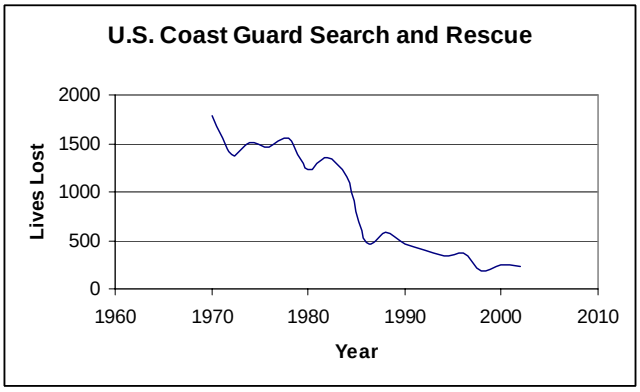
Rendering Help on the High Seas

Saving lives, minimizing injury, and reducing property damage are some of the U.S. Coast Guard Search and Rescue's (SAR) oldest missions. Recognized worldwide as a leader in the field of Search and Rescue, the Coast Guard is the Maritime SAR Coordinator. This means that when a distress call about persons or property in the maritime environment is made, SAR responds by rendering aid.

One of the first tasks of a SAR team, upon receiving a distress call, is to formulate a plan of action. To do this requires real-time information about atmospheric and oceanic conditions in the area that the search is to be conducted. Ocean observing systems provide the real-time information rescuers need to plan their mission. Along the southeast coast of the United States, the Southeast Coastal Ocean Observing System (SEACOOS) is the regional component of a larger Integrated Ocean Observing System that is helping SAR save lives.

Coast Guard SAR stations ring the coast of the United States and are also found on the shores of the Great Lakes and inland waterways. The stations are linked to cutters, aircraft and boats, the tools of the rescue trade, by communication networks. As technology in the areas of ocean and atmospheric prediction systems and communication networks have improved, so has the success rate of Search and Rescue missions. For example, in the Search and Rescue Summary Statistics, the U.S. Coast Guard reports that the number of lives lost after Coast Guard SAR was notified decreased from 1,783 in 1970 to 246 lives in 2003. What features of oceanic and atmospheric observation systems contribute to the dramatic increase in SAR's success?



SAR team members use the most recent information available on tides, winds and currents to both provide navigation information and to predict the trajectory of lost individuals. Successful recovery of a victim is greatly enhanced when the search area becomes smaller in scope.
The SEACOOS instrument most relevant to search and rescue is the Acoustic Doppler Current Profiler (ADCP). The ADCP measures the velocity of water using a physical principle called the Doppler shift. Overly simplified, the ADCP is placed in the water at a specific depth and emits sound at a specific frequency or frequencies. The sound is transmitted between the source (ADCP) and the receiver (e.g. an antenna on top of a buoy). The amount of time it takes for the sound to reach the receiver is proportional to the velocity of the water current. Accurate measures of current direction and velocity are calculated from an equation that requires both the

speed sound travels in water and the change in frequency due to the Doppler shift. Combining information about the speed and direction of currents with local features of ocean basins allows rescuers to target their search. Who would have thought that measuring sound waves in water could help save lives?

Like SEACOOS which is specific for the southeast United States, other regional systems monitor oceanic and atmospheric conditions along their coasts and further offshore. The goal is to have a series of systems that ring the coast of the United States and provide real-time information to professional and recreational marine users. Ultimately, the regional systems will feed information into a national system, which will then be incorporated into a global ocean observing network. Think how this will help the Coast Guard plan rescue missions around the world!