

## CONTRIBUTING STAKEHOLDERS

# National Oceanic and Atmospheric Administration



## UNMANNED AIRCRAFT SYSTEMS

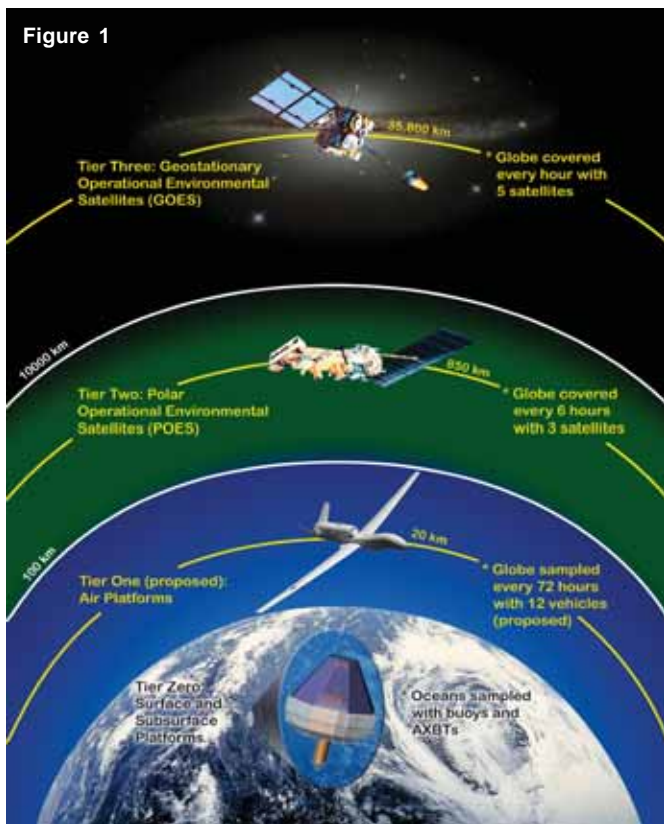
The National Oceanic and Atmospheric Administration (NOAA) is a United States Federal agency focused on the condition of the oceans and atmosphere. NOAA plays several distinct roles within the United States Department of Commerce among which is the mission to predict weather and climate. One of the most important resources today is information, which NOAA supplies to its customers pertaining to the state of the oceans and atmosphere. This is manifest in the production of weather warnings through the National Weather Service, but NOAA's information products extend to climate, ecosystems and commerce, national coastal and marine environments. NOAA's mission is «to understand and predict change in the Earth's environment and conserve and manage coastal and marine resources to meet the United State's economic, social and environment needs.» Improved data and observations hold the key to saving lives, property and resources, from better hurricane track and intensity forecasts to understanding global climate systems and the state of the planet's natural resources.

At the foundation of NOAA's ability to accomplish this mission, it operates a global observing system of satellites, surface stations, ocean and upper air measurements. NOAA is working with the international community on the Global Earth Observing System of Systems to maximize its capabilities.

environment, while increasing national security and individual safety. UAS have the potential to fill critical observation gaps in climate change research, weather and water resources forecasting, ecosystem monitoring and management, and coastal mapping. These information gaps usually exist over remote and often dangerous areas, such as the polar regions, the mid-oceans, expansive wild lands, volcanic islands, and other remote reaches of the Earth. Manned aircraft flights are not possible in these areas due to long flight durations and hazardous conditions. As the world faces the prospect of long term climate change, NOAA scientists are proposing that UAS be used to fill the data gaps between satellites and ground sensors (Figure 1).

NOAA is proposing 3 UAS bases (Figure 2: a primary base in Alaska to help determine the fate of the Arctic Ocean ice, monitor coastal erosion, ecosystems, marine mammals, forest fires; two secondary bases, one in the Gulf of Mexico Region and one in the Pacific). UAS that are based in the Gulf Region will be deployed during hurricane season to monitor hurricane cyclogenesis and collect hurricane data to improve the track and intensity forecasts, providing coastal residents with a greater lead time for evacuation. In addition, observations will be taken for harmful alga blooms that cause red tides and coastal erosion. UAS that are based at the

Figure 1



### NOAA's Unmanned Aircraft Systems Project

Unmanned Aircraft Systems (UAS) are an emerging technology and developing segment of the aviation industry used primarily, to date, by the military. Civilian agencies, such as NOAA, have only just begun to recognize the potential of UAS to revolutionize NOAA's ability to monitor the global

Figure 2



Pacific site will be used for detection of Central Pacific storms, for forecasting flash floods and water resources management (Arctic and Pacific); they will also monitor the North West Hawaiian Islands National Monument, the largest marine conservation area in the world encompassing nearly 140,000 square miles. Other applications in the Pacific and Arctic Oceans include typhoon development, ghost nets monitoring, fisheries assessments and enforcement, and protection of marine sanctuaries (Arctic and Pacific).

There is not scientific agreement on the fate of the Arctic Ocean ice over the next 200 years. Some models predict a rapid collapse (2015 to 2040) of the summer ice cover, while other models keep it until 2180 and beyond. NOAA scientists believe that an intensive research and observing program over the Arctic Ocean, combined with existing satellites and the observations from the International Polar Year, can significantly reduce the prediction uncertainty. The crucial observations of

the atmospheric energy balance over the ice can be determined from sophisticated instruments that can be put on the UAS.

### NOAA's UAS Tests

NOAA has worked with a number of partners to complete three successful UAS demonstration projects:

- In 2005 NOAA worked with National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), the Federal Aviation Administration (FAA) and General Atomics Aeronautical Systems, Inc. to test the Altair (a version of the Predator B) off the California coast. The test culminated with an 18 hour, 45,000 foot flight over the Pacific Ocean, demonstrating the flight altitude, duration and instruments that are possible with this type of aircraft. The Altair was equipped with surface imaging, monitoring, & surveillance capabilities, and instruments that measured temperature, ocean color, atmospheric chemistry.
- In August 2005, Aerosonde flew into Tropical Storm Ophelia when it was located off the North Carolina coast which marked the first time a UAS had flown into a tropical storm. Peak winds were 75 knots at 2500 feet, a region of the tropical storm environment that has historically been either impossible, or impractical, to routinely observe by either NOAA or U.S. Air Force Reserve hurricane hunter aircraft. NOAA's hurricane project continues for the 2007 hurricane season.
- In February 2006, NOAA used the Silver Fox, made by Advanced Ceramics Research, to conduct flight operations over the Hawaiian Islands Humpback Whale National Marine Sanctuary. The Silver Fox is a small, low altitude, short endurance UAS that carried instruments for observing subsurface features, surface features, living resources,

and vessels, and was launched from both land and from a vessel. The objectives of the exercise were to evaluate platforms for their surveillance potential for use in National Marine Sanctuaries; to determine whether systems can be used to spot and/or identify individual whales and pods of whales; and to determine whether systems can be used to identify vessels, activity aboard vessels & to document precise locations of above.

NOAA continues to develop partners among federal and state government agencies, industry, and the academic community (including a consortium of universities) for future missions. We are developing stakeholder groups in the three test base regions to insure that the local and regional interests and requirements are taken into account. NOAA has begun a dialogue with the Arctic communities including Canada, and continues to expand her outreach.

If you would like more information regarding the NOAA UAS program, please visit <http://uas.noaa.gov>



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