

# **Presentations**



## **Naval Air Operation: The Development of Aircraft Carrier Operations during the Second World War**

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Aircraft were extensively employed during the First World War and navies also used them to support naval operations. Their role as the “eyes” for battleship-oriented fleets had been clearly recognized at a relatively early stage. After the First World War, as aviation technology advanced, its striking power attracted increasing attention during the interwar years. Once the Second World War started, aircraft replaced battleships which until then were the capital ships, as the leading player in naval warfare.

However, it took considerable time for aircraft, an entirely new platform for the navy, to integrate into the force structure of each navy, and the ways it was accepted varied significantly by country. It was the Japanese, U.S. and British Navies that succeeded in introducing aircraft carriers, which enabled full-fledged operations of air power, particularly operations of aircraft in vast oceans. The British Navy first operated aircraft carriers in actual fighting in the First World War, taking an overwhelming advantage over Japan and the United States in terms of both quality and quantity. At the outset of the Second World War, however, Britain possessed only obsolete carriers and aircraft, and fell far behind the two countries. Consequently, it was the Japanese and U.S. Navies that were able to accomplish the full-scale operation of air power over the ocean during the Second World War.

Presumably, these gaps derived largely from differences in the strategic environments, hypothetical adversaries, operational thoughts and organizations of their respective navies among Japan, Britain and the United States. This paper attempts to make an analysis of the joint air-sea operations that matured during the Second World War by comparing the three countries in view of the strategic environment, operational thought and organization.

The building of aircraft carriers during the interwar period attracted attention as the model case of “Revolution in Military Affairs (RMA),” in which military effectiveness would improve spectacularly with the introduction of innovative military technologies and/or doctrines. While there are excellent previous studies, including books by Williamson Murray and others, comparative studies between the United States and Britain make up the bulk of them due in part to constraints on available documents.<sup>1</sup> Thus, this article will focus on the Japanese Navy, on which there are relatively few previous studies from the standpoint of joint

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<sup>1</sup> For example, Geoffrey Till, “Adopting the Aircraft Carrier: The British, American and Japanese Case Studies,” in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Allan R. Millet (Cambridge: Cambridge University Press, 1994); Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, *American & British Aircraft Carrier Development, 1919-1941* (Annapolis: Naval Institute Press, 1999).

operations in particular.

In this article, however, joint operations do not mean the employment of different services. While Britain had the Royal Air Force as an independent service, neither Japan nor the United States had an independent air force. Furthermore, as for Japan, the Army and the Navy did not cooperate closely on joint operations. Unlike the United States, there existed no marine force specializing in amphibious operations as an independent service. Therefore, this article examines the development of aircraft carriers as an example of the operations of aircraft and surface ships, i.e., different branches within the navy, or the combined arms, which would later form the independent military services.

### **The Strategic Environment**

New technologies are the driving force of RMA that receive the most attention, but the competitive strategic environment is also widely recognized as another major driving force. For example, Kenneth Waltz, an eminent scholar on international politics and a founder of neorealism, pointed out, “Contending states imitate the military innovations contrived by the country of greatest capability and ingenuity. So the weapons of the major contenders, and even their strategies, begin to look much the same over the world.”<sup>2</sup> In other words, states are believed to imitate military innovations of other countries for their survival, and as a consequence, tend to possess similar armaments.

Stephen Rosen, a leading expert on RMA, also recognizes that changes in the international environment, while an external element for the military, do provide an opportunity for innovation.<sup>3</sup> As a result, as Elliot Cohen points out, military forces around the world came to possess similar weapons for much of the 20th century.<sup>4</sup>

It seems only natural that states that are surrounded by oceans take interest in aircraft carriers. However, the same maritime states differ in the ways and extent they imitate other countries’ innovations, and the ways they accept those innovations are largely affected by the strategic environment at the time. In the same manner, the Japanese, British and U.S. Navies significantly differed in the nature and operations of aircraft carriers during the Second World War.

Geoffrey Till argues that strategic environment had the most significant impact on the development of naval air power during the interwar period. First, Britain saw hypothetical adversaries in Germany and Italy as well as Japan, and expected to conduct operations not only in the Indian Ocean and the Pacific but also in the Mediterranean Sea. Furthermore, as shown by air raids on London in the First World War, Britain was exposed to an aerial threat from the Continent and could not invest its limited defense resources only in naval air power. This strategic environment, according to Till, can explain, in large part, why Britain lagged

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<sup>2</sup> Kenneth Waltz, *Theory of International Politics* (New York: McGraw-Hill, 1979), p. 127.

<sup>3</sup> Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991), p. 57.

<sup>4</sup> Eliot Cohen, “Technology and Warfare,” *Strategy in the Contemporary World: An Introduction to Strategic Studies*, ed. John Baylis, James Wirtz, Eliot Cohen, and Colin S. Gray (Oxford: Oxford University Press, 2002), p. 245.

behind Japan and the United States in naval air power.<sup>5</sup>

Disarmament in the interwar years also had a negative impact on Britain. The 1921 Washington Treaty on the Limitation of Naval Armament set the ratios of capital ships among major countries, including aircraft carriers. At the time of the conclusion of the treaty, Japan and the United States did not have large aircraft carriers, and were allowed to convert battleships and battle cruisers into carriers. By contrast, Britain, which had operated aircraft carriers since the First World War, had to be content with those out-of-date carriers for the good part of the interwar years. Thus, disarmament in the interwar period presumably worked negatively for Britain's construction of aircraft carriers as it could not build new large carriers and experiment with them.

The United States regarded Japan as a potential enemy from early in the interwar period and expected the South Pacific to become the main battlefield. Unlike Japan, however, the nearest front-line base for the United States was in Hawaii and the United States was prohibited from boosting defenses of Guam under the Washington Treaty. Thus, the United States had no choice but to employ aircraft carriers to use air power in a decisive fleet engagement in the Pacific. Consequently, aircraft carriers were widely recognized as the means of power projection for the U.S. Navy. Furthermore, as Till points out, because the United States had few islands in the Pacific that could be used as bases, it was necessary for the country to acquire Pacific islands and build bases expeditiously.<sup>6</sup> Thus, it became necessary to occupy islands in the Pacific to use land-based aircraft, which required landing operations. That led to the development of Marine Corps specializing in landing operations, along with the generation of landing operations doctrines. Aircraft carriers were indispensable to the use of air power, both in fleet battles and in landing operations in the Pacific.

Japan also followed the strategy of intercepting U.S. fleets in the South Pacific since the interwar period, and aircraft carriers served as the platform to play the role of the eyes of its fleets and to provide air defense. However, as the offensive capabilities of carrier-based aircraft increased, antiship strikes came to be regarded as one of the central tasks of aircraft carriers, with their status heightened as a means of tapering the fighting capabilities of enemy fleets.

For Japan, particular reference should be made to the presence of the South Pacific Islands. The Japanese Navy attached importance to bases on those islands in the interception of U.S. fleets. Initially, the Japanese Navy assumed the deployment of land-based air units to the bases to attack enemy aircraft carriers, together with the strength of Japanese carriers. To that end, Japan developed the long-range land-based bomber with a combat radius of 650 miles and deployed many of the bombers by the opening of the war. The Japanese Navy's bombers, including Type 96 attack bomber and Type 1 attack bomber, were capable of not only

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<sup>5</sup> Geoffrey Till, *Seapower: A Guide for the Twenty-First Century* (London: Frank Cass, 2004), p. 140.

<sup>6</sup> Ibid., p. 140.

level bombing but also torpedoing.<sup>7</sup> Consequently, Japan adopted the policy of developing air bases on the islands in the South Pacific and deploying land-based aircraft and seaplanes to have them actively participate in decisive fleet battles.<sup>8</sup>

This strategy demonstrated its validity as attacks by the Type 96 attack bomber and Type 1 attack bomber sank the British battleship *Prince of Wales* and battle cruiser *Repulse* on the Malay front, though not on the Pacific front. In the decisive fleet battles with the United States, however, aircraft carriers, for the Japanese Navy, were one of the means to intercept the U.S. fleets, along with land-based aircraft and submarines. Therefore, the competitive international environment alone could not spur the development of aircraft carriers, and it is necessary to examine other driving forces.

## Organization

RMA cannot be achieved by a competitive international environment alone. Some argue that RMA can be achieved only when new technologies are systematically accepted based on strategic demands. According to the definition of Andrew Krepinevich, RMA is “what occurs when the application of new technologies into a significant number of military systems with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict.”<sup>9</sup> In terms of organization as well, there were significant differences among the Japanese, British and U.S. Navies.

First, Britain became keenly aware of the importance of aircraft in the First World War and turned the Air Force into an independent service in 1918. As a result, air squadrons possessed by the Navy were absorbed by the Air Force, and pilots were transferred to the Air Force. In 1924, the Fleet Air Arm was reestablished but only to be subject to “dual control,” in which the Air Force oversaw the designing and production of carrier-based aircraft. Consequently, the Navy lost interest in naval aviation, and even after dual control came to an end, considerable time was required to reorganize the Fleet Air Arm.<sup>10</sup>

By contrast, Allan Millet argues that Japan and the United States introduced RMA successfully, also in terms of organization.<sup>11</sup> For example, the U.S. Navy momentum for an independent Air Force mounted in the United States as well after the First World War. In particular, Brigadier General Billy Mitchell vociferously called for the independence of air squadrons of the U.S. Navy. However, the Bureau of Aeronautics of the U.S. Navy, led by Rear

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<sup>7</sup> *Ginga*, the land-based bomber on which development work started in 1940, was the twin-engine plane that could carry 800-kilogram bombs or torpedoes and also had the capability to conduct even dive-bombing attacks. Nihon Kaigun Koukushi Hensan Inkai (Japanese Naval Aviation History Compilation Committee), ed., *Nihon kaigun kokushi* [The history of Japanese naval aviation], Vol. 3 (Tokyo: Jiji Tsushinsha, 1969), pp. 470-472.

<sup>8</sup> Boeicho, Boei Kenkyusho, Senshishitsu (War History Office, National Institute for Defense Studies, Japan Defense Agency, hereafter “NIDS”), *Senshi sosho: Kaigun koku gaishi* [War history series: A historical overview of Japanese naval aviation], (Tokyo: Asagumo Shimbunsha, 1976), p. 136.

<sup>9</sup> Andrew Krepinevich, “Cavalry to Computer,” *National Interest*, no. 37 (Fall 1994), p. 30.

<sup>10</sup> Till, “Adopting the Aircraft Carrier,” pp. 207-209.

<sup>11</sup> Allan R. Millet, “Patterns of Military Innovation in the Interwar Period,” in *Military Innovation in the Interwar Period*, ed. Murray and Millet, pp. 355-356.

Admiral William Moffett, strongly objected to the idea. Moffett relied on his own political savvy and mounted lobbying campaigns to dissuade the U.S. President and other high-level civil politicians, successfully rejecting the calls for an independent Air Force.

Furthermore, in order to promote RMA, in addition to the development of new military technologies, it is necessary to systematically accept them and also reflect them in doctrines. It has been argued that the U.S. Navy encouraged the development of aircraft carriers under the so-called “Naval Trinity” of the Navy’s Bureau of Aeronautics, the Naval War College that studies new operations of aircraft carriers, and operational units that actually conduct their experiments and exercises.<sup>12</sup> In this sense, the organizational arrangements had been in place for naval air squadrons, which had already established their organizational status, to move ahead with RMA at their own initiative. In this regard, Williamson Murray and Barry Watts point out that RMA of the U.S. Navy is a successful case that particularly relied on organizational interactions and processes.<sup>13</sup>

It has been pointed out that Japan, though not to the same extent as the United States, found itself in a better situation than Britain.<sup>14</sup> The same can be said on calls for an independent air force. In Japan, like Britain, under the influence of developments in Western countries, the military was not entirely free from arguments for an independent Air Force. For example, in 1920, in the wake of the strong influence from the First World War, at the request of the Army, *rikukaigun koku iinkai* (the Joint Army-Navy Aviation Committee) was established for talks between the Army and the Navy on the integration of air power. In a committee report, the two services agreed that the integration of air force was premature, thus postponed the establishment of an independent Air Force. The issue of an independent Air Force was rekindled when Germany declared its rearmament with an independent Air Force. However, the Navy again resisted the idea, and an independent Air Force was thus not formed.

The first reason for this outcome is the absence of intervention by civilian politicians or the Diet to promote an independent Air Force, as Japan lacked the kind of civilian control that existed in Britain and the United States. Like other bureaucratic organizations, military forces are known to be conservative organizations, making it extremely difficult to change from within. Therefore, Barry Posen points out that civilian intervention is one of the prerequisites for the accomplishment of RMA in peacetime.<sup>15</sup> However, the post of the Navy Minister was always occupied by a uniformed officer, and there were very few civilian personnel serving in the Navy Ministry. Without an effective civilian control system, civilian influence was very limited in the Navy’s policymaking. Furthermore, while the Imperial Diet might have put discussions of an independent Air Force on the agenda, the Navy was able to easily brush aside such demands, leaving the Navy’s policy unaffected. Thus, unlike the United States and

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<sup>12</sup> Andrew Krepinevich, “Transforming to Victory: The US Navy, Carrier Aviation, and Preparing for War in the Pacific,” in *The Fog of Peace and War Planning: Military Strategic Planning under Uncertainty*, ed. Talbot C. Imlay and Monica Duffy Toft (London: Routledge, 2006), pp. 183-187.

<sup>13</sup> Barry Watts and Williamson Murray, “Military Innovation in Peacetime,” in *Military Innovation in the Interwar Period*, ed. Murray and Millet, p. 384.

<sup>14</sup> Till, “Adopting the Aircraft Carrier,” p. 211.

<sup>15</sup> Barry R. Posen, *Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca: Cornell University Press, 1984), pp. 225-226.

Britain, there was very little political pressure for an independent Air Force in Japan.

Secondly, as the Navy's aviation surpassed that of the Army in both quality and quantity, the Navy was able to turn down the Army's demands relatively easily. Since there were few other instances where the Navy's air force surpassed that of the Army in terms of both quality and quantity, A.D. Harvey points out that the Japanese Navy's air force was very unique.<sup>16</sup> The Navy believed that the Army, which had fallen behind in aviation, was maneuvering to catch up at a stroke by absorbing the Navy's air force.

Another major reason behind the Navy's resistance was a significant difference in performance required of aircraft between the Navy and the Army, which resulted from the fact that the Army's main battlefields were on the continental front and the Navy's main theater of war was on the Pacific Ocean.<sup>17</sup> There was no civilian intervention to resolve the tug of war between the two military services, and as a consequence, contentions of the Army and the Navy remained as far apart as ever, making it possible to keep naval aviation with the Navy.

Furthermore, in terms of the Navy's organization, the fact that the Naval Aviation Department had been established in 1927 as an organization to supervise naval aviation also had a major influence. Till notes that the development of carrier aviation following the establishment of the Naval Aviation Department supports the view that the bureaucratic and administrative environments exert a decisive impact on the RMA process.<sup>18</sup>

In addition, as with the United States, there existed the "Naval Trinity" cooperative relationship, with the Naval Staff College conducting research on the operations of aircraft carriers, the Yokosuka Naval Air Group conducting field experiments and training in an integrated manner and these two organizations maintaining close cooperation. Furthermore, the Japanese Navy established the Yokosuka Naval Air Technical Arsenal specializing in research and development of aviation-related technologies, thereby creating a better environment to develop aircraft suited to naval operations than in Britain with a long-divisive aviation area.

In terms of the operations of aircraft carriers, after constructing *Hosho*, which was planned as an aircraft carrier from the outset, and commissioning *Akagi*, built as a large fleet carrier as a result of the conclusion of the Washington Treaty, the Japanese Navy deployed destroyers around them and organized the First Carrier Division in 1928. The organization of the carrier division made it possible to conduct routine training along with battleship-centered fleets, allowing trials and experimentations with the operations of aircraft carriers in preparation for decisive fleet battles.

The Navy also conducted "*sengi*" combat training, which was used for aircraft as well. For *sengi* combat training, specified naval ships and task forces were chosen for focused research on specific tactics and operations, and the research results were shared extensively with other units. *Sengi* training for carrier-based aircraft included torpedoing, level-bombing, dive-bombing, shooting, reconnaissance and antisubmarine warfare, in order to advance

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<sup>16</sup> A. D. Harvey, "Army Air Force and Navy Air Force: Japanese Aviation and the Opening Phase of the War in the Far East," *War in History* 6, no. 2 (April 1999), p. 175.

<sup>17</sup> NIDS, *Kaigun koku gaishi*, p. 73.

<sup>18</sup> Till, "Adopting the Aircraft Carrier," p. 213.

research on new tactics and improve skills. In other words, the Japanese Navy could conduct experiments on the collaboration between aircraft carriers and other surface ships, including battleships, and also on aircraft tactics through these organizational arrangements.

Meanwhile, what differed most significantly between Japan and the United States was the training of aviation personnel. It was necessary to train aviators expeditiously in order to expand naval aviation, which was a totally new combat arm to the Navy. As aircraft performance was poor in the initial stage and there were numerous fatal accidents during training, the attrition rate of pilots was high. Therefore, it was also necessary to gather a large number of junior officers in a short period of time to staff newly-expanding naval air units.

However, the change of generation takes place over time within military organizations where top-down orders do not necessarily bring about rapid changes. Particularly because the interwar period was simultaneously a period of disarmament and it was difficult to expand the overall size of personnel, naval aviation had to vie with other branches for the limited manpower available. Thus, naval aviation faced the very high hurdle in expanding themselves organizationally. In addressing this challenge, Rosen points out that Rear Admiral Moffett and the Bureau of Aeronautics of the U.S. Navy played an important role in creating new career paths to attract capable officers to the new combat arm.<sup>19</sup>

The U.S. Navy assigned officers the task of pilots, and as a result, officers accounted for around 90% of the pilots. The rapid increase in officers of naval aviation would significantly disrupt the existing personnel hierarchy of the Navy. For the sake of avoiding possible disruption, the U.S. Navy took advantage of the reserve system, which allowed it to have some flexibility in peacetime and secure necessary manpower in wartime. Also, in order to open the way for the promotion of pilots, the U.S. Navy, in accordance with the decision by the Marrow Board that examined aviation-related measures in 1925, took steps to appoint only pilots to the posts of air stations and aircraft carrier captains, thereby, succeeding in attracting capable young officers to the aviation field. Consequently, the political clout of naval aviation increased within the Navy, contributing to enhancing their status.

Despite the rise in the number of pilots, the number of senior officers assigned to naval aviation as commanding officers was limited. Therefore, the U.S. Navy had promising senior officers take observer training programs to teach them basic flying skills and airborne operations, and then transferred them to the aviation field. An officer who followed this career path is Joseph Reeves who greatly contributed to the discovery of the potential offensive capacity of aircraft carriers. Furthermore, as Rosen points out, if military forces are deemed to be “political groups” that constantly compete for budgets, personnel, authority and other organizational interests among various combat arms, the increase in the number of senior officers carrying a lot of weight, let alone the increase in the size of personnel, contributed to the expansion of naval aviation.<sup>20</sup>

Meanwhile, the Japanese Navy also faced similar problems, but took a different approach to them. The Japanese Navy, too, initially assigned officers to serve as pilots. However, as

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<sup>19</sup> Rosen, *Winning the Next War*, p. 77.

<sup>20</sup> Ibid., pp. 19-22.

demand for pilots increased further with the rapid expansion of air squadrons, it became difficult to meet all of the demand with officers. As the enrollment limit of the Naval Academy could not be raised, the Japanese Navy began to select competent noncommissioned officers to serve as pilots. One of the measures for this was the *yokaren* (Flight Reserve Enlisted Trainee) system, designed to foster junior commanding officers of air squadrons by selecting young people who graduated from junior-high schools and training them in flying skills. Under the *otsushu* (Class B) *yokaren* system launched in 1930, the Japanese Navy trained over 8,000 naval aviation personnel, including observers, by 1941.<sup>21</sup> As a result, contrary to the case of the U.S. Navy, noncommissioned officers accounted for 90% of the aviators of the Japanese Navy, with officer aviators kept to around 10%.

In addition, the Japanese Navy set the authorized number of pilots at 1.5-2 times the regular number of aircraft, which was not many even as an absolute number.<sup>22</sup> While official documents provide different figures for the total number of pilots, Mark Peattie estimates that at the time of the opening of the war, the United States had over 6,000 Navy and Marine Corps pilots combined, against about 3,500 pilots of the Japanese Navy.<sup>23</sup>

Furthermore, the Japanese Navy also considered the introduction of reserve pilots to make up for the shortage. However, the Navy as a whole did not give much thought to the idea, as it attached importance to the “one-game match” in coming decisive fleet battles. In particular, as a problem unique to the naval aviation field, it was extremely difficult to have reserve pilots maintain skills to fly aircraft with rapid technological advances, given the Japanese fiscal and industrial capacity at the time. This made the proactive use of reserve pilots infeasible. For example, the *kaigun yobi gakusei* (Navy Student Aviation Reserve) program, designed to recruit undergraduate students as reserve pilots, was launched in 1937. They were commissioned as soon as training courses were completed to make up for the shortage of active-duty officers. Thus, the system failed to meet the initial objective of augmenting the effective strength of wartime reserves.

In addition, carrier pilots were required to have particular skills for taking-off and landing planes on flying-off decks. Because of this requirement, only a select group of pilots was able to become carrier pilots. Thus, there was only a very limited number of crew members for carrier-based aircraft across the Japanese Navy, which had a hard time securing personnel even for the attack on Pearl Harbor. For the First and Second Carrier Divisions, the backbone of the First Air Fleet, seasoned pilots were extracted from aircraft carriers of the Third and Fourth Carrier Divisions not participating in the attack.<sup>24</sup> With the addition of the Fifth Carrier Division made up of aircraft carriers *Shokaku* and *Zuikaku*, it became necessary to pick out even instructors and seasoned aviators from training squadrons and air units belonging to

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<sup>21</sup> Nihon Kaigun Koukushi Hensan Iinkai, ed., *Nihon kaigun kokushi*, Vol. 2, p. 836.

<sup>22</sup> NIDS, *Kaigun koku gaishi*, pp. 466-467.

<sup>23</sup> Mark R. Peattie, *Sunburst: The Rise of Japanese Naval Air Power, 1909-1941* (Annapolis: Naval Institute Press, 2001), p. 332n13.

<sup>24</sup> NIDS, *Senshi sosho: Hawaii sakusen* [War history series: Hawaii operations] (Tokyo: Asagumo Shimbunsha, 1967), p. 153.

*Chinjufu* naval bases and *Keibifu* guard districts.<sup>25</sup> As seen in the absolute shortage of crews of aircraft carrier-borne aircraft for front-line deployment, the already low percentage of officers was even lower. Of the 720 identified pilots, observers and radio operators who participated in the Pearl Harbor attack, only 74 were commissioned officers.<sup>26</sup> This appears to have had a negative impact on enhancing the political and organizational representation of carrier forces within the Navy.

In addition, the number of senior officers assigned to rapidly expanding naval aviation was limited in the Japanese Navy as well. Thus, the Navy transferred senior officers from surface ships and other branches. But the major difference from the U.S. Navy was that there were no formal programs for these officers to acquire flying skills and airborne operations, and the Japanese Navy expected them to cultivate the skills required in naval aviation by gaining field experiences.<sup>27</sup> The Japanese Navy believed that competent commanders, with the assistance of staff and experts, could command aircraft carriers and air stations even without actual experiences in flying aircraft.<sup>28</sup>

As a result, of the 15 key commanding officers in the naval aviation field at the time of the opening of war, there were only three former pilots (Torao Kuwabara, Osamu Imamura and Shunichi Kira). Of the captains of 12 operational aircraft carriers, there were also only three former pilots (Tomeo Kaku, Kaoru Umetani and Ushie Sugimoto).<sup>29</sup> As is well known, Vice Admiral Chuichi Nagumo, commander of the First Air Fleet at the time of the Pearl Harbor attack, was not an aviator by training. Nagumo is said to have taken little initiative in the planning and guidance of air operations and made decisions as advised by his staff.<sup>30</sup> Moreover, throughout the Pacific War, only a handful of aviators held key posts within the Japanese Navy, let alone in the naval aviation field.<sup>31</sup> Since military forces are top-down organizations and it is up to commanding officers to make final decisions, the fact that commanders lacked experiences as aviators had a negative influence on conducting actual battles.<sup>32</sup> Thus, the organizational structure of naval aviation within the Japanese Navy influenced not only the development of aircraft carriers but also their operational effectiveness.

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<sup>25</sup> Ibid. As these units were responsible for the training of new aviators, they are said to have influenced the fostering of crew members.

<sup>26</sup> Ibid., pp. 596-616.

<sup>27</sup> Isoroku Yamamoto, Tomeo Kaku and several other top-ranking naval officers are said to have learned how to fly aircraft on their own while they were assigned to air squadrons. But such flying training was not provided systematically, and only a very small number of officers actually acquired flying skills.

<sup>28</sup> Nihon Kaigun Koukushi Hensan Iinkai, ed., *Nihon kaigun kokushi*, Vol. 1, p. 32.

<sup>29</sup> Teiji Nakamura, *Nichibei ryokaigun no teitoku ni manabu: Dainiji sekaitaisen ni okeru tousotsu no kyokun* [Learning from the admirals of the Japanese and U.S. Navies: Lessons of leadership during the Second World War], (Tokyo: Heijutsu Dokokai, 1988), pp. 480-481.

<sup>30</sup> Neither First Air Fleet Chief of Staff Ryunosuke Kusaka nor Senior Staff Officer Tamotsu Oishi provided little planning or guidance for air warfare. It is said that Air Staff Officer Minoru Genda, a former pilot, had his way most of the times. NIDS, *Senshi soshō: Middowei sakusen* [War history series: The Battle of Midway] (Tokyo: Asagumo Shimbunsha, 1971), pp. 159-160.

<sup>31</sup> For example, two former pilots, Takijiro Onishi and Misao Wada, were promoted as vice chief of the Navy General Staff and chief of the Naval Aviation Department, respectively, but only in 1945 when Japan's defeat in the war seemed almost certain. Nakamura, *Nichibei ryokaigun no teitoku ni manabu*, p. 29n3.

<sup>32</sup> Nihon Kaigun Koukushi Hensan Iinkai, ed., *Nihon kaigun kokushi*, Vol. 1, p. 32.

## Operational Thought

There is no doubt that throughout the interwar period, the Japanese, British and U.S. Navies gave much weight to the battleship-oriented force and considered decisive fleet battles as most important. Carrier-borne aircraft were regarded as indispensable for reconnaissance and gun-fire spotting for decisive fleet engagements. Air supremacy over own fleets was also considered critical to prevent the use of carrier-based aircraft by enemies. Therefore, aircraft carriers were expected to accompany fleets and play an auxiliary role in decisive fleet battles. However, as the performance of carrier-borne aircraft increased, attacks on auxiliary ships initially and then attacks on capital ships gradually came into sight. As Thomas Mahnken points out, the potential offensive capacity of aircraft carriers came to be realized as sophisticated carrier-based aircraft emerged in the latter half of the 1930s.<sup>33</sup>

The strategic environment for each of the Japanese, British and U.S. Navies affected their operational thought on aircraft carriers and also brought about differences in their carrier design. Britain needed to defend sea lanes linking its colonies across the world and the mother country and also to guard against threats from Germany and Italy in continental Europe as well as from Japan in the Far East. Therefore, Britain could not concentrate resources only into aircraft carriers and had to prepare itself for aerial threats against the homeland. Under such an environment, aircraft carriers were assumed to operate under the threat of land-based aircraft, and Britain built armored carriers as its unique type of carriers that could withstand attacks from such aircraft.

Consequently, British aircraft carriers had relatively small hangars and, in the absence of the idea of deck parking common for U.S. carriers, operated a smaller number of carrier-borne aircraft than Japanese or U.S. carriers did. In addition, the “dual control” with the Air Force resulted in the late arrival of high-performance carrier-borne aircraft, which in turn reduced the potential offensive capacity of aircraft carriers as a whole and presumably led to the lower rating of aircraft carriers.

Like Britain, Japanese aircraft carriers mounted carrier-based aircraft in hangars and parked them on flying-off decks. As such, they had a smaller number of carrier-borne aircraft than U.S. carriers of the same class. However, as Japan had a greater number of large aircraft carriers than Britain, and the Naval Aviation Department led efforts to aggressively develop carrier-based aircraft, Japanese carriers had greater offensive capabilities than their British counterparts. The smaller number of carrier-based aircraft posed no substantial problems because Japan could rely on land-based aircraft in case of decisive fleet battles in the South Pacific.

Finally, for the United States, aircraft carriers were the only means of projecting air power at sea, and as such, increasing the number of carrier-borne aircraft led to the enhancement of power projection. Therefore, the U.S. Navy repeatedly conducted experiments to enhance the offensive capabilities of aircraft carriers through fleet maneuvers. As a result, it developed the method of deck parking, thereby, increasing the number of operable carrier-based aircraft more

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<sup>33</sup> Thomas G. Mahnken, *Uncovering Ways of War: U.S. Intelligence and Foreign Military Innovation, 1918-1941* (Ithaca: Cornell University Press, 2002), p. 73.

than Japanese and British carriers of the same class. As this directly led to the enhancement of the striking capabilities of aircraft carriers, the U.S. Navy came to recognize their potential antiship strike capacity much sooner.

Like the U.S. Navy, the Japanese Navy was also aware of the potential strike capacity of aircraft carriers from early on. Initially, the Japanese Navy placed much emphasis on aerial torpedoing to support destroyers and cruisers. Subsequently, as the performance and payload of aircraft improved, the Navy turned its eyes to level and dive bombing. These achievements were vividly demonstrated in the Pearl Harbor attack. Following the loss of most fleet aircraft carriers in the Battle of Midway, however, the Japanese Navy was far from being able to make the most of the potential capacity of aircraft carriers.

The failure to fully exploit the potential of aircraft carriers can be explained by the fact that the Japanese Navy focused on carriers' offensive mission against ships and paid little attention to their other tasks. Aircraft carriers were to be used for the two primary objectives of securing air supremacy and conducting decisive fleet battles. In the Pacific War, however, aircraft carriers could be employed for a wide range of tasks, from supporting landing operations and bombing of onshore targets to convoy escorting and antisubmarine operations, not limited to fleet battles. It was the U.S. Navy that succeeded in giving full play to the war potential of aircraft carriers. For example, the Marine Corps continued with research on air support for landing operations throughout the interwar period, and as part of that research, also studied close air support and produced good results.<sup>34</sup>

In the Second Sino-Japanese War, Japan used aircraft carriers to support landing operations and thus had the experience of providing close air support for ground troops. In the early stage of the Pacific War, Japanese carrier-based aircraft attacked onshore targets. For example, in addition to attacks on the air force at the bases in Hawaii right after the opening of war, on their way back, carrier-borne aircraft from *Soryu* and *Hiryu* bombed Wake Island to support landing operations. In addition, on the Indian Ocean front, carrier-based aircraft mainly from the First Air Fleet bombed Colombo, Ceylon. Furthermore, in the Battle of Midway, aircraft launched from four aircraft carriers of the First Air Fleet conducted ground attacks. However, the Japanese Army, which was chiefly responsible for landing operations, did not see much need for naval air support. Its recognition of the joint air-sea operations was not necessarily high.<sup>35</sup>

During the Pacific War, the United States constructed a large number of low-speed, small escort carriers based on merchant vessels, and used them for the transportation of aircraft to front-line bases and convoy escort.<sup>36</sup> Japan also possessed low-speed aircraft carriers, which were converted from merchant ships. Some of them were used to escort convoys carrying resources from Southeast Asia. In stark contrast to the United States, however, the Japanese

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<sup>34</sup> Allan R. Millet, "Assault from the Sea: The Development of Amphibious Warfare between the Wars: The American, British, and Japanese Experiences," in *Military Innovation in the Interwar Period*, ed. Murray and Millet, pp. 85-87.

<sup>35</sup> Ibid., p. 85.

<sup>36</sup> The British Navy also operated a large number of escort carriers provided by the United States, and used them for convoy escort with carrier-based aircraft manufactured by the United States.

Navy, due to poor equipment and training for antisubmarine warfare, was unable to produce the intended results. Three out of four aircraft carriers deployed with the Marine Escort Headquarters in charge of convoy escort were sunk by enemy submarines.<sup>37</sup> In order to protect the transportation of resources from Southeast Asia, for example, it has been argued that since regions along the sea lanes were occupied by Japan, it would have been more advisable to use land-based aircraft deployed there for convoy escort rather than the use of aircraft carriers.<sup>38</sup> In this respect, the Japanese Navy did not recognize the real advantage of aircraft carriers as a platform for power projection.

## Conclusion

Geographically speaking, the Second World War saw battles in unprecedentedly large areas. For Japan and the United States that had the vast Pacific Ocean as the theater of war, aircraft carriers were indispensable to the employment of air power in naval operations. Consequently, in terms of the strategic environment, there was a major difference in incentives to build aircraft carriers between Britain, which faced threats from Germany and Italy, both continental states, and had colonies across the world, and Japan and the United States, which considered each other as rivals from early on and expected the Pacific Ocean to be the likeliest theater of war.

There also was a significant difference between Britain on the one hand, and Japan and the United States on the other, in terms of organization. For the purpose of supporting naval operations, aircraft carriers required close cooperation with other naval vessels. To that end, unique tactics and doctrines had to be devised for them. According to Robert Rubel, the most important characteristic of aircraft carrier-borne aircraft is that they function, in effect, as an extension of ship-borne weapons and sensors.<sup>39</sup> The same can be said of aircraft carriers at the time of the Second World War. In order to make good use of this characteristic of carrier-borne aircraft, it was more reasonable to keep air squadrons within the Navy than to detach them as an independent Air Force. This factor played no small part to the greater success of Japan and the United States in bringing out the offensive potential of aircraft carriers than Britain.

That said, a difference could be observed between Japan and the United States in terms of the extent of the use of aircraft carriers. Japan focused its attention on decisive fleet battles with U.S. fleets, and was in a position to use land-based aircraft due to the presence of Marshall Islands and the South Pacific Islands under its control. Therefore, the main tasks of Japanese aircraft carriers were to accompany main fleets and carry out preemptive attacks on enemy carriers and to provide air cover over Japanese fleets. Needless to say, it is evident from the Pearl Harbor attack that battleships also became the target of attacks in tandem with the

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<sup>37</sup> Nihon Kaigun Koukushi Hensan Iinkai, ed., *Nihon kaigun kokushi*, Vol. 1, p. 382.

<sup>38</sup> Ibid., pp. 382-383; NIDS, *Senshi sosho: Kaijo goei sen* [The maritime protection war] (Tokyo: Asagumo Shimbunsha, 1971), pp. 311-312. A detailed action report of aircraft carrier *Unyo* tasked with convoy escort pointed out that it would be disadvantageous to have aircraft carriers accompany slow-speed convoys.

<sup>39</sup> Robert C. Rubel, "A Theory of Naval Airpower," *Naval War College Review* 67, no. 3 (Summer 2014), p. 64.

enhanced performance of carrier-borne aircraft.

Aircraft carriers are the revolutionary weapons as the platform that made it possible to operate aircraft even in vast oceans, with their biggest contribution being the expansion of the naval power projection even farther. In this respect, the U.S. Navy was successful in exerting the potential capacity of aircraft carriers in following the strategy of approaching to mainland Japan while occupying the Pacific islands. For this, it is presumed that not only the strategic environment but also systematic preparations made by the U.S. Navy in the interwar period paid off.

The Japanese Navy, for its part, focused on the offensive defense plan to intercept U.S. fleets in the vicinity of the Mariana Islands, and it could also rely on its “shore-based” forces as Japan possessed forward bases on the islands in the South Pacific.<sup>40</sup> Consequently, the Japanese Navy considered aircraft carriers as an element of that strategy, and could not take full advantage of the potential capacity of aircraft carriers as the platform of power projection. Furthermore, in terms of organization, though the Japanese Navy took measures similar to those of the U.S. Navy, the Japanese Navy was slow to change staff assignment, particularly the positioning of officers favorable to the development of naval aviation.

Lastly, while the British Navy played second fiddle with respect to the operations of aircraft carriers during the Second World War, it does not necessarily mean that the British Navy itself had fundamental problems. For example, it has been noted that the British Navy developed such innovative equipment as the angled deck, steam catapult and optical mirror landing system ahead of the U.S. Navy after the Second World War.<sup>41</sup> Therefore, if it had been given appropriate resources and personnel, it is not hard to imagine that the British Navy would have had a capable carrier force matching that of the Japanese and U.S. Navies. However, the strategic environment Britain faced at the time did not allow the British Navy to allocate enough resources to fully exploit the potential of aircraft carriers.

Therefore, as indicated by previous studies, not only the strategic environment but also other factors influence the success and failure of RMA, and the same can be applied to the development of carrier operations during the interwar period. However, an accumulation of detailed case studies is necessary to clearly articulate what factors had the most significant impact under what conditions, requiring further research into the cases of Japanese, British and U.S. aircraft carriers.

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<sup>40</sup> Rubel argues that on top of the reconnaissance mission, land-based aircraft, in effect, play a role as an extension of coastal artillery and are designed to control ocean areas they can reach. Rubel, “A Theory of Naval Airpower,” p. 70.

<sup>41</sup> On this point, see Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, “The Development of the Angled-Deck Aircraft Carrier: Innovation and Adaptation,” *Naval War College Review* 64, no. 2 (Spring 2011).

