Lectures and Review Articles Presented at the
Scientific Session of the Intercosmos
Council of the Hungarian
Academy of Sciences

Gyorgy Benko, ed.

Translation of Magyar urkutatis 1981-1985. MTA Interkozmosz
Tanacs tudomanyos ulessonaknak eloadasai es beszamolo
Foreword and table of contents of the book are given. This monograph presents an overview of Hungarian space research from 1981-1985. Topics discussed in the original report include the development of space research centers, the flight of the first Hungarian astronaut, Hungarian participation in international space programs such as the VEGA/Halley's Comet mission and the BEALUCA materials science experiment, advances in astronomical research and activities of the Cosmic Geodetic Observatory. Other topics discussed include space biomedical studies, meteorological applications of space research, satellite communications and satellite power supply systems.
The publication entitled "Ten years of the Hungarian space research, containing the lectures presented at the scientific sessions of the Intercosmos Council of the Hungarian Academy of Sciences, held on June 2, 3, and 4, and depicting the activities of the initial years of the Hungarian space research, was published in 1981. This time period was characterized, on the one hand, by the development of space research centers and technical bases, and on the other hand, by the acquisition of scientific and technical experience. The flight of Bertalan Farkas, the first Hungarian astronaut, closed off this period.

During the period from 1981 to 1985 the Hungarian space research experienced a significant evolution. On the basis of experience gained during the earlier
years, by centering the available intellectual and technical resources, an opportunity was offered to our investigators to become involved in international collaborative programs, such as the Vega program to investigate Halley's Comet, the goal of which was to carry out a "for the first time in the world" experiment. While the Hungarian scientific devices prepared during the previous period participated in the study of the space near the Earth, the more recent ones have been installed into remote space probes. Our experts are participating in the construction of the so-called service installations of space probes and satellites, such as the on-board data-collecting system, on-board supply system, whereby the designers and builders must satisfy significantly stricter requirements. All this represented a quality jump, a higher level for the Hungarian space research.

Our investigators achieved good success during recent years in the evaluation of biological experiments carried out with the help of satellites. Spectacular results were obtained in the field of cosmic meteorology and space communication. Results of satellite-based power supply research are being widely applied in various branches of the national economy.

This publication summarizes the obtained results. However, the published summarizing lectures and communications present only a part of the widely ramified space-research activities, carried out in Hungarian research institutes on the basis of ever-broadening international cooperation.

The Intercosmos Council of the Hungarian Academy of Sciences expresses its thanks to all the collaborators, who, in spite of the pressure of their work, found time to write review articles and communications, and to every person who contributed to the publication of this work.

The Editor
# TABLE OF CONTENTS

## A. COSMIC PHYSICS

Space research activity in the Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences during the 1980-1985 period

P. Bencze, J. Vero, L. Banyai  
1

Plasma flow in the ionosphere-magnetosphere system

P. Bencze  
13

Measurement with whistlers of the coupling electron fluxes and average electron density of the plasmasphere-ionsphere

Gy. Tarcsai, L. Hegymegi, P. Szemeredi  
21

Study of the plasmasphere and VLF wave propagation by whistlers

D. Hamar, Gy. Tarcsai, J. Lichtenberger, L. Cserepes  
31

Automatic signal-recognition and processing station (FULGUR)

L. Hegymegi  
43

Results of the Astronomical Research Institute of the Hungarian Academy of Sciences in the Intercosmos program

I. Almar  
49

Neutral upper-atmospheric models: Earth, Venus and Mars

E. Illes  
57

The crumbling sponge model of the comet's nucleus

67
The international space experiment Vega to observe Halley's Comet
I. Apathy, Mrs. P. Bereczki, G. Endrocezy, T. Gombosi,
A. Gschwindt, L. Lohonyai, Gy. Kozma, I. Naday,
A. Somogyi, L. Szabo, S. Szalai, K. Szego, A. Varga 75

Space research activities of the Cosmic Geodetic Observatory
between the years of 1980 and 1985
J. Adam, T. Borza, I. Kardos, Sz. Mihaly 93

Present status and future prospects of the VLBI technique
I. Fejes, Sz. Mihaly 107

Development of instrumentation at the Technical University
Budapest within the framework of cosmic physics research
A. Gschwindt, T. Hetenyi, L. Drimusz, J. Selmeczi
Zs. Koros, I. Papp 119

Supply subsystems for satellites and space probes
L. Balogh, A. Banfalvi, R. Redl, J. Szabo 125

Results and potentialities of space materials technology
E. Fuchs, A. Roosz, I. Gyuro 131

The "BEALUCA" space materials technology program
E. Fuchs, A. Roosz, G. Buza 133

B. COSMIC BIOMEDICAL STUDIES

Possibilities to prevent motion sickness
Gy. Bodo, L. N. Kornilova, T. N. Krupina,
E. I. Matsnev, T. L. Thuy 135
Measurement of the capillary partial oxygen pressure of blood by a transcutaneous method in an antiorthostatic position

P. Remes, J. Hideg, I. Peter, A. Pozsgai, Z. Sido, Gy. Kiss, S. Kalmar

Accommodation to weightlessness of muscles with various functions

I. Cosmic flight of short duration

O. Takacs, V. Oganov, M. Rapcsak, T. Szilagyi, F. Guba

Accommodation

Accommodation to weightlessness of muscles with various functions

II. Cosmic flights of intermediate duration

O. Takacs, V. Oganov, M. Rapcsak, A. Szoor,
T. Szilagyi, F. Guba

Study of muscular atrophy and osteoporosis in model immobilization experiments; effect of weightlessness on various skeletal muscles

T. Szilagyi, M. Rapcsak, A. Szoor, I. Kalapos, Gy. Bot,
Gy. Vereb, K. Szues, F. Kovacs E., F. Erdodi, J. Hideg,
A. Pozsgai, I. Foldes, J. Gyarmati, Jr., O. Takaes, F. Guba,
I. Sohar, V. S. Oganon, S. A. Skuratova

Effect of vibration and hypokinesis on the organism

T. Gati, I. Budavary, S. Dubecz, E. Feher, F. Gelencser,
J. Hideg, A. Pozsgai, K. Rabai, D. Szombath, M. Till, E. Toth

Circulatory effects of hypokinesis in rats

L. Simon, R. Veres, I. Csiszar

Effect of hyperbaric oxygen on spasmodic activity

N. Ludvig, P. Serfozo, J. Hideg, L. G. Harsing,
Gy. Somogyi, E. Sz. Vizi
X-ray emission analysis of mineral element metabolic processes
J. Bacso, L. Uzonyi 213

Psychological studies aiming to enhance the operational reliability of astronauts
L. Bognar, J. Hideg, P. Remes, Z. Sido, A. Pozsgai,
I. Peter, A. Berenyi, S. Kalmar, S. Kovacs, D. L.
Myasnikov, E. P. Ponomareva, O. P. Kozerenko, A. P. Nechayev 221

Psychophysiological study of cerebral bioelectric responses within the framework of the Intercosmos research program
Gy. Karmos, M. Molnar, V. Csepe, I. Winkler, Z.
Bohnadecky, T. Radil, Zs. Cenner, J. Racz 227

Effect of environmental stresses on the sleep, heat regulation and response-to-pain functions of the organism
F. Obal, Gy. Benedek, F. Obal, Jr., J. Hideg, M. Szikszay,

Researches in cosmic biology at the OSSKI during the period from 1980 to 1985
L. D. Szabo, Gy. Benko, K. Bodo, E. Csato, Gy. Kubinyi,
I. Nikl, E. Ronai, Gy. Turoczy 247

Investigations in space dosimetry
I. Feher, S. Deme, P. P. Szabo, J. Vagvolgyi
A. Csoke, Gy. Lanesaries, E. Lang, L. Sagi 251

Development of trace-detector heavy-ion dosimeter and its application in the Cosmos satellites
Gy. Somogyi 265
Radiation protection and the interferon system in connection with space flight problems
L. Batkai, M. Talas, I. Stoger, L. Feuer (deceased),
L. Koblinger, I. Feher, B. Fedorenko, R. Torua, V. Barkaya

C. COSMIC METEOROLOGY

Development of meteorological satellite receiving and processing systems in Hungary
F. Pinter

Application of wind vectors derived from Meteosat cloud pictures for weather analysis
F. Rakoczi

Use of satellites information for numerical weather forecasting
D. Devenyi

Comparison for climatological purposes of cloud covers over Europe observed from satellite and the Earth's surface
R. Roth

Estimation of the probability of precipitation on the basis of satellite pictures
J. Saiko, T. Tanczer

D. SPATIAL TELECOMMUNICATIONS

Research tasks of the Intercosmos national research center
S. Cigany, Cs. Kantor
Investigations concerning the implementation of satellite-based broadcasting within the framework of the Intercosmos cooperative program of the Socialist countries

J. Bali, I. Papp 343

Interesat (Interchannel) - a new channel-forming installation in the Intersputnic system

A. Baranyai, L. Uhereczky, T. Henk, F. Rakosi 347

Service connection of the Intercsat installation

Gy. Abrusan, P. Eszto, A. Marczy, Gy. Pribelszky, I. Toth 359

Channel capacity of satellite retranslators in homogeneous and inhomogeneous SCPC systems

Gy. Pribelszky 371

Computer modeling of many-states digital modulation

P. Ratkovics 381

Computer simulation and circuit models of the digital encoders of videosignals

K. Fazekas, Gy. Szondy 387

Optimization of the parameters of speech signal encoding processes

Vo Dang Thanh, M. Szokolay 397

E. RESEARCH ON AERIAL AND STAELLITE POWER SOURCES

International position of telesensing and its development trends

F. G. Remetey 403
Preparation of thematic maps from aerial and space-sensed basic materials

Mrs. Gy. Domokos 417

Computerized processing results of space pictures at the Geodetic Institute

Gy. Buttner, T. Hajos 425

Tracking the development of cultivated plants by processing digital space pictures

G. Csornai, O. Dalia, J. Vamosi, J. Farkasfalvy 441

Application of telesensing processes in the planning of betterment studies

B. Liesko, J. Varga 451

Telesensing instrument development activities within the framework of the IKT power source research committee

A. Gschwindt, G. Ijjas 463

Results of the Hungarian-Soviet airplane-based ground moisture measurement tests

P. Zilahi, I. Juhasz, Z. Vekerdy 477

The Kursk '85 International telesensing experiment

B. Farkas, L. Bassa, P. Szilagyi 489