

# Maximilian Hell

## A Legacy in Transit

Richard Hill

Rudolf Maximilian Hell (spelled Höll) was born 15 May 1720 in Schemnitz (or [\*Selmecbánya\*](#)), Kingdom of Hungary, the third son of the second marriage of Matthias Cornelius Hell, a mining engineer who had total of 21 children! The area was historically alternately German, Hungarian and Slovak (leading to multiple names for the same geographic locality as the reader will see) and while he could understand Hungarian and Slovakian languages, his commonly spoken language as he was growing up was German. Even so, Hell identified as a Hungarian.

Maximilian joined the Jesuit order in 1738 right after graduating from secondary school and made his novitiate (training in preparation to taking the “vows” in the church) in Trenčín. In 1745 he was invited to be an assistant to astronomer Josef Franz, then Director of the Jesuit observatory in Vienna, where he studied theology and helped in the founding of a museum in experimental physics.

Hell wrote many papers and became a well-known astronomy popularizer, his lectures often attracting large audiences. He was sent to be a teacher of humanities at the secondary school in Levoča (Slovakia) founding an observatory at Trnava at that time. Maximilian was subsequently ordained as a priest in 1752 and received his doctorate in mathematics, his first assignment being in Kolozsvár (Klausenburg) at the time part of Hungary but today known as Cluj-Napoca, Romania. Here he was charged with the construction of a new college that included an astronomical observatory. He was also the instructor for mathematics, physics and history and published texts on these subjects. Clearly a man of extraordinary energy!

In 1755, Hell’s lifelong career was set in place when Maria Theresa, Archduchess of Austria and Queen of Hungary and Bohemia (of the reigning Hapsburgs), named him as her “court astronomer” commissioning him to organize a new large observatory in Vienna, along with a general reform of the University of Vienna that would give it European prominence. Maximilian was appointed as the lifelong director, with an annual income of 300 golden crowns. The initial equipment was that used by the late Imperial Mathematician and geodetic surveyor, Johann Jakob Marinoni. His house and personal observatory were on the outskirts of Vienna a mile or so from the University, which in those days was a formidable distance. So the instruments were salvaged and installed in a tower four stories tall, over the newly completed hall of the university in Vienna. Here he quickly began making regular observations and establishing valuable connections with the European astronomical community and published [\*Ephemerides astronomicae ad meridianum Vindobonensem\*](#) (Ephemerides for the Meridian of Vienna) only two years after being appointed! The only other such tables were published by the well-established Paris Observatory so this was a bold move and gave the Vienna Observatory some notoriety. Hell’s Ephemerides laid out the theoretical predictions of the transits of Venus for 1761 and 1769 (which will become important later on) and how to derive the Sun’s parallax from observations thus establishing a value for the astronomical unit. There were also tables for Sun, Moon and planets and explanations on how to observe them, discussions on meteorological observational methods (including his explanation of the aurora borealis) and a geodetic survey with latitudes and longitudes of places in northern Europe and the exact mapping of the empire.

He published this work each year up to and including 1768, missing four years while he was off on an observing expedition for the 1769 transit of Venus, and then picked it up again from 1772 to 1792, the year of his death. This work was so important that Franz de Paula Triesnecker, who

had been appointed assistant director of the Vienna Observatory in 1782 (succeeding Hell as director in 1792) went on to publish a further 14 volumes of this work.

This new observatory and its ephemeris undoubtedly had some practical significance for the Archduchess since the Seven Years' War began in 1756 and Vienna itself was under threat of invasion almost at once. The ephemeris, with its improved positions of cities in Europe and concomitant improvement in mapping of the continent would aid in the movement of troops and planning of battles. This could explain the seemingly hurried first ephemeris publication only two years after the founding of the observatory.

The transit of Venus which occurred on 6 June 1761 was an important astronomical event for the reasons mentioned above. In Vienna the whole event could be seen and was observed by Hell and César-François Cassini de Thury (the grandson of the famous Italian astronomer Giovanni Domenico Cassini). Because it was only partially observable from Paris, Cassini planned to travel only as far east as Vienna to observe the event, a restriction undoubtedly forced on him by the Seven Years' War which was then in full vigour north and east of Vienna.

Their results were among those that were too poor for the primary scientific goal of transit observations, the determination of the astronomical unit. In fact only the observations carried out by English astronomers Charles Mason and Jeremiah Dixon (of Mason-Dixon fame in U.S. geographic history) from the Cape of Good Hope were usable, and even they carried some significant errors. Therefore astronomers around the world were dedicated to the goal of improving instrumentation and techniques for the transit in 1769.

In 1767 Maximilian received an invitation from King Christian VII of the combined kingdom of Denmark and Norway to observe the transit of Venus on 3 June 1769 from the small town of Vardø in the province of Finnmark, the most north eastern settlement in Norway. Situated nearly 4° above the Arctic Circle, this site had the advantage of 24 hours of daylight. The offer came as a surprise as Hell had never had any direct contact with any astronomical institute in Denmark. However, it may have been desirable to leave Vienna at that time for while the Seven Years' War had ended, there was now a suppression of Jesuits taking place in Europe. For Hell it would culminate with Jesuits being expelled from Austria in 1770 (though he seems to have avoided that). King Christian was a Protestant, and Maximilian would have his protection while carrying out this expedition. The invitation was accepted and he took a former student and fellow Jesuit priest János Sajnovics with him.

They took a very circuitous route up through Norway before putting out to sea at Trondheim and sailing north around the northern end of Scandinavia and then to Vardø. One of their first tasks was to accurately determine the latitude and longitude of their observing site which was probably valuable information to the government since the province of Finnmark had been acquired only relatively recently. Maps of that period show how little was known of the area.

Hell saw the transit as only one part of a larger scientific expedition, Hell and his companion also making magnetic observations which showed diurnal variation in the magnetic declination as well as some magnetic storms. In fact, Hell and his team stayed in Vardø for over two years, spending most of their time collecting other scientific data for an encyclopedia concerning on arctic regions they planned to publish. This was to contain studies in biology, meteorology, oceanography, zoology, geography, natural history and linguistic analysis. Sajnovics was studied in linguistics, and helped to explore the already widely discussed but not well understood similarities between the language of the Sami, Finns and the Hungarians. Sadly, nothing came of Hell's encyclopedic tome, due to the ongoing Suppression of the Jesuits throughout Catholic Europe culminating in 1773 when Pope Clement XIV recognized the suppression as a "fait

accompli” in his brief, *Dominus ac Redemptor* essentially giving it his blessing. Nevertheless they did publish *Demonstratio idioma Ungarorum et Lapponum idem esse* (Copenhagen, 1770) on the language study through their Protestant patron.

Meanwhile the astronomers who had stayed home were anxious to get his observations, since Hell's were expected to be the most reliable of all the scientists involved. However, Hell felt his first duty was to report to his Danish sponsor. The Jesuits being specifically expelled from Austria in 1770, likely had some bearing on his lack of haste. This upset the French Academy which prompted Jérôme Lalande to accuse Hell of having falsified his data to better agree with observations of other observers. This was a devastating accusation but not surprising in that the French were the main agitators against the Jesuits at the time. The observations and detailed analysis of Hell and Sajnovics were published in 1770, the same year as their linguistic study, by the Royal Danish Academy of Sciences and Letters (Protestant) as *Observatio transitus Veneris ante discum Solis die 3. Junii anno 1769* (Copenhagen, 1770), only one year after the event and which at that time was not unreasonable! So it would seem that there may be more politics than science behind this.

The Jesuits were not restored until 1814 (by Pope Pius VII) when the Catholic Church was seeking more support to rebuild and restart their schools after both the French Revolution and the Napoleonic Wars. Even so, the defamation of the Jesuits, as an attitude if not stated policy, lasted well into the nineteenth century when in 1823 Johann Franz Encke furthered the division in his review of the Venus transits in which he rejected Hell's work out of hand, with no reason given. Later, Joseph Johann von Littrow, the Director of the Vienna Observatory, misinterpreted the fragmentary manuscripts he had seen of Hell's work and claimed he had seen erasures in them, announcing that he had thus found direct evidence of falsified observations. This was very damning as it came from an astronomer at the same institution, and it further ruined the reputation of Hell for over fifty years.

Hell's reputation was restored in 1883 by the American astronomer Simon Newcomb who studied his observations en toto preserved at the Vienna Observatory, and showed that in fact Littrow's inferences were wrong. This was verified when Hell's observations, properly included with those of others from 1769, showed the Sun's parallax much closer to the correct value than without them!

Even with all Maximilian had to deal with, he was still greatly admired throughout Europe for his scientific abilities and his kind and friendly demeanor. He was elected to numerous academies in Europe even after the accusations, and offered honorary pensions beyond his salaries, though he refused them. Today we should remember Maximilian Hell as a well-liked and well respected astronomer and overall renaissance scientist who, through politics, was denied his rightful place among the greatest astronomers in history, though it is hoped that this legacy is in transit!

This article first appeared in the *Yearbook of Astronomy 2022* and is reproduced here with the kind permission of the publishers Pen & Sword Ltd.

The Yearbook of Astronomy 2022 can be ordered from the publisher's website at:

<https://www.pen-and-sword.co.uk/Yearbook-of.../p/19313?fbclid=IwAR3CXCGOMeG2euF1zfNVPUU2NojUyflrtgCqnHc9DeGVt2Ep6j2nNwd1NIE>