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Petra Hyklová

ORCID 0000-0002-0893-8939
Institute of Philosophy, Czech Academy of Sciences
(Prague, Czech Republic)
hyklova@flu.cas.cz

Elías Fuentes Guillén

ORCID 0000-0001-8722-5090
Institute of Philosophy, Czech Academy of Sciences
(Prague, Czech Republic)
eliasfg@flu.cas.cz

Continuity and Change in Astronomy in the Czech Lands at the Turn of the 19th Century

Abstract

Founded by the Jesuits in the mid-18th century and situated within the Clementinum complex, the Prague Observatory played a significant role in astronomy in the Czech lands for around two hundred years. In this article, we analyse the work of the community that formed around this observatory in the late 18th and early 19th centuries. Specifically, we examine how this work reflects both some of the astronomical practices that were common at the time and new trends, as well as the observatory's own position within such a context. As we shall show, whilst this was a period characterised by a degree of continuity, there were also significant changes – or attempts at change – particularly during the directorship of Alois David, who was in charge of the Prague Observatory at the turn of the 19th century.

Keywords: *Prague Observatory, history of astronomy, Alois Martin David, Czech lands, positional astronomy, longitude problem*

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Ciągłość i zmiany w astronomii na ziemiach czeskich na przełomie XIX i XX wieku

Abstrakt

Założone przez jezuitów w połowie XVIII wieku i położone na terenie kompleksu Klementinum, Obserwatorium Praskie odgrywało znaczącą rolę w astronomii na ziemiach czeskich przez około dwieście lat. W niniejszym artykule analizujemy działalność społeczności skupionej wokół tego obserwatorium pod koniec XVIII i na początku XIX wieku. W szczególności badamy, w jaki sposób praca ta odzwierciedla zarówno niektóre z powszechnych wówczas praktyk astronomicznych, jak i nowe trendy, a także pozycję samego obserwatorium w tym kontekście. Jak pokażemy, chociaż był to okres charakteryzujący się w pewnym stopniu ciągłością, nastąpiły również istotne zmiany – lub próby zmian – szczególnie za czasów dyrekcji Aloisa Davida, który kierował Obserwatorium Praskim na przełomie XIX i XX wieku.

Słowa kluczowe: *Obserwatorium Praskie, historia astronomii, Alois Martin David, ziemie czeskie, astronomia pozycyjna, problem długości geograficznej*

1. Introduction

With the rise of the modern era, colonialism, and transoceanic voyages, new demands on astronomy and related fields emerged. In particular, in the interests of administration and safe ocean navigation, governments mainly needed more precise maps, calendar maintenance, and the determination of geographic coordinates, all of which required greater precision of the coordinates of stars and issuing ephemerides of the Sun, Moon and planets. This, in turn, entailed more comprehensive cooperation not only between astronomers but also between a growing number of observatories, from comparing and evaluating observations from different observatories to extensive collaborations on common enterprises.

Towards the end of the 18th century, in addition to letters, astronomical practitioners started to exchange scientific publications and, more importantly, astronomical books and journals.[1] This was linked to the emerging professionalisation of mathematical disciplines and, ultimately, of astronomy, as a result of which new platforms for the communication of news were gradually developed.[2] Among these new spaces in which collaborations were negotiated were the astronomy congresses, as well as the newly established astronomy societies, such as the Vereinigte Astronomische Gesellschaft (established in 1800) and the Royal Astronomical Society (1822).[3]

In the case of observatories, an effective cooperation required a more precise determination of the difference between their geographic longitudes, inasmuch as all observatories worked with the local times. It is true that the determination of geographic coordinates had long been an important problem not only for astronomy but also for cartography and safe ocean navigation. But the new collaborations between astronomers necessarily required the refinement of those coordinates and, in particular, of longitude,[4] which therefore turned out to be one of the most important tasks of the observatories.

In this paper, we address the work carried out by the community that formed around the Prague Observatory in the late 18th and early 19th centuries. In particular, we examine how this work reflects both some of the astronomical practices that were common at the time and new

[1] The most prominent periodicals in astronomy were *Astronomisches Jahrbuch* (from 1776), *Monatliche Correspondenz zur Beförderung der Erd-und Himmels-Kunde* (1800–1813), *Astronomische Nachrichten* (1821), *Memoirs of the Royal Astronomical Society* (1822), and *Monthly Notices of the Royal Astronomical Society* (1827). See Holl 2004.

[2] See Barrow-Green, Gray, Wilson 2022, 335 ff.

[3] See Gerdes 1990; Dreyer, Turner 1923.

[4] Determination of latitude was easier than longitude. For more on this, see Dunn, Higgitt 2014.

trends, as well as the observatory's own position within such a context. To this end, in Section 2 we offer an overview of the astronomical knowledge in Europe at the time, while in Section 3 we explain the general state of the observatories' facilities and equipment. Then, on this basis, in Section 4 we address the astronomical community in the Czech lands in the late 18th century and its work, as well as the status of the Prague Observatory. As we shall show in this section, but especially in Section 5, whilst such a period was characterised by a degree of continuity, there were also significant changes – or attempts at change – particularly during the directorship of Alois David, who was in charge of the Prague Observatory at the turn of the 19th century.

2. The state of knowledge

In order to better understand astronomical practices in the Czech lands at the turn of the 19th century, and in particular in Prague, it is useful to provide an overview of the astronomical knowledge in Europe at the time. To begin with, solar culmination observations carried out at most observatories throughout Europe, which were important for timekeeping (both as a public service and for research purposes), provided an opportunity to examine the Sun as a physical object and determine its properties. This examination involved, among other things, the observations of sunspots made with telescopes and camera obscura, which enabled astronomers to determine the solar activity cycles, its rotation period and surface structure, and of which astronomers had hundreds at their disposal by the beginning of the 19th century.[5]

In addition to the determination of physical properties of the Sun, another important problem at the time was the determination of the astronomical unit within 1% of its modern value, which helped to estimate the scale of the whole solar system. This was achieved by correlating observations of the transit of Venus from widely separated locations, which were obtained thanks to expeditions carried out by astronomers from England, France and Austria in 1761 and 1769. This was therefore a large-scale cooperation between astronomers that required the support from governments, as well as cooperation with military authorities and negotiations of safe passage during the Seven Years' War.[6]

There were also constant discussions on the possibility of the existence of undiscovered objects in the Solar System, in particular within the sizable space between Mars and Jupiter.[7] The fortuitous discovery of Uranus by William Herschel in 1781 only strengthened these discussions, and a coordinated sky survey focused on the search for such a planet and the improvement of star catalogues called the Celestial Police (Himmelspolizey) was established at the astronomical conference in Lilienthal in 1800.[8] As a result, between 1802 and 1807, three bodies were found in the Mars-Jupiter gap (Pallas, Juno, and Vesta), the status of which, in addition to that of a body that was discovered accidentally and independently of the Celestial Police survey in 1801 (Ceres), was disputed from the very beginning.[9]

Discoveries of new bodies of the solar system and the calculations of their orbits were closely intertwined with the development of celestial mechanics.[10] This included the theory of lunar motion, which required tables of the positions of the Moon within at least an arc-second

[5] While in 1774 Alexander Wilson hypothesised that sunspots are openings in the Sun's luminous atmosphere (Wilson, Maskelyne 1774), variations of sunspots were systematically observed by Samuel Heinrich Schwabe from 1826 (Schwabe 1838).

[6] See Teets 2003.

[7] For example, the possibility that at some point a planet between Mars and Jupiter could have existed was discussed in Lambert 1761, pp. 6–7, while the so-called Titius-Bode Rule, which, though not universally accepted (Schwemin 2022, p. 92),, pointed to the existence of such a planet, was first used by Johann Daniel Titius and popularised in Bode 1772, pp. 462–463 and later editions, a book that was indeed used at the University of Prague.

[8] For more details on this conference, see Trimble 2015.

[9] Hughes, Marsden 2007.

[10] For example, Gauss's new method of least squares, published in Gauss 1809, proved instrumental in the initial determination of the orbit of Ceres.

precision. These positions were obtained through observations of stellar occultations by the Moon, which in turn required knowledge of accurate positions of those stars included in the newest star catalogues. But such a development also encompassed the improvements in accuracy of nautical almanacs, which impacted the determination of geographic coordinates and therefore had practical implications.[11]

Other objects being studied at the time were comets and binary stars. On the one hand, physical properties of comets were widely discussed, including the origin and nature of their tails as explained and confirmed by Heinrich Wilhelm Olbers and Friedrich Wilhelm Bessel, respectively,[12] while the second and third known periodical comets were identified in the 1820s. On the other hand, the systematic observation of changes in the relative position of binary stars for more than two decades led W. Herschel to prove that some binaries are orbiting their common centre of gravity, which allowed Félix Savary to compute the first orbit of a binary star and Friedrich Georg Wilhelm von Struve to publish his catalogue of binaries in 1827.[13]

It is important to note that, while in all these cases the improvements of telescopes were crucial, in the particular case of stellar astronomy they led to significant advancements. Firstly, some of the previously observed *nebulous stars* were revealed to be in fact diffuse cloud-like structures or star clusters, the first catalogue of which was published in 1771–1781 by Charles Messier, and it was this advancement that prompted Laplace's development of the nebular hypothesis in 1796. Secondly, the distribution of stars was studied from the 1780s by W. Herschel and his son John Herschel.[14] Finally, the first successful measurements of stellar parallaxes in the 1830s enabled calculations of the actual distances of stars from our solar system.[15]

3. The state of facilities and equipment

3.1. Astronomical instruments

Most astronomical instruments at the turn of the 19th century were intended for measurements of the positions and movements of stars, planets, and comets as well as for geodesy. In European observatories, refractors prevailed as the most utilised – and largest – instruments and circles, quadrants or sextants with graduations and attached smaller telescopes were regularly used, while mirror telescopes were still in development, and the spectroscope, which enabled observations of spectra of the Sun, Moon, planets and stars, was only invented in 1814.[16]

For the observation of faint objects such as nebulae, astronomers needed telescopes with larger apertures and thus larger light-gathering power, the most advanced of which, namely Herschel's Great Forty-Foot (finished in 1789), proved unwieldy, leading him to use a smaller and more manageable telescope instead.[17] A great practical advance, however, was achieved with the improvement of practices for the construction of more precise aspheric and parabolic speculum mirrors, which nevertheless suffered from poor reflectivity and tarnishing in the open air, as a result of which they required constant removal, repolishing and re-configuration.[18] All of which, in the end, accounts for the increasing necessity of certain materials but also expertise

[11] For more on this, see Dunn, Higgitt 2014.

[12] Olbers correctly explained the origin of comet tails in 1812 and Bessel observed streams of vapour from the core of Halley's Comet in 1836. See Guillemin 2010.

[13] See Herschel 1803, Struve 1827, and Savary 1827.

[14] For more on W. Herschel's research, see Hoskin 1963. For more on J. Herschel, see Case, Verbugt 2024.

[15] Published in Struve 1837; Bessel 1838; Henderson 1840.

[16] For more see King 2003. For more on Joseph von Fraunhofer's invention of the spectroscope, see Dutta Roy 2025.

[17] See Wilson 2007, p. 134.

[18] This issue went unsolved until the mid-19th century, when speculum was replaced by silvered glass. See Wilson 2007, p. 11.

for the construction, development and maintenance of more complex optical instruments, including large astronomical telescopes.[19] This, in turn, led to the professionalisation of scientific instrument making from the second half of the 18th century. [20]

One of the problems that astronomers – and therefore instrument makers – were facing was the stability of instruments used for precise measurements of events, as in the case of the aforementioned timings of celestial phenomena (see Section 2). That way, while smaller instruments on tripods were conveniently movable but less stable, larger and heavier movable telescopes needed special mounts that varied in degrees of freedom and structural complexity:

- zenith instruments, which were used for the determination of latitude and precise observations of near-zenith objects, required an altazimuth mount;
- meridian instruments enabled the precise tracking of culminations of celestial objects and were mounted on a fixed east-west axis;
- universal instruments could move in horizontal and vertical directions, thus enabling the reading of vertical and horizontal angles;
- the repeating circle, invented in 1784, required a more complex mount consisting of two telescopes on a shared axis for direct measurements of angles between two celestial objects.

Overall, the development of instruments at the turn of the 19th century went hand in hand with the development of methods of observation and for processing the data gathered from such observation. However, inasmuch as inaccuracies in observations due to instruments and observers were unavoidable, different ways to lessen their effects were considered in the following decades, including training observers, developing instruments for multiple observers, as well as mathematical methods to derive possible correct values from observation data, such as the method of least squares. In the particular case of observer training, the changes implemented were aimed at broadening the pool of observers, whilst ensuring strict adherence to working procedures through training and supervision by the observatory director, thereby increasing the number of less experienced but well-trained practitioners to carry out the observations.[21]

3.2. Observatories in Europe

Alongside advances in instruments and their manufacture, as well as in observational methods and data processing, a number of changes also took place with regard to observatory facilities. To begin with, new purpose-built rooms were required to house or store the telescopes and conduct observations. However, in the absence of some of the more sophisticated and stable instruments, at the turn of the 19th century, many observatories were still being built with facilities that allowed observations to be made using small instruments through open windows or in the open air when the weather permitted, as was the case with those in Königsberg, completed in 1813, and Turku, completed in 1819.[22]

Now, in order to accommodate the new, larger telescopes and achieve the stability required for their optimal operation, the increased complexity of their mounting systems made it necessary to implement more significant modifications to the observatories' facilities, starting with the foundations of the buildings. Thus, various instruments but above all equatorial telescopes began to be mounted beneath openable and revolving domes, requiring sturdy

[19] Access to materials and expertise involved connections, continuity of technical knowledge through family relations and apprenticeship, support of innovations from government bodies, etc. For a work that takes into account the social dimension of the instrument making, see Dewhirst 1955.

[20] See King 2003, p. 102.

[21] For more on the shift in observational practices, see Donnelly 2014.

[22] For further details on the developments in the construction of the observatories, see Markkanen 2013.

underground foundations (e.g. the Seeberg Observatory in Gotha, completed in 1791) or extremely robust pillars (e.g. the Dunsink Observatory, completed in 1785, and the Armagh Observatory in Ireland, completed in 1790) precisely to ensure their stability.[23]

In addition, new factors began to play a role in the construction of new observatories, as well as in the modification or consideration of relocating existing ones in cities. Despite the advantages of having a wealth of resources at their disposal, starting with housing for staff, mechanical and optical workshops and printers, it gradually became clear that, even with infrastructure improvements put in place to ensure – at least in theory – the stability of instruments and enhance observations, light pollution, traffic vibrations and rising air temperatures were affecting astronomical activity at observatories in cities.

Three cases are particularly significant as they illustrate quite well the impact that the observatory's location had at the time on the work carried out there. On the one hand, although the Paris Observatory was initially situated on a practically uninhabited hill outside the city, where the observations carried out were not compromised, by 1811, when it acquired its first large telescope, the urban development of the surrounding area and the city's expansion had rendered the observatory's location and the isolation provided by the wall built around it insufficient. As a result, it gradually began to lag behind in observational astronomy, producing excellent theoretical works instead and prompting, from the 1830s onwards, suggestions that it should be relocated outside the city.[24]

On the other hand, the location of both the Greenwich Observatory, situated some distance from central London within a park – a factor which limited the urban development in the neighbourhood –,[25] and W. Herschel's Observatory House, approximately thirty kilometres from that city, provided the necessary conditions for carrying out the desired observations. Thus, in the first case, its infrastructure enabled the staff not only to carry on their work in the long tradition of positional astronomy, but also to test and distribute naval chronometers and observe magnetic variations, as well as to provide astronomical training to sailors when requested to do so by the navy in 1810;[26] indeed, their equipment was significantly improved a year later thanks to the donation of the 4.1-inch Shuckburgh refractor, one of the largest achromatic telescopes at the time. In the second case, Herschel's skills and resources enabled him to build his own large instruments, which he set up in the garden on a triangular wooden system with ropes and pulleys, and these, coupled with the freedom that he and his sister Caroline Herschel enjoyed to carry out their work, allowed them to focus on what interested them, namely systematic sky surveys in search of nebulae and star clusters, as well as identifying binary stars and multiple star systems.[27] J. Herschel would continue this research, particularly that concerning binary stars, stellar distribution and nebulae.[28]

Other European astronomical centres at the time included, first and foremost, the Seeberg Observatory near Gotha, which became the state-of-the-art observatory under the direction of Franz Xaver von Zach.[29] This observatory featured an innovative layout and equipment from the leading British instrument makers, serving as an inspiration for other observatories throughout Europe, and, as in other cases, was focused on positional astronomy, timekeeping,

[23] Markkanen 2013.

[24] For more on the Paris Observatory, see Aubin 2003; Lequeux 2015.

[25] Aubin 2003.

[26] For more on the Greenwich Observatory see Higgitt 2019.

[27] For more on Herschel's instruments and practices, see King 2003, 127 ff.

[28] See footnote 14.

[29] Von Zach (1754–1832) was the director of the observatories in Seeberg from 1786–1804 and Genova from 1815–1827. He organized the astronomical conferences in Seeberg in 1798 and Lilienthal in 1800 and founded and edited some of the most important regular publications on astronomy and related fields of the time. See Brosche 2001.

geodetic and meteorological observations.[30] Secondly, with broad political – and, consequently, financial – support and under Giuseppe Piazzi's directorship, the Palermo Observatory established itself as one of the leading observatories, where much of the work concerned star positions, proper motion and parallaxes, along with the publication of star catalogues. Built in 1790–1791 in a tower of the Royal Palace, it had a meridian room and a gallery for storing portable instruments and was equipped with a complete set of new state-of-the-art instruments made by Ramsden, such as the Five-foot Palermo Circle that was believed to be more accurate than any other instrument in existence. Nevertheless, following Piazzi's departure in 1817 and a series of unfavourable political changes, the observatory experienced a decline in scientific activity and was not modernised until after 1850.[31]

As for the observatories located in the territories ruled by the Habsburg monarchy, many of them were medium-sized ones housed within the university facilities, as was the case in Vienna, Prague, Graz, Trnava, Buda, Pest, Kraków, Lviv, Warsaw, Brera and Cluj. Of these, the most important was undoubtedly the first one, built in the mid-18th century and consisting of a four-storey wooden structure on the roof of a university building in the city centre, the primary functions of which were: to carry out meteorological observations; to determine the observatory's longitude so that it could serve as a reference point for the Austrian Empire; to determine the positions of stars, planets, and moons of Jupiter for navigation; to publish some of the gathered data;[32] and, from 1822 onwards, timekeeping and the transmission of time signals for the clocks on Vienna's towers. Due to the shortcomings of its facilities and its inconvenient location, from the beginning of the 19th century, the directors of the Vienna Observatory requested its relocation and even the construction of a new one. However, it was not until the mid-1820s that the reconstruction and improvement of its facilities and equipment were authorised, as a result of which the observatory came to have, among others, two towers with revolving domes and a room with meridian slits, as well as a range of state-of-the-art instruments.[33]

4. Astronomy in the Czech lands in the late 18th century

4.1. An overview of the astronomical community and its work

The establishment of the Prague Observatory in the Clementinum university complex in the mid-18th century by Joseph Stepling,[34] a prominent figure in the scientific community who, among other things, was interested in problems of Newtonian celestial mechanics, marked the creation of what was to become the epicentre of astronomy in the Czech lands. The astronomical community in and around the observatory consisted of university professors (Stepling, Jan

[30] Wolfschmidt 2004.

[31] Foderà Serio 1993.

[32] These included the *Ephemerides astronomicae anni … ad meridianum Vindobonensem* (1757–1806), the *Meteorologische Beobachtungen an der K.K. Wiener Sternwarte* (1775–1855) and, from 1821, the *Annalen der K.K. Sternwarte in Wien*.

[33] For more on this reconstruction and improvements of the Vienna Observatory (which from the 1830s onwards included the six-inch Fraunhofer refractor, a Reichenbach universal instrument and a 24-inch vertical circle), see Hamel, Müller, Posch 2010, pp. 182–185, 218, and Posch 2015.

[34] Stepling (1716–1778), a Jesuit physicist and astronomer, was the director of the Prague Observatory in 1751–1777, director of philosophical studies from 1753 and one of the founders in the 1760s of the society that preceded the Bohemian – and later Royal Bohemian – Society of Sciences, namely the Private Learned Society (Soukromá učená společnost). See Smolka 2018.

Tesánek[35] and Antonín Strnad[36]) and the observatory's staff (František Josef Gerstner[37] and David), most of whom focused primarily on problems related to the determination of geographical coordinates at that time.

Having collaborated with the Berlin Academy in 1748 to determine the longitude of Prague by observing lunar eclipses, Stepling worked with Maximilian Hell[38] to refine the coordinates from the following decade onwards. This task was continued by his successors and, in fact, took on particular importance due to the empire's growing interest in maintaining a more accurate land register and, ultimately, in making land taxation more effective, which led to the so-called Joseph's Cadastre in the mid-1780s.[39] In addition to which, this task was also of interest to the Royal Bohemian Society of Sciences, whose members were at the time deeply engaged in a natural historical survey of the Czech lands, for which they required a more precise map of the territory based on the densest possible network of base points.

Another of the tasks that began to be carried out at the observatory were regular meteorological observations under Stepling's supervision. These entailed measurements of air temperature, barometric pressure and precipitation, and were systematised under Strnad's direction in accordance with the standard practice. As a result, the observatory's staff began to take several measurements a day at fixed times, which, from the 1780s, were published in Europe's leading periodical publication on meteorological research at the time (namely *Ephemerides Societatis meteorologicae palatinae*),[40] and Strnad went on to establish some other meteorological stations in the Czech lands.[41]

The above in turn testifies to how, in addition to publishing in the proceedings of the Royal Bohemian Society of Sciences (the *Abhandlungen der königlichen böhmischen Gesellschaft der Wissenschaften*), Czech astronomers of the time not only published their results abroad but did so in leading journals, including the *Astronomisches Jahrbuch* (at least from 1783), *Allgemeine Geographische Ephemeriden* (from 1798) and the *Monatliche Correspondenz zur Beförderung der Erd- und Himmelskunde* (from 1800).[42] Furthermore, this not only accounts for the fact that the dissemination of astronomical knowledge generated in the Czech lands at the time was not confined to the publications and meetings of the Society, but also points to further links between the Czech astronomical community and the European community. It is therefore no coincidence that both Strnad and David were among the guests invited to the first international astronomical conference, organised by von Zach at the Seeberg Observatory in 1798.[43]

[35] Tesánek (1728–1788) was Professor of Physics, later professor of Higher Mathematics at the University of Prague, and director of studies in mathematics and physics from 1778. See Folta, Šišma 2003b.

[36] Strnad (1746–1799), another one of the founders of the Private Learned Society, started working as an adjunct at the Prague Observatory and as custodian of the Mathematical Museum at the Clementinum in 1774, becoming professor of mathematics and physical geography at the University of Prague in 1778, director of the observatory in 1781 and member of the Meteorological Scientific Society in Mannheim in 1784. See Novotná, Kalvoda 2013.

[37] Gerstner (1756–1832) worked at the Vienna Observatory and then at the Prague Observatory in the 1770s, becoming professor of higher mathematics at the University of Prague in 1789 and being the driving force behind the establishment of the Polytechnic School in Prague in 1806 and its first director. See Psota 1956.

[38] Hell (1720–1792) was the director of the Vienna Observatory from 1756 and, among other things, calculated the distance between the Sun and the Earth using data from the transits of Venus in 1761 and 1769, leading the Austrian expedition to observe the transit of Venus in Vardø in the latter year. See Smolka, Šolc 2008.

[39] For more on the impact this had on the development of land surveying and cartography in the Czech lands, see Mádrová et al. 2022, p. 88. For more on the geodetic work of astronomers from Clementinum, see Nový et al. 1961, pp. 107–108; Šíma, Smolka 2017.

[40] See Seydl 1938b.

[41] Novotná, Kalvoda 2013.

[42] The lists of these publications can be found in Seydl 1952.

[43] For more about this conference, which Strnad and David did not attend in the end, see Herrmann 1968, 1970.

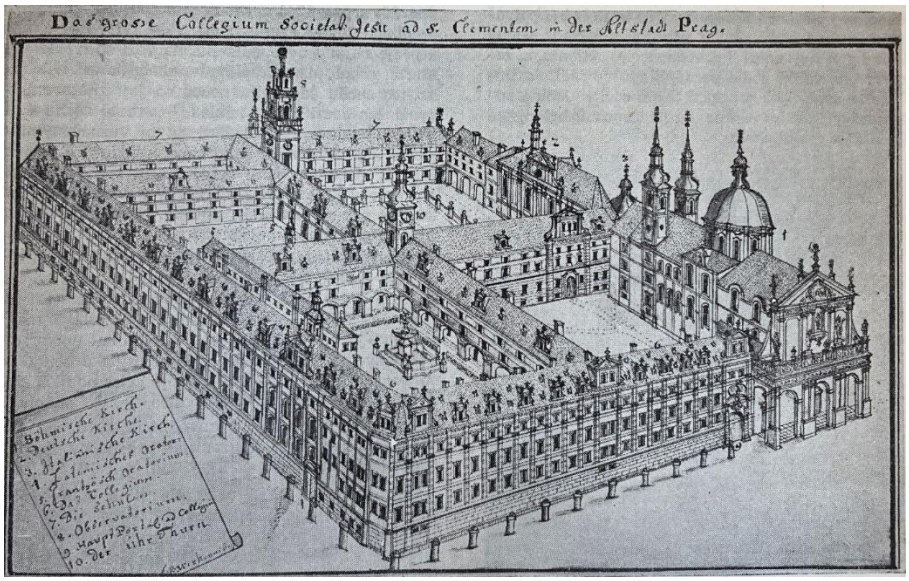


Fig. 1. Clementinum in ca. 1750. Drawing by F.B. Werner. Reproduced from *Sborník prací Hydrometeorologického ústavu ČSSR* 1963(1), p. 11 by Petra Hyklová

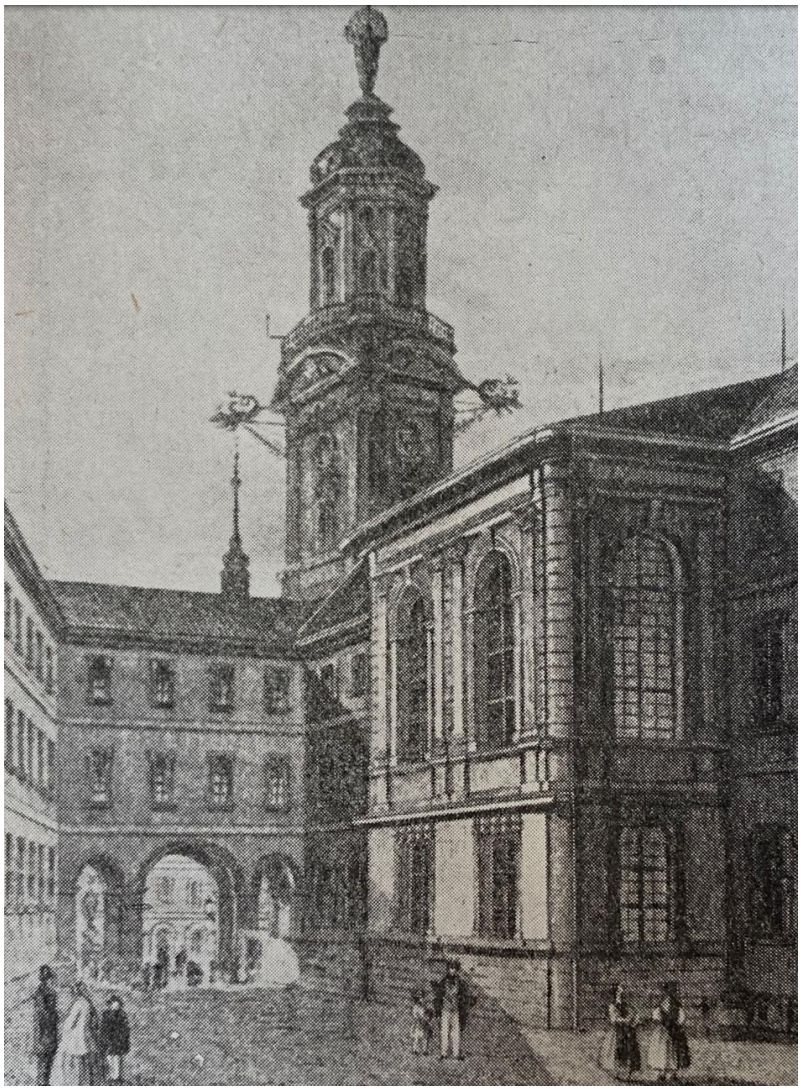


Fig. 2. The Astronomical Tower in ca. 1840. Drawing by Joseph Morstadt. Reproduced from *Sborník prací Hydrometeorologického ústavu ČSSR* 1963(1), p. 12 by Petra Hyklová

4.2. The Prague Observatory

There is scarce information on the original tower at the Clementinum (Fig. 1), which was "intended for astronomical observations"[44] and sightseeing and was finished in 1722.[45] What we know for certain is that the astronomical treatises which originated from the Clementinum at that time were purely theoretical[46] and that this started to change after Stepling founded the astronomical observatory. With the support of the state and the University of Prague, the tower underwent a reconstruction that, however, did not fully implement the original plan, which would have been more suitable for practical astronomy.[47] As a result, apart from a seven-foot mural quadrant[48] in the meridian hall, only smaller instruments could be installed in a narrow gallery, which limited the size of the instruments used, or in the open doorways of the tower, the height and location of which, however, made it impossible to observe the entire horizon.

In addition to the reconstruction, Stepling had to acquire scientific instruments and literature, which were financed from various sources besides the Jesuit Order, most prominently by Stepling himself.[49] He therefore ordered new instruments from places as far afield as Paris thanks to his contacts and the Jesuit network, whilst also drawing on the expertise of local Jesuit clockmaker and technician Johannes Klein, who built the mural quadrants.[50] As a result, by the time Francisco Zeno[51] took over the observatory from Stepling in 1777, it was well-equipped for its time: it had fifteen astronomical instruments, five clocks, and six hundred books.[52] The inventory was expanded over the following decades by the subsequent directors, Strnad and David, the latter of whom received, in 1807, a twelve-inch full meridian circle and other instruments as a donation from Georg von Reichenbach,[53] although the existing facilities were not adequate to install them.[54]

It is worth noting that the acquisition of instruments and the work carried out at the observatory by its staff (which at times consisted of the director, an adjunct, one or two assistants, a technician, and a servant) were largely determined by the interests of the director in charge at the time. This was because, in the case of Prague, the observatory formed part of the university and, as a result and unlike the Vienna Observatory, it did not have a government-determined programme of observations. As we shall discuss in Section 5, this enabled a degree of continuity in the work carried out at the Prague Observatory, although, as for example the

[44] Seydl 1938b, p. 488.

[45] For more on this, see also Seydl 1938b.

[46] See Mačák 2001.

[47] For more, see Seydl 1938b.

[48] We are referring to the south-oriented quadrant, corresponding with a small window that allowed for the observation of a part of the meridian. The second one was north-oriented, and during a reconstruction in 1999, it was confirmed that this quadrant never had any division, and therefore could not be used for observation. See Šíma 2000.

[49] Stepling donated 4000 Guldens from his mother's inheritance, while some of the Czech Estates donated another 400 Guldens. See Seydl 1938b.

[50] Seydl 1938b lists Harrison's astronomical clock from Lepaute in Paris (1763), an astronomical quadrant from Würzburg with a Cannivet micrometer from Paris (1764), a three-foot Dollond telescope (1768), an achromatic telescope (1768), a Dollond prism, and a small terrestrial globe (1769). In addition, the observatory acquired a pendulum clock from the Jesuit Pizcardi and acquired a Newton telescope from M. Hell.

[51] Zeno (1734–1781), an avid geologist and palaeontologist, was professor of higher mathematics and grammar at the University of Prague in 1766–1772 and director of the Prague Observatory in 1777–1781. See Folta, Šišma 2003a.

[52] Seydl 1938b.

[53] Von Reichenbach (1771–1826) was a German engineer and scientific instrument maker, cofounder of Mathematical-Mechanical Institute in Munich (1804), and High Council for Salines from 1811. See Weber 2003.

[54] For details see Šolc 2004; Masaryk Institute and Archives of the CAS (hereafter MIA CAS). *Státní hvězdárna*, Sign. I b 041 Inv. No. 105, Umístění hvězdárny. Stavba hvězdárny – snahy, 1801–1809.

systematisation of meteorological measurements under Strnad's leadership suggests, it also allowed for certain changes to be introduced from time to time.



Fig. 3. Detail of the rector portrait of Alois Martin David from 1816. Photo: Martin Šolc

5. Changes under the leadership of Alois David

In early 1783, a couple of years after entering the Premonstratensian Order in Teplá, Alois David[55] was sent back to Prague to study higher mathematics, which he did under the guidance of Tesánek. As in the case of Stepling, Tesánek took an interest in Newton's work on celestial mechanics and, in fact, published two annotated volumes of the *Principia* in the 1780s, whilst leaving a third one – containing applications of the principles of celestial mechanics – unfinished. This explains why David's dissertation, published after he passed his public examination in late 1783, was about Newton (*Das Leben Newtons*), as well as how his interest in mathematics and astronomy developed.

Given such interests, David in fact applied for the position of adjunct to Strnad at the Prague Observatory in the mid-1780s, but the position went to Gerstner, who had worked at the Vienna Observatory under Hell. However, David was appointed Strnad's assistant in 1786, a role that involved supporting him in his various tasks, including, first and foremost, carrying out observations and calculations, which he compaginated with broadening his knowledge on theoretical astronomy and higher mathematics.[56] He subsequently applied for the chair of Higher Mathematics at the very same University of Prague, which had become vacant following Tesánek's death, but once again Gerstner, who had in fact stood in for Tesánek when he fell ill, was appointed to it.[57] As a result, Gerstner vacated his position as Strnad's adjunct, which was then taken up by David, who held it from 1789 to 1799.

[55] Alois Martin David (1757–1836) was born in a village situated on the grounds of the Premonstratensian Abbey of Teplá, where he attended grammar school before going on to study philosophy (between 1776 and 1778) and later theology (between 1778 and 1785, with a break in between) at the University of Prague. Alois (or Aloys) was the religious name he adopted after entering the Order, which was the most important for members of religious orders (Hlinomaz, Mildorfová 2008). This is why we use the name 'Alois David' here, in addition to the fact that he signed in this way.

[56] MIA CAS. *KČSN.* Inv. No. 370, Biografické materiály členů a spolupracovníků – M.A. David: Angaben zu meiner Biografie, pp. 6–7.

[57] Bolzano 1837, p. 11.

In addition to conducting observations and calculations, the position of adjunct involved teaching at the university under Strnad's supervision, all of which allowed David to gain more experience. Moreover, this new position helped him to strengthen existing contacts or forge new contacts within the scientific community in the German-speaking territories, the most significant of which was his relationship with von Zach, with whom he maintained a long-lasting correspondence.[58] These exchanges not only helped him with his work but indeed contributed to expand his knowledge of practical astronomy, amongst other things, with regard to the use of portable instruments for field measurements and the construction and operation of modern observatories.

On the one hand, amongst his duties at the observatory, one of the key tasks – given the interests of the empire and local scientific community – was determining the geographical positions of significant points in the Czech lands (see Section 4.1). Thus, with the help of small, portable precision instruments that he gradually acquired or received as donations,[59] he began with the coordinates of Bohemian borders, specifically the southern border with Upper Austria (published in 1794), the northern border with Upper Lusatia (1797) and the eastern and western borders (1799), as well as locations of particular relevance such as the Teplá Monastery (1789, 1793), Hradec Králové, Plzeň, Sazená and Slaný.[60] As he would later recount, he "considered it an essential part of [his] job to remedy [any shortcomings] by determining, through astronomical observations, a number of fixed geographical points, in order to improve Müller's map and to draft a new, more accurate map of Bohemia."[61]

On the other hand, as regards teaching, in the years prior to 1789 Strnad had taught a number of courses on astronomy, geography and meteorology, all of which formed part of the philosophical studies that had a propaedeutical role and granted access to the Faculties of Theology, Medicine and Law. However, with the additions of both Gerstner and David, the teaching of astronomy at the University of Prague underwent some significant changes. Firstly, under Strnad's supervision, David took charge of the individual observations of occasional celestial phenomena, such as eclipses and occultations, and, in addition, and also gave demonstrations of the astronomical instruments and their use on announced days and times.[62] Secondly, when Gerstner took over Tesánek's course on higher mathematics and theoretical astronomy that was to be extended into a non-compulsory multi-year course, he went on to cover the latter's application to gnomonics, chronology, geography and nautics on the basis of de Lalande's work.[63] As a result, Strnad's non-compulsory course on practical astronomy turned into a new one on *Practical Astronomy in Its Entire Scope (Praktische Astronomie in ihren ganzen Umfange)*, for which he used de Lalande's and Bode's works and which he would go on to teach until his retirement, along with another non-compulsory course on mathematical geography, meteorology and sky orientation, which he began teaching from the mid-1790s. In the case of de Lalande's introductory book, *Astronomy* (*Astronomie*), it was intended for

[58] For more on their relationship and correspondence, see Seydl 1938a.

[59] These included a high-quality seven-inch Dollond mirror sextant (donated by von Zach in 1791), a Ramsden astronomical telescope (bought at David's own expense), and an Emery chronometer (bought by the Royal Bohemian Society of Sciences), as well as new portable barometers and thermometers. Kulik 1837; Hlinomaz, Mildorfová 2008, Šolc 2004.

[60] For list of publications with results of these surveys and their dates, see Seydl 1952.

[61] „[H]ielt es daher für einen wesentlichen Theil meines Berufes diesem Mangel durch astronomische Bestimmung mehrerer geographischer Fixpunkte für die Verbesserung der Müllerischen, und für die Entwerfung einer neuen richtigen Karte Böhmens zu sorgen." David 1815, p. III. Jan Kryštof Müller's *Mappa geographica regni Bohemiae* (1720) was the largest map of Bohemia until the 1860s. It was published and revised several times and used as a reference for cartography in Europe during the 18th century. For details see Semotanová 2023.

[62] Institute of the History of Charles University and Archive of Charles University. *Verzeichniß der ordentlichen und ausserordentlichen Vorlesungen, welche an der Universität zu Prag von … zu … gehalten werden*.

[63] Anon.1790, p. 153.

students with previous knowledge of algebra and geometry, and it traced the development of astronomy throughout the history of European civilisation, explaining the emerging concepts and discoveries;[64] in the case of Bode's book, *Introduction to the knowledge of the starry heavens* (*Anleitung zur Kenntnis des gestirnen Himmels*), it was not intended as a university textbook, although it did end up being used for teaching within the German-speaking regions, with the universities of Prague, Ingolstadt and Göttingen being among the first to adopt it as such.

Further changes followed when David succeeded Strnad as professor of practical astronomy at the university and director of the observatory following the latter's death in 1799. First, the course on practical astronomy was replaced by another entitled *Popular and Practical Astronomy for Teachers and Astronomy Enthusiasts* (*Populäre und praktische Astronomie für Volkslehrer und Liebhaber der Sternkunde)*, for which he used Bode's work, and the course on mathematical geography and meteorology was discontinued. Secondly, alongside the sporadic individual observations of celestial phenomena, David incorporated training in telescopic observations and analysis of the results into the demonstrations of astronomical instruments, thereby covering the knowledge required of assistants at astronomical observatories of the time.[65]

As for the observatory itself, in the early 19th century the community centred around it also included amateur astronomers, namely Josef Morstadt and Wilhelm von Biela,[66] as well as Franz Ignac Cassian Hallaschka,[67] who went on to become professor of physics at the University of Prague in 1814 and ran a small private observatory at the Piarist Convent in Prague, equipped with instruments comparable to those at the Prague Observatory, which provided an opportunity to organise and compare observations. In addition, from 1806, the Royal Bohemian Society of Sciences began publishing the *Astronomische Beobachtungen an verschiedenen Sternwarten* within its proceedings (i.e. the *Abhandlungen*) at the behest of Franz de Paula Triesnecker,[68] the director of the Vienna Observatory. It was there, in that very same year, that calculated deviations from Delambre's tables for Uranus, which had appeared in the 1794 edition of de Lalande's *Astronomie*, were published,[69] with a number of observations of stellar occultations by the Moon, lunar and solar eclipses, comets and culminations of major and minor planets appearing in subsequent years. And it was the comparison of these observations with data from other observatories in Europe and the analysis of the differences that made it possible to refine the geographical longitude of the Prague Observatory.

In the particular case of David, he continued with his geodetic survey of the Czech lands and in 1800, he published an analysis of the inaccuracies in the geographic coordinates he had detected on Müller's Map, demonstrating that they bore no relation to one another or to the main borders.[70] For the rest of his life, he would continue to publish lengthy and meticulous

[64] De la Lande 1771, pp. I–VI.

[65] Institute of the History of Charles University and Archive of Charles University. *Verzeichniß der ordentlichen und ausserordentlichen Vorlesungen, welche an der Universität zu Prag von … zu … gehalten werden*.

[66] Morstadt (1797–1869), a civil servant, and Biela (1782–1856), a military officer, were close collaborators focused on observations and the orbit determination of comets. In the 1820s, Biela identified the third known periodic comet (3D/Biela) and independently co-discovered two other comets. See Martínek 2006; Günther 1885.

[67] Hallaschka (1781–1847) was a lecturer at Theresianum Academy in Vienna in 1804–1807, professor at Piarist colleges in Mikulon and Brno in 1804–1814, Professor of Physics at University of Prague in 1814–32, and government counsellorof Studienhofcommission in Vienna from 1833. He is the author of the *Elementa eclipsium …, ab A.1816 usque ad A.1860* (1816). See Šolc 1999.

[68] Triesnecker (1745–1817) was the director of the Vienna Observatory from 1792 and editor of the Viennese yearbook *Ephemerides astronomicae*, which published observations from all observatories in the Habsburg territories up to 1806, when it ceased to exist. See Günther 1894.

[69] Triesnecker 1806, pp. 27–28.

[70] See David 1800.

works on the geographic positions of various locations throughout the Czech lands.[71] As he put it in the mid-1810s with regard to that work, "[it] has been well received, and I intend to devote to the rest of my days to it, alongside my professional duties."[72]

At the same time, from the early 1800s onwards, David became interested in researching non-astronomical methods of longitude difference determination, and in 1804, he received a government mandate to use the method of measurement of local time differences by light signals.[73] Thus, under his supervision, charges of gunpowder were set off on a hill of known longitude, and the moment at which the flashes were observed from selected observation points was recorded in local time; all of this required the coordination of a wide network of observers, ranging from professional astronomers to ordinary citizens.[74] The longitude difference was then calculated on the basis of the time differences at observation points and relative to the prime meridian of Ferro.[75] This not only allowed him to determine the longitude differences between Prague and Dresden and Breslau (published in 1804 and 1806, respectively) and between Vienna and Munich (published in 1821),[76] as well as between other locations in the Czech lands (Fig. 4) and neighbouring territories. In addition, this enabled him to determine geographic positions of several locations in the Czech lands.[77]

All this, in turn, illustrates how in Prague, as indeed in Vienna, astronomers followed the trend of becoming specialists in collecting and analysing large amounts of data from very early on in the 19th century.[78] Interestingly, this data came to include observations of sunspots: first, in 1818, David published various observations of sunspots during the solar eclipse of 1816 from Prague and Vienna, along with a drawing of a large sunspot made in Prague, in the *Astronomische Beobachtungen*;[79] secondly, in the same year, Hallaschka published his observations of sunspots and solar flares from 1817 and early 1818 in *Astronomisches Jahrbuch*.[80] As evidenced by the fact that, in the second case, this was the only observation of a sunspot recorded in such a yearbook, it was an unusual piece of work for the time, although some of David's associates, such as Thaddeus Derfflinger from the Kremsmünster Observatory, did observe sunspots systematically in the first decades of the 19th century.[81] Moreover, as regards the data collected, David decided to use the data he gathered through measurements with his astronomical and meteorological instruments to study other phenomena, such as the effects of river gradients on flood intensity.[82]

[71] These included the positions of Benátky nad Jizerou (1802), several locations at the southern Bohemian border and Malonice by Klatovy (1804), Petřín and Hradčany in Prague area (1805), Plzeň (1806), Mělník (1814), Chržín u Velvar (1820), locations in the Cheb region (1824) and Český Krumlov (1825), and Teplice (1830), all of them published in the *Abhandlungen*.

[72] „Beyfall lohnte diese meine Arbeiten, denen nebst meinen Berufsgeschäften auch der Rest meiner Tage geweiht seyn soll". David 1815, pp. VI–VII.

[73] Hlinomaz, Mildorfová 2008. This method, first proposed for sea navigation by W. Whiston and H. Ditton in 1713, was occasionally used for surveying. See Dunn, Higgitt 2014, p. 35.

[74] David 1811, pp. 22, 34–35.

[75] David 1820, p. 3.

[76] This latter case involved more complex cooperation, as three observation points were required to observe light signals from Sněžka and Unterberg mountains: Vienna, Munich and the Pöstlinberg hill. David, Soldner 1821.

[77] Among others, he determined some geographic positions at the northern Bohemian border (1807), Krásná Lípa (1809), Plzeň, Chotěšov and Manětín (1811), Orlík and several locations in Písek area (1815), Hradec Králové and Hořice (1819), Rotenhaus and nearby locations (1820), and Březina (1823).

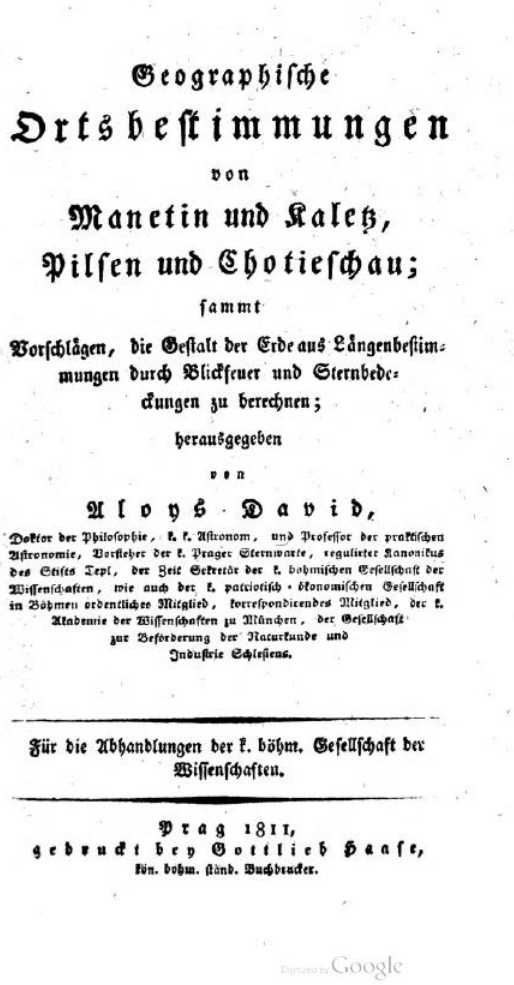
[78] See Donnelly 2014.

[79] David 1818.

[80] Hallaschka 1818.

[81] For more on Derfflinger's sunspot observations, which he did as a byproduct of local noon observations, see Hayakawa 2020.

[82] David 1823, p. 46.



Geographiſche
Ortsbeſtimmungen
von
Manetin und Kaletz,
Pilſen und Chotieſchau;
ſammt
Vorſchlägen, die Geſtalt der Erde aus Längenbeſtimmungen durch Blickfeuer und Sternbedeckungen zu berechnen;
herausgegeben
von
Aloys David,
Doktor der Philoſophie, k. k. Aſtronom, und Profeſſor der praktiſchen Aſtronomie, Vorſteher der k. Prager Sternwarte, regulirter Kanonikus des Stifts Tepl, der Zeit Sekretär der k. böhmiſchen Geſellſchaft der Wiſſenſchaften, wie auch der k. patriotiſch-ökonomiſchen Geſellſchaft in Böhmen ordentliches Mitglied, korreſpondirendes Mitglied, der k. Akademie der Wiſſenſchaften zu München, der Geſellſchaft zur Beförderung der Naturkunde und Induſtrie Schleſiens.
Für die Abhandlungen der k. böhm. Geſellſchaft der Wiſſenſchaften.
Prag 1811,
gedruckt bey Gottlieb Haaſe,
kön. böhm. ſtänd. Buchdrucker.
Digitized by Google

Fig. 4. Title page of *Geographische Ortsbestimmungen von Manetin und Kaletz, Pilsen und Chotieschau* (1811), with proposal to calculate the shape of the Earth from determinations of longitude using signal fires and star occultations. Public domain, scanned by Google

His contacts with the scientific community in German-speaking territories also enabled David to conduct visits to some observatories, such as the one in Seeberg run by Zach (1801, 1818), the one in Leipzig (1801), von Reichenbach's new observatory in Bogenhausen by München (1818), and Utzschneider's Mechanical Institute and Fraunhofer's optical workshop (1818). These visits proved crucial because, for example, whilst he was able to inspect the new observatory in Leipzig and its shortcomings, in Bogenhausen he attended the installation of its meridian telescope, quadrant and equatorial telescope, as well as von Reichenbach's demonstration of these instruments, and in Fraunhofer's workshop he took interest in the process of manufacturing achromatic lenses and the production of flint glass, the latter involving a manufacturing secret that Fraunhofer would not disclose.[83]

As early as 1786, Strnad had submitted a proposal to reconstruct the Prague Observatory,[84] given that it was situated at a very low altitude and surrounded by a dense cluster of houses, the chimneys of which produced a lot of smoke, which also affected temperature measurements.[85] This reconstruction did not take place, but David, aware of the observatory's

[83] MIA CAS. *KČSN*. Inv. No. 370, Biografické materiály členů a spolupracovníků – M.A. David: Angaben zu meiner Biografie.

[84] The proposal was published in 1793. Seydl 1938b; 1946.

[85] Strnad 1783, Munzar 1996.

unfavourable location and the shortcomings of its facilities, revived the idea and took it a step further. Thus, in the early 19th century, having already made some of the visits to other observatories mentioned above, David also gained experience in the construction of small observatories: one in the garden of Teplá Abbey and another one in the abbey estate on Branišov Hill, in addition to which he prepared the plans of a third one for the Philosophical Institute in Plzeň, which included adapting an existing tower and purchasing instruments but which was rejected in 1817 due to the high costs involved.[86]

Meanwhile, as early as 1801, David began negotiations to acquire an old church building on Petřín Hill, near Prague, which he planned to reconstruct and adapt into an observatory.[87] His first plans for the new observatory were ready in 1810, but it is unclear what became of them afterwards. What we do know is that, later, David obtained the plans for the Munich Observatory from von Reichenbach and that he based a new proposal for the Petřín observatory on those plans, making numerous changes, including widening the rather narrow space between the two towers of the Munich Observatory, thereby broadening the view from the observation hall situated between them. He submitted this proposal in 1819 to the Provincial Building Directorate in Prague (Landesbaudirektion), which turned it to the court in 1821. This coincided with the Emperor Franz ordering a commission to be appointed for a new observatory in Vienna, which shifted the attention of the authorities towards such a project. David was a key member of the commission and, in fact, the plans drawn up were ultimately based on his plans for the Petřín observatory, although unfortunately neither of the two projects ever came to fruition.[88]

David served as rector of the University of Prague in 1816, the year from which, and until 1819, he became the editor of the *Astronomische Beobachtungen*. Over the course of the following decade, David continued to publish there the observations made in Prague by himself, Bittner and Hallaschka, and in 1832 he was elected director of the Royal Bohemian Society of Sciences. He held the latter position actively for a year until he resigned at the end of 1833, and in 1834, due to declining health, he left Prague and took up residence in the Teplá Abbey, where he lived until his death in 1836.[89]

6. Final remarks

Because of the continuity in work focused on astronomy in Prague between 1752 and 1836, Zdeněk Horský named such a period the “astronomical era of the observatory”.[90] As we have explained, throughout that era the observatory had sufficient equipment and proper conditions to observe phenomena such as sunspots and minor planets, to the extent that the level of said equipment was just behind that of the Vienna Observatory in the early 19th century, mostly due to David efforts,[91] although in both cases it was certainly not comparable to the equipment at the newly built observatories (e.g. Dorpat or Seeberg). Moreover, the facilities of the Prague Observatory, finished towards the late 1770s in accordance with the prevailing Baroque observatory trend, did not undergo any major changes, thus providing as well, for better or for worse, a degree of stability during this era.

It is true that the work carried out at the Prague Observatory did not deviate at the general level from the one carried out at other national observatories in Europe, although there were some differences in official tasks, such as time service or the publication of almanacs. In the

[86] Bečvářová, Bečvář 2024, p. 228.

[87] MIA CAS. *Státní hvězdárna*, Sign. I b 041 Inv. No. 105, Umístění hvězdárny. Stavba hvězdárny – snahy, 1801–1809.

[88] Kulik 1837, MIA CAS. *KČSN*. Inv. No. 370, Biografické materiály členů a spolupracovníků – M.A. David: Angaben zu meiner Biografie..

[89] Kulik 1837.

[90] Nový et al. 1961, p. 161.

[91] Hlinomaz, Mildorfová 2008.

particular case of astronomical observations, the ones made there were indeed in line with what Kevin Donnelly has described as painstaking, long-lasting, precise, and perhaps even boring but useful and necessary observations carried out at most observatories at that time (see Section 2).[92]

David did, in fact, follow the trend of becoming a specialist in collecting and analysing a large amount of data from various observatories across the Czech lands and throughout Europe. However, at the same time, not only did he become an expert in practical astronomy, just as his teacher Strnad had become an expert in meteorology, but he also decided to test new methods and integrate them into his work, some of which proved to be fruitful and, in some cases, crucial for the elaboration of more precise maps of the Czech lands that were published in the first decades of the 19th century.[93] Moreover, David's so-called "engineering-orient[ation]"[94] led him to work tirelessly on plans for a new observatory – rather than merely a reconstruction, as Strnad had put forward – on a hill on the outskirts of Prague, having clearly recognised the need to take such a step and not only to upgrade the equipment – in the latest trends of which he became very knowledgeable – in order to genuinely improve the astronomical work carried out in Prague.

Last but not least, it is important not to overlook the changes that David introduced to the teaching of astronomy at the University of Prague. He not only went on to incorporate training in telescopic observations and analysis of the results into the demonstrations of astronomical instruments. In addition, his course on *Popular and Practical Astronomy* stood at the beginning of a trend that would subsequently spread widely throughout the German-speaking academia. Those lectures, the course on instruments, observations and calculations, and the course on theoretical astronomy were eventually merged into a single course entitled *Theoretical and Practical Astronomy (Theoretische und praktische Astronomie)* in the mid-1820s, and it was to be his successors, Adam Bittner[95] and Karl Kreil,[96] who would set the course for astronomy at the university and the observatory in Prague during the final decades of the first half of the 19th century.

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[92] See Donnelly 2014.

[93] These included the *Map of the Kingdom of Bohemia by the Imperial Prague Astronomer Aloys David* (*Mapa Królowstwj Českého od Cys. Kral. Prazského Hwězdáře Aloyzyusa Dawida*), published in 1819, and a series of maps by the cartographer and Catholic priest František Jakub Jindřich Kreibich, published between 1807 and 1836.

[94] Kulik 1837.

[95] Bittner (1777–1844) began working at the Prague Observatory in 1800 as an intern and went on to become its director between 1837 and 1844, also teaching practical mathematics at Prague's university and polytechnic school. See von Wurzbach 1856.

[96] Kreil (1798–1862) worked at observatories in Vienna and Brera before becoming adjunct at the Prague Observatory in 1838 and its director from 1845 to 1851, when he was appointed the director of Central Institute for Meteorology and Geodynamics and professor of physics in Vienna. See von Wurzbach 1865.

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