

Buenaventura Suárez SJ: the pioneer astronomer of Paraguay

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Abstract

Father Suárez was a self-made astronomer in colonial Paraguay during the first half of eighteenth century. He constructed some scientific instruments, obtained data from his own astronomical observations, and made his own computations. He wrote to other scientists around the world, and published a book, *Lunario de un Siglo*, which was well received in Europe. Copies of this work are elusive today.

Key words: *Father Buenaventura Suárez, SJ, Lunario de un Siglo, latitude and longitude determinations, Paraguayan astronomy*

1 INTRODUCTION

San Cosme y San Damián (or San Cosme, for short) was one of the thirty communities set up by the Jesuits for Guarani Indians in the Great Province of Paraguay in South America. It is situated just north of the Paraná River, which marks the Paraguay-Argentina border (see Figure 1). San Cosme was founded in 1632, but in less than a century its location was changed at least three times as a result of attacks by Portuguese bandits originating from nearby Brazil (Furlong, 1978).

San Cosme's main claim to fame is that it was the home of Paraguay's first astronomer, the missionary priest Father Buenaventura Suárez, SJ (see Troche-Boggino, 1997, 1998). Born in Santa Fé (Argentina) on 1678 September 3, Suárez studied for the priesthood in Córdoba (also in Argentina), and then was based at San Cosme from 1703 until 1747. He then moved to Santa Maria, Argentina, where he died on 1750 August 23.

Apart from his astronomical achievements, little has been documented about Suárez's personal life, and no portrait of him has been located. However, he is known to have been a very amiable and prudent man, and not at all eccentric. He was very knowledgeable about medicinal herbs, and developed a method of preparing chocolate in a land where cocoa was not well known. He also made mirrors, organs, and bells, and advised local artisans in the art of picture-painting and icon-making (Furlong, 1978).

Father Suárez was the first native-born astronomer in southern South America, and was a contemporary of such famous 'Old World' astronomical figures as Bradley, Halley, and Newton (Figure 2). His southern hemisphere work predated that of La Caille at the Cape of Good Hope (see Evans, 1988), yet virtually nothing has been written about him (partly, one suspects, because of the paucity of relevant documentation). This little paper, which is based in part upon the account of Suárez provided in Spanish by Furlong (1978:597-606), summarizes what little we know about his pioneering astronomical achievements in Paraguay over a forty-year period during the eighteenth century.

2 SUÁREZ'S INSTRUMENTS AND ASTRONOMICAL OBSERVATIONS

With the help of local Indian artisans Father Suárez personally built several astronomical instruments. These included telescopes; at very least one sundial; a

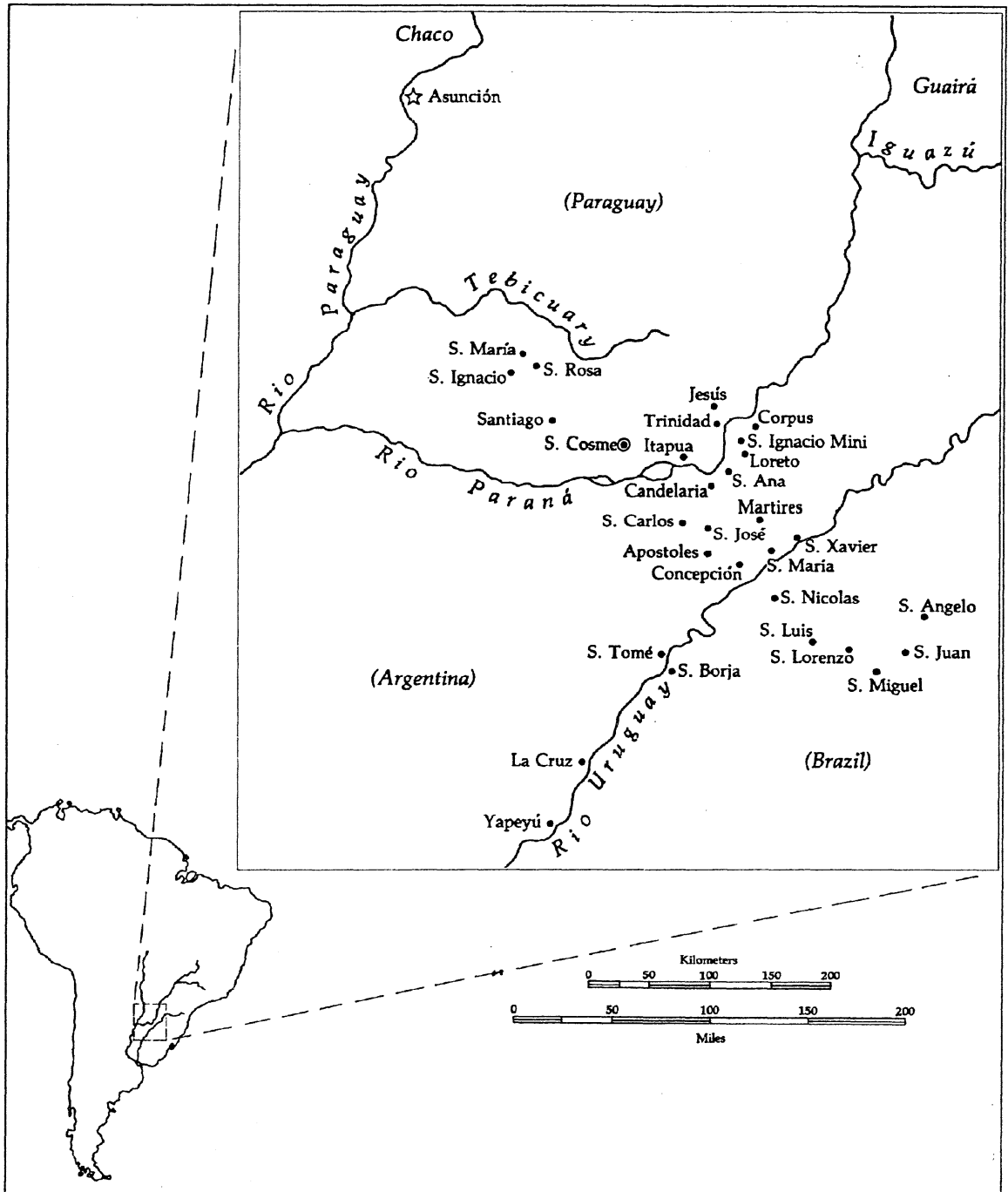


Figure 1. Jesuit towns of Paraguay, 1607-1767 (after McNaspy and Blanch, 1982:17).

quadrant (marked with degrees, subdivided into minutes); and a pendulum clock (Suárez, 1752; Furlong, 1978). Solar observations made with the quadrant were used to regulate the clock.

There is firm documentation that prior to 1739 Suárez made eight different refracting telescopes, or 'long view glasses', each featuring two convex lenses polished from local crystalline rocks. The lengths of these instruments are listed as 8, 10, 13, 14, 16, 18, 20, and 23 feet (*ibid.*), indicating that they were simple Galilean refractors of long focal length reminiscent – but on a much smaller scale – of those 'long telescopes' made during the previous century by Hevelius and others (e.g. see King, 1979:52-53). For them to have functioned at all, Suárez must have fashioned some form of simple supports for his telescopes.

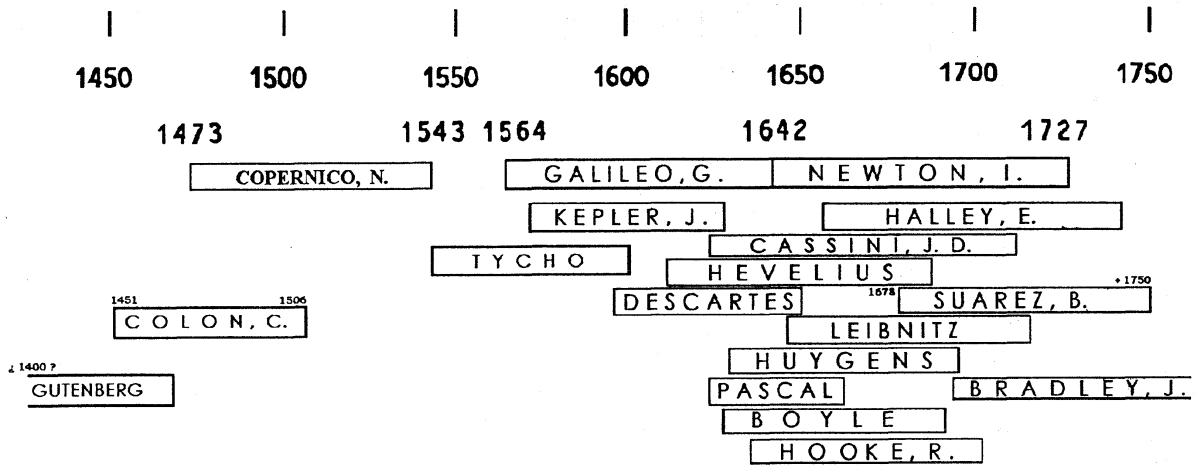


Figure 2. The life-spans of Fr. Suárez and other astronomers and scientists, 1450-1750.
Detail from a poster presented at IAU Colloquium 162, London, 1996

Suárez (1752) employed his two smallest telescopes to record solar and lunar eclipses, and between 1726 and 1739 he used his six largest telescopes and the astronomical clock to record 147 eclipses of the Jovian satellites. Prior to 1739 Suárez (*ibid.*) also observed some comets, but precisely which ones is not specified. Marsden and Williams (1999) reveal that just eight different comets were reported world-wide between 1703 and 1739 (inclusive), and these are listed below in Table 1. However, as the final column in this table indicates, not all of these comets were prominent naked eye objects when viewed from San Cosme (A Gilmore, pers. comm., November 2000).

Table 1. Comets, 1703-1739

Comet	Perihellon Time	Old Designation	Visibility
C/1706 F1	1706 January 30.706	1706	Marginally naked eye
C/1707 W1	1707 December 12.488	1707	Naked eye
C/1718 B1	1718 January 15.406	1718	Naked eye
C/1723 T1	1723 September 28.128	1723	Naked eye
C/1729 P1	1729 June 16.648	1729	Telescopic
C/1733 K1	1733 May 6.159	1733	Naked eye
C/1737 C1	1737 January 30.847	1737 I	Naked eye
C/1739 K1	1739 June 17.916	1739	Marginally naked eye

By the early 1740s the Jesuit provincial heads had come to recognize Father Suárez's genius, and they decided to provide him with two professionally-made telescopes (of unspecified manufacture) and two 'Martirion' (Martineau?) clocks. All of these instruments were imported from England, and arrived in 1743 (Furlong, 1978). The telescopes had focal lengths of 8.25 and 16.5 feet, and judging by other telescopes in this size range available in Europe at this time (e.g. see Howse, 1986; King, 1979) were most likely refractors rather than reflectors. Collectively they cost 36,000 pesos, while the clocks were even more expensive at 62,400 pesos (Furlong, 1978). With these new instruments, Suárez was able to substantially improve the accuracy of his Jovian satellite observations.

During his time in Paraguay Father Suárez determined the longitude and latitude of San Cosme, and he then used these as datum points from which to establish the coordinates of all of the other local Jesuit mission towns (Furlong, 1978:303). It would appear that he used Galilean satellite observations to establish the longitudes.

Although there is no evidence that Suárez published any of his astronomical observations in scientific journals, he did correspond with other scientists – including

Celsius at Uppsala, de Peralta at Lima, Grammatici at Amberg, l'Isle at St. Petersburg, and Koegler at Peking – and exchanged observations with them (Furlong, 1978).

3 THE BOOK *LUNARIO DE UN SIGLO*

Father Suárez may not have published any research papers about his on-going astronomical work, but he did publish a book, *Lunario de un Siglo* (literary, *Lunar Calendar for a Century*), based upon his own observations and the astronomical writings of Hipparchus, Copernicus, Reinaldo, Mulerio, Petacio, Billi, de l'Isle, and de la Hire.¹ Although all the necessary calculations were completed in 1739, *Lunario de un Siglo* did not appear until 1743 or 1744. The first edition came out in Europe (city unknown) of which no copies are extant, and the book was subsequently reprinted in Lisbon (Portugal) in 1748, Barcelona (Spain) in 1752 (see Figure 3), Quito (Ecuador) in 1759 and in Corrientes (Argentina) in 1856 (Furlong, 1978). It is of interest to note that three of these reprints were published posthumously and that the last two originated from South America.

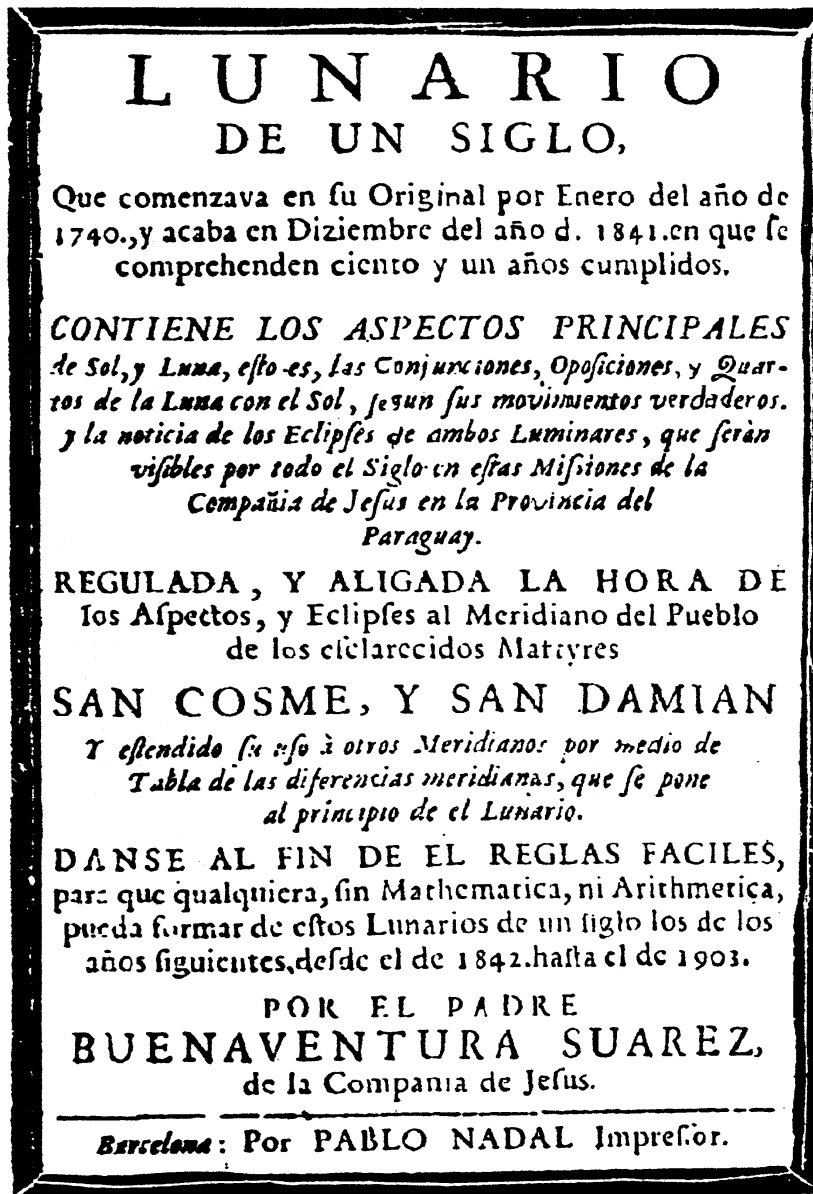


Figure 3. Title page of the 1752 Barcelona edition of *Lunario de un Siglo* (after Furlong, 1978:602).

Lunario de un Siglo is a kind of astronomical calendar for one century (covering the period 1740 January to 1841 December), and contains the dates of phases of the Moon, solar and lunar eclipses visible from Jesuit towns, and church festivals. Also listed are the longitudes (in hours and minutes relative to San Cosme) and latitudes of seventy different towns and cities around the world. Suárez also gives rules for the extension of the data in *Lunario de un Siglo* from 1842 through to 1903. When it was first published this proved a very useful book, and consequently it was well received in Europe.

4 THE LEGACY

By order of King Carlos III, Jesuit priests and brothers were expelled from Spain and all of its colonies about 1767. San Cosme had 3,356 inhabitants at this time, and as with other Jesuit communities in Paraguay its population declined. The passage of the years and military actions also took their toll, and now all that remain on the sites of many of the original communities are ruins and some sculptures (see McNaspy and Blanch, 1982).

San Cosme fared somewhat better and today is a little town of about 4,000 inhabitants. All of Father Suárez's astronomical instruments have been lost, but a sundial at San Cosme has survived (Figure 4) and is attributed to him (Servin, 1988). Meanwhile, his church, house and, a number of associated buildings have been reconstructed, all serving as a testament to this exceptional man.



Figure 4. The surviving Suárez sundial at San Cosme y Dámian (Troche-Boggino Collection).

5 CONCLUDING REMARKS

Father Buenaventura Suárez was South America's first native-born astronomer, and was a remarkable man. Despite his isolated situation, he constructed a number of

scientific instruments (including eight different telescopes and an astronomical clock), and used the telescopes to observe comets, solar and lunar eclipses, and Jovian satellite phenomena. Some of these observations served to provide the latitudes and longitudes of the thirty little Jesuit communities in the Great Province of Paraguay. Suárez also wrote a book, *Lunario de un Siglo*, which was well received in Europe and South America and went through four reprints.

Suárez is recognized as Paraguay's earliest astronomer and he is also well known to Argentine astronomers (who consider him *their* first astronomer), yet little has been done to document and publicize his achievements.² This little paper provides a useful start, but a much more detailed account is warranted. The challenge in conducting such a study will be to access Jesuit and other archival repositories in Europe and locate letters and other records written by, or about, Suárez.

6 ACKNOWLEDGEMENTS

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7 NOTES

- 1 De la Hire provided a basic table that Suárez used for his eclipse computations.
- 2 However, Dr Jaime Garcia (Director of the Instituto Copernico, Argentina, and a leading member of the Liga Latinoamericana de Astronomía) is also taking an interest in Suárez, while Dr B Servin has actively promoted Suárez's memory here in Paraguay.

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