# CHAPTER 6: AIRSPACE OPERATIONS

## 6.1. Mission Coordination.

6.1.1. ADMINISTRATION.

**6.1.1.1. Annual Liaison Meetings.** An annual liaison meeting will be conducted between the following participants:

* National Oceanic and Atmospheric Administration (NOAA) Aircraft Operations Center (AOC)
* U.S. Air Force Reserve Command (AFRC) 53rd Weather Reconnaissance Squadron (53rd WRS)
* Federal Aviation Administration (FAA) Air Traffic Control System Command Center (ATCSCC), System Operations Security, and participating en route Air Traffic Control (ATC) facilities[[1]](#footnote-1)
* Department of Defense (DOD) Policy Board on Federal Aviation (PBFA) designated representative (optional)

This meeting will review the previous season’s operations, any proposed changes to the current NHOP; the trilateral Memorandum of Agreement (MOA) between the FAA Air Traffic Organization (ATO), NOAA AOC, and AFRC 53rd WRS[[2]](#footnote-2); supporting Letters of Agreement (LOA); arranging FAA familiarization flights; and procedures to conduct international oceanic operations in accordance with International Civil Aviation Organization (ICAO) standards and recommended practices. This meeting will normally be conducted in conjunction with the Office of the Federal Coordinator for Meteorology (OFCM)-sponsored Interdepartmental Hurricane Conference (IHC).

**6.1.1.2. Visits and Briefings.** Annual visits by participating FAA en route ATC facilities, System Operations Security, and ATCSCC; and briefings by 53rd WRS aircrews, NOAA AOC aircrews, and FAA Military Liaisons are encouraged. These joint visits emphasize the unique challenges and non-standard operational procedures, communication and coordination required to successfully and safely accomplish the Hurricane Hunter mission.

**6.1.1.3. FAA Familiarization** Flights. FAA familiarization flights on USAF (IAW AFI 11-401 and DOD 4515.13) and NOAA Hurricane Hunter aircraft are authorized and encouraged. These flights are important in providing FAA controllers with a better understanding of weather reconnaissance/research operations, and how to better provide Air Traffic Control (ATC) services to these critical flights. These familiarization flights may be requested by FAA controllers, in accordance with FAA Order 3120.29, Flight Deck Training Program.

### 6.1.2. WEATHER RECONNAISSANCE/RESEARCH AIRCRAFT (WRA).

**6.1.2.1. Participating Aircraft.** A “Participating Aircraft” for the purposes of the NHOP and related documents[[3]](#footnote-3) is defined as a NOAA AOC or 53rd WRS manned aircraft listed in the Tropical Cyclone Plan of the Day (TCPOD) or tasked with an unscheduled operational mission that is conducted in a WRA.

* 53 WRS: “TEAL 70 through 79” (WC-130J aircraft)
* NOAA AOC: “NOAA 42 and 43” (WP-3D aircraft)

**6.1.2.2. Other Weather Reconnaissance/Research Aircraft**

* NASA: “NASA 817” (DC-8 aircraft); “NASA 928” (WB-57 aircraft); “NASA 872” (Global Hawk UAS)
* NRL: “WARLOCK 587” (NP-3 aircraft)
* NSF/NCAR: “N677F” (G-V aircraft)
* NOAA AOC: “NOAA 49” (G-IV aircraft)

NOTE- Unmanned Aircraft Systems (UAS) operations are conducted in accordance with the applicable Certificate of Waiver or Authorization (COA) and are not permitted to participate with manned aircraft within a WRA.

### 6.1.3. DEFINITIONS.

**6.1.3.1. Mission.** For purposes of this chapter, a mission is defined as a flight by an aircraft, as described in the NHOP, to conduct weather reconnaissance/research operations.

**6.1.3.2. Weather Reconnaissance Area.** A Weather Reconnaissance Area (WRA) is airspace with defined dimensions and published by Notice to Airmen (NOTAM), which is established to support weather reconnaissance/research flights. ATC services are not provided within WRAs. [[4]](#footnote-4),Only participating weather reconnaissance/research aircraft from NOAA AOC and 53rd WRS are permitted to operate within a WRA.

### 6.1.4. PRE-MISSION COORDINATION.

6.1.4.1. Mission Coordination Sheet. All missions must provide a Mission Coordination Sheet to the ATCSCC, the affected en route ATC facilities, and any affected Special Use Airspace (SUA) Using Agencies, as soon as possible, but no later than 2 hours prior to departure time (see Appendix L).

6.1.4.2. Chief, Aerial Reconnaissance Coordination (CARCAH). CARCAH’s pre-mission coordination procedures include:

* Publishing TCPOD when required.
* Submitting a request for a WRA NOTAM when necessary
* Coordinating with the affected en route ATC facilities and the ATCSCC as required.
* For unscheduled missions, notifying the flying units and the ATCSCC.
* Notifying 53rd WRS and NOAA AOC flight crews when other research missions will be airborne in the operations area at the same time.

**6.1.4.3. 53rd WRS and NOAA AOC.**

* Submit the Mission Coordination Sheet (see Appendix I) according to sub-paragraph 6.1.4.1.
* Submit a request to the appropriate FAA en route ATC facility for a WRA NOTAM when necessary.
* **Missions Not Listed in the TCPOD.** In the event of an unscheduled mission, the flying unit will contact the ATCSCC. The ATCSCC will initiate a conference call with the unit and all affected ARTCCs.
* **Use of NORAD Mode 3/A Transponder Codes.** 53rd WRS and NOAA AOC NHOP missions may request NORAD assigned mode 3/A transponder codes. These codes are only applicable in FAA controlled airspace in the Gulf of Mexico and Atlantic. These codes are issued by the 601st Air -Operations Center, Airspace Management Team (DSN 523-5837 or COM 850-283-5837) and must be requested as needed.
* If a transponder code is not assigned by NORAD, a code will be assigned by ATC.

**6.1.4.4. Flying Agencies (other than the 53 WRS or NOAA AOC).**

* NASA, NRL, NSF or any other agency planning reconnaissance/research missions into or around the forecast or actual storm location must coordinate with affected FAA en route ATC facilities and CARCAH as soon as possible prior to all flights.
* The flying unit must submit the Mission Coordination Sheet (see Appendix I) according to sub-paragraph 6.1.4.2.
* Flights in support of the NHOP (conducted by the 53rd WRS and NOAA AOC operations) are normally published in the TCPOD at <http://www.nhc.noaa.gov/reconlist.shtml> by 1830 UTC. Reference the TCPOD to assist in de-confliction efforts.
* Issue advance notification to CARCAH of all planned reconnaissance/research missions in areas where NHOP operations are being conducted, including proposed flight tracks, aircraft altitudes, and locations where expendables may be deployed; this information can be e-mailed to ncep.nhc.carcah@noaa.gov or faxed to 305-553-1901 (please indicate “CARCAH” on submitted materials).

NOTE - CARCAH coordination is normally restricted to what is required between the 53 WRS, NOAA AOC, NHC, and ARTCCs in support of operational tasking. Due to staffing constraints, the CARCAH unit’s operating hours vary and often depend on the requirements levied. Its ability to coordinate non-operational missions is extremely limited. Reconnaissance/research missions can only be considered on a non-interference basis when flown concurrently with a tasked mission or when data collected will be directly beneficial to NHC in real time.

* Transponder codes will be assigned by ATC.

**6.1.4.5. Flight Plan Filing Procedures.**

* Flight plans must be filed with the FAA as soon as practicable before departure time.
* For flights into all U.S. Flight Information Regions (FIRs), include delay time in the route portion of the international flight plan – this will keep the IFR flight plan active throughout operations, especially for a delay in a WRA.
* Only the following remarks should be included in the “Other Information” block:
* “EET” to FIR boundaries,
* Navigation Performance (ex. RNP-10)
* “RMK/MDCN” diplomatic clearance information.

**6.1.4.6. Mission Cancellation.** When a mission is cancelled or delayed, the unit flying the mission must notify the Primary en route ATC facility responsible for the WRA and the ATCSCC as soon as possible.

### 6.1.5. FAA COORDINATION.

**6.1.5.1. Responsibilities.** The ATCSCC and the affected en route ATC facilities are responsible for operational coordination in support of the NHOP.

**6.1.5.2. ATCSCC Procedures.**

* Review the TCPOD available at <http://www.nhc.noaa.gov/reconlist.shtml>, by 1830 UTC.
* Activate the Hurricane desk, if required.
* Review the Mission Coordination Sheet (see Appendix L). Prepare a public Flow Evaluation Area (FEA) based on the latitude/longitude points specified in the Mission Coordination sheet when a mission is scheduled to be flown. The FEA naming convention is the aircraft call sign. Modify the FEA when requested by the affected facilities. (The flying unit will submit their Mission Coordination Sheet to the ATCSCC and the affected en route ATC facilities at least 2 hours prior to flight departure time).
* Coordinate with the impacted en route ATC facilities as required and designate a primary en route ATC Facility when the Operations Area includes airspace managed by multiple ATC facilities.
* In the event of an unscheduled mission that is not listed on the TCPOD, the flying unit will contact the ATCSCC. The ATCSCC will initiate a conference call with the unit and all affected en route ATC facilities.
* When NOAA or TEAL aircraft receive priority handling as specified in FAA Order 7110.65, assist en route ATC facilities with traffic flow priorities.
* Conduct hurricane and customer teleconferences, as necessary.

**6.1.5.3. En Route ATC Procedures**

* Review the TCPOD available at http://www.nhc.noaa.gov/reconlist.shtml, by 1830 UTC.
* Review the Mission Coordination Sheet (see Appendix L) - the flying unit will submit their Mission Coordination Sheet to the ATCSCC and affected en route ATC facilities at least 2 hours prior to flight departure time.
* Coordinate with all impacted en route ATC and Terminal facilities within their area of responsibility.
* Coordinate with all impacted DOD facilities and SUA Using Agencies in accordance with Letters of Agreement (LOA), including de-confliction procedures for SUA that may not be approved for release.
* When applicable, assign 53rd WRS and NOAA aircraft the designated NORAD transponder code associated with their call sign listed on the Mission Coordination Sheet.
* When designated by ATCSCC as the Primary ATC Facility, responsibilities will include:
* Coordinate with CARCAH and aircrew(s) on flight plan specifics, when necessary.
* If the mission profile changes, coordinate with the ATCSCC for FEA modifications, and ensure other affected ATC facilities are aware of the change.
* Advise the ATCSCC and other affected ATC facilities of any mission cancellation or delay information received from the flying unit.

## 6.2. Mission Execution.

### 6.2.1. AIRCREW RESPONSIBILITIES.

**6.2.1.1. Aircraft Commander Authority.** Aircraft Commanders must exercise their authority in the interest of safety or during an aircraft emergency, regardless of NHOP procedures.

**6.2.1.2. Priority Handling.** ATC will provide priority handling to TEAL and NOAA aircraft, when requested by the aircrew. The aircraft commander will only ask for priority handling when necessary to accomplish the mission.

**6.2.1.3. Altitude.** Aircrews are responsible for maintaining their own clearance from the surface of the sea, obstacles, and oil platforms while operating below the Minimum IFR Altitude (MIA).

**6.2.1.4. Military Assumes Responsibility for Separation of Aircraft (MARSA).** Aircrews of the 53Rd WRS may apply MARSA, in accordance with FAA Order 7110.65 and FAA Order 7610.4, between 53rd WRS aircraft. MARSA may not be applied between 53rd WRS aircraft and NOAA AOC participating aircraft.

**6.2.1.5. ATC Communications.** The aircrew normally maintains ATC communications with only the primary ATC Facility. When operating within an ATC terminal area depicted on the NHOP Operational Maps (see Appendix K), the aircrews will be in contact with both the primary ATC Facility and the terminal facility (FAA or DOD) if it is operating. Normally, VHF, UHF or HF radios will be used for communications with ATC, when within range. In the storm environment, HF exhibits poor propagation tendencies. When HF is unusable, satellite communications (SATCOM) may be used as a back-up (see Appendix L). IFR aircraft flying in domestic or international airspace are required to maintain continuous two-way communications with ATC, even while flying in uncontrolled airspace (Class F or G). Monitor the active ATC radio frequency for any other air traffic transiting the area.

NOTE- While in international airspace, aircrews will make periodic “Operations Normal” calls to the primary ARTCC if not in radar contact and no transmissions have been made within the previous 20-40 minutes (reference: ICAO 4444/RAC 501/12 VI, 2.1).

**6.2.1.6. Backup ATC Communications Procedures.** Aircrews of participating aircraft are required to maintain contact with CARCAH at all times. CARCAH is responsible for ensuring that ATC clearances, clearance requests and messages are relayed in an accurate manner through any means available. Only use this method when the aircraft or ATC is unable to contact each other.

### 6.2.2. NHOP MISSIONS OUTSIDE A WRA.

**6.2.2.1. International Airspace.** International airspace is defined as the airspace beyond a sovereign State’s 12nm territorial seas limit. Beyond this limit ICAO rules apply. In international airspace, VFR flight is not allowed at night. In class A controlled airspace, aircraft must operate using IFR procedures: ATC separation is provided between IFR aircraft. In class E controlled airspace, both VFR and IFR operations are allowed; separation is provided between IFR aircraft but with VFR traffic; traffic information is provided to VFR traffic and about VFR traffic, as far as practical.

**6.2.2.2. IFR Procedures and Clearance.** Aircrews will conduct flight operations to and from the WRA utilizing IFR procedures to the maximum extent possible and will not normally conduct these flight operations under the provisions of “Due Regard.” When departing the WRA, if the aircraft commander determines that mission, ATC communications, weather, and/or safety requirements dictate, they may exercise their operational prerogative and declare “Due Regard.” When conducting “Due Regard” operations, aircrews will comply with as many IFR procedures as possible. If an aircrew is able to notify ATC before declaring “Due Regard,” ATC will retain flight plan information. If an aircrew is unable to notify ATC beforehand, they will inform them when able. As soon as practical, the aircrew will notify ATC that they are terminating “Due Regard” operations and request resumption of IFR services. These procedures do not preclude aircraft commanders from exercising their authority in the interest of safety or during an aircraft emergency.

**6.2.2.3. Operations in Controlled Airspace.** While IFR, and not operating in a WRA, ATC will assign an altitude or a block of altitudes and provide standard vertical separation between all IFR aircraft and will provide VFR traffic advisories as far as practical. Prior to departing controlled airspace, advise ATC and state your intentions; ATC will not cancel your IFR flight plan.

**6.2.2.4. Operations in Uncontrolled Airspace (Class F and G).** Per FAA Order 7110.65, ATC is not authorized to assign altitudes in nor provide separation between aircraft in uncontrolled airspace. While in uncontrolled airspace, the aircraft commander is the IFR clearance authority. In addition, aircrews are responsible for maintaining their own separation from the surface of the sea, obstacles, and oil platforms while operating below the Minimum IFR Altitude (MIA). In class F and G uncontrolled airspace, both VFR and IFR operations are allowed. When operating in uncontrolled airspace, flight information service, which includes known traffic information, is provided and the pilot is responsible for arranging the flight to avoid other traffic (ICAO, Annex 11).

### 6.2.3. NHOP MISSION OPERATIONS IN A WRA.

The procedures for participating aircraft operations in a WRA are in accordance with the MOA between the FAA, NOAA, and 53 WRS.

**6.2.3.1. General Operations.** The airspace within a WRA is normally at or below FL150 with a radius of 200 nm around a set of center coordinates. An ATC facility prevents other aircraft receiving ATC services from entering the WRA during the effective time of the WRA as published in the NOTAM. This area can include the terminal areas (Class D Airspace) depicted on the NHOP Operational Maps (see Appendix K), and any other airspace within 50 NM of the CONUS shoreline after radio contact is established with ATC. If not in radar contact within the area as shown on the NHOP Operational Maps (see Appendix K), the aircrew will make position reports in relation to designated navigational aids as requested by ATC along the coast. Any changes to the WRA will be coordinated with the primary ARTCC.

**6.2.3.2. Participating aircraft arrival to a WRA.**

* Participating aircraft must use ATC services to the WRA.
* Prior to entering the WRA, the arriving aircraft must obtain the position and altitude of each aircraft already in the WRA and verify the center coordinates and maximum radius within the WRA.
* Arriving aircraft will commence entry to the WRA from FL150[[5]](#footnote-5), unless otherwise coordinated with ATC and other participating aircraft.
* Arriving aircraft must report entering the WRA to ATC.

**6.2.3.3. Participating Aircraft Procedures in a WRA.** The following actions must be taken by the aircrews to de-conflict operations and enhance situational awareness with other participating aircraft within the WRA:

* Set 29.92 (inches Hg) in at least one pressure altimeter per aircraft.
* Contact (Primary: VHF 123.05 MHZ, Secondary: UHF 304.8 MHZ, Back-up: HF 4701 KHz) the other participating aircraft and confirm (as a minimum) the pressure altitude, location relative to a center point position, true heading, and operating altitude or block altitude.
* Monitor the frequency during the duration of the flight and maintain communication with all other participating aircraft at all times.
* The center coordinates will be used for the duration of the flight. If a WRA is moved due to operational reasons, a different center point will be coordinated between all participating aircraft.
* If any aircraft is unable to maintain assigned altitude(s), immediately notify all participating aircraft and take actions to ensure sufficient vertical and/or lateral separation is maintained or attained as soon as practical.
* Use “see and avoid” principles to the maximum extent possible within the WRA. Aircraft must periodically broadcast GPS position reports to other aircraft within the WRA and use air-to-air TACAN and cockpit displays/maps to maintain awareness of other aircraft locations.

**6.2.3.4. Separation between participating aircraft within a WRA.**

* Aircraft 10 NM or more from other aircraft operating in the same WRA must maintain vertical separation within the WRA of at least 1,000 feet between their operating altitudes or block altitudes, or as specified in the applicable LOA.
* Aircraft less than 10 NM from other aircraft operating in the same WRA, must apply vertical separation of at least 2,000 feet between operating altitudes or block altitudes, or as specified in the applicable LOA. Aircraft may use air-to-air TACAN and TCAS to assist with visual acquisition. Reduced vertical separation may be applied with concurrence from other aircraft within the WRA.

**6.2.3.5. Altitude changes between participating aircraft within the WRA.**

* Aircraft must initiate communications with each other prior to the altitude change and maintain two-way aircraft-to-aircraft communications throughout the duration of the altitude change.
* Aircraft must ensure positive lateral separation prior to descending or climbing through the altitude(s) of other participating aircraft by reference to the WRA center point using the appropriate aircraft navigation systems.
* Aircraft that are not in visual contact and separated by 30NM or more, as indicated by the appropriate aircraft navigation systems, may transition through the altitude of other participating aircraft.
* Aircraft that are not in visual contact and separated by less than 30 NM, as indicated by the appropriate aircraft navigation systems, must confirm with each other that they are not on converging courses prior to an altitude change.
* Aircraft that are in visual contact may apply visual separation in accordance with the following procedures:
1. An aircraft that initiates visual separation must advise the other aircraft that the aircraft is in sight and will maintain visual separation from it.
2. The observed aircraft must acknowledge the use of visual separation by the initiating aircraft prior to the altitude change.
3. The aircraft changing altitude must advise the other aircraft upon reaching and maintaining the altitude to which it was climbing or descending.
4. Visual separation may be discontinued when the altitude change is complete.
* An altitude change is complete when the aircraft changing altitude advises the other aircraft, and receives an acknowledgement, that the altitude to which it was climbing or descending is reached and maintained.

6.2.3.6. Participating aircraft departure from a WRA.

* Prior to departing the WRA, aircraft will establish communications with the appropriate ATC facility and request an IFR clearance.
* Aircraft will depart a WRA at FL140[[6]](#footnote-6), unless otherwise coordinated with ATC and other participating aircraft.
* Prior to departing the WRA, aircraft will verify and maintain vertical and lateral separation from other aircraft in the WRA.
* Should an aircraft lose communications with the other aircraft within a WRA, it will maintain the last altitude that was coordinated with the other aircraft until it departs the WRA.
* If navigation systems become unreliable, the flight crew will terminate the mission and depart the WRA at the last coordinated altitude, or as coordinated with ATC if radio communications are available.
* Departing aircraft will report “leaving (tropical activity name) WRA,” to other aircraft in the WRA.

NOTE- The tropical activity name is identified by the National Hurricane Center and is part of the identification of the WRA. Examples: Isabelle WRA, Sandy WRA, Tropical Storm Emily WRA, etc.

**6.2.3.7. Weather Instrument Release in a WRA.** The aircraft commander is the sole responsible party for all weather instrument releases or sensor activations. Aircraft commanders will ensure coordination with other participating aircraft prior to release or activation. (Examples of weather instruments are dropsondes and oceanographic profilers (OP)).

### 6.2.4. BUOY DEPLOYMENT MISSION.

Regardless of the designated class of airspace (A through G) the following rules apply:

**6.2.4.1. Flight Plan.** A normal IFR flight plan will be filed for this mission. The coordinates for some of the planned deployments may need to be changed while en route to adjust to the forecast track of the storm. CARCAH will be responsible for relaying any revisions to the flight crew. The aircraft routing will not be altered by ATC because the buoys must exit the aircraft in a specified order and they cannot be rearranged in flight.

**6.2.4.2. Procedures.** It is preferred that these missions be filed and flown using IFR procedures in either controlled or uncontrolled airspace. However, with the concurrence of the aircraft commander, they may be flown VFR. If this change is made en route, ATC flight following and traffic advisories will be requested by the aircrew, and any changes to the route of flight must be relayed to ATC by the aircrew.

### 6.2.5. HIGH ALTITUDE SYNOPTIC TRACK MISSIONS.

**6.2.5.1. Flight Plan.** A normal IFR flight plan will be filed for this mission.

**6.2.5.2. NOTAM.** A NOTAM request must be submitted by the 53 WRS, NOAA AOC, NASA, NSF, or NRL for any High Altitude Synoptic Track mission that will release weather instruments (e.g., dropsondes, etc). The NOTAM must contain individual coordinates or an area defined by coordinates for all releases. Submit NOTAM request per Appendix D procedures.

**6.2.5.3. Release of Dropsondes.** During NHOP missions and when operationally feasible, dropsonde instrument releases from FL 190 or higher and sensor activation must be coordinated with the appropriate en route ATC facility by advising of a pending drop or sensor activation about 10 minutes prior to the event when in direct radio contact with ATC. When ATC has radar contact with the aircraft, they will notify the aircrew of any known traffic below them that might be affected. The aircraft commander is solely responsible for release of the instrument after clearing the area by all means available.

* When contact with ATC is via ARINC, event coordination must be included with the position report prior to the point where the action will take place, unless all instrument release points have been previously relayed to the affected ATC center(s). Contact between participating aircraft must be made using the frequencies listed in paragraph 6.2.1.8., second bullet.
* During NHOP missions, approximately five (5) minutes prior to release the aircrew will broadcast in the blind on radio frequencies 121.5 MHZ and 243.0 MHZ to advise any traffic in the area of the impending drop. Pilots must not make these broadcasts if they will interfere with routine ATC communications within the vicinity of an ATC facility. The aircraft commander is responsible for determining the content and duration of a broadcast, concerning the release or sensor activation.
1. Specifically includes FAA Air Route Traffic Control Centers (ARTCC), Center Radar Approach Controls (CERAP), and, in select cases, Combined Control Facilities (CCF) such as the Honolulu Control Facility (HCF). Only facilities, which have established or intend to establish a Letter of Agreement (LOA) in accordance with the national template supporting the *trilateral Memorandum of Agreement between the FAA Air Traffic Organization, NOAA AOC, and the AFRC 53rd WRS, will participate.*  [↑](#footnote-ref-1)
2. Refers to the MOA cited by footnote 1. [↑](#footnote-ref-2)
3. Including the aforementioned trilateral MOA and any executing LOAs. [↑](#footnote-ref-3)
4. The FAA may provide ATC services to participating flights in transit to and from WRAs, but will not provide ATC services, specifically including separation, to these flights within a WRA. [↑](#footnote-ref-4)
5. The upper limit of WRAs may be negotiated between NOAA AOC, 53rd WRS, and the responsible FAA en route ATC. While the default WRA will extend from SFC through 15,000 feet, the WRA ceiling may be lowered, especially when established closer to land where ATC services are provided at lower altitudes. [↑](#footnote-ref-5)
6. See footnote 5 for information on WRAs with lowered ceilings. [↑](#footnote-ref-6)