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AUG 25 2009

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Mr. John Greenewald, Jr.
[redacted]

Dear Mr. Greenewald

We have processed your Freedom of Information Act request (FOIA), for The Use of Weather Reconnaissance in Combat Operations, dated May 1981. All releasable information responsive to your request is enclosed.

There is no charge for processing this request since assessable fees are less than $25.00.

Sincerely

Gerald Yap

GERALD T. YAP, Major, USAF

Attachments
The Use of Weather Reconnaissance
In Combat Operations

AIR COMMAND AND STAFF COLLEGE

STUDENT RESEARCH REPORT

THE USE OF WEATHER RECONNAISSANCE

IN COMBAT OPERATIONS

1165-81

'insights into tomorrow'

STUDENT RESEARCH REPORT

REPORT NUMBER 1165-81

AUTHOR MAJOR JAMES E. HENSON, USAF

TITLE THE USE OF WEATHER RECONNAISSANCE IN COMBAT OPERATIONS

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SPONSOR USAF SIMPSON HISTORICAL RESEARCH CENTER

Submitted to the faculty in partial fulfillment of requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY (ATC)
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A historical analysis of the use of weather reconnaissance in support of combat operations. It traces the use of P-51s to provide weather reports over target areas in WW II, the use of WB-29s and RB-26s in Korea, and the use of WC-130s in a weather modification and interdiction role in Southeast Asia.

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EXECUTIVE SUMMARY

"INSIGHTS INTO TOMORROW"

REPORT NO: 1165-81

AUTHOR(S): MAJOR JAMES E. HENSON

TITLE: THE USE OF WEATHER RECONNAISSANCE IN COMBAT OPERATIONS

I. Purpose: To trace the use of weather reconnaissance in support of combat operations.

II. Data: A scouting force was developed during World War II to aid the strategic bombing effort over Germany. It consisted of P-51 aircraft flying ahead of the bombers to report if the target areas were open. They also reported the enroute weather to aid in the assembly of the bomber formations. During the Korean War, WB-29s and RB-26s were used to gather weather data over enemy territory. In the Vietnam conflict, WC-130s were used to provide weather data for use in tactical forecasts. Additionally, they were used to enhance the rainfall over infiltration routes along the Ho Chi Minh Trail to maintain poor traffic conditions.

III. Summary: Without air superiority, the weather reconnaissance aircraft could not have accomplished their mission. In future wars, we may not have the needed air superiority to allow weather reconnaissance to operate effectively. Weather satellites are able to provide this data and weather reconnaissance aircraft will be used as weather scouts for fighter deployments.

CHAPTER ONE

INTRODUCTION

Weather reconnaissance has played its greatest and most lasting role in support of weather forecasting operations. These operations have included hurricane and typhoon reconnaissance and long range weather infromation gathering over data-sparse areas of the ocean and polar regions. Weather reconnaissance has undoubtedly improved the forecasting accuracy in areas where it has been used and in the case of hurricane and typhoon reconnaissance has saved many thousands of lives and millions of dollars in property damages. But, one of the lesser known and least publicized aspects of weather reconnaissance is its employment in combat operations. Whether it was the P-51 in World War II, the B-26 or B-29 in Korea, or the WC-130 in Southeast Asia, the weather scouts have etched a place in history of air warfare.

PURPOSE

The purpose of this paper is to provide a historical perspective on the use of weather reconnaissance forces in direct support of combat operations during World War II, the Korean Conflict, and the war in Southeast Asia.

LIMITIATIONS

This paper will only cover those aspects of weather reconnaissance that were used as inputs in making the short range combat decisions such as whether or not to strike the primary target as opposed to the secondary or tertiary targets. Long range synoptic weather reconnaissance will not be covered.

ORGANIZATION

This paper is organized into five chapters. Chapter One will outline the purpose and limitations of the study. Chapter Two will trace the historical development of the Scouting Force in World War II. Chapter Three will cover the use of weather reconnaissance forces in the Korean Conflict. Chapter Four will highlight its use during the Vietnam Conflict. And, finally, Chapter Five will be a brief summary.

CHAPTER TWO

WEATHER RECONNAISSANCE IN WORLD WAR II

HISTORY OF DEVELOPMENT

The evolution of the P-51 Scouting Force in World War II can be traced back to the use of aircraft to reconnoiter the bomber assembly areas prior to the launch of the bomber force. This early effort was driven by the prevailing bad weather over England during the winter months which caused problems in assemblying the bombers after take-off. The solution was to assign one of the bombers to take-off early, climb to the planned assembly altitudes and report the existing weather conditions. (5:2)

The derivation of this concept of operations is unclear, but by the end of 1943 it was in use throughout the bombardment divisions of Eighth Air Force on an unofficial basis. On 9 January 1944, Eighth Air Force issued a directive standardizing pre-mission weather scouting procedures. This was done primarily because Eighth Air Force felt those radio reports forewarned the Germans of impending air operations against them. The directive included weather reporting instructions for operational missions and instructions for launching aircraft on non-operational days to transmit reports as if the rest of the bombers were going to launch. (13:1)

These pre-mission weather scouting efforts were effective in aiding in the launch and assembly of the bomber force, but the weather enroute to the target areas and over the targets themselves was still a problem. This problem was not solved until the long range fighter escort, the P-51 Mustang, arrived on the scene. But this did not stop the planners from trying to solve the problem of weather diversions over the target area.

The solution seems to have occured to at least two men at about the same time during the war. Colonel Budd J. Peaslee claims to have seen the need for advanced weather information while flying a mission against the aluminum plant at Heroya, Norway on 24 July 1943. He later wrote:

> ...while leading a Combat Wing, weather consisting of an undercast existed on the briefed

> course and bomb run to the very target, making it impossible for the bombardier to make a sighting, while from other directions the target was open. This required one of the first double runs on a heavily defended target in this theater and resulted in every ship in the formation suffering battle damage. Had adequate weather information been furnished, a successful first run could have been accomplished. (19:1)

Lieutenant Colonel John A. Brooks, III, who had completed a tour of combat in B-24s in August 1943 and was serving at Hq Eighth Air Force, advanced the idea of employing ex-bomber pilots flying fighter aircraft as weather scouts. (14:1) But it was not until the arrival of the P-51 that the idea of using the fighter escorts, which were then extending into the target areas, began to take shape.

Since the German fighter tactics consisted of mass frontal attacks, fighter protection was needed in front of the bomber formations. Thus the lead fighter group might have sufficient time to provide weather reports over the target area. (19:2) This idea was tried for several months but did not prove successful since the fighter pilots generally had no concept of the weather problems faced by the bomber formations and they were primarily concerned with locating and destroying enemy aircraft. (16:1)

Still, the concept of some sort of weather reconnaissance force ahead of the bombers had merit and the P-51 seemed to be the best choice since it had the range, speed, and was much less vulnerable than a bomber. Thus, the idea of a special weather scouting force, composed of P-51 Mustang fighters, came into existence. The idea had the approval of General LeMay and General Hodges, the commanders of the 3rd and 2nd Bombardment Divisions respectively, along with General Kepner of Eighth Fighter Command. In order to conduct the test of this new concept, men and equipment were authorized and the first scouting unit was established and attached to the 355th Fighter Group at Steeple Morden in mid July 1944. (19:2) The test was successful and on 6 September 1944 General Doolittle, the Eighth Air Force Commander, directed Eighth Fighter Command to designate fighter groups to be responsible for scouting functions for each bomabrdment division. (18:1)

ORGANIZATION AND TRAINING

One of the most novel aspects of this operation was the experience of the pilots selected to man the scouting force. Both

bomber pilots and fighter pilots were selected to fly the P-51 fighters of the scouting force. "There was a large number of bombardment pilots and co-pilots who desired to fly fighters; and, upon hearing of the formation of the scouting force, men with experiences ranging from co-pilots with one mission to command pilots with thirty missions applied." (14:1) Since proven flying ability and experience in all phases of bombing tactics were key qualifications, all bomber pilots chosen had completed tours as lead crew pilots or command pilots. The fighter pilots selected for the scouting force had from 75 to 100 combat hours. (14:2) In addition, each unit had a detachment commander, executive officer, a bomber navigator, and an intelligence officer.

The purpose of using both bomber pilots and fighter pilots was twofold. The bomber pilots were familiar with the weather factors that affected their operations and could translate this information into recommendations on new bomb run headings or alternate targets to be struck. While the bomber pilots of the scouting force were pin pointing targets, navigating and reporting the weather, the fighter pilots would be flying top cover against enemy fighters.

In order to get the ex-bomber pilots qualified as fighter pilots required an in-unit transition program. An AT-6 trainer aircraft was used for this purpose and all pilots were given from 20 to 25 hours dual instruction in this aircraft to reacquaint them with a single engine aircraft again. After this initial training was completed, the pilots were then indoctrinated in fighter tactics used in the P-51 Mustang. This initial training was completed in three to four weeks and was followed by instrument take-offs and instrument flying. (16:2-3)

TACTICS AND TECHNIQUES

In order to accomplish their mission, certain tactics and techniques evolved that took advantage of the mix of bomber and fighter pilots. Usually nine aircraft were sent on a scout mission, with the ninth aircraft being a spare which would turn back at the contential coast if not needed. The remaining aircraft would be composed of two flights of four each. The scout flight's leader and deputy leader would be ex-bomber pilots and their wing men were fighter pilots. This flight did all the weather reporting over the targets. The second flight or high flight would be composed of all fighter pilots or fighter pilots as leaders and bomber pilots as their wing men. This flight provided cover for the scout flight. (14:3)

Besides the target Scouting Force, the air divisions often used a Control Force and a Route Force. The Control Force, composed of one or more P-51s flown by bomber pilots, would rendezvous with the bombers along their assembly line. They would then monitor and aid the bombers in their assembly. The Route Force of two P-51 aircraft would depart the English Coast at the same altitude the bombers would be flying and would report the weather along the route to the target area. They would then return to base, refuel and then rendezvous with the bombers along the return route and report the weather to assist in the descent. The Route Force would also provide protection for stragglers or perform air-sea rescue spotting. (22:V)

Since the primary mission of the scouting force was to provide weather information to the bombers, every effort was made to avoid combat until that portion of the mission was completed. If the target had not been scouted, an effort would be made to drive off the enemy fighters and then continue the mission. If the weather scouting portion of the mission had been completed and the bombers were under attack, the fighter flight would lead the attack and the scout flight would provide top cover. (14:3)

The largest fighter engagement of any of the Scouting Forces occurred on 26 November 1944, when eight Scouting Force P-51s attacked 100 to 125 German aircraft which were attacking the bombers while their fighter escort was engaged. The after action report said:

> The Scouts had completed their primary function of reporting the weather at the target at Misburg, near Hanover, Germany, and were shepherding the last of the bombers across the target and observing the results when a large force of enemy aircraft, numbering about 200, engaged most of the fighter escort. Another force of enemy aircraft, consisting of three waves of 30 plus each and about 20 aircraft top cover, came through and attacked the last group of B-24s. As soon as they commenced their attack, the Scouting Force leader ordered the top flight to attack. However, the top flight was unable to reach the first wave in time to prevent them from attacking the last squadron and eight B-24s were shot down. The second wave of enemy aircraft was attacked by the top flight while the lead flight hit the third wave, both of the waves then breaking up. After attacking the third wave two aircraft chandelled up and attacked the top cover of 20 FW 190s.
>
> The fight lasted for 35 minutes, during which the Scouts destroyed 6, probably destroyed 1, and

damaged 3. There were no losses; one aircraft crash landed due to landing gear failure, and one suffered bullet holes in the tail. (16:3-4)

RESULTS

From 16 July 1944 to 21 April 1945 the Scouting Forces of the three air divisions flew 385 missions "during which the bombing results of the Eighth Air Force were improved by an appreciable amount." (15:1) (17:1) On one such mission on 18 April 1945, the Scouts held the bomber formation below 20,000 feet while enroute because of contrails and haze at the higher altitudes. They notified the Division and Wing Air Commanders that the formation would be able to climb to the bombing altitude at least 50 miles prior to the Initial Point (IP). Before the bombers reached the IP, they were diverted to the secondary targets which were in the only visual area within 100 miles. Besides producing good to excellent bombing results, it was done without the usual confusion caused by last minute changes in the assigned targets. (17:1)

From the Combat Bombardment Wings to Hq Eighth Air Force, the consensus remained the same--the Scouting Forces enabled many targets to be bombed and destroyed under weather conditions which would otherwise have resulted in the recall of the bombers.

CHAPTER THREE

WEATHER RECONNAISSANCE DURING THE KOREAN WAR

STRATEGIC WEATHER RECONNAISSANCE

The North Korean People's Army struck across the 38th parallel before dawn on 25 June 1950. The 512th Weather reconnaissance Squadron (512th) was ordered to curtail their regular Buzzard flights (synoptic reconnaissance tracks using the Buzzard call sign) to one a day and to keep one WB-29 aircraft per day ready to fly Far East Air Force (FEAF) support missions. Within 24 hours the 512th was flying daily Buzzard Special weather reconnaissance missions over Korea. (10:25) The squadron was already stationed in Japan at the outbreak of the war and had been flying daily synoptic weather tracks and typhoon reconnaissance in their area of responsiblity.

On 29 June 1950, the 2143d Air Weather Wing, the 512th's parent unit, was requested to determine the feasibility of having the 512th's WB-29s furnish target reconnaissance. The WB-29 was not the best aircraft to use for that type of work, but in view of the dire necessity of having weather information from the target areas, the Buzzard Special mission was modified to a zig-zag track over the battle area and renamed Buzzard King. In addition to visual target information, a weather summary was transmitted to the 8th Fighter Bomber Wing Staff Officer at Itazuke Air Base, Japan. This in-flight weather summary in many cases was the determining factor as to whether or not early morning fighter strikes would be made. (10:25-26)

On 13 July, a WB-29 flown by 1st Lieutenant Fred R. Spies with General O'Donnell aboard led the first B-29 strikes from Japan against North Korean installations. Four other missions were flown by the 512th as the lead and command aircraft for FEAF Bomber Command strikes. On each mission, the reconnaissance aircraft was required to remain in the immediate target area reporting weather conditions and observing bomb results. Lt Spies was later awarded the first oak leaf cluster to the Distinguished Flying Cross for the first and two other B-29 strikes. (2:144) (1:12)

In addition to the weather reconnaissance missions, the 512th (later redesignated the 56th Strategic Reconnaissance Squadron)

reported numerous sightings of surface vessels and movements of troops and vehicles. The intelligence data submitted by the WB-29 crews proved to be a valuable contribution to the theater intelligence program. (10:30)

The WB-29s of the 56th continued to fly weather reconnaissance missions over North Korea until 9 June 1952 when the Buzzard King track was moved south of the 38th parallel. In logging approximately 750 combat missions since 26 June 1950, the day after the Korean War began, the 512th/56th Weather Reconnaissance Squadron was the only Air Force unit to have an aircraft over enemy held territory every day since the beginning of the war. (8:1) (9:2,10)

TACTICAL WEATHER RECONNAISSANCE

Not long after tactical air operations began over North Korea, weather forecasters saw the need for a tactical weather reconnaissance unit. The use of weather reports from combat pilots was helpful, but inaccuracies and inconsistencies detracted from the value of the reports. (2:145) The idea of tactical weather reconnaissance had been discussed in the Far Eastern Air Forces as early as January 1950. The plan was again presented to FEAF staff officers at the outbreak of the Korean War, but was not implemented until 25 December 1950 when the Fifth Air Force authorized the activation of the 6166th Air Weather Reconnaissance Flight. (11:1)

The 6166th was composed of six RB-26 type aircraft and nine crews. Each crew consisted of a pilot, navigator, weather observer, and radio operator. The Flight Commander was a qualified weather forecaster as well as a pilot. The 6166th had a unique mixture of command and control. The 6166th was attached to the 12th Tactical Reconnaissance Squadron (Night Photo), a unit of the 67th Tactical Reconnaissance Wing. Technical weather supervision was the responsiblity of the 30th Weather Squadron Commander, who also had the responsiblity for the assignment of a rated officer as the Flight Commander and the assignment on TDY status of nine aerial weather observers to the flight crews. (7:30, Appendix 12)

The primary mission of the 6166th was the observation and reporting of weather conditions enroute to and over target areas of the Fifth Air Force and FEAF Bomber Command. Also, areas of suspected weather development to the east, west, and south of Korea were reconnoitered for the purpose of supplementing fixed synoptic stations. A secondary aspect of their mission was to observe and report the movement of enemy vehicles, aircraft, and shipping observed while flying weather reconnaissance. (11:5)

After a month of crew training at Komaki Air Base in Japan, operations began at Taegu, South Korea on the night of 7 February 1951. Throughout February, the unit continued to improve their operational effectiveness. Weather codes were modified and the positions of the crew members in the aircraft were changed. The weather observers were moved from the nose position to the seat next to the pilot and the navigator was moved to the nose compartment. The weather observer was more able to see the sky in making his observations while the navigator had more room to work and easier access to the Loran equipment. (11:2,4) By the end of June 1951, the unit had logged over 400 missions.

The routes flown by the 6166th were primarily designed as aids to tactical weather forecasting. These routes were either overwater routes off the coast of Korea or overland routes over the bombline. The routes varied from day to day depending on targets, the ground military situation, and the synoptic situation. (6:68) The weather reconnaissance tracks were also modified due to enemy threats. During the second week of February 1952, RB-26s flying the Charlie track over North Korea encountered heavy anti-aircraft fire near the Namchonjem area. After ten consecutive days of moderate, accurate fire, the Charlie track was changed to bypass the Namchonjem area and yet not materially affect the mission. (12:2)

Typical of the type of weather support provided by the 6166th Air Weather Reconnaissance Flight was that which was reflected in a letter of commendation from the Joint Operations Chiefs in March 1952. The letter commended the 6166th for the work done by the unit during the past months and in particular for a special voluntary mission flown by one of the 6166th's crews. On that mission the "entire Fifth Air Force, with the exception of the 6166th, was grounded by bad weather and it was, as a result of Lt William Myer's observations around the Sinanju area, that fighter-bombers were sent out, and what started as a "weathered in" day for the Fifth Air Force became one that was highly successful." (12:3)

CHAPTER FOUR

WEATHER RECONNAISSANCE DURING THE WAR IN SOUTHEAST ASIA

TACTICAL WEATHER RECONNAISSANCE

As the United States' air involvement in the Vietnam War increased, weather over the target frequently determined the success or failure of bombing missions, either through mission aborts or diversions to alternate targets. Starting on 1 September 1966 an attempt was made to obtain the needed weather data, especially over North Vietnam. The pilots of fighter aircraft flying escort for EC-121 reconniassance missions over the Gulf of Tonkin took weather observations of the target areas. But due to the lack of meteorological expertise of the personnel taking, compiling, and relaying the information from the EC-121 aircraft back to the 7th Air Force command post, the weather data was of marginal value. To alleviate this problem, a qualified weather reconnaissance officer was placed aboard the EC-121. (3:126-127)

Although the weather data provided by the EC-121 missions were valuable, the amount and scope was inadequate for the expanding air operations in Southeast Asia. By early 1967, the 7th Air Force wanted routine weather reconnaissance of "permissive" areas over South Vietnam and "standoff reconnaissance of 'non-permissive' areas ... and ... the collection of data needed to meet increasing sophisticated operational requirements." (3:128) This last clause was a cover for a top secret mission which was revealed only on a strict need-to-know basis. Permissive areas were defined as geographical areas where flight could be conducted at or above 18,000 feet without risk from anti-aircraft fire or surface-to-air missile threats and where fighter escort negated the threat of interception by enemy fighters.

WC-130s of the 54th Weather Reconnaissance Squadron, operating out of Udorn AB, Thailand conducted weather reconnaissance missions over permissive areas of Southeast Asia. These reconnaissance missions were flown to provide observations in air refueling areas and along principal strike routes leading to North Vietnam. Because of a lack of weather reports from the vicinity of eastern Laos and the Ho Chi Minh Trail, the WC-130s were directed to loiter in those regions to collect the needed intelligence information. They also flew over areas of the

Mekong River Delta where the knowledge of flood stages was critical to the success of allied operations in that area. (3:128) (4:352)

One of the more useful weather reconnaissance routes the WC-130s flew was along the Ho Chi Minh Trail to report the cloud cover over the trail network. These weather reports were passed directly to weather forecasters located at the various bases in Thailand. These weather reports were used in briefing the pilots of the forward air control and strike aircraft for interdiction missions along the Trail.

Irregardless of the value or usefulness of the weather reconnaissance data supplied to the tactical weather forecasters in Southeast Asia, the weather reconnaissance mission was just a cover for another, more interesting and unique facet of the Vietnam War -- weather modification.

OPERATION POP EYE

The purpose of Operation Pop Eye was to reduce the capability of the North Vietnamese to infiltrate supplies and equipment through the Laotian panhandle and the Plain Des Jarres of northern Laos. This was to be accomplished by artificial enhancement of the rainfall in those areas.

The weather over Southeast Asia is dominated by two principal seasons, the northeast monsoon and the southwest monsoon. The northeast monsoon is the dry season and rainfall is light or nonexistent. During the southwest monsoon, the rainfall is heavy and almost daily. As a result, unimproved roads become soaked and will not support vehicle traffic. Each year during the Vietnam War, the southwest monsoon wet season would significantly reduce the amount of supplies that flowed down the Ho Chi Minh Trail.

During the spring transition to the southwest monsoon, from April to mid-May, even isolated thundershowers could temporarily disrupt the logistic traffic. Most of the unimproved route surfaces were hard due to the dry weather conditions that prevailed in Laos during the northeast monsoon. When the isolated showers fell on that kind of a surface, the runoff was quick and complete. As the amount and frequency of rainfall increased during the period of May through June, the ground would soak up more and more moisture until it became saturated. When this condition was reached, the ground would remain soggy for extended periods with only moderate amounts of rain needed to maintain saturation. At this point, truck traffic became extremely difficult if not impossible. By the end of June, the southwest monsoon was well established and the roads would remain soggy. These conditions continued through September when the fall transition to the dry northeast monsoon would begin. (21:88-89)

Thus, the objective of Operation Pop Eye was to increase the rainfall in carefully selected target areas to further soften the road surfaces, cause landslides along roadways, and to wash out river crossings. By seeding the clouds with air dropped silver iodide flares, the intent was to extend the normal rainy season and to supplement the amount of natural rainfall to maintain poor traffic conditions.

The cloud seedings were accomplished by two types of aircraft -- a WC-130 and an RF-4. The WC-130 carried pods containing 104 seeding flare units each on both sides of the aircraft fuselage forward of the paratroop doors. The RF-4 carried a total of 104 seeding units in the photo cartridge compartments. The flares were dropped into the updrafts near the top of the clouds with a resulting increase in the amount of rainfall. Usually, the aircraft could seed an average of four or five clouds or cloud groups per day. (21:92)

The operation was conducted in two parts. Phase I was a planned and scientifically controlled experiment to serve as an operational evaluation of the concept. Phase II was the operational application of the concept over portions of Laos, North Vietnam and South Vietnam. (20:1)

Phase I was conducted during October 1966 in the Laos Panhandle. Fifty-six seedings were conducted and over 85 percent of the clouds tested reacted favorably. On 9 November 1966, the Commander in Chief, Pacific reported the test completed and concluded that cloud seeding to enhance rainfall over infiltration routes in Laos could be used as a valuable tactical weapon. (21:92)

Phase II, the operational phase, began on 20 March 1967 and was conducted each March thru November until 5 July 1972 when the operation was terminated. The selection of areas for seeding was based on the importance of the lines of communication and their susceptibility to interdiction by increased rainfall. Target priorities were assigned in terms of drainage basins instead of specific points because of the low probability that a cloud favorable for seeding would form over a specific point. But, priority was given to seeding clouds directly over roads, intersections, and river crossings within each basin. When reconnaissance indicated that objectives were attained in one area, the seedings were shifted to other areas. Seeding was not conducted during periods of tropical storms when large amounts of rainfall were falling naturally and accomplishing the military objectives. (21:93, 102)

During the six southwest monsoon seeding periods from 1967 to 1972, 2,602 sorties were flown and 47,409 seeding units were

expended. Although the results of the project could not be precisely measured due to the lack of sufficient ground stations to report the rainfall, the Defense Intelligence Agency estimated that rainfall was increased in limited areas up to 30 percent above that predicted for the existing conditions. Sensor recordings and other information following seeding indicated enemy difficulties from heavy rainfall. Subjectively it was believed that the rainfall was heavier than that which would have fallen normally and that it did contribute to slowing the flow of supplies into South Vietnam along the Ho Chi Minh Trail. (21:103)

CHAPTER FIVE

SUMMARY

The common thread that ran through each of the three conflicts and determined the success of weather reconnaissance operations was that of air superiority. Without air superiority, the weather reconnaissance units could not have accomplished their mission. During World War II, the P-51 aircraft were armed and used their own planes as fighter escort. But even with armed aircraft, the deep penetrations into Germany would have been ineffective without air superiority. Over Korea, the WB-29s were armed with only tail guns and flew most of their missions at night. The RB-26s were unarmed and flew their reconnaissance missions during the day. Even with control of the skies over Korea, there were instances of attacks by MIGs on the RB-26s. Certainly the WC-130s could not have loitered over portions of North Vietnam and Loas without our having almost total control of the air over Southeast Asia.

Will future wars have the needed air superiority to allow the weather reconnaissance aircraft to operate effectively? The answer depends on the enemy and where the war will be fought. Certainly in a war in Europe, we would not have enough control of the air to allow the WC-130s to operate over enemy territory without high losses. In fact, the employment doctrine for the weather reconnaissance WC-130s does not call for their use over non-permissive areas. Their use will be confined to synoptic weather reconnaissance over data-sparse areas and weather scout missions ahead of fighter deployments.

But, weather satellites with their high resolution, day or night capability will be able to effectively fill the void caused by not using weather reconnaissance aircraft. A selective mix of satellite imagery and weather reconnaissance data will provide improved weather forecasts for both the employment bases and over the target areas.

The future of weather reconnaissance will depend more on budgetary considerations than on improvements in satellite or other weather data gathering capabilities. So far, the hurricane and typhoon reconnaissance mission has more than likely saved the weather reconnaissance squadrons from the budgetary axe. The argument that weather reconnaissance is a "national resource" in regards to the hurricane reconnaissance mission will carry less and less weight as defense dollars become more scarce.

But until that time, weather reconnaissance will play a key role in the movement of fighter aircraft overseas and in providing weather information from data sparse areas.

BIBLIOGRAPHY

REFERENCES CITED

Official Documents

1. Air Weather Service 1937-1977 An Illustrated Chronology. Scott Air Force Base, Illinois: Military Airlift Command, July 1977.

2. History of Air Weather Service, 1 July - 31 Dec 1950. USAF Historical Research Center (HRC), Maxwell AFB, Alabama.

3. History of Air Weather Service, 1 July 1966 - 30 June 1967. USAF HRC, Maxwell AFB, Alabama. SECRET. Excluded from General Declassification Schedule; Special Handling Required; Not Releasable to Foreign Nationals.

4. History of Air Weather Service, 1 July 1967 - 30 June 1969. USAF HRC, Maxwell AFB, Alabama. SECRET. Excluded from General Declassification Schedule; Special Handing Required; Not Releasable to Foreign Nationals.

5. History of 2d Air Division Scouting Force, Aug 1944 - May 1945. USAF HRC, Maxwell AFB, Alabama.

6. History of the 30th Weather Squadron, Jan - March 1951. USAF HRC, Maxwell AFB, Alabama.

7. History of the 30th Weather Squadron, July - Dec 1952. USAF HRC, Maxwell AFB, Alabama.

8. History of the 56th Strategic Reconnaissance Squadron, Oct - Dec 1951. USAF HRC, Maxwell AFB, Alabama.

9. History of the 56th Strategic Reconnaissance Squadron, Apr - June 1952. USAF HRC, Maxwell AFB, Alabama.

10. History of the 2143d Air Weather Wing, July - Sep 1950. USAF HRC, Maxwell AFB, Alabama.

11. History of the 6166th Air Weather Reconnaissance Flight, 25 Dec 1950 - 30 June 1951. USAF HRC, Maxwell AFB, Alabama.

12. History of the 6166th Air Weather Reconnaissance Flight, Jan - Apr 1952. USAF HRC, Maxwell AFB, Alabama.

CONTINUED

13. Letter, 9 Jan 1944 from Hq VIII Bomber Command to Commanding Generals, 1st, 2d, & 3d Bombardment Divisions, Subject: Pre-Mission Weather Scouting. USAF HRC, Maxwell AFB, Alabama.

14. Letter, 18 Jan 1945 from 2d Division Scouting Force to Commanding General, 8th Air Force, Subject: Report on 2d AD Scouting Force. USAF HRC, Maxwell AFB, Alabama.

15. Letter, 20 Jan 1945 from Hq Eighth Air Force to Commanding General, U.S. Strategic Air Forces in Europe, Subject: Authorization for a Scouting Force. USAF HRC, Maxwell AFB, Alabama.

16. Letter, 11 Mar 1945 from Hq Eighth Air Force to Commanding General, Army Air Forces, Subject: Scouting Force. USAF HRC, Maxwell AFB, Alabama.

17. Memorandum, 21 Apr 1945 from Deputy Commander for Operations to Commanding General, Eighth Air Force. Subject: Authorization for a Scouting Force. USAF HRC, Maxwell AFB, Alabama.

18. Message, 6 Sep 1944 from 8th Air Force to 8th Fighter Command. USAF HRC, Maxwell AFB, Alabama.

19. Peaslee, Budd J., Col, US Army Air Corps. Air Scouting. USAF HRC, Maxwell AFB, Alabama.

20. Seventh Air Force Operations Plan 463-67, "Pop Eye", 23 Sep 1966. USAF HRC, Maxwell AFB, Alabama.

21. U.S. Senate, Subcommittee on Oceans and International Environment of the Committee on Foreign Relations, Hearings: Weather Modification, 93d Congress, 2d Session, 1974.

22. 3d Division Tactical Doctrine (5th Edition). USAF HRC, Maxwell AFB, Alabama.