THE REGULARITIES OF ONCOLOGIC DISEASES AND NATURAL GEOPHYSICS SPECIAL FEATURES OF ENVIRONMENT

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Introduction

Problems of interaction between human and environment changing its parameters quickly and significantly under technologic loading became central ones in the biology and medicine in the last years. In addition to the strong pressure of technogeneous and anthropogenous factors at health and life conditions of population, a human being is forced to settle and work in geopathogenic and other unfavourable zones caused mainly by natural conditions.

Every year harmful wastes of industry are being accumulated in environment that is a factor of cancerogenic risks. In the same direction some physical contaminations also bring their contribution (radiation, arising of electromagnetic background, vibration, infrasound, etc.). It is evidently that urgent measures are necessary for an identification of mutagens and cancerogens, preventing of their coming into environment or neutralisation of their unhealthy effects.

One of the main causes of oncological diseases increase is the anthropogenous contamination of the environment with technogenic and biogenic factors. In connection with continuous urbanisation process the high level of malignant new growth is marked among the urbane population.

A. I. Potapov and N. V. Vaseeliev conclude that in 1970-1980 in the USSR the stable decreasing of population diseases with cancer of stomach, gullet, lips and uterus neck is marked [4]. On the other hand, cases of diseases of malignant new growths of

the skin, lymphatic and blood-creating tissue became more frequent. The malignant new growths of stomach, lungs and skin are mostly widespread.

The analysis of indices of the oncological diseases and death shows the variability of spreading the frequency of the malignant new growths through the territory of Russia. Thus, epidemiological investigations must be directed at the study of such factors as climate-geographical conditions, special features of labour and mode of life, feeding, bad habits, and genetic peculiarities, in the common sum of biosocial conditions influence on the cancerogenic situation creating.

Methodical approach

The problem of risks factors discovery is being solved by way of investigation of correlation of disease levels with natural and technogenic factors of environments, with adequate mapping and statistic methods.

Taking into consideration many-factority of situations stipulating the malignant process, obviously, it is necessary to use the statistic methods of mathematical modeling, with computers. Taking into consideration recent possibilities of computer correlation, medical-geographical investigations, with elaboration of the special oncographic maps, disclose new possibilities for revealing of correlative relations.

The study of provisional and territorial tendencies of the cancer expansion, revealing of zones of malignant tumours with further imposition on geographical maps, characterising environment parameters (climate, technogenous pollution, biogeochemical features etc.) and social-hygienic processes (especially migration flows) are the important components of the oncoepidemiologic investigations.

The tendencies study is carried out by means of the initial data limited generalization. This method allows to map slight but big sized anomalies, morphostructures and areals of sign fields. The gist of the method consists of special-purpose selection of initial information, tendencies of transformations, mathematical mapping and results interpretation. The space size of the elementary cell is distinguished by the form and size of the investigation object, in our case – areals of diseases,

distance or step between the adjacent areals centers.

Selective analysis of diseases maps has shown that minimal diameter of closed isolines contouring the oncologic diseases areals is of 100 km, and medium, characteristic or often occurred size and distance between adjacent areals is of 280-350 km. Upon the geophysical, geological and other natural anomalies taken as signs of natural-technogenic environment, the basis of geologo-geophysical and geomorphological data are composed, As an elementary cell, the map trapezium of 1:200000 scale is used, or one degree along latitude and 40 minutes along longitude, with a dimension, on an average, about 90 km along diagonal, close to the special-purposed areal size. Among numerous purposed signs maximal (maximum) and minimal (minimum) ones are chosen. With usage of consecutive row of the cells by scale of 1:200000, 1:500000 and more small scale, the maps of different sign fields are elaborated, with corresponding level of generalization. Specifically, areas of signs fields generalizated into cells-trapeziums of the 1:500000 scale (dimension are of 2 degrees of latitude and 3 degrees of longitude) are corresponded in their dimensions to typical areals of the diseases.

Among different geological and geophysical parameters the following ones were used:
- maximal and minimal points of the relief;
- maximal and minimal value of the residual gravity field;
- maximal depth of the crystallic basement roof;
- complicity of the basement tectonics;
- maximal and minimal value of the magnetic field.

As initial information, the data on quantity of oncologic patients per 100 thousand people are used, in different districts of the Krasnoyarsk Region, for last 5 years (1989-1993). For analysis of the possible oncologic diseases expansion dynamics the maps were elaborated which contained closed isolines (Fig. 1). As soon as the main part of the districts is situated in the south of the Krasnoyarsk Region, this area was marked as a separate district (Fig. 2).

For the maps designing, the GRAPHER software was used. Upon existing irregular points, three-measure interpolation was carried out. Obtained maps, with boundaries of the
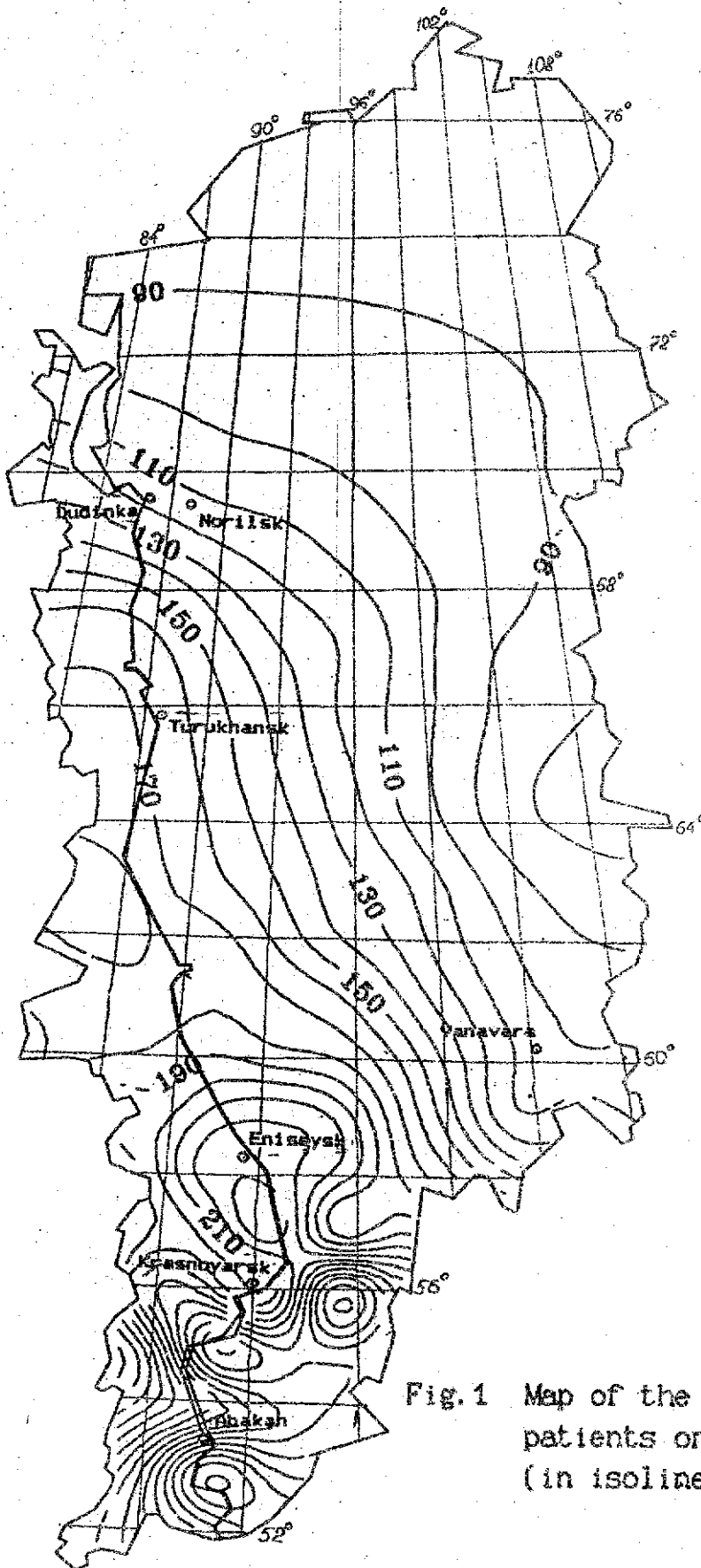
Krasnoyarsk region 1993 year

Fig.1 Map of the density of oncologic
patients on 100000 people
(in isolines)

Krasnoyarsk Region and contour Yenissey River, were printed, in the form available for next processing.

For revealing of possible correlation between oncologic diseases and natural-geophysical conditions, coefficients of pair correlation for generalizated values of all signs were analysed. Degree of coherence was estimated with correlation graph [5] calculated as the sum of corresponding coefficients of pair correlation.

Results of the investigations

The Krasnoyarsk Region is characterised with uneven density of population (low in the north and rather high in the south), high urbanization level, high temp on population migration. Lately the dramatic growth of the environment contamination causes great alarm. Areas of contaminated territories reach many tens thousands of square kilometers and depend upon not only industrial wastes, but also dust storms over forestless territories. The industrial wastes destroy the environment more and more every year. The environment in Siberia is very vulnerable, it will be restored slowly and changed without turning back. Moreover, geological structure of the Central Siberia has plenty of geophysical and geochemical anomalies including radioactive ones, numerous deposits and areals of raw materials.

Especially it is possibly to mark the radioactive isotope contamination in the Yenissey River as a result of long time getting out of cooling water from the Mine-Chemical Combinate reactors (Krasnoyarsk-26). Into Yenissey valley a tendency to accumulation of radionuclides in the near-surface stratum, bed and bank sediments has been watched.

All this must, naturally, reflect onto structure of the diseases and death. Among the death causes, in Siberia, malignant new-growth stay at the 2-3 place giving the top place only to heart-vascular diseases and having some parity with traumatism.

In 1992, patients with malignant new-growths were 224.5 per 100 thousand people (with those who were dead), and in 1993, their number has increased up to 246.1 per 100 thousand (comparatively, in 1991, there were 223.3 ones). Distributions of the diseases types is shown in table 1.

Table 1

Distribution of malignant diseases types
(on.every 100 thousand people)

	1989	1990	1991	1992
Cancer of lung	45	41. 5	43	42. 6
Cancer of stomach	31. 1	32. 5	35. 9	29. 7
Cancer of mamma	17	16. 1	18. 2	17. 8
Cancer of skin	15. 6	12. 3	12. 3	11
Cancer of rim gland	8	8. 5	7. 8	9. 4

Looking at the maps (Fig. 1, 2) it is possible to mark that the biggest density of oncologic patients is at the south of the Krasnoyarsk Region and districts adjacent to Yenissey. It is caused by those that main part of population and industrial enterprises are situated in these areas. It may be also explained that population of near-Yenissey zone is subjected to more intensive radiation and practically has no systematic medical watching.

Analysis of the diseases density distribution and regional peculiarities of natural environment revealed in geophysical, geomorphological and geological fields identifies such dependence as correlation of signs fields value matrix, as well as in space combination diseases areas with anomalies, morphostructres and areals of analysed fields.

Areals of increased density of the oncologic diseases distribution in different time and different places are located as a rule at ends or saddle parts of generalized magnetic field anomalies which are located, in its turn, at edges and closings of negative gravity anomalies, and also, in majority of cases, are placed into limits of flat regional morphostructures of day surfaces depressions.

Those revealed space relations are in conformity with placing among sign fields ore-concentrating and oil-gas-bearing areas of Siberia [2]. Otherwise saying, areals of oncologic diseases and raw mineral deposits concentration are into
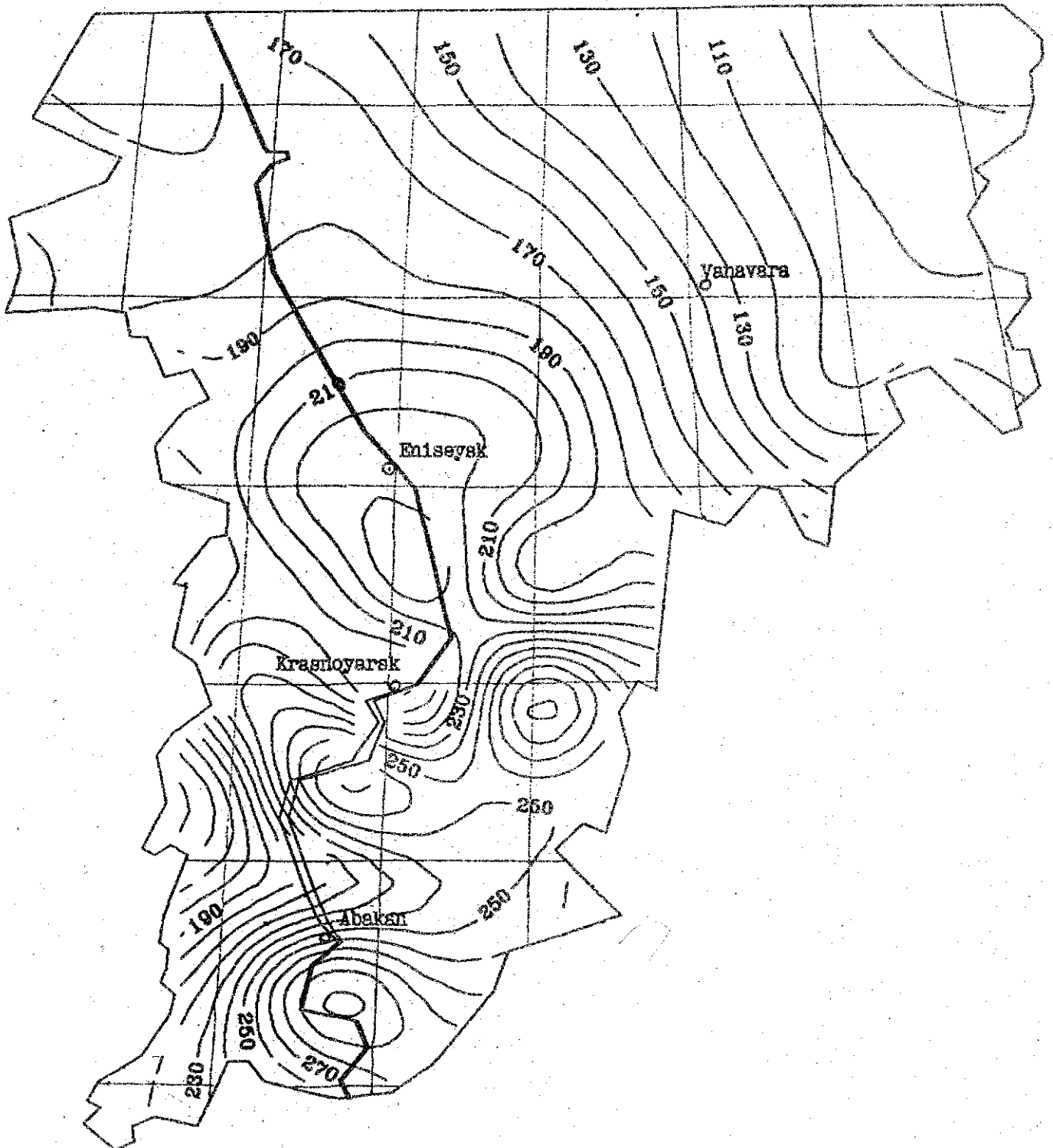
South of the Krasnoyarsk region 1993 year

Fig.2 Map of the density of oncologio patients
on 100000 people (in isolines)

non-extremal areas of geophysical, geological, geomorphological
fields. Namely, such set of sign fields characterises
geodynamically tensed structures of the earth crust having
distinguish set of the hyperlowfrequent fluctuations [1] and,
often, giving geodynamical parameters of natural environment
ecological properties. Search and prognostic of the ecological
comfortable and discomfortable zones could be to realized
through composite interpretation of generalized maps of the sign
fields and oncologic diseases density. Namely, into regional
zones of ecological discomfort prognosed with using of the sign
fields generalized maps, the geopathogenic areas and increased
malignant diseases density local areas are revealed. It is
necessary to use the signs of geopathogenic lands and local
areals of oncologic diseases for ecologic division into
districts of territories and population defending measures from
unfavourable factors and discomfortable ecological conditions.

Analysing values of pair correlation between geophysical
parameters and oncological diseases one can distinguish the
next. Some positive correlation between quantity of oncological
diseases and heights of relief and maximal magnitude of magnetic
field, and also opposite correlation between oncologic diseases
and minimal residual gravity anomalies are being observed. These
relations allow to make more accurate the local areals of
diseases signs like possible zones of ecological discomfort.
Arranging of increased values of cancer diseases to depressions
of the relief and high amplitudes of magnetic field testifies
the cause of geodynamic influence on natural stimulation of
diseases of population. Into areas with high magnitudes of
magnetic and gravity fields a human being undergoes additional
pressure of geophysical fields. Under those constant conditions
the immunity decreasing and increasing of diseases including
malignant new growths are possible.

According to pair correlation calculation between geophy-
sical parameters and oncologic diseases value for last 5 years
the graphic of the dynamic of weight of correlation graph is
built (Fig. 3). It is seen from here that the correlation graph
weight decreases every year. It says that relation between taken
geophysical parameters and data of density of oncologic patients
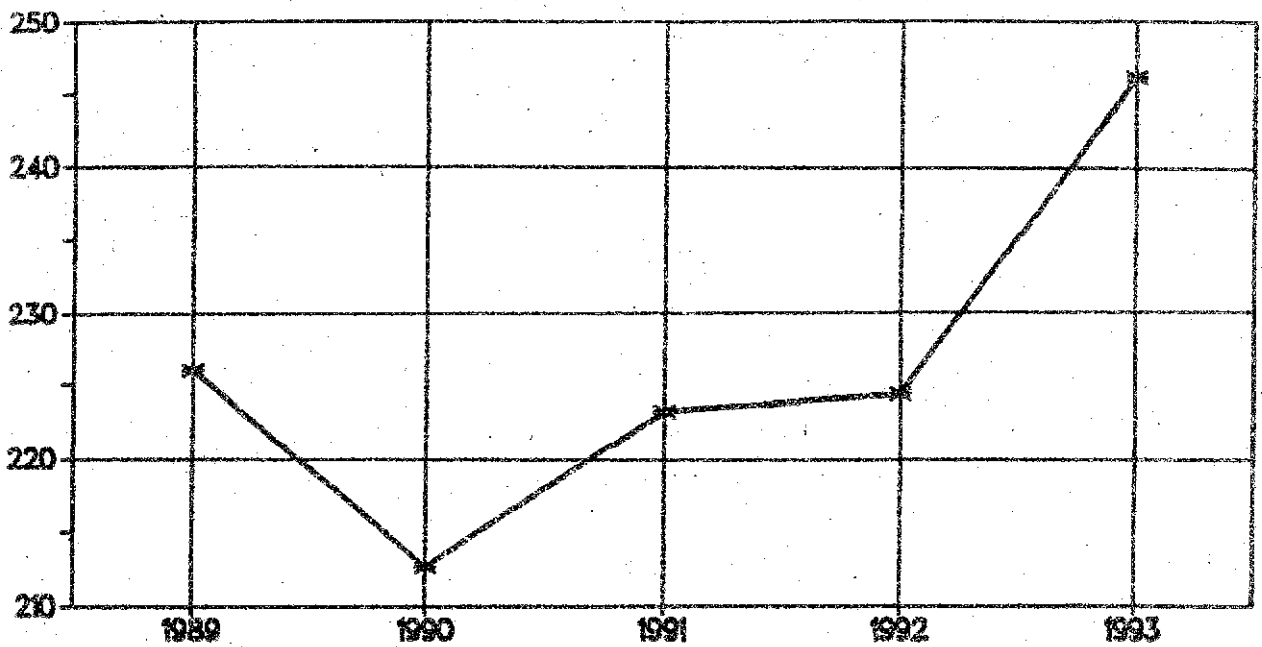per 100 thousand of population in districts of the Territory

Fig. 3   Changes in density of onoologio patients on
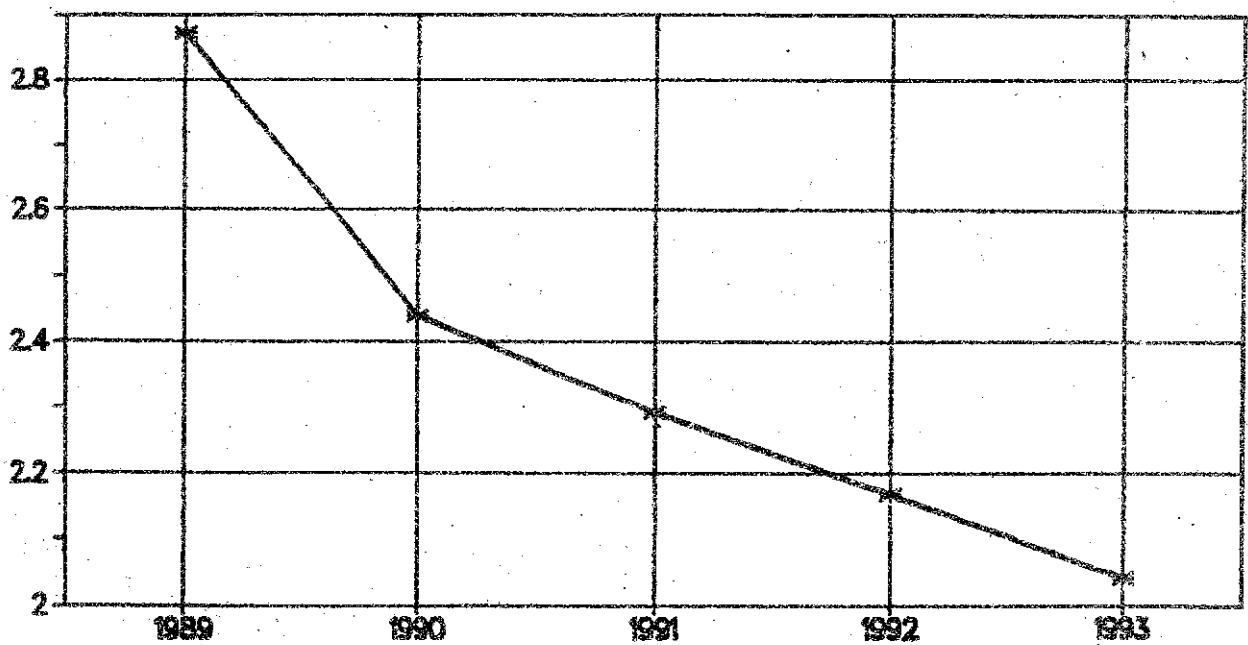100000 people for 5 years

Fig. 4   Dynamics of correlation of geophysical parameters
and density of onoologio patients in the Krasnoyarsk
Territory.

falls down. But common quantity of cancer patients increases (Fig. 4). Hence, one can make a conclusion that in the last time constantly increasing density of oncologic patients depends upon other than natural causes. It may be technogenic or psychological factors.

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