

NAVIGATION SYMPOSIUM: The History and Future of Celestial Navigation



November 3 - 5, 2017
Mystic Seaport, Mystic, Connecticut USA

Join practical navigators, experts in navigation theory, and historians of science for the *Celestial Navigation Symposium*, a conference devoted to celestial navigation, both historical and modern, and related topics. Opening events will take place on the afternoon of Friday, November 3, and presentations and papers will occur through Saturday and Sunday, November 4 – 5.

To register for the conference, contact Mystic Seaport’s Registration desk by phoning 860-572-5322, or email reservations.desk@mysticseaport.org. Registration is \$100 and covers admission to the museum for the entire weekend plus all on-site events of the conference (excluding food and drink).

For general inquiries regarding the conference, contact Frank Reed, organizer and founder of this Navigation Symposium, by email at frank@reednavigation.com or by phone at 401-644-6012.

Please note: this schedule is subject to change, and Mystic Seaport, the NavList community, and Frank Reed cannot guarantee any event, presentation, or speaker’s participation. Please visit <http://fer3.com/mystic2017> for updates.

FRIDAY, NOVEMBER 3:

- 3:00-3:30pm: **Registration and Introductions**, Treworgy Planetarium, ground floor. Meet the navigators and learn about the Treworgy Planetarium and the NavList community.
- 3:45-4:30: **Teaching Modern Celestial Navigation**, Brian Koehler and Frank Reed. Under the planetarium dome, Treworgy Planetarium, main floor.
- 4:45-5:00: **An Ode to Celestial Navigation**, Mark Coady. A dramatic reading aboard the historic whaleship *Charles W. Morgan*.
- 5:15: **Nathaniel Bowditch & the Power of Numbers**, Tamara Plakins Thornton. A presentation on her definitive new biography of Nathaniel Bowditch, highlighting Bowditch's sometimes exaggerated significance to celestial navigation as well as his influence on the developing numeracy of business in early 19th century America. Masin Room, Thompson Building. Followed by a book signing.

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SATURDAY, NOVEMBER 4:

- 9:00am: **Why (and When) Did the Greenwich Meridian Move?**, George Kaplan, US Naval Observatory. The zero of longitude at Greenwich, UK lies over 100 meters east of the traditional prime meridian. Why and when did the prime meridian move?
- 10:00: **Trust Your Lunars**, Frank Reed. Observations of the Moon for determining longitude at sea as found in historical logbooks and how to analyze them with modern software and apps.
- 11:00: **The Celestial Transformation and the Origins of GPS**, Richard Easton. The early history of the GPS system and its connection to traditional methods of navigation. Richard Easton's father was one of the principal creators of the GPS system, and he has written a detailed book on the subject.
- 11:55: **Five Minutes of Navigation (I)**. Frank Reed. Various fun topics, time permitting.
- 12:00: **Lunch Break**
- 1:00pm: **The Running Fix on the Sphere and Ellipsoid too**, Robin Stuart. A number of attempts at generalizing the classical running fix from the plane to the globe have been hampered by flawed prescriptions for advancing Circles of Position. The problems that arise and their resolution will be demonstrated geometrically. It is shown that when the running fix on the globe is treated correctly the formulas needed are all very familiar to any navigator.
- 2:00: **Mystic Seaport Tour**, guides TBD. An opportunity to visit some of the highlights of Mystic Seaport with insights from local experts.
- 3:00: **Astronomical Journal-Keeping and Misconceptions in Celestial Navigation**, Philip Sadler, Harvard University. Sadler teaches celestial navigation at Harvard and is also a leading expert on science education. He will discuss some of the preconceived notions that students bring to the subjects of astronomy and navigation and the technique of astronomical journal-keeping as a method of dispelling some of those misconceptions.
- 3:50: **Five Minutes of Navigation (II)**. Frank Reed. Various fun topics, time permitting.
- 4:00: **Becoming a Celestial Navigator in the Marion-Bermuda Race**, Bob Dugan. Learning and practicing celestial navigation during the race, Dugan's team won second place overall in the highly competitive sailing race to Bermuda.
- 7:00pm: **Group Dinner**, details TBD.

Presentations on Saturday and Sunday will alternate between the lower level of the Treworgy Planetarium and the third floor of the Stillman Building at Mystic Seaport.

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SUNDAY, NOVEMBER 5

- 9:00am: **Celestial Navigation in the Flight Levels**, Tracy Shrier. Experiments in aerial celestial navigation near the tropopause; a modern pilot's journey back in time.
- 10:00: **Direct Hybrid Navigation with the Method of Co-planar Vertices**, Yves Robin-Jouan. An overview of a mathematical system for combining or "hybridizing" celestial observations with other navigational observations.
- 10:45: **Five Minutes of Navigation (III)**. Frank Reed. Various fun topics, time permitting.
- 11:00: **Current Directions in Navigation Technology**, George Kaplan. A discussion and analysis of current US Department of Defense projects in navigation augmenting GPS with complementary navigation technologies, including automated celestial navigation.
- 12:00: **Lunch Break**
- 1:00pm: **NavList Live**, panel of navigation experts. We take your questions! Ask anything you want on the subject of celestial navigation or related topics. There's only one rule: your question must be 160 or fewer characters of text (like an early text message) with one optional attached image. Your name and contact email do not count against your 160 characters. Questions may be submitted by email to x@fer3.com (use subject "NavList Live") or in-person at the conference. Each question will be allowed up to five minutes of discussion.
- 1:55: **Five Minutes of Navigation (IV)**. Frank Reed. Various fun topics, time permitting.
- 2:00: **Traditional Compass Adjusting**, Robert Peterson. A presentation on the techniques of adjusting magnetic compasses using celestial observations and other methods, based on over thirty years experience in the trade.
- 2:30: **Celestial Tools and Almanac Oddities**, Stan Klein. Development of the Celestial Tools software package has made Stan Klein an expert in the fine details of the computations of the Nautical Almanac. He'll discuss some of his unique discoveries in this presentation.
- 3:00: **Defeating GPS Spoofing with Rapid Celestial**, Frank Reed. The strengths and also limits of celestial sights as a means of detecting GPS "spoofing" at sea, including a demonstration of an accurate, quick, and convenient anti-spoof app (sextant required!).

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