

**TOPIC NUMBER:**  
SOCOM10-006

**TOPIC TITLE:**  
Optical Wave Guide  
Integrated Weather  
Sensor

**CONTRACT  
NUMBER:**  
FA8651-14-C-0132

**SBIR  
COMPANY  
NAME:**  
Physical Optics Corp.  
Torrance, CA

**TECHNICAL  
PROJECT  
OFFICE:**  
AFRL Munitions  
Directorate,  
Eglin AFB, FL

**PUBLISHED:**  
March 2016



*Two U.S. Army soldiers deploy the Micro Weather Sensor during a demonstration.  
(Courtesy Photo)*

## **SMALL BUSINESS CUTS MISSION RISKS WITH PORTABLE, LOWER-COST WEATHER INTEL SYSTEM**

Flying helicopters through remote areas like Afghanistan is a high-risk endeavor as missions typically rely on weather predictions instead of real-time weather data. The danger to U.S. personnel and assets, however, is poised to take a dramatic plunge because of a system developed by a woman-owned small business in partnership with the Air Force Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program.

A Department of Defense customer is in the process of fielding the new Micro Weather Sensor system developed by Torrance, Calif.-based Physical Optics Corp. The system - designed to be low cost, expendable and portable versus the current crop of bulkier, more costly weather monitoring equipment - provides near instantaneous weather reports in places where it wasn't possible before. That access to critical battlefield information has several other potential users in the Department of Defense, as well as at least one U.S. ally, looking to buy the system.

Backed by an Air Force SBIR award, Physical Optics refined its individual sensors in the Micro Weather Sensor system, also known as MWS, to be more accurate than called for in the original specifications while focusing on manufacturability to keep production costs low. The MWS can now be sold for less than 10 percent of the cost of currently fielded tactical weather system and without the associated high sustainment costs.

The current system weighs more than 100 pounds, and requires a minimum of two people to set up, while Physical Optics' MWS weighs about three pounds and can be carried in a backpack and rapidly placed in the field by one operator. Additionally, the MWS provides images so weather personnel and planners can actually see the conditions rather than just simply reading the data, a feature that is not available on any other fielded tactical weather system.

Getting the MWS ready for sale required the company to push the bounds of miniaturizing the myriad of necessary sensors while meeting stringent accuracy and performance requirements. "It forced us to think of ways we could measure different weather phenomena with very small and sometimes non-traditional sensors," said Christian Veeris, director of business development for Physical Optics.

## AN URGENT NEED

The DoD demands accurate, highly-localized weather reports in its operations to protect the warfighter and be effective on the battlefield. In some places, however, there are no weather stations for hundreds of miles, forcing commanders to act upon estimates or without weather data.

Through the Air Force SBIR/STTR Program, Physical Optics was seeking to meet urgent needs for U.S. Central Command (USCENTCOM) and Special Operations Command Central (SOCCENT) in addition to enhancing the Air Force Special Operations Command Special Operation Weather Team's ability to provide timely, accurate, and critical deep battlespace weather reconnaissance and intelligence.

Unlike currently fielded systems – with multiple components typically connected by cables, large battery sources, and multiple support arms - the Micro Weather Sensor system is a single, compact unit with its own self-contained power source. It features an Iridium satellite communications system that provides world-wide connectivity, a complete package of weather sensors, a panoramic imaging system, and a hybrid solar/battery power system capable of operation even at extreme latitudes in winter.

Physical Optics' device can run unattended for a minimum of 90 days with some fielded systems already demonstrating autonomous operation for more than 12 months. It is small enough to be camouflaged in most environments and can be fully deployed in less than a minute. Additionally, the company is using another SBIR contract to develop an integrated cloud-height measurement capability.

## PATHWAY TO COMMERCIAL SUCCESS

Combatant commanders, mission planners, DoD centers that focus on weather, and other DoD service components are among the long list of intended customers for the Micro Weather Sensor system.

In addition to military use, Physical Optics' officials expect the MWS will be attractive for a variety of applications to other federal government agencies, such as NOAA, the U.S. Forest Service, and the Border Patrol, as well as other branches of the Department of Homeland Security. Other likely targets will be state and local authorities, such as fire departments, parks departments, and transportation departments.

Company officials plan to introduce other variants of the Micro Weather Sensor system for environmental monitoring and detection of explosive, chemical, and nuclear hazards. As the platform gains greater exposure and acceptance in the market, look for the list of capabilities to continue expanding.

Physical Optics' Veeris said the company has a plan to grow as it receives SBIR Phase III contracts – which are investments that come from outside the SBIR Program, as well as other investments – and by the end of next year may spin-off an entire business unit focused on the MWS and its variants.



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