



**Committee on Transportation and Infrastructure  
U.S. House of Representatives**

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May 16, 2014

**SUMMARY OF SUBJECT MATTER**

**TO:** Members, Subcommittee on Coast Guard and Maritime  
**FROM:** Staff, Subcommittee on Coast Guard and Maritime Transportation  
**RE:** Hearing on “Using New Ocean Technologies: Promoting Efficient Maritime Transportation and Improving Maritime Domain Awareness and Response Capability”

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**PURPOSE**

On May 21, 2014, at 9:30 a.m. in 2253 Rayburn House Office Building, the Subcommittee on Coast Guard and Maritime Transportation will hold a hearing to examine the proliferation of new or emerging ocean technologies, how such technologies could improve government performance, maritime commerce, and our understanding of the ocean environment and any impediments that limit or constrain the use of such technologies. The Subcommittee will hear from representatives of industry and academia.

**BACKGROUND**

Oceans cover 71 percent of the earth’s surface and are home to an estimated 50 to 80 percent of all life on earth. However, less than five percent of the undersea world has been explored. Gaining a better understanding of the oceans and how its ecosystems work is important because the oceans play an integral role in our nation’s economy, national defense, and our quality of life.

One of every six jobs in the United States is marine-related and over 40 percent of the U.S. Gross Domestic Product originates in coastal areas. Industries dependent on the ocean such as commercial fishing, marine transportation, offshore energy production, tourism, and recreation provided wages of over \$107 billion to more than 2.8 million Americans in 2011. Finally, U.S. seaports transfer nearly \$4 billion worth of goods in and out of our nation each day and move 95 percent of our nation’s foreign trade each year.

The oceans provide the platform for our armed services to project forces throughout the world to ensure the security of our nation and that of our allies and protect the global supply chain that supports the U.S. economy. The Navy is capable of deploying nearly 290 ships worldwide to provide for our defense. U.S. servicemembers deployed overseas remain predominantly dependent on weapons and supplies transported by ocean-going vessels. For example, nearly 98 percent of all weapons and supplies delivered for U.S. and allied forces fighting in Iraq and Afghanistan were transported by vessel.

The oceans impact the daily life of Americans in several other ways:

- The oceans play a central role in the earth's climate and weather patterns.
- Ocean plants produce half of the world's oxygen and absorb one-third of carbon dioxide emissions.
- Approximately 30 percent of the oil and gas consumed in the world comes from offshore sources.
- According to U.N. Food and Agriculture Organization statistics, seafood supplies 16 percent of the world's protein consumed by humans
- Half of all communications between nations is carried on undersea cables.
- Marine biotechnologies provide the ingredients commonly used in household items such as soaps and cosmetics, but also produce medicines that help fight cancer, arthritis, Alzheimer's, heart disease, and other diseases.

The federal government is responsible for recording, understanding, monitoring, and protecting the oceans in the Exclusive Economic Zone that surrounds the United States and its territories out to 200 miles, and even in areas of the ocean beyond those littoral zones. Understanding and monitoring both the physical characteristics of these areas and how these areas are being used is vital to our national defense, the safety of maritime transportation, and to the conservation and management of the natural resources contained in these areas. For instance the Coast Guard must enforce all U.S. laws in these areas, as well as conduct search and rescue, icebreaking, coastal security, marine safety, marine resources protection, and oil spill response activities offshore. Unfortunately, manned operations offshore are expensive and potentially dangerous. In order to reduce costs and improve mission effectiveness, the Coast Guard and other federal agencies will likely become more reliant on ocean observation and maritime domain awareness (MDA) technologies that reduce costly time-on-station operations, provide operational flexibility, maximize the deployment of manned assets, and reduce annual and life time maintenance costs.

## **Ocean Technologies**

Several private companies and academic institutions, often in collaboration with federal agencies, are working on developing ways to improve our understanding of the oceans and their ecosystems by inventing new, or making advances in existing, ocean observation and MDA technologies. Some of these technologies include:

### *Autonomous Vehicles*

Autonomous underwater vehicles (AUV) and unmanned surface vessels (USV) have been used for the last several decades primarily by academic institutions for exploration and research purposes. Recently, however, several private companies have been developing larger and more advanced AUVs and USVs that could be used for commercial purposes such as, searching for offshore oil and mineral deposits, renewable energy production laying submarine cables, and salvage operations.

The Coast Guard and the National Oceanic and Atmospheric Administration (NOAA) are considering the use of autonomous vehicles to conduct missions such as patrolling fisheries; collecting current, tidal, and weather observation data; responding to oil spills; and detecting activities and collecting intelligence in the maritime domain.

### *Automatic Identification System*

Automatic Identification System (AIS) is a Very High Frequency (VHF)-based, short-range communication system that provides a means for vessels to electronically exchange data, including identification, position, course, and speed, with other nearby vessels and shore-based AIS receivers. Depending on signal strength, weather, geography, and receiver capability, AIS signals can generally be received up to 50 miles away. The Coast Guard currently uses AIS to track the movements of commercial vessels greater than 300 gross tons operating in U.S. waters. Several private companies have developed enhanced AIS systems that leverage navigation data from satellite and other sources and integrate it into a single common operational picture that can be viewed on several platforms including smart phones.

### *High Frequency Radar*

High Frequency Radar (HF) is used by NOAA and academic institutions to measure and track the speed and direction of surface currents in the ocean which have a direct impact on commercial shipping. NOAA and the Coast Guard use the data to help plot oil and hazardous material spills in the ocean, such as during the DEEPWATER HORIZON oil spill in 2010, as well as to improve search and rescue operations. Several private companies and academic institutions are working on advanced HF systems that can be coupled with other technologies to improve navigation and enhance the tracking of vessels in the maritime domain.

### *Ocean Sensors*

Since the proliferation of satellites, a variety of sensors have been deployed to track currents, temperatures, and other physical characteristics of the world's ocean. NOAA uses free-floating sensors and other sensors attached to the seabed to help improve weather forecasts, detect tsunamis, determine the location and behavior of marine mammals and other marine life, and test water quality. Several private companies and academic institutions are working to improve the sensitivity of sensors, extend their operational life, enhance detection capability, and expand the use of data in the commercial sector.

## **Impediments**

### *Regulations*

The regulatory regimes of federal agencies often cannot keep up with advancements in technology. For instance, Coast Guard regulations currently do not contemplate the use of autonomous vehicles. Most UAVs and USVs are often too small or engaged in a non-commercial activity and do not meet the definition of a vessel used by the Coast Guard (see 1 U.S.C. 3). However, larger UAVs and USVs being developed today for commercial purposes may meet the definition of vessel and could be subject to Coast Guard regulations governing vessel construction, lighting, propulsion, and other standards.

### *Criteria for Ocean Technology*

In 2011, the Ocean Studies Board of the National Academy of Sciences proposed criteria that could help prioritize federal agency investments for ocean technology infrastructure. These criteria include the affordability, efficiency, and longevity of the technology; and the ability of the technology to contribute to other missions or applications. These criteria may be useful to federal agencies in determining how to best meet their ocean technology needs.

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