

MINNAERT'S FOLLY: A FORGOTTEN TEACHING OBSERVATORY FROM THE 1960s

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Abstract: A deserted tower at the Uithof Campus of Utrecht University used to be an astronomical observatory, purpose-built for Marcel Minnaert's famous undergraduate course in practical astronomy. The tower, which was opened in 1964, has hardly been. This paper reconstructs the history of Minnaert's 'Sterrentoren'.

Keywords: observatory, twentieth century astronomy, astronomy teaching, Minnaert, failures

1 INTRODUCTION

A dreary parking lot, hidden behind some buildings, hosts one of the most remarkable buildings at the Uithof campus of Utrecht University (see Figure 1). The campus is known for its architecture—it includes buildings by famous architects such as Rem Koolhaas (b. 1944)—but this building is less spectacular. It most resembles a watch tower at a heavily guarded Cold War border, or the control tower of a small airport. It was, however, an astronomical observatory, but is now abandoned. And even before it was deserted, it was hardly ever used for its intended purpose: observing sessions by

undergraduate students. It was built especially for Marcel Minnaert's practical sessions in his first-year astronomy course. Professor Minnaert (1893–1970; Figure 2; Roode, 2014) was a passionate promoter of astronomy teaching.

Marcel Minnaert's 'Sterrentoren' (star tower) is a dramatic example of an observatory that failed. Its astronomical history is almost completely forgotten. It is not even mentioned in a book about the history of astronomy in Utrecht (De Jager et al., 1993) or in Minnaert's biography (Molenaar, 2003). It only features on a website on local architecture, where the tower is described as a 'folly', a decorative building with



Figure 1: The Sterrentoren (photograph: David Baneke).

no practical purpose (Van Rossen, n.d.). That does not, however, make it any less interesting as astronomical heritage. Its history illustrates the history of astronomy at a modern university, and more specifically the changing role of observing practices in twentieth-century astronomy teaching.

2 FAILURES AS HISTORY

The most treasured astronomical heritage is often associated with famous people or discoveries, or ones that represent important steps in the development of astronomy in a particular city or nation. In the Netherlands, this includes the lenses of Christiaan Huygens (preserved in the Museum Boerhaave), the nineteenth-century observatories at Leiden and Utrecht, and the 1956 Dwingeloo radio telescope (Baneke 2015).

But the history of astronomy is not only made at prominent observatories, and not all instruments produce important discoveries. Most astronomers spend their time doing routine observations, calibrating instruments, and especially teaching students. And even this does not always lead to the intended results. Many initiatives simply fail. These failures are part of the history of astronomy too, but their material legacy is rarely preserved.

Three examples from Dutch history of astronomy demonstrate that stories of failure can provide interesting history. In 1951, Jan van der Bilt published a history of two prestigious telescopes built by the Frisian instrument-makers Arjan Roelofs and Sied Rienks in the early nineteenth century at the request of King William I (Van der Bilt, 1951). They turned out to be beautiful to look at, but unfit for astronomical use. They were scrapped quietly, so as not to offend the King. This history reveals much about astronomical instruments, institutions and patronage in this period.

More recently, Huib Zuidervart and Rob van Gent (2012) published a history of Felix Meritis Observatory in Amsterdam, the first purpose-built observatory in the Netherlands, built and equipped at great expense in the late eighteenth century by a society for science, arts and commerce of the Amsterdam elites. Several promising young observers were sent to prestigious French and German observatories for training, but one after another died before being able to do useful scientific work. The platform is still there (it was recently restored), but the instruments have been scattered or lost (*ibid.*). The story of Felix Meritis is a tragic one, but also one that reveals as much about daily astronomical practice as the stories of great geniuses or stunning discoveries.

Perhaps the most notorious failure in Dutch

astronomical history was the observatory that J.C. Kapteyn never got. For obvious reasons, there is no material legacy of this non-observatory, except a few designs in the archives of Groningen University. For Kapteyn, around the turn of the twentieth century this failure was a major reason for him to pioneer new approaches that were highly influential (Van der Kruit and Van Berkel, 2000; Van der Kruit 2014). In 1896, he established an 'astronomical laboratory': the first astronomical institute without a telescope, relying exclusively on observations obtained elsewhere. In this way, Kapteyn could still do world-class research. However, he could not train students, and observing skills were an indispensable part of becoming an astronomer.

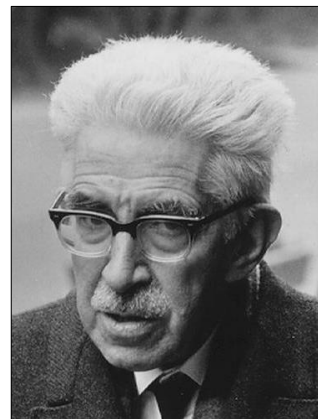


Figure 2: Marcel Minnaert in 1967 (photographer: Rob Rutten; https://en.wikipedia.org/wiki/Marcel_Minnaert#/media/File:Marcel_Minnaert.jpg).

3 ASTRONOMY IN UTRECHT

In 1642, Utrecht Observatory established its first observatory in the Smeetoren, one of the towers of the city walls (Figure 3). It was used on-and-off for two centuries, depending on the interests of the successive professors (De Jager et.al., 1993). In the early nineteenth century, the tower was in disrepair. In 1847 C.H.D. Buys Ballot (1817–1890) an ambitious new Professor, managed to get funding to establish a new Observatory at the Sonnenborgh, an impressive former bulwark of the city walls. This was more or less a by-product of his main ambition: the establishment of a Royal Meteorological Institute (KNMI), also at the Sonnenborgh (Van Lunteren, 1998). Buys Ballot is known mostly for his meteorological work.

Buys Ballot's successors were more active astronomers, and when the KNMI moved to a new location in 1897, the Sonnenborgh became an exclusively astronomical observatory. The Director at that time, A.A. Nijland (1868–1936) was known as a variable star observer and an active organizer of eclipse expeditions. His modest ambitions are illustrated by the title of



Figure 3: The Smeetoren, which was demolished in the nineteenth century (courtesy: Utrechts Archief).

his opening lecture: “The Legitimacy of Small Observatories”. In 1937, he was succeeded by Marcel Minnaert, who reorganized the Observatory, introducing new research projects as well as new teaching methods.

Marcel Gilles Jozef Minnaert had a remarkable career (Molenaar, 2003). Trained in biology at the University of Ghent, he investigated the effects of the intensity of sunlight on plant development for his doctorate (which inspired an interest in photometry). Later he became more interested in physics. For political reasons, he was forced to leave his native Belgium at the end of the first World War (he had collaborated with the German occupiers to establish a Dutch-language university in Ghent). He ended up in Utrecht, where he joined the Physics Institute of W.H. Julius and L.S. Ornstein, who had established a spectrographic laboratory (Heijmans, 1994). Here Minnaert found his life's work, investigating the solar spectrum, and he completed a second doctorate, this time in solar physics. His solar work brought him in touch with the astronomical community, and eventually he switched disciplines again and became Professor of Astronomy at Utrecht and Director of the University Observatory (Figure 4). At Sonnenborgh Observatory he started working on a great atlas of the solar spectrum.

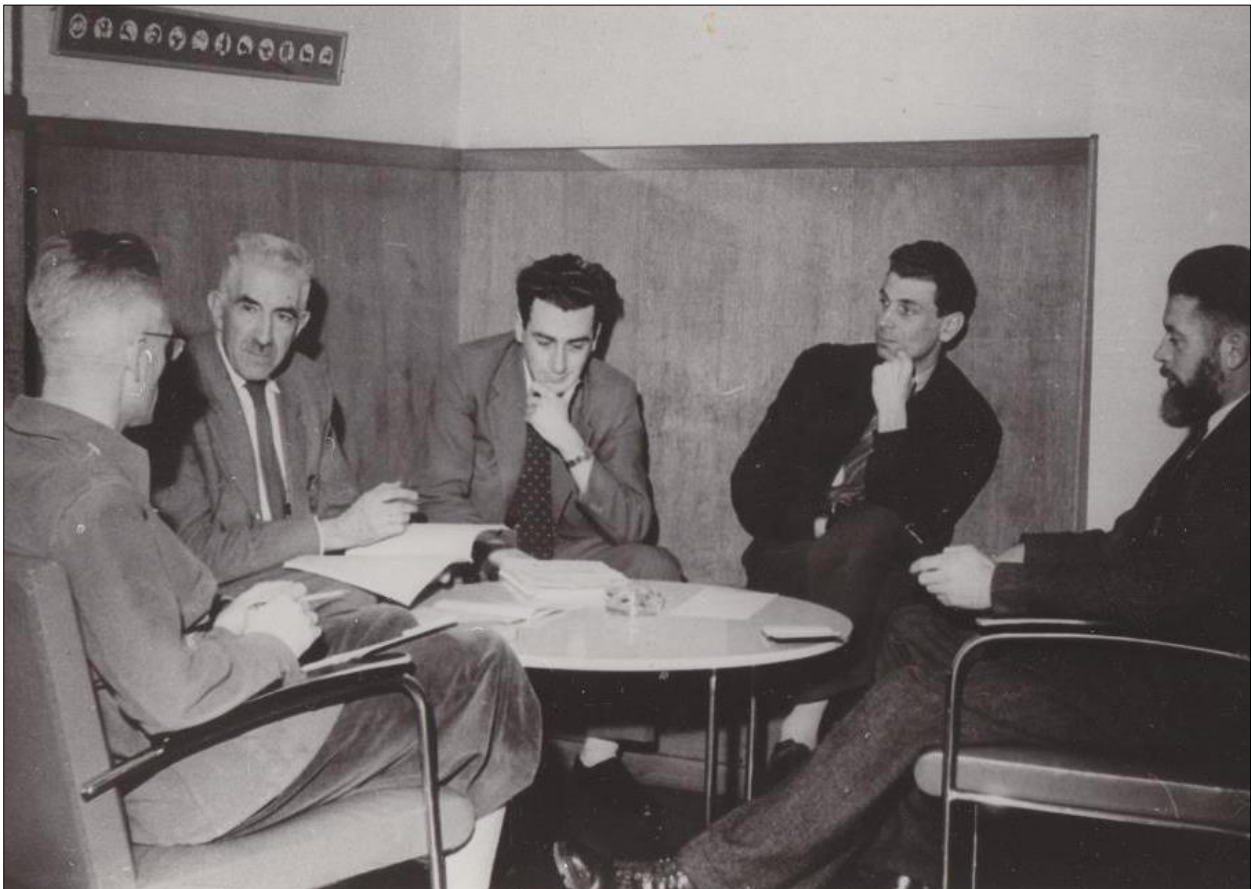


Figure 4: Minnaert and his University of Utrecht Astronomy Department colleagues. From left to right: Kees de Hager, Marcel Minnaert, Tom de Groot, Hans Hubenet and Jaap Houtgast (courtesy: Universiteitsmuseum 1956).

Minnaert is not only known as a solar physicist. Today, his name is still known to many as a popularizer and educational reformer. His *Natuurkunde van 't vrije veld* (Physics in the Outdoors; the first of the three volumes was also published in English: *Light and Colour in the Open Air*) has become a classic. It is illustrative of his didactic approach: for Minnaert, understanding preceded formal knowledge such as mathematical skills. He strongly promoted the use of real-life examples and hands-on experiments in mathematics and physics education (Molenaar, 2003; cf. Minnaert, 1924). Later, he was one of the most active members of Commission 46 'Teaching of Astronomy' of the International Astronomical Union. He was also known as an extremely inspiring, if demanding, teacher himself.

4 MINNAERT'S PRACTICAL SESSIONS

In the 1920s, a specialized graduate program in astronomy had been introduced at Leiden Observatory by Willem de Sitter (1872–1934; Blaauw, 2014) and Ejnar Hertzsprung (1873–1967; Hermann, 2014). It combined thorough theoretical training in physics, mathematics and astronomy with practical observing skills (Baneke, 2010). This was relatively new—especially observing, which was something that most astronomers learned on the job, while working at an observatory. Only from this time on did a doctorate in astronomy become the standard entry ticket into the professional astronomical community (cf. Lankford, 1997).

As soon as he was appointed Professor of

Astronomy, Minnaert set out to reorganize astronomy teaching at Utrecht University, establishing the second major school of astronomy in the Netherlands, after Leiden. Utrecht became especially known as a school of solar physicists. But Minnaert was not only interested in teaching specialists. He also established an undergraduate course, based on his ideas about hands-on teaching. This became his famous *Sterrenkundepacticum*, practical work in astronomy for first-year students. Minnaert (1969: xi) wrote:

It is intended for freshmen; future mathematicians, physicists and astronomers, who from the very start should be confronted with the sky before they are asked to look at the blackboard!

The practical sessions were mandatory for all first-year students in physics, mathematics and astronomy. The *kandidaatsprogramma's* in those fields (roughly equivalent to Bachelor programmes) were combined: students had to choose two of these fields as majors, with the third one as a minor. Throughout their first year, they worked in pairs on assignments ranging from orbital calculations to measuring and interpreting astronomical photos and spectra in the library. On rare clear nights, they would perform observations on the roof of the Observatory (Figure 5). Students started by mapping constellations, proceeding to more advanced observations with various instruments. Other assignments included for example making sun dials, grinding lenses, and measuring parallaxes using lights positioned at various distances in a dark, quiet street.



Figure 5: Participants in one of the 1942 practical sessions, on the roof of Sonnenborgh Observatory (courtesy: Universiteitsmuseum Utrecht).



Figure 6: The small practice telescopes; a few copies have been preserved in the Sonnenborgh Museum (courtesy: Universiteitsmuseum, 1953).

Gradually, the assignments were standardized, and Minnaert (1969) eventually published them. The Sonnenborgh's instrument-maker Nico van Stralen made a series of dedicated small 40-mm $f/12.5$ telescopes (e.g. see Figure 6); several dozens were made of various generations.

Many students have participated in the half century that the practical sessions existed; more than one would-be mathematician was converted to astronomy in the process (Moleenaar, 2003). In the 1950s, Minnaert's staff member and former student Hans Hubenet took over the practical sessions, although Minnaert still often came by (he lived in the Observatory).

5 THE TOWER

In the 1950s, the number of students increased rapidly, especially in the natural sciences. The Government made funding available for expansion of the teaching facilities (Baneke, 2012). As space was limited inside the university towns of Utrecht, Leiden and Groningen, universities started to look for new locations. This led to the establishment of university campuses at the outskirts of the cities. The natural sciences were usually the first to move there, later followed by social sciences and academic hospitals.

Utrecht University selected the Johanna-polder at the East side of the city for its expansion. It was became known as De Uithof, although its official current name is Utrecht Science Park. To facilitate the process, the first building to be erected was 'Transitorium I', intended as a temporary transit building in which departments would be housed temporarily while their permanent facilities were being built. It was a concrete structure (Figure 7), set up as an indoor street lined with lecture rooms, so that students could move around without having to deal with the muddy building site that was the rest of the Uithof (Reinink, 1986).

Physics and astronomy *prekandidaten* (bachelor's students) would be the first to move to the new campus. This was a chance for Minnaert to realize a purpose-built 'observatory' for his observing sessions. Architect Sjoerd Wouda designed the observatory according to Minnaert's specifications. The tower is labeled 'Sterrewacht' (Observatory) on Wouda's blueprint's, but other documents speak more modestly of an 'observing platform' (*waarneemplatform*) (*Bestuurs-archief* inv. 4.48). Minnaert specified that he wanted a platform on the south side of the building—the view towards the south being the most important for astronomical observations from Utrecht's latitude—with ample storage space and room for 50 students (Minnaert, 1960). The observing platform was equipped with concrete pillars as described in



Figure 7: Transitorium I and the Sterrentoren around 1970, seen from the south (photograph: J.C. Janssen, Utrechts Archief).



Figure 8: The observing platform in rare use, c. 1973; note the concrete pillars for equipment, and the tall Transitorium II building in the background (photograph: Hans Nieuwenhuizen).

in Minnaert's instructions.

The Sterrentoren can be regarded as the oldest building of the campus: it is built on the official first foundation pile, which was ceremoniously driven into the ground on 15 April 1961. Wouda's design evoked the old Smeetoren, but in modern 'brutalist' style, in which the traces of the casing forms remain visible in the concrete.

The Transitorium I complex was opened on 12 March 1964. It was later renamed Marinus Ruppert Building, after the member of the University Board of Trustees (College van Curatoren) who coordinated the Uithof campus construction. Even though it was designed as a temporary construction, it is still in use. The tower, however, is not.

6 AN IGNOMINIOUS END

As the University kept growing—with the post-war 'baby boom' generation flooding into the lecture halls in even greater numbers than expected—the need for space became more urgent. In March 1967, the University Board saw an opportunity to add a lot of floor space fast, by copying some large office buildings that were being developed in The Hague and Rijswijk, also called 'Transitoriums'. Using the same blueprints and the same construction company would save a lot of time.

The buildings did not look particularly innovative but they were constructed in an unusual way. After the foundation, the first floor to be built was the top floor. It was jacked up, and a new floor was added under it, while the higher floors were being finished (this technique is known as jack-blocksysteem or lift slab construction). In this way, a building could be built in record time, from the top down. According to Reinink (1986: 247), the Government had

promised the construction company Haskoning and architects Lucas & Niemeijer to build at least 10 such buildings, in order to make the necessary investments worthwhile.

The 22-floor 'Transitorium II' building (now Willem C. van Unnikgebouw) was opened in October 1969, only two and a half years after the initial plans were drafted (Reinink, 1986). It had not featured in the master plans for the Uithof Campus. The building blocked the view from the Sterrentoren towards the East. Even worse, it was a source of stray light, significantly impeding high-quality observations. By all accounts, the observing platform was used only incidentally after this (Figure 8). Some free fall experiments may have been conducted in the stairway.

The astronomers were undoubtedly unhappy about this, but I have not found evidence of great outrage or formal protests. Perhaps they recognized that the University's building frenzy was a juggernaut that could not be stopped. But it is also possible that they considered the tower a temporary solution anyway, because in the meantime, they were working on bigger plans.

In the 1950s and 1960s, the Sonnenborgh Observatory had become too small for the growing staff. Besides, Kees de Jager established a Space Research Institute that was expanding rapidly (De Jager et.al., 1993; De Kort, 2003). New buildings, sometimes former city houses, were bought to provide room, so that Astronomy gradually became spread over many locations throughout Utrecht. It was clear that a new observatory was needed. An excellent location seemed to present itself: Fort Rhijnauwen, about one mile south of the Uithof campus, and this was bought by the University.¹

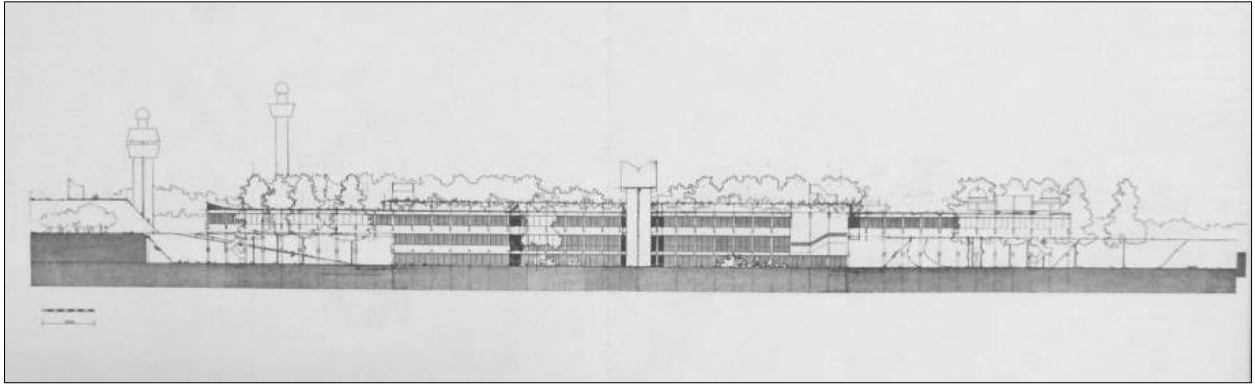


Figure 9: Sjoerd Wouda's design for an observatory at Rhijnauwen fortress (Bestuursarchief box 08342).



Figure 10: The University of Utrecht's original Sonnenborgh Observatory is now a popular astronomy museum (<https://www.sonnenborgh.nl/bezoekersinformatie>).

The fort was ideal: quiet, removed from city lights yet close to the university, while the heavy bulwarks offered a stable foundation for sensitive instruments. Architect Wouda designed a new building (Figure 9). But the project ran into trouble, in part because of the complex situation regarding building permits: the Johannapolder was divided over four different counties, while the University also claimed to have an independent public mandate for its building planning. Emerging environmental concerns proved a bigger problem, however. The deserted fortification had evolved into a small but rich natural area, home to protected plants and animals. The astronomers argued that their plans did not pose a threat; in fact, establishing an observatory would only strengthen the protection. Astronomers also required darkness and quietness, after all.² But the activists were not convinced. A national newspaper reported that this was the first time the fort saw battle (*De*

Volkscrant, 1968; cf. *Bestuursarchief* box 08342). Eventually, the plan was dropped in 1976. This, too, is a tale of a failed observatory.

There may be another reason why the tragedy of the Sterrentoren attracted so little attention. Perhaps practical classes were already losing steam. Minnaert retired in 1963 and died in 1970. Under his successors Cornelis "Kees" de Jager (b. 1929), Henk van Bueren (1925–2012) and Anne Underhill (1920–2003), the emphasis at the Utrecht Institute of Astronomy shifted to astrophysical work (Baneke, 2015, De Jager et.al, 1993). The institute was growing rapidly, and the number of graduate students also increased. Undergraduate teaching was probably a lesser priority.

When academic programs were restructured in 1984 (for insiders: when the Tweefasestructuur was implemented), physics, mathematics and astronomy became separate under-

graduate programs for first-year students. This was the last straw; the practical sessions were abolished. From now on, it was possible to study physics, mathematics, and even astronomy, without actually looking through a telescope. Astronomy in Utrecht (and in many other places) became synonymous with astrophysics. Skills in physics, mathematics, and increasingly programming were more important than knowing how to calibrate your telescope or how to navigate the constellations.

The Utrecht Institute of Astronomy finally moved out of the Sonnenborgh in 1987, to a non-descript office building at the Uithof, which was named after Buys Ballot. The new building did not have observing facilities. The institute remained a center for astrophysics until 2011, when it was quite unexpectedly closed as part of a large-scale reorganization of the Science Faculty. Since then, Utrecht University has no longer offered professional astronomy. The old Sonnenborgh Observatory has become a public observatory and museum (Figure 10; www.sonnenborgh.nl).

7 AFTERLIFE

In the 1980s, the Sterrentoren was completely abandoned, as new buildings kept being added around it. Many suggestions for repurposing have been made, including using it as room for prayer and meditation (stiltecentrum). More creative suggestions of the University's campus management service include turning the tower into a climbing wall, party room or bike parking, or enclosing it in a glass cube to create a conference center or greenhouse (UU DVC, 2016). None of those plans seemed particularly realistic.

For many years, the tower was used as storage space for the Utrechtse Introductie Tijd (UIT), the festive introduction of new students into Utrecht student life before the start of a new term. The students who organized the UIT over the years have recorded their names on the walls and stairs. In June 2017, the tower hosted an art project by Maarten vanden Eynde, but for health and safety reasons only three visitors could enter at a time (DUB, 2017).

The future of the tower is unclear, although at least its existence is protected: the Transitorium I complex, including the tower, was recognized as cultural heritage of the city of Utrecht (gemeentelijk monument) in 2017, as an example of the architecture of the postwar reconstruction era (wederopbouwarchitectuur) (Van Santen, 2016). It still sits at the Uithof campus, noticed by few, as a silent witness of changing ideas about undergraduate astronomy education.

8 NOTES

1. According to (Reinink, 1986: 253), this was agreed to by Ruppert, the President of the Board of Trustees, Count Van Lynden van Sandenburg and the Minister of Defense on an impulse. The University then paid the Ministry, but ownership was never transferred officially.
2. Similar arguments were being used to defend plans for a new radio telescope at Westerbork around this time (see Elbers, 2017).

9 ACKNOWLEDGEMENTS

I am grateful to Hans Nieuwenhuizen for providing Figure 8, to Frans van den Hoven of Utrecht University Museum for Figures 4-6, and to the staff at the *Bestuursarchief* of Utrecht University for providing access to the university archives.

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