DATA FOR HISTORY OF METEOROLOGICAL RESEARCHES IN SZEGED

by Á. Novák

Summary: Regular meteorological observations have been carried out in Szeged since 1854, and since 1970 within the framework of the independent Hungarian meteorological service.

The climatological station of Szeged now celebrating its hundred years' existence operated till 1929 in the Piarist grammar school.

The climatological station of the Geographical Institute of the University of Szeged, established in 1926, took over the tasks of the station of the grammar school which was then closed in 1929. Besides network observations with modern equipment and besides teaching, research work also started. In 1927, the Institute started microclimatological researches, in 1928 aerological researches, and in 1932 it started a forecasting service for the southern part of the country and established an agrometeorological observation network.

Since the Second World War more favourable conditions ensure regular research work. The network climatological station is operating within the framework of the Climatological Institute established in 1952. Nevertheless the research work of the Institute is not based on this, but with its largely locally designed instruments the Institute carries out microclimatological researches useful for agriculture such as the investigation of the microclimate of alkali soils and sandy areas in the southern part of the Great Hungarian Alföld, the investigation of the weather conditions hindering rice growing, the investigation of the conditions of extending the forest areas in the North Hungarian mountains of medium height, the investigation of the microclimate of sink-holes (dolinas), the investigations of the vergency lines of the heat flows in the soil, etc.

Zusammenfassung: Systematische meteorologische Beobachtungen werden in Szeged seit 1854, und zwar seit 1970 im Rahmen des unabhängigen ungarischen Dienstes, ausgeführt.

Die Szegeder klimatologische Station, die in 1970 ihr hundertjähriges Bestehen feiert, fungierte bis 1929 im Piaristen Gymnasium.

Die 1926 gestiftete klimatologische Station des Geographischen Instituts der Universität von Szeged nahm ab 1929 die Aufgaben der dann eingestellten Station des Gymnasiums über. Neben Netzwerkbeobachtungen mit modernen Instrumenten und neben Unterricht begann auch die Forschungsarbeit. Ab 1927 begann das Institut mikroklimatologische, ab 1928 aerologische Forschungen, und ab 1932 leistete es Wettervorhersagendienst für den südlichen Teil des Landes und errichtete ein agrarmeteorologisches Beobachtungsnetz.

Seit dem zweiten Weltkrieg sichern günstigere Verhältnisse die Fortsetzung systematischer Forschungen. Die klimatologische Netzwerkstation fungiert im Rahmen des 1952 gestifteten Klimatologischen Instituts. Die Forschungsarbeit des Instituts ist aber nicht darauf gegründet; das Institut führt mikroklimatologische Forschungen aus die für die

Landwirtschaft nützlich sind, wie die Untersuchung des Mikroklimas der Sodaerden und der sandigen Gebiete im Süden der grossen ungarischen Tiefebene, die Untersuchung der Wetterverhältnisse die Reisproduktion hindern, die Untersuchung der Bedingungen der Vergrösserung der Waldgebiete im nordungarischen Mittelgebirge, die Untersuchung des Mikroklimas der Dolinen, die Untersuchung der Vergenzlinien der Wärmeströmungen im Boden, usw.

Introduction

Organization of a meteorological observation network and systematic collection of data started in Hungary in the second half of the 19th century. In creating the provincial observation post system the *Central Meteorological Office (CMO)* had to take several facts into account. For instance, it had to cimmit the observation posts to the care of institutes whose permanent status guaranteed the work for a long time, for decades, and the financial situation of which made possible the covering of extra costs that might arise.

Besides the facts mentioned above the standard of work demanded from the observers could not be neglected either. The workers on duty had to prove their love of work and devotion, and from the point of view of the functioning of the observation post, their interest, their expertness and enthusiasm were only usefull; so they could be relied upon.

The duties connected with the work of the climatological station were undertaken by staff members of Szeged's oldest middle school, the Piarist Grammar School, for most of the teachers had a training in the natural sciences. The permanent existence, the great past, and the good reputation of the school, the adequate financial possibilities and the zeal of the teachers were very favorable conditions for the establishment and operation of the climatological station.

From the first collections of data to the beginning of systematic observation

In the second half of the last century meteorological observation had been going on in Szeged prior to the establishment of the observation post of the Piarist Grammar School. The systematizer and evaluator of the collected data of the Grammar School's first decade, A. BERTALAN refers in his dissertation (1884) to these earliest weather observations in Szeged. *The post mentioned in the historical survey was one of eleven posts established in 1854.* It does not appear from the brief report where and with what sort of instruments the collection of data was done or what became of the observation material and of the post. BERTALAN gave the names of the observers between 1854 and 1869, all of them army surgeons, in chronological order proving thereby the relative continuity of the observations. At the station established by the meteorological institute of Vienna the following persons collected the data:

1854—1861	DR. ALTSTÄDTER (MÓRICZ)
1862—1863	no observations
1864	DR. JANI, regimental surgeon
1865	DR. JANI, DR. BLASCHKE and DR. PLANETER, military surgeons
1866	DR. M. PLANETER

1867 DR. M. PLANETER and DR. WALDSTEIN, regimental surgeons

1868—1869 DR. WALDSTEIN

Officially recognized uninterrupted service was done starting from 1870 by the climatological station established in the Piarist Grammar School of Szeged; this station was created at the same time as the *Central Meteorological Office (CMO). The station of the Grammar School was in the northern part of the square now named for Beloiannis.* The whole instrumental equipment here consisted of a ,,vessel barometer" (mercury barometer) in a first-floor room facing east, a ,,common psychrometer" on the northern side of the building, and a rain-gauge set up 75 cm from the window in the garden of the school. Wind direction was determined with the help of the wind vane on top of the flag mast of the steamboat company near the school. The arrangement of the instruments was not proper from the modern point of view but there was probably no better place for them. *The school and together with it the station moved in 1886 in the new building which is now in the Square of the Arad Martyrs.* Nothing is known about the arrangement of the instruments in the new building.

Starting from 1870 observations were made daily at 7, 14, and 21 hours by the following Piarist teachers:

till October 1870	K. PARÁDI
1871—1872	I. BERKES
1872—July 1885	K. STANCZEL
July 1885—Aug. 1887	I. MARKOS
Aug. 1887—Aug. 1890	L. FARKAS
Aug. 1890—May 1893	I. BACSKOR
May 1893—July 1905	M. SCHANDL
July 1905—Aug. 1905	J. PRELOGG
Aug. 1905—Aug. 1914	J. HOGYOR
Aug. 1914—Nov. 1917	J. LÁSZLÓ
Nov. 1917—Aug. 1923	GY. SÜMEGI
Aug. 1923—July 1924	P. BOHARCSIK
July 1924—July 1926	J. PÉNTEK

The frequent changes in personnel did not interfere with the standard of work. This is proved by N. BACSÓ's comment published in the periodical *Időjárás* (= Weather) in 1929.

,,The meteorological station of the Piarist Grammar School of Szeged began operating in 1870 and since then observation has been carried on continuously at this station which is as old as the Central Meteorological Office (CMO). Since the school undertook running of the station nearly sixty years ago, it has served science as a faithful aid to the CMO and has supplied Hungarian climatology with a lot of useful data."

In view of the fact that the weather station of the Geographical Institute of the University of Szeged was, in the meantime, doing more and more complex and comprehensive work, and possibly also owing to the financial difficulties caused by the economic crisis of 1929, the observation post of the school was finally closed on Dec. 31. 1929. The observer of the school sent the last weather report to the CMO on April 4, 1929.

The meteorological data supplied by the Grammar School over a period of

60 years might have been very useful for Szeged and the southern part of the A l f ö l d yet these data were worked up only on one occasion. *The weather conditions between 1872—1881 were analyzed by* A. BERTALAN, geography and natural history teacher of the Piarist Grammer School (1884).

The comprehensive study, which by the way dealt in detail also with the geographical conditions of Szeged, analyzed with commendable thoroughness the local peculiarities of the changes in the meteorological factors (air pressure, air humidity, precipitation, wind) using monthly, seasonal, and yearly means and extreme values.

A great merit of this study was that the author compared in it the observations of this station with the data of other stations and tried to explain the differences. It is also remarkable that he recognized the importance of the conclusions drawn from the material of observation and drew useful conclusions for agriculture in the environs of Szeged.

The Geographical Institute of the University of Szeged starts and gradually extends research work

A culturally and economically very important event in 1921 was the transfer of the University of Kolozsvár to Szeged. The work of the Geographical Institute of the University had a cimilarly great importante in the geographical and climatological research of Hungary Szeged, and the A l f ö l d .

K. KOGUTOWICZ *played an important role in starting this complex work.* He was invited from Budapest and appointed full professor of the Institute for General and Comparative Geography on April 14, 1923. *(Report . . . 1929.)* KOGUTOWICZ saw clearly that research of the A l f ö l d was in an initial phase and that the town of Szeged also expected from the Institute the investigation and solution of a number of problems of geographical character. He also felt correctly that these investigations could not be limited to Szeged only because one would inevitably be faced with general problems of the A l f ö l d . Thus he came to the conclusion: „. . . . if we could find the correct way of investigating the A l f ö l d , we would have adequate guidance to most of the problems of Szeged." (KOGUTOWICZ, 1927.)

The local possibilities and tasks were even more concretely difened by the geographer P. TELEKI (1927), who, by the way, was a leading politician of the former regime in Hungary. He said: „There was an imminent need for the universities of the A l f ö l d because without research organizations and institutes, i. e. first of all universities living in the Plain itself, we would never get to know the A l f ö l d ."

Elsewhere he wrote: „. . . the work done by the Meteorological Institute is not satisfactory in every respect, but synthetic climatological research satisfying the geographer, the botanist, and the agrogeologist is needed. This can better be done by universities where experts of various disciplines work together."

The above ideas and objectives guided research in the proper direction, but yet another factor was involved in shaping the sphere of interest of the Institute. *It was that the differentiation of climatology began in the 1920's* Zs. RÓNA (1932), former director of the CMO, spoke of the importance of this process in these words: „Under the name of microclimate a new branch of clima-

tology has arisen which is concerned with the meteorology of the air layer next to the soil."

The so-called *Alföld Research Committee* also helped to direct research toward the unsolved scientific problems of Szeged, its environs, and the southern part of the A l f ö l d . According to contemporaneous opinion (K. KOGUTOWICZ testimonial colume, 1939):

„this was the frist organ which not only studied the A l f ö l d, but, recognizing the needs, also tried to help, often with success." *Two large provincial universities, that of Debrecen and that of Szeged, had an outstanding role in the activities of the Alföld Research Committee. Within the framework of geographical researches the Geographical Institute of Szeged was given a well-defined sphere: that of investigating the southern part of the* A l f ö l d *between the* D a n u b e *and the* T i s z a *and the area east of the* T i s z a *roughly south of the valley of the* K ő r ö s. *Investigation of the climate was also thought very important,* so the first item of the work program was climatological investigation of this area. The plan of work generally included climatological investigations and, under the influence of German results, investigation of the air layers from the soil to a height of 150 cm as well as aerological researches *(Research of the Alföld . . . 1927).*

For the realization of these important plans well qualified workers, good equipment, and especially much money were needed. It was particularly difficult to procure the necessary funds because up till 1924 there was a long-lasting inflation after the First World War and then after 1929 there was again a several year long grave economic crisis. Under such circumstances the Institute could not think of largescale purchases because the State was simply unable to give any financial support. That in spite of these difficulties the research work of the Geographical Institute could be started was largely due to the praiseworthy moral and financial support gien to the Institute by the town of Szeged and the communities and institutions in the southern area of the A l f ö l d. The above-described meteorological observation post also owed its establishment first of all to the generosity of Szeged, because the Institute received for this purpose 50.000.000 crowns (i. e. 4.000 pengő) and a seismograph, but from the agricultural chambers, vounties, towns and villages of the A l f ö l d an additional sum of 150,000.000 crowns. As a result of the organizing and purchasing activity of the indefatigable KOGUTOWICZ and his coworkers and supported by the generous financial aid, *the Institute could present itself and its equipment to the public within the framework of a little ceremony already on February 15, 1924.*

Although the climatological station officially began its work only later, collection of data, with incomplete instrumental equipment, had been going on already since 1924 (BACSÓ 1929). The task of starting observations with the fullest equipment could be realized only by further hard work of the winning of a capable expert, and much of the job was undertaken by KOGUTOWICZ. *The professor, using his personal connections managed to have an excellent expert of the CMO,* GY. MARCZELL *as planner of the station and advisor to the local coworkers.* MARCZELL was an outstanding theoretical researcher and at the same time a practical expert, a designer of instruments and a person with an interest in everything new. Starting of aerological researches in this country was due to him. For years he helped the Institute with his advice readily, indefatigably, personally or through letters, and by the acquisition of instruments.

In his earliest letter (dated Febr. 7, 1925) MARCZELL knowing the local

possibilities, compiled a list of absolutely necessary instruments to be bought later and made a proposition for their arrangement. He considered it of prime importance to buy a barometer, a barograph (to be placed in a room), a psychrometer, thermometers, a hair hygrometer (to be set up in the sports ground in front of the building or in the garden beside the building, in an English thermometer hut, possibly in the window), a Hellmann's ombrometer, a wind flag and a Robinson's cross (above the facade of the building, on one of the turrets), a recorder to be connected with them (to be placed near the barometer), a Jordán—Fényi's sunshine meter (to be set up on a turret or in a suitable window). He also thought it worth while to consider acquiring an Angström's radiation meter and a radio. He proposed to place the seismograph that the Institute had received in a pavilion in a yard because of the dampness of the cellars. (The above letter shows the carefulness of the advisor.)

According to MARCZELL's *plan of arrangement (Febr. 22, 1926) the instruments were set up in the most suitable places, partly at the edge of the sports ground in front of the university building, partly on the terreace on top of the building.*

The meteorological radio station supplied the CMO with data as of April 1926. The Meteorological and Seismological Observatory of the Geographical Institute of Francis Joseph University was inaugurated on June 14. *The station, which had some 50 instruments, began work officially on August 1, 1926 (Alföld Research . . . 1927).* The first appointed unsalaried observer of the station as from July 17, 1926 was L. ORAVETZ *(Report . . . 1929).*

The pforessional press *(New Meteorological . . . 1926)* spoke of the importance of the event in these words:

„. . . the ceremony was really the laying of the foundationstone, for Professor KOGUTOWICZ has great plans for the realizations of which the good beginning bids fair. The seismographs of the station have already recorded the very remote earthquake of July 30 of the current year, and its evaporation recorder is unique in the country."

Earliest possible establishment of the station was important for the CMO because in consequence of the observatory of Temesvár having been ceded to Roumania the observation network was very sparse in the southern part of the country and the data were not sufficient for the preparation of forecasts.

Early, modern equipment of the station is suggested by the letter of G. SCHILLING, assistant professor of the Institute, to MARCZELL (SCHILLING's correspondence 1927) in which he asked for standard tapes for the ombro-, evapori, baro-, hygro-, and thermographs.

The scope of the tasks of the observatory of Szeged, as it appears from A. RÉTHLY's communication, was extended in 1927: the observation data were sent from here to the CMO in special telegrams in the morning and as from 1928, like at the stations of Szombathely, Keszthely, Pécs, Debrecen, also at 19 hr for the preparation os forecasts. *From 1927 onward the Institute employed a telegraphist to carry out the new task properly.* After closure of the observation post of the Piarist Grammar School from April 4, 1929 onward, the CMO in preparing weather forecasts, relied regarding the region of Szeged exclusively on the telegrams of the Geographical Institute sent twice a day. (The correspondence of SCHILLING 1929).

In the summer of 1931 arose the need that the observatory of Szeged do weather forecast service for the southern part of the country in the interests of agriculture.

(KOGUTOWICZ 1933.) The basis of the forecasts was the Hungarian and foreign material of observation collected with the help of radio. The telegraphist from the military helped very much by industriously collecting the radio communications of European weather stations often all day long. Thus a considerable amount of data was collected a large part of which was never worked up. Yet with the help of the smaller part which was used it was easier to make relatively reliable forecasts since weather conditions of nearly all of Europe were known.

After due preparation R. WAGNER *prepared synoptic maps and forecasts for the southern part of the country from January 1, 1932 onward on the basis of the daily observation material of 21 hr and, in this country for the first time, of 14 hr.* These weather forecasts were published daily over two years as of March 1 in several Budapest newspapers and there was even a period when they were read in the radio *(Report...* 1934*)* (K. KOGUTOWICZ *testimonial volume, 1939).*

The sphere of activity of the observatory was soon extended again: research of the high atmosphere began. The preliminaries and cause of this were the experiments carried out at the airfield of Szeged since 1925. The investigations were carried out utilizing airplanes. The director of the investigations was A. HILLE (MARCZELL 1925) (HILLE 1925). The meteorologist G. TÓTH, official of the CMO took part in the high altitude research flights in 1928 and 1929. The experiences so gained were more or less regularly published by the professional journal *„Időjárás"* (HILLE 1928 a, 1928 b, 1929 a, 1929 b, 1930).

Later on there is no news of the remarkable investigations. It is possible that it was for economic and professional causes that these important investigations had to be given up.

The Geographical Institute probably raised the idea of starting aerological research already in 1925. This is suggested by a letter of MARCZELL (Sept. 11, 1925) in which he gave information of the possibilities of acquiring a meteorograph. In 1927 it must have become apparent that the Institute was unable to realize the plan unaided. The original plan was therefore modified so that the program of the pilot observations made together with the weather service of the airfield was worked out and consultations were held with those engaged in the work (KOGUTOWICZ, 1927).

In order to acquire the knowledge and practice necessary for piloting, R. WAGNER, *assistent of the Institute went to Budapest in June 1928 and learned what there was to know under the guidance of* N. BACSÓ. *(The correspondence of* MARCZELL, *May 23, 1928.) During his stay in Budapest* R. WAGNER *gathered useful experience but his study tour abroad in 1929—1930 meant much more to him and had a great effect on his interests because in the Meteorological Institute of Munich he worked in all the sections* (WAGNER's personal communication, 1969).

The Geographical Institute deserves praise for ensuring with circumspection the technical and personal conditions of aerological researches. Thus it is understandable that *continuous piloting could start as early as 1928. These researches were important because after Budapest Szeged was the only town in the country where the observatory carried out daily pilot observations.* The data were communicated to the Office in Budapest by radio. The CMO used the communications from Szeged in compiling the day's weather report and also communicated them to similar institutions abrad. (TÓTH, 1928.)

Still in 1926 MARCZELL took note in connection with the establishment of the climatological station of the fact that KOGUTOWICZ wanted to set up more thermometers in the instrument garden than were generally used in the

observation network of the country. The reason for this was that the Geographical Institute wanted to measure soil temperature in various highst over the ground, that is, after German example, it considered carrying out microclimatological observations as early as the middle of the 1920's. (The correspondence of MARCZELL, Febr. 22, 1926.) *Microclimatological research in Szeged started owing to the personal encouragement of August* SCHMAUSS, *head of the University of Munich and the Meteorological Institute of Bavaria* (WAGNER's communication 1969).

To all this were added WAGNER's personal experiences in Munich which confirmed KOGUTOWICZ in his decision to start microclimatological researches as soon as possible. His foresight was proved again by the fact that he obtained a home scholarship for the selected coworker before launching intensive research. Thus B. BODNÁR could stuy results in this field at home. Professional public opinion took note of the event. The journal *Időjárás* greeted the holder of the scholarship and expressed its approval of the endeavours of the Geographical Institute of the University of Szeged to give an important role to agricultural meteorological researches (RÉTHLY, 1930).

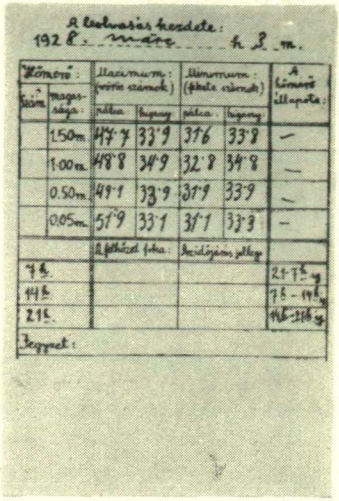
In the course of the realization of the plans a number of experiments were carried out. *Novel experiences were for instance the large-scale terrain investigations by* B. GYŐRFFY *in 1938. In the same period* R. WAGNER *made thermoelectric measurements of experimental character in the sandy area of Átokháza.* The scientific value of this experiment was not lessened by the fact that the instruments used were unsuitable for field investigations, they could not bear the great temperature variations, for they were designed for use in laboratories.

More important than these *short-term experiments were the micrometeorological investigations with four Six-type maximum—minimum thermometers which were carried out as of Jan. 1, 1927 under the direction of* B. BODNÁR *and* R. WAGNER. The thermometers set up in the instrument garden of the station measured the daily temperature maxima and minima in 5, 50, 100 and 150 cm heights. At 7, 14, and 21 hr the degree of cloudiness, the character of the weather between the times of observation, and even the height of the surrounding vegetation were determined. (Fig. 1.)

With a view to gathering comparative data, *the Geographical Institute established additional microclimatological stations in Királyhalma, Nagykörös and Szarvas using maximum—minimum thermometers received from Bavaria.* Systematic observations were carried out generally between 1932 and 1933 in the afore-mentioned localities. Then researchers in Bavaria revised their earlier methods, the experiences gained, and came to the conclusion that their methods were not correct, and they stopped their investigations with the old methods. At this news the Geographical Institute also stopped its investigations. The fact that, although microclimatological observations were planned also in Baja, Hódmezővásárhely, and Szeghalom, establishment of these three stations did not take place is due to the same circumstance.

From this it followed that a new direction had to be given to the microclimatological investigations in Szeged. *The new plan was developed already in 1932 according to which the setting up of 40 rain-gages and an additional 6 stations for the investigation of the air layer next to the soil was begun in present-day Békés and Csongrád counties well as in the southern part of Bács county (*KOGUTOWICZ, *1933). (Document of Szeged . . . 1933—1934.)* Of the stations

Fig. 1. One page of the agrometeorological logbook



planned only 28 were left which systematically gave reports to the Geographical Institute. Judging by their observation material their work may be considered to have been useful. Their work was interrupted by the economic crisis of 1929—1933. (Fig. 2.)

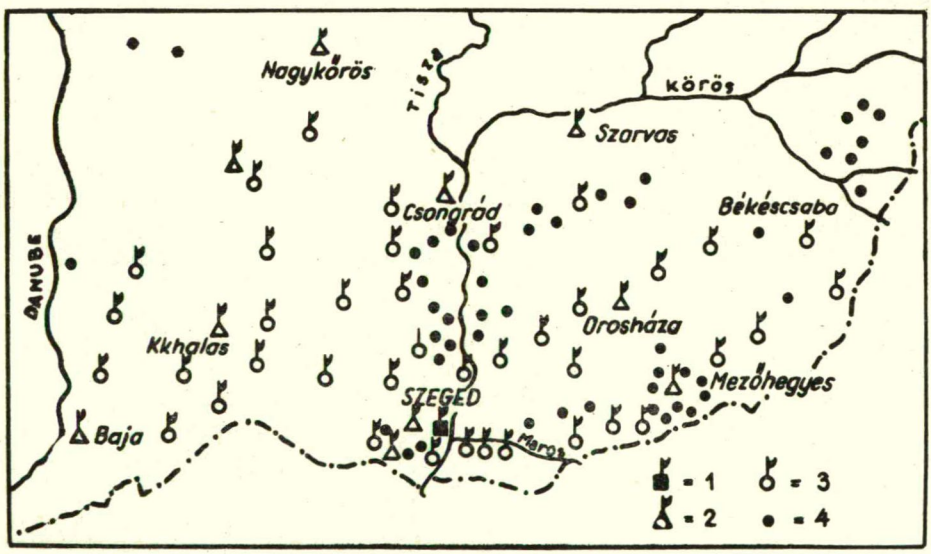


Fig. 2. The meteorological network of the Geographical Institute of the University of Szeged Fey: (1) Observatory, (2) agrometeorological station, (3)rain-gauge station, (4) privately owned raingauge station

Though most often interrupted, these undertakings did not fail to have an effect on the interested, enthusiastic institutions and experts of the A l f ö l d. With its devoted work and readiness to help the Geographical Institute soon gained prestige. This is why the climatological stations and the post of the precipitation measuring network turned to the experts of the climatological station of Szeged with great confidence asking for guidance or equipment or printed matter. Whenever it was possible, the Institute satisfied the demands, and it was so that several establishments received Six-type thermometers. Here it must be remarked that MARCZELL's opinion in connection with the Six-type thermometers (his correspondence, March 19, 1928) was that first of all Fuess-type minimum thermometers ought to have been used which were in general use in Hungary and the Six-type thermometer could have been used besides tham.

For want of sufficient financial resources the Institute was often unable to satisfy the demands for instruments; this happened in the case of the state Practical Secondary School of Tótkomlós, the Practical Secondary School of Endrőd, the Gardener's Association of Békés County, and the Szentes Board of Woods and Forests. These institutes asked for the establishment and equipment of climatological stations. The institute could undertake only forwarding of the requests to the CMO (the correspondence of SCHILLING, July 2, 1928).

The researches are useful only if the results come to be published in a usable form for the community, worked up with scientific methods pretension. *The Geographical Institute had a scientific status already in the years following the start; this is why the journal Időjárás published one after another the communications of its workers. The Alföld Research Committee of Szeged also urged and helped publication of the scientific papers by starting a series under the name of Library of the Alföld Research Committee of Szeged in which appeared, among others, climatological and meteorological studies.* (WAGNER, 1929, 1930, 1931 a, 1931 b.) Among them for instance the study dealing with the wind conditions of the A l f ö l d had a great repercussion: Zs. RÓNA (1931) reported on and evaluated it in *Időjárás*. Although some of the studies were prepared only in manuscripts, their titles prove that the Institute took the task of research of the A l f ö l d seriously; for instance WAGNER: *„New evaluation of pilot observations"*, WAGNER: *„The industrial town of Szeged and the wind" (Report . . . 1933).*

It was the intention of the Institute to publish the locally collected observation material after working up in a year-book. This, however, was not realized on account of the lack of understanding of the editorial board of the university publications *(Acta).*

It is gratifying, however, that the raw material of observations collected till 1932 made it possible to prepare a study of international importance; the manuscript of R. WAGNER's paper *„Barometric minima in Europe, 1926—1930"* was prepared *(Report . . . 1934)* which was first published in the local publication entitled *Földrajzi Szeminárium* (Geographical Seminar). By the way the *Földrajzi Szeminárium* owed its short life repeatedly to the devoted work of the Geographical Institute which knew no obstacles. Since the publication of year-books could not be started earlier, the workers of the Institute themselves created a possibility for publication. Edited by R. WAGNER and mimeographed, later printed, ten issues of the *Földrajzi Szeminarium* were published in 1935—1936. This publication was destined to serve geographical science, the teaching of geography, researchers, teachers, and university students.

Besides articles by local researchers, articles by noted Hungarian experts also appeared in this journal. The following articles, which also prove the rapid expansion of the sphere of scientific research, deserve special attention: N. BACSÓ: *„The weather in Hungary in 1935"*, A. PÉCSI: *„Climatic elements and intellectual work"*, R. WAGNER: *„Shade"*; R. WAGNER: *„Barometric minima in Europe"*, R. WAGNER: *„The change of weather at Candlemas"*, R. WAGNER: *„The role of wind in the gas defense of the Alföld.*

The Geographical Institute considered teaching also a very important task. Here we only touch upon this problem in so far as it has some connection with obtaining meteorological or climatological knowledge. In the first years of the functioning of the University, in the 1920's, climatology did not figure in the curriculum even in the form of practica exercise. The more important body of climatological knowledge was taught within the framework of physical geographical studies *(Lectures on meteorology . . . 1927)*. At the committee session of the *Hungarian Meteorological Society* in 1926 attention was called to the then existing situation: the fact that at two universities of the country meteorology was not taught even as a facultative subject. In order to change this situation as soon as possible it was decided to urge introduction of the teaching of meteorology in a petition addressed to the Minister of Education *(The MMT . . . 1926)*.

As a first step toward independent teaching of climatology in Szeged, from 1930 onward R. WAGNER *lectured four hours a week on the use of instruments and lead measurement exercises. From the middle of the 1930's climatology was already an independent subject.* At that time the Geographical Institute developed and introduced a training cycle of eight semesters within which there were also lectures on climatology during a semester every other year. In the odd years the students gained climatological knowledge within the framework of the lectures on physical geography (WAGNER's communication, 1969).

The Geographical Institute did much till 1944 in the interests of climatological and areological research and teaching. With modern objectives, not introverted, and doing autotelic work, it recognized the demands of the environment and thus it considered research of the A l f ö l d its exclusive task. The failures and difficulties did not discourage it; if in the way of realization of an objective it met with an unsurmountable obstacle, it looked for another objective and tired to achieve by good work results with the greatest possible use.

Results achieved in the service of meteorology at the University of Szeged since 1945

World War II set back the work of the Geographical Institute very much. For years there was no teaching work, the financial and personal conditions necessary for resuming research were lacking. There was also a radical change in the situation of the climatological station, and observation work started under difficult conditions.

For some years after the war it was the Geographical Institute which dealt with the teaching of meteorology and maintained the climatological station and ensured its continuous work. *In 1952* there was a change in organization and content; R. WAGNER *was appointed university drofessor and as from August*

15 he was commissioned to establish the so-called Geographical Institute Number Two. Owing to the character of the University, the new Institute had to do both teaching and research work. *In September 1953 the name of the Institute was changed to Climatological Institute.* Besides teaching, the Institute has been doing complex and ever increasing research work since 1952—1953.

Achieving the present results has been a long story. This is also true of *the climatic station* which at *the end of the war had to be transferred with all of its instruments to the terrace on top of the university building* on account of the installation of a military hospital, and the observations have been done there ever since. All the instruments were successfully mounted in the place formerly used only for pilot observations. The conscientiousness of the observers, F. Csóti Gyapjas and I. Hegedűs, is proved by the fact that, in spite of the difficulties during and after the war, the work of observation was nearly uninterrupted.

From the academic year 1946—1947 onward the climatological station again took part in the weather forecasting service; till 1951 it informed the civilian airport of the weather conditions and cabled data to Budapest every hour or every three hours. In 1951, on account of the airfield catastrophy in Pécs, the station of the Institute temporarily substituted for the station of the airfield. *Since 1952 the station of the university has not been sending cable reports; it has only been collecting the data of therminus observations* and sending them, together with the records of the self-registering instruments, to Budapest.

To the number of instruments was added a locally designed and prepared wind direction recorder, which however, could be used only for a short time on account of technical problems. *In 1957 the station received a Robitzsch pyranograph, then in 1961 a universal wind recorder.*

The accumulated data of sensual and instrumental observations have not been worked up systematically for a longer period on account of the shortage of personnel and the complexity of the teaching and research tasks. In evaluating the results of the investigations in the area of the southern part of the A l f ö l d, the workers of the Institute always make use of the data collected at the station in order to characterize the macroclimatic situation and to make comparisons easier. Utilization of the observation material is also done in the form of home climatological stations, but chiefly institutes in the region of Szeged, agricultural experimental and producing establishments asking information of the Institute; near thirty establishments ask for and receive weather mean values regularly.

But the agricultural and research establishments demand not only direct observation material but also generalizations, the knowledge of regularities. The Climatological Institute has tried in the past and is trying now to satisfy this expectation. It was such motives that led to researches of an agricultural nature and investigations of working place climatology in industrial establishments. Most of the scientific problems to be solved and especially those posed by agriculture were studied by microclimatological methods and the work of the researchers was successful.

However, *to start microclimatological researches, very sensitive instruments, uninfluenced by the presence of persons, were needed. Since no such instruments were available at the Institute,* R. Wagner *started designing suitable instruments from 1950 onward. Such an instrument was the remote-control photocell light reflection meter* which served for studying the properties of different kinds of soil.

It is very regrettable that the shortage of personnel-there was only one worker employed for this purpose — was a great setback for regular measurements, although hourly observations were planned. *It was also in 1950 that an experimental specimen of an electric remote-control thermometer of great sensitivity of the* WAGNER—GALYAS *type, an electric anemometer, and a wind direction finding instrument were made.* Among the last named, the temperature-measuring basic instrument is a constantly used device in microclimatological research.

The first period of exploratory investigations was characterized by the fact that they lasted from a few days to a few weeks, and there was no possibility to repeat them.

A further feature of these investigations was that they were in close connection with teaching, since the data were collected using the field exercises and the observation work of the students. Such were part of the investigations in the southeastern region of the A l f ö l d, for instance on the alkali soils of Békés (at Pusztatornya, near Orosháza) in 1951 in the interest of their better utilization; then the observations made at Mezőhegyes in 1952 in order to explore the microclimate of the working place of harvesters and threshers. In the same place in the same year agrometeorological investigations were carried out in a stand of hemp. Instrumental collection of data took place on alkali soil at Kétegyháza in 1952. In 1953 single investigations were carried out on quicksand at Üllés and on alkali soil at Gyulapejrét. Investigations were carried out also in the air space of both banks of the river T i s z a at Algyő in 1955 in connection with the afforestation of the flood basins. Still in the same year, the Institute carried out exploratory measurements in the A n n a and I s t v á n caves of L i l l a f ü r e d. In 1955 a series of measurements were carried out in the area of several industrial establishments (iron foundry, turnery, textile factory) in Szeged in connection with plans for conditioning the workshop spaces. Instrumental investigations were carried out at Alsógöd in 1956 and 1957. In 1958 the Institute tried to study simultaneously different kinds of microclimatic spaces of the mesoclimate in the area between Dunaföldvár and Solt.

Economically more important than these were the investigations lasting several years. In the course the first series of large-scale investigations, measurements under circumstances of artificial influences were carried out in 1951. Between 1952 and 1954, experiments were conducted to explore and favorably change the microclimate of cotton, then under acclimatization. Investigation of the microclimatic conditions of the refreshment of the woods of the B ü k k m o u n t a i n s and the planting of trees in the barren places began in 1953. This investigation still goes on in every season except in winter, and its importance is ever growing. In the course of the investigation of the main theme a number of new problems have come up. From 1959 onward, for instance, began the investigation of the microclimate of sink-holes, from 1961 that of mountain meadows and forest clearings. Radiation measurements which have been going on regularly since 1966, help to better understand the environmental conditions. The experiences gained in the course of the investigations are already being put to use in the forestry of the B ü k k m o u n t a i n s.

Very important and successful series of investigations were carried out between 1956 and 1959 at the experimental station of Kopáncs. The Institute investigated there the natural and the artificially produced microclimatic causes of the browning disease (bruzone) of rice in different phenophases in the summer months of successive years.

In 1960 and 1961 the Climatological Institute carried out instrumental investigations in nine kinds of vegetation on sandy terrain in summer — autum and in spring — autumn aspects. The aim of the investigation was to clear the conditions of binding the quicksand.

Without capable and well-trained, variously interested experts it would have been impossible to produce such results. Quite a school of geographers formed round Professor WAGNER, with biologists, more exactly botanists, among them who got there as a result of conscious guidance. Harmonious collaboration was seen in the investigations. In case of need researchers of other institutes or experts not belonging to the University were also drawn into the work. Thus everything that could only be planned before the war was successfully realized, for the experts of different disciplines joined their efforts.

The results of the microclimatological investigations described above are available to both Hungarian and foreign experts. Information service at home was and is done by the *Acta Geographica*, the *Földrajzi Értesítő (Geographical Bulletin)*, *Földrajzi Közlemények (Geographical News)*, *Communications of the Agrarian Science Department of the Hungarian Academy of Sciences*, ets. To foreign researches the results of the investigations are available in the independent periodical publication *Acta Climatologica* (1959—1969). The 21 studies in German or English were published in 8 volumes till 1969. The majority of the studies were written by the researchers of the Climatological Institute, but place was given in it also to experts of other universities or research institutes. Researchers of the Soviet Union, Poland, the German Democratic Republic, the German Federal Republic, and Japan are interested in the results, and several of Professor WAGNER's studies are even used as teaching material. The international standing of the publication is proved by the fact that in the last volume already studies by foreign researchers were also placed.

The Institute greatly contributes to the foundation of the professional knowledge of the students. Lectures on, and exercises in, astronomical geography, cartography, projective geometry, and climatology have been constant and compulsory subjects in the curriculum since the establishment of the Institute. Students of geography may put themselves down for microclimatology as a recommended special course. Earlier, for a short time the Institute took charge of teaching of biogeography, introduction to geographical science (development and classification of geographical knowledge, history and theory of science), and topography. All the staff members have to do research work at the same time, for in this way theory is of necessity combined with practical activity; they mutually influence each other and as a result the standard of teaching and research is raised.

Summarizing we may say that the University of Szeged has, during its work of a half century, greatly contributed to the results of meteorological research in this country. Using the given possibilities, the Institute endeavored to perform its duty of teaching, connected with geography and the related disciplines. Both the Geographical Institute and the Climatological Institute considered the work of maintenance of the climatic station a very important task and made efforts to use the scientific results of it for clearing research problems concerning the southern part of the A l f ö l d. Till 1944 the Climatological Institute tried to accomplish this great objective on many occasions and in several ways, and it was not the fault of the Institute that the results were not proportional to the work done. Since 1945 the climatological rese-

arches in Szeged, fitted into the national scientific research plan and serving real needs, have cleared several, earlier open, questions. It may be said that the inner endeavours, under favorable conditions, meet fully the demands of life.

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