265284

JPRS 81344

23 July 1982

East Europe Report

SCIENTIFIC AFFAIRS

No. 749

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

Reproduced From
Best Available Copy

20000121 165

FBIS FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

DTIC QUALITY INSPECTED 1

4
34
AØ3

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 81344

23 July 1982

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 749

CONTENTS

NEW RECEIVING TELESCOPE ADAPTERS DEVELOPED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 1, 82
pp 67-73

[Article by Senior Scientific Associate Dr Bogomil Kovachev: "New Receiving Instruments For the Telescopes of the National Astronomical Observatory (NAO) of the BAN [Bulgarian Academy of Sciences] Developed and Applied"]

[Text] In this article we shall discuss three receiving instruments: a Coude spectrograph for the 2-meter telescope, the achromatic Zeeman analyzer for the Coude spectrograph and the stellar electrophotometer for the 60-centimeter telescope.

Before giving a brief description of these apparatus and indicating their basic characteristics, let us mention that the task of developing new light receiving instruments for the observatory's telescopes remains exceptionally relevant. Whereas the optical system of the instruments, once designed, offers specific fixed opportunities for observing light sources, the receivers attached to them are the component in the corresponding registering process which depends most closely on the development of science and technical progress. With considerably more modest funds it can and must be steadily expanded and improved.

Coude Spectrograph For the 2-Meter Telescope

A number of large optical telescopes (usually with a diameter of the principal mirror of close to or more than 1.5 meters) have a fixed (Coude) focus, which is obtained when the concentrating bundle of light from the star is deflected after it has been reflected in the main and the opposite mirrors with the help of an additional deflecting mirror. In this case the light beams progress through the polar axis of the telescope and focus in a premise located under the telescope and the dome area. It is here that a larger spectrograph may be installed permanently (rather than being carried by the telescope as a spectrograph installed on a Cassegrain focus, located behind the main mirror), for photographing spectra with a broader dispersion. For instance, normally a maximal spectral dispersion of stars photographed with it in the order of up to 20 Å/mm is achieved with a universal spectrograph installed on a Cassegrain focus with the 2-meter telescope; with a Coude spectrograph installed on the same telescope it is close to 2 Å/mm, i.e., it is greater by a factor of 10. Consequently, in this case we have the possibility of seeing, singling out and measuring separately a larger number of lines in the stellar spectrum, many of which merge (blend) with a 20 Å/mm dispersion. Naturally, this applies only to the brighter among the stars which can be observed in a Cassegrain focus.

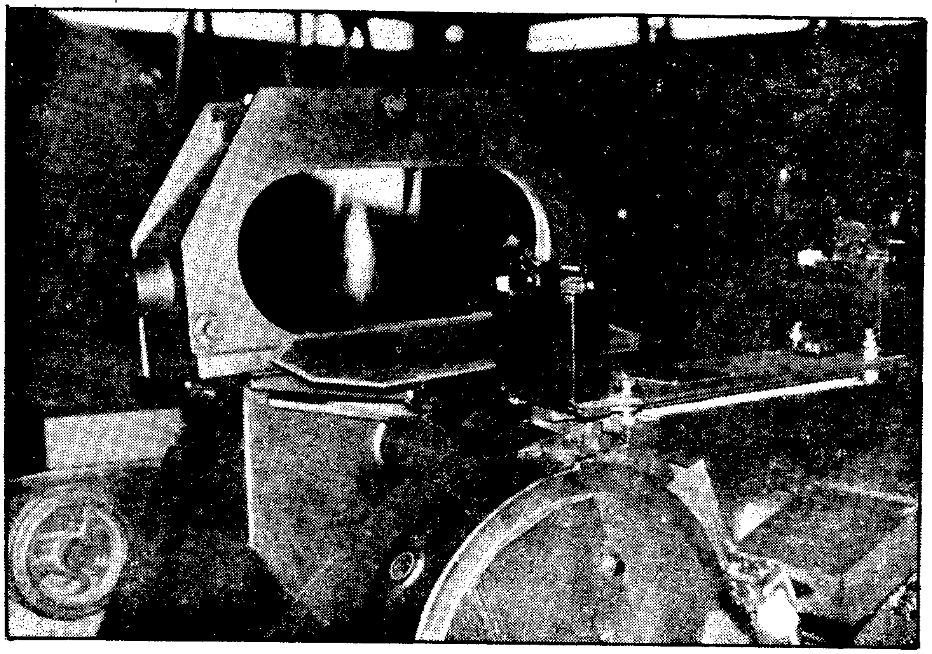
The telescopes with a 2-meter main mirror, which were made at the Karl Zeiss People's Works in Jena before the telescope for the NAO and which are located in the observatories in Tautenburg (GDR), (Onjeiov) (Czechoslovakia) and Shemakha (Azerbaijan SSR) have Coude spectrographs whose diffraction grating is limited by a collimator light bundle 20 cm in diameter.

Our objective was to make the Coude spectrograph of the 2-meter NAO telescope able to make full use of the telescope's optical power. Dr B. Kovachev's design included a collimator with d=20 cm for cameras with respective focal distances of F=875 mm and F=1,900 mm. This made it possible subsequently to place the white light of the collimator bundle in a spectrum of widest possible diffraction grating 306 x 360 cm. The next step was to compute the diffraction gratings which would cover with their spectral intervals and have a maximal light concentration within the given range of the recordable spectral area, from the ultraviolet (approximately 3,200 Å) to the end of the infrared range passing through the atmosphere. The spectrograph's precision slit (with an accuracy of 0.01 mm) and several additional optical-mechanical, electrical and electronic systems are located in the service area, while the collimators, the grating surface and an original structure in which the three cameras, two of which can rotate around an axis and a third which is fixed, operate on the same optical axis, are in a second air-conditioned chamber. Depending on the camera, with a diffraction grating of 632 lines per mm and a correspondingly selected range of concentration of the light (third or second), the instrument provides a dispersion ranging from 2.8 to 18.4 Å/mm.

Skipping technical details, let us merely point out that the Karl Zeiss People's Works in Jena implemented the design perfectly, and that only the spectrograph's diffraction gratings had to be ordered from Leningrad and the Bausch and Lomb Company (United States). In this case, the large holographic gratings were purchased from the Jobin-Ivon Company (France).

In 1979 and 1980 the observatory conducted tests and spectrographic calibrations. Subsequently (mainly in 1981), dozens of high-quality spectrograms of many interesting stars in our galaxy were obtained.

The tests indicated that the NAO has the best Coude spectrograph of all CEMA countries, with which spectrograms of very weak objects are possible. Our calculations indicated that with a 2-hour exposure the image of a Class AO star on the 2" spectrograph opening and density D=0.6, in the 4,000 Å range, with emulsion Kodak 103a-0, stellar spectrograms, from camera 3 with a 2.8 Å/mm dispersion for stars of a magnitude of up to 4.8, to camera 1, with dispersion 18.5 Å/mm, for 9.5 magnitude stars are possible. Borderline values close to the computed ones were obtained in practice. Thus, with camera 2 and dispersion 9 Å/mm we obtained Coude spectrograms of up to 7.4-magnitude stars, which include far more stars than are visible to the naked eye.



Photograph 1. Camera 3 of Coude spectrograph for 2-meter NAO telescope

Now, using the NAO Coude spectrograph, Bulgarian astronomers and many of our foreign collegues invited by the observatory are studying spectral twin stars, variable stars, magnetic stars, hot stars surrounded by gases and gas rings around their equator, metallic stars and others, with the help of a large number of high-quality spectrograms obtained for many of them. This enables us to gather data on the physical conditions and chemical structure of these stars, their radiation spee in space, parameters of orbital elements in spectral twin stars, etc.

The installation of a Zeeman achromic analyzer in November 1981 further expanded the possibilities of this equipment.

Achromatic Zeeman Analyzer For the 2-Meter Telescope Coude Spectrograph

In the course of discussing a plan for bilateral scientific cooperation between our observatories with Dr I. Kopilov, director of the Special Astrophysical Observatory (SAO) with a 6-meter telescope of the USSR Academy of Sciences, I was told by him about the achromatic Zeeman analyzer developed by the SAO. I requested that two analyzers be made, the second for the NAO.

Basically, this is a unit consisting of two Frenel blocks, separated by an Icelandic spar crystal. The light which crosses them splits into right- and left-polarization bundles. The analyzer is placed at the entrance of the rays in front of the Coude spectrograph slit in such a way as to project the two bundles of light on two levels on the slit. Consequently, two instead of one stellar spectra are photographed. If a magnetic field exists in its atmosphere, the spectral lines which are sensitive to it (magnetoactive) divide into Zeeman components along the wavelength. If the magnetic fields are sufficiently strong, the photographing of two spectra with a Zeeman analyzer makes it possible to record on the plate the displacements of the two σ-components of the lines and to rate the value of the component of the magnetic field along the beam of vision.

The duplicate of a Zeeman analyzer, which was designed and built by the SAO, identical to the one installed on the 6-meter telescope, was brought by Dr Yu. V. Glagolevskiy as a gift to our observatory. Assisted by his SAO colleague Engineer I. D. Naydenov and the members of our observatory Engineer T. Shukerski, Candidate of Physical Sciences D. Kolev and T. Tomov, Dr Glagolevskiy installed the equipment on the Coude spectrograph of the 2-meter NAO telescope. The tests conducted at the observatory in November 1981 proved that the equipment was working well and made possible the study of up to 7th-magnitude stars with a dispersion of 9 Å/mm and the use of Kodak IIaO plates. The accuracy of the measurements, which depends on the sharpness of the spectral lines usually ranges from 90 to 600 gauss in the measurement of 30-40 unblended lines. The spectra are processed when the width of the lines does not exceed 0.5 Å. The analyzer makes possible the measurement of spectral lines within the wavelength interval $\lambda\lambda$ from 3,400 to 4,800 Å. If Kodak IIaO plates are used the measurement interval is restricted to the wavelength area between 3,700 and 4,800 Å.

The tests conducted at the NAO with familiar stars indicated a good coordination between the results and the data on their magnetic fields measured at the SAO and observatories elsewhere in the world.

By broadening the sighting possibilities of the 2-meter telescope, the Zeeman analyzer allows Bulgarian astronomers to work in yet another interesting and promising area of contemporary astrophysical research. The 1982 NAO observations program duly includes the study of stellar magnetic fields with the new equipment. A detailed plan for scientific cooperation between the SAO and the NAO in this direction has been formulated. It calls for the observation of magnetic stars with the 6-meter SAO telescope and the 2-meter NAO telescope on a coordinated basis, and the joint processing and interpretation of results. This will also require joint efforts to improve the method and technology used in spectrographic measurements. New magnetic stars will be looked for (currently there are only slightly more than 100, a figure which is too small for purposes of statistical studies). Detailed studies of stars with interesting characteristics of the magnetic field will be made, such as stars whose measured magnetic field varies along the lines of the different chemical elements. The problems to be studied also include the shape of the magnetic field and the angle of inclination of the dipole axis toward the star's rotational axis. The results of such studies are related to the theory of the origin of stellar magnetic fields. Another equally interesting problem is that of determining the relationship between the intensity of the magnetic field and the extent of chemical anomalies in the structure of stellar atmospheres, which is presumed but has not been studied.

The study of magnetic stellar fields with a Zeeman analyzer will be continued at the NAO in 1982 on the basis of multilateral scientific cooperation among socialist countries and on a bilateral basis with the Astronomical Institute of the GDR Academy of Sciences in Potsdam (Dr Jotken's group).

Stellar Electrophotometer for the NAO 60-Centimeter Telescope

Together with astronomical photography and astrospectroscopy, electrophotometry is one of the modern astrophysical methods used in the observation and study of celestial bodies, which enables us to make high-precision measurements of the brightness of cosmic light sources.

The first electrophotometric observations of stars and galaxies in Bulgaria were made by Candidate of Physical Sciences Al. Tomov, who used an electrophotometer he had built himself, with the 60-centimeter telescope of the Belogradchik Observatory. The NAO has a similar 60-centimeter telescope of the Cassegrain system, which was procured especially for this purpose, and which is particularly convenient for electrophotometric observations. It enables us to observe up to 13th-magnitude stars.

In 1980-1981, on the suggestion of Candidate of Physical Sciences K. Panov, a group consisting of K. Panov, Engineer I. Pamukchiev, engineer P. Khristov, D. Petkov, P. Notev and N. Kotsev designed and made at the workshop of the Astronomy Section with NAO a stellar electrophotometer (EF-1) for the NAO 60-centimeter telescope. Let us point out that when the contract for a 2-meter telescope with a dome and attachments for the NAO was signed with the Karl Żeiss Firm in Jena, the German side declined to produce an electrophotometer, citing the difficulty of its manufacturing.

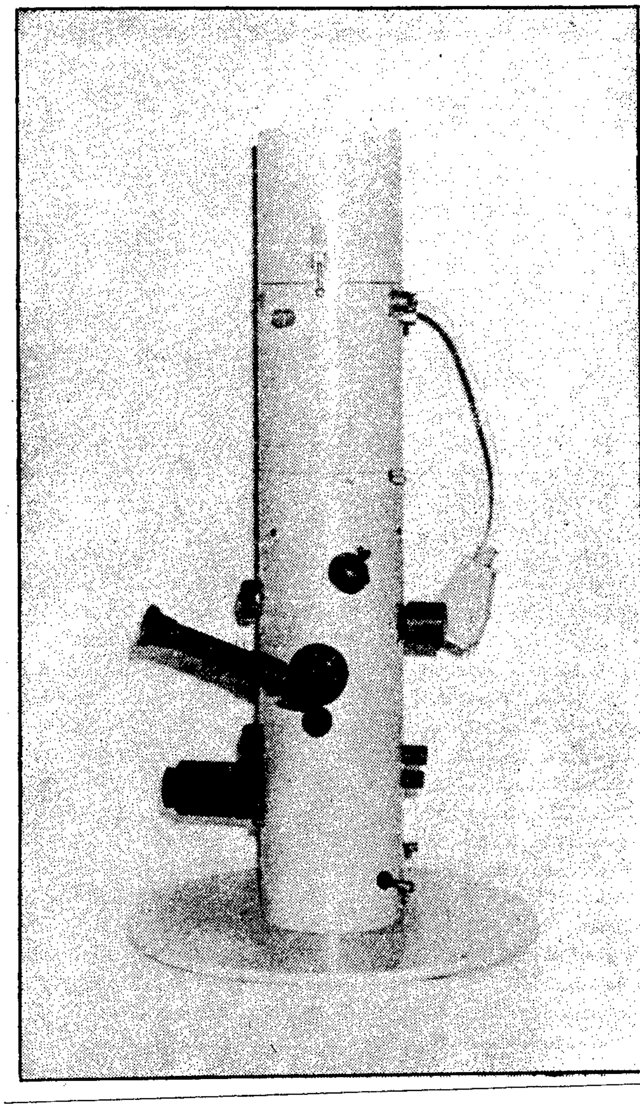
Essentially, the equipment works as follows: the star identified with the help of the sight directs a light through the Fabri quartz lens, reflected by the telescope's optical system, on the photocathode of the photomultiplier (in this case EMI-9789 B). The resulting electrical impulse with amplitudes of several millivolts is intensified, after which it is recorded by the impulse counter and the printer. The recording equipment for the electrophotometer was made in the GDR.

In the course of the observations the source is compared with a standard luminophor and recorded through a set of filters with the help of which specific spectral intervals are photometrically registered.

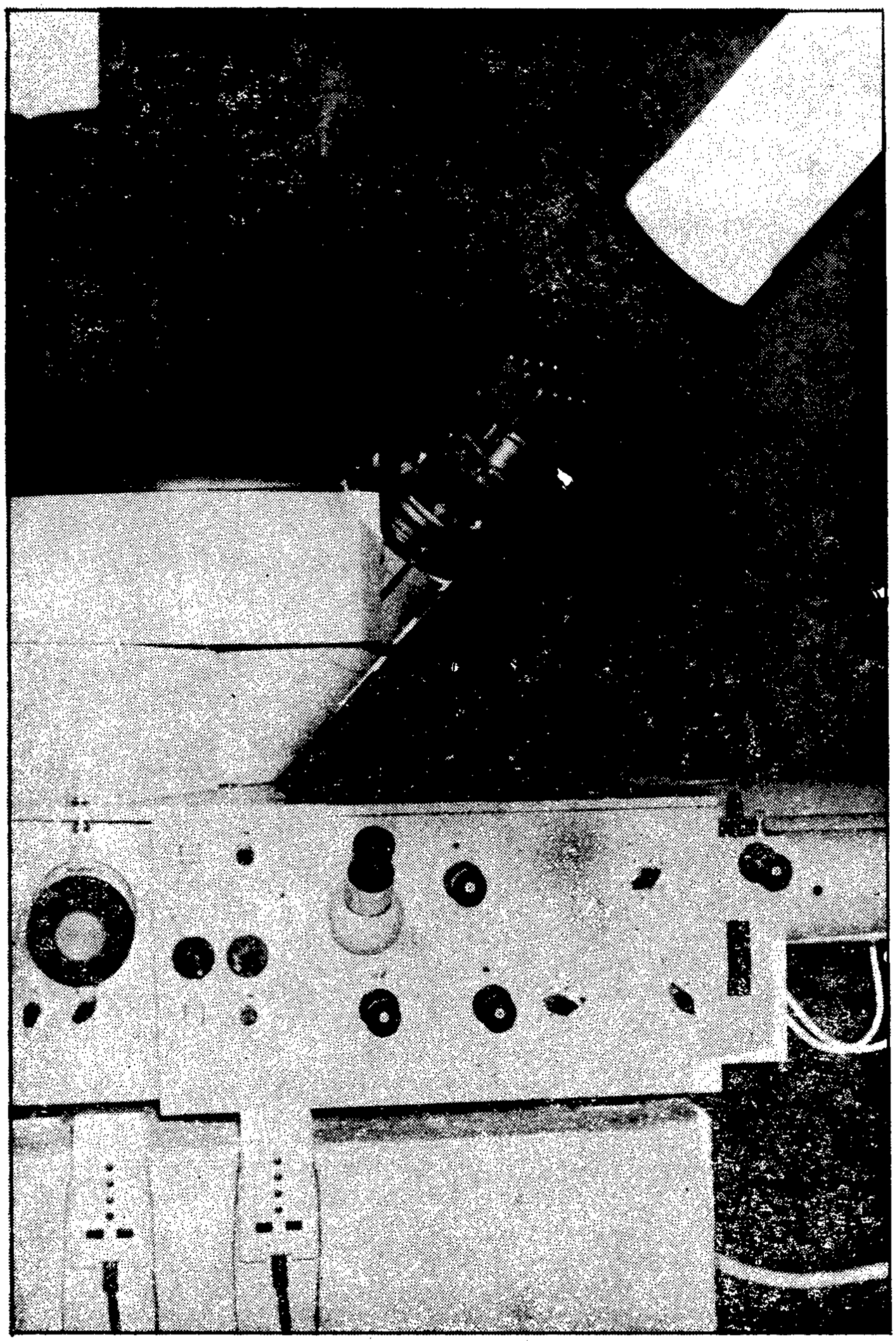
The studies conducted with the NAO electrophotometer in the autumn of 1981 indicated a recording accuracy of 1/5,000ths of the stellar magnitude (discounting the influence of the atmosphere) and under average atmospheric conditions with 10-second integrations and maximal deviations of 2-3/100ths of the stellar magnitude.

The use of the new electrophotometer at the NAO allows independent electrophotometric observations with the 60-centimeter telescope as well as simultaneous electrophotometric (60-centimeter telescope) and spectral observations (2-meter telescope) of the same body. This broadens the range of information of the studied celestial body. It also makes possible the simultaneous electrophotometric observations with the Belogradchik and NAO telescopes. A series of simultaneous electrophotometric observations will be conducted by the NAO and neighboring Greece in 1982.

In concluding this brief report on the new recording equipment for the NAO telescopes, let me mention that our main objective at the initial stage of development of the NAO, which will also remain a permanent task for the future, is to obtain high-quality observation data maximally possible in the area of astrophysical observations with the observatory's telescopes. In astronomy, as in many other sciences, this is the basis for accurate studies and for obtaining new results.



Phot. 3. Stellar electrophotometer for the 60-centimeter NAO telescope



Ph. 2. Zeeman analyzer on a Coude spectrograph of the 2-meter NAO telescope

5003
CSO: 2202/13

NEW RESEARCH, TECHNOLOGY DEVELOPMENTS NOTED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 1, 82
pp 82-84

[Report: "Application Proposals and Applied New Instruments, Materials and Technology"]

[Text] Medium Temperature Catalyst for Carbon Monoxide Conversion With Water Vapor

This development is based on three discoveries made at the Institute of Organic Chemistry With Phytochemical Center of the BAN [Bulgarian Academy of Sciences]: Method for obtaining a catalyst for the conversion of carbon monoxide with water vapor (Registration No 28,662/ 6 January 1975); Method for obtaining a medium temperature catalyst for the conversion of carbon monoxide with water vapor (Registration No 37,080/ 3 June 1977); Method for obtaining promoted iron-chromium acid catalyst for the conversion of carbon monoxide with water vapor (Registration No 52,876/ 10 July 1981).

The inventors are Senior Scientific Associate A. Andreev, Corresponding Member D. Shopov, Scientific Associate B. Kunev, V. Idakiev and A. Bankova. A collective at the Economic Chemical Combine in Vratsa, consisting of Candidate of Technical Sciences Engineer K. Petkov, Engineer G. Khristov and Engineer P. Stefanov, assisted in applying and improving the technology.

A method for obtaining a highly active catalyst for the conversion of carbon monoxide with water vapor, containing small quantities of sulfur in fixed condition, was developed. The catalyst will be used in our nitrogen industry for the production of ammonia gas. Its specifications make it as good as the best products of its kind in the world (such as those produced by Gidler, ICI, etc.). Annual savings from the production of the catalyst alone are estimated at about 300,000 leva. Additional results are expected from reducing the time needed by the catalyst to reach a standard operational regimen. Imports from capitalist countries will be terminated. Possibilities exist of our country specializing in the production of the catalyst within CEMA.

The BAN Organic Chemistry Institute has drafted technological rules and plant standards for the production of the catalyst and is actively participating in the application of this development at the Vratsa Economic Chemical Combine.

Regular production is expected to begin at the end of 1982, following the completion of the catalyst shop at the combine, currently under construction.

Technology For the Production of Glucoamylase

The BAN Institute of Microbiology has developed a method for the production of glucoamylase (Registration No 45,809 of 5 December 1979) invented by Senior Scientific Associate T. Kalinov, Engineer I. Ganchev, A. Vicheva and K. Tsekova. The method became the basis of a technology for the production of a glucoamylase enzyme concentrate containing about 50 percent dry matter and effectiveness of 5,000 u/ml. In terms of activeness the product is as good as any glucoamylase preparation in the world.

The enzyme glucoamylase is effective in the production of glucose in crystal, in sweetening starchy products, alcohol production, the production of special beverages, improving the quality of bread products and others.

The production of glucoamylase enzyme is new to our country. Industrial tests have been completed and the preparation will be produced on a regular basis at the G. Dimitrov Economic Chemical Combine in Botervgrad. It will be used at the Geo Milev Starch and Glucose Combine in Sofia (for the production of glucose in crystals) and the Alcohol Manufacturing Factory in Katunitsa Village, Plovdiv Okrug (for the production of alcohol). Some glucoamylase will be used in the production of the Bodrost diet drink, the manufacturing of bakery products, etc. Savings from the cumulative results of the use of glucoamylase are estimated at more than 600,000 leva annually.

'Betatest ST-140' General-Purpose Testing Stand

The general-purpose Betatest ST-140, used in a wide range of research projects and tests of lead traction batteries, was developed at the BAN Central Laboratory for Electrochemical Power Sources. Its use in plants and research laboratories makes improved plant control quality and faster scientific research and application in the field of lead batteries possible.

The stand is part of the system of instruments and technical facilities for the study of Betatest current. It is also part of the set of testing stands. Betatest ST-140 allows the simultaneous check of six operating cells with a power of up to 400 ampere-hours in different testing systems based on GOST, DIN, BDS and SAE for durability, capacity, recharging, testing in "floating" batteries, efficiency, specific energy features and other battery parameters.

A central processor ensures the use of Betatest ST-140 in various work systems such as galvanostatic (G), potentiostatic (P) and combined (P or PGP), the latter being used for shileding the tested item.

Remote control makes its use in a broad range of other research tests possible.

The Betatest ST-140 general-purpose testing stand has the following technical data: Number of simultaneously tested cells -- 6; control accuracy -- 0.2 percent; minimal charging tension (regulated) -- 14-17 V; operational systems -- manual, automatic and remote control; control system -- G, P, PGP; capacity measurement -- automatic and in percentage figures; power -- 360 ± 10 % 50 Hz; size 1,000 x 1,000 x 2,000 mm; weight -- 240 kg.

Surface Dynamic Compacting of Loess Sinking Soil With a 15-Ton Compactor

A method for compacting sinking ground for construction purposes consistent with local conditions has been developed and applied at the BAN Laboratory for the Geotechnology of Weak Earthen Foundations and Grounds, under the guidance of Prof M. Minkov. Because of the great depth required for effective compacting of the surface (from 3 to 6 m depending on the loess soil) and the low resistance of the compacted areas, this method can be applied in cases of sinking earthen foundations first and second type, with a thickness of the sinking area of up to 10-12 m, which are quite common in the country. The safe distance to existing buildings is 10-20 m. Our equipment allows to raise the compacting weight to 20-25 tons. This increases the depth of the effective compacting and expands the area of application of the method. Instructions on the controlled application of the method will be drafted at the stage of its expanded application. The method is highly scientific. It was applied in countersinking foundation works in the construction of large projects in Ruse Okrug. Excellent possibilities exist to extend the use of this system to construction in areas with widespread loess sinking foundations.

5003
CSO: 2202/13

BRIEFS

LASER-FIBER OPTIC COMMUNICATIONS--The Technical Physics Research Institute of the Hungarian Academy of Sciences [MTA Muszaki Fizikai Kutato Intezet] is conducting research on lasers for communications with good results. Preparations for production of light-conducting optical fibers are underway at the Hungarian Optical Works [MOM]. At the same time the Postal Experimental Institute [Posta Kiserleti Intezet] is concerned with introduction in Hungary of fiber optical communications equipment. The technology for fiber optical communications equipment based on lasers was developed abroad between 1974-1980. Although the Hungarian Post Office does not use lasers, it has been using the new type of PCM transmission with fiber optics successfully for years. It will soon put an experimental network using lasers into operation. This will help domestic research, development, production and utilization close the gap between it and international achievements in the field of fiber optics communications. [Excerpt] [Budapest NEPSZABADSAG in Hungarian 29 Jun 82 p 10]

CSO: 2502/84

POLAR RESEARCH DEVELOPMENTS DESCRIBED

Remote Sensing Methods

Warsaw CZASOPISMO GEOGRAFICZNE in Polish No 4, Oct-Dec 81 pp 379-396

[Article by Kazimierz Furmanczyk, Gdansk University Institute of Geography, and Jacek Jania, Silesian University Institute of Geography: "Remote Sensing Methods in Polar Research"]

[Excerpt] Abstract. This paper attempts to present systematically the development of applications of remote sensing methods (including air and ground photogrammetry) to study the geographical environment of Polar regions. Special attention is paid to a historical review of Polish work in this area. The results of the Polish Antarctic expedition during the 1978-1979 season are stressed. In the expedition to King George Island in the South Shetlands, a multi-spectral camera, mounted on a Mi-2 helicopter, was used to take photographs. This article includes an example of a computer study of these photographs for charting vegetation distribution. The collected and systemized material from the literature as well as the authors' own Polar experiences and research permit the differentiation of the main stages of development of applications of the described methods in the Arctic and Antarctic as well as an evaluation of the state of Polish work in this area.

Introduction

Polar research in the various branches of natural science is affected by the relative inaccessability of the terrain being investigated, difficult or very difficult weather conditions and limited time for scientific exploration because of the lack of sunlight during the Polar winter. The difficulties of Arctic and Antarctic (water) research imposed by nature means that the cost of expeditions and research are very high, and direct terrestrial observation is limited usually to the Polar summer season. But some fields of geography, geophysics and biology require continuous, uninterrupted research throughout the entire year. These investigations are accomplished at permanent research stations operating in summer as well as in winter. Poland has two such stations: on Hornsund Fjord, Spitsbergen Island, in the Arctic Ocean and on Admiral Gulf, King George Island, in Antarctic(land).

An important goal of the tasks undertaken for regional compilation during the Polar summer is to investigate the variability of objects in space and time. Remote sensing methods are modern research tools that overcome the barrier resulting from the severe Polar environment. Remote sensing, based on recording and interpreting information about the natural environment carried by electromagnetic radiation, is defined in various ways. In the Polish literature, Andrzej Swiatkiewicz (1978) offered a good proposal for a comprehensive definition of 'nontactile' research methods. In his view, remote sensing is a group of methods that permit the nature or state of objects and phenomena, as well as their interdependence with the surrounding area, to be determined based on recording the electromagnetic radiation energy of the investigated objects and properly interpreting the recordings. Determining the nature of objects depends on determining their physical-chemical or biological structures, and investigating their state depends on transmitting geometric, topographic, physical or physiological characteristics. Observations via remote sensing methods for earth science needs are done from the decks of spacecrafts or from ground stations. Remote sensing is divided into various divisions depending on the electromagnetic radiation wavelength used or the method of collecting and recording this radiation. Ordinarily the following methods are differentiated: conventional black-white photography; conventional color photography; unconventional photography (infrared, spectro-zonal and multispectral); methods using nonphotographic passive techniques--television, scanner and radiometric as well as active techniques--radar, laser, acoustic (when investigating the sea bottom) and others. All of these pictoral methods of recording radiation emitted from the earth's surface can be and are used in Polar research. The conventional photographic techniques are the most extensively used for the longest time period.

The purpose of this paper is to present the most important stages in the development of applications of remote sensing methods in the exploration of Polar regions with special consideration for Polish research. The authors based their work on the literature, archival charting material and photogrammetric photographs as well as on their own research and observations on Spitsbergen Island and King George Island. The verbal accounts of colleagues are also utilized--members of the Polar Club of the Polish Geographical Society. This article does not consider the problem of using 'nontactile' methods in specific natural science branches because the problems of each of these disciplines would require a separate, extensive and critical study.

Polish Remote Sensing Operations in the Arctic and Antarctic

The application of remote sensing methods in Polish Polar studies for investigating the geographic environment is much more modest than those of such polar and remote sensing potentates as the Soviet Union or the United States. Nonetheless, the Polar expeditions organized in our country used remote research methods from the start to investigate terrain. The second independent Polar expedition, which labored during the summer of 1934 in Torrell Land on Spitsbergen under the direction of Eng Stefan Bernardzikiewicz, included Antoni Rogala-Zawadzki on its team. He conducted the ground photogrammetric operations using a Zeiss C 3b camera with a 13X18 format and a 193.42 mm lens. Maj Stanislaw Zagrajski conducted the triangulation measurements. The photogrammetric station was fixed by reverse intersection, base lengths were measured parallactically, and for base lengths greater than 300 m both stations were fixed trigonometrically. Also, 70 control points were surveyed using the intersection method. Altogether photographs from 22 stations were taken which provided 56 sterograms encompassing an area of almost 350 km^2 [Zawadzki, 1934]. For glaciological, geomorphological and geological observations, 148 individual photographs were also taken. All ground operations were accomplished from June to September. These materials were studied at the WIG [Military Geographic Institute]. In 1935 the WIG published a 1:50,000 scale, two-color map of the terrain explored by the expedition [Zawadzki, 1936].

During the 1937 expedition to Western Greenland, directed by Dr Aleksander Kosiba, Maj Antoni R. Zawadzki busied himself with the photogrammetric and triangulation operations. He took 226 ground photographs from 9 stations and 262 individual photographs for special investigations. During the expedition an area of about 300 km^2 in the region of the eastern edge of Arfersiofik Fjord was mapped. Repeat photographs were taken from those same stations to observe the dynamics of the changes occurring on the surfaces of a continental glacier as a result of ablation. In some cases, six photographs were taken of the same phenomenon at weekly intervals. The tempo of geomorphological processes in the fjord's shore zone was investigated in a similar way. The geodetic measurements and photogrammetric materials were sufficient to draw up a primary map on a scale of 1:50,000 and detailed maps of terrain fragments encompassed by the searching investigations (on a scale of 1:2,500 and 1:20,000) [Zawadzki, 1938]. The photogrammetric work of the 1937 Greenland expedition is an example of a useful application of a remote sensing method to resolve specific glaciological, geomorphological and other problems.

The next operation using this method was conducted during the Polish expeditions to Spitsbergen during the summers of 1957-1959 that were directed by Doc Stanislaw Siedlecki within the framework of the Third International Geophysical Year. The photogrammetric work was executed by Eng Cezary Lipert, and the geodetic network measurements were taken by Dr J. Fellmann, Eng J. Staszel and Eng M. Gasienica. A detailed 1:5,000 scale topographic map based on photogrammetric photographs of the head zone of the Werenskiold Glacier was developed [Lipert and others, 1961]. Just as in the prewar expeditions, in addition to photographs for a primary map, smaller fragments of the terrain were also photographed for special research needs. Am important goal of these glaciological studies was to determine the rate of recession of the glaciers around Hornsund Fjord [Lipert, 1960]. A station to systematically photograph the Hans Glacier near the Polish Polar station on Polar Bear Bay was permanently fixed in 1957. Repeat photographs were taken from these stations in 1958 and 1959. The state of the heads of Horn and Torell Glaciers were similarly recorded. In addition, the circus area of Penck Glacier was remapped [Lipert, 1981]. These studies were the greatest Polish photogrammetric project in the Arctic after World War II. The photographic materials were used not only for topographic mapping but also as an aid in many glaciological, geomorphological and geological studies. To this day they represent invaluable comparison material for further research of South Spitsbergen Island, similar to the results of the Polish studies in 1934 and the German research on Sorkappland [Pillewizer, 1939]. Lately an attempt has been made to develop more completely the 1959 photogrammetric material on the head of Hornsund Glaciers to obtain information concerning the fluctuations of these glaciers. The Norwegian aerial photographs taken in 1978 are also being used [Jania, Kolondra, Lipert, 1981].

Regarding other Polish Polar photogrammetric studies, the participation of Eng T. Konysz in the 1968 expedition of the Polish Geographic Society to Iceland should be mentioned. The foreland of Skeidararjokull Glacier was charted to a 1:5,000 scale with the aid of photographs taken by a Zeiss Photheo 19/1318 phototheodolite [Linsenbarth, 1974].

In the framework of the reactivated expeditions to Spitsbergen, organized by Wroclaw University under the direction of Dr Stanislaw Baranowski, the photogrammetric studies of the head of Werenskiold Glacier were repeated (a 1:10,000 scale unpublished map) and measurements of the head of the Hans Glacier were repeated.

Eng Zbigniew Mechlinski, a photogramist, participated in the 1978 expedition of PAN [Polish Academy of Sciences], the goal of which was to reconstruct and reactivate permanent scientific activity at the Polish Spitsbergen station in the Hornsund region. He executed a series of photogrammetric charts of the head zone of Werenskiold Glacier which were used to develop a 1:5,000 scale map [Mechlinski, 1979].

In that same year, the Second Polar Expedition of Silesian University operated on the southern shore of Hornsund Fjord. Ground based remote sensing operations were conducted there to analyze the forms and processes on the periglacial slopes in the Gasdalen region and the processes shaping the surface of Nordfall Glacier [Jania, 1979]. The photogrammetric photographs were executed with a Photheo 19/1318 camera on the basis of which large-scale 1:5,000 cartographic bases were developed. From these same stations a series of photographs were taken at 2-week intervals with a Kiev 80 camera having a 6X6 cm format with replaceable cassettes on film. Panchromatic, color-reverable and near infrared photographs were taken. Stereoscopic, repeated ground-based photographs of test fragments of the slope and glacier enabled typical forms on the slopes to be defined and the dynamics of some slope processes to be observed. The use of infrared sensitive film made it easier to determine the role of increased humidification of slope coverings in modeling the investigated periglacial slopes [Jania, 1979b, 1981].

In the following year, during the PAN expedition to Spitsbergen, geodetic and photogrammetric measurements were taken in the area near the Polish station on Hornsund (Dr Witold Mizerski), and in the summer of 1980 photogrammetric photographs were taken of the heads of Hans and Horns Glaciers [Dabrowski, Mroczek, 1981].

In addition to the above-mentioned studies, there is much interest on the part of Polish geologists, geomorphologists and other specialized naturalists in the terrain and in the field of interpretation of the Norwegian panchromatic aerial photographs of Spitsbergen (for example, Sendobry, Sinkiewicz, 1979; Andrzejewski, Stankowski, 1981; Marks, 1981], and earlier in the Iceland region [Klimek, 1972; Churski, 1974]. Interest is also increasing in the use of radar techniques to determine the thickness of glaciers. Polish glaciological work in the Hornsund region is being aided by Soviet radar cross-section work being done with helicopters [Moczeret, Zurawlow, 1980], and at the same time interesting tests are being conducted on the Hans and Werenskiold Glaciers using a ground-based radar with great success [Czajkowski, 1980, 1981].

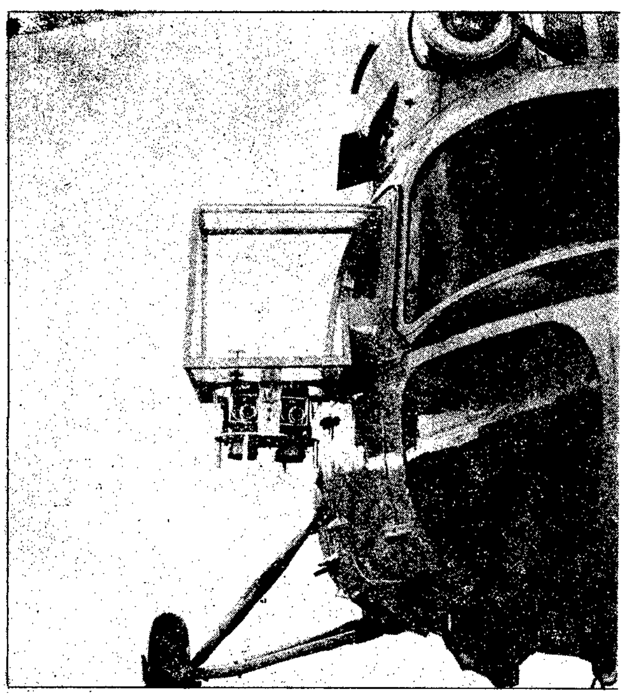


Figure 1. A Mi-2 helicopter with a multi-spectral MSK 4/6.6-1UG camera at the H. Arctowski Polar station.

In Polish Arctic research, a material limitation in the use of remote sensing methods is the lack of airborne equipment and also the difficulties of obtaining in Poland aerial photographs of Spitsbergen and other areas visited by our expedition.

A receiver of meteorological satellite images was installed at the Polish H. Arctowski Antarctic station on King George Island during the 1977/1978 Second PAN Antarctic Expedition. The pictures taken by Krzysztof Zubka from January through March 1976 from the NOAA-5 Meteor-22 and Meteor-23 satellites were studied from the viewpoint of observing the effect of the orography of the South Shetlands and Graham Land on cloudiness. The results of the study were reported in a paper presented at the Seventh Polar Symposium [Boniewicz, Kumoch, Zubek, 1980]. During the 1978/1979 season the reception was supervised by Leszek Kumoch [Rakusa-Suszczewski, 1979]. They were used immediately for synoptic purposes and after being interpreted in Poland they were used for climatic and actinometric analyses.

The two 1978/1979 PAN Antarctic Expeditions were of historical significance. For the first time in the history of Polish Polar research, helicopters were used and pictures of King George Island and Bunger's Oasis were taken from the helicopters. Eng Zbigniew Battke took aerial photographs at the A. B. Dobrowolski Station, Bunger's Oasis. He operated an AFA BAAF 21S nonphotogrammetric camera having a 210-mm focus and a 13X18 negative format that was installed on a Mi-2 helicopter. Photographs were taken of the marginal zones of Antarctic's continental glacier in contact with Bunger's Oasis and of the immediate surroundings of the station. In addition, a proper structure for the photopoints was established [Cisak, 1980]. As a result of this research, a 1:5,000 scale map of the region near the A.B. Dobrowolski Station as well as a 1:5,000 scale photosketch of all the photographed regions were developed. They will be used, among other things, to investigate the dynamics of the continental glacier's marginal zones; in addition a comparison of the Polish studies with the aerial photographs taken in 1956 by the Soviet expedition is planned [Battke, 1980].

During the third PAN expedition, directed by Doc Stanislaw Rakusa-Suszczewski at the H. Arctowski Station, aerial photographs were taken from two Mi-2 helicopters. The first Polish aerial photographs of the Antarctic region were taken 14 December 1978. Franciszek Wozniak took pictures of the Admiral Bay region and of a small, volcanic islet of Penguin Island for the PAN Insitute of Ecology using AFA BAAF 21S and AFA 39 camera. Photosketches were prepared by many groups of biology and earth science specialists [Rakusa-Suszczewski, 1979]. Dr Dazimierz Furmanczyk took multi-spectral, color, panchromatic vertical and oblique aerial photographs to prepare interpretational thematic maps of the ocean and land environments and to locate selected types of flora and fauna in the Admiral Bay region [Furmanczyk, 1979]. The multi-spectral photographs were taken with a MSK 4/6.6 1UG multispectral camera constructed at Gdansk University from four Kiev-80 cameras having a 6X6 cm photograph format, replaceable cassettes and objective lenses of 45, 90 and 250 mm. Detail descriptions of the cameras, utilized filters and films and photointerpreting work conducted at the H. Arctowski Station are presented in a separate report [Furmanczyk, 1981]. The panchromatic and

Figure 2. Aerial photograph of the H. Arctowski Station (King George Island) made with a multi-spectral camera in band 1--red (February 1979)

color film slides were taken with Pentacon Six TL and Practica LLC cameras. In combination with a U.S. navigation map, these photographs permitted the recording of changes in the locations of the present glacial shorelines relative to their locations about 20 years earlier and the preparation at Gdansk University of a 1:25,000 scale situational sketch of the entire Admiral Bay region that takes into account the indentations of the structure points taken during the first expedition in 1976/1977 by Dr Kazimierz Fedak [Furmanczyk, Marsz, 1980]. These photographs were also used to interpret the distribution of macro-algi in the shoreline zone, to localize bird breeding colonies, to localize concentrations of elephant seals, to determine the extent of vegetation distribution and to localize the outflow of fresh water into the bay and changes in its surface area. Some of the results of these studies have been published [Furmanczyk, 1979, 1980, 1981; Rakusa-Suszczewski, 1979], and others are in the process of compilation. Figure 2 is an example of one of the multi-spectral photographs of the area around the H. Arctowski Station. A Gdansk University computer with specially composed programs was used to interpret this photograph. The photograph was converted into a digital form having 0.2X0.25 mm elementary fields (pixies) using a CSPO-01 digital image scanning converter which also was built at this university. Figure 3 shows the results of this interpretation in the form of a digital thematic map. The fact should be emphasized that this is the first map of its kind developed from Polish aerial photographs using Polish equipment and Polish computer programs. It was prepared in the fall of 1979.

[see Figure 3, next page]

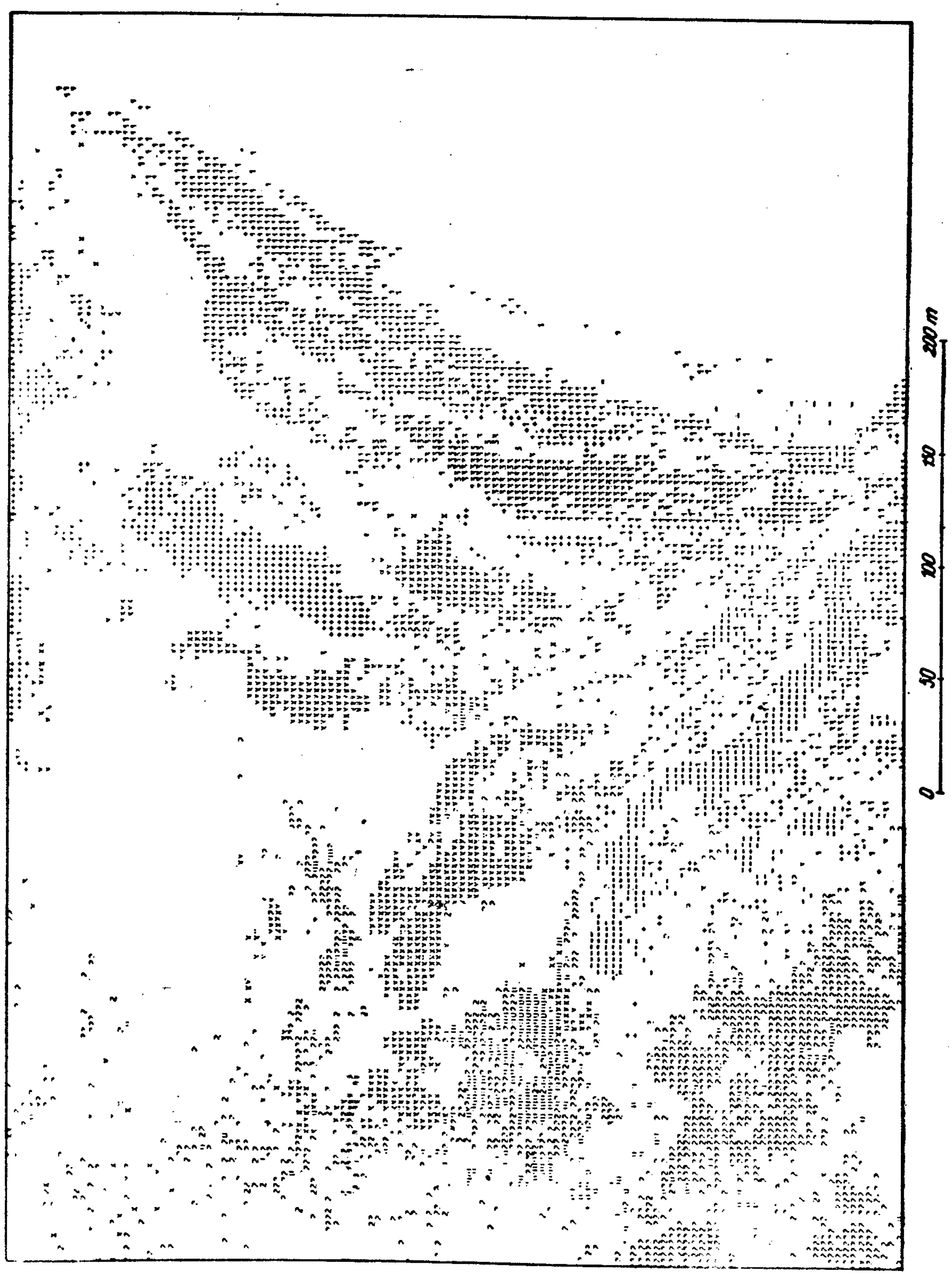


Figure 3. Digital thematic map of vegetation distribution in the area near the H. Arctowski Station that was made in the autumn of 1979 by way of computer analysis of multi-spectral photographs using the Odra 1204 computer at Gdansk University.

According to the expedition report [Rakusa-Suszczewski, 1979], all the aerial photographs were helpful to Doc Andrzej Marsz [1979] in studying the typology of the seashores to prepare a 1:25,000 scale navigation map, which is a supplement to the U.S. map. During this same expedition, Dr Jacek Piasecki conducted glaciological research using a Photheo 19/1318 camera. It was the Polish expeditions in which remote sensing methods were first used to analyze so many elements of the geographic environment.

Conclusions

1. Remote sensing methods were used by the Polar countries somewhat earlier in comparison with their wide use in Europe and America. In particular, photogrammetric methods were verified earlier in the Polar regions in a satisfactory way. It can even be stated that Polar exploration was the stimulus for developing some remote sensing methods.

2. In the development of applications of remote sensing methods to research Polar regions, several periods can be differentiated:

--the earliest period (the beginning of the 20th century) in which the use of ground-based photogrammetry to chart the Arctic and Antarctic predominated;

--the period starting with the initial use of aircraft for photogrammetric charting (the detection and charting of large areas of the Arctic and Antarctic);

--the period wherein only aircraft are used to take black-white, color and multi-spectral aerial photographs; and

--the period in which the use of non-photographic image recording from aircraft and satellites was initiated (the 1960's).

3. The use of remote environment research methods in Polar research activities evolved through stages similar to those described above but with delays and limitations resulting from the lack of technical resources, especially airborne equipment. However, it should be remembered that Polish studies in the 1930's concerning Spitsbergen and Greenland resulted in some of the first detailed photogrammetric photographs of these regions.

4. Remote sensing methods are a very economical method for Polar investigations and permit comprehensive investigations of relatively large areas in a short time period, and compiling the results takes place in Poland under laboratory conditions after the expedition returns.

5. A certain disproportion still exists between the modest use of remote sensing methods and the scale of the research problem resolved by the Polish expeditions. It appears that it is necessary to revise research plans to include the more extensive use of remote sensing methods, which are an excellent and essential compliment for most terrestrial research.

Arctic Minerals, Fishing Claims

Warsaw RZECZPOSPOLITA in Polish 13 May 82 p 4

[Article: "Research Among the Polar Ices"]

[Text] Poland has been conducting Polar research for many years. And despite difficult economic conditions, we will continue these investigations although, of course, on a smaller scale in accordance with our capabilities. This is the only way we can maintain our present and future advantages, scientific and economic, that result from a presence in that part of the world.

Polish fishermen have been fishing in Antarctic fisheries since 1977, and in the future there is the possibility that valuable mineral resources, especially crude oil and gas, will be discovered in this area as well as in the Spitsbergen region.

In accordance with international conventions, only those countries actively participating in scientific Polar research have the right to eventually benefit from expected discoveries. The first political conference on this theme was held in 1980 at which the Polish delegation emphasized our right to share in the benefits brought about by discoveries of deposits, for example, crude oil. We have full rights as a result of our many years of active scientific work. The situation regarding the exploitation of Arctic fisheries looks the same.

Our country is a signatory to the Treaty on Antarctic Affairs, and in 1977 we became a member of a group of nations--The Consulting Countries for the Treaty--representing an international body making decisions on shaping the future of Antarctic(water) and its surrounding seas (up to 60° latitude south). One year later the PAN [Polish Academy of Sciences] became a member of SCAR (Special Committee for Antarctic Research), an organization directing and coordinating the scientific activities in the Antarctic area of all the member countries.

For over 90 years, Polish interest in the Arctic was traditionally limited to Spitsbergen. Now we are conducting research in the Greenland and Barents Seas. In the region's Spitsbergen shelf there is a promise of hydrocarbons (crude oil or gas), where future exploitation could be a subject of interest to companies with Poland's participation.

Poland is working closely with other countries in the area of Polar research, especially with the Soviet Union. Both our countries are the only nations from the socialist camp participating in the treaty on Antarctic research affairs.

The PAN has prepared a more modest Polar research program for the next several years up to 1985 than for previous years. As we mentioned, this is linked to our economic difficulties. However, operations at the Arctowski station on Antarctic(land) and on Hornsund, Spitsbergen Island, will continue. We also will take part in the international program for polar oceans research.

11899
CSO: 2606/19

CRISIS IN COMPUTER APPLICATION DESCRIBED

Warsaw INFORMATYKA in Polish No 1, Jan 82 pp 4-6

[Article by Tadeusz Walczak, Main Office of Statistics, Warsaw: "Information Science in a Period of Changes"]

[Text] The current critical situation in Polish computer technology has arisen owing to various factors stemming from both inside and outside the computer industry. The correct identification of its causes is, for obvious reasons, of basic importance not only to correct diagnosis of the existing situation but also--and perhaps primarily--to the determination of future directions and prospects.

The present article will chiefly deal with computer applications, although it is obvious that problems of application cannot be considered in isolation from other aspects of the subject, and especially from the production and operation of hardware, qualifications of personnel, or materials supply.

The symptons of the growing crisis in computers are chiefly the declining rate of the installation of new computers, the curtailment of computer exports, the absence of progress in the utilization of equipment, and the stagnation in the employment of computer experts. Some of these aspects are illustrated in Table 1.

Table 1.

	YEAR					
	1975	1976	1977	1978	1979	1980
Number of large and medium computers	514	623	708	756	812	857
Percentage increase over preceding year	--	21.2	13.6	6.8	7.4	5.5
Number of minicomputers	430	924	1,182	1,336	1,470	1,776
Percentage increase over preceding year	--	114.9	27.9	13.0	10.0	20.8

Employment in computer centers [thousands]	41.3	47.1	51.0	56.2	56.9	57.1
Percentage increase over preceding year	--	14.0	8.4	10.1	1.3	0.0

Beginning in 1977 a marked decline in the number of new computer installations can be observed. To be sure, this number continued to increase in absolute figures, but this has been accompanied by aging of the computer pool. This is clearly seen from the figures on the percentile structure of (large and medium) computers by age (Table 2). Assuming that computers should be withdrawn from operation after about 8 years, recently the deliveries of new computers did not even offset the number of those withdrawn from operation. For example, the difference between the number of new computers installed in a given year and the number of computers in use for 9 and more years was (in minus terms) -57 computers in 1978, -77 in 1979, and -135 in 1980. Actually then, even the natural depreciation of the computer pool was not offset.

For several years as well there has been no progress in the utilization of computers. Table 3 shows the utilization of computers measured in terms of their operating time (on bearing in mind the conditional nature of this indicator). As can be seen from the data in this table, large and medium computers have on the average been utilized for an amount of time equal to less than two work-shifts daily, and minicomputers--less than one work-shift daily. These data comprise the total operating time, that is, the so-called network-hookup time, which includes both production time (inclusive of maintenance) and down-time (due to technical or organizational reasons.)

Table 2.

	Year		
Age of Computers	1978	1979	1980
1-3 years	30.3	21.6	18.3
4-5 years	31.7	29.8	22.8
6-8 years	24.0	32.1	37.9
9-10 years	8.3	9.0	11.1
11-15 years	5.0	6.9	9.2

Table 3. Overall Operating Time of Computers, in hours per work day

	Year			
	1977	1978	1979	1980
Large and medium computers	13.2	13.1	13.3	13.1
Minicomputers	6.0	6.5	6.4	6.3

The division of overall time into actual operating time and down-time in hours per work day is shown in Table 4.

Table 4.

	Year			
	1977	1978	1979	1980
Large and medium computers:				
--Operating time	10.6	11.0	11.1	10.9
--Down-time	2.6	2.1	2.2	2.2
Minicomputers:				
--Operating time	3.4	4.4	4.4	4.3
--Down-time	2.6	2.1	2.0	2.0

The above figures point to an increasingly unsatisfactory situation in the field of computers and their applications, which even now causes a deterioration in the quality of the computer service and is a foretaste of still greater problems to come. The unfavorable aspects also include problems in complementing final computer assemblies, which are keenly felt by the computer centers. The domestic industry is implementing consistently and successfully a monopoly dictate forcing users to accept not what they need but what is convenient and profitable to the producers. This results in the use of incomplete and internally unbalanced--from the standpoint of computing capacity--computer configurations which make it impossible to utilize the capacities of multi-program operation and activate more advanced processing programs or systems utilizing a common database.

The situation with regard to the supply of software to computer centers is very difficult. This applies chiefly to line printers, color tapes for printout equipment, and all kinds of data carriers. In many cases the critical supply situation of the computer centers causes equipment down-time and the failure of the centers to fulfill their contractual obligations to customers.

An even more alarming problem than that of the stagnation described above is the increasing crisis of public confidence in computer science. This crisis, difficult to assess by means of quantitative indicators, is chiefly expressed in the disappointment of users with the results of computer applications and in the conviction of computer experts that their efforts are not producing the expected social and economic results, since the information provided to users is not being effectively utilized.

In computer technology, in particular, there exists a disproportion between the tremendous potential of the equipment, the ability to perform millions of operations per second and to remember an unlimited amount of information, which so stirs the human imagination, on the one hand, and the data-processing practice, on the other. This disproportion is often used as an argument against computerization. If, however, this problem is approached without bias, it turns out in a large majority of cases that the information on the capabilities of computers (as expressed in terms of technical parameters) is not exaggerated at all, and that the failures of application stem from mistakes in the selection of computers or their configurations, or from failure to provide the right conditions for the proper utilization of computers.

Users often forget that the acquisition of a computer is only part of the investment needed to modernize an information system. A much more difficult and often as costly part is to provide the proper conditions for its utilization. A user could avoid many difficulties and disappointments if he were to formulate in advance as accurately as possible the principal purposes and tasks for which he is acquiring a computer.

Computers used in management usually are expected to accomplish two principal purposes. The first is to increase the operating efficiency of the data processing system and to obtain information at lower cost. But the second is that, owing to the application of computer technology, the user should improve his basic performance (reduction of production cost, improvement in quality of products).

The degree to which the first purpose is achieved may be termed the efficiency [English term used] of computer technology. The criterion for achieving the second purpose is termed effectiveness [English term used]. For most cases of application both these purposes are accomplished at the same time. An efficient system is at the same time effective. For it has to be assumed that the data processing system, which is a function of the management system, fulfills its tasks in accordance with the principal purposes of the organizational unit which it serves. It may happen, however, that a data processing system is effective without meeting the criteria of efficiency. By way of an example, computerized airline booking systems or bank savings account monitoring systems may have a low efficiency as expressed in terms of utilization of discrete computer accessories, but the effectiveness of these systems, as expressed in better utilization of vacancies, curtailment of idle flights, better customer service, reduction of public losses of time on waiting in lines, improved customer relations, etc., can be high.

Sometimes, unfortunately, what happens is the other way around: an extremely well utilized, that is, efficient data processing system may be ineffective. A user's failure to utilize, or improper utilization of, the data provided by that system is besides one of the main reproaches addressed by computer experts toward data users.

The acquisition of the needed data within the time period required is a major requirement for efficient management of socio-economic activities at different levels of management. But it is not the only requirement. What is also needed is that the management of organizational units adopt decisions correcting the deviations indicated by the received information and optimally implement the basic tasks of the organizational unit. Otherwise, even an optimally functioning information system will not enhance the effectiveness of management and will not justify its financing.

The inaugural issue of the periodical MASZYNY MATEMATYCZNE (previous title of INFORMATYKA) in 1965 contained an article dealing with the computerization of a planning system for the supply of motor vehicle spare parts. Readers were particularly attracted to a photograph of empty store shelves captioned: "Empty shelves in Motozby [Motor Vehicle Spare Parts Sales Organization] stores. We do not promise that by 1966 all spare parts will be available, but at least it is known for which parts will there be a demand."*

This example from some 17 years ago, as compared with our present-day appraisal of the improvement in the supply of motor vehicle spare parts, may serve to illustrate the aforementioned thesis that even an extremely efficient information system may prove ineffective unless the economic and social factors assuring effective decisionmaking and response to the situations signaled by the information system are geared to it.

Economic Reform--The Chances for Computers

In accordance with the assumptions of the Reform, the principal task of the changes to be introduced is to translate into reality those principles and that operating mechanism of our economy which would assure its high social effectiveness.** This means restoring the importance of economical management and a cost effective approach to every field of management, both on the scale of the enterprises and on that of the entire national economy.

Analogous requirements of effectiveness must be satisfied by measures taken in the field of computers. This will certainly lead to:

--Performing a critical analysis of the so-called large computerized-information systems on provincial and national scale, which should be closely linked to the hitherto mandatory distribution-orders system of management. Most probably, some of these systems will prove dispensable or too costly in terms of the effects of their operation and will have to be eliminated (without any great loss to society and to computer science). For most of these systems so far, only outlays have been made on research and design, but even so in many cases these outlays have been substantial.

*Jan Przybylski, "Automation of Behamot Planning," MASZYNY MATEMATYCZNE, No 1, 1965, pp 18-20.

**"Kierunki reformy gospodarczej, projekt" [Directions of Economic Reform; Draft], published by TRYBUNA LUDU, Warsaw, July 1981, p 8.

--A reassessment of the purposes and functions of computer applications in enterprises. It is no secret that in the past in many cases computers were utilized not to meet the needs of enterprises but for other reasons among which a direct factor was the aforementioned misjudged belief that "the computer can do anything" as well as the fears of enterprise managers that they might be accused of obstructing progress, pressures exerted by higher-level units, the use of research and development funds to sponsor the expenditures on computers, and pressures to limit employment exerted by elements of enterprise governing-boards combined with the absence of restrictions on EPD [electronic data processing] expenditures.

The factors mentioned above will most likely result in a temporary decrease in the demand for computers. This will apply in particular to those "thought-up" applications and systems which were constructed to satisfy the inflated ambitions of the authorities and of the information experts fawning upon them rather than to meet the needs of the economy and society. At the same time, the Reform will activate instruments accelerating the directions of action whose implementation logically requires the application of computer technology.

The basic operating principles of enterprises following the economic reform, that is, the autonomy and self-government of enterprises, as manifesting themselves in, among other things, the responsibility of the enterprise's self-government and management for the effects of the decisions taken, will confront enterprises with the inexorable requirements of cost effective management. This will necessitate organizing a reliable and efficient system of internal information. Such a system must assure an operative accounting of inventories and resources, monitoring of co-production agreements and their implementation, calculations of input and output, and the provision of the necessary market information assuring the maintenance of the types and assortment of production geared to the expectations and needs of the customers for the enterprise's products. It appears hardly likely that such an information system could be organized without using computers, especially at the larger enterprises.

A radical increase in the autonomy of enterprises and the curtailment--and where needed, elimination--or directive-type tasks and administrative distribution of resources do not signify dispensing with the need for a centralized adoption of important social decisions in the future. Such decisions must especially pertain to: programs for national development (especially the rate and basic proportions of development), the generation and division of national income, employment policies, incomes and prices, investment activities, housing construction, or economic cooperation with foreign countries. To make possible this centralized steering of the economy, an appropriate data transmission system for transmitting data from the basic economic units to the central-level units must be set up. In this connection, the collection, conversion, and provision of these data will necessitate using appropriate computer systems and data-communications systems.

Another argument in favor of the broad use of computers in these systems is the need to organize direct data flow from the enterprises (for example, through the mediation of state statistical agencies) in connection with the elimination or revision of functions of the intermediate levels of management (associations) which at present participate in the process of the collection and processing of data transmitted from enterprises to the central level.

There will doubtlessly also occur an increase in the demand of banks for information computer services, in connection with the changes in and broadening of their tasks in the operating system of the economy.

In addition, the applications of computers to consumer service systems should gain markedly in importance. This concerns in particular the postal and telecommunication services, ticket reservations and sales in road, rail, and air transport, loan and financial services, and communal services.

To sum up, following some decline in the demand for computer services owing to the general crisis and the failure of certain previous concepts of computer application, a gradual increase in demand for computer services is to be expected. But in order to make it happen, it is necessary to meet a number of methodological and technical conditions in computer science itself as well as in certain fields of the economy that work for or are closely linked to computer science. This concerns chiefly the removal of barriers which in the past had often--irrespective of objective circumstances unfavorable to an effective utilization of computers--discouraged users from resorting to computers.

--Computer experts must cease regarding computerization as an end in itself and begin to treat it as a method and a means of accomplishing purposes which should be formulated by the users themselves. Hence too a prerequisite for designing and operating an efficient information system that would at the same time satisfy the criterion of effectiveness, as reflected in the streamlining of management and improvements in the performance of organizations, is the active cooperation of data users in the design and introduction of computer systems. In practice, this work is too often entrusted to computer experts without adequate participation or monitoring by information users. Under such conditions, computer experts tend to devise excessively complex systems geared more to the requirements of data processing technology than to the needs of users, while systems users become too dependent on the computerized system and at the same time have no voice in improving it. The users of data needed for management, that is, heads of data departments and elements at all levels, must acquire the ability to find a common language with data systems designers and other experts engaged in the process of preparing the data needed for management. The point is not that data users should penetrate in too much detail into the mysteries of the operation of computer equipment or of programming techniques. Problems of this kind must continue to lie in the domain of experts. But users must learn to understand the language of these experts and rid themselves of the complex of the supposed inaccessibility of computer science and, when needed, to suggest solutions adequate to their computerization needs.

To this end it is necessary to steadily improve knowledge about computers among current and potential computer users, that is, among the broad community of managers, members of workers' self-governments, students at higher schools of economics and engineering, and teachers who influence the education of the rising generation of specialists in many fields.

--Computer experts should make a greater effort to understand the actual needs of users and propose the application of computers in fields in which their correct functioning is of the greatest importance to users and in which the positive effects of the application can manifest themselves most rapidly and convincingly. This should mean, among other things, the need to introduce data systems that streamline data circulation within the enterprise and assure improved monitoring of the utilization of resources, combatting losses and poor management, or streamlining of employment.

--Computer industry must abandon the position of a monopoly industry which supplies users with hardware and software in the quantity and variety meeting its own needs and requirements rather than those of users, and instead it should adapt itself to meeting the wishes, needs, and possibilities of users. Unless radical changes are made in this respect, all the plans for streamlining and increasing the effectiveness of computers will remain unrealistic.

--There is a need for a fundamental improvement in the quality and reliability of the hardware and software supplied, as well as for increasing the supplier's responsibility for their proper operation. One form of protecting users against poor quality of hardware should be the broad introduction of the equipment leasing principle as well as the linkage of the leasing fees to the actual performance of the leased equipment.

1386
CSO: 2602/21

END