Biographical Encyclopedia of Astronomers

Maskelyne, Nevil

Born London, England, 6 October 1732

Died Greenwich, England, 9 February 1811

As Great Britain's fifth Astronomer Royal and founder of the *Nautical Almanac*, Nevil Maskelyne made practical the finding of longitude at sea. Maskelyne was the third son of Edmund and Elizabeth Booth Maskelyne of Purton, Wiltshire, England. His father died when he was 11 years old. Maskelyne was educated at Westminster School and admitted to Trinity College, Cambridge University. He graduated seventh wrangler in mathematics in 1754, took Holy Orders in 1755, and became a fellow of his college. Maskelyne was elected a Fellow of the Royal Society of London in 1758. He was appointed the fifth Astronomer Royal of England and director of the Royal Observatory at Greenwich in 1765; he held that office for 46 years. Maskelyne was also awarded his Doctor of Divinity (1777); he was named rector of Shrawardine, Shropshire (1775) and of North Runcton, Norfolk (1782). He married Sophia Rose in 1784; their only child, Margaret, was born the following year.

At the request of the Royal Society, Maskelyne traveled to the island of Saint Helena with Robert Waddington to observe the 6 June 1761 transit of Venus, but was thwarted by clouds. On the same voyage, however, he was able to make longitude calculations using the so-called "lunar distances" method advocated by Sir Isaac Newton and Edmond Halley, among others, and made possible by the improved lunar tables calculated by Johann Mayer. Maskelyne published the lunar distances method in *The British Mariner's Guide* (1763). While on Saint Helena, he carefully observed the tides and the variation of the compass, and undertook measurements on the annual parallax of Sirius

Finding longitude at sea was a major problem for sailors in the 18th century. Many ships had foundered as a result of not being able to determine their positions accurately. In 1714, the British Board of Longitude established a prize of 20,000 pounds to facilitate the discovery of a reliable method for determining longitude at sea. It fell to Maskelyne (as Astronomer Royal) to examine the various solutions and inventions proposed to this problem. In 1763, he sailed to Barbados in order to test the reliability of John Harrison's fourth chronometer, H-4, and found its accuracy superior to the lunar distances method. Maskelyne also undertook longitude determinations by observing eclipses of Jupiter's Galilean satellites and found this method impractical on the deck of a ship at sea

When Maskelyne succeeded Nathaniel Bliss as Astronomer Royal in 1765, he at last fulfilled the public function for which the Royal Observatory was founded by King Charles II in 1675, namely, the preparation of tables for ocean navigation. Maskelyne inaugurated the publication of *The Nautical Almanac and Astronomical Ephemeris*, the first volume of which appeared in 1766 for the year 1767. It contained a compendium of astronomical tables and navigational aids, such as James Bradley's tables of atmospheric refraction Maskelyne had assisted Bradley

in the preparation of such tables during the latter's tenure as the third Astronomer Royal in 1755. Maskelyne supervised the publication of the *Nautical Almanac* for 50 years, from 1767 to 1816. He also published the cumulative Greenwich observations for the period from 1776 to 1811 in four volumes, containing the positions of the Sun, Moon, planets, and selected reference stars. Maskelyne's work on the proper motions of several bright stars was used by Sir William Herschel to estimate the Sun's movement toward the constellation of Hercules.

In 1774, Maskelyne experimented with a plumb line to determine the mean density of the Earth by measuring the gravitational deflection induced by a mountain. In the summer of the previous year, astronomer Charles Mason (of Mason-Dixon line fame) toured the highlands of Scotland and regions in northern England in search of a suitable mountain. He eventually selected the peak of Schiehallion in the Cairngorm mountain range in Perthshire, Scotland. This mountain was reasonably isolated from other hills, had the desired east-west orientation (with a small north-south extent that Maskelyne sought), and had a relatively regular shape to facilitate the calculation of its volume. In this experiment,

Maskelyne investigated the principle and the constant of universal gravitation, confirming that the force of gravity acting between bodies is proportional to the inverse square of their separation. Charles Hutton analyzed Maskelyne's data and calculated a value for the mean density of the Earth between 4.56 and 4.87 g/cm³, as compared with the modern value of 5.52 g/cm³. For this demonstration, Maskelyne received the Copley Medal of the Royal Society in 1775

One of Maskelyne's correspondents was the Irish astronomer, James Archibald Hamilton, who operated a private observatory at Cookstown, County Tyrone. Hamilton communicated his observations of the 1782 transit of Mercury to Maskelyne, who commented favorably on the results. Hamilton was later appointed the first astronomer of the Armagh Observatory in 1790. Maskelyne was requested to obtain precision clocks for the Armagh Observatory and eventually recommended chronometer maker Thomas Earnshaw, who subsequently produced two astronomical clocks for the observatory. With Maskelyne's support, Earnshaw was awarded £3,000, under the new Longitude Act of 1774, for his innovative clock designs

Maskelyne contributed to a number of fields of study, e.g., he invented the prismatic micrometer and edited Mason's improvements to Mayer's lunar tables. Yet, his most enduring legacy was his contributions toward the longitude problem and his establishment of the *Nautical Almanac*. Several lunar craters are named for him, Maskelyne W being the crater used as a finder by the crew of Apollo 11 during the lunar module's final descent onto the surface in 1969. The Maskelyne Islands in the Pacific Ocean are also named for our subject.

John McFarland

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