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# DATA BASE COMPILED BASED ON THE RESULTS OF MONITORING THE ATMOSPHERIC EMISSIONS FROM INDUSTRIAL ENTERPRISES

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## ABSTRACT

Since 1981 the Institute of Atmospheric Optics started regular airborne sounding of the atmosphere. As a result vast observational material has been compiled during the last decade. In fact three generations of computers changed in the course of airborne missions onboard, first IL-14 and then AN-30 aircrafts. Therefore the data have been stored in different formats and on different data media. In this connection it happened to be an urgent task at present to rewrite the whole data bulk in one and the same format. Thus created data base involves three types of data sets, i.e. profiles acquired during the ascends and descends, data collected along horizontal flights, and data on chemical composition of air including data obtained with analytical techniques in laboratory. This data base has been included into the list of data bases at the Information Center of the National Committee of the Russian Academy of Sciences (number 43). During the period from 1989 till 1991 several ecological surveys have been performed with an "Optik-E" airborne laboratory on board an AN-30 aircraft over a number of cities. The data base compiled during these missions has similar to the above data base structure. It differs from that by additional blocks of information on flight routes necessary for mapping air pollutions. Data sampled inside stack plumes from plants with the aircraft and data collected with a ground-based mobile station also differ it from that data base.

**Keywords:** data base, air pollutions, sample

## 1. INTRODUCTION

Deterioration of the environment observed in several regions of the Earth requires its comprehensive study. At the same time, a large bulk of information is available which includes diversity of parameters. Specialized data bases are created to alleviate processing of this information. Creation of databases in the majority knowledge branches doesn't face any special difficulties since information flows there are easily formalized. But information on the state of the environment, in addition to being multi-parametric, differs by the variety of parameters which doesn't allow the use of standard software in the most cases or requires their significant modification. In this paper examples of solutions to this problem on creating geophysical data base are given. In particular, data bases composed of the results of many years airborne sounding, including ecological aspects, and of the results of climate-ecological monitoring in the ground atmospheric layer near Tomsk at TOR-station are considered.

As a result of long-standing irrational exploitation of natural resources, there is a very adverse situation in many regions, which calls for performing the well-justified measures for salvaging our environment. However, the information on the present-day state of the environment, in particular, on air quality, mainly is not of systematic and complex character. This hampers the choice and realization of optimal measures for the environmental protection. Therefore, one of the primary tasks is collection, accumulation, and generalization of the data on quality of the environment and its irreversible changes.

In 1981 at the Institute of Atmospheric Optics SB RAS an airborne laboratory was created, intended for investigating the concentration and chemical composition of atmospheric aerosol in different regions of the former Soviet Union. In the course of exploitation the onboard measuring complex, the airborne laboratory was constantly modernized and supplemented by new instruments, and by now this measuring complex makes it possible to determine a wide range of gas and aerosol air characteristics. A detailed description of the onboard measuring complex is presented in Ref. 1.

Hereafter, because of worsening of ecological situation, the problem of fair assessment of the degree of urban pollution of atmospheric air is of great importance. And since the airborne laboratory operation corresponds completely to such problems in determinable parameters, in 1989 the first test survey of industrial centers of Russia and Kazakhstan was carried out, during which the technique of sounding was developed.

Beginning in 1991 a mobile station mounted in a GAS-66 motor van with advanced cross country capability has been used for investigating the urban air basins in addition to the airborne laboratory. Its characteristics are analogous to those of the airborne measuring complex<sup>2</sup>.

Therefore the data have been stored in different format and on different data media. In this connection it happened to be an urgent task at present to rewrite the whole data bulk in one and the same format. The data base created consists of three big blocks :

1. Data base of airborne sounding of the atmosphere.
2. Data base of survey of cities.
3. Data base of ozone,gases and aerosol components in the ground atmospheric layer.

## 2. DESCRIPTION

The first block involves data on profiles and data of areal soundings ( Fig. 1).

"Profiles" represents the data obtained during the climb or descent of the airplane. Here the vertical distribution of concentration of aerosol particles, gases, and meteorological values as well as navigation characteristics are recorded. The measurements are carried out from the earth's surface (beginning of the airplane run) with the 100-m step up to maximum height of 6 to 8 km.

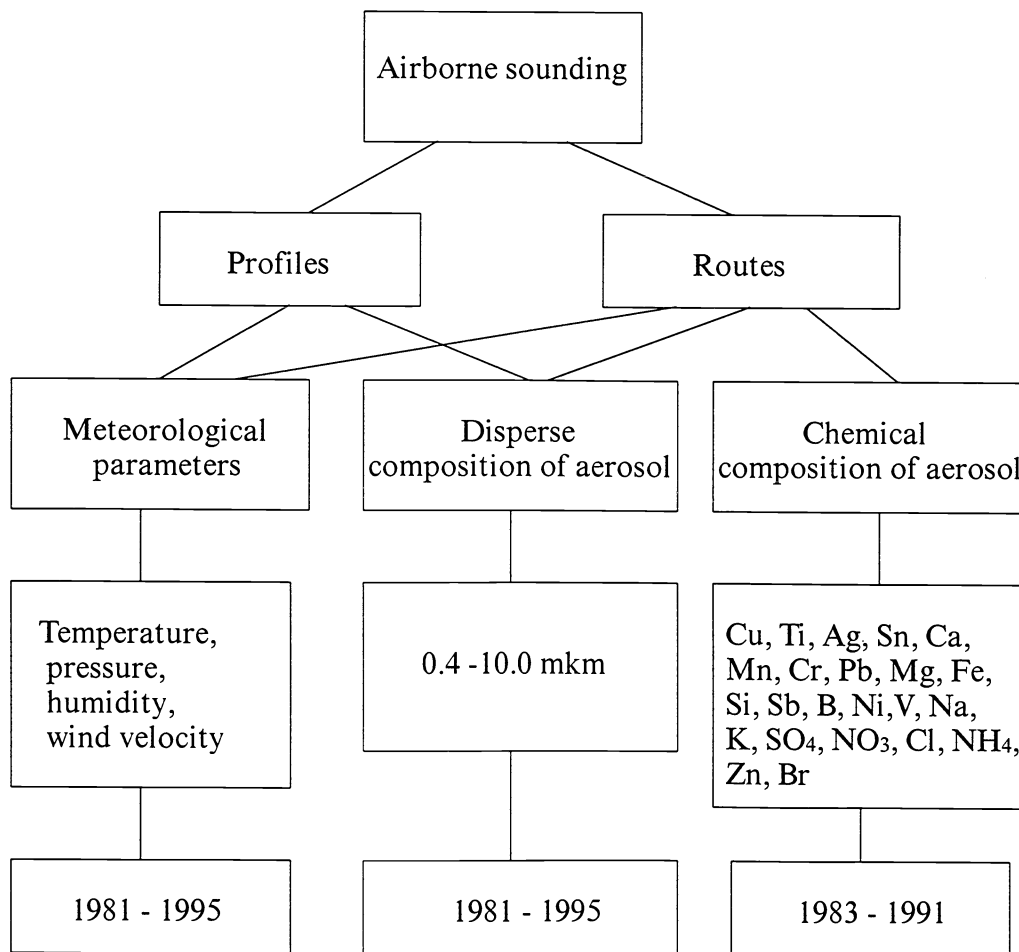


Fig.1. Structure of data base of airborne sounding..

"Routes " presents the data obtained with the airborne laboratory along various routes at fixed heights. Here the spatial distribution of aerosol, gases, and meteorological values are recorded as well as sampling of air and aerosol is performed for subsequent ground-based analysis. The recording rate for average characteristics equals 1 Hz providing the space resolution of 80–100 m. These data are used for construction of concentration fields and calculation of balances and gradients of pollutants over the city, as a whole.

All data are provided with a synoptic description. For the description of the synoptic situation we use the classification developed in Ref. 3

Data base of ecological investigations involves results of surveying cities and particular territories ( Fig. 2). This data base has similar to the airborne data base structure. It differs from that by additional blocks of information on flight routes necessary for mapping air pollutions. Data sampled inside stack plumes from plants with the aircraft and data collected with a this data base has similar to the airborne data base structure. It differs from that by additional blocks of information on flight routes necessary for mapping air pollutions. Data sampled inside stack plumes from plants with the aircraft and data collected with ground-based mobile station also differ it from that data base. The data on synchronous measurements of the wind make it possible to calculate the volume of specific pollutants and their total mass.

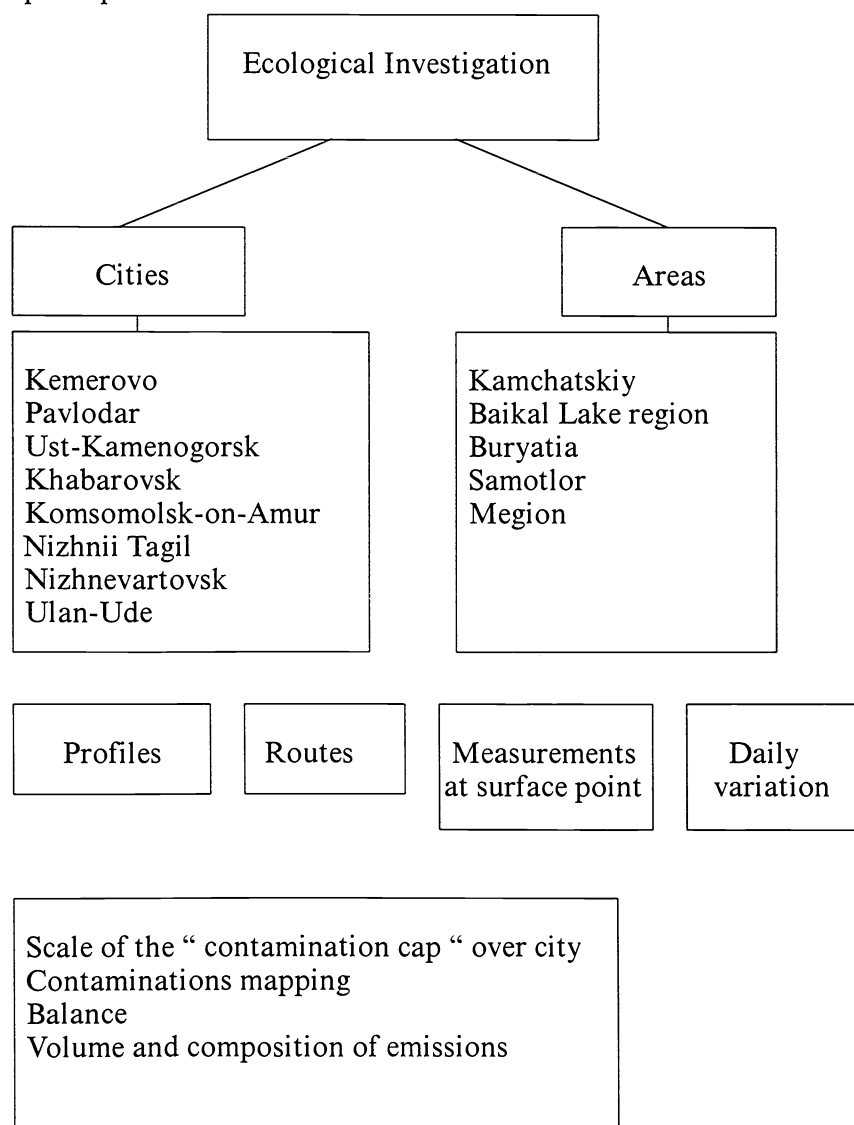


Fig.2. Data of survey of cities.

Results of samples processing are stored in an individual data base that can be completed with newly acquired

information. The data base includes data on chemical composition of aerosol and additional information on time and location of sampling, as well as a description of synoptic situation.

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