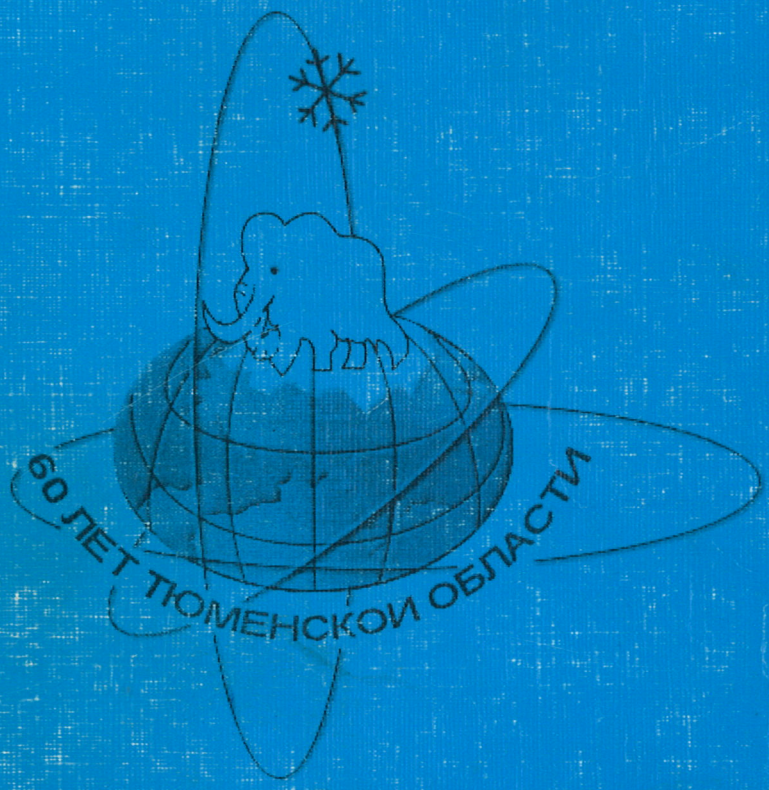

ABSTRACTS

INTERNATIONAL CONFERENCE

CRYOSPHERE OF OIL-AND-GAS BEARING PROVINCES

DEDICATED TO THE SIXTIETH ANNIVERSARY OF TUMEN REGION

TYUMEN, RUSSIA

2004

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CRYOSPHERE OF OIL-AND-GAS BEARING PROVINCES

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CONTENTS

FROST AFFECTED SOILS OF OIL-AND-GAS BEARING REGIONS

Phenomenon might be explained through energy diagrams of the orientation and ion defects in ice and water. Potential energy of defects (as well as formation energy of a pair of defects with opposite charges) is higher in ice than in water. In accordance with that, equilibrium concentration of similar defects is greater in water. During crystallization, defects are captured by ice in non-equilibrium amount. Their energy increases due to phase transition heat. During structured transformations of ice, non-equilibrium defects recombine intensively, which is accompanied by liberation of energy equal to the energy of pair formation. This energy can be spent on excitation of chemically active particles and, thereby, reduction of activation barrier of chemical reactions. Consequently, the intensity of chemical process will increase. Thereby, reaction acceleration in ice compared to that in water at the same temperature is related to greater energy, liberated at during recombinations of defects and, as consequence, to smaller resulting height of potential barrier of reactions.

MONITORING OF STRESS-STRAIN CONDITIONS OF COASTAL SLOPE ON "BOLVANSKY" STATION BY USE OF SEISMORECONNAISSANCE

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In 2002-2003 on the northern slope of cape Bolvansky (the estuary of Pechora river) seismic research have been carried out to study the stress-strain conditions of the coastal ledge. Space-time forecasting of coastal slope stability was the purpose of this research.

The methodical approaches used in this study were developed earlier for seismic monitoring of landslide process outside of the cryolitozone. We developed the principles of multiwave multiazimuth seismoreconnaissance (MMS) technique based on simultaneous use of longitudinal and shear waves. It provides essential trustworthiness and reliability increase of the space-time forecast of coastal slope stability at the stage before any displacement.

In 2002, seismic research has been carried out on four cross-sections 50-60 meters long located 20-30 meters from each other. We found weakened zones predicted to have massif discontinuity. The most dangerous zone were located 7-10 meters from the coastal ledge. Superficial crack revealed at landscape mapping served as an indicator of the forthcoming displacement in this zone. The crack was found 10-15 m west of the cross-section field.

In 2003, the repeated cycle of the seismic research was carried out using the same technique. The area of the seismic research was expanded because of two new additional seismic cross-sections.

Two cycles of the seismic research, executed with one-year interval, have provided an opportunity of monitoring landslide process. Comparison of the data showed that general regularity of the seismic characteristics distribution was preserved, the reduction tendency of the coastal slope stability was observed.

Area regularity of seismic characteristics variability was most demonstrably shown on the differential maps designed one the results of two seismic research cycles. Thus, the maximal changes of seismic characteristics occurred within the weakened zones revealed in the first research year.

The results confirm that suggested multiwave multiazimuth seismoreconnaissance technique has been the effective tool of space-time forecast of coastal ledge stability in the Arctic zone at the stage before any discontinuity started.

This research is supported by INTAS №2332.

TRANSFORMATION OF OIL POLLUTION AREAS UNDER THE INFLUENCE OF CRYOGENIC FACTORS

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One of the actual ecological problems in West Siberia is a high level of oil pollution in the resource-saving territories. The mathematical model of evolution of the state of oil-polluted areas is presented in the report. This model allows to estimate residual content of the pollutant in the areas of accidental oil spills and to forecast its assimilation in the contiguous surroundings. The contaminated field is characterized by the distributed content of masses of contaminant (pollutant) in four cumulative media –mass of surface contamination [MV_1 MS_1], mass of ground contamination within the spill area and conforming masses of contaminant related to buffer zone. It is surface stratum [MV_2 MS_2] and soil contamination [MG_2 MGS_2]. For composition of combined equations of balance of masses, the quantity of pollutant in these mediums is represented by two variables MV and MG, the quantity of pollutant of fluid phase, capable to participate in the migration processes and the pollutants transformed in resinous and solid phase - MS and MGS (bituminisation) unable to actively migrate. The dynamics of the mass's condition of surface stratum (layer) complies with the combined equations:

$$dMV_1/dt = -\lambda(mP_1+mD_1+mG_1+mR_1) - mS_1 - mBV_1 + mU_1 - mrU_1,$$

$$dMS_1/dt = mS_1 - mBS_1 - mrS_1,$$

where mP_1- the intensity of surface movement of pollutants in buffer region(zone) together with masses of water, mD_1- the intensity of diffusion mass-transfer with the buffer (in the water medium),