



Scripps Oceanography is one of the most important centers for global science and education in the world. Hundreds of research programs covering a wide range of scientific areas are under way on every continent and in every ocean.



UNDERSTANDING THE FICKLE BEARER OF CALIFORNIA'S RAIN

In February, Scripps Oceanography took part in the most intensive study ever of an atmospheric river, a weather phenomenon that influences California's economy and environment. Atmospheric rivers are channels of water vapor in the sky that give large areas of the state up to half of their water. During the campaign, researchers got the chance to study an incoming river by collecting data on aircraft, research vessels, and ground stations simultaneously.

Scripps, NOAA, the Department of Energy, NSF, California Department of Water Resources, NASA, and several other agencies took part in CalWater 2015, which was one component of a multi-year project aimed at understanding what causes atmospheric rivers to produce catastrophic flooding in some instances while passing by California without delivering any rain in others.

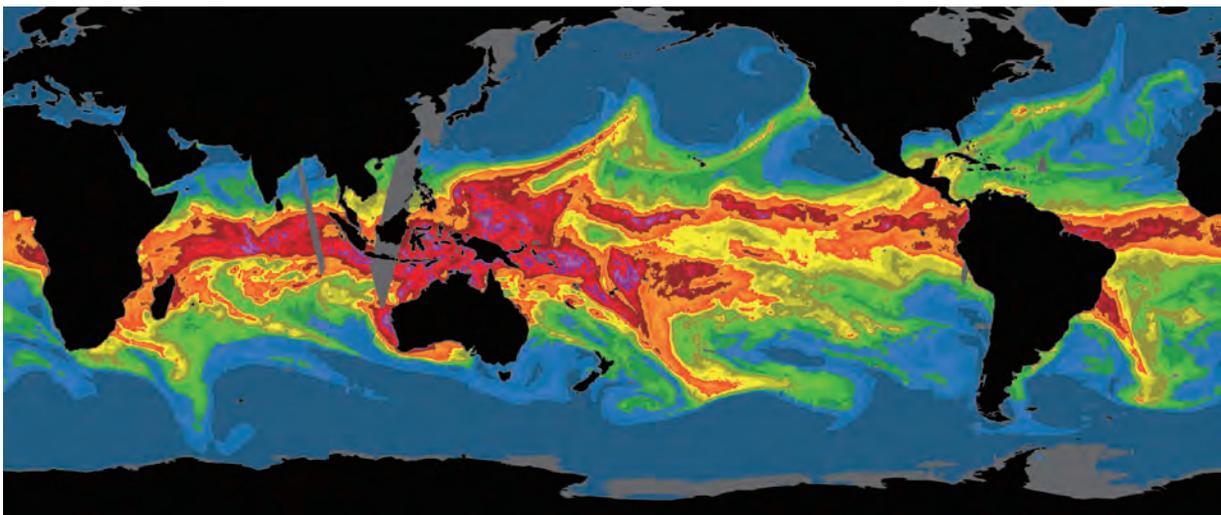
"To see the kind of team we have, the facilities we have, is really an amazing story about cooperation, partnership, perseverance, and the power of science to make a difference for society," said Scripps climate scientist and CalWater lead scientist Marty Ralph.

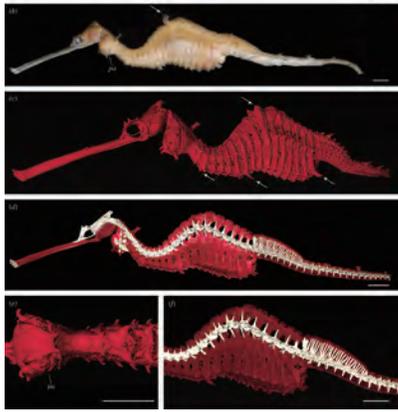
SUCCESS LOCATING DOWNED WORLD WAR II AIRCRAFT

Researchers from Scripps Oceanography were part of a team that in March found a U.S. Navy aircraft lost in World War II and missing for over 70 years. The plane was discovered in the tropical waters of the Republic of Palau. The find is one of several made in recent years by a group of university-based oceanographers working with the BentProp project, a nonprofit organization that seeks to recover lost aircraft and aviators listed as missing in action for decades.

The academic and not-for-profit teams were brought together nearly four years ago after a chance meeting while the oceanographers were conducting marine research in Palau. They were able to obtain seed money support from the U.S. Office of Naval Research to apply emerging undersea technologies to find aircraft associated with MIAs.

"It's a great feeling to be involved in an effort that develops and applies new scientific and technical approaches to a problem of national interest," said Scripps physical oceanographer Eric Terrill, a co-leader of the search mission, "and that in some small way, our efforts may help bring closure to those who have lost loved ones."





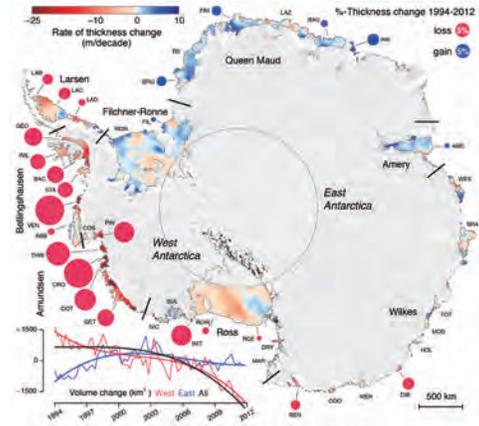
'RUBY SEADRAGON' DISCOVERED BY SCRIPPS RESEARCHERS

While researching the two known species of seadragons as part of an effort to understand and protect the exotic and delicate fish, scientists at Scripps Oceanography made a startling discovery: A third species of seadragon.

Using DNA and anatomical research tools, Scripps graduate student Josefin Stiller and marine biologists Nerida Wilson of the Western Australia Museum (WAM) and Greg Rouse of Scripps Oceanography found evidence for the new species while analyzing tissue samples supplied by WAM. The researchers then requested the full specimen as well as photographs taken just after it was retrieved from the wild in 2007. They were further surprised by the appearance of the newly identified animal. The bright red color was vastly different from the orange tint of Leafy Seadragons and the yellow and purple hues of Common Seadragons.

Stiller, Wilson, and Rouse gave their new discovery the scientific name *Phyllopteryx dewysea*, and called it the "Ruby Seadragon." Details were published in the journal *Royal Society Open Science*.

Following in the footsteps of its successful Seahorse Propagation Program, now in its twenty-first year, Birch Aquarium at Scripps has developed a seadragon propagation program. Seadragons are heavily protected in Australia and programs such as the one at Birch Aquarium can help safeguard these animals in the wild.



ANTARCTIC ICE SHELVES RAPIDLY THINNING

Scripps Oceanography researchers found that the thickness of Antarctica's floating ice shelves has recently decreased by as much as 18 percent in certain areas over nearly two decades, providing new insights on how the Antarctic ice sheet is responding to climate change.

Data from nearly two decades of satellite missions have shown that the ice volume decline is accelerating, according to a NASA-supported study published in *Science*. Scripps graduate student Fernando Paolo, Scripps glaciologist Helen Amanda Fricker, and oceanographer Laurie Padman of (non-profit) Earth & Space Research constructed a high-resolution record of ice shelf thickness based on satellite radar altimetry missions of the European Space Agency from 1994 to 2012.

Merging data from three overlapping missions, the researchers identified changes in ice thickness over more than a decade, an advancement over studying data from single missions that only provide snapshots of trends. The study showed that total ice shelf volume across Antarctica changed very little from 1994 to 2003, then declined rapidly.

West Antarctic ice shelves lost ice throughout the entire observation period, with accelerated loss in the most recent decade.

