

1 **History of the Potsdam, Seddin and Niemegek Geomagnetic** 2 **Observatories – Part 3: Niemegek**

3

4 **Hans-Joachim Linthe¹**

5 [1] {Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences}

6 Correspondence to: Hans-Joachim Linthe (linthe@gfz-potsdam.de)

7

8 **Abstract**

9 The measurement series of the 3 geomagnetic observatories Potsdam, Seddin and Niemegek
10 span over more than 130 years, starting in 1890. It is one of the longest, almost uninterrupted
11 series of recordings of the Earth's magnetic field. Data users frequently emphasize the high
12 quality of the data and its significance for geomagnetic base research. The very well-known
13 and outstanding scientists for geomagnetism, Max Eschenhagen, Adolf Schmidt, Julius
14 Bartels, Gerhard Faselau and Horst Wiese directed among others, in historical sequence, the
15 three observatories.

16 This paper describes the history of the Niemegek Adolf Schmidt Observatory, which was
17 started in 1932 and is currently still in operation.

18

19 **1 Introduction**

20 The Potsdam Prussian Meteorological-Magnetic Observatory operated two magnetic
21 observatories: Potsdam on the Telegrafenberg near by the town of Potsdam, which was in
22 operation 1890-1928, and Seddin near by the village of Seddin, which worked 1907-1931.
23 Anthropogenic noise from DC-powered railway traction vehicles, which were operated in
24 small distances, caused the termination of both the magnetic observatories (Best, et al., 1991
25 and 1992; Linthe, 2023a and 2023b). It was necessary to find a suitable location for a new
26 observatory, which allowed the undisturbed long-term operation.

27 Adolf Schmidt was successful in doing this job. The mayor of the town of Niemegek offered
28 excellent conditions for the new observatory. The construction of the observatory buildings

1 took place under extreme time pressure – Potsdam and Seddin were already disturbed by the
2 DC-powered railway traction vehicles.

3 The next problems occurred by upwelling ground water in the variation house, which caused
4 comprehensive construction repairs. The end of World War II in 1945 caused building and
5 instrument damages and – mostly serious – the lost of instruments. The observatory personnel
6 restarted the observations under extremely difficult conditions, but they could not prevent a
7 data gap of 9 months.

8 The following decades were years of precise observations, successful scientific research,
9 fruitful international collaboration and excellent instrument construction. The German
10 reunification in 1990 implicated dramatic changes for the observatory. The number of
11 employees decreased extremely, but the conditions of the operation of the observatory
12 improved strongly. Modern instruments were purchased and the access on up to date IT hard
13 and software rendered possible to make the observatory completely digital.

14 The International Kp Index Service was taken over from Göttingen University in 1997.
15 Actually it was the return home – the K index was invented on the base of Niemeck
16 recordings in 1939. Even scientific conferences were performed at the observatory. Two
17 employees of the observatory were awarded by the log-service IAGA medal.

18 In the beginning of the data series Potsdam-Seddin-Niemeck the observatories belonged 1890
19 - 1932 to the Magnetic-Meteorological Observatory Potsdam. From 1933 – 1991 followed a
20 period of several affiliation chances. From 1992 onward a period of constant affiliation to the
21 GeoForschungsZentrum Potsdam – now termed Helmholtz Centre Potsdam GFZ German
22 Research Centre for Geosciences - followed.

23 The most important fact for the observatory are the unchanged magnetically clean observing
24 conditions from the beginning until today, therefore, Adolf Schmidt selected an excellent
25 place for the observatory. Furthermore, the administration of the town of Niemeck accepted
26 over the complete operation time – almost 100 years – the agreement stating the conditions of
27 an undisturbed operation.

28 The paper contains the following sections:

- 29 1. Introduction
- 30 2. Niemeck Adolf Schmidt Geomagnetic Observatory
- 31 2.1 Niemeck observatory buildings

- 1 2.2 Niemegek observatory instruments
- 2 2.2.1 Absolute measurements
- 3 2.2.2 Variation recordings
- 4 2.3 Operation of the Niemegek observatory
- 5 2.4 Development of the observatory after the German reunification in 1990
- 6 2.5 Observers and directors resp. heads of the observatory

7 The paper is completed by seven appendices, competing interests and acknowledgements:

8 Appendix I – Brief description of observatory instruments

9 Appendix II – Further observatory equipment

10 Appendix III – Activities of the observatory, exceeding its ordinary purpose

11 Appendix IV - Selection of significant meetings and conferences related to the observatory

12 Appendix V – Collaboration with international observatories

13 Appendix VII - Prominent scientific results and instrumental achievements connected with
14 the observatories Potsdam – Seddin – Niemegek

15 Competing interests

16 Acknowledgements

17 **2 Niemegek Adolf Schmidt Geomagnetic Observatory**

18 The famous Adolf Schmidt (1860-1944), director of the magnetic observatories 1902-1928
19 tackled the task to find a suitable place for a new observatory. At first he considered locations
20 near the villages of Raben and Rädigke in the Hoher Fläming hills (Bock, 1950). But the
21 power supply and building heating was a problem at that time at those locations. But due to a
22 favourable circumstance Adolf Schmidt found a suitable location. Paul Temming (1884-
23 1953), mayor of the small town of Niemegek 1917-1937, got by chance knowledge of Adolf
24 Schmidt's intension to establish a magnetic observatory in the region of Hoher Fläming. He
25 expected development impulses for Niemegek, having such a facility in the town. He made
26 aware Adolf Schmidt on his idea. Schmidt brought forward his expectations on the location
27 and the conditions of the undisturbed operation of the observatory. The negotiations of both
28 the authorities came to the successful result to establish the new observatory in a distance of
29 1,000 m from the town boundary at the edge of a forest (Nippoldt, 1929). On Adolf Schmidt's
30 request the town of Niemegek and the observatory agreed in a contract to ensure the

1 undisturbed operation of the observations. The town of Niemegek committed to abstain from
2 DC facilities and to accept a protection circle of 500 m radius around the observatory, in
3 which any constructions should be allowed only in case of the permission by the observatory.
4 Fig. 1 shows this contract.

5 The town of Niemegek bought the properties from private owners and sold it for the half of its
6 price to the observatory. Furthermore the town constructed a gas and water pipeline and the
7 electrical power supply connection to the observatory, bearing one third of the expenses
8 (Bock, 1950).

9 It was intended to start and finish the construction of the new observatory in 1927 to enable
10 the parallel operation of Seddin and Niemegek over a suitable time period. The Deutsche
11 Reichsbahn-Gesellschaft, owner of the Berlin suburban railway, announced to start the
12 electrical operation of the trains at the beginning of 1929. In fact it was started already on 11
13 June 1928. But the construction of the Niemegek observatory started only in 1929 and became
14 functioning only in the course of 1931. The parallel operation of Seddin and Niemegek was
15 only possible during the time period of almost one year, but the Seddin observations were
16 already disturbed by the leakage currents of the electrical trains (Linthe, 2023b).

17 Adolf Schmidt continued to accompany the activities even after going retired on 1 October
18 1929. He actively influenced the construction plans of the buildings and their locations. The
19 Deutsche Reichsbahn-Gesellschaft, the operator of the DC powered Berlin suburban railway,
20 as the originator of the movement of the observatory from Potsdam and Seddin to Niemegek
21 contributed a significant fee to the costs of the new observatory on the base of a contract – as
22 a result of Schmidt’s successful negotiations (Nippoldt, 1930; Best, 1997).

23 The construction activities of the observatory started on 3 May 1929 (Nippoldt, 1931b). The
24 Prussian Minister for Science, Art and Education granted on 1 April 1930 the new
25 observatory the name “Adolf-Schmidt-Observatorium für Erdmagnetismus”. Fig. 2 shows the
26 document. On 23 July 1930, Adolf Schmidt’s 70th birthday, the observatory was officially
27 opened (Nippoldt, 1931a). Fig. 3 shows the first page of the observatory guest book with
28 Adolf Schmidt’s inscription. He wrote his motto “To be always excellent and to distinguish
29 from others” in Greek and old-style German. Forty six invited persons participated in the
30 opening ceremony. At Fig. 4 the inscriptions of all of them in the guest book are depicted.

31 After the complete finishing of the building construction in 1931 the instruments were
32 installed and adjusted by Richard Bock (1899-1961). The operation of Seddin observatory

1 was continued until 9 May 1932. On 1 January 1932 the observations started officially at the
2 Niemeck Adolf Schmidt Observatory (Bock, 1950).

3 **2.1 Niemeck Observatory Buildings**

4 Fig. 5 shows the ground plan of the new observatory compound of a size of 3.5 ha (Bock,
5 1939). The solid clinker-constructed apartment and service building (later called main
6 building) contains 2 apartments, some offices, 2 guest rooms, the necessary power supply
7 equipment, a workshop and a central heating system. In the as well as solid clinker-
8 constructed storage house were a garage, a laundry and storage rooms. Fig. 6 shows a photo
9 of both the buildings.

10 The house for absolute measurements (later called absolute house) and the variation house are
11 of wooden construction on a concrete foundation. The sand, cement and further additives,
12 used for the concrete, were carefully investigated on being free of any magnetic influence on
13 the observations. Any fitting assemblies are made from brass, the nails are copper ones. The
14 pillars for the instruments are as well as concrete ones, resting in groups together (variation
15 house) resp. all together (absolute house) on a concrete foundation of 50 cm thickness. An
16 outdoor pillar is located eastward of the absolute house.

17 The absolute house (see a photo at Fig. 7 and the ground plan at Fig. 9) consists of a crawl
18 space below the Earth's surface and the measurement room at the ground floor with another
19 crawl loft for thermal insulation. Sixteen pillars are available for the vibration-free placement
20 of instruments (14 in the main room and another 2 in a special annex chamber at the west
21 wall). The church tower (viewable at Fig. 12) and the water tower of the town of Niemeck in
22 a distance of about 1,000 m, visible from some of the pillars, serve as azimuth marks. Before
23 the wooden construction of the house was started, astronomical measurements to determine
24 the azimuth values of a number of inside pillars and the outside one with respect to the
25 azimuth marks took place (Nippoldt, 1930).

26 In 1957 inner walls with thermal insulation and a thermoelectric controlled heating was added
27 in the absolute house to ensure a constant temperature for the absolute measurements (Wiese,
28 1960a). All this was removed in 2003 and 2004 in connection with the basic renovation of the
29 building. Since the invention of the new set of absolute measurement instruments from 1992-
30 1996 a strict constant temperature during the absolute measurement set was not any more
31 necessary.

1 The variation house (see a photo at Fig. 8 and the ground plan at Fig. 10) partly sunk-in below
2 the Earth's surface to avoid as good as possible a thermal influence on the instruments.
3 Around the instrument rooms an insulation corridor for further thermal protection takes
4 course. Three rooms, called following their geographic directions – south, north-east and
5 north-west – are intended to be used for the instruments. A service corridor in the centre
6 allows the access on the recording equipment of both the northern rooms and to enter the
7 south room. The wooden loft with roof over all the concrete basement is further intended to
8 avoid thermal influence on the instruments. A crawl space below the wooden floor of the
9 instrument rooms and the service corridor allows the placement of cables.

10 Adolf Schmidt intended a separate heating system on the base of gas for the variation house
11 and tile stoves for the absolute house. But finally a central heating system for the heating of
12 both magnetometer buildings was constructed. A separate solid clinker-constructed heating
13 house (Fig. 11 shows a photo of the building) containing the coal burning boiler, the pumps
14 and the coal storage in a suitable distance to the observation buildings was in use during the
15 cold seasons. The connection pipes and the radiators in the observation houses were made
16 from copper. Only the insulating corridor of the variation house is heated by means of the
17 warm water heating system. The instrument rooms are heated by means of thermoelectric
18 controlled electric radiators. The annual temperature variation in the rooms is less than 0.5
19 degrees centigrade.

20 The two Seddin observatory buildings were re-erected on prepared magnet-free concrete
21 foundations in 1932 (Nippoldt, 1934). The former Seddin variation house was intended to be
22 used as a laboratory, which is still its function nowadays. It was also connected to the central
23 heating system operated from the heating house. Its basement has a crawl space for cable
24 placement. The former Seddin absolute hut was called first “observation hut”. Later it was
25 renamed into “small hut”. A photo of its present situation shows Fig. 5 in Linthe, 2023b. Fig.
26 12 shows a photo of the observatory buildings, viewed from the apartment and service house.

27 In 1960 the construction of a new building as an electric laboratory was finished (Fanselau,
28 1962a). Fig. 13 shows a view from the attic floor of the main building on the laboratory. In
29 1961 two more measurement huts were constructed at the observatory compound, one of them
30 for housing the sensor of the proton magnetometer. In 1963 an observation hut for the telluric
31 recordings and a little solid building for housing of a small computer was added (Fanselau,

1 1964). During the next year a wooden building housing the measurement centre was
2 constructed.

3 In 1967 the construction of a solid house, called workshop building, housing the precision
4 mechanical workshop, 3 guest rooms, 3 offices, 2 meeting rooms, a kitchen and a
5 photographic laboratory was finished (Fanselau, 1968). Fig. 14 shows a photo of the
6 building. In the same year the computer building was enlarged.

7 Further buildings were constructed at different times for different purposes. Finally 26
8 buildings existed on the observatory compound. Fig. 15 shows the ground plan of 2003. One
9 of the 26 buildings did not any more exist at this time. Three more buildings, which were not
10 any more in use, were removed in 2004. Fig. 16 shows the present ground plan of the
11 observatory compound.

12 The buildings No. 1, 4, 5, 6, 7, 8, 9, 10 and 11 were declared historic monuments in 2004.

13 **2.2 Niemegek Observatory Instruments**

14 The before in Potsdam and in Seddin used instruments were transported step by step to
15 Niemegek and installed at the new site. Brief descriptions of the instruments and the
16 measurement procedures can be found in appendix I.

17 **2.2.1 Absolute Measurements**

18 The three theodolites for the measurement of declination and horizontal intensity, Wanschaff,
19 Bamberg and Schmidt as well as the oscillation box Wanschaff have got suitable conditions in
20 the new absolute house due to the big number of 14 pillars. The 2 Earth inductors Schulze
21 No.1 and No. 65 as well as the appropriate galvanometers have got their places on separate
22 pillars. Fig. 17 shows an interior view of the absolute house. The table below the figure gives
23 the assignment of the visible instruments to the pillars.

24 The accuracy of the oscillation measurements was significantly improved by means of the
25 construction of a photoelectric oscillation measurement facility in 1933 (Fanselau, 1933).

26 The theodolite Bamberg, the oscillation box Wanschaff, the photoelectric oscillation
27 measurement facility and the standard magnets for the measurement of the horizontal
28 intensity were lost in 1945 (Fanselau's preliminary remark in Richard and Wiese, 1954). New
29 standard magnets were purchased in 1950. A new oscillation box was constructed by the
30 observatory workshop. The lost photoelectric oscillation measurement facility was replaced

1 by a new established one in 1954 (Schmidt, 1956). A further Earth inductor was delivered by
2 Mating & Wiesenberg, Potsdam (Richard and Wiese, 1954). The new positions of the
3 instruments in the absolute house were as follows:

4	Pillar No.	Instrument
5	2	Galvanometer for the earth inductor Mating & Wiesenberg
6	4	Galvanometer for the earth inductor Schulze No. 1
7	6	Collimator (azimuth mark in case of invisible towers)
8	7	Oscillation box
9	8	Theodolit Wanschaff
10	9	Theodolit Schmidt
11	11	Earth inductor Mating & Wiesenberg
12	13	Earth inductor Schulze No. 1

13 From 1959 onward several self-made proton magnetometers were in use for permanent
14 measurements of the total intensity (Schmidt, 1962; Wiese, 1962). In 1970 a Russian caesium
15 magnetometer was taken into use on pillar No. 1 in the absolute house. Comparisons to the
16 proton magnetometer measurements were done (Lengning et al., 1973). Later on a self-made
17 vector proton magnetometer was installed on pillar No. 1 in the absolute house.

18 In 1992 two DI-flux instruments on the base of the theodolite ZEISS THEO 010B equipped
19 with the Bartington flux-gate magnetometer MAG01H were purchased and taken into use.
20 Fig. 18 (left) shows the DI-flux on pillar No. 2 of the absolute house with the Niemeck church
21 tower in the background. The absolute measurements by means of these instruments were
22 performed on pillar No. 2 and 5 in the absolute house. Measurements of the total intensity
23 were carried out on the same pillars by means of the Overhauser proton magnetometer
24 GEMSYS GSM19 (Best et al. 1993). The GSM19 is depicted at Fig. 18 (right).

25 Brief descriptions of the instruments and the measurement procedures of the modern
26 instruments can be found in appendix I as well.

27

28 **2.2.2 Variation Recordings**

29 In the beginning variometers, formerly operated in Potsdam or Seddin were installed in
30 Niemeck. The differences of Potsdam and Seddin against Niemeck are as follows: Instead of
31 baseline interruptions (Potsdam and Seddin) vertical lines on the photographic recordings
32 were in use as hourly time marks in Niemeck, controlled by the non-magnetic pendulum
33 clock, which was moved from Potsdam. In Potsdam and Seddin gasoline lamps were in use

1 for the illumination of the photographic recording. In Niemegek from the beginning electrical
2 lamps powered by batteries in the main building were used exclusively for the photographic
3 recording.

4 The variometers of Mascart's origin, used before at the Potsdam observatory for the recording
5 of the declination (D), horizontal (H) and vertical intensity (Z), were mounted after some
6 modifications and alignments in the north-east room of the Niemegek variation house. An
7 instrument for recording of the inclination (I) was added. The projected sensitivities were 2
8 nT mm^{-1} for H and Z and $0.4 \text{ arc minutes mm}^{-1}$ for D and I. The recording equipment (made
9 by Askania, Berlin-Friedenau), having 4 drums for the photographic paper, used 2 of the
10 drums for 2 variometers each on 1 paper sheet of a recording speed of 2 cm hour^{-1} . The 2
11 further drums allowed the recording of the same variometers of selectable recording speeds of
12 6 or 24 cm hour^{-1} (Bock, 1935).

13 Fig. 21 shows one of the first test photographic recordings of the horizontal intensity,
14 declination and the vertical intensity of the time interval 25 March 1931 at 08:00 till 26 March
15 1931 at 07:20 (Greenwich local mean time) taken at the Niemegek Adolf Schmidt
16 Geomagnetic Observatory.

17 The former in Seddin used variometer set including the photographic recording equipment for
18 recording of the North (X), East (Y) component and the vertical (Z) intensity was placed in
19 the Niemegek north-west room in the same disposition as at Seddin. Fig. 19 shows an interior
20 view of this room. The tracks on the photographic recordings are described in Linthe (2023b)
21 and remained unchanged.

22 All the variometers in the north-east and north-west room were equipped with Helmholtz
23 coils for the galvanic scale value determination.

24 In the south room a declination (D), horizontal (H) and vertical intensity (Z) variometer set
25 was operated. From 1937 onward a special recording unit (Schmidt, 1926) of a plotting speed
26 of 4 mm minute^{-1} was operated, which was already in use in Seddin (Linthe, 2023b).

27 From 1938 onward an instrument set of reduced sensitivity (25 nT mm^{-1} for H and Z and 5 arc
28 minutes mm^{-1}), a so called storm variometer, was operated in the west room of the magnetic
29 laboratory.

30 Caused by the World War II damages of buildings and instruments and loss of 3 variometer
31 sets in 1945, only a provisional operation of the north-east system was restarted in February

1 1946. Details are described in chapter 2.3 at page 12. Fig. 22 shows the first photographic
2 recordings after the observation gap of the horizontal intensity, declination, the vertical
3 intensity and the room temperature of the time interval 27 February 1946 at 10:30 till 28
4 February 1946 at 09:00 (Greenwich local mean time). The principle of recording the
5 variations of different components of the Earth's magnetic field and temperatures at the same
6 magnetogram, which is clearly visible at this figure, was in use all the time at the Niemeck
7 observatory.

8 In 1948 a new set of variometers of reduced sensitivity (storm variometer) was installed
9 (Fanselau and Wiese, 1956). In 1950 a new variometer set was installed in the south room of
10 the variation house, recording the North (X), East component (Y) and the vertical intensity
11 (Z), made by Mating & Wiesenberg, Potsdam. Also in 1950 a new variometer system was
12 installed in the north-west room, recording H, D and Z, which was made in the observatory
13 workshop.

14 The operation of the storm variometer in the magnetic laboratory was stopped in 1951 and
15 replaced by a journey recording unit (Fanselau, 1951), which was operated additionally in the
16 north-west room of the variation house. It was finally replaced by a new H, D, Z storm
17 variometer set in the north-east room of the variation house in 1954 (Wiese, 1957).

18 In 1960 a new recording equipment made by Mating & Wiesenberg, Potsdam was installed
19 for the north-west variometer system.

20 In 1965 a special paper-economizing three-component photographic recording using an
21 especially constructed recording equipment was started in the magnetic laboratory (Fanselau
22 and Grafe, 1963). It was in operation until 1970 (Lengning et al. 1971).

23 Digital recording vector proton magnetometers were constructed during the 1970th at the
24 observatory. Their continuous operation at Niemeck observatory and in the remote station
25 Warnkenhagen (at the Baltic Sea coast, north-west German Democratic Republic, GDR)
26 started in 1976 (Lengning et al. 1977). In 1978 a digital recording scalar proton magnetometer
27 was installed at the remote station Sosa in the Erzgebirge (south GDR). All the proton
28 magnetometers recorded of a sampling rate of 1 minute on eight canal punched tapes. The
29 operation of these instruments at the remote stations was terminated in 1991. The termination
30 of the Niemeck vector proton magnetometers followed in 1994.

1 In 1993 an “automatic geomagnetic observatory” M390, made by the French company
2 GEOMAG, consisting of the fluxgate magnetometer VM390A, the Overhauser proton
3 magnetometer GEMSYS SM90R, the electronic unit and a METEOSAT transmitter was
4 installed and operated continuously in the variation house. The recorded data were transmitted
5 to INTERMAGNET and stored on a 3.5” floppy disk. The operation of this instrument was
6 terminated in 2006.

7 In 1995 the 3-component fluxgate magnetometer FGE, made by the Danish Meteorological
8 Institute Copenhagen, and the Overhauser proton magnetometer GSM19, made by GEM
9 Systems, Richmond Hill, Canada, were taken into operation in the variation house. They were
10 controlled by the self-made data logger MAGDALOG (Best and Linthe, 1996). Fig. 20 shows
11 a photo of the FGE. The GSM19 is depicted at Fig. 18, right. Two more of this digital
12 recording system of the same configuration were installed in the variation house in 2000.
13 These instruments are the present variation recording systems of the Niemegek Adolf Schmidt
14 Geomagnetic Observatory. Only the GSM19 were replaced by the Overhauser proton
15 magnetometers GSM90. The vector sensors FGE are located in the south room, the scalar
16 sensors are placed in the north-east room of the variation house. A further digital recording
17 system was installed in 2008 in an underground container (No. 16 at Fig.16).

18 In 1996 a further 3-component fluxgate magnetometer, made by MAGSON, Berlin, was
19 installed in a measurement hut. The recorded data were transmitted manually by means of a
20 laptop (Best and Linthe, 1997). The operation of this instrument was terminated in 2005.

21 The photographic recordings were continued until the photographic paper was finished. Fig.
22 23 shows the last photographic recordings of the north (X), east (Y) component and the
23 vertical (Z) intensity and 2 room temperatures of the time interval 27 May 2006 at 09:00 till
24 28 May 2006 at 9:00 (Greenwich local mean time) taken at the Niemegek Adolf Schmidt
25 Geomagnetic Observatory.

26 Brief descriptions of the classical and modern instruments for recording of the variations can
27 be found in appendix I as well.

28

29 **2.3 Operation of the Niemegek Observatory**

30 On 30 May 1930 a caretaker and a technician moved into their apartments of the main
31 building. Richard Bock (1899-1961) as the observer followed them on 1 December 1930

1 (Nippoldt, 1931a). These 3 employees operated the observatory on-site. All the data
2 evaluation took place at the institute head quarter in Potsdam.

3 Already in 1931 ground water welled up in the variation house, which dramatically degraded
4 the operation conditions of the instruments. The seasonal changing level of the ground water
5 was not carefully enough considered during the planning phase. An expensive and time
6 consuming drainage construction (finished in November 1931) drained off the ground water
7 (Bock, 1950). Together with a ventilation system the situation for the instruments was finally
8 improved. But the wooden beams and shelves of the floor construction were so aggrieved that
9 in 1934 a chemical conditioning of the beams and replacement of the shelves was necessary
10 (Bock, 1937 and 1950). These measures required to remove all the instruments from the
11 building. The replacement recordings took place in the magnetic laboratory, which was taken
12 into use end of 1933 after its demolition in Seddin and re-erection in Niemegek. After a more
13 or less provisional operation 1931-1934 of the observatory due to the construction defect of
14 the variation house finally from 1935 onward a normal situation started.

15 The absolute measurements were performed by means of the theodolite Wanschaff on pillar
16 No. 9 for the declination (D) and horizontal intensity (H), supplemented by the oscillation box
17 on pillar No. 3 and by means of the Earth inductor Schulze No. 1 on pillar No. 11 for the
18 inclination (I). The associated galvanometer was placed on pillar No. 2.

19 From 1936 onward plots of typical variations as Bay disturbances, sudden storm
20 commencements (ssc) and further characteristic trends of the geomagnetic variation field were
21 included into the yearbooks. In 1937 plots of pulsations followed. For the publication in the
22 yearbooks the photographic recordings were scale-transformed using a special developed
23 pantograph, constructed by Adolf Schmidt (Luyken, 1909).

24 From 1937 onward the magnetic activity indices K, proposed by Julius Bartels (1899-1964),
25 were published regularly in the yearbooks (Bartels, 1938). The index was internationally
26 adopted on Bartels' suggestion at the Washington conference of the International Association
27 for Terrestrial Magnetism and Electricity (IATME) in 1940.

28 Already in 1944 World War II influenced the Niemegek territory. Bombings and airplane shots
29 attacked the town. The storm on the town of Niemegek by Soviet tank, artillery and infantry
30 forces took place in April 1945 (Dalitz, 1995). The last magnetograms were taken off the
31 recording equipment on 20 April 1945. The absolute house was heavily damaged by an
32 artillery strike, whereby the instruments were totally contaminated. A further artillery strike

1 damaged the transformer house, so that the power supply was interrupted until September
2 1945. The most serious consequence was the instrument loss, commandeered by the victor
3 force (Fanselau and Wiese, 1954).

4 Only under strenuous efforts the war damages were abolished step by step. The operation of
5 the observatory needed to be re-established completely anew. The artillery strike of the
6 absolute house caused a lot of shrapnel in the wooden parts, which needed to be individually
7 and extensively discovered and removed additionally to the building repair (Fanselau and
8 Wiese, 1956). The variometer recordings were restarted on 27 February 1946, first only
9 provisionally. Due to the loss of the standard magnets the absolute measurements of the
10 horizontal intensity were performed using a magnet of low quality.

11 On the newly purchased or constructed instrumental base a new determination of the absolute
12 level of the Earth's magnetic field values took place 1950-1952 (Richard and Wiese, 1954). In
13 this connection the azimuth values of the outdoor pillar, of some of the pillars in the absolute
14 house and both of the ones in the small hut with respect to the Niemeck church and water
15 tower and further distant village church towers were geodetically newly determined.

16 Up to this time only theodolite Wanschaff was in permanent use for the determination of the
17 declination and horizontal intensity. From this time onward these measurements were
18 performed by means of both the theodolites, Wanschaff and Schmidt. Their results were
19 averaged.

20 On the base of the experimental studies of proton magnetometers, started in 1950, an
21 equipment for the permanent measurement of the total intensity was established (Schmidt,
22 1962; Wiese, 1962). It was in use from 1958 onward. The results were published from 1959
23 onward in a special yearbook table, demonstrating the difference of the proton magnetometer
24 measurements to the classical ones. The total intensity measurements were performed
25 manually operated on the outdoor pillar "Waldpfeiler" ("forest pillar") in hut No. 15 at Fig.
26 15) as well as in the absolute house on pillars No. 15 and 16 regularly on workdays. From
27 1965 onward such measurements were in parallel carried out also in the absolute house on
28 pillar No. 2. The data of the proton magnetometer measurements of all installed instruments
29 were permanently compared. In 1962 a survey of the total intensity in the absolute house was
30 carried out (Schmidt, 1963) to find out magnetic anomalies. Neglectable anomalies were
31 found.

1 The observatory results on the base of the proton magnetometer measurements were of higher
2 accuracy in comparison to the data achieved from inclination measurements by means of the
3 Earth inductor. Therefore, consequently from 1966 onward the measurements of the total
4 intensity by means of proton magnetometers were directly used for the baseline calculation.
5 The inclination measurements by means of the Earth inductors were used only for level check
6 and finally terminated (Grafe, 1968).

7 In 1968 the first magnetic recording instruments with digital output were taken into operation
8 (Fanselau, 1969).

9 **2.4 Development of the Observatory after the German Reunification in 1990**

10 After the positive evaluation of the Niemeck Adolf Schmidt Geomagnetic Observatory by the
11 German Council of Science and Humanities it was decided to integrate the observatory into
12 the GeoForschungsZentrum (GFZ) Potsdam, which was founded on 1 January 1992.

13 The observatory started in 1931 with 3 on-site employees. This situation did not change until
14 the time immediately after World War II. Gerhard Fanselau lost his apartment in Berlin due to
15 bombing attacks on the city. He took a free apartment at the observatory. He first arranged the
16 repairs of the demolished buildings and instruments and restarted the observation service.
17 Next he promoted a comprehensive development of the observatory. He initiated the
18 instrument development and established a scientific working group in Niemeck. He looked
19 after the logistic base and recruited the necessary number of employees: technicians and
20 scientists. Even after Fanselau's retirement in 1969 the number of employees increased up to
21 55 persons during the eighties. With the foundation of the GeoForschungsZentrum (GFZ) the
22 employees number decreased dramatically, but more or less social compatible. The
23 Unification Treaty determined the closing of all institutes of the Academy of Sciences of the
24 German Democratic Republic on 31 December 1991. New positions for scientists and
25 technicians were opened during the foundation of the GFZ in the course of the year 1991.
26 Former employees of the observatory, who were not considered for any new observatory
27 position went retired, changed to other enterprises, took alternative positions within the GFZ
28 or took project positions.

29 From 1992 onward all the historical computers were replaced step by step with modern
30 personal computers. The complete variation recording was transmitted into the digital mode
31 by installing self-made data loggers MAGDALOG and glass fiber data transmission. The
32 complete observatory data are data-base stored and secured by suitable backup systems.

1 From 1992 onward absolute measurements were performed regularly by means of the DI-flux
2 (declination, inclination) and the GEMSYS GSM 19 (total intensity) in parallel with the
3 classical ones. The results of both measurements were compared.

4 The Niemeck Adolf Schmidt Geomagnetic Observatory became an IMO (INTERMAGNET
5 Geomagnetic Observatory) in 1993. In 1994 the survey of the total intensity of the pillars in
6 the absolute house was repeated (Linthe, 1995). The new survey confirmed the results of
7 (Schmidt, 1963).

8 From 1994 onward digital observatory data were published on 3.5" floppy disks besides the
9 yearbook tables (Best and Linthe, 1995).

10 After the successful comparisons of the absolute measurements by means of the classical
11 instruments and the modern ones over 4 years in 1996 the classical absolute measurements
12 were stopped. The observatory level was based from this time onward on the DI-flux and the
13 Overhauser proton magnetometer on pillar No. 8. This instrument change caused a jump of
14 the observatory level in the horizontal and vertical intensity. The classical photographic
15 recordings were continued. But the observatory data were based on the digital recordings of
16 the 3-component fluxgate magnetometer FGE (Best and Linthe, 1997).

17 A new determination of the azimuth values of the outdoor pillar and several absolute house
18 pillars was carried out in 1997 (Förster, 1998).

19 The Bundesamt für Seeschifffahrt und Hydrographie Hamburg (BSH) decided to terminate
20 the operation of the Erdmagnetisches Observatorium Wingst with 1 January 2000. The
21 GeoForschungsZentrum Potsdam (GFZ) and the BSH agreed in a contract to continue the
22 observations in Wingst. The BSH remained responsible for the management of the compound
23 and the buildings, while the GFZ took over the operation of the instruments and the scientific
24 responsibility (Linthe and Schulz, 2005). Wingst Observatory was finally taken into complete
25 responsibility of the GFZ in 2014. From 2000 onward joint yearbooks of both observatories
26 were published. The yearbook publication was terminated with the 2003 one.

27 **2.5 Affiliations, Observers and Directors resp. Heads of the Observatory**

28 The Niemeck Adolf Schmidt Geomagnetic Observatory was affiliated to different scientific
29 or administrative organisations. Table 2 shows the complete affiliation history. Table 3
30 contains the list of the scientific directors resp. heads of the observatory. The responsible
31 observers are listed in table 4.

1 **Appendix I – Brief Description of Observatory Instruments**

2 Magnetic observatory data can be achieved only by combining continuous recordings of the
3 temporal variations of the Earth's magnetic field with periodical absolute measurements. The
4 absolute measurements are necessary to calibrate the variation instruments (variometers). The
5 classical instruments, which were in use in Niemegek until the 1990s, were constructed mainly
6 after the principle of a suspended magnet.

7 Variometers for recording of horizontal elements, for instance the North (X), or East
8 component (Y), or the horizontal intensity (H), or declination (D) consist of a bar magnet
9 suspended by means of a vertical thread. The magnet can only move in one direction,
10 corresponding to the element to be recorded. The instrument for the vertical component (Z)
11 needs a magnet able to move vertically. Practically this is achieved by mounting the magnet
12 on a balance. Both the horizontal and vertical variometers have a mirror at their face side.

13 During the beginning of magnetic observatories the position of the magnet was manually read
14 by means of a telescope. The observer's sight was reflected by the mirror at the magnet on a
15 scale. Already during the 19th century the photographic recording was constructed. A light
16 beam from a lamp is reflected by the mirror at the magnet on a photographic paper, which is
17 fixed on a drum, driven by a clock work, which takes one turn per day. The photographic
18 paper was to be changed once per day and developed in the normal way. The product was
19 called magnetogram. The variometer rooms needed to be kept in complete darkness. Only for
20 the short time of paper change week red light was allowed.

21 In the beginning of photographic recording the light sources were gasoline lamps. They were
22 in use in Potsdam and Seddin. In Niemegek electrical lamps, powered by batteries, were in use.
23 In Seddin and Niemegek Helmholtz coils, mounted at every variometer were in use for scale
24 value determination. By means of glass scales the positions of the tracks at the magnetograms
25 were read and converted using the scale values into magnetic units. Comprehensive details on
26 classical instruments and measurement practices can be found in (Wiese et al., 1960b).

27 Absolute measurements are performed by using magnetic theodolites. By means of them the
28 declination (D) and the horizontal intensity (H) can be determined. They consist of a
29 horizontal circle, a telescope, a magnet (the so called magnetic needle) and a vertical thread. It
30 is placed on a stable pillar. It is necessary to know the geodetical azimuth of the pillar with
31 respect to an azimuth mark. The geodetical azimuth is the angle between the geographic
32 North direction and the sight line from the measurement pillar to the azimuth mark. The

1 declination measurement starts with a bearing by means of the telescope to the azimuth mark
2 and the reading of the circle. Then the magnetic needle is fixed at the vertical thread. The
3 natural Earth's magnetic field will force the magnetic needle to point to magnetic North. The
4 observer needs to turn the theodolite, until the magnetic needle is parallel to the axis of the
5 telescope, by observing the face side of the magnetic needle. Now the horizontal circle needs
6 to be read. The difference of both the readings is the declination.

7 For the measurement of the horizontal intensity the theodolite needs to have one or two bars
8 at the same level as the magnetic needle is placed. A so called deflection magnet of a known
9 magnetic force is put on the bar in a fixed distance perpendicular to the magnetic needle.
10 From the angular difference of a bearing with and without the deflection magnet H can be
11 calculated. A second method of H measurement is the oscillation method. The deflection
12 magnet is fixed in its centre at a vertical thread and forced to make torsion movements. The
13 horizontal intensity can be calculated from the oscillation period. The performance of 2
14 independent methods for the same parameter allows to eliminate drifts in the magnetic force
15 of the deflection magnet. The determination of the oscillation period can be done by the "eye
16 and ear" method. More accurate results yield the use of a suitable opto-electronic equipment
17 (Schmidt, 1956).

18 The inclination (I) was in ancient times determined by a dip needle, which is a magnetic
19 needle, which may move in vertical direction. The position of the needle with respect to a
20 vertical circle gives the value of I . A more precise instrument is the earth inductor. It uses a
21 zero-method. The position of a rotating coil is to be found, in which no current in the coil is
22 induced caused by the Earth's magnetic field. A sensitive galvanometer is connected to the
23 coil as the indicator for the induced current. Tilt and azimuth of the coil axis can be adjusted
24 and read on reference circles. The read tilt is the inclination.

25 Beginning with the 1940s new measurement methods and instruments for the Earth's
26 magnetic field were developed. Around 1990 instruments using the new principles were able
27 to be used in the magnetic observatories. Three principles found wide application in the
28 observatory practice:

29 Coils of many windings without cores came in use for the recording of short periodic
30 variations. The voltages induced in the coils were recorded on photographic paper by
31 galvanometers. Later on coils with high permeable cores (search coil magnetometers) were in
32 use with digital recording.

1 A further principle is the saturation core or flux-gate magnetometer. The working principle of
2 this instrument is based on the saturation of a transformer core. In this situation primarily odd
3 harmonics of the excitation frequency are produced. When in addition to the alternating
4 excitation field also a DC component of the environmental magnetic field acts on the core,
5 also even harmonic signals appear. By means of suitable electronic circuits these even
6 harmonics are detected and converted into an output voltage proportional to the Earth's
7 magnetic field component in the direction of the sensor core.

8 A third principle is the so called proton magnetometer. It consists of a vessel filled with a
9 proton-rich liquid, a surrounding coil, and electronic control circuits. The coil is used in two
10 modes: In the first one a strong DC current flows through the coil. The induced magnetic field
11 forces the protons in the liquid sample to align their spin axis along the coil field. After switch
12 off of the DC current the protons start to reorient their spin axis towards the ambient magnetic
13 field by performing a precession motion. The resulting precession frequency is proportional to
14 the ambient magnetic field strength. In this phase the coil is used to pick up the proton
15 precession signal and the electronics measures the derived frequency. Best results are
16 achieved when the direction of the applied DC field is approximately perpendicular to the
17 Earth's magnetic field.

18 Further principles were developed, but their use in magnetic observatories is limited. Only the
19 optical pumping is some useful, which is based on an atomic effect of the electrons. The
20 construction of such magnetometers is extremely expensive (Bloom, 1962; Pulz and Jäckel,
21 1998).

22 Widely in use for absolute measurements are DI-flux magnetometers, which consist of a non-
23 magnetic theodolite, having a horizontal and a vertical circle and is equipped by a fluxgate
24 sensor, connected to its electronic unit. The axis of the fluxgate is adjusted as good as possible
25 parallel to the telescope axis and serves as an indicator for the direction of the Earth's
26 magnetic field. It is possible to determine the declination (D) and the inclination (I). The
27 instrument is placed on a stable pillar. It is necessary to know the geodetical azimuth of the
28 pillar with respect to an azimuth mark. The geodetical azimuth is the angle between the
29 geographic North direction and the sight line from the measurement pillar to the azimuth
30 mark. The declination measurement starts with a bearing by means of the telescope to the
31 azimuth mark and the reading of the circle. The next step is to align the telescope as exactly as
32 possible horizontally. Then the telescope is rotated until the display of the magnetometer

1 shows zero. That means, the direction of the Earth's magnetic field in the horizontal plane is
2 perpendicular to the telescope. The horizontal circle is to be read. The difference of both the
3 readings, considering the azimuth value and 90° is the declination. The inclination can be
4 determined by tilting the telescope until the display of the magnetometer shows zero. Reading
5 the vertical circle, considering 90° (because the position of the telescope is perpendicular to
6 the direction of the Earth's magnetic field in the vertical plane). Both angles are determined
7 by means of a zero method, which eliminates offset errors and non-linearities of the
8 magnetometer. The misalignments of the sensor axis with respect to the telescope axis are
9 eliminated by means of performing the D and I measurements in 4 positions each.

10 The total intensity (F) of the Earth's magnetic field is determined by means of a proton
11 magnetometer. The 2 angles, D and I and the scalar value F determine completely the field
12 vector. The natural variation of the field during the time of the absolute measurement is taken
13 into account by considering the variometer data. The instruments and the procedure are
14 described in detail in (Jankowski and Sucksdorff, 1996).

15 **Appendix II – Further Observatory Equipment**

16 On the occasion of the International Polar Year 1932/1933 an equipment for recording of
17 telluric currents was installed, consisting of 2 lines in the geographic directions North-South
18 and East-West, both of 1,000 m length, funded by the Rockefeller foundation (Bock, 1950).
19 The electrodes were lead plates. The East and South electrodes were located at the
20 observatory compound, the West and North electrodes in the appropriate distance in
21 neighbouring forests. The recording was performed by galvanometers on photographic paper,
22 located in the laboratory. It is unknown, when the recordings were stopped; recordings are not
23 anymore available. In 1949 activities for the re-establishment of telluric recordings were
24 started. Potential-free copper – blue vitriol electrodes were developed in 1953 at the
25 observatory (Lengning, 1958). In 1956 the continuous recording was started (Lengning,
26 1960). From 1957 onward further lines of different directions and lengths were installed and
27 operated. Presently only the two 1,000 m geographically oriented lines are still in operation,
28 using digital recording since 2001 (Linthe and Schulz, 2007).

29 In 1952 induction coil variometers were installed and operated. Rectangular coils of many
30 windings and big dimensions located in the absolute house were in use for the North and East
31 component. The vertical intensity was detected by a wire fixed at the fence around the
32 observatory compound. The coils were connected to galvanometers recording on

1 photographic paper of a speed of 4 mm per minute in the South room of the variation house
2 (Wiese, 1956). Due to the enlargement of the observatory compound in 1952 a horizontal
3 coil of 50 m circumference was installed as vertical intensity sensor (Wiese, 1958). The
4 recording galvanometer was moved in 1957 to the West room of the variation house (Wiese,
5 1960a). In 1971 the coreless coils were replaced by cylindrical ones with cores of high
6 permeability of small diameter and 2 m length (search coils). An electronic amplifier unit,
7 developed during the period 1965-1970 with photographic recording was taken into operation
8 (Auster, 1972). The photographic recording was in 1999 replaced by digital one. The
9 equipment is still in operation.

10 **Appendix III – Activities of the Observatory, Exceeding its Ordinary Purpose**

11 Around 1948 a field balance on the base of a tape-suspended magnet was constructed in the
12 precise mechanic workshop of the observatory (Fanselau, 1948). This instrument improved
13 dramatically the knife-edge field balance after Adolf Schmidt. In the beginning of the 1950s
14 the development of instruments on the base of new principles was started: flux-gate and
15 proton magnetometers. The tape-suspended field balance was elaborated more and more,
16 different modifications were constructed. The project of constructing a chamber of constant
17 magnetic field (“Konstanthaltung”) for instrument calibration was started (Fanselau, 1953). In
18 1952 the compound of the observatory was enlarged to a size of 5.2 ha to ensure the
19 undisturbed operation of the Earth magnetic observations besides the further projects of
20 instrumental development. A measurement and adjustment hut for the field balance
21 production and 2 huts for the constant magnetic field chamber (one containing a 3-component
22 cylindrical Helmholtz coil system of big dimensions) were constructed (Fanselau, 1955).

23 In preparation of the International Geophysical Year (IGY) 1957 in 1953 three satellite
24 stations were started to be constructed in Warnkenhagen (North-West German Democratic
25 Republic), Ückermünde (North-East GDR) and Herrnhut (South-East GDR) for geomagnetic
26 and geoelectric recordings (Fanselau, 1956). The data of the satellite stations were intended to
27 be used for scientific investigations of the distribution of the Earth’s magnetic field over the
28 GDR and local differences of the secular variation. The Herrnhut station was terminated in
29 1961 (Fanselau, 1962b). The Ückermünde station existed until 1965 (Fanselau, 1966). The
30 closure of the 2 stations happened due to logistic and financial reasons.

1 In 1956 the precision mechanical workshop was moved from the basement of the main
2 building to the storage house, suitably modified for this purpose. The instrumental equipment
3 of the satellite stations was continued in 1956 (Fanselau, 1957).

4 In 1956 a project to study the local gradient of the Earth magnetic field was started. For this
5 purpose 4 magnetometer stations were constructed at the corner points of a 7 km square,
6 geographically oriented (Fanselau, 1958). Each station was equipped with 3 geographically
7 oriented photo-electrically compensated field balances with analogue paper recording. The
8 north-western station was located in a distance of 200 m south-westward of the observatory
9 compound.

10 Different measurement expeditions were performed in connection with the IGY: repeat
11 station and magneto-telluric measurements at the territory of the GDR and some Eastern
12 European countries from 1956 onward. In 1961 an expedition to study the effect of a solar
13 eclipse on the Earth's magnetic field in Romania and Bulgaria took place (Fanselau, 1962a).
14 A van "Phänomen Granit 30 K" (Fig. 24 shows a photo of it) was in use for all expeditions.
15 The van was completely equipped with any necessary instruments.

16 From 1953-1962 repeat station measurements on 1762 stations on the territory of the German
17 Democratic Republic were carried out. The results were reduced on the period 1957.5 (Bolz,
18 et al., 1969).

19 In 1963 electronic data processing started by means of purchase of a small computer Cellatron
20 SER 2, produced by the company Cellatron in Zella-Mehlis, Thuringia, German Democratic
21 Republic (Fanselau, 1964). An equipment for digitization of photographic magnetic
22 recordings was developed and taken into use together with the small computer. The yearbook
23 1965 was the first one produced by means of the use of the SER 2 (Schmidt, 1967).

24 From 1970 onward the observation program of the remote station Warnkenhagen was
25 enlarged. Besides the variometer set of sensitive scale values a set of lower sensitivity and a
26 scalar proton magnetometer was installed. Also telluric and induction coil magnetometer
27 recordings were taken into operation (Lengning et al., 1973). From 1976 onward a vector
28 proton magnetometer was in operation. At a further remote station, located at Sosa in the
29 Erzgebirge, a scalar proton magnetometer was installed in 1978.

30 In 1972 a digital data acquisition equipment based on modules of the computer ROBOTRON
31 R300, produced by the company Robotron in Radeberg, near Dresden, German Democratic

1 Republic was installed for the recording of 1 Hz- sampled five channels magnetic and telluric
2 data in the enlarged computer house (building No. 3 at Fig. 15) of the observatory (Lengning
3 et al., 1973).

4 In 1975 a process control computer PRS4000, produced as well as by the company Robotron,
5 was installed in the again enlarged computer house of the observatory (Lengning et al., 1976).
6 It was intended to be used for the direct digital data acquisition from the geomagnetic
7 recording instruments and for data processing. It was in operation during the 3 regular world
8 days for the on-line processing of the signals of the search coil magnetometers. From 1976
9 onward the yearbook tables were produced by means of this computer. All the digital proton
10 magnetometer recordings on punched tapes were inserted and stored on the PRS4000.

11 In 1983 a microcomputer MPS4944 was taken into operation for the continuous on-line
12 processing of the signals of the search coil magnetometers. The MPS4944 was produced by
13 the scientific toolbuilding of the Central Institute for Nuclear Research in Rossendorf near
14 Dresden, German Democratic Republic, which is today the Helmholtz-Zentrum Dresden-
15 Rossendorf. The necessary software was developed at the observatory (Lenners et al., 1984).

16 The remote stations Warnkenhagen at the Baltic Sea coast as well as Sosa at Erzgebirge
17 mountains were closed in June 1991 due to the changed conditions caused by the German
18 reunification in 1990.

19 On the base of contributions of the observatories Fürstfeldbruck, Niemeck and Wingst the
20 first entire German magnetic map after the German reunification was published in 1995
21 (Beblo et al. 1995).

22 The self-made vector proton magnetometer on pillar No. 1 in the absolute house was in
23 operation until 1998, but its results were never in use for the observatory data (Linthe, 2000).

24 A long tradition of instrument development existed at the Niemeck Adolf Schmidt
25 Geomagnetic Observatory. The precise mechanical workshop and the electronic laboratory
26 ensured excellent conditions. The staff reduction of the observatory caused by the German
27 reunification decreased the instrumental development base. But several activities took place
28 further. Eberhard Pulz intensively worked on the design of optically pumped magnetometers,
29 using international experiences. He designed for instance a caesium-potassium tandem
30 magnetometer (Pulz and Jäckel, 1998). Also on the base of his international contacts a
31 caesium-helium magnetometer was built (Pulz and Linthe, 1998). The scalar caesium-

1 potassium magnetometer is still in test operation on pillar No. 15 of the absolute house. On
2 the base of the experience with these scalar instruments later on a vector magnetometer was
3 developed (Pulz, et al., 2009). The sensor of the instrument is placed in the small hut (house
4 No. 9 at Fig. 16). The instrument is still in permanent test operation.

5 The Institute of Geophysics and Extraterrestrial Physics of the Technical University
6 Brunswick proposed the development of an automatic absolute measurement system on the
7 base of the satellite magnetometer calibration experiences (Auster et al., 2007, Hemshorn et
8 al. 2009). The precise mechanical workshop of the Niemeck Adolf Schmidt Geomagnetic
9 Observatory manufactured the hardware and installed it on pillar No. 5 in the absolute house.
10 The software was designed by the Brunswick and Niemeck teams. The instrument is still in
11 permanent test operation.

12 Julius Bartels suggested in 1949 to the international geomagnetic community to establish an
13 international service of producing a general index, which describes the geomagnetic planetary
14 activity, caused by solar corpuscular radiation. He called this activity index Kp “planetarische
15 Kennziffer” (Bartels, 1949). His suggestion was accepted by the international community and
16 was continuously produced under his leadership at the Geophysical Institute of the Göttingen
17 University. After Bartels’ death in 1964 his successor Manfred Siebert continued the service.
18 Considering his retirement Siebert asked for any responsible successor institution within the
19 Deutsche Geophysikalische Gesellschaft (German Geophysical Society). The Niemeck Adolf
20 Schmidt Geomagnetic Observatory was ready to take over the service. Therefore, on 1
21 January 1997 the Kp Index Service of the International Service of Geomagnetic Indices was
22 taken over from the Geophysical Institute of the Göttingen University (Best and Linthe,
23 1999). The index is of global relevance and did not lose any significance and usage during the
24 years.

25 **Appendix IV - Selection of Significant Meetings and Conferences Related to the** 26 **Observatory**

27 Several scientific and technical conferences were held from time to time at the observatory.

28 On 11 and 12 November 1960 a commemorate event was held at the Humboldt University
29 Berlin, honouring Adolf Schmidt’s 100th birthday on 23 July 1960 and the 150th anniversary
30 of the university. A further memorial on the occasion of the 30th anniversary of the
31 observatory took place on 21 December 1960 (Fanselau, 1962a).

1 On the occasion of the 50 years anniversary of the Niemeck Adolf Schmidt Geomagnetic
2 Observatory the international symposium “Current problems of the geomagnetic research”
3 took place at the observatory and at a holiday camp in 20 km distance. Almost 100
4 participants attended the symposium. About 50 scientific presentations were given and 13
5 participants performed comparison measurements by means of their own instruments
6 (Kautzleben, 1981).

7 The Central Institutes for Physics of the Earth and Solar-Terrestrial Physics performed on 29
8 April 1983 in Potsdam a colloquium honouring Gerhard Fanselau, former director of the
9 Geomagnetic Institute Potsdam and Niemeck Adolf Schmidt Geomagnetic Observatory.
10 Seven scientific presentations were given (Lengning et al., 1983).

11 The Heinrich Hertz Institute for Atmosphere Research and Geomagnetism Berlin performed
12 22-26 September 1986 the IAGA Symposium on Space-Time-Structure of the Geomagnetic
13 Field in Lutherstadt Wittenberg including a visit of the Niemeck Adolf Schmidt Geomagnetic
14 Observatory (Mundt, 1987).

15 From 23-28 April 1990 the International Symposium 100 Years Geomagnetic Observatory
16 Potsdam – Seddin – Niemeck was held in Potsdam. Sixty scientists from 14 countries
17 participated. Forty four scientific presentations were given. The participants visited the
18 historic magnetic measurement buildings on Telegrafenberg Potsdam and the Niemeck Adolf
19 Schmidt Geomagnetic Observatory (Mundt and Best, 1991; Best et al., 1991; Best et al.,
20 1992).

21 On 7 and 8 September 1996 the INTERMAGNET Executive Council and Operations
22 Committee held a meeting at the Niemeck Adolf Schmidt Geomagnetic Observatory.

23 The observatory organized the VIIth IAGA Workshop on Geomagnetic Instruments and Data
24 Acquisition from 9-14 September 1996. Ninety five scientists from 33 countries participated
25 in the workshop. During the practical part 45 absolute measurements were performed at the
26 observatory. During the scientific part 48 papers and 12 posters were presented in the ALBA
27 Hotel Wittenberg. The results and papers were published (Best and Linthe, 1998).

28 In collaboration with the German Esperanto League a commemoration on Adolf Schmidt’s
29 50th year of death took place at the observatory on 17 October 1994 (Best and Wollenberg
30 1994).

1 On 23 July 2010 Adolf Schmidt's 150th birthday and the 80 years anniversary of the opening
2 of the Niemegk Adolf Schmidt Geomagnetic Observatory were celebrated in Niemegk by the
3 Deutsche Geophysikalische Gesellschaft and the Helmholtz Centre Potsdam (Jacobs and
4 Linthe, 2010). Thirty participants attended the festivity.

5 **Appendix V –Collaboration with International Observatories**

6 The Adolf Schmidt Niemegk Geomagnetic Observatory maintained a closed collaboration
7 with many international geomagnetic observatories. Scientific mutual visits took place in a
8 big number. Comparison measurements were carried out at Niemegk and international
9 observatories to compare the accuracy of the instruments and the observers.

10 In 1996 the Hurbanovo Geomagnetic Observatory (Slovakia) was supported by providing
11 new instruments for the absolute measurements and variation recordings funded by the
12 Volkswagen foundation. The Hurbanovo staff was trained in the use of the instruments by
13 Hans-Joachim Linthe.

14 From 2005 onward new geomagnetic observatories were established or existing ones
15 equipped with modern instruments on the base of international agreements, sponsored by
16 Helmholtz Centre Potsdam - GFZ. The observatories are listed in table 1.

17 Meetings of German speaking observers were held from time to time in Niemegk or at other
18 observatories. Students education of several German universities is supported in the frame of
19 excursions and practical training. Guided tours through the observatory are offered to any
20 interested persons.

21 Since 1961 the observatory instructs regularly trainees in precise mechanics and electronics.

22 The agency for military surveying of the German Federal Armed Forces regularly calibrated
23 their magnetic instruments at the observatory and took consult on magnetic measurement
24 instruments and measurement practice.

25

26 **Appendix VI - Internationally Awarded Employees of the Observatory**

27 Walter Zander (1922-1998) was awarded with the Long Service Award of the International
28 Association of Geomagnetism and Aeronomy (IAGA) in 1993 for his outstanding
29 contribution to produce high quality data by the Niemegk Adolf Schmidt Geomagnetic
30 Observatory (IAGA News 1993). Fig. 25 shows the handing over of the medal to Walter

1 Zander by Heinrich Soffel (National Representative of Germany for IAGA). The same award
2 was presented to Hans-Joachim Linthe in 2015 for his dedicated effort for the operation of the
3 Niemeck Adolf Schmidt Geomagnetic Observatory and the modernization or new
4 establishment of international observatories (Mandea, 2014). He was further an active
5 member of the INTERMAGNET Operations Committee (2003-2014) and chair of the
6 Working Group V-OBS of the IAGA (2003-2007). At Fig. 26 Linthe (right) is to be seen
7 together with Kathy Whaler (IAGA President 2011-2015, left) and Mioara Mandea (IAGA
8 Secretary General 2009-2019).

9 **Appendix VII - Prominent Scientific Results and Instrumental Achievements** 10 **Connected with the Observatories Potsdam – Seddin – Niemeck**

11 Max Eschenhagen: Classification of days into 5 categories regarding the magnetic activity
12 (Eschenhagen, 1894); introduction of the “Gamma, γ ” as a unit in geomagnetism
13 (Eschenhagen, 1896); Discovery of pulsations “Elementarwellen” (elementary waves),
14 (Eschenhagen, 1897).

15 Adolf Schmidt: Calculation of the geomagnetic potential for the epoch 1885 (Schmidt, 1885);
16 transformation of spherical harmonics into different coordinate systems (Schmidt, 1889);
17 construction of the knife edge field balance (Schmidt, 1915); simplification of Eschenhagen’s
18 classification of days by introduction of 3 categories, introduction of the International
19 Character Figure C_i and the inter-diurnal variability (Schmidt, 1916); construction of a new
20 magnetic theodolite for an improved method of the deflection experiment (Bock and Schmidt,
21 1928).

22 Julius Bartels: Introduction of the activity index K “Kennziffer” in 1939 from Niemeck
23 recordings (Bartels, 1938); introduction of the planetary activity index K_p “planetarische
24 Kennziffer” and derived indices a_p , A_p , C_p and C_9 , the internationally most used measure to
25 characterise geomagnetic activity (Bartels, 1949).

26 Richard Bock: “Magnetische Reichsaufnahme” – repeat station campaign over Germany
27 “Deutsches Reich” together with F. Burmeister and F. Errulat (Bock, Burmeister and Errulat,
28 1948); high merits in the changeover of the observation service from Potsdam and Seddin to
29 Niemeck (Bock, 1950).

30 Gerhard Fanselau: Improvement of the field balance by using a suspended balance (Fanselau,
31 1948).

1 Horst Wiese: Discovery of the North German conductivity anomaly together with O. Meyer
2 (Wingst) – basement of his theoretical contributions to magneto-tellurics – “Wiese Arrow”
3 (Wiese, 1965).

4 H. Schmidt: Construction of several observatory instruments: proton magnetometers,
5 fluxgates, induction coil variometers (Schmidt, 1962; Wiese, 1962); introduction of data
6 processing into the observatory practice (Fanselau, 1964).

7 **Competing Interests**

8 I declare that I do not have any conflict of interest.

9 **Acknowledgements**

10 Kristian Schlegel strongly encouraged me to write this paper. I am very thankful to him for
11 his patience. I further thank the Helmholtz Centre Potsdam GFZ German Research Centre for
12 Geosciences, which rendered possible to write the paper using its resources. I am especially
13 thankful to Jürgen Matzka, group leader Geomagnetic Observatories of the Geomagnetism
14 Section of the GFZ, for giving me the opportunity to work at the Niemeck Adolf Schmidt
15 Geomagnetic Observatory. Since my official retirement end of 2014 I had the chance to use
16 an office, a computer and all the observatory publications to collect the necessary
17 information.

18

Year	IAGA code	Name	Country
2005	PAG	Panagyurishte	Bulgaria
2005	KMH	Keetmanshoop	Namibia
2006	YAK	Yakutsk	Russia
2007	MGD	Magadan	Russia
2007	SHE	St. Helena	British Overseas Territory
2007	ABG	Alibag	India
2009	SUA	Surlari	Romania
2009	PET	Paratunka	Russia
2010	SMA	Santa Maria	Portugal – Azores

2013	ODE	Odessa	Ukraine
2014	VSS	Vassouras	Brazil
2014	TDC	Tristan da Cunha	British Overseas Territory
2015	TTB	Tatuoka	Brazil
2015	BFO	Black Forrest	Germany
2015	VNA	Neumayer Station III	Germany's Antarctic Station
2018	GAN	Gan	the Maldives
2019	STT	Sao Teotonino	Portugal – Azores
2022	LRV	Leivogur	Iceland

1 Table 1. List of the observatories, newly established or equipped with modern instruments on
2 the base of the international collaboration with Helmholtz Centre Potsdam – GFZ, Niemeck
3 Adolf Schmidt Geomagnetic Observatory.

4

Time period	Institutional Affiliations
1932-1933	Magnetic department of the Magnetic Meteorological Observatory Potsdam of the Prussian Meteorological Institute Berlin
1934-1936	Magnetic Observatory of the Berlin University in Potsdam-Niemeck
1937-1950	Geophysical Institute Potsdam
1950-1956	Geomagnetic Institute and Observatory Potsdam/Niemeck of the Meteorological and Hydrological Service of the Interior Ministry of the German Democratic Republic
1957-1968	Geomagnetic Institute and Observatory Potsdam-Niemeck of the German Academy of Sciences Berlin
1969-1981	Central Institute for Physics of the Earth Potsdam
1982-1983	Central Institute for Solar-Terrestrial Physics Berlin
1984-1991	Heinrich Hertz Institute for Geomagnetism and Atmosphere Research Berlin

From 1992 onward	GeoForschungsZentrum Potsdam, in 2008 renamed into Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences
------------------	--

1 Table 2. Affiliations of the Niemegek Adolf Schmidt Geomagnetic Observatory

2

Time period	Scientific Directors resp. Heads	Portrait
1932-1936	Alfred Nippoldt (1874-1936)	Fig. 13 in Linthe, 2023a
1937-1945	Julius Bartels (1899-1964)	Fig. 27, left
1945-1969	Gerhard Fanselau (1904-1982)	Fig. 28, left
1969-1982	Herbert Schmidt (1921-1981), Klaus Lengning (1917-2000)	Fig. 29, left Fig. 29, right
1983-1998	Adolf Best (1933-2012)	Fig. 30, right
1999-2001	Richard Holme (born in 1967)	Fig. 31, right
2002-2014	Monika Korte (born in 1971)	Fig. 31, left
From 2014 onward	Jürgen Matzka (born in 1971)	Fig. 33

3 Table 3. Scientific directors resp. heads of the Niemegek Adolf Schmidt Geomagnetic
4 Observatory

5

Time period	Observers	Portrait
1932-1933	Richard Bock (1899-1961)	Fig. 27, right
1934-1951	Gerhard Fanselau (1904-1982)	Fig. 28, left
1952-1961	Horst Wiese (1922-1972)	Fig. 28, right
1962-1968	Armin Grafe (born in 1934)	Fig. 30, left
1969-1982	Klaus Lengning (1917-2000)	Fig. 29, right
1983-1991	Eberhard Ritter (born in 1934)	Fig. 32, left
1992-2014	Hans-Joachim Linthe (born in 1949)	Fig. 32, right
From 2014 onward	Jürgen Matzka (born in 1971)	Fig. 33

1 Table 4. Observers of the Niemegek Adolf Schmidt Geomagnetic Observatory

2

1 **References**

- 2 Auster, H.-U., Manda, M., Hemshorn, A., Korte, M., Pulz, E.: GAUSS: Geomagnetic
3 Automated System, Proceedings of the XIIth IAGA Workshop on Geomagnetic Observatory
4 Instruments, Data Acquisition and Processing, pp.49-59, Publications of the Institute of
5 Geophysics, Polish Academy of Sciences, Monographic Volume C-99 (398), ISBN-83-
6 88765-70-1, ISSN-0138-0117, Warszawa, Poland, 2007
- 7 Auster, V.: Zum gegenwärtigen Stand der Pulsationsregistriergeräte am Observatorium
8 Niemeck, Jahrbuch 1971 des Adolf-Schmidt-Observatoriums für Erdmagnetismus in
9 Niemeck, Zentralinstitut Physik der Erde Potsdam, 1972
- 10 Bartels, J.: Potsdamer erdmagnetische Kennziffern, pp. 68-78, Zeitschrift für Geophysik, Bd.
11 XIV, Heft 3/4, 1938
- 12 Bartels, J.: The standardized index, Ks, and the planetary index, Kp. *IATME Bull.*, 12b, pp.
13 97–120, 1949
- 14 Beblo, M., Best, A., Schulz, G.: Magnetische Karten der Bundesrepublik Deutschland, pp. 1-
15 31, Sci. Technical Report des GFZ Potsdam. STR95/22, Potsdam 1995
- 16 Best, A., Lengning, K., Mundt, W., Tiemann, K.-H.: A century of measuring geomagnetism
17 in Potsdam, Seddin and Niemeck, pp. 7-16, HHI-Report No. 22, Berlin, 1991, ISSN 0863-
18 0607
- 19 Best, A., Mundt, W., Tiemann, K.-H.: Die 100jährige erdmagnetische Meßreihe Potsdam-
20 Seddin-Niemeck, pp. 10-13, Arbeitskreis Geschichte der Geophysik in der Deutschen
21 Geophysikalischen Gesellschaft, Mitteilungen Nr. 11, H. 1, ISSN: 0179-5658, 1992
- 22 Best, A., Henke, H., Linthe, H.-J.: Jahrbuch 1992 des Adolf-Schmidt-Observatoriums für
23 Geomagnetismus in Niemeck, GeoForschungsZentrum Potsdam, 1993
- 24 Best, A., Wollenberg, F.: Adolf Schmidt 1860 – 1944 Zum 50. Todestag des Geophysikers
25 und Esperantisten, GeoForschungsZentrum Potsdam, 1994
- 26 Best, A., Linthe, H.-J.: Jahrbuch 1994 des Adolf-Schmidt-Observatoriums für
27 Geomagnetismus in Niemeck, GeoForschungsZentrum Potsdam, 1995
- 28 Best, A., Linthe, H.-J.: Jahrbuch 1995 des Adolf-Schmidt-Observatoriums für
29 Geomagnetismus in Niemeck, GeoForschungsZentrum Potsdam, 1996

- 1 Best, A.: Zur Geschichte des Adolf-Schmidt-Observatoriums für Geomagnetismus in
2 Niemeck, pp. 38-42, Zur Geschichte der Geophys. In Deutschl., Hamburg, 1997, DOI:
3 <https://doi.org/10.23689/figgeo-4244>
- 4 Best, A., Linthe, H.-J.: The Adolf-Schmidt-Observatory for geomagnetism Niemeck – history
5 and present, Proceedings of the VIIth IAGA Workshop on Geomagnetic Observatory
6 Instruments, Data Acquisition and Processing, GeoForschungsZentrum Potsdam Scientific
7 Technical Report STR98/21, pp. 9-12 Potsdam, 1998
- 8 Best, A., Linthe, H.-J.: Jahrbuch 1997 des Adolf-Schmidt-Observatoriums für
9 Geomagnetismus in Niemeck, GeoForschungsZentrum Potsdam, 1999
- 10 Bloom, A. L.: Principles of operation of the rubidium vapor magnetometer, Applied Optics 1
11 (1) pp. 61-68. 1962
- 12 Bock, R., Schmidt, A.: Ein neuer magnetischer Normaltheodolit, pp. 1-14, Zeitschrift für
13 Instrumentenkunde, XLVIII. Jahrgang, Januar 1928, Erstes Heft.
- 14 Bock, R.: Über einen Registrierapparat mit doppelter Registrierung, pp. 497-499, Z. f.
15 Instrumentenkunde 55, 1935
- 16 Bock, R.: Ergebnisse der Magnetischen Beobachtungen im Adolf-Schmidt-Observatorium für
17 Erdmagnetismus Niemeck im Jahre 1934, pp. 1-36, Magnetisches Observatorium der
18 Universität Berlin in Potsdam, Julius Springer, Berlin 1937
- 19 Bock, R.: Das Adolf-Schmidt-Observatorium Niemeck (Kreis Zauch-Belzig), pp. 1-47, Abh.
20 Geophysik. Institut Potsdam Nr. 1, Julius Springer, Berlin, 1939
- 21 Bock, R., Burmeister, F., Errulat, F.: Magnetische Reichsvermessung 1935.0, Akademie-
22 Verlag Berlin, 1948
- 23 Bock, R.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
24 Erdmagnetismus in Niemeck in den Jahren 1932 und 1933, pp. 1-116, Geophysikalisches
25 Institut Potsdam, Erdmagnetisches Jahrbuch, Akademie-Verlag Berlin, 1950
- 26 Bolz, H., Kautzleben, H., Mundt, W., Wolter, H.: Die magnetische Landesvermessung der
27 Deutschen Demokratischen Republik zur Epoche 1975,5 Ergebnisse und Auswertung,
28 Abhandlung Nr. 41 des Geomagnetischen Instituts Potsdam, Akademie-Verlag Berlin, 1969
- 29 Dalitz, S.: Niemeck meldet Panzeralarm – 1945 - Das Jahr zwischen Krieg und Frieden,
30 ISBN 3-9803383-2-0, Wittenberg, 1995

- 1 Eschenhagen, M.: Ergebnisse der magnetischen Beobachtungen des Observatoriums in
2 Potsdam in den Jahren 1890 und 1891, pp. 1-76, Veröffentlichungen des Königlich
3 Preußischen Meteorologischen Instituts, A. Asher & Co., Berlin, 1894
- 4 Eschenhagen, M.: Über Simultan-Beobachtungen erdmagnetischer Variometer (mit Fußnote
5 über die Einführung der Einheit gamma). Terr. Magn. 1 (1896), s. 55-61
- 6 Eschenhagen, M.: Erdmagnetische Elementarwellen. Terr. Magn. 2 (1897) pp. 105-114
- 7 Fanselau, G.: Ein neuer Schwingungsmesser. Zeitschrift für Geophysik. 9. 1933. pp. 93-98.
- 8 Fanselau, G.: Über eine neue magnetische Vertikalfadenwaage, Zeitschrift für Meteorologie
9 2, 1948 Heft 7/8, pp. 216-225
- 10 Fanselau, G.: Gedanken über die technische Durchführung des geomagnetischen
11 Registrierbetriebes, Zeitschrift für Meteorologie 5, 1951 Heft 12 , pp.364 - 373.
- 12 Fanselau, G.: Über einige beobachtungstechnische Neuerungen am Adolf-Schmidt-
13 Observatorium für Erdmagnetismus in Niemeck, Freiburger Forschungshefte, Reihe C, H. 7,
14 Beihefte der Zeitschrift der Bergakademie, Freiberg 1953
- 15 Fanselau, G., Wiese, H.: Ergebnisse der magnetischen Beobachtungen am Adolf-Schmidt-
16 Observatorium für Erdmagnetismus Niemeck im Jahre 1951, Akademie-Verlag, Berlin 1954
- 17 Fanselau, G. : Vorbemerkungen, In: Erdmagnetisches Jahrbuch 1952, Akademie-Verlag
18 Berlin, 1955
- 19 Fanselau, G., Wiese, H.: Ergebnisse der magnetischen Beobachtungen am Adolf-Schmidt-
20 Observatorium für Erdmagnetismus Niemeck in den Jahren 1946 bis 1950, Akademie-Verlag,
21 Berlin 1956
- 22 Fanselau, G. : Vorbemerkungen, In: Erdmagnetisches Jahrbuch 1953, Akademie-Verlag
23 Berlin, 1956
- 24 Fanselau, G. : Vorbemerkungen, In: Jahrbuch 1954 des Adolf-Schmidt-Observatoriums für
25 Erdmagnetismus in Niemeck, Akademie-Verlag Berlin, 1957
- 26 Fanselau, G. : Vorbemerkungen, In: Jahrbuch 1955 des Adolf-Schmidt-Observatoriums für
27 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1958
- 28 Fanselau, G. : Vorbemerkung, In: Jahrbuch 1959 des Adolf-Schmidt-Observatoriums für
29 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1962a

- 1 Fanselau, G. : Vorbemerkung, In: Jahrbuch 1960 des Adolf-Schmidt-Observatoriums für
2 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1962b
- 3 Fanselau, G., Grafe, A.: Eine neue Schnellregistrierung der geomagnetischen Komponenten
4 X, Y, Z am Observatorium in Niemeck, Jahrbuch 1961 des Adolf-Schmidt-Observatoriums
5 für Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1963
- 6 Fanselau, G.: Vorbemerkung, Jahrbuch 1962 des Adolf-Schmidt-Observatoriums für
7 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1964
- 8 Fanselau, G.: Erwähnenswertes aus dem Geomagnetischen Institut und Adolf-Schmidt-
9 Observatorium für Erdmagnetismus, Jahrbuch 1964 des Adolf-Schmidt-Observatoriums für
10 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1966
- 11 Fanselau, G.: Erwähnenswertes aus dem Geomagnetischen Institut und Adolf-Schmidt-
12 Observatorium für Erdmagnetismus (1.1.1967 bis 31.12.1967), Jahrbuch 1966 des Adolf-
13 Schmidt-Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1968
- 14 Fanselau, G.: Erwähnenswertes aus dem Geomagnetischen Institut und Adolf-Schmidt-
15 Observatorium für Erdmagnetismus, Jahrbuch 1967 des Adolf-Schmidt-Observatoriums für
16 Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1969
- 17 Förster, H.: Genaue Azimutbestimmung auf einem Pfeiler des Adolf-Schmidt-Observatoriums
18 in Niemeck – einer Außenstelle des GeoForschungsZentrums Potsdam, Diplomarbeit am
19 Institut für Planetare Geodäsie der Technischen Universität Dresden, 1998
- 20 Grafe, A.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
21 Erdmagnetismus in Niemeck im Jahre 1966, Jahrbuch 1966 des Adolf-Schmidt-
22 Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag, Berlin 1968
- 23 Hemshorn, A., Pulz, E., Manda, M.: GAUSS: Improvements to the Geomagnetic Automated
24 SyStem, Proceedings of the XIIIth IAGA Workshop on Geomagnetic Observatory
25 Instruments, Data Acquisition and Processing, pp. 100-103, U.S. Geological Survey Open-
26 File Report 2009-1226, Boulder and Golden, Colorado, U.S.A., 2009
- 27 IAGA News No. 32, Published by the Secretary General of IAGA, Fraser Noble Building,
28 Aberdeen University, Aberdeen AB9 2UE, Scotland, (UK), Printed by Woods of Perth
29 (Printers) Ltd., 1993

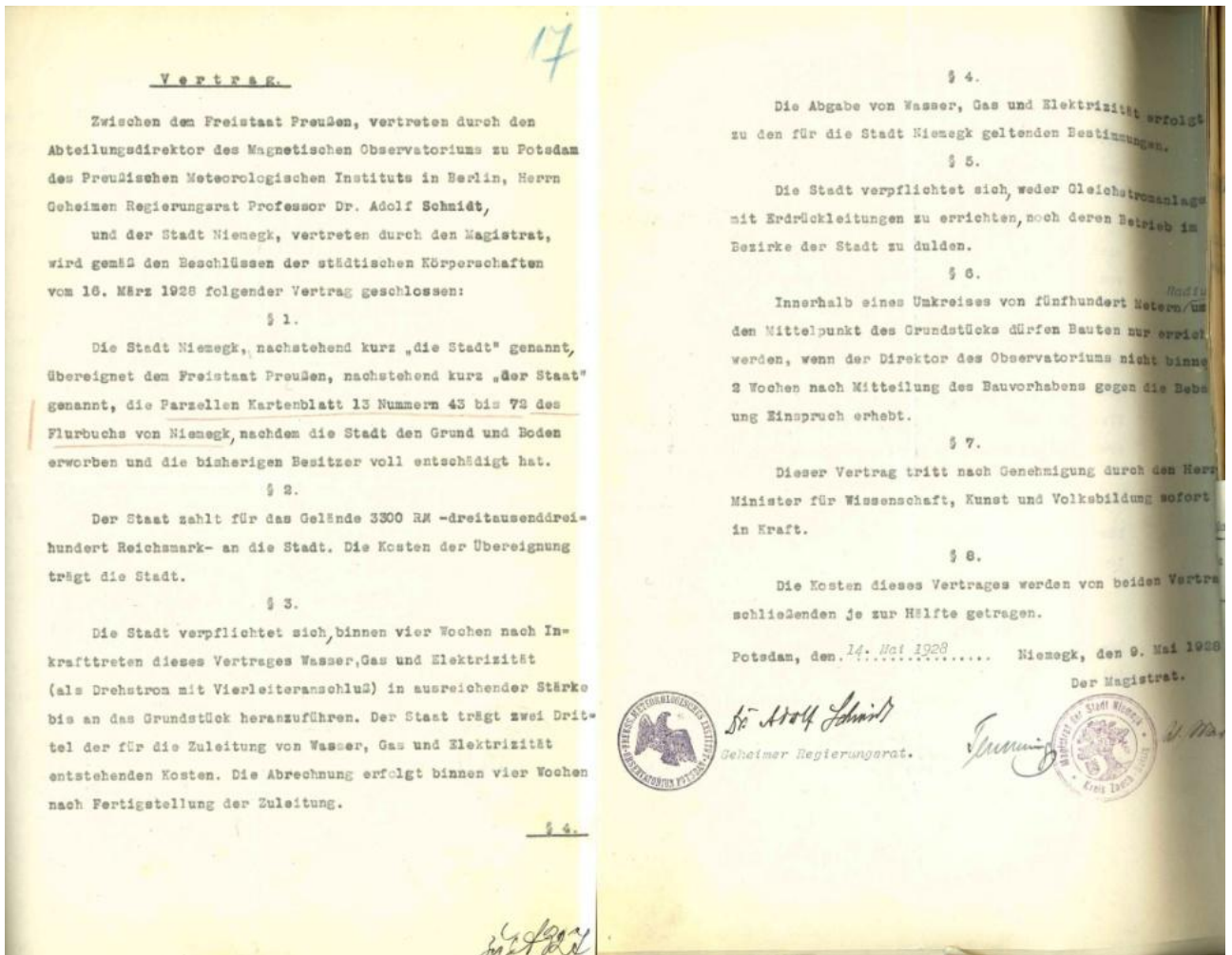
- 1 Jacobs, F., Linthe, H.-J.: 150 Jahre Adolf Schmidt und 80 Jahre Observatorium Niemegk, pp.
2 46-48, DGG-Mitteilungen, Potsdam, 3/2010, ISSN 0934-6554
- 3 Jankowski, J., Sucksdorff, C.: IAGA Guide for Magnetic Measurements and Observatory
4 Practice, ISBN: 0-9650686-2-5, Warsaw, 1996
- 5 Kautzleben, H.: Vorwort; 90 Jahre Adolf-Schmidt-Observatorium für Erdmagnetismus in
6 Niemegk – 90 Jahre geomagnetische Forschung in Potsdam, pp. 5-23, Veröffentlichungen des
7 Zentralinstituts für Physik der Erde Nr. 70 Teil 1, Potsdam, 1981
- 8 Lengning, K.: Die Erdstromapparatur am Observatorium in Niemegk, pp. 160-165, Jahrbuch
9 1955 des Adolf-Schmidt-Observatoriums für Erdmagnetismus in Niemegk, Akademie-Verlag
10 Berlin, 1958
- 11 Lengning, K.: Angaben zur Erdstrom-Registrierung, pp. 45-48, Jahrbuch 1957 des Adolf-
12 Schmidt-Observatoriums für Erdmagnetismus in Niemegk, Akademie-Verlag Berlin, 1960
- 13 Lengning, K., Schmidt, H., Zander, W.: Jahrbuch 1970 des Adolf-Schmidt-Observatoriums
14 für Erdmagnetismus in Niemegk, Zentralinstitut Physik der Erde Potsdam, 1971
- 15 Lengning, K., Schmidt, H., Zander, W.: Jahrbuch 1972 des Adolf-Schmidt-Observatoriums
16 für Erdmagnetismus in Niemegk, Zentralinstitut Physik der Erde Potsdam, 1973
- 17 Lengning, K., Schmidt, H., Zander, W.: Jahrbuch 1975 des Adolf-Schmidt-Observatoriums
18 für Erdmagnetismus in Niemegk, Zentralinstitut Physik der Erde Potsdam, 1976
- 19 Lengning, K., Schmidt, H., Zander, W.: Jahrbuch 1976 des Adolf-Schmidt-Observatoriums
20 für Erdmagnetismus in Niemegk, Zentralinstitut für Solar-Terrestrische Physik, 1977
- 21 Lengning, K., Lenners, D., Zander, W.: Jahrbuch 1982 des Adolf-Schmidt-Observatoriums
22 für Erdmagnetismus in Niemegk, Zentralinstitut Physik der Erde Potsdam, 1983, ISSN 0065
23 - 2016
- 24 Lenners, D., Ritter, E., Zander, W.: Jahrbuch 1983 des Adolf-Schmidt-Observatoriums für
25 Erdmagnetismus in Niemegk, Zentralinstitut Physik der Erde Potsdam, 1984, ISSN 0065 -
26 2016
- 27 Linthe, H.-J.: Bestimmung der Pfeilerdifferenzen in der Totalintensität im Absoluthaus,
28 Jahrbuch 1994 des Adolf-Schmidt-Observatoriums für Geomagnetismus in Niemegk,
29 GeoForschungsZentrum Potsdam, 1995, ISSN 0065 - 2016

- 1 Linthe, H.-J.: Jahrbuch 1996 des Adolf-Schmidt-Observatoriums für Geomagnetismus in
2 Niemeck, GeoForschungsZentrum Potsdam, 1997
- 3 Linthe, H.-J.: Jahrbuch 1998 des Adolf-Schmidt-Observatoriums für Geomagnetismus in
4 Niemeck, GeoForschungsZentrum Potsdam, 2000, ISSN 0065 - 2016
- 5 Linthe, H.-J., Schulz, Günter: Yearbook Magnetic Results 2000, Adolf Schmidt Geomagnetic
6 Observatory Niemeck, Geomagnetic Observatory Wingst, GeoForschungsZentrum Potsdam,
7 2005, ISSN 1614-5801, DOI: 10.2312/GFZ.b103-20004 ; urn:nbn:de:kobv:b103-20004
- 8 Linthe, H.-J., Schulz, Günter: Yearbook Magnetic Results 2001, 2002, 2003 Adolf Schmidt
9 Geomagnetic Observatory Niemeck, Geomagnetic Observatory Wingst,
10 GeoForschungsZentrum Potsdam, 2007, ISSN 1614-5801, DOI: 10.2312/GFZ.b103-
11 yb2001_20037
- 12 Linthe, H.-J.: History of the Potsdam, Seddin and Niemeck Geomagnetic Observatories –
13 First Part: Potsdam, Hist. Geo Space. Sci., 14, 23–31, [https://doi.org/10.5194/hgss-14-23-](https://doi.org/10.5194/hgss-14-23-2023)
14 2023, 2023a
- 15 Linthe, H.-J.: History of the Potsdam, Seddin and Niemeck Geomagnetic Observatories –
16 Second Part: Seddin, Hist. Geo Space. Sci., 14, 43–50, [https://doi.org/10.5194/hgss-14-43-](https://doi.org/10.5194/hgss-14-43-2023)
17 2023, 2023b
- 18 Luyken, K.: Der Pantograph für Registrier-Kurven von Ad. Schmidt (Potsdam), Zeitschrift
19 für Instrumentenkunde XXIX, Januar 1909, Erstes Heft, pp. 1-14
- 20 Manda, M. (Executive editor): IAGA News No. 52, GFZ German Research Centre for
21 Geosciences, Potsdam 2015
- 22 Mundt, W.: HHI Report No. 21, Proceedings of the IAGA Symposium Space-Time-Structure
23 of the Geomagnetic Field, September 22-26, 1986 in Wittenberg, GDR, Berlin, 1987, ISSN
24 0863-0607
- 25 Mundt, W., Best, A.: HHI Report No. 22, Proceedings of the International Symposium 100
26 Years Geomagnetic Observatory Potsdam – Seddin – Niemeck, April 23-28, 1990 in
27 Potsdam, Berlin, 1991, ISSN 0863-0607
- 28 A. Nippoldt: Verlegung der magnetischen Observatorien von Potsdam und Seddin wegen
29 Elektrisierung der Vorortbahnen, pp. 52-60, Bericht über die Tätigkeit des Preußischen

- 1 Meteorologischen Instituts im Jahre 1928, Veröffentlichung des Preußischen
2 Meteorologischen Instituts Nr. 362, Berlin, 1929
- 3 Nippoldt, A.: Ergebnisse der magnetischen Beobachtungen in Potsdam und Seddin im Jahre
4 1928, pp. 3-38, Veröffentlichungen des Preußischen Meteorologischen Instituts Nr. 374,
5 Julius Springer, Berlin, 1930
- 6 Nippoldt, A.: Magnetische Arbeiten, In: Bericht über die Tätigkeit des Preußischen
7 Meteorologischen Instituts im Jahre 1929 erstattet vom Direktor, pp. 35-39, Veröffentlichung
8 des Preußischen Meteorologischen Instituts Nr. 372, Julius Springer Berlin, 1930
- 9 Nippoldt, A.: Magnetische Arbeiten, In: Bericht über die Tätigkeit des Preußischen
10 Meteorologischen Instituts im Jahre 1930 erstattet vom Direktor, pp. 44-49, Veröffentlichung
11 des Preußischen Meteorologischen Instituts Nr. 380, Behrend & Co. Berlin, 1931a
- 12 Nippoldt, A.: Ergebnisse der magnetischen Beobachtungen in Potsdam und Seddin im Jahre
13 1929, pp. 3-35, Veröffentlichungen des Preußischen Meteorologischen Instituts Nr. 383,
14 Julius Springer, Berlin, 1931b
- 15 Nippoldt, A.: Ergebnisse der magnetischen Beobachtungen in Potsdam und Seddin im Jahre
16 1931, Magnetisches Observatorium der Universität Berlin in Potsdam-Niemegk, Julius
17 Springer, pp. 3-52, Berlin, 1934
- 18 Pulz, E., Jäckel, K.-H.: A new design for an optically pumped tandem magnetometer,
19 Proceedings of the VIIth IAGA Workshop on Geomagnetic Observatory Instruments, Data
20 Acquisition and Processing, GeoForschungsZentrum Potsdam Scientific Technical Report
21 STR98/21, pp. 155-167, Potsdam, 1998
- 22 Pulz, E., Linthe, H.-J.: A Long term investigation of two different optically pumped scalar
23 magnetometers, Proceedings of the VIIth IAGA Workshop on Geomagnetic Observatory
24 Instruments, Data Acquisition and Processing, GeoForschungsZentrum Potsdam Scientific
25 Technical Report STR98/21, pp. 136-146, Potsdam, 1998
- 26 Pulz, E., Jäckel, K.-H., Bronkalla, O.: A quasi absolute optically pumped magnetometer for
27 the permanent recording of the Earth's magnetic field vector, Proceedings of the XIIIth IAGA
28 Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing, pp.
29 216-219, U.S. Geological Survey Open-File Report 2009-1226, Boulder and Golden,
30 Colorado, U.S.A., 2009

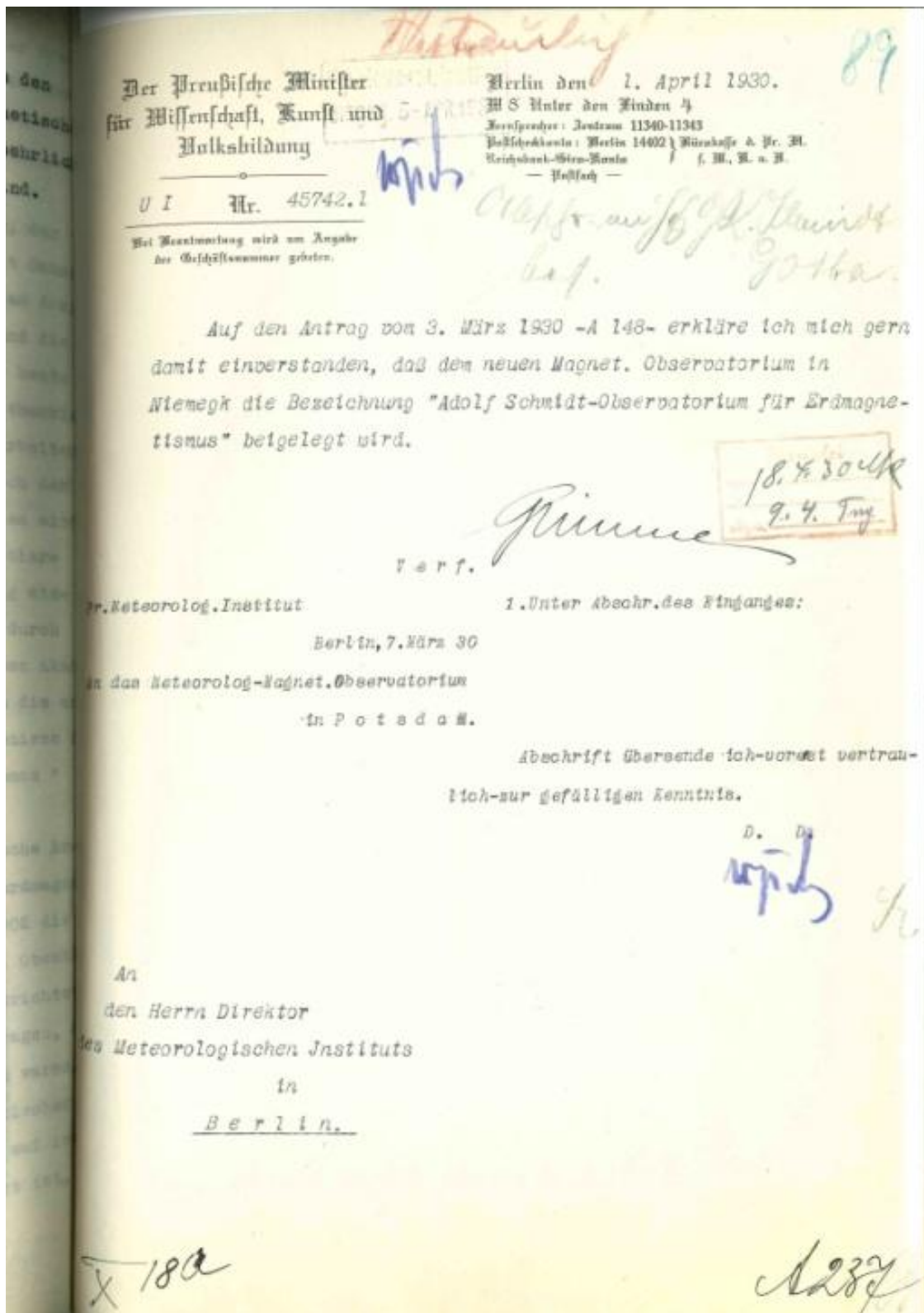
- 1 Richard, M., Wiese, H.: Die Neubestimmung der absoluten erdmagnetischen Feldgrößen am
2 Adolf-Schmidt-Observatorium für Erdmagnetismus in Niemeck, Abhandlung Nr. 13 des
3 Geophysikalischen Instituts Potsdam, Akademie-Verlag Berlin, 1954
- 4 Schmidt, A.: Mitteilungen über eine neue Berechnung des erdmagnetischen Potentials. Abh.
5 Bayer. Akad. D. Wiss., II. Klasse, 19, 1895, pp. 1–66.
- 6 Schmidt, A.: Mathematische Entwicklungen zur allgemeinen Theorie des Erdmagnetismus.
7 In: Aus dem Archiv der Deutschen Seewarte. 12. Jg. Nr. 3, 1889.
- 8 Schmidt, A.: Ein Lokalvariometer für die Vertikalintensität. Ber. Tätigkeit Kgl. Preuß.
9 Meteorol. Inst, im Jahre 1914, pp. 109–134, Berlin 1915
- 10 Schmidt, A.: Die internationalen erdmagnetischen Charakterzahlen. Meteor. Z. 33 (1916), S.
11 481-492
- 12 Schmidt, A.: Eine photographische Registriereinrichtung mit weiter Zeitskala bei sparsamem
13 Papierverbrauch, pp. 38-45, Bericht über die Tätigkeit des Preußischen Meteorologischen
14 Instituts im Jahre 1925 erstattet vom Direktor, Veröffentlichung des Preußischen
15 Meteorologischen Instituts Nr. 335, Behrend & Co., Berlin 1926
- 16 Schmidt, H.: Untersuchungen zur Theorie und Praxis geomagnetischer Schwingungs-
17 messungen mit Beschreibung einer neuen Schwingzeitmeßanlage, Abhandlung Nr. 19 des
18 Geomagnetischen Instituts und Observatoriums Potsdam-Niemeck, Akademie-Verlag Berlin,
19 1956
- 20 Schmidt, H.: Beobachtung der Totalintensität mit Protonenmagnetometern, Jahrbuch 1959 des
21 Adolf-Schmidt-Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag Berlin,
22 1962
- 23 Schmidt, H.: Die Vermessung des Absoluthauses mit Protonenmagnetometern, Jahrbuch 1961
24 des Adolf-Schmidt-Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag
25 Berlin, 1963
- 26 Schmidt, H.: Zur Programmierung des Jahrbuch-Datenflusses für den Klein-Computer
27 Cellatron SER 2, Jahrbuch 1965 des Adolf-Schmidt-Observatoriums für Erdmagnetismus in
28 Niemeck, Akademie-Verlag Berlin, 1967
- 29 Wiese, H.: Die Anlage zur Registrierung der zeitlichen Gradienten des geomagnetischen
30 Feldes in Niemeck, Erdmagnetisches Jahrbuch 1953, Akademie-Verlag Berlin, 1956

- 1 Wiese, H.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
2 Erdmagnetismus in Niemeck im Jahre 1954, Jahrbuch 1954 des Adolf-Schmidt-
3 Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag Berlin, 1957
- 4 Wiese, H.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
5 Erdmagnetismus in Niemeck im Jahre 1956, Jahrbuch 1956 des Adolf-Schmidt-
6 Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag Berlin, 1958
- 7 Wiese, H.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
8 Erdmagnetismus in Niemeck im Jahre 1957, Jahrbuch 1957 des Adolf-Schmidt-
9 Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag Berlin, 1960a
- 10 Wiese, H., Schmidt, H., Lucke, O., Frölich, F.: Geomagnetische Instrumente und
11 Messmethoden. In Geomagnetismus und Aeronomie. Bd. 2 (Editor: Faselau, G.), VEB
12 Deutscher Verlag d. Wissenschaften, Berlin, 1960b
- 13 Wiese, H.: Ergebnisse der Beobachtungen am Adolf-Schmidt-Observatorium für
14 Erdmagnetismus in Niemeck im Jahre 1959, Jahrbuch 1959 des Adolf-Schmidt-
15 Observatoriums für Erdmagnetismus in Niemeck, Akademie-Verlag Berlin, 1962
- 16 Wiese, H.: Geomagnetische Tiefentellurik. Akademie Verlag Berlin, 1965
17



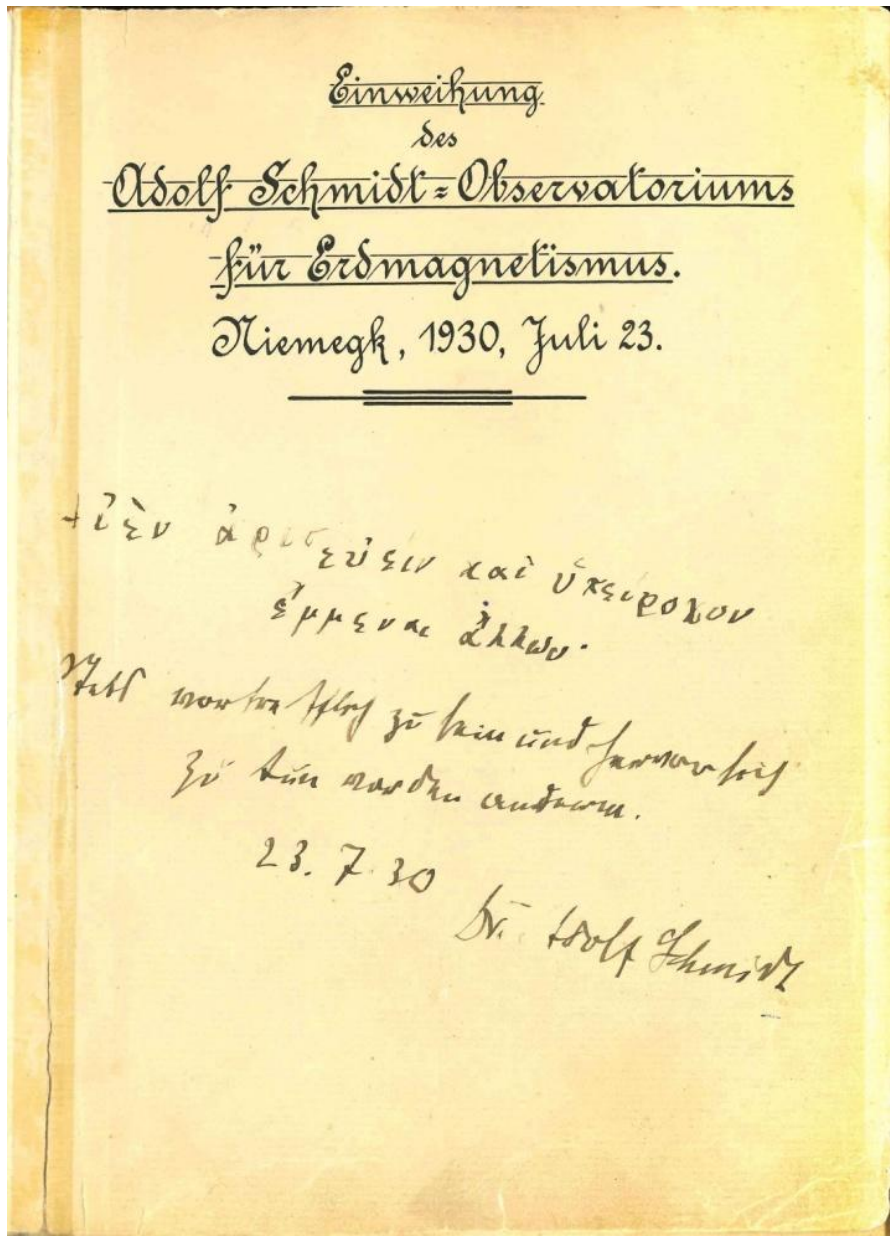
1
2

3 Fig. 1. Contract between the Free State of Prussia, represented by Adolf Schmidt and the
4 magistrate of the town of Niemegek, represented by the mayor Paul Temming on the
5 conditions for the undisturbed operation of the new observatory. Source: Helmholtz Centre
6 Potsdam - GFZ



1

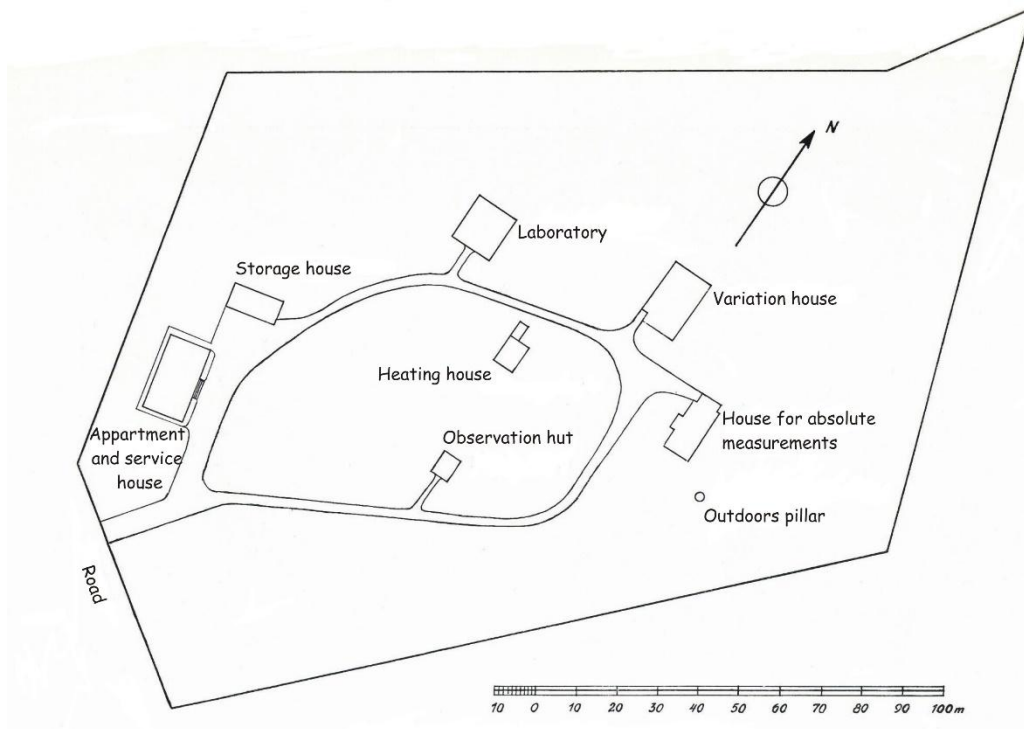
2 Fig. 2. Document from the Prussian Ministry for Science, Art and Education of 1 April 1928
3 attaching the new observatory the name "Adolf-Schmidt Observatorium für Erdmagnetismus
4 Niemegek" (Niemegek Adolf Schmidt Geomagnetic Observatory). Source: Helmholtz Centre
5 Potsdam – GFZ



1

2 Fig. 3. First page of the observatory guest book with Adolf Schmidt's inscription. Source:

3 Helmholtz Centre Potsdam – GFZ



1

2 Fig. 5. Compound plan of the Niemeck Adolf Schmidt Observatory. Source: Bock, 1939

3



4

5 Fig. 6. Photo of the apartment and service house (left) and the storage house (right). Source:

6 Bock, 1939



1

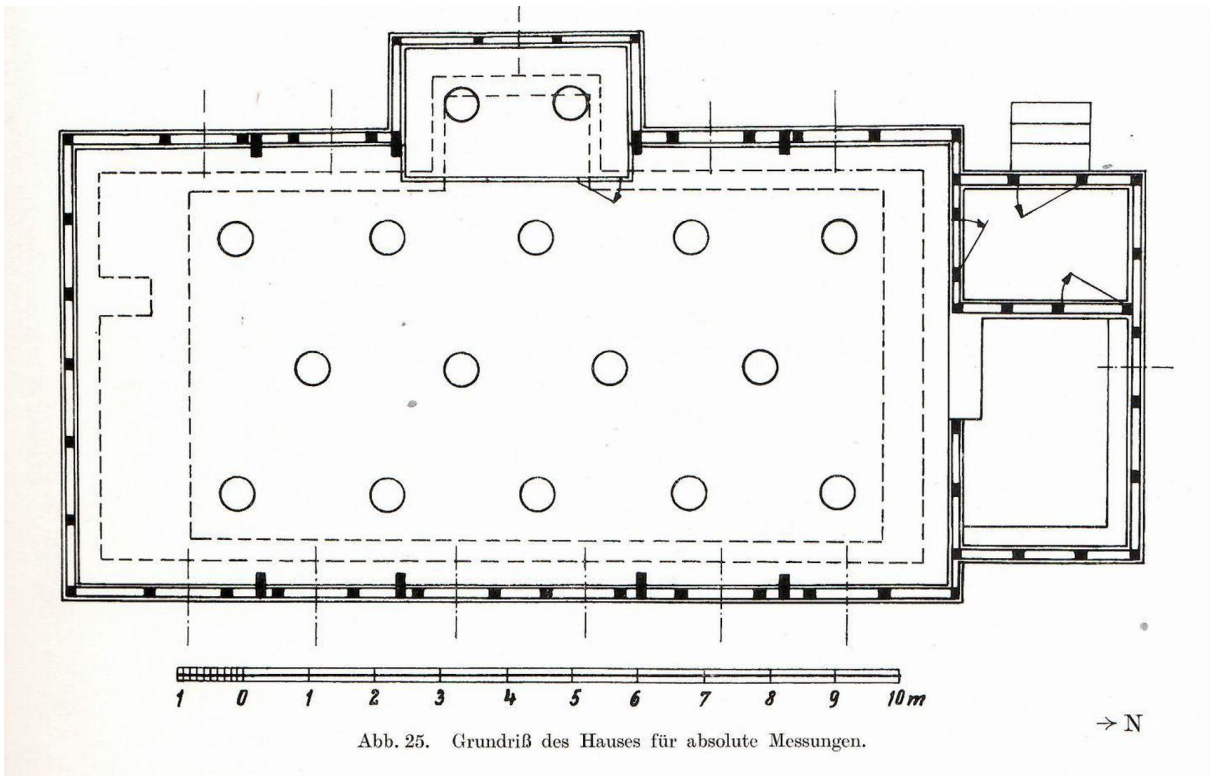
2 Fig. 7. Photo of the absolute house. Source: Bock, 1939

3



4

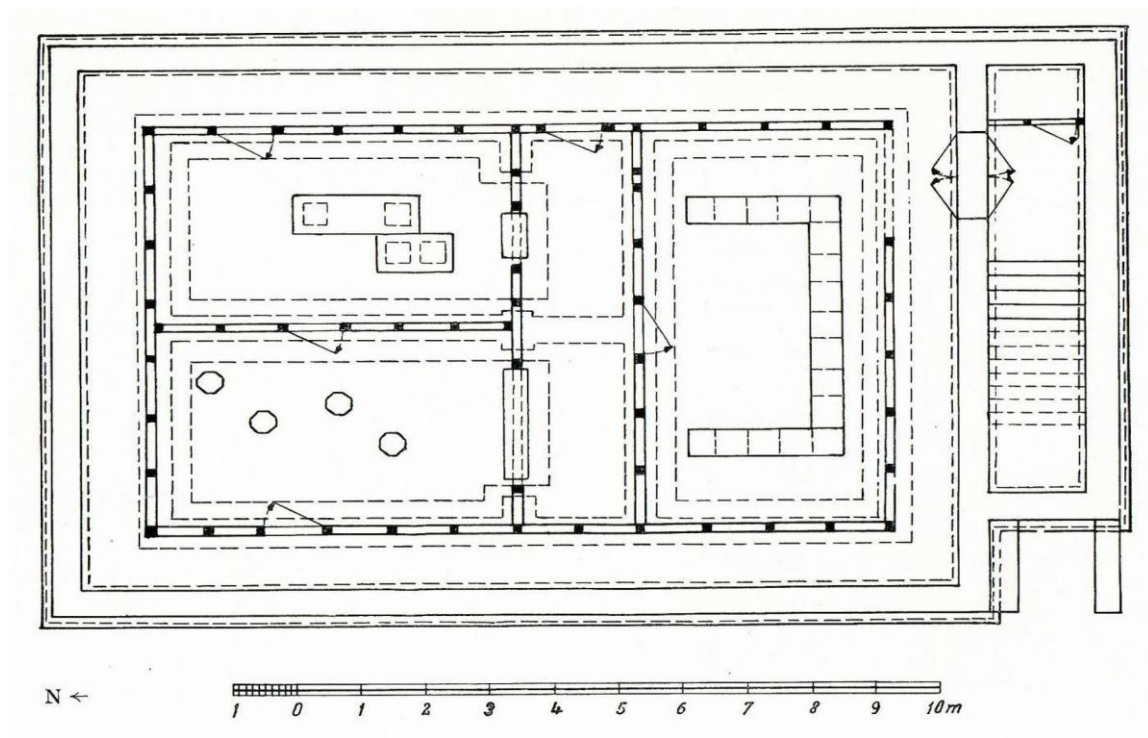
5 Fig. 8. Photo of the variation house. Source: Bock, 1939



1

2 Fig. 9. Ground plan of the absolute house. Source: Bock, 1939

3



4

5 Fig. 10. Ground plan of the variation house. Source: Bock, 1939



1

2 Fig. 11. Photo of the north-east corner of heating house. Source Helmholtz Centre Potsdam –
3 GFZ

4



5

6 Fig. 12. Photo of the Niemegk Adolf Schmidt Geomagnetic Observatory compound, taken in
7 1933 from the apartment and service house. From left to right: laboratory (former Seddin
8 variation house), variation house, heating house (partly hidden by a tree), absolute house,
9 Niemegk church, outdoor pillar, observation hut (former Seddin absolute house). Source:
10 Bock, 1939

1



2

3 Fig. 13. View from the attic floor of the main building on the electric laboratory. Source:
4 Helmholtz Centre Potsdam – GFZ

5



6

7 Fig. 14. Photo of the workshop building, view from the north-east. It was taken in 2005.
8 Source: Helmholtz Centre Potsdam – GFZ

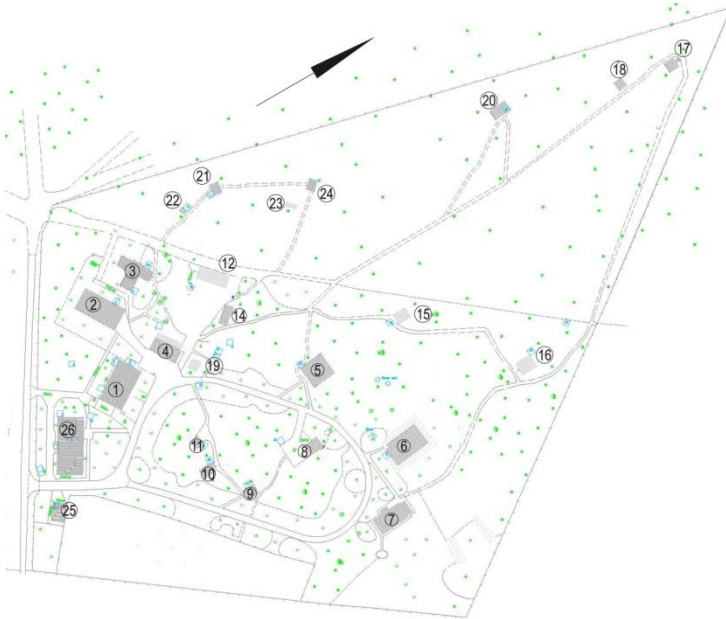


Fig. 15. Ground plan of the observatory compound, situation in 2003. Source: Helmholtz Centre Potsdam – GFZ

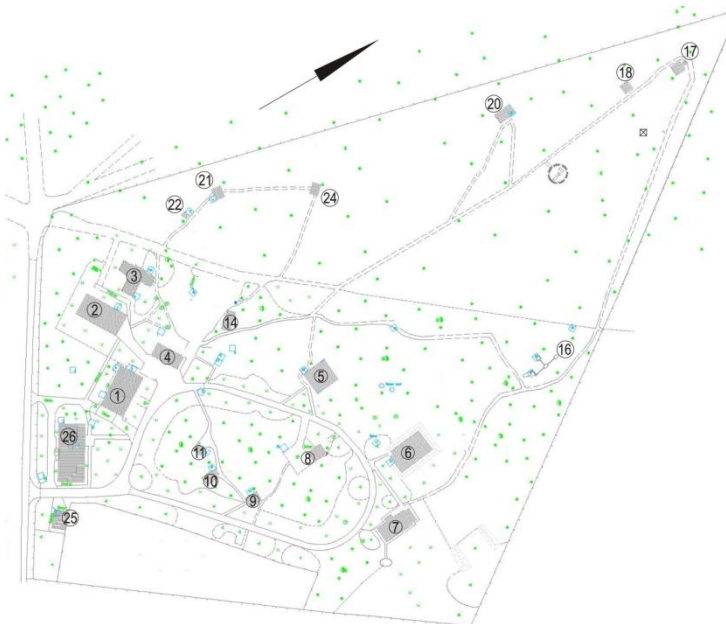
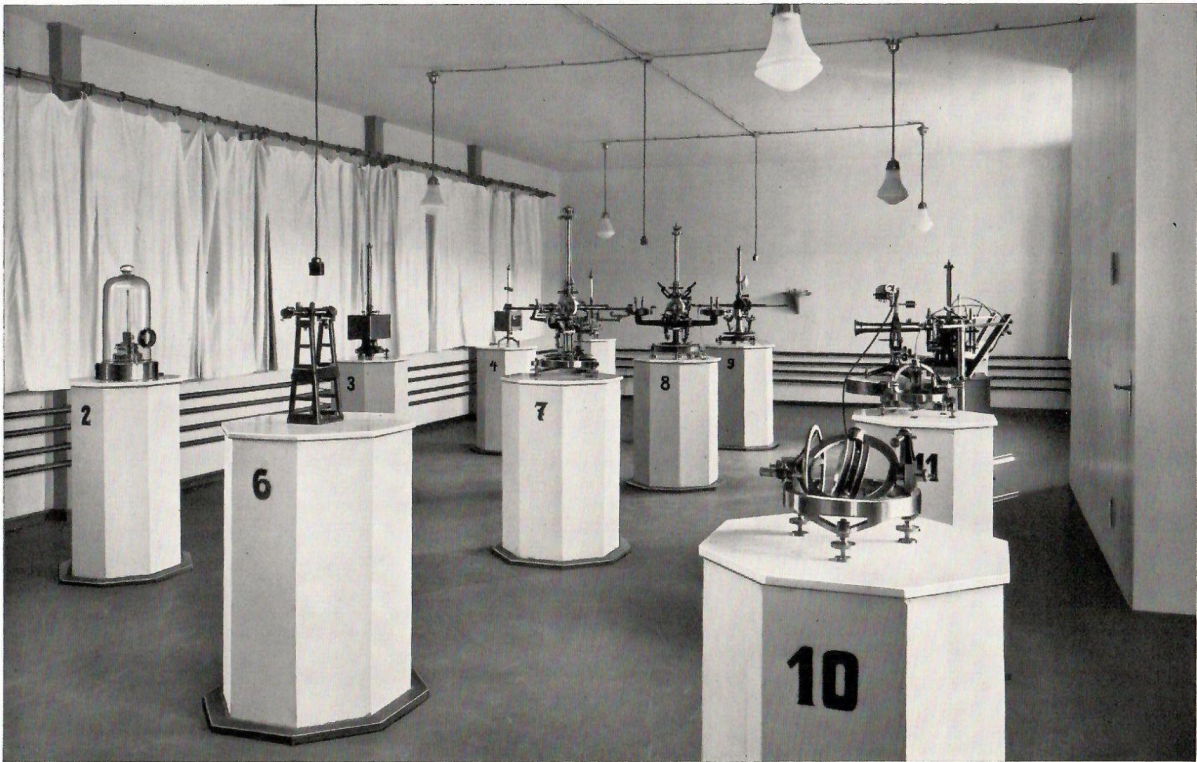


Fig. 16. Ground plan of the observatory compound, present situation. Source: Helmholtz Centre Potsdam – GFZ

No. Building

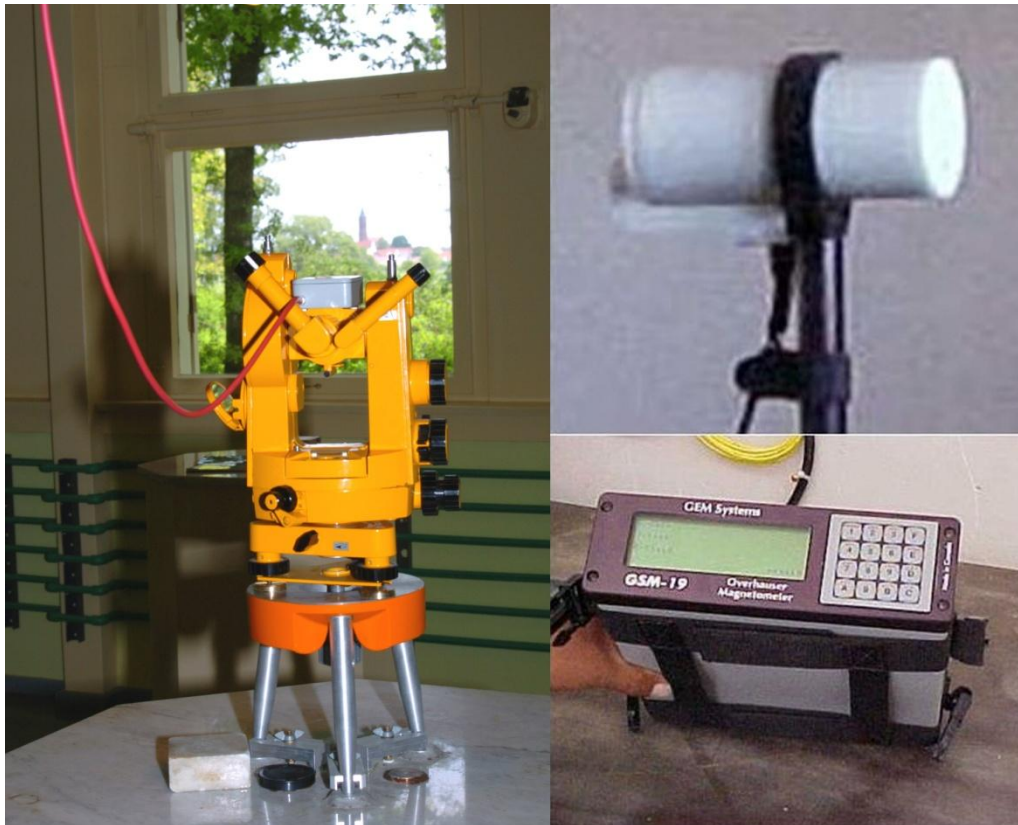
- 1 Main building
- 2 Electric laboratory
- 3 Computer centre
- 4 Storage house
- 5 Magnetic laboratory
- 6 Variation house
- 7 Absolute house
- 8 Heating house
- 9 Small hut
- 10 Adjustment hut
- 11 Thermal adjustment hut
- 12 Garage
- 14 Equipment shed
- 15 Proton magnetometer hut
- 16 Control hut No. 1
- 17 Coil hut No. 1
- 18 Control hut No. 2
- 19 Measurement centre
- 20 Teluric hut
- 21 Coil hut No. 2
- 22 Small control hut
- 23 Control hut No.3
- 24 Coil hut No.3
- 25 Power unit house
- 26 Workshop building



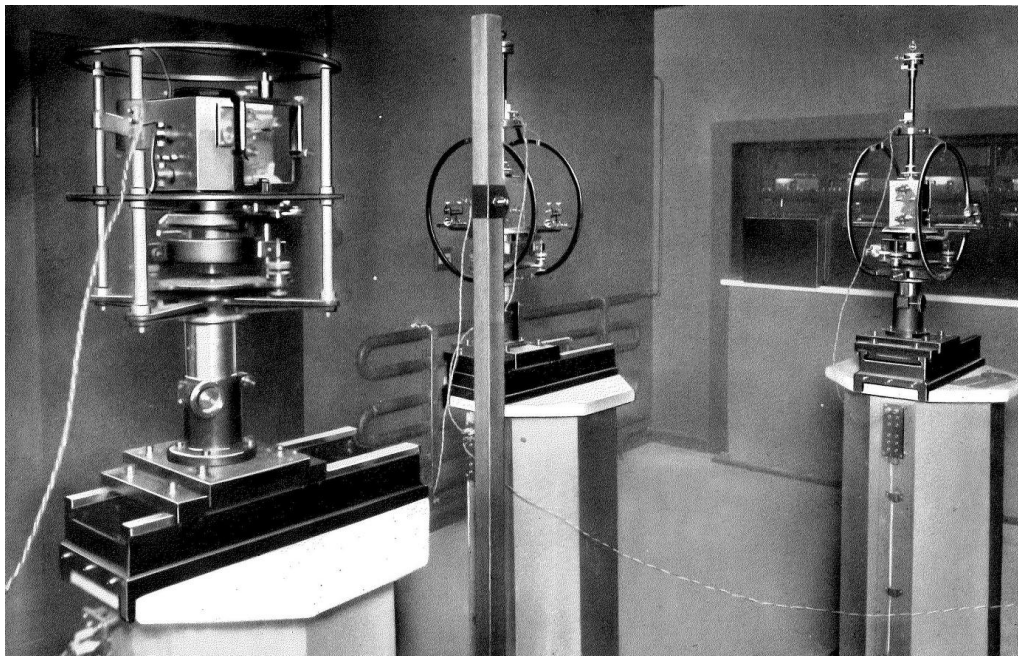
1

2	Pillar No.	Instrument
3	2	Galvanometer for the earth inductors
4	3	Oscillation box Wanschaff
5	4	Oscillation box Schulze (Fürstenfeldbruck)
6	5	Theodolit Schulze No. 65 (Fürstenfeldbruck)
7	6	Collimator (azimuth mark in case of invisible towers)
8	7	Theodolit Bamberg
9	8	Theodolit Schmidt
10	9	Theodolit Wanschaff
11	10	Earth inductor Schulze No. 550 (Fürstenfeldbruck)
12	11	Earth inductor Schulze No. 1
13	13	Earth inductor Schulze No. 65
14	14	Journey theodolit Schulze No. 541

15 Fig. 17. Interior view of the absolute house in 1932. The table contains the assignment of the
 16 visible instruments to the pillars. Source: Bock, 1939



1
 2 Fig. 18. DI-flux on pillar No. 8 of the absolute house with the Niemegek church tower in the
 3 background (left) and Overhauser proton magnetometer GSM19 (right, sensor up and
 4 electronic unit down). Source: Helmholtz Centre Potsdam – GFZ.
 5

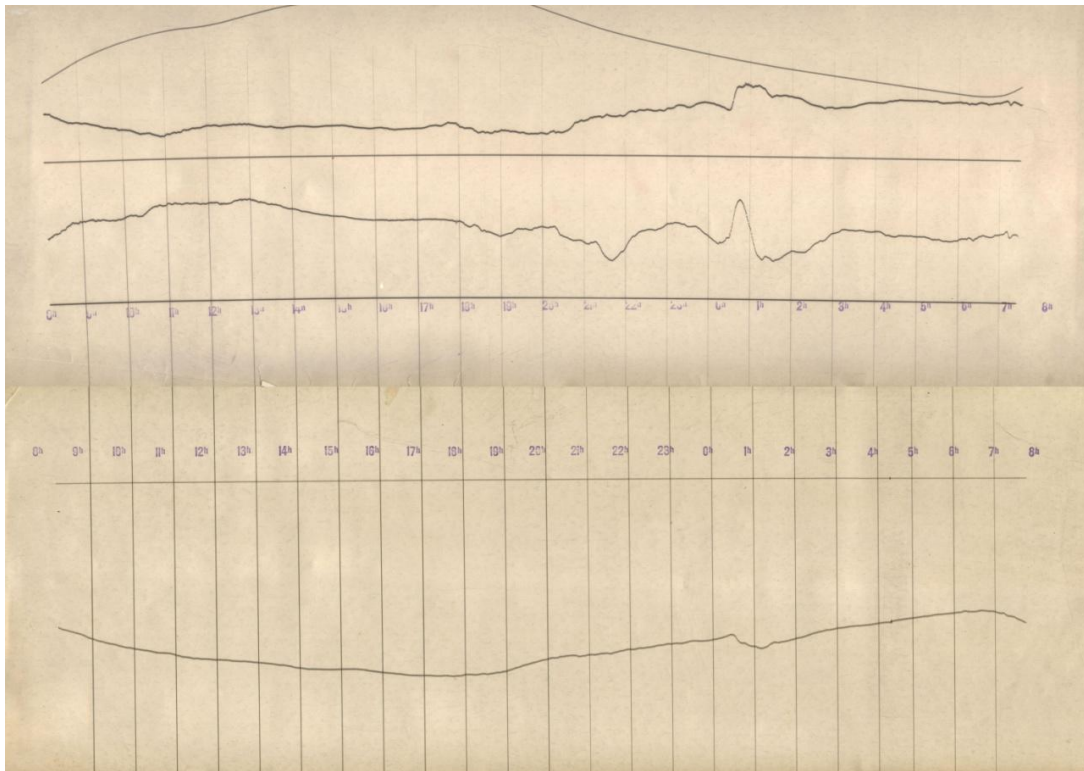


6
 7 Fig. 19. Photo of the interior of the north-west room of the variation house. Source: Bock,
 8 1939



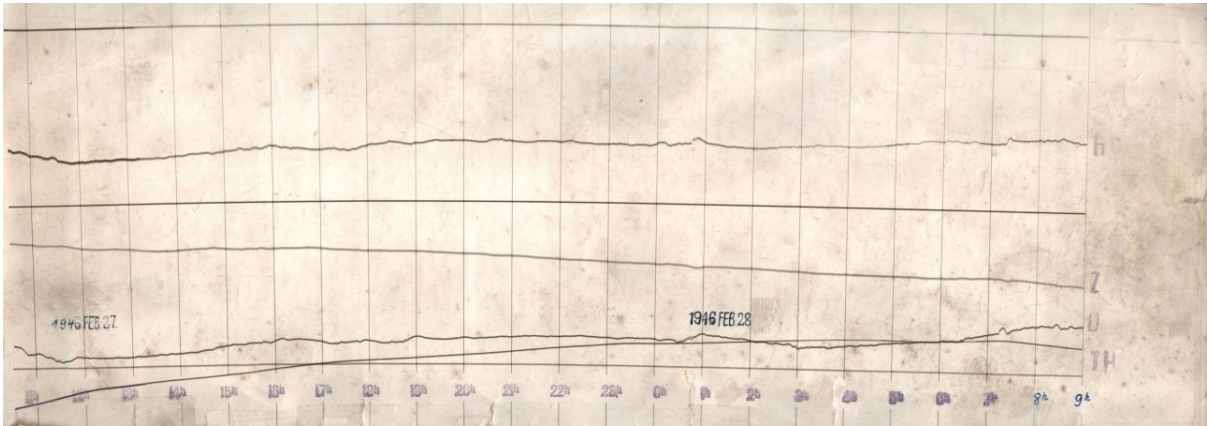
1
 2 Fig. 20. Fluxgate magnetometer FGE sensor (left) and electronic unit (right). Source:
 3 Helmholtz Centre Potsdam – GFZ.

4
 5



6
 7 Fig. 21. One of the first photographic recordings of the horizontal intensity and declination
 8 (top) and the vertical intensity (bottom) of the time interval 25 March 1931 at 08:00 till 26
 9 March 1931 at 07:20 (Greenwich local mean time) taken at the Niemegek Adolf Schmidt
 10 Geomagnetic Observatory. Source: Helmholtz Centre Potsdam – GFZ.

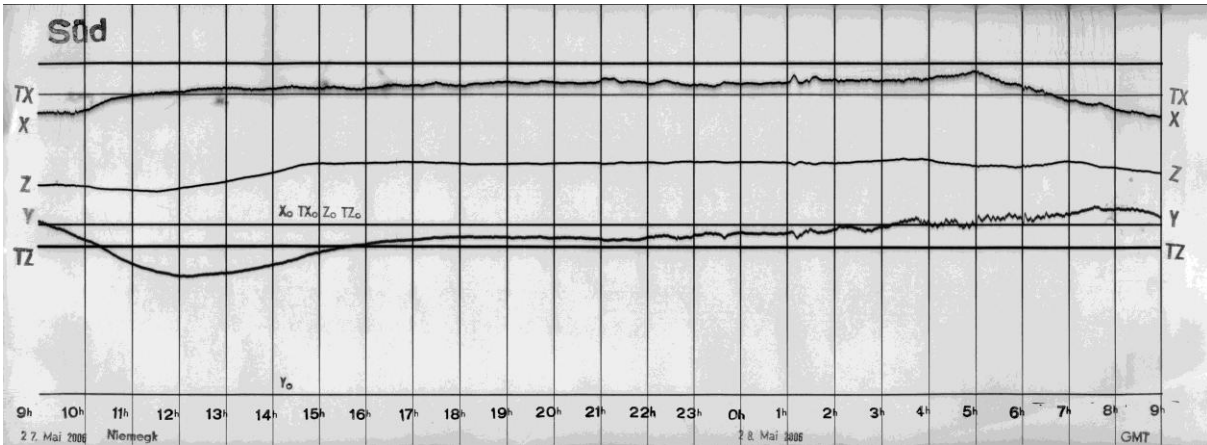
1



2

3 Fig. 22. First photographic recordings after the operation gap caused by World War II of the
 4 horizontal (H) and vertical (Z) intensity and declination (D) of the time interval 27 February
 5 1946 at 10:30 till 28 February 1946 at 9:00 (Greenwich local mean time) taken at the
 6 Niemeck Adolf Schmidt Geomagnetic Observatory. Source: Helmholtz Centre Potsdam –
 7 GFZ.

8



9

10 Fig. 23. Last photographic recordings of the north (X), east (Y) component and the vertical
 11 (Z) intensity of the time interval 27 May 2006 at 09:00 till 28 May 2006 at 9:00 (Greenwich
 12 local mean time) taken at the Niemeck Adolf Schmidt Geomagnetic Observatory. Source:
 13 Helmholtz Centre Potsdam – GFZ.

14



1

2 Fig. 24. Photo of the survey van Phänomen Granit 30K. Source: Helmholtz Centre Potsdam –
3 GFZ.

4



5

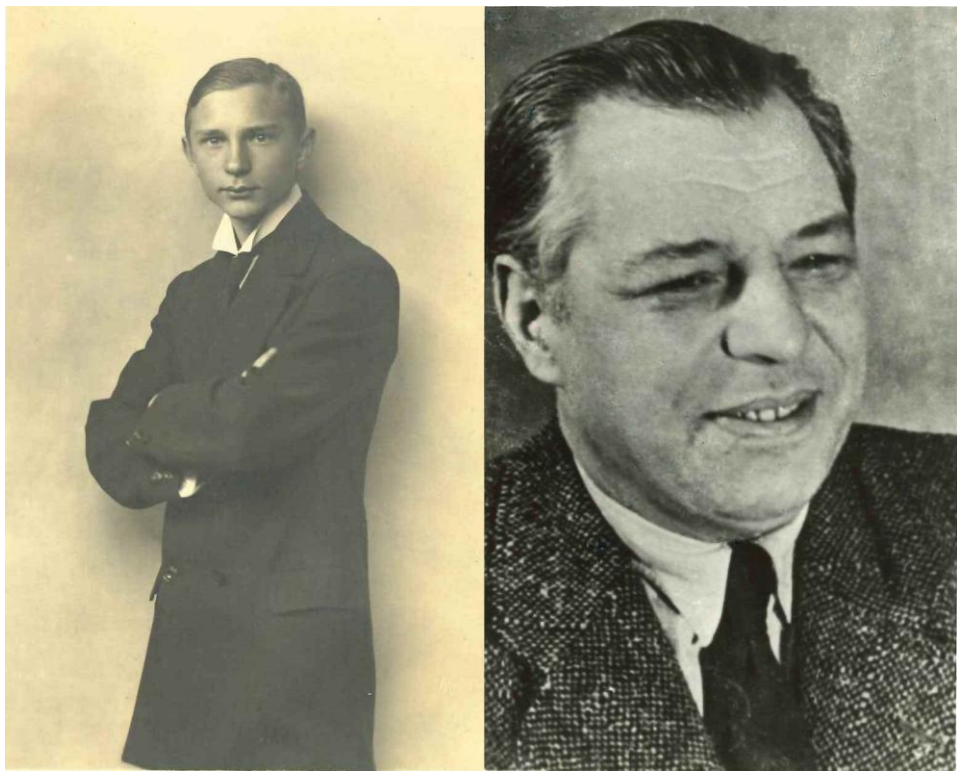
6 Fig. 25. Heinrich Soffel, the National Representative of Germany for IAGA (right), hands
7 over the Long Service Award of IAGA to Walter Zander (left). Source: IAGA News No. 32,
8 https://iaga-aiga.org/data/uploads/pdf/newsletter/iaganews_32_1993.pdf

9



1
2
3
4
5
6

Fig. 26. From left to right: Kathy Whaler (IAGA President 2011-2015), Mioara Manda (IAGA Secretary General 2009-2019) and Hans-Joachim Linthe after receiving the IAGA Long Service Medal. Source: Manda, 2015, https://iaga-aiga.org/data/uploads/pdf/newsletter/iaganews_52.pdf



7
8
9

Fig. 27. Julius Bartels' portrait (left) and Richard Bock's portrait (right). Source: Helmholtz Centre Potsdam – GFZ

1



2

3 Fig. 28. Gerhard Fanselau's portrait (left) and Horst Wiese's portrait (right). Source:

4 Helmholtz Centre Potsdam – GFZ

5



6

7 Fig. 29. Herbert Schmidt's portrait (left) and Klaus Lengning's portrait (right). Source:

8 Helmholtz Centre Potsdam – GFZ



1
2
3
4

Fig. 30. Armin Grafe's portrait (left) and Adolf Best's portrait (right). Source: Helmholtz Centre Potsdam – GFZ



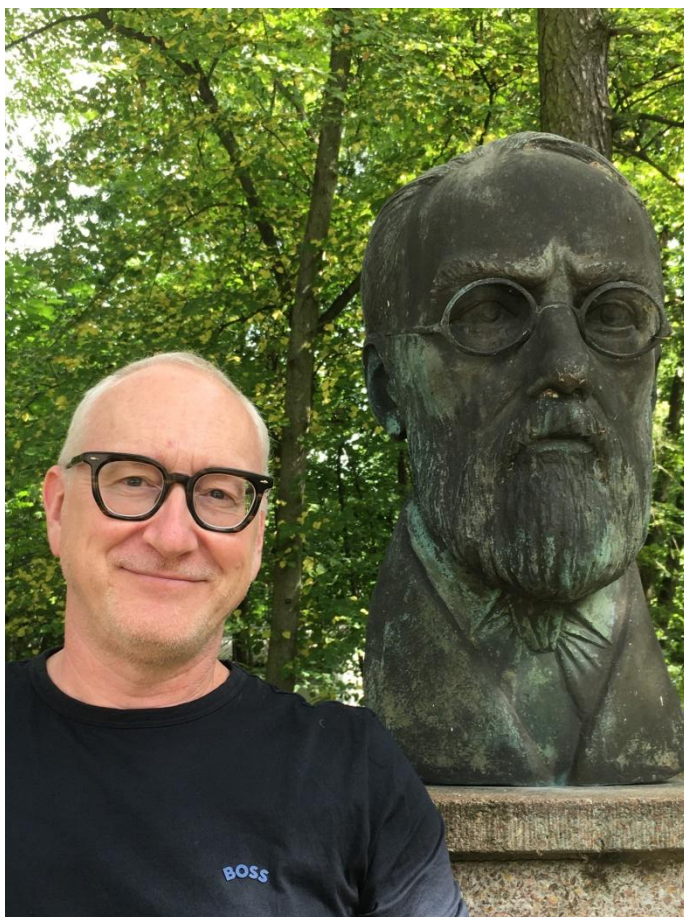
5
6
7

Fig. 31. Monika Korte's portrait (left) and Richard Holme's portrait (right). Source: Helmholtz Centre Potsdam – GFZ



1
2
3
4

Fig. 32. Eberhard Ritter's portrait (left) and Hans-Joachim Linthe's portrait (right). Source: Helmholtz Centre Potsdam – GFZ



1
2 Fig. 33. Jürgen Matzka's portrait next to the Adolf Schmidt bust at the Niemeck observatory
3 compound. Source: Helmholtz Centre Potsdam – GFZ
4