

INTERDEPARTMENTAL SESSION OF THE WORKING GROUP "ATMOSPHERE" OF THE COMMITTEE "NATURAL-RESOURCES AND ECOLOGICAL RESEARCH FROM SPACE" OF THE INTERDEPARTMENTAL SCIENTIFIC-TECHNICAL COUNCIL FOR SPACE RESEARCH OF THE USSR ACADEMY OF SCIENCES (MARCH 3–4 AND APRIL 26–27, 1989. TOMSK)

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In accordance with the resolutions of the Interdepartmental Scientific-Technical Council for Space Research (ISTC for SR) of the USSR Academy of Sciences, the working group "Atmosphere" held two sessions at which the following problems were discussed:

1. The concepts of organization and general program of ecological monitoring of the atmosphere from space.

2. Formulation of the principal directions and contents of national programs involving atmospheric-ecological problems.

3. Discussion of proposals concerning the leading organizations and subordinate institutions involved in the relevant national programs.

On the basis of the contributions delivered by Academician V.E. Zuev, Chairman of the Working Group "Atmosphere" (Institute of Atmospheric Optics (IAO), SB USSR Acad. Sci.) and by his Vice Chairmen Prof. O.I. Smoktii (Institute of Informatics and Automaton (IIA), USSR, Leningrad) and Corr. Member USSR Acad. Sci. M.V. Kabanov (Siberian Physico-Technical Institute (SPTI), Tomsk State University), the concept of the general program was formulated. The program is a combination of the fundamental, prospective, and applied atmospheric studies to be performed on the basis of integrated system principles.

According to this concept the work of the working group "Atmosphere" is based on the following principles:

1. The atmosphere is one of the most important components of the geosphere, the physical and meteorological fields of which are in constant interaction and flux. Simultaneously, the atmosphere is the main transporter of pollutants to the oceans and the soil.

2. From the systems viewpoint the atmosphere processes matter, energy, and information in fluxes penetrating into it, being thus a statistical spatial-temporal, dynamic, and informational transfer filter.

3. Finally, from the ecological point of view the Earth's atmosphere is the most important element of the environment (biosphere), and it is presently evolving towards conditions which are extremely unfavorable for life on Earth owing to the constantly increasing anthropogenic load, decreasing the zone of influence of natural factors, and the increasing disturbance of the energy balance and various global substance cycles.

The proposed conceptual basis assumes optimal planning organization, the development of methodological principles of the technology for remote sensing of the atmosphere, including ecological monitoring of the atmosphere from ground-based, airborne, and spaceborne platforms. The formation of an integrated system of informational data bases and expert estimation systems for the main atmospheric components is considered to be one of the most important problems.

It has been seen to be expedient to concentrate all efforts on the realization of the atmospheric research programs with the help of optical and superhigh-frequency sensing using extraterrestrial platforms within the framework of five national programs (NP). They are as follows:

1. Informational Data Bases and Atmospheric Monitoring. (Leading organizations are IAO, SB USSR Acad. Sci., Tomsk and IIA, USSR Acad. Sci., Leningrad).

2. Ozone and Primary Gaseous Components of the Atmosphere Including those of Anthropogenic Origin.

3. Clouds and Aerosols (Background and Anthropogenic) of the Atmosphere.

4. The Upper Atmosphere and Solar-Earth Coupling. (Leading organizations are the Institute of Terrestrial Magnetism, the Ionosphere, and Radiowave Propagation, USSR Acad. Sci. (ITMIRP) and the Siberian Institute of Terrestrial Magnetism, the Ionosphere, and Radiowave Propagation, SB USSR Acad. Sci. (SITMIRP).

5. Aerospace and Ground-Based Research on the Components of the Earth's Radiation Budget. (Leading organization is Voeikov Central Geophysical Observatory).

The first program, which is of particular importance, is to play a methodological and integrating role in the combined investigations of the atmosphere considered as an ecological system and in the creation of a versatile sensing methodology and in the development of data bases oriented towards knowledge bases.

The scientific secretary of the working group "Atmosphere", Cand. Sci. (Phys. & Math.), S.M. Sakerin (IAO, SB USSR Acad. Sci.) in his recent report gave an overview of the proposals for cooperation along with his approval of the formulated approach to the organization and contents of the research, based on the input of

more than 40 organizations of seven ministries and departments.

In the presentations made by the participants, who represented 16 organizations, remarks on the national programs and organization of work were made and additions suggested.

Dr. Sci. (Phys. & Math.) V.Yu. Trakhtengerts (Institute of Applied Physics, USSR Acad. Sci.) described the achievements which have been made to date in the diagnostics of the ozone layer and minor gaseous components of the atmosphere using superhigh-frequency sensing and stressed the necessity of their use in atmospheric monitoring.

Prof. Yu.G. Yakushenkov (Institute of Geodetic Engineers, Aerial Photography, and Cartography, Moscow) and Cand. Sci. (Phys. & Math.) A.P. Chaikovskii (Institute of Physics, BSSR Acad. Sci.) remarked on the great importance of the continued development of instrumentation for atmospheric research. To strengthen this direction, it was suggested to include corresponding items in the program and to develop an exchange of know-how and a continuing update on current technical developments with the research bodies of various industrial firms.

Cand. Sci. (Phys. & Math.) B.A. Kargin (Computing Center, SB USSR Acad. Sci.) in his paper described the role of statistical simulation methods in carrying out the programs of the working group "Atmosphere," particularly for the purpose of solving various inverse problems of remote sensing and the problem of optimal planning of experiments.

Corr. member of the USSR Acad. Sci. M.V. Kabanov (Siberian Phys.-Tech. Inst.) analyzed the need to monitor atmospheric electromagnetic fields, which affect both the biosphere and the aerosol and gaseous components of the atmosphere.

Dr. Sci. (Phys. & Math.) E.A. Ponomarev (SITMIRP), Cand. Sci. (Tech.) V.T. Kalaida (IAO), SB USSR Acad. Sci.) discussed the necessity of creating standards for information technologies and constructing a system for the "communication and exchange of information."

In his contribution Cand. Sci. (Tech.) G.M. Matiyasevich (State Center "Nature") encouraged the concept and content of the programs planned and suggested that we pay greater attention to the use of metrological instrumentation and the field-sites for their testing and calibration. It was proposed to form a group of experts for solving such problems.

Dr. Sci. (Phys. & Math.) G.S. Ivanov-Kholodnyi (ITMIRP), Cand. Sci. (Phys. & Math.) A.K. Gorodetskiĭ (Institute of Space Research, USSR Acad. Sci.), Dr. Sci. (Phys. & Math.) V.E. Pavlov (Astrophysical Institute, Kazakh. SSR Acad. Sci.), Cand. Sci. (Phys. & Math.) S. Mukhamednasarov (Physico-Technical Institute, TSSR Acad. Sci.), Prof. V.G. Mironov (Altai State University), and Cand. Sci. (Phys. & Math.) V.M. Ignat'ev (Institute of Cosmophysical Research and Aeronomy, SB USSR Acad. Sci.) proposed the participation of particular organizations in the national programs and discussed some additions to them.

In a short contribution Dr. Sci. (Phys. & Math.) G.O. Zadde (IAO, SB USSR Acad. Sci.), presented Information on International collaboration and the International Year of Space in 1992 ("Mission to the Planet Earth") and made proposals of Soviet-American cooperation within the framework of the working group "Earth Sciences."

In conclusion, the participants were acquainted with the experimental base and the new technologies of the Scientific-Technical Complex "Institute of Atmospheric Optics" and with the past results and future prospects of the Soviet-Bulgarian International Scientific-Industrial Association (ISIA) "ZOND."

The participants of this conference were unanimous in their appreciation of the integrated approach which was formulated by the working group to the structure and contents of the national programs foreseeing a competitive participation in this research by organizations from various ministries and departments.