

2023: *The Journal of Astronomical Data* 29, 1.

BOOK REVIEW

Three Millenniums of Measurement of Earth

I–V. Notes on the History of determining the Size and Shape of the Earth using Meridian Arcs

1. *From earliest times to Riccioli c. 800BC–c. 1660*
2. *From Picard to the Peruvian arc c. 1650–c. 1744*
3. *From Maclaurin to Cavendish c. 1740–c. 1820*
4. *From Svanberg to Arc of the 30th meridian c. 1800–c. 1955*
5. *From Spitzbergen to Bomford c. 1880–c. 1960*

VI. Meridian Arcs in East & Southern Africa with Emphasis on the Arc of the 30th Meridian

VII. Connection between the Struve Geodetic Arc and the Arc of the 30th Meridian

Jan De Graeve & Jim R. Smith

Trimble and FIG Publications. 2020, 3108 p.

ISBN 978-87-92853-96-7 (printed) & ISBN 978-87-92853-97-4 (pdf), 300.00/200.00 EUR

This work is a collection of seven books covering the life-long research work of Jim Smith (1934–2021) and Jan De Graeve on the history of geographical surveying. Only one hundred *Special Edition Sets* of the seven volumes, totalling more than 3000 pages, have been published in print. These volumes deal with measurements of arcs in Europe, Peru, India, Africa and many other places up to the 1950s, when advancements in measurement technology let distance-measuring devices and satellite navigation systems to take over the tedious tasks of expedition-borne visual surveying.

Volumes I–V, *Notes on the History of determining the Size and Shape of the Earth using Meridian Arcs*, consist of a massive set of notes painstakingly collected over decades, covering the determination of the size and the shape of the Earth since about 800 BCE until the nineteen-sixties, a span of almost three millennia. The layout of each volume covers a time base which in some cases overlaps preceding or subsequent volumes. The first volume covers 2500 years up to c. 1660 in seven chapters. Volume II ranges 1650–1744 in five chapters, Volume III spans an almost entire century 1740–1820 in five chapters, Volume IV contains the entire 19th century until the mid-1950s and Volume V deals with a time interval from 1880 on, and partly overlaps with the previous volume. This volume closes with a chapter on the use of pendulums.

Volumes VI and VII, respectively, *Meridian Arcs in East & Southern Africa with Emphasis on the Arc of the 30th Meridian* and *Connection between the Struve Geodetic Arc and the Arc of the 30th Meridian*, complement each other and describe the history of the measurement of Earth covering the longest span ever: approximately 105 degrees of latitude (11 650 km) from Hammerfest in Norway to Port Elizabeth in South Africa.

Meant to not only estimate the size of the Earth, but also its shape, the string of arcs on the African continent consisted of a continuous chain of triangles from the

Cape to the Mediterranean. The European chain comprised two main sections, *viz.*, the Struve Arc from the North Cape to the Black Sea, and its prolongation via Crete to Cairo. The latter strand of triangles is the main theme of Volume VII.

The groundwork for this collection of books was carried out by Ronald Stretton Webb (1892–1976) in the 1920s–1930s, who compiled an archive of historical data that were to serve the fulfillment of his vision of compiling the most comprehensive historical work on geodesy ever. Jan De Graeve and Jim R. Smith persistently pursued the depths of detail that Webb incorporated. They also included extracts from the various prefaces to Webb’s twelve unpublished volumes (each with up to 500 pages of handwritten text).

Not only the great players are biographized, but also numerous other persons who were working in surveying Earth are chronicled. As such, the authors embed a social aspect that is mostly neglected in historical studies, in particular the role of assistants and auxiliary staff, and “service” scientists, *viz.*, the large number of people with scientific or technical training in mathematics, astronomy, instrumentation and measurement, but who never appear in biographies.

This is a reference work with innumerable clues to historical sources: there are nearly 2500 references covering 80 pages. Citations, *verbatim* and in translation, are plentiful, and there are numerous text boxes with biographical information about early surveyors and geographers. In addition, there is a lot of technical information about surveying apparatus and instruments, as well as a comprehensive account of units of measurement, and frequent critical discussions of sources of measuring error.

Each volume has its separate index, and Volume V contains a complete index as well as an overall list of references of Volumes I–V. Some (of the more than 400) illustrations have captions handwritten by R. Webb.

The authors kicked-off with Webb’s heritage but they had in turn also to wrap up because of their age. With one of them being octogenarian, they had to call closure rather than leave the work unfinished and most likely lost. Therefore, the style of this work is unavoidably somewhat telegraphic, with often purely informative statements and short sentences.

This treasure trove awaits a team to build a full e-version comprising hyperlinks, and a dedicated wiki website that also covers the satellite-borne developments of the past half century.

Christiaan Sterken

Vrije Universiteit Brussel

Pleinlaan 2, B-1050 Brussels, Belgium
