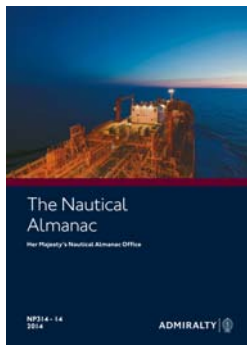


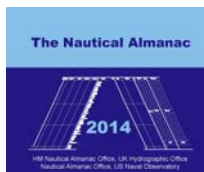
Celestial navigation remains a vital backup to Global Navigation Satellite Systems (GNSS) and relies on the use of almanac services. HM Nautical Almanac Office (HMNAO) provides a number of these services through publications and software. This poster describes how HMNAO continues to combine the latest scientific and technological advances with the creation of products that meet the needs of our users in the field of celestial navigation.

Publications and Software

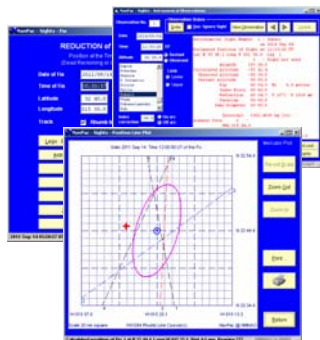


Our traditional printed book, *The Nautical Almanac*, published yearly, provides the ultimate backup for determining position at sea in the case of GNSS failure. It contains tabulations of the Sun, Moon, navigational planets and stars as well as the other necessary tables, diagrams, forms and information for celestial navigation.

The recently introduced electronic version of *The Nautical Almanac* allows for increased ease of use and portability.



Compact Data, a printed book, accompanies *NavPac* and provides navigators with simple, efficient methods for calculating the positions of celestial objects with the aid of a pocket calculator or computer.



Our software package, *NavPac*, provides a means for automatically carrying out all the necessary celestial navigation calculations as well as providing additional tools, saving time and reducing human errors.



Our other celestial navigation products include *Rapid Sight Reduction Tables for Navigation*, providing the altitude and azimuth for a range of declinations as well as of the seven stars most suitable for finding your position with a sextant.

The development of applications for mobile devices to assist the user with celestial navigation is also being considered, providing yet another alternative.



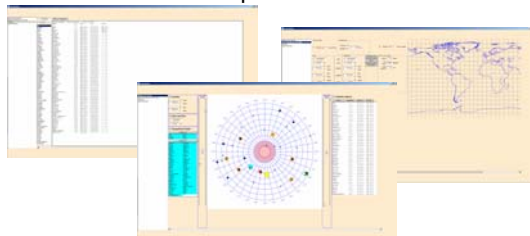
Ephemerides and IAU Resolutions

The current edition of *The Nautical Almanac* and its electronic version, as well as the upcoming new release of *NavPac* and *Compact Data*, are all based on JPL's DE430/LE430 ephemerides and all include the latest IAU resolutions.

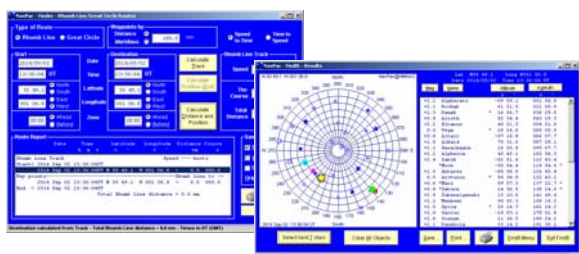
In particular the 2012 redefinition of the astronomical unit is applied throughout and the 2000 and 2006 resolutions concerning nutation and precession are implemented through the use of the latest IAU SOFA software collection.

Improved User Interface

An updated version of HMNAO's celestial navigation software package, *NavPac*, is due to be released in 2015. A new interface will provide an improved user experience.



Additional Tools



The *NavPac* software also provides additional tools. These include a 'Find It' application that allows for easy planning and identification of celestial objects using a graphical interface and a tool for calculating great circle and rhumb line tracks.

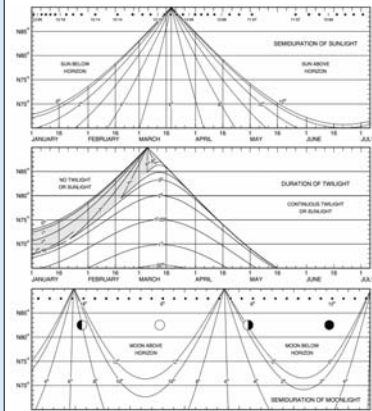
Collaboration with USNO

The Nautical Almanac and its electronic version, are produced in collaboration with the Nautical Almanac Office at the United States Naval Observatory. The combined expertise at the two offices provides further assurance of the accuracy of the data.



Continuous Improvement

HMNAO are always looking to improve our products. For our upcoming 2016 edition of *The Nautical Almanac* we will include a new section on Polar Phenomena, allowing the user to calculate durations of sunlight, moonlight and twilight at very high latitudes.



Feedback

We welcome feedback from our users, including navies and commercial shipping from around the world. Members of the office have gone aboard ships and attended training given to navies in order to gain an insight into how our products are used and to listen to the opinions of mariners who use them.



Thanks go to DID at the UK Hydrographic Office for printing this poster.