The National Oceanic and Atmospheric Administration (NOAA) is developing an operational transition plan for hurricane surveillance and forecasting, based on the findings from its ongoing Sensing Hazards with Operational Unmanned Technology (SHOUT) project. SHOUT utilizes the Global Hawk Unmanned Aircraft System (UAS), and NOAA is seeking to transition these efforts into an operational program using Global Hawk airborne platforms.

The NOAA UAS Program and the Office of Marine and Aviation Operations (OMAO) have been collaborating with the Airborne Science Program of the NASA Earth Science Division since 2008 to demonstrate and evaluate the benefits of UAS flying at high altitudes (i.e., >50,000 feet) and low altitudes (i.e., <18,000 feet) for scientific environmental data collection. The Global Hawk UAS collaboration has been particularly successful. The NOAA UAS Program contributed funding and science support while OMAO contributed aviation personnel support to the first Global Hawk missions carrying Earth science payloads over the Pacific and Arctic Oceans. NOAA and NASA have also collaborated with the National Science Foundation and the National Center for Atmospheric Research to successfully sample in situ vertical atmospheric profiles of temperature, pressure, moisture, wind speed, and wind direction using AVAPS dropsondes released from the Global Hawk. More recently, NASA has also expanded the Global Hawk performance capabilities to overfly Tropical Cyclones (TCs) with remote sensing payloads that have been used to transmit data in real-time to science teams across the United States and to launch missions from one coast with the mission pilots located at a ground control center across the country on the other coast.

These accomplishments have advanced the technology readiness level of the Global Hawk UAS to that of a feasible observing platform for operational weather observation. In addition, the long endurance (i.e., >24 hours) and long range (i.e., >9000 nautical miles) of the Global Hawk offer increased capabilities for targeted observing strategies over the ocean that are designed to use upstream observations of developing storms to better predict downstream impacts with longer lead times.

Science Objectives

The overall goal of the SHOUT project is to demonstrate and test a prototype concept of operations for unmanned observing technology that could be used to mitigate the risk of diminished high impact weather forecasts and warnings in the case of polar-orbiting satellite observing gaps. To achieve this goal, the SHOUT project will have two main scientific objectives:

Objective 1 - Quantify the significance of unmanned observations to high impact weather prediction through data impact studies using Observing System Experiments (OSE) based on unmanned observations collected during prototype operational field missions and Observing System Simulation Experiments (OSSE) based on expected unmanned observing capabilities.

Objective 2 - Quantify the cost and operational benefit of unmanned observing technology for high impact weather prediction through detailed analysis of life-cycle operational costs and constraints versus scientific benefit.