

**Date:** April 24, 2009  
**Speaker:** Mr. Marvin B. May  
Chief Navigation Technologist  
Applied Research Laboratory (ARL), Penn State  
Navigation Research and Development Center  
**Topic:** Relationship of Satellite Navigation to Advanced  
Submersible Navigation



### Abstract

The lecture begins with a history of satellite navigation from the impetus of the Sputnik launch to the early days of the TRANSIT satellite navigation systems to the beginnings of GPS and through the modern era of the Global Navigation Satellite System (GNSS). The principle contributors to satellite navigation are recognized along with the major challenges they met and overcame. The genesis of satellite navigation as a military system for strategic submarines is reviewed. This is used as an introduction to the overall topic of navigation for submersibles. The elements of submersible navigation as consisting of inertial navigation, geophysical correlation, speed sensor integration, transponder navigation and radio navigation are discussed. The uniqueness of submersible navigation as it related to satellite navigation is addressed. One of the major remaining frontiers of bringing satellite navigation accuracy and availability characteristics to the underwater environment is addressed. Various research concepts to achieve precise navigation in the underwater environment are examined. Their advantages and disadvantages are summarized with a prognosis for future development.

### Biography

Marvin B. May is the Chief Navigation Technologist at ARL Penn State's Navigation Research and Development Center in Warminster, PA. He also manages their Navigation Education Program. He has a BSEE from City College of NY and a Masters Degree from New York University and Polytechnic Institute, doctoral courses at Polytechnic Institute and is a Professional Engineer. He is an adjunct professor at several universities and teaches Master's Degree and sponsor directed navigation courses for the Penn State University. He is a recognized navigation specialist with expertise in GPS, inertial and geophysical navigation. During his Navy career he has worked at the Navy's Navigation Laboratory of the Naval Command, Control and Ocean Surveillance Center (NCCOSC), and his experience includes eight years as chief analyst for GPS responsible for satellite navigation systems analysis, laboratory testing and integration issues. May has served as Chairman of the Greater Philadelphia Chapter and is the national Marine Navigation representative and the one and only Historian of the Institute of Navigation. He has written numerous articles on navigation and has served on high level navigation committees. He was the 2007 winner of the Institute of Navigation's Captain Weems Award and was selected as an ION Fellow in 2008.