurgency to these crisis response missions, ACE commanders and planners will need ATZMs, which can be created faster, by fewer Marines, and for larger battlespaces which are not as well understood.

And frankly, as a component in T&R events, if we expect our intelligence Marines to train to these events, we must provide a standard for them to meet.

A Starting Point

A recommended definition for an ATZM might be:

> an all-source product that supports a Commander's air threat mitigation efforts by graphically identifying a spectrum of air threat zones within an area of interest, in an identified operational environment, and utilizing defined metrics.

From historical examples and the available T&R events, it appears that ATZMs have six fundamental characteristics.

First, they define distinct threat zones (e.g., one area is "low" and another is "medium"). While units may use a variety of scales or terms for these zones, the distinct areas should identify appreciably different threats (i.e., the enemy's capability and/or intent differ in an identifiable way). Such a threat matrix enables the commander to clearly see where the assessed threat changes from one level to another and, therefore, when and where he must implement different mitigation measures.

Second, ATZMs use metrics. Historically, the quality of metrics has varied, but as a SAT, there must be a repeatable process for assessing an area as one level of threat vice another. These metrics may include the presence of certain weapons systems or a certain number of surface-to-air fires (SAFIRE) within a given timeframe. The salient point is that the intelligence section should be able to definitively say, "This area is assessed to be medium threat because of these specific threat values."

Third, it must predictively support threat mitigation criteria for different type/model/series aircraft. This requires collaboration with the operations section to identify ways that the threat can be mitigated by certain tactics, equipment, or flight profiles by different airframes. This characteristic also implies that the threat must be evaluated in terms of the effects it has on friendly operations (e.g., requiring escorts to ensure aviation operations or limiting ability to provide immediate CAS support because of entrenched defenses) so that the operations section and commander can match appropriate mitigation measures to maintain the ACE's ability to continue the mission.

Fourth, it must evaluate the air-specific threat. While the threat to ground forces can become a threat to air assets with the simple elevation of an AK-47 into the sky, a high threat to ground forces in the form of improvised explosive devices or anti-convoy operations does not necessarily translate into a similar threat to air operations. And, in order to be able to support mitigation efforts for future Sorties, ATZMs require a methodology for adding new assessments and reporting as well as removing outdated assessments and reporting.

Fifth, an ATZM is a macro threat estimate, meant to facilitate flight routing to an objective by assessing the threat to air operations across a sprawling battlespace; however, it is not a substitute for detailed objective area analysis and threat assessment for specific missions. And indeed, the two may conflict. A bed-down location for a high value in-

dividual wishing to remain undetected may present little threat to an aircraft passing by at altitude whereas a raid to capture the same individual may result in a coordinated defense and deliberate targeting of orbiting or landing aircraft.

Sixth, it evaluates a given area of operations in a specified operational environment. Like any intelligence product, ATZMs must be tailored to the mission and the unit's needs. A "high threat" zone in an Afghanistan ATZM (where the air threat is largely limited to small arms and heavy machine guns) will not have the same definition as a high threat zone for a theater of operations littered with surface-to-air missiles, air defense artillery, and a highly proficient enemy.

One of the biggest perceived obstacles to creating and maintaining ATZMs is the manpower traditionally associated with these products. In 2013, 2nd MAW (Forward) dedicated three intelligence Marines to compiling data and updating the ATZM. In 2015, the U.S. Army's 34th Combat Aviation Brigade (34th CAB) used three to five intelligence analysts working full time on their version of an ATZM (Army aviation currently has the same problem with a lack of documentation and collected best practices with ATZMs, although units like 34th CAB are working on rectifying the problem). This cost is simply too high for a squadron-sized ACE intelligence section that might be as small as three to four intelligence Marines.

While this problem can be solved by generating less detailed ATZMs when manpower is a limiting factor, it can also be remedied by working with the MAGTF command element's topographic section and their geospatial intelligence and map-making software, ArcGIS. ArcGIS enables computer-based analysis of geographically-correlated data and the creation of products that graphically depict information and analysis to aid in operational decision making. Using this tool, geographically-correlated components of the air threat can be input into the software, and a type of heat map can be generated. Information, such as SAFIRE events, assessed enemy locations, population density, lines of communication, etc., is all readily available in geo-correlated form (usually in a Google Earth KMZ file) and can be assigned weighted threat values and factored together. While this requires some detailed work up front to select the appropriate threat values, it makes keeping an ATZM up to date potentially as simple as inputting the most recent data files and re-running the computer model. In this way, within an hour or two of computer processing time, an ATZM of arbitrary size can be updated by a single Marine.

Limitations of the ATZM

A survey of the Marine Corps Center for Lessons Learned (MCCLL) interview archives highlights a number of concerns with ATZMs, but none of these need be serious.

ATZMs still retain a level of subjectivity. What does a "red" zone truly mean? Why is this area "high" threat and that area "medium" threat? Is an area with 5 SAFIREs within 10 miles in 30 days really a substantively different threat than an area with 4 SAFIREs? But this is true of any intelligence assessment. It is not a statement of fact but rather, in the words of Cynthia Grabo, "a hypothesis whose validity can neither be confirmed nor refuted until it is too late." Using defined metrics and effect-based threat definitions can go a long way to mitigate subjectivity. Furthermore, it is ultimately the S-2's responsibility to understand and assess the threat throughout the battlespace. An ATZM is little more than a graphical depiction of this assessment and nothing the S-2 isn't *already* doing.

It is also not uncommon for an ATZM to be perceived as restrictive, especially by certain type/model/series. This is most common when ATZMs are formally tied to mitigation measures through unit flight standard operating procedures (such as requiring escorts when flying in certain threat levels). However, these are the mitigation measures the commander has put in place because of the threat not because of the tool that communicates that threat to him. And viewed another way, such requirements are empowering: enabling assault support aircraft to receive the escort support dictated by the threat environment they are tasked to fly into without having to fight for those assets to be allocated.

Conclusion

ATZMs are not new. Indeed, that is the point: they have been around for years yet remain ill defined and sometimes misunderstood. But with large-scale operations in Iraq and Afghanistan quickly fading into memory and with a new normal of smaller, more expeditionary missions, this is the time for the air intelligence community to capture the best practices that have been developed over the last decade and explore how to employ those lessons in the new operational environments Marine aviation finds itself in.

To do this, ATZMs should be taught at Air Intelligence Officers Course, Weapons and Tactics Instructor Course, and Expeditionary Warfare Intelligence Course. The tool and concept should continue to be refined, adapted to wider mission sets, and incorporated into some form of air intelligence doctrine (which as yet does not exist). ATZMs should be used in training environments ranging from unit deployments for training, large MAGTF training exercises like TALONEX, and MEU and SPMAGTF pre-deployment training programs. Marine air intelligence should incorporate many of the effective practices of the Army's version of ATZMs and a central repository of ATZMs should be retained somewhere like the Marine Corps Intelligence Activity to provide the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISR-E) historic examples of ATZMs, giving both aviators and intelligence Marines a library of products that have worked in various theaters and situations in the past, potentially with feedback or after-actions like MCCLL interviews.

With work, ATZMs can gain much wider use, their concepts and fundamental principles can be refined, and the community can develop best practices that result in a better product, providing enhanced intelligence support to aviation operations in the current and future operational environment.