

**National Oceanic and Atmospheric Administration/  
Atlantic Oceanographic and Meteorological Laboratory/  
Hurricane Research Division (HRD) Hurricane Field Program:  
Overview and Participation Guidelines**

As of June 14, 2024

**1. NOAA Advancing the Prediction of Hurricanes Experiment Hurricane Field Program**

Developed in partnership between NOAA’s Atlantic Oceanographic and Meteorological Laboratory (AOML), Environmental Modeling Center (EMC), National Hurricane Center (NHC), Aircraft Operations Center (AOC), and National Environmental Satellite, Data, and Information Service (NESDIS), the [Advancing the Prediction of Hurricanes Experiment](#) (APHEX) is intended to improve our understanding and prediction of hurricane track, intensity, structure, and associated hazards by collecting observations that will aid in the improvement of current operational hurricane models, such as the Hurricane Analysis and Forecast System (HAFS). APHEX goals are met through a combination of operational tasking of NOAA’s P-3 and G-IV aircraft by NHC and EMC and research tasking by OAR/AOML and NESDIS/STAR. Guidelines for operational tasking are set forth in the NOAA National Hurricane Operations Plan ([NHOP](#)), while guidelines for research tasking are set forth in the APHEX Hurricane Field Program (HFP) Plan. AOML supports all research missions that it tasks and also supports NHC-EMC tasked operational missions as needed and as resources allow.

**2. NOAA APHEX HFP Participants**

HRD leads the annual HFP and supports operationally- and research-tasked P-3 and G-IV missions as onboard scientific crewmembers and as scientific ground-based support. HRD also works with scientific collaborators who are not part of HRD who may contribute to the design and execution of HFP Plan experiments/modules, fly aboard the NOAA aircraft, and/or support missions from the ground. The following definitions outline these various roles and their requirements and the roles of HRD HFP leadership.

*a) HRD Field Program Director*

The HRD HFP Director is appointed by HRD leadership, is responsible to HRD leadership for the preparation and implementation of the HFP and is the official communication link between

HRD and both the NOAA Aircraft Operations Center (AOC) and the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH). Their duties include working with principal investigators (PIs) to select APHEX missions to be flown, providing pre-mission briefing for HRD Scientific Crewmembers (see Sec. 2c below), assigning duties, ensuring safety of the HRD Scientific Crewmembers, helping coordinate press statements with the AOML Communications Team, organizing necessary deployment debriefs, and reporting activities to HRD leadership.

*b) HRD Field Program Deputy Director and Science Director*

The HRD HFP Deputy and Science Directors are appointed by HRD leadership. The HRD HFP Deputy Director assumes the duties of HRD Field Program Director in their absence and assists the HRD Field Program Director on all activities related to the HFP. The HRD HFP Science Director assumes the duties of the HRD Field Program Director and Deputy Director in their absence, assists the HRD Field Program Director on all activities related to the HFP, leads the effort to develop and facilitate the creation of scientific objectives for the APHEX HFP (including the annual APHEX Field Program Plan), and ensures their execution whenever possible.

*c) HRD Scientific Crewmembers*

HRD staff who are designated to perform specific onboard scientific duties to ensure mission success (e.g., Lead Project Scientist (LPS), tail Doppler radar operator, Aspen dropsonde processor, small Uncrewed Aircraft System (sUAS) operators). HRD Scientific Crewmember requirements include 1) must be a Federal or Cooperative Institute staff affiliated with HRD (see [HRD homepage](#) for staff listing); 2) must complete annual training held by HRD HFP leadership in order to perform the duties of LPS, tail Doppler radar (TDR) operator, and Aspen dropsonde processor; and 3) must complete an annual (calendar year) NOAA/AOC “Acknowledgment and Waiver” form. HRD Scientific Crewmembers may fly on each NOAA aircraft type (i.e., P-3 or G-IV) a maximum of 3 times per calendar year (includes missions and ferries). HRD Scientific Crewmembers planning to fly on a NOAA aircraft type more than 3 times in a calendar year must complete all training requirements as per NAO 209-124, [NOAA Aviation Safety Policy](#) (includes E-Learning courses, watching safety videos, and participating in Water Ditching, Safety and Survival training). The NAO 209-124 certification must be renewed every 5 years.

*d) HRD Scientific Ground-Based Support*

HRD staff who are designated to perform specific ground-based (GB) scientific duties to ensure mission success (e.g., GB LPS, GB TDR support, and GB Aspen dropsonde processor). HRD Scientific GB Support requirements include 1) must be a Federal or Cooperative Institute staff affiliated with HRD (see [HRD homepage](#) for staff listing); and 2) must complete annual training held by HRD HFP leadership in order to perform the duties of GB LPS, GB TDR support, and GB Aspen dropsonde processor.

*e) Scientific Collaborators*

Scientific collaborators from other institutions (e.g., Federal agencies, universities, and private sector companies) who are working with HRD staff can participate in the APHEX HFP in several ways. Scientific collaborators may: 1) act as Co-PIs (with a Co-PI who is a Federal or Cooperative Institute staff affiliated with HRD) or team members of APHEX HFP experiments and modules (see Sec. 4); 2) participate aboard operational or research tasked P-3 and/or G-IV aircraft missions (the HRD HFP Director or Deputy Director must provide a justification to NOAA/AOC as to why the Scientific Collaborators is considered essential to the success of the mission). Scientific Collaborators planning to fly on NOAA aircraft must complete the requirements outlined in Sec. 2c (item #3). Foreign nationals must obtain NOAA clearance through AOML (at least 90 days in advance) to allow involvement on the aircraft and any NOAA facilities associated with missions; and 3) participate from the ground with HRD Scientific Ground-Based Support personnel during operational and/or research tasked missions (e.g., using Google Meet and/or Internet Relay Chat clients such as XChat and HexChat) to ensure that a mission's scientific objectives are met. Costs for participating in missions as a Scientific Collaborator are the responsibility of the collaborator.

*f) Airborne Observers*

These are guest flyers (P-3 and/or G-IV) who do not have a specific tie-in to the APHEX research and/or operational objectives of the mission and can include media and government officials and their staff members, among other similar categories. Those participating under this category coordinate their participation with OMAO/AOC staff.

HRD Scientific Crewmembers & Scientific Ground-Based Support personnel are canvassed for their interest and availability prior to the start of the season. The final schedule dictating the

airborne crew schedule uses a prioritization based first upon mission needs, then the individual's involvement in the formulation of the potential experiment/module that is being flown, and finally their contribution to the science being conducted during the mission. For Scientific Collaborators, prioritization for participation in a mission is based first on the individual's involvement in the formulation of the potential experiment/module that is being flown and then their contribution to the science being conducted during the mission.

### **3. NOAA Operational & Research Missions**

#### *a) Operational missions*

As outlined in the NOAA [NHOP](#), Department of Commerce (DOC), through the NOAA Office of Marine and Aviation Operations (OMAO), is responsible for aircraft operations that may be requested to 1) provide TC vortex fixes, acquire airborne radar data, and conduct synoptic surveillance missions; 2) augment Air Force Reserve Command (AFRC) aircraft reconnaissance when DOC needs exceed the capabilities of Department of Defense (DOD) resources; and 3) assume responsibility for hurricane reconnaissance over foreign airspace that may be restricted for military operations. Tasking for operational missions is requested by NOAA NHC, EMC, and the Central Pacific Hurricane Center (CPHC) and is coordinated through CARCAH. HRD supports operationally tasked missions with HRD Scientific Crewmembers and/or HRD Scientific GB Support personnel as needed and as resources allow. Scientific Collaborators may join operationally tasked missions either onboard or through GB support if their contributions are expected to help ensure mission success.

#### *b) Research missions*

As outlined in the NOAA [NHOP](#), the Department of Commerce (DOC), through the NOAA Office of Marine and Aviation Operations (OMAO), is also responsible for aircraft operations that may be requested to conduct research flights. HRD tasks and supports research missions outlined in the annual APHEX HFP plan (see below) with HRD Scientific Crewmembers and/or HRD Scientific Ground-Based Support personnel. Scientific Collaborators may join research tasked missions either onboard or through GB support if their contributions are expected to help ensure mission success.

APHEX HFP Plan research experiments and modules (described in Sec. 4 below) will be executed as the opportunity arises (resources permitting). If the experiment or module is flown, it is expected that the PI/Co-PI participates in the execution of the mission, either as an onboard or ground-based scientific collaborator.

#### **4. APHEX HFP Plan**

##### *a) Components of the APHEX HFP plan*

Each year HRD compiles a list of submissions that comprises the Hurricane Field Program (HFP) plan. These submissions describe the scientific justification and flight patterns requested to accomplish the scientific objectives. A submission can be classified as an “experiment” or a “module”. An experiment describes a scientific objective and associated flight pattern that is executed for the duration of a mission (typically ~8 h in length, which includes ferry time to/from the storm). A module describes a scientific justification and associated flight pattern of shorter duration, usually 1 h or less, that can be appended to or inserted into another flight pattern. Modules can thus be flown as a part of a research mission or added to an operational mission, provided that the primary objective of the mission (research or operational) is not negatively impacted.

##### *b) Submission and approval process*

HRD typically calls for proposed experiments or modules in the January-February time frame through a call to NOAA, NOAA Cooperative Institutes (CIs), other government agencies, university collaborators, and private sector companies. HRD welcomes collaborators external to NOAA/CIs, including their affiliates (postdocs, research associates, etc.), to submit an experiment or module plan for evaluation. These experiments/modules must have an HRD scientist as a co-PI involved. All experiments/modules should align with the goals of APHEX.

Experiment/module development and approval is done by a review from HFP and HRD leadership. All experiments and modules are then reviewed by AOC through a process called Operational Risk Management. This process determines the level of risk and flight safety of a proposed experiment. If an experiment is determined to pose a high flight safety risk, it will not be considered.