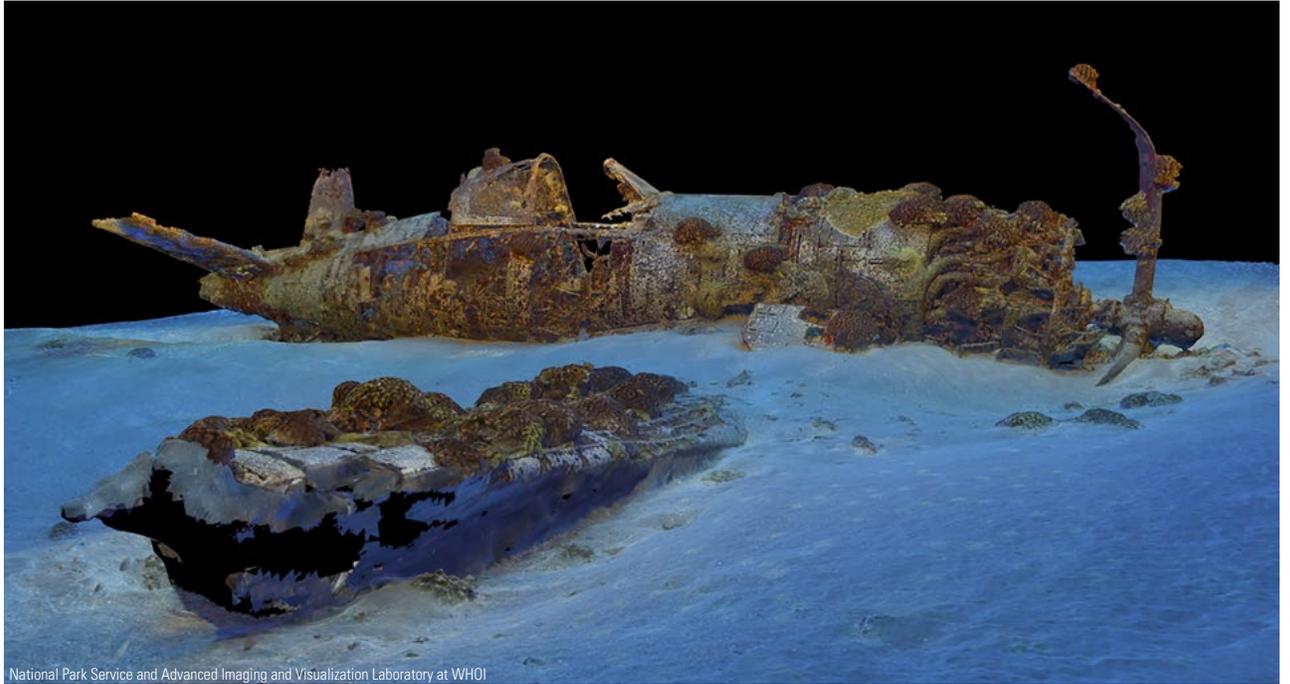


# Re-envisioning Underwater Imaging

SCIENTISTS CAN ZOOM INTO 3-D SHIPWRECKS AND SEAFLOOR LANDSCAPES *by Erin Koenig*



National Park Service and Advanced Imaging and Visualization Laboratory at WHOI

Scientists can visually immerse themselves in this 3-D optical model of a World War II-era airplane called a Corsair, which lies on the seafloor 115 feet below the ocean surface. The plane ran out of fuel during a routine mission in 1948 about two miles southwest of Koko Marina, Hawaii.

A revolutionary new underwater imaging system developed at Woods Hole Oceanographic Institution can generate ultrahigh-definition television video, 2-D mosaic images, and 3-D optical models—images that scientists can spin to view from all sides and zoom in on to visually explore around and inside objects or ocean environments. These models can transform the way scientists examine seafloor objects and environments, such as coral reefs, marine protected areas, maritime heritage sites, and even hazardous-material sites.

“These new imaging systems can visualize wide areas of the seafloor and shipwreck sites at optical resolutions not previously obtainable and represent a real paradigm change in our ability to image and interpret objects and features on the seafloor,” said William Lange, director of the Advanced Imaging and Visualization Laboratory (AIVL) at WHOI.

The new technology was developed by the AIVL, working with Marine Imaging Technologies and the National Park Services Submerged Resources Group. It is currently being field-tested on several submerged shipwreck sites in both the United States and Europe.

The near-millimeter-accurate 3-D models are built using digital optical imagery rather than lasers. Unlike 3-D images, which enable a static view in three dimensions, these models are able to represent the volume of an object from all sides with high resolution—giving researchers the ability for the first time to visually explore at scales approaching what humans see in air.

Currently, 3-D models take months of processing back in the lab. But the new underwater imaging system will make the models possible in shorter periods of time—even during expeditions at sea.

“This is really exciting, because the deep sea is a realm with very limited access,” said Tim Shank, a deep-sea biologist at WHOI. “Even when scientists are able to dive in a submersible, like the human-occupied vehicle *Alvin*, we typically have just a few hours on the seafloor per day, and it’s impossible to step out of the sub and experience the terrain and its thriving ecosystems in three dimensions.”

“These high-resolution 3-D models will allow us to visually walk through the seafloor landscape among the biological communities that live there, much like a wildlife biologist would walk through a rain forest,” Shank said. ▲



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This 3-D optical model image reveals the *Rouse Simmons*, a schooner that sank on Lake Michigan in 1912 during a violent storm. It was carrying a cargo of Christmas trees bound for Chicago.