As this book is basically a catalogue of the Adler's collection of sundials it does not necessarily give full technical details of each type of dial, so at the back is a Bibliography with about 444 entries listing books and other publications describing such sundials. Although many of the books are from the twentieth century there are some as early as the sixteenth century.

Apart from the few minor problems mentioned above, this is an excellent and attractive work, and I look forward to reading Volume 2 when it is published.

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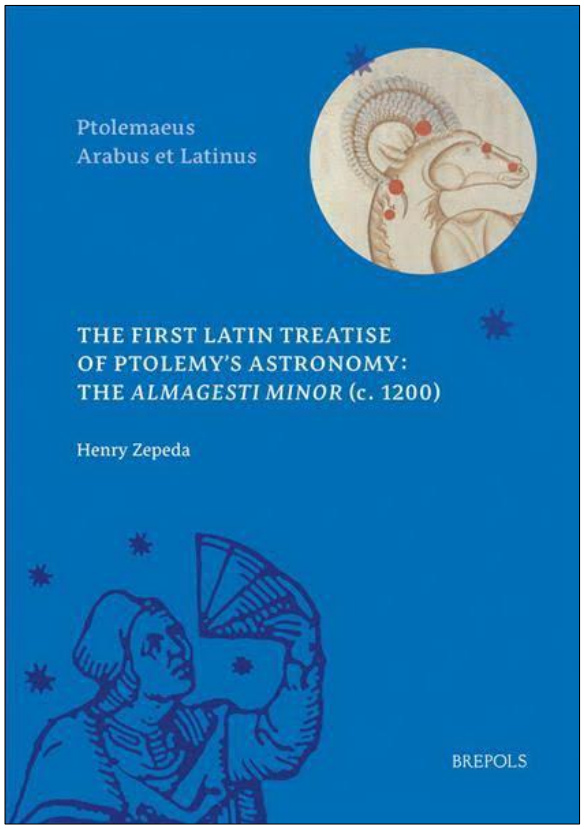
The First Latin Treatise of Ptolemy's Astronomy: The *Almagesti Minor* (c. 1200) [Ptolemaeus Arabus et Latinus, Texts: Volume 1], by Henry Zepeda. (Brepols, Turnhout, 2018). Pp. x + 662. ISBN: 978-2-503-58137-8 (hardback), 178 × 254 mm, Euros 155.

The *Almagesti minor* is the first volume of the "Ptolemaeus Arabus et Latinus" Text Series. With this book, Henry Zepeda offers us the critical edition, translation and commentary of this famous Latin abridgement of Ptolemy's *Almagest*, Books I to VI.

The book has three major parts: I. Introduction, II. Critical Edition and Translation, and III. Commentary on the Text and Figures.

I. Introduction. – The first section is about the title, date, origin, and author of the *Almagesti minor* (pp. 5–19). Although this work is known to modern scholars as *Almagestum parvum*, Zepeda retains *Almagesti minor*, which better reflects the manuscript tradition. This work would have been written ca. CE 1200, with CE 1220 as the *terminus ante quem*, because extracts of it appear in Guillelmus' *Astrologia*. This work cannot be attributed to Albategni (al-Battānī) or Geber (Jābir ibn Aflaḥ) because the text follows Gerard of Cremona's Latin version of the *Almagest*, which is later. Zepeda finds little evidence of previous attributions, e.g. to Thomas Aquinas, Albert the Great, Hermann of Carinthia, Campanus of Novara, and Walter of Lille (according to Richard de Fournival's *Biblionomia*, ca. 1240), and only concludes that the text may have been written in northern France. The *Almagesti minor's* most remarkable feature is that Ptolemy's text has been stripped down in elements, and reorganized—sometimes adapted—to fit into an "… axiomatic, deductive …" structure in the Euclidean style (see pp. 21–27). This choice explains the disappearance of the many tables from the *Almagest* and the deletion of the first eight (non-mathematical) chapters of the *Almagest*, summarized in a few sentences. As this is an essential feature of the text, an analysis of the axiomatic structure of the text would have provided a better understanding of the author's reflection on the structure of the text, his choices of materials from the *Almagest* and reorganization into a work of its own. A critical reflection on the limits of this reorganization would have been useful. The preliminary principles of each book are more often definitions than demands (postulates) or common notions (axioms). The definitional structure is not always consistent: some concepts are used covertly, without any connection to the apparent 'Euclidean' structure. For example, the concepts of parallax (II, 36), epicycle (III, 3), apogee and perigee (III, 3-4), syzygy (V, 10) do not refer to any preliminary definition.



As regards the author's sources (pp. 29–39), textual parallels show that the *Almagesti minor* owes much to Gerard of Cremona's Latin translation of the *Almagest*. The author also very often borrows from al-Battānī's *Zīj* (translated by Plato de Tivoli as *De scientia astrorum*). Numerical values are not from Ptolemy or al-Battānī, but most often from the Toledan Tables. Hipparchus and Theon of Alexandria are known second-hand. The 23 MSS of *Almagesti minor* (pp. 47–70) fall into four groups which are 1A(P, F, R_1)–1B(Pr, Me, L_1, N), 2(P_7, B, Da, E, T, E_1, W_1), 3A(K, P_{16}, D, R, L, W_2)–3B(M, W), 4(Ba). In examining the relationships between the MSS, Zepeda concludes that no stemma codi-

cum can be created through the standard practice of critical edition. He only provides a tentative stemma p. 54, without excluding the possibility of contaminations.

In the section on Influence (pp. 81–119), the author shows that the *Almagesti minor* had a decisive influence on Latin astronomers, notably Robert Grosseteste, Richard of Wallingford, Simon Bredon, Johannes Schindel, John of Gmunden. This was also the case of Peuerbach and Regiomontanus (pp. 109–114) who used it to compose, at Cardinal Bessarion's request, an *Epitome of the Almagest* that would be later used by Copernicus and Erasmus Reinhold. Editing methods are explained pp. 121–129. Zepeda has prepared his critical edition by reporting the readings of seven best witnesses, but mainly the following five: 1A(P)-1B(N), 2(P_7), 3A(K)-3B(M). The decision has been made to exclude 4(Ba) because of its too many variants. P (Paris, BnF 16657, b. 1260), a witness who is both old and presumably close to the autograph, is considered a reliable witness.

II. Critical Edition and Translation (pp. 131–527). – The contents of the *Almagesti minor* are in Book I: Preliminaries (Plane and Spherical Geometry), Book II: The Celestial Sphere, Book III: Sun's motion, Book IV: Moon's motion, Book V: Irregularities of Moon's motion, Book VI: Eclipses. The *Almagesti minor* does not include the fixed stars or the planets. The choice to reorganize the materials of Ptolemy's *Almagest* following the structure of propositions, leads the author of the *Almagesti minor* to put emphasis on geometrical proofs, and to complete them when necessary. The extent of these additions varies. In some cases, these are short additions. For example, prop. III, 4 completes *Almagest* III, 3, by demonstrating that angle AZB is smaller than GZD. Prop. V, 19, about the Moon's parallax, rejects the assimilation of al-Battānī between the hypothenuse and the long side of a very thin triangle: the author adds a few steps of calculation of the hypothenuse. In other cases, the addition is more substantial. For example, prop. I, 14 gives a demonstration of the "joint figure" – "alkata coniuncta" – of Menelaus' theorem, which is stated without demonstration in the *Almagest* I, 12. Prop. III, 1 similarly deviates from Ptolemy: it provides the values of the length of the year by al-Battānī, Thabit and the Toledan Tables, introduces the theory of trepidation, and states that the length of the year is not constant through time. Prop. V, 22, about parallaxes, gives a demonstration of the case in which the Moon is located south of the ecliptic, which is missing in Ptolemy. Prop. VI, 13, which aims to determine the digits of the lunar eclipse for whatever latitude of the Moon from the ecliptic, and for whatever distance of the Moon from the Earth, has no equivalent in Ptolemy's *Almagest*; in addition, the author takes the demonstration much further than al-Battānī does in *De scientia astrorum*, chapter 43. Prop. VI, 17 on apparent syzygies follows a method different from Ptolemy, *Almagest* VI, 10. In general, the demonstrative style of the *Almagesti minor* denotes the author's familiarity with al-Battānī. Another way to emphasize the demonstrative structure and universal scope of the text was to replace calculations with 'metrical analyses', i.e. theoretical justifications for the derivation of a numerical value given through calculation. They occur quite frequently in the *Almagesti minor,* e.g. I, 16–17.

Commentary (pp. 529–579). – Zepeda identifies the passages in discussion from the *Almagest* and describes the changes introduced by the author. Despite the thorough reorganization of the text, it is clear that *Almagest*'s materials were picked out in the order in which they were read. Except for props. V, 6-7 (*Almagest* V, 7 and 5) and VI, 9-10 (*Almagest* VI, 9 and 6), the text has no inversion. The *Almagesti minor* comes with a large number of geometric figures that differ from, or are not found in Ptolemy's *Almagest*. From a methodological point of view, Zepeda's edition takes advantage of the recent interest in diagrams to offer a critical edition of the figures. In his Commentary (pp. 581–607), Zepeda states which figure is chosen (most often from P: Paris BnF 16657 and K: Kraków, Biblioteka Jagiellońska 1924) and discusses the variants in graphic structure and lettering encountered in the main witnesses of the text – quite often in a larger number of manuscripts. The book is backed by an Appendix, which provides additions and alternate proofs (pp. 609–633), a Glossary of select words and phrases (pp. 635–646) and a Bibliography (pp. 647–662), which is extensive and up to date.

Comparisons between the *Almagesti minor* and other abbreviations could clarify their respective characteristics or establish possible dependencies. The present book indeed refers to Geber (Jābir b. Aflaḥ), the author of *Iṣlāḥ al-Majisṭī (Correction of the Almagest)* translated into Latin as *De Astronomia*, and published in 1534 as *Instrumentum primi mobilis*. There is no mention of the *Mukhtaṣar al-Majisṭī (Epitome of the Almagest)* composed by Averroes ca. 1159–1162, which is lost in Arabic, but preserved in Jacob Anaṭoli's Hebrew translation, *Qiṣṣur al-Magisṭi*, ca. 1235 (Lay, 2019). The intertextual question is all the more important as in the Latin translation of Averroes' *De separatione primi principii*, the author Alfonso declares: "Averroes knew the Almagest very well: indeed, I have seen an epitome of the Almagest written by him, a book which King Alfonso the Great has had translated, and which is found in Bologna and Spain. These are the words of

Master Alfonso, the translator of this treatise …" (= "*Scivit enim Averoys optime Almagestum. Nam vidi per eum Almagesti abbreviatum, quem librum fecit transferre rex Alfonsus magnus, et habetur Bononie et in Hispania. Hec sunt verba magistri Alfonsi, translatoris huius tractatus*…") (Steel and Guldentops, 1997: 94–95). There are three Alfonsos here. The first is the author of the Latin text, Alfonso Dinis of Lisbon (d. 1352) appointed personal physician to the King of Portugal. *Alfonsus magnus* could be Alfonso X of Castile (1221–1273). *Magister Alfonsus* is Alfonso de Valladolid, i.e. Abner de Burgos (d. 1350), a converted Jew, then sacristan of Valladolid (= "*converso sacrista [Vallis]toletano*"), who served as an interpreter from Arabic to Spanish to Alfonso Dinis, when the latter was writing the Latin version of Averroes' *De separatione primi principii*. So, in the passage quoted above, this is Abner de Burgos, who was the eyewitness to Averroes' *Almagesti abbreviatum*, and certified that a (Hebrew or Latin?) translation was made at Alfonso the Great's request. Since Averroes' *Epitome* contains no table and little numerical data, it would be worth seeing whether the generalizing nature of these texts results from an interference or a coincidence.

The *Almagesti minor* is indisputably an important milestone in the history of astronomy. Henry Zepeda has provided an excellent piece of scholarship that deserves to be known by all those who are curious about medieval and Renaissance astronomy.

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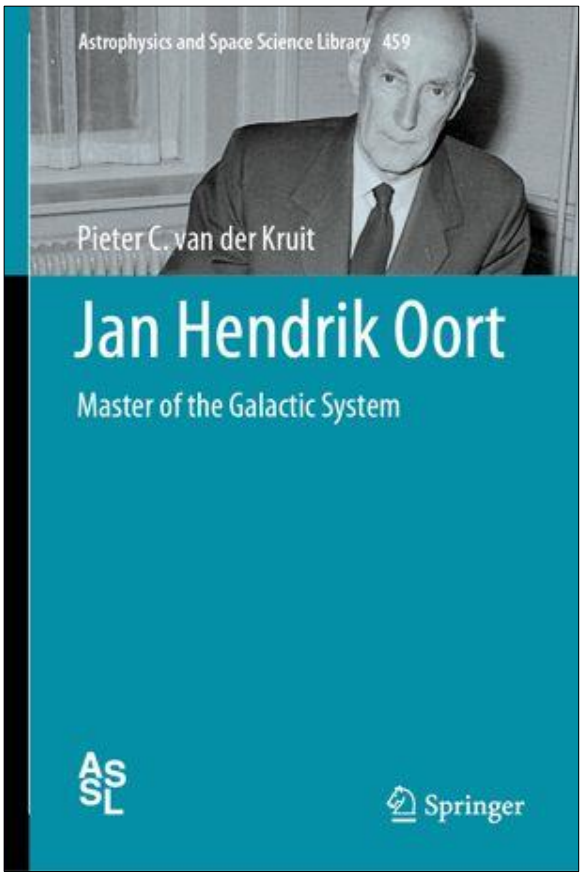
***Jan Hendrik Oort: Master of the Galactic System*, by Pieter C. van der Kruit (Cham (Switzerland), Springer, 2019). Pp. xx + 726. ISBN 978-3-030-17800-0 (hardback), 160 × 240 mm, €155.99.**

The very slender Jan H. Oort (1900–1992) was one of the colossi of twentieth century astronomy and well deserves a colossal biography. This he now has, thanks to his student, Pieter C. van der Kruit (PhD, Leiden, 1971).[1] This volume does not tell you everything that is to be known about Oort (one of my own stories appears near the end of this review), but it does present an enormous richness of information about his life, work, influence on other scientists, and contributions to the survival of international astronomy under exceedingly difficult circumstances. Van der Kruit, himself an outstanding research astronomer,[2] only nominally retired, also provides interludes of explanation of the scientific issues as seen then and now surrounding Oort's achievements, particularly concerning the structure and dynamics of our own Milky Way Galaxy and some of its wondrous contents.

The last 100 pages include a CV, list of publications, students, honours, and academic ancestors; English language versions of Oort's inaugural and valedictory addresses as Professor



at Leiden (1935 and 1970); as well as the talk he gave at the post-WWII re-opening of Leiden Sterrewacht (Observatory) on 20 June 1945; notes citing sources; and Indices of people, galaxies, telescopes, places, and concepts. The directly-quoted words of Oort and everybody else, written or spoken, appear in a distinctive bold-face type, which is genuinely very helpful in keeping the reader from worrying, "Is this just the opinion of the author, or someone else?"

Why should anybody care, always excepting, as for all biographies, family and friends (among the latter of whom I am proud to count myself)? Some indication of Oort's significance for twentieth century astronomy is to be found in