Ukrainian Polar Association

V.N. Karazin Kharkiv National University

with support of the

Ukrainian Scientific Club

and

Ukrainian team of the USA based Pew Charitable Trusts' Antarctic Krill Conservation Project

International Antarctic Conference
IAC2009

International Polar Year in Ukraine: results and horizons

May 22-24, 2009 - Kharkiv, Ukraine

International Polar Year 2007/8

Program

Organizing Committee and Conference Venue:
V.N. Karazin Kharkiv National University
Address: 4, Svobody Sq., Kharkiv, Ukraine
E-mail: iac_2009@ukr.net
Telephone: +38 067 1290743, +38 050 6616554

Conference Venue: V.N. Karazin Kharkiv National University
Address: 4, Svobody Sq., Kharkiv, Ukraine

Conference topics: Biology and Ecology; Atmosphere and Near-Space Physics; Meteorology and Climate; Geology, Geophysics and Glaciology.

Conference languages: English, Russian, Ukrainian

ORGANIZING COMMITTEE:

Andrey Utevsky, Ph.D., *V.N. Karazin Kharkiv National University, Chairman*
Eugene Dyky, Ph.D., *Scientific Committee of Ukrainian Diving Federation, Deputy Chairman*
Iryna Kozeretska, Ph.D., *Taras Shevchenko National University of Kyiv*
Gennadi Milinevsky, Ph.D., *Taras Shevchenko National University of Kyiv*
Ivan Parnikoza, *Taras Shevchenko National University of Kyiv,*
Kateryna Petrenko, *Central Geophysical Observatory, Conference Secretary*

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FRIDAY, MAY 22, 2009

08:00-09:00 **Participants arrival, registration and accommodation**

09:15-09:30 **Opening ceremony. *Chair: Dr. Andrei Utevsky***

09:30-10:40 **Plenary session. *Chair: Dr. Andrei Utevsky***

09:30-10:00 *P. Convey (British Antarctic Survey, Natural Environment Research Council, Cambridge, UK)* **Recent human impacts on terrestrial biological processes in the maritime Antarctic**

10:00-10:20 *G. Milinevsky (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Ukraine Antarctic research during International Polar Year 2007/8 - view from outside**

10:20-10:40 *E. Shcolniy, E. Galich (Odessa State Ecological University, Odessa, Ukraine)* **Features of large-scale circulation atmospheric processes in western sector of the Southern Hemisphere**

10:40-11:10 **Coffee-break**

11:10-13:10 **Plenary session. *Chair:* Dr. Gennadi Milinevsky**

11:10-11:30 M. Chesalin **(***Institute of Biology of the Southern Seas, Sevastopol, Ukraine* **)**, R. Naveen (*Oceanites, Inc.,USA*), H. Lynch (*Dept of Biology, University of Maryland, USA*), I. Bullock (*Tegfan, Caerbwdi, St. David's, United Kingdom*), M. Rider (*US Antarctic Program, Raytheon Polar Services Company, USA*), A. Miller (*Antarctic Ecosystem Research Division, Southwest Fisheries Science Center, USA*), S. Forrest (*World Wildlife Fund, USA*), R. Dagit (*Resource Conservation District of the Santa Monica Mountains, USA*), I. Dykiy (*University of Lviv, Lviv, Ukraine*), V. Timofeyev (*Institute of Biology of the Southern Seas, Sevastopol, Ukraine***) Long-term changes in populations of seabirds on Petermann Island and surrounding islands near Antarctic Peninsula**

11:30-11:50 J. Smykla *(Department of Biodiversity, Institute of Nature Conservation, Polish Academy of Science, Poland and Department of Antarctic Biology, Polish Academy of Sciences, Poland)* **Vegetation patterns around penguin colonies in Admiralty Bay (King George Island, Maritime Antarctic) – a model system for studying ecological hypotheses**

11:50-12:10 A. Koloskov *(Institute of Radio Astronomy, National Academy of Sciences of Ukraine, Kharkiv)* **Internet controlled HF receiver for ionospheric research in Polar Regions**

12:10-12:30 V. Lozitsky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Comparison of total ozone column distribution over Northern and Southern high latitudes**

12:30-12:50 L. Pshenichnov ***(****Laboratory of the Southern Ocean Bioresources, YugNIRO, Kerch, Ukraine)* **Influence of icebergs on the structure of fishable part of the spiny icefish (*Chaenodraco wilsoni*) population in the Cosmonaut and Cooperation Seas (Southern Ocean)**

12:50-13:10 B. Kapochkin, V. Dolia *(Odessa State Ecological University, Odessa)* **Climatic changes in Antarctica as consequence of geophysical changeability**

13:10-14:00 Lunch

14:00-15:45 Plenary session. *Chair: Dr. Asen Grytsai*

14:00-14:15 B. Kapochkin, V. Dolia *(Odessa State Ecological University, Odessa)* **Climatic changes on the Earth - Antarctica as the planetary indicator**

14:15-14:30 T. Danova, O. Prokof'ev *(Odessa State Ecological University, Odessa)* **The troposphere ground layer air temperature dynamics by the Antarctic coastal stations observation**

14:30-14:45 A. Grytsai, O. Evtushevsky, V. Kravchenko, G.Milinevsky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)*, A. Klekociuk *(Australian Antarctic Division, Kingston, Australia)* **Quasi-stationary planetary waves in the late winter Antarctic stratosphere temperature distribution**

14:45-15:05 G. Milinevsky**,** O. Evtushevsky, V. Kravchenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Winter temperature interannual variations at the Faraday/Vernadsky Antarctic station (1948-2008)**

15:05-15:25 V. Bogillo, M. Bazylevska *(Institute of Geological Sciences, National Academy of Sciences, Kiev, Ukraine)* **Volcanic emission of ozone-depleting halogen' species**

15:25-15:45 V. Bogillo, M. Bazylevska *(Institute of Geological Sciences, National Academy of Sciences, Kiev, Ukraine)* **The interaction of organochlorine contaminants with snow cover in Antarctica**

15:45-16:15 **Coffee-break**

16:15-18:00 **Plenary session. *Chair: Dr. Evgen Shkolny***

16:15-16:30 R. Kalendar *(MTT/BI Plant Genomics Laboratory, Institute of Biotechnology, Viikki Biocenter, University of Helsinki, Helsinki, Finland),* D. Maidanyuk *(Lugansk National Agrarian University, Lugansk, Ukraine)* **Cloning of *cassandra* elements from genomes of Antarctic vascular plants**

16:30-16:45 Y. Hihiniak *(The State Scientific and Production Amalgamation «The Scientific and Practical Center for Bioresourses», Minsk),* E. Grusov *(Zoological Institute of the Academy of Sciences, Russia)* **Hydrobiological researches of coastal bottom communities in Davis sea (Antarctica)**

16:45-17:00 E. Khlon, S. Shnyukov, I. Lazareva, A. Mitrokhin, Yu. Gasanov, V. Morozenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Geochemical modeling of magmatic and magmatic-hydrothermal systems of Deception Island volcano (West Antarctica): basic data and preliminary results**

17:00-17:15 A. Grytsai **(***Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Planetary wave climatology in Antarctic region for 1979-2008 ozone distribution**

17:15-17:30 A. Utevsky, S. Utevsky *(Dept. of Zoology and Animal Ecology, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine)* **Biogeography of fish leeches (hirudinea: piscicolidae) of West Antarctica**

17:30-17:45 A. Zalizovski *(Institute of Radio Astronomy, National Academy of Sciences of Ukraine, Kharkiv, Ukraine)* **The role of ozone in the troposphere-to-ionosphere energy transfer**

17:45-18:00 V. Voytenko **(***East-Ukrainian National Volodymyr Dal' University, Lugansk, Ukraine),* S. Kovalenok *(Ministry Education and Science of Ukraine, Kyiv, Ukraine)* **The small ice cap disintegration monitoring by the low frequency acoustic emission method**

18:30-21:00 **Dinner and Social**

SATURDAY, MAY 23, 2009

Round table in the framework of IAC2009
"Ukraine and Russia in Antarctica: charges and profits"
Round table topics:

1. To search the joint understanding why Ukraine and Russia need to provide Antarctic research under difficult economic conditions which they are experienced nowadays.
2. To find a conceptual basis for joint position of Ukraine and Russia in research and conservation of the Antarctic environment and marina living resources.

09:00-11:30 ***Co-chairs: Dr. Volodymyr Herasymchuk, Dr. Vassily Spiridonov, Dr. Gennadi Milinevsky, Dr. Vyacheslav Bizikov***

Introduction. State-of-art of Antarctic environment problems

09:00-09:10 L. Pshenichnov *(Laboratory of the Southern Ocean Bioresources, YugNIRO, Kerch, Ukraine)* **Current state of the international scientific observation system in Antarctica and the place of Ukrainian scientists**

09:10-09:20 G. Milinevsky *(National Taras Shevchenko University of Kyiv and Antarctic Krill Conservation Project, Kyiv, Ukraine),* I. Mikityuk (*AKCP - Antarctic and Southern Ocean Coalition, Kyiv, Ukraine*). **Climate change influence and tourism impact on Antarctic ecosystem**

09:20-09:40 V. Spiridonov *(P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences and WWF Russia, Moscow, Russia).* **Biological resources, Antarctic krill and ecosystem based management: introductory notes for the Ukrainian – Russian round table on the Antarctic issues**

09:40-09:55 V. Herasymchuk *(State Committee for Fisheries of Ukraine, Kyiv, Ukraine)* **Krill fishing in Antarctic seas: Ukraine view**

09:55-10:15 V. Bizikov *(Russian Federal Research Institute of Fisheries and Oceanography)* **The role of science in conservation of the Antarctic ecosystem: review of XXXII ATCM results**

10:15-10:20 L. Pshenichnov *(YugNIRO, Kerch, Ukraine),* G. Milinevsky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine and Antarctic Krill Conservation Project (AKCP) in Ukraine)* **The research project to digitize former Soviet krill fishing expedition data**

10:20-10:30 I. Mikityuk *(Antarctic Krill Conservation Project and Antarctic and Southern Ocean Coalition in Ukraine, Kyiv, Ukraine)* **Priorities for establishing Antarctic krill ecosystem monitoring and management program**

10:30-10:40 V. Bryantsev, V. Bibik, V. Timofeev, B.Trotsenko *(Southern Research Institute of Marine Fisheries and Oceanography, Kerch, Ukraine)* **Factors determined the Antarctic krill *(Eufausia superba)* fisheries success in the Atlantic part of the Antarctic region**

10:40-11:30 ***Discussion on introductory presentations:***

The role of Ukraine and Russia in solving of the global environmental and resource problems related to Antarctic region.

What income the environmental research in Antarctic region could provide to our countries.

Whether or not possible to develop the joint position of Ukraine and Russia in the Antarctic Treaty System.

What we can do for Ukrainian and Russian scientists informal collaboration strengthening in the field of study and conservation of Antarctic ecosystem.

Conclusions

11:30-12:00 Coffee-break

12:00-13:00 Ukrainian Polar Association Meeting

13:00-14:00 Lunch

14:00-16:00 Plenary session. *Chair: Dr. Andrej Zalizovsky*

14:00-14:15 O. Futorna *(M.G. Kholodny Institute of Botany NAS of Ukraine, Kyiv, Ukraine)* **Ecological variability of *Deschampsia antarctica desv*. leaf anatomy of two maritime Antarctic regions**

14:15-14:30 A. Utevsky, S. Utevsky, G. Shandikov *(V.N. Karazin Kharkiv National University, Kharkiv, Ukraine), E. Dyky (Scientific Committee of Ukrainian Diving Federation, Kyiv, Ukraine)* **South Ocean ecosystem monitoring in the framework of Ukrainian Antarctic Program 2011-2020**

14:30-14:45 Y. Zanimonskiy *(Institute of Radio Astronomy NAS of Ukraine, Kharkiv, Ukraine)*, G. Milinevsky, V. Danylevsky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **General features of the sea level records from Antarctic Peninsula and South America tide gauges**

14:45-15:00 I. Parnikoza *(Institute of Molecular Biology and Genetics NAS of Ukraine, Kyiv, Ukraine)*, I. Dykiy *(Ivan Franko National University of Lviv, Lviv, Ukraine)*, V. Trokhymets, I. Pilkewicz *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* ***Larus dominicanus*: gardener of maritime Antarctica?**

15:00-15:15 S. Korsun *(Institute of Agriculture of the Ukrainian Academy of Agrarian Sciences, Kyiv region, Kyevo-Svyatoshinsky district, town Chabany, Ukraine),* I. Parnikoza *(Institute of Molecular Biology and Genetics NAS of Ukraine, Kyiv, Ukraine)* **Natural and anthropogenic factors influencing soil development at King George Island (Maritime Antarctic)**

15:15-15:30 T. Danova, E. Galat *(Odessa State Environmental University, Odessa, Ukraine)* **Climatology of the Northern Hemisphere sea ice**

15:30-15:45 V. Danylevsky, V. Ivchenko, G. Milinevsky, A. Grytsai *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine),* M. Sosonkin *(Main Astronomical Observatory of National Academy of Science of Ukraine, Kyiv, Ukraine)*, Ph. Goloub, Z. Li, O. Dubovik *(Laboratoire d'Optique Atmosphérique, Université de Lille, Lille, France)* **Aerosol measurements with CIMEL and MICROTOPS II sunphotometers**

15:45-16:00 A. Utevsky, *(V.N. Karazin Kharkiv National University, Kharkiv, Ukraine, E. Dyky (Scientific Committee of Ukrainian Diving Federation, Kyiv, Ukraine),* I. Parnikoza *(Institute of Molecular Biology and Genetics NAS of Ukraine, Kyiv, Ukraine)* **The influence of global climate change on Arctic tundra and adjacent marine shelf ecosystems**

16:00-16:30 Coffee-break

16:30-17:00 Plenary session.
Co-Chairs: Dr. Andrei Utevsky, Dr. Andrej Zalizovsky
Conference recommendations and resolution adoption

17:00-17:15 Closing the Conference

Poster program (presented during lunch and coffee breaks)
FRIDAY-SATURDAY, MAY 22-23, 2009

A. Artamonov *(Obukhov Institute of Atmosphere Physics RAS, Moscow, Russia),* M. Babiy, A. Bukatov *(Marine Hydrophysical Institute NASU, Sevastopol, Ukraine),* I. Repina *(Obukhov Institute of Atmosphere Physics RAS, Moscow, Russia),* E. Skripaleva *(Marine Hydrophysical Institute NASU, Sevastopol, Ukraine)* **Researches of the large-scale and mesoscale variability of hydrometeorological conditions in the Antarctic coastal regions by experimental measurement data**

Yu. Artamonov, A. Bukatov *(Marine Hydrophysical Institute NASU, Sevastopol, Ukraine), V. Eremeyev (Oceanological Center NASU, Sevastopol, Ukraine), E. Skripaleva (Marine Hydrophysical Institute NASU, Sevastopol, Ukraine)* ***Researches of seasonal and interannual variability*** **of Antarctic sea ice closeness**

O. Burgaz *(Odessa State Environmental University, Odessa, Ukraine)* **The general atmosphere circulation influence on the total ozone in middle and polar region in South Hemisphere**

S.Kovalenok *(Ministry Education and Science of Ukraine, Kyiv, Ukraine)*, O.Evtushevsky, A.Grytsai *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **Asymmetry in total ozone distribution in Antarctic region and South Ocean ecosystem**

N. Svietlova, V. Storozhenko, N. Taran, A. Okanenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)* **The *Deschampsia antarctica* adaptive reactions to UV-B irradiation**

O. Tyshchenko (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) **Reproduction peculiarities of Galindez Island bryophytes, Antarctica**

S. Krakovska *(Ukrainian Hydrometeorological Institute (UHMI), Kyiv, Ukraine)* **Numerical study Antarctic precipitating cloudiness**

J. Kolb *(Massey University, Institute of Natural Sciences, Ecology & Conservation Group, Auckland, New Zealand),* C. Evans *(University of Auckland, Faculty of Science, School of Biological Sciences, Auckland, New Zealand),* P. Rainey, R. Barraclough, D. Brunton *(Massey University, Institute of Natural Sciences, Auckland, New Zealand)* **Short circuit co-evolution by the perfect parasite: antifreeze glycoproteins of fish leeches (Hirudinea, Piscicolidae) in Antarctica**

G.Milinevsky, O.Evtushevsky, A.Grytsai, O.Agapitov *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)*, A. Klekociuk *(Australian Antarcti Division, Kingston, Australia)* **Asymmetries in Antarctic total ozone distribution and tropopause height**

K. Petrenko *(Central Geophysical Observatory of the MNS of Ukraine, Kyiv)* **The regional trend and direction distinction of temperature changes in Antarctica**

SUNDAY, MAY 24, 2009

09:00-12:00 Excursions, University tour

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IAC2009

International Polar Year in Ukraine: results and horizons

May 22-24, 2009 - Kharkiv, Ukraine
-
International Polar Year 2007/8

Abstracts

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ORGANIZING COMMITTEE:

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Eugene Dyky, Ph.D., *Scientific Committee of Ukrainian Diving Federation, Deputy Chairman*
Iryna Kozeretska, Ph.D., *Taras Shevchenko National University of Kyiv*
Gennadi Milinevsky, Ph.D., *Taras Shevchenko National University of Kyiv*
Ivan Parnikoza, *Taras Shevchenko National University of Kyiv,*
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Preface

The experience of previous informal meeting - the International conference «Ukraine in Antarctic Region: National Priorities and Global Integration» (Kyiv, Ukraine, May 23-25, 2008) - shows effectiveness of useful scientific exchange of scientists who provide research in Antarctica. This meeting - the International Antarctic Conference IAC2009 «International Polar Year in Ukraine: results and horizons» (Kharkiv, Ukraine, May 22-24, 2009) - aimed to summarize the research outcomes and future plans of Ukrainian scientists after the International Polar Year 2007-2008. The IPY 2007/8 officially finished in March, 2009 and now times to understand what income from IPY and how it has been organized in Ukraine and other countries. Our meeting has to assist scientists to formulate Ukraine's national priorities in Antarctica for next decade for new Ukrainian Antarctic Research Program 2011-2020 and discuss the Ukraine's place in framework of Antarctic Treaty. No doubt that Antarctica remains the key region for understanding climate change, space weather processes and ecosystem behavior. As a starting point we provide below the participants of IAC2009 by Resolution of previous meeting IAC2008 to assist fruitful discussions.

IAC2008 RESOLUTION

We, participants of the International conference «Ukraine in Antarctic Region: National Priorities and Global Integration» (Kyiv, May 23-25, 2008), state:

- researches in the Antarctic region are among **main priorities of world science;**

- polar regions are an unique natural laboratory, where processes of planetary scale prove oneself before they appear in other parts of Earth, above all things climate change and sequential alteration of ecosystem;

- Antarctic Region is a that ground, where the Ukrainian scientists **have the acknowledged achievements and can be in future on the cutting edge of modern world science** and to take part on even in integration of potential and programs of researches of international scientific community;

- the unique location of the Ukrainian Antarctic Station Akademik Vernadsky (UAS) allows to conduct **international research to solve the special problems** which can not be studied in other places of the world;

- the legal and organizational providing of Antarctic researches must become **the important task of domestic and external policy of Ukraine**.

Recognizing important progress of Antarctic researches for times of existence of UAS Vernadsky, and acknowledging the necessity of improvement of mechanism of development of the new **National Program of Antarctic Research for 2010-2020** we propose:

- to form priorities of scientific researches of Ukraine in Antarctic Region by taking into account both those directions which are **priority in modern world science** and those, which are directed on the **effective use of potential and development of domestic science, assist in solving of economic and humanitarian problems of the state, defend national interests of Ukraine in this region of the world**;

- to pay special attention for the projects, in development and realization of which **international co-operation is possible at participation of the Ukrainian scientists**;

- to introduce development of the **National Program of Antarctic Research for 2011-2020** with bringing in of all **specialists on a polar subject**, which work in Ukraine, regardless of their department belonging, and if necessary – **specialists from other countries**; in particular by the conducting of opened "round tables" and scientific seminars which will offer the **criteria of selection of priority projects and mechanisms of their realization**. Only then this program will correspond to a modern level of researches of the Antarctic Area, and its implementation will lead to increase in competitiveness of the Ukrainian science;

- Ministry of Education and Sciences of Ukraine, National Academy of Sciences of Ukraine, leading universities and research department establishments to begin without delay the process of consultations in relation to forming of the **National Program of Antarctic Research for 2011-2020** and to carry it out transparently and in public.

We suggest including the following priority tasks into the new Program:

- **to create the system of the permanent long term monitoring** of the state of physical, chemical, geological, biological and ecological components of the Antarctic system; to develop and **co-ordinate the system of monitoring and set of indicators for it with the existent global systems of monitoring**;

- for implementation of the Ukraine's obligations within the limits of Antarctic Treaty and Convention on the Conservation of Antarctic Marine Living Resources to create a **protective marine area near UAS Vernadsky**. A conducting of researches, necessary for creation of protective area, is priority for the nearest two years;

- **training of young polar researchers**;

- **informative accompaniment of projects of the program and** dissemination **of their results.**

For the improvement of situation in relation to organization of works on UAS and co-ordination of scientific researches we propose:

- to **reorganize** functions of National Antarctic Scientific Center of Ukraine according to modern concept of effective management processes for prevention of situation when **the same state institution determines priorities of its activity and controls implementation of the program of researches**;

- to create new effective National Polar Agency, or new Institute of Polar Research;

- to inculcate **transparent system of scientific projects competition** with bringing in of leading domestic and foreign specialists as independent experts;

- projects to hold competition through **Independent Expert Panel** with the use of objective criteria of evaluation of authors previous scientific achievements (publications in leading scientific journal, citation indexes etc.).

With the purpose of creation of professional environment, opened to the contacts with world science, for introduction of democratic principles of co-ordination, accounting and control in the processes of making decision, we propose:

- to create **Ukrainian Polar Society** as independent from the state professional association, opened for all Ukrainian polar scientists, explorers, and their foreign partners, and call to the collaboration of all interested.

The scientific potential of the Ukrainian researchers as Conference has shown, and directions of the international cooperation offered by participants from the various countries, allows to look with optimism at prospect of participation of Ukraine in the future polar researches.

May 25, 2008, Kyiv, Ukraine

Plenary

RECENT HUMAN IMPACTS ON TERRESTRIAL BIOLOGICAL PROCESSES IN THE MARITIME ANTARCTIC

P. Convey

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Regional climate warming trends are well established at various locations within the maritime Antarctic. Most attention has been given to warming trends, although the importance of changes in other biologically relevant variables (particularly water availability and radiation climate) has also been recognised. However, surprisingly few studies of biological responses to these changes have been completed, with a particular lack of studies over extended timescales. This presentation will integrate recently published data from manipulation studies of plant and animal communities, field observations and remote sensing data to illustrate responses that have been seen or are predicted. Comparison will be made with other, 'direct', human impacts on Antarctic terrestrial ecosystems, including habitat modification (e.g. through trampling) and the introduction of non-indigenous species.

UKRAINE ANTARCTIC RESEARCH DURING INTERNATIONAL POLAR YEAR 2007/8 - VIEW FROM OUTSIDE

G. Milinevsky

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According to results of IV International Antarctic Conference "III International Polar Year 2007-2008: Results and Outlooks" (IV IAC 2009) that was held May 12-14 in Kyiv (Ukraine) by the National Antarctic Scientific Center of Ukraine (NASCU) the main researches carried on during the IPY at Ukrainian Antarctic station Vernadsky in 2007-2008 were in the fields of meteorology and climate, oceanography, Earth geophysics (incl. seismic observation), biology (mainly microbiology and virusology), medicine. Unfortunately the key Vernadsky researches in upper atmosphere physics, physics of ozone layer have not been developed and were presented by two reports only. That because after 2006 the development of many key researches, successfully provided before at Faraday and continued then at Vernadsky, was terminated by the NASCU. Several national and international research projects including the IPY projects were cancelled as well. There are projects of glaciers discharge with Spanish scientists, Ukrainian participation in the ClicOPEN project, project TIMIS as Ukraine participation in the ICESTAR SCAR program and several others collaborative projects. According to IV IAC 2009 there are two NASCU projects only were fulfilled in real international collaboration with other countries. Then very few papers were published in peer-reviewed journals during IPY. The NASCU many years experienced big problems with creation the Antarctic database or Antarctic Data Center. The data produced at Vernadsky during more than 13 years are still not available to Antarctic scientific community as demanded in accordance to Antarctic Treaty.

The analysis of the state of the existent research shows way to improve Ukrainian Antarctic research: (1) needs to increase further the international scientific collaboration by publishing more in international journals, making data available via the Internet, (2) provide international rules for selecting science and selecting the science leaders to defining the fields of the science and research programs have to be undertaken.

FEATURES OF LARGE-SCALE CIRCULATION ATMOSPHERIC PROCESSES IN WESTERN SECTOR OF THE SOUTHERN HEMISPHERE

E. Shcolniy, E. Galich

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Circulation processes of the Southern Ocean in the high latitudes of Southern Hemisphere are insufficiently studied, however they play an important role in formation and development of large-scale general atmospheric circulation and, consequently, the climatic system. Features of statistical structure in the flow patterns for isobaric surface of AT-925, AT-850, AT-500 and AT-200 of hPa, which determine the fields of air flows, are discussed in the paper. ERA40 reanalysis data were used as initial information, presented in the knots of regular 2.5×2.5° grid regards the latitude, from the South Pole to 20°S and meridians 120°W and 30°E, for 1958-2002 for each month. The Antarctic Peninsula, where the Ukrainian Antarctic station Akademik Vernadsky is situated, is included in the sector. On the basis of covariation matrices a component analysis which makes it possible to reveal the important features of structure and dynamics of large-scale atmospheric processes was made. As dispersions in the first three orthogonal components are responsible for most of the total dispersion in the fields (more than 70%), the corresponding orthogonal components are characteristic of the basic features of the most large-scale circulation processes. The first orthogonal component belongs to the most large-scale component of the general atmospheric circulation, west-east transfer. Of considerable interest is the second principal component as the corresponding fields of other proper vectors in all months of a year have the form of bipolar oscillation which describes the correlation between the atmospheric circulation processes above the southern aquatoriae of the Pacific and the Atlantic. It was termed the South-Pacific-Atlantic Zonal Oscillation (SPAZO). It was further explored as to whether interrelationship between the global oscillations indices of intensity of circulation processes in the atmosphere, El-Niño South Oscillation, North Pacific-American Oscillation and North-Atlantic oscillation. These indices provide climatic descriptions of separate regions and global climate as a whole, as well as an interrelationship between these oscillations and SPAZO. Statistical correlations between the factors that characterize circulation processes in the Northern and Southern hemispheres were obtained by perennial data and are of great interest.

LONG-TERM CHANGES IN POPULATIONS OF SEABIRDS ON PETERMANN ISLAND AND SURROUNDING ISLANDS NEAR ANTARCTIC PENINSULA

M. Chesalin (1), R. Naveen (2), H. Lynch (3), I. Bullock (4), M. Rider (5), A. Miller (6), S. Forrest (7), R. Dagit (8), I. Dykiy (9), V. Timofeyev (1)

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(5) US Antarctic Program, Raytheon Polar Services Company, USA
(6) Antarctic Ecosystem Research Division, Southwest Fisheries Science Center, USA
(7) World Wildlife Fund, USA
(8) Resource Conservation District of the Santa Monica Mountains, USA
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The study of the bird population dynamics, especially of pygoscelid penguins is one of the focuses of modern biological research in Antarctica. That serves as bio-indicators of long-term physical and biological change in the Antarctic ecosystem. At Petermann Island there is a long census record of penguin breeding dating back to the 1909 French expedition of Jean-Baptiste Charcot. Since 1994, the Antarctic Site Inventory project has been monitoring penguin, blue-eyed shag, and Southern giant petrel colonies throughout the Antarctic Peninsula. Since 1998, studies of bird composition, reproduction, behavior, population dynamics have been conducted by Ukrainian researchers based at Akademik Vernadsky Station, which is located on Galindez Island, 10 km south of Petermann Island.

The comparison of our data on the number of gentoo nests on Petermann Island with previous data shows that their abundance has increased about 30 times from beginning of the 20th century, 3–4 times from 1970–80, and has doubled since 1990. In contrast, the abundance of Adélie penguin nests on Petermann Island diminished about four times since 1970 and two times since 1997. The newly discovered gentoo penguin rookeries on Moot Point, Yalour, Galindez Islands and possibly Cape Tuxen represent the southernmost locations where this species has been found breeding in the Antarctic Peninsula. In contrast, Booth Island remains the southernmost point where chinstrap penguins currently breed. Possible reasons for long-term changes in seabird populations are discussed.

The location of Akademik Vernadsky Station relative to the southernmost limit of gentoo and chinstrap penguin breeding makes this station a critical site for monitoring seabird populations on the Antarctic Peninsula. We recommend that the Ukrainian Antarctic Program play a critical role in contributing to an expanded international program of seabird monitoring in the area, as well as suggesting the need for increased monitoring of other climatologically sensitive species in the area.

VEGETATION PATTERNS AROUND PENGUIN COLONIES IN ADMIRALTY BAY (KING GEORGE ISLAND, MARITIME ANTARCTIC) – A MODEL SYSTEM FOR STUDYING ECOLOGICAL HYPOTHESES

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Breeding penguins are the major source of nutrients for terrestrial ecosystems in the Maritime Antarctic. It has long been recognized that penguin rookeries and their attendant nutrient supply are of great importance in determining the distribution and abundance of the Antarctic terrestrial vegetation. But, apart from general descriptions, there has been no attempts of quantitative analyses of the effects of penguin rookeries on vegetation changes. The objective of this research was to determine how the presence of penguin nesting sites affects vegetation and to examine whether based on the observed patterns it is possible to validate theoretical models. To address this question stands with plant communities under varying degrees of penguin rookery influence were examined. The fieldwork was carried out on King George Island, near the Polish Research Station "Arctowski". Several vegetation zones related to varying degrees of rookery influence have been recognized. Plant assemblages, which form these different vegetation zones, floristically are not sharply separated. Change in species composition is gradual with a broad overlap of species distributions, the distinct zones are mainly the result of differences in growth-forms of the dominant species. Such results are compatible with Gleason's (1939) individualistic model of plant communities. The process of change in the species composition of plant communities results from a species adaptation to a particular range of environmental factors. In the debate concerning mechanisms of the vegetation change along environmental gradients theoretical models of Grime (2001) and Tilman (1988) have captured considerable attention. Analysis of the results have shown that the recorded patterns of vegetation changes are in agreement with predictions of both these distinct models. However, a detailed examination of the data and the assumptions of both models reveals that these patterns are compatible only with Grime's model. Their agreement with the predictions of Tilman's model is only illusory.

INTERNET CONTROLLED HF RECEIVER FOR IONOSPHERIC RESEARCH IN POLAR REGIONS

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Significant experience has been accumulated in the Institute of Radio Astronomy (IRA) on remote probing of artificial and natural ionospheric inhomogeneities using Doppler technique in HF waveband. The basic signal parameters used within the technique are Doppler spectra of the carrier frequency providing information about the dynamic processes in a vicinity of the radio wave reflection region in the ionosphere. Distinction of the technique is that it does not require construction of expensive dedicated transmitting sites, as well as simplicity and mobility of the receiving sets. The high level of modern computer technology gives possibility to make observations even without operator at receiving site. This sort of Internet-controlled HF receiving facility was developed in IRA. The receiving facility includes: desktop PC; digital HF receivers WR-G313i WiNRADiO (2 units); external reference oscillator; active loop antenna. All the components except antenna are mounted inside the PC. Special software developed in IRA provides remote control of the facility and real time access to the data through Internet. The facility was installed at KHO observatory (coordinates: 78^{o} 12' N, 15^{o} 49' 44'' E) at Svalbard Island (Spitsbergen archipelago, Norway) in 2008. The facility was used for monitoring of the signals from HF radio stations situated near Moscow, Irkutsk, Magadan and Norilsk (Russia). The influence of the full Solar eclipse on the parameters of the probe HF signals were analyzed. The receiving complex took part in several special measuring campaigns which were organized for studying of the self scattering effect produced by powerful HF signals from heating facilities HAARP (USA, Alaska) and EISCAT (Tromso, Norway). One year experience of the operation in remote controlled mode shows that the autonomous Internet controlled HF receiver may be very effective tool for studying of the ionosphere in difficult of access regions like Polar areas of the Globe.

COMPARISON OF TOTAL OZONE COLUMN DISTRIBUTION OVER NORTHERN AND SOUTHERN HIGH LATITUDES

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Results of comparative analysis of quasi-stationary planetary wave (QSW) influences on total ozone column (TOC) distribution over 60°N and 60°S latitudes are presented. TOMS version 8 total ozone satellite data for years 1979-2003 were used to examine variations of longitudinal ozone distribution. Three-month averages for each year were used to obtain the spatial distribution and spectral components of the QSW patterns. Long-term changes of QSW spectral characteristics are compared for the Arctic and Antarctic regions. Comparative analysis has shown domination of quasi-stationary wave 1 in the Southern Hemisphere (SH) during spring, while in the Northern Hemisphere (NH) on the background of wave 1 predominate, although in certain years wave 2 dominates. The maximal TOC disturbances by planetary waves are observed in the winter-spring period both in NH (January-March) and SH (August-October). During development of the Antarctic ozone hole (from mid 1980s to the present) the QSW longitudinal phase at 60°S moved eastward, whilst at 60°N only the longitude of the QSW maximum moved, also eastward. Both hemispheres show strong interannual variability in both position and amplitude of the QSW patterns.

The research was partly supported by Taras Shevchenko National University of Kyiv, project 06BF051-12. The research was undertaken in the framework of the ORACLE-O3 IPY project and the Polar Atmospheric Chemistry at the Tropopause (PACT) SCAR Action Group.

INFLUENCE OF ICEBERGS ON THE STRUCTURE OF FISHABLE PART OF THE SPINY ICEFISH (*CHAENODRACO WILSONI*) POPULATION IN THE COSMONAUT AND COOPERATION SEAS (SOUTHERN OCEAN)

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Data for the analysis were collected by the author in the Cosmonaut and Cooperation Seas (Indian Ocean sector of Antarctica). There were observed alterations in the structure of the fishable part of spiny fish population in January-March. Change of structure defined by both season's alterations of the environment oceanographic characteristics and by icebergs which are grounded in the large quantity on the fishing grounds. It was noted that nuclei of the fishable aggregations were located in the immediate proximity to grounded icebergs on depth 180-300 m. Influence of icebergs on the configuration and density of aggregations of spiny fishes and attendant fish species (*Dissostichus mawsoni, Trematomus spp*., some species of families Channichthyidae and Bathydraconidae) was observed. Icebergs serve as hydrodynamic factors for the accumulation of main food species – Antarctic krill *Euphausia superba*. Thawing of icebergs at warm summer season assists in the beginning of moving (tearing off fast ice and bottom). As the consequence the fish aggregation shifts to the nearest aground iceberg or group of icebergs. Then the iceberg starts movement and scouring shelf floor benthos. That is another factor of influence on space configuration of aggregations. It was noted at day time that the main part of the mature fishes aggregation exists near the bottom where sea floor was free of sponges, corals and another epifauna on the depth 190-300 m. "Cleaned" areas after iceberg impact are basic places of icefish aggregations. Presumed mud bottom blown up by icebergs attracts mature (big size) Antarctic krill to close to bottom layers with abundance of seston. Movement of fishing vessels during changing fishing situation at summer season was analyzed as well.

CLIMATIC CHANGES IN ANTARCTICA AS CONSEQUENCE OF GEOPHYSICAL CHANGEABILITY

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As we studied before the interrelation between climatic changes on the planet and regional anomalies (a drought in Brazil in 2004) with gravitational field changes as global and regional scales were investigated. From the NASA Goddard Institute for Space Studies (GISS) researches it is known that throughout last 50 years the temperature of ground air in Antarctica has been raising each ten years on 0.12°C, and in its western sector - on 0.17°C. In recent paper (Turner et al. 2007) it is specified, that for the last 30 years practically in all territory of Antarctica the deviation of atmospheric pressure from climatic values with a negative sign is observed. Air temperature for the last 30 years concerning climatic values increased in an average troposphere on 0.7°C, and in the lower stratosphere – had been falling down on 0.15°C each 10 years. These facts testify to complex changes in the lower layer of atmosphere. From researches CHAMP (Challenging Mini - Satellite Payload for Geophysical Research and Application) and GRACE (Gravity Recovery and Climate Experiment) it is evident, that around Antarctica the changes of geoid's form take place and corresponding changes in the gravitational field of the Earth with the negative sign the extreme values of which are observed in the western sector of mainland. The reason of such changes is studied in the report. The thesis of influence of these geophysical processes on the climate in the region is discussed.

CLIMATE CHANGES ON THE EARTH - ANTARCTICA AS THE PLANETARY INDICATOR

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Last 50 years each ten years average value of positive ground air temperature anomaly on the planet is 0.11°C and in the western part of Antarctica 0.55°C. Polar areas of the planet are exposed to the greatest climatic changes rather than any other part of the Earth planet. Than in Arctic regions for the last 30 years average value of surface air temperature has raised to 1.3°C, in West Antarctica - to 2.6°C that testifies to special value of Antarctica as the indicator of climatic changes on the planet. In the report, the features of plates tectonic processes around the Antarctic plate and the other processes connected with the geophysical planetary scale changes are considered. Integrated monitoring of geosphere in the Antarctic region allows predicting adequately geophysical changes which form climatic changes on the Earth.

THE TROPOSPHERE GROUND LAYER AIR TEMPERATURE DYNAMICS BY THE ANTARCTIC COASTAL STATIONS OBSERVATION

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In work the data of average monthly values of the ground temperature on 34 stations of Antarctica with the use of statistical methods and methods of multidimensional statistical analysis are considered. All stations are separated on groups of the station in the East and West coast of Antarctica, and also in the Antarctic Peninsula.

Regime of many years ground air temperature changes for each month, season and average annual temperature changes is analyzed. Quantitative descriptions of trend for every group of the stations on which it is possible to judge the tendency in the changes of temperature for all examined period for a definite district are calculated. Three periods are selected, which the steady rise of the ground temperature on the Antarctic stations registered. On Antarctic Peninsula in the period 1980 - 2008 the positive trend more than 2C was obtained. West Antarctica is characterized by growth of the ground temperature of air with 1956 on a 1988 year and falling of temperature of air from 1988 to 2008. East Antarctica is characterized by decreasing of the ground temperature of air from 1954 to 1989 and rising from 1989 to 2008.

Characteristic periodicity in the air temperature changes for the Antarctic Peninsula is about two years. For Western Antarctica this parameter is two and four summer periods, for East Antarctica – two years. The correlation connection between the ground air temperature and global climatic indexes (index of El Nino - La Nino (SOI index), the NAO index) showed the connection of temperature variations with global climatic indices in spring and summer months.

QUASI-STATIONARY PLANETARY WAVES IN THE LATE WINTER ANTARCTIC STRATOSPHERE TEMPERATURE DISTRIBUTION

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Ozone hole over Antarctica exists almost three decades each austral spring. The planetary wave amplification is usually observed on the final stage of the ozone hole development and this feature is generally described by the dynamical model of the sudden stratospheric warming during the stratospheric polar vortex breakdown. The relationship between the late-winter dynamical disturbances in the polar vortex region and the ozone hole state in spring was analyzed statistically. As an indicator of the wave activity in late winter, the quasi-stationary wave (QSW) amplitude in the zonal distribution of the stratosphere temperature in August was used. The late winter zonal anomalies in the stratospheric air temperature were examined by the NCEP-NCAR Reanalysis data using the August mean zonal distribution. The ozone hole state is characterized by the monthly mean values of the three parameters: (1) **ozone hole area** by datasets presented in Southern Hemisphere Winter Bulletin (2007); (2) **zonal mean total ozone** column by the daily TOMS/NOAA/OMI gridded data and (3) **the Amundsen-Scott total ozone data**. The correlation coefficients between the **QSW temperature** amplitude time series and the three mentioned parameters have been calculated. It has been shown that the QSW amplitude in August is highly correlated with September-November total ozone (0.6-0.7). This results indicate that initial conditions of the ozone hole formation are dependent on the polar vortex asymmetry and the 3-month duration of the QSW effects in the seasonal evolution of the ozone hole existence. The possible ozone hole diminution is mainly preconditioned by the QSW amplitude increase in the lower stratosphere, particularly, near the polar vortex edge.

The research was partly supported by Taras Shevchenko National University of Kyiv, project 06BF051-12 and Australian Antarctic Science project 737. The research was undertaken in the framework of the ORACLE-O3 IPY project, SCAR ICESTAR Program and the Polar Atmospheric Chemistry at the Tropopause (PACT) SCAR Action Group.

WINTER TEMPERATURE INTERANNUAL VARIATIONS AT THE FARADAY/VERNADSKY ANTARCTIC STATION (1948-2008)

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Winter warming in Antarctic is most distinct in the region of the West Antarctic Peninsula. The winter temperature increased to 6°C at the Faraday/Vernadsky station during the second half of twentieth century. The corresponded decadal trend is 1.1 °C/decade while the global mean value is in average 0.11 °C/decade. The interannual variations of the winter temperature at Faraday/Vernadsky are analyzed in comparison with the variations of the large-scale temperature distribution. The meteorological station datasets (surface air temperature and wind velocity/direction for the 1948-2008 period) from the READER project data, as well as the temperature and zonal/meridional wind distribution at 1000 hPa from the NCEP-NCAR reanalysis data (1979-2007) were used. It has been shown that the winter warming at Faraday/Vernadsky is accompanied by narrowing of the range of the temperature variability as a result of weakening of the extremely cold winter anomalies. The temperature varied between -4°C and -14°C during 1950s and between -4° and -8°C in the last decade. The east-west migrations of quasi-stationary extremes in the temperature distribution around Antarctic Peninsula indicate that the cold anomaly appearance at the station relates to the area located to the east of Antarctic Peninsula (Weddell Sea region). Decrease in the influence of the cold anomalies on the station temperatures can be concerned with the tendency in the wind direction change. At Faraday/Vernadsky, the frequency of the cold continental winds (azimuth 0°E±45°) has been reduced but frequency of the warm ocean winds (azimuth 180°E±45°) has been increased threefold in the last two decades in comparison to 1950s-1970s. That is evidence of the structural change-over of a circulation pattern in the region of the West Antarctic Peninsula. Results indicate that the changes of the quasi-stationary patterns in the Antarctic troposphere parameters can possibly give a contribution to the local climate change in the region.

The research was partly supported by Taras Shevchenko National University of Kyiv, project 06BF051-12.

VOLCANIC EMISSION OF OZONE-DEPLETING HALOGEN' SPECIES

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The driving role of chlorofluorocarbons (CFCs) in the depletion of stratospheric ozone is generally accepted. CFCs are commonly esteemed as purely anthropogenic. However, volcanic explosive eruptions and noneruptive quiescent continuous degassing is one of powerful natural sources of several ozone-depleting halogen species in atmosphere, especially in Antarctica. The aim of present study was to assess the source strength of these emissions, to elucidate the reaction mechanisms for the halocarbon formation in the volcanic plumes, and to estimate the possible volcanic halocarbons emission in Antarctica during Holocene.

The values of global emission for halocarbons (CH_3Cl, CH_2Cl_2, $CHCl_3$, CCl_4, C_2H_5Cl, $CHCl{=}CCl_2$, $CCl_2{=}CCl_2$, $CH{\equiv}CCl$, C_6H_5Cl, p-$C_6H_4Cl_2$, $CH_2{=}CHCl$, CH_3CClF_2, CF_2Cl_2, $CFCl_3$, CH_3Br, CH_2Br_2, $CHBr_3$, C_2H_5Br, CH_3I and C_2H_5I) from volcanic and hydrothermal sources into Earth' atmosphere have been calculated and compared here. It follows that contribution of volcanic emission for these species in depletion of stratospheric ozone in the catalytic halogen cycles is not more 0.1 %, but these species impair significantly the level of tropospheric ozone in vicinity of the volcano.

The scheme of gas phase free radical chain halogenation of the hydrocarbons has been proposed and confirmed by our thermodynamic and kinetic calculations. The synthesis of halogenated trace gases is possible as light alkanes like CH_4 and C_2H_6 are produced at shallow depth in the volcanic and hydrothermal systems by thermal decomposition of organic matter. In simple gas-phase reaction radical-chain cycles, these hydrocarbons can react simultaneously with Cl, Br and I – atoms produced from appropriate inorganic halides. This allows to explain the experimental relations between concentrations of CH_3I:CH_3Br:CH_3Cl and CCl_4:$CHCl_3$:CH_2Cl_2:CH_3Cl in volcanic and fumarolic gases from Momotombo volcano.

The possible volcanic emission of halocarbons from Erebus and explosive eruptions in Southern Hemisphere during Holocene was demonstrated hasn't notably impact on their content in air from firn and ice cores in Antarctica. This conclusion was confirmed by our analytical data for the halocarbons analysis in ice cores sampled along glacier profile on Galindez Island (Coastal West Antarctica).

THE INTERACTION OF ORGANOCHLORINE CONTAMINANTS WITH SNOW COVER IN ANTARCTICA

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The snow cover in Antarctica is a global sink for high-toxic organochlorine contaminants (OCs) from their anthropogenic sources in tropics and mid-latitudes. The snow surface/air (K_{IA}) and mineral surface/water (K_m) partition coefficients, and related changes of the enthalpies in these processes have been calculated for OCs (pesticides, polychlorinated biphenyls, dibenzo-p-dioxins/furans) identified in air, seawater and snow cover of Antarctica. Influence of OCs nature and air temperature on the snow flakes/air scavenging ratio has been elucidated. It has been shown that ice/air interface introduces main contribution into decreasing of total OCs fugacity in snow cover in Central Antarctica, whereas the contribution of the organic phase in the cover is more essential than one in the coastal regions.

The desorption kinetics for OCs from the snow cover to boundary air layer corresponds to the kinetics of the cover' diagenesis, and it can be predicted on basis of independent glaciological measurements of the snow diagenesis' kinetics at different temperatures.

The lifetime for OCs from the cover increases with growth of $log\ K_{IA}$ value for the OCs. Maximal fluxes of DDTs and polychlorobiphenyls from air onto the snow cover in Antarctica are close to the same fluxes in Arctic and to peak' values for world production and usage of the OCs. The temporal decline for OCs level in the Antarctic snow cover reflects the global reduction of their production and usage in the Southern Hemisphere. Intensity of the fluxes for the OCs from air into the Antarctic snow cover is reduced during latest decades and the process is closed to the equilibrium now. Although the OCs amount deposited in Antarctic snow is low in comparison with their global emission, the glaciers and snow cover in coastal regions of the continent and the islands are to be essential local sources for the re-emission of COPs in coastal waters of ocean, lakes and in the boundary atmospheric layer.

CLONING OF *CASSANDRA* ELEMENTS FROM GENOMES OF ANTARCTIC VASCULAR PLANTS

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Native Antarctic flora of vascular plants is represented by only two species: *Deschampsia antarctica* and *Colobanthus quitensis* (Alberdi, 2002). These species inhabit the Western shore of the Antarctic Peninsula and adjacent islands. Until now remains unclear how many times these plants migrate in Antarctica from South America (Parnikoza et al., 2007). Genetic analysis of Antarctic and American populations can solve this problem. One of the most effective is analysis through retrotransposon-based fingerprinting (Kalendar, Schulman, 2006).

Previously we reported the new plant TRIMs (terminal-repeat retrotransposons in miniature), named *Cassandra* (Kalendar et al., 2008). These elements were found in more than 50 species across the plant kingdom. They carry conserved 5S RNA sequences and produces noncapped, polyadenylated transcripts. The distribution of 5S genes is very variable in flowering plants and may be partially explained by *Cassandra* activity. So, using these elements as tools for genotyping may be useful in investigations of plant population genetics, phylogenetic works etc.

We cloned and sequenced *Cassandra* from *D. antarctica* and *C. quitensis*. Both elements have similar structure and length: 766 bp (*D. antarctica*) and 801 bp (*C. quitensis*). Nucleotide sequences and information about these elements are available in GenBank under accession numbers EU867815 and EU882730.

HYDROBIOLOGICAL RESEARCHES OF COASTAL BOTTOM COMMUNITIES IN DAVIS SEA (ANTARCTICA)

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Researches of coastal biocenosis were conducted with the help of diving method to the depths of 50-60 meters. By number of species the coastal high-altitude areas of Antarctic (station Peace) are similar to the Arctic pool and boreal seas. Density of settlements and a biomass of animals also were great. The biomass reached some kgs on 1 square meters. The flora is presented by Diatoms and red algae *Phylophora antarctica.* On the bottom surface of ice Amphipoda, Polychaeta, Echinodermata, Hydrozoa and Fishes are found. Such species as Gammarus, Paramoera, Cheirimedon and fishes *Pagothenia borchgrevinki* reach high numbers.

Zonality in distribution of animals on depth is mentioned. The zone type of distribution of shallow fauna and flora is characteristic for the high-latitude Antarctic seas. The superficial zone is almost lifeless. Biocenosis of urchin and starfish begins with 5 meters of depth. More deeply than 15 meters Alcyonaria appears, from 20 meters Spongia, Ascidiae, Echinodermata are recorded.

Diapause of sestonophages and termination of primary production formation in winter months are mentioned. The temperature and other hydrological parameters vary little with depth.

GEOCHEMICAL MODELING OF MAGMATIC AND MAGMATIC-HYDROTHERMAL SYSTEMS OF DECEPTION ISLAND VOLCANO (WEST ANTARCTICA): BASIC DATA AND PRELIMINARY RESULTS

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Taking into account that subglacial terrains of Antarctica are inaccessible for direct geological study, region-scale results may be obtained by means of single-grain trace element geochemical study of zircon and monazite large detrital populations from glacial sediments that reflect provenance (age and composition of rock types widely distributed within the drained area). Complete application of this approach requires the realization not only the models designed for the geochemical evolution of the system continental crust — depleted mantle which are based on estimation of the rate of growth of the continental crust at the expense of the extraction from the depleted mantle, but the additional realization of geochemical models of magmatic and corresponding magmatic-hydrothermal systems for each investigated subglacial terrain.

The designed models Includes: (1) a set of equations of Rayleigh type for trace elements behavior during the melt crystallization based on empirical data set obtained for comagmatic rock series; (2) zircon (Zrn), apatite (Ap) and monazite (Mnz) solubility equations (Watson — Harrison — Montel) used to evaluate model temperature (T_{model}) and fluid (H_2O) regime of magmatic system during its evolution; (3) calibrated $\ln K_Y^{Ap/Zrn}$ vs. 1/T(K) dependence ($K_Y^{Ap/Zrn} = C_Y^{Ap}/C_Y^{Zrn}$, C_Y^{Ap} and C_Y^{Zrn} are the Y content in coexistent Ap and Zrn respectively) allowing to confirm the obtained values of T_{model}; (4) equations for calculation of model fluid/melt trace element distribution coefficients as well as model trace element composition of hydrothermally altered rocks and their accessory minerals; (5) equations for determination of the initial magma source and corresponding degree of partial melting as well as procedures for total (final) validity test.

In a restricted case of points (1)-(4) a good agreement between the model (calculated) trace element compositions and modal (natural) ones serves as effective validity test. Pilot version of modeling procedure was demonstrated on an example of Deception Island volcano (West Antarctica) with hydrothermally altered marine sediments of its caldera (Port Foster). Preliminary results of modeling confirm the obtained geochemical data validity. But their further realization requires the technique to derive the hydrothermal contribution from whole-rock trace element composition of Port Foster sediments. Final validity test of point (5) requires the results of modeling of geochemical evolution of crust — mantle system within the region which may be derived from detrital zircon and monazite geochemical study.

PLANETARY WAVE CLIMATOLOGY IN ANTARCTIC REGION FOR 1979-2008 OZONE DISTRIBUTION

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Total ozone distribution in latitude belt of 50-80S is investigated using satellite data. The measurements of Total Ozone Mapping Spectrometers on board of Nimbus-7 (1979-1992) and Earth Probe (1996-2005) as well as Ozone Monitoring Instrument data (2006-2008) are analyzed. A gap in these measurements is filled in with use of NOAA-9 data for 1993-1995. Southern spring period is analyzed because during this season ozone hole develops and maximal ozone time and spatial variations exist. The ozone distribution asymmetry in longitudinal direction is considered. Planetary wave parameters and their long-term changes are studied. The values of wave amplitude, maximum and minimum position are calculated. The wave maximum is systematically situated in Australian longitudinal sector and the minimum - in the southern part of the Atlantic Ocean. At the same time, the determination of quasi-stationary wave structure shows a statistically reliable eastward minimum shift on basis of 30-year climatology. The shift rate equals 13-20 deg/decade. The planetary wave spectral characteristics are determined with use of longitudinal distribution decomposition in Fourier series. The spectral harmonics amplitude and phase are calculated. The impact of their long-term changes on quasi-stationary wave structure is shown. A quasi-stationary wave longitudinal profile depends predominantly on the first 2 harmonics with the lowest zonal wave numbers. The variations of total ozone absolute values are considered. Ozone hole development during 1980-1990-s and its stabilization in the last 10-15 years are explored. Interannual oscillations of monthly and seasonal zonal means for the 30-degree latitudinal range are studied. Tendencies for the maximum and minimum longitudinal distribution are estimated. Ozone content change analysis over Antarctic Peninsula is carried out as well. As a result, in this work a complex estimation of the ozone hole state and planetary wave impact on ozone distribution is studied.

The research was partly supported by Taras Shevchenko National University of Kyiv, project 06BF051-12. The research was undertaken in the framework of the ORACLE-O3 IPY project.

BIOGEOGRAPHY OF FISH LEECHES (HIRUDINEA: PISCICOLIDAE) OF WEST ANTARCTICA

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The Southern Ocean is the single water area encompassing southern extremities of the Atlantic, Indian and Pacific oceans including a relatively small shelf zone inside. Its conventional boundaries extend over deep sea trenches and are marked by the Antarctic Circumpolar Current. This current started emerging in the Cretaceous (at the beginning of the breakup of Gondwana) and came finally into existence 26 My ago. The Antarctic Circumpolar Current favoured the isolation of the cold-water fauna of the Southern Ocean and the formation of a unique refugee or an “evolutionary machine” on a global scale. This process resulted in a high degree of endemism of various groups of invertebrates, lower chordates and fishes. In Antarctic coastal waters, the bulk of the fish fauna comprises members of the order Perciformes belonging to the super family Notothenioidae. Families characteristic to other parts of the world are represented there in a much less degree; these include Rhinobathidae, Zoarcidae, Liparidae, Macrouridae, Muraenolepidae and Bothidae. It has been showed that the main body of the Antarctic autochthonous shelf fish fauna is members of Notothenioidae (fam. Nototheniidae, Channichthyidae, Bathydraconidae, Harpagiferidae and Artedidraconidae). In this connection, an examination of their parasites and leeches (Hirudinea, Piscicolidae) first of all is of great interest. Fish leeches are viewed as a component of benthos since they lay cocoons on bottom substrates and attack their hosts during their reproduction and feeding at the bottom.

In the Antarctic Region, 21 species of fish leeches assigned to 13 genera have been recorded. Beyond that region, 3 species have been recorded from Australian and Tasmanian waters, thus suggesting a high degree of endemism of these animals, which are associated with endemic fishes. Biogeographical demarcation of the Antarctic Region by benthic fishes is very uneven. It is interesting to find out whether the distribution of fish leeches correlates with the division into districts according to the distribution of their hosts. We presented a faunistic analysis of leeches of West Antarctica (in terms of geography), which differs in its climatic conditions and structure of the coastal zone from East Antarctica and includes not only the West Antarctic Province but also some areas of the Continental Province.

THE ROLE OF OZONE IN THE TROPOSPHERE-TO-IONOSPHERE ENERGY TRANSFER

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The better places for investigation of the weather impact on the geospace are meteorologically active regions located in middle geomagnetic latitudes. In these areas the ionosphere is relatively undisturbed and meteorological effects can be detected there on quiet background. Antarctic Peninsula satisfies these requirements as well as possible and seems the best site for study the troposphere-to-ionosphere energy transfer. The role of ozone in the different geophysical processes is one more task which can be experimentally examined at this region at the time of evolution of the ozone hole, when quick variations of ozone concentration with a big magnitude were observed.

The results of analysis of ozone impact on the troposphere-ionosphere coupling are presented. Meteorological, ionospheric and ozone data obtained at the *Akademik Vernadsky* station from 1995 through 2004 have been statistically processed. It have been established that the intensified troposphere-ionosphere interaction (by example of spread-F phenomenon) corresponds to depressed ozone concentrations. This result is discussed in terms of theory of atmospheric gravity waves propagation in the non-isothermal atmosphere.

This work was supported by joint Ukrainian-Russian project financed by National Academy of Sciences, Ukraine (grant 72-02-a) and Russian Fund of Fundamental Research (grant 08-02-90437-Ukr).

THE SMALL ICE CAP DISINTEGRATION MONITORING BY THE LOW FREQUENCY ACOUSTIC EMISSION METHOD

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Regional warming produces rapid ice sheets disintegration in Antarctic Peninsula. The small ice caps are more sensitive to the regional climate changes. During the last decades the annual mean temperature has risen about 2.5°C in Antarctic Peninsula region. According Shepherd and Wingham (*Science*, 315, 2007) the West Antarctica Ice Sheet is losing about 50 Gt/year. However the high dynamics of the glacier volume reduction is related not only to the rise of air temperature, but also with their structure peculiarities. The glacier age diminishes with the rise of the ice temperature. It causes change of parameters of the tense state of large ice volumes. As a result the number of destruction points is developed in the places of the tension concentration. The processes of large cracks formation and the glacier separate parts movement are accompanied by acoustic emission. The powerful low-frequency acoustic emission results the avalanche-like development of large cracks from small ones in absorption processes. The inner state glacier change monitoring allows providing the volume ice losses forecast taking into account the processes of internal destruction. The analysis of temporal sequence of the ice destruction moment and the power spectrum of low-frequency acoustic emission in separate sites of cracks will allow studying the avalanche-like destructions in an icy array, initiated by the separate powerful hidden breaking. Comparison of the ice volume reducing data to 3D photogrammetric results will allow creating an interpolation model of the off-shore island glaciers volume losses. The results of the correlations of intensities of the destruction of ice with the variations of ice temperature, air temperature and the volume losses of ice, the role of each mechanisms of ice destruction is defined. The result of the studies is interpolation model of dependencies of the volume losses of ice from parameters of low frequency acoustic emission of the glacier, reflecting processes of the internal destruction of ice. The model will allow forecast the ice volume losses connected to the glacier internal destruction which correlates with the ice temperature and the surrounding environment temperature.

Round table in the framework of IAC2009

"Ukraine and Russia in Antarctica: charges and profits"

CURRENT STATE OF THE INTERNATIONAL SCIENTIFIC OBSERVATION SYSTEM IN ANTARCTICA AND THE PLACE OF UKRAINIAN SCIENTISTS

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On the basis of Antarctic Treaty, signed by a number of the countries in 1959, the Convention was drawn up and signed. In 1982 the Commission for Conservation of Antarctic Marine Living Resources (CCAMLR) was founded and began activity. Presently 25 countries are the Commission Members. Ukraine became a full member of the Commission since 1995. The System of International Scientific Observation in the Antarctic region is created within the framework of the CCAMLR and intended to assist to the achievement of the purposes, ensuring of the compliance of the Convention provisions and guidelines.

At present the Commission determines the mandatory presence of International Scientific Observers aboard all fishing vessels, conducting fisheries for fishes, squids and crabs in the area of the Convention responsibility. For several years Ukraine has initiated the mandatory presence of International Scientific Observers aboard krill fishing vessels. Up to now some countries object to the realization of these initiatives, justifying their position by the national programs available on scientific observation aboard krill vessels. The duty of scientific observers aboard the vessels carrying on scientific researches or fisheries for marine living resources is observation of fishery operations and submission of reports in the Convention area from the standpoint of objectives and principles of the CCAMLR.

The report and the Logbook of Scientific Observations are only submitted to the Secretariat of the Commission in electronic form. Forms of the Report and the Logbook are annually edited, complemented or simplified for obtaining of larger amount and better quality of data on fisheries and biology. During the period of the country's membership in the Commission, the Scientific Observers from Ukraine have annually participated in the Scientific Observation System in the Antarctic region both as International and National scientific observers.

Only for the last two seasons 10 YugNIRO research workers have taken part in cruises on the vessels of Ukraine, Russia, Namibia, and Spain. The Ukrainian scientific observers are distinguished by their high level of proficiency in comparison to observers from other countries. Unfortunately, absence of the sufficient financing from the side of the state in the last years affects the technical training of scientific observers' team of Ukraine and results in lack of young scientific manpower.

CLIMATE CHANGE INFLUENCE AND TOURISM IMPACT ON ANTARCTIC ECOSYSTEM

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No doubt that the main threat to krill based South Ocean ecosystem is (1) climate warming and other environment changes caused by warming - reducing sea ice in Antarctic Peninsula region, sea water temperature changes, desalination, ozone depletion, UV-irradiation rising and (2) tourism activity impact. Recent information (Yang et al 2007, Turner et al., 2009) confirms idea about impact of ozone depletion on climate changes, especially at Antarctic Peninsula region and South Atlantic. Our recent research shows the significant changes of planetary wave ozone minimum position and strong asymmetry in ozone distribution above South Ocean with low ozone in South Atlantic region and high ozone in Australian sector (Grytsai et al. 2007). It was extremely scientifically and practically important to understand how all this changes impact on krill population and phytoplankton distribution and abundance. Then the most reasonable the tasks should be focused on climate change impact on krill population.

Last decade the Antarctic tourism is growing every year. Thousands visitors attend the same Antarctic sites every days disturbing breeding colonies of penguins, seals, sea birds. The tourism activities in Antarctica should have no more than a minor or transitory impact on the environment. Antarctic tourism should take into account that Antarctica is unique region. The establishment of geographic and seasonal limits for tourism activities from regional to local scales may be required. A precautionary approach should be used to manage tourism in the absence of scientific data about tourism impacts. Certain types of commercial tourism need to be limited or prohibited. In particular, the development of land-based tourism should be prevented.

BIOLOGICAL RESOURCES, ANTARCTIC KRILL AND ECOSYSTEM BASED MANAGEMENT: INTRODUCTORY NOTES FOR THE UKRAINIAN – RUSSIAN ROUND TABLE ON THE ANTARCTIC ISSUES

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Once it was possible for the USSR to send fishery research expeditions to the Antarctic which continued more than half a year. Almost the half of this time took only the way there and back. Nobody calculated yet how much funds did spend USSR for exploring biological resources in the Southern Ocean. Of course these investments turned out to be not very effective but due to the studies of Soviet, Russian and Ukrainian scientists the world learned more about Antarctic marine ecosystems. And there is a considerable contribution of the USSR and its successors in achieving today's situation when a number of countries use Antarctic krill, fish and even king crabs and squids and there are international standards to regulate this process adopted through the Commission for Conservation of Antarctic Marine Living Resources (CCAMLR). Nowadays the place of Russia and Ukraine in the Antarctic seas is barely visible and it is not acceptable from both the political and economical point of view. Our countries, being guided by historical experience, have to take a much more active position in the research of Antarctic marine ecosystems and practical issues of the ecosystem based management of marine living resources within CCAMLR. This is one of many (of course!) important conditions for Russia and Ukraine of finding their new roles in the word, winning confidence and trust on the international scene, and stimulating the development of marine science and technology.

KRILL FISHING IN ANTARCTIC SEAS: UKRAINE VIEW

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Due to current uncertainties in the status of Antarctic krill resources, which do not allow scientists to provide a forecast of the ecosystem changes, Ukrainian scientists suggest to make the scientific observation system mandatory in the krill fishery. The extremely limited amount of information on the state of krill biomass (stock) on the fishing grounds, especially at the beginning of the fishing season and necessity to improve the understanding of Antarctic marine ecosystem and its components required urgent introduction mandatory national/international scientific observers on krill fishing vessels. Data is lacking about the dynamics of mesopelagic fishes (myctophids). In addition, considerable data gaps exist on marine birds and whales. Squids are not quite taken into account in the models and very small information on squid population and behaviour in Southern Ocean waters is available. Some parameters of krill predators demand, applied in the models, are not sufficiently accurate or are out of date. The influence of climate change, which still is practically not taken into account in the models, represents a major source of uncertainty. Believing that the conservation of marine living resources requires international co-operation and taking into account the experience of the Ukrainian national scientific observers deployed on vessels fishing for Antarctic krill, Ukraine scientists propose that each vessel participating in the fishery shall have at least one international or national government-appointed scientific observer in fulfilling the requests in the CCAMLR Scheme of International Scientific Observation. In addition we suggest considering the development of a research plan, which would allow progressively reducing the gaps in the necessary data. The research plan can be based on the matrix of research tasks proposed for exploratory krill fisheries in new regions.

THE ROLE OF SCIENCE IN CONSERVATION OF THE ANTARCTIC ECOSYSTEM: REVIEW OF XXXII ATCM RESULTS

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The first joint SC-CCAMLR/CEP Workshop (3-4 April, 2009) was a remarkable event in the tight schedule of XXXII ATCM in Baltimore, USA. It was held at the 50th Anniversary of the signing of the Antarctic Treaty, in respond to the urgent need for more close cooperation of different scientific bodies within Antarctic Treaty System. For the first time the scientific experts from CEP and CCAMLR met together to discuss the areas of common interest in the principal problems of conservation and environmental protection in the Antarctic, including the climate change, introduction of non-native species, protection of native species, conservation of marine ecosystems and marine areas monitoring, management and protection. The Workshop emphasized the importance of a harmonized approach to the development of a representative system of marine protected areas in the Antarctica and pointed out that such a system could be based only on solid scientific ground. In the light of recommendation adopted by the Workshop and latter approved by XXXII ATCM, the development of representative system of marine protected areas becomes the issue of priority for both CCAMLR and CEP. For CCAMLR it presents a challenge to find 'the golden mean' between the conservation and the rational use, according to the words and spirit of the Article II of the Convention of the Conservation of the Antarctic Marine Living Resources. Scientific ecosystem approach provides the firm basis in solving this complex problem.

THE RESEARCH PROJECT TO DIGITIZE FORMER SOVIET KRILL FISHING EXPEDITION DATA

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During former Soviet Union krill-fishing expeditions in Southern Ocean in 1970-1990 was collected valuable set of data for each trawl fishing effort. Those data now are kept in paper forms as expedition's logbooks and represent exclusive set of observations to research the climate change impact on krill ecosystem. The lack of data on krill distribution and behavior in 70-90s, that are essential to create real patterns and models of krill ecosystem response on climate change, fishing and overfishing, make impossible to estimate the sustainability of krill population. The data kept in more then 50 fishing cruise observer logbooks with krill fishing trawl sets, biological sampling of krill individuals for bioanalysis and size measuring in each trawl sets. According the project will be provided: (1) scan each logbook page; (2) digitizing all data in electronic format; (3) submitting the data to the Commission for Conservation of Antarctic Marine Living Resources (CCAMLR). The digitized data will help to answer on very important question what happen to krill population now and in future is to create the krill distribution dataset and corresponded to that phytoplankton, chlorophyll, salinity data with maximum time and spatial coverage and make it available for scientists for analysis and modeling. On this task the project will provide data in electronic format on krill fishing efforts and krill distribution in 58 Convention area for scientists and the CCAMLR consideration for estimation the changes of krill ecosystem in connection to climate change, fishing and give possibility to make forecast of its "health" for future. This data will help as consequences to adopt the ecosystem precautionary measures. According the project all data in electronic format will be submitted to the CCAMLR to make them available before the CCAMLR Meeting in 2009. The first results of the project are discussed.

The research is supported by the USA based Pew Charitable Trusts' Antarctic Krill Conservation Project.

PRIORITIES FOR ESTABLISHING ANTARCTIC KRILL ECOSYSTEM MONITORING AND MANAGEMENT PROGRAM

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The main purpose of our activity is advocating the adoption by the Commission for Conservation of Antarctic Marine Living Resources (CCAMLR) of a precautionary, ecosystem-based management regime for krill by the end of 2009 that protects the species and its predators. To follow this aim the priorities for its achievement are: (a) establishing no fishing regime in small-scale management units (SSMU) where there is no monitoring; (b) limiting krill fishing near sea birds, penguins and seals breeding sites in whole Area 48; (c) discuss possibilities to break down the current total krill annual catch (TAC), or complement it with smaller TACs at subarea level; (d) discuss the possibility to lower current 620 000 tons krill catch limit until enough scientific data will be obtained to take management decisions. All these priorities arise because of uncertainty on krill and krill predator populations, their distribution and seasonal and inter-annual variability, as well as predator-prey relationships and the effects of climate change.

The work is supported by the USA based Pew Charitable Trusts' Antarctic Krill Conservation Project.

FACTORS DETERMINED THE ANTARCTIC KRILL (*EUFAUSIA SUPERBA*) FISHERIES SUCCESS IN THE ATLANTIC PART OF THE ANTARCTIC REGION

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The long-term variability of the Antarctic krill catches in the Atlantic part of the Antarctic Region (APAR) are caused by the changes of water currents structure and intensity. These fluctuations determine the direction of transfer and amount of the krill inflow into the fishing areas as well as intensity and location of topographical gyres, creating favorable conditions for commercial accumulations formation. Hydrostructure dynamics is generated by the atmospheric transfers which and intensity depends on variability of helio- and geophysical factors (the Solar activity, of Earth rotation). As shown in a number of works (Chizhevskiy 1973; Cushing 1995; Bryantsev 2008). These factors can be considered as indirect predictor of the general ecosystem state or its separate components.

In our case the predictors are total catches of the Antarctic krill in three districts of APAR: at the South Shetland and South Orkney Islands and at the island of South George as well as total catches (according to FAO). There is also exist an opinion that these indices reflect krill productivity, but in a more long-range extent they reflect intensity of its transferring from the Weddell and Bellingshausen Seas and peculiarity of the local currents system. The obtained system of the relation between krill catches and geo- and heliophysical properties and indices of atmospheric circulation allow making a number of direct and indirect conclusions as to the dependence of krill catches in APAR in general from certain atmospheric transfers.

The results show that the anticyclone form of atmospheric transfers within the limits of the analyzed area creates water circulation system, which stimulates formation of commercial accumulations of the Antarctic krill. The possibility of extrapolation of the mentioned above initial geo- and heliophysical properties and exposed relations gives reasons for creation of long-term prognostication methodology of the krill population state and success of its fisheries.

Plenary

(continue)

ECOLOGICAL VARIABILITY OF *DESCHAMPSIA ANTARCTICA DESV.* LEAF ANATOMY OF TWO MARITIME ANTARCTICA REGIONS

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We studied comparative anatomy of *Deschampsia antarctica* leaf structure, taken from two distant Coastal Antarctic regions King George Island (South Shetland Islands): 4 points from Arctowski ice-free area, and 1 from Ferraz station area and Argentine Islands region: 1 point from Berthelot Island and 1 point from Urugway Island. The middle one-third parts of leaves of 5 plants from each habitat were fixed in Chamberlain mixture. Transverse sections were cut by microtome, paradermic preparations were carried out in order to study epidermis as well. Leaf sections were washed by weak solution of safranin and hematoxylin. Anatomical leaf sections were evaluated by Vasil'ev's scale (Vasil'ev, 1988) with a few additions to it. Certain variability of *D. antarctica* leaf anatomy was shown in xeromorphic and mesomorphic characteristics.

Plants from habitats at coastal rocks and directly under Ecology Glacier from Arctowski ice-free area have the most xeromorphic structure, as determined from studied complexes of characteristics. Plants of the former habitat have some xeromorphic characteristics (very small epidermal cells with thick external cell walls, even smaller motor cells), and some mesomorphic (thick epidermis, large motor cells). Plants from Ecology Glacier also have xeromorphic (very thick epidermal cell walls, small mesophile cells) and some mesomorphic characteristics (thick epidermis, large motor cells). Plant from Berthelot Is. has the most mesomorphic anatomical leaf structure (the thinnest epidermis with thin external cell walls, middle-size mesophile cells).The extent of xeromorphy in this case possibly depends on ecological conditions of the plant habitats, most likely on insolation intensity and hydrological regime. The less droughty are the habitat conditions, the more mesomorphic leaf structure takes place.

We thank the National Antarctic Scientific Center of Ukraine and I. Parnikoza for preparing this investigation.

SOUTH OCEAN ECOSYSTEM MONITORING IN THE FRAMEWORK OF UKRAINIAN ANTARCTIC PROGRAM 2011-2020

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To develop the Ukrainian research in the field of ocean ecosystem study we propose to include in Ukrainian Antarctic Program 2011-2020 the following objectives: establishing the network of monitoring ranges on Argentine Island Archipelago, monitoring underwater landscapes, monitoring of the set of key parameters of pelagic ecosystem at the network of stationary sites at Vernadsky area, study the several mammal species according the CEMP Program.

Main feature of proposed project is the creation of digital database for the research data provided by former Soviet fishing vessels. The project assists to establish the operating network of the ecosystem monitoring of shelf and pelagic area in the Vernadsky Ukrainian station region, and to study the biocenosis changes due to climate warming and anthropogenic pollution.

GENERAL FEATURES OF THE SEA LEVEL RECORDS FROM ANTARCTIC PENINSULA AND SOUTH AMERICA TIDE GAUGES

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Tide gauge data provide information on sea level variations as well as on the vertical land movements at tide gauges area. Sea level records from a number of tide gauges in the region of Antarctic Peninsula and South America were analyzed with the help of the empirical orthogonal functions method.

Monthly averaged data from each tide gauge have been expressed as a sum of four components: a tide gauge constant, a linear trend, low and high frequency variations. Trend and variations in two frequency bands obtained from the Antarctic Peninsula records were compared with different tidal gauges ones. Gauges have been segregated into three groups versus a level of correlation of components. High level of correlations indicates common features in tide gauge records. The spatial distributions of tide gauges in these groups were analyzed to model of regional and local components in recorded time series. The regional component was used for recursive determination of trend and the local component at each site.

Time series of sea level variations were compared with the atmospheric pressure data to investigate the inverted barometer effect in the region of Antarctic Peninsula. Variations of sea level in both frequency bands were highly anti-correlated with variations of the pressure. However the trends in the time series of two kinds of data are rather independent.

LARUS DOMINICANUS: A GARDENER OF MARITIME ANTARCTIC?

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A great number of direct observations corroborate the possibility of native Antarctic vascular plants being transferred by birds for their nests. However, the identities of bird species, the manner(s) of plants' employment, and itineraries of their travels remain unclear. It was shown for different parts of maritime Antarctic (and we confirmed it for the Argentine Islands region) that *Larus dominicanus* Lichten does use the vascular plants to build nests. The utilization of plants is therefore selective and independent on the geographical location. If the weather is fine, *L. dominicanus*'s sexual activity is registered in early October. Birds mate, secure nesting places, collect material to build nests. The birds are forced to gather nest material from different islands because only the tops of coastal ridges shed its snow coats and that stimulate the shortage of nest material. That conducts the transfer of the nest material from nearby islands.

Their propensity to nest in lawns of *Deschampsia antarctica* may be otherwise explained. The nests are surrounded by push-ups where the birds smash limpets and throw away the shells that in time would fertilize the soil. After the introduction of *D. antarctica* and *Colobanthus quitensis* as the nesting material, Antarctic herb tundra formation can develop. Nesting sites could then be abandoned and grow over, and the cenosis forms in a new location. *L. dominicanus* seems to be the bird that tend Maritime Antarctic gardens, namely to carry propagules with seeds between the islands.

We thank the National Scientific Antarctic Center of Ukraine and Dr. S. Loparev & Dr. G. Milinevsky. The research was undertaken in the framework of the ClicOPEN IPY project.

NATURAL AND ANTHROPOGENIC FACTORS INFLUENCING SOIL DEVELOPMENT AT KING GEORGE ISLAND (MARITIME ANTARCTIC)

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During the 30th Polish and the 10th Ukrainian expeditions (09.11.2005 – 09.02.2006) we set 8 experimental plots of $1m^2$ to study the ecotopes at two ice-free territories of King George Island (South Shetland Islands) around the Admiralty Bay. They were distributed in the vicinities of H. Arctowski Polish Antarctic Station and near the Brazilian Antarctic Station Comandante Ferraz in Keller Peninsula. Six of them did not undergo direct anthropogenic influence (plots 4 and 5 were situated in ASPA No. 128.

Western shore of Admiralty Bay), the locations of 7th and 8th ones are anthropogenically impacted. At every plot, we conducted chemical analysis of soil as described in Parnikoza et al., 2007 and recorded the state of Antarctic herb tundra formation found at each one of them. The data then were compared to the 6th plot (control one for three plots where we modeled the influence of sea or fresh water or guano solution). The heterogeneity of macro- and microelements and trace elements and pH of soils of the ice-free territory in the vicinities of the Station can be attributed to both natural and anthropogenic factors. For example, the vascular plants and bryophytes of Antarctic herb tundra formation at the control (6th) plot notably effected the soil's declining pH and humus accumulation.

Meanwhile, treatment with guano solution led to alkalization (pH increased from 3,6 to 4,2). Both guano and sea water treatments revealed that if systematically applied to thin (3 – 10 cm) soils where there is occasionally no lateral flow, the soils can change in pH, organic and inorganic matters, biogens and toxic elements can be allocated. Not unexpectedly for a region thought to be rich in ores, the amount of acid soluble copper was high at all plots without any dependence on pH or anthropogenic impact.

The increase in trace elements at recently deglaciated areas probably means that the global technogenic contamination here is increased by upper soil strata adding to elements' cycles in the biogeocenosis.The plots that were or had previously been used by man in some way were found to be anthropogenically polluted. These pools of trace elements may become dangerous due to their migrations to other components of the cenosis, namely plants and animals.

We thank the National Antarctic Scientific Center of Ukraine and Department of Antarctic biology of PAS and especially Prof S. Rakusa-Suszczewski. The research was undertaken in the framework of the ClicOPEN IPY project.

CLIMATOLOGY OF THE NORTHERN HEMISPHERE SEA ICE

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History data of general closeness of sea ice of the Arctic pool for a period with 1870 on a 2007 year are analyzed. Data are presented as a net with spatial resolution one degree. Data are broken-down on four groups on the method of receipt of information. All data were exposed to the statistical analysis, the fourth group of data, characterizing a period with 1972 on a 2008 year, is the actual information got by a satellite, is treated by the methods of multidimensional statistical analysis.

The general row of data of general closeness of sea ice of the Arctic pool testifies to the catastrophic decline of area of ice, since a 1964 year. The characteristic periods of oscillation of general closeness of sea ice are made: for 1870-1900 – 2,2 years; 1901-1952 – 6,1; 6,3 years; 1953-1971 – 1,9 years; 1972-2007 – 4,2 years. Meaningful periods of oscillation for all selection 138 years – 16,7; 7,5; 2,5; 2,2 years. The peak spectrum obtained as a result of mutual spectral analysis showed the increase of amplitude of sea ice value variations from a 1964 year that testifies to instability of all system of sea ice in Arctic and is investigation of climatic changes on overall planet.

It is known, that the warm flow Gulfstream is the major constituent of circulation in North Atlantic and has major influence on the climate of Western and North Europe. The changes of ocean circulation indissoluble are related to the changes in the field of temperature and salinity in an ocean. For the exposure of influencing of ocean flows on general closeness of sea ice of the Arctic pool correlation with the index presented by the Plymouth's sea laboratory of Great Britain is conducted, which shows to the anomaly in position of north border of flow Gulfstream at the coast of North America. The correlation coefficient field characterizing dependence of general closeness of sea ice and flow Gulfstream as a net with resolution in five degrees for Arctic pool was calculated.

AEROSOL MEASUREMENTS WITH CIMEL AND MICROTOPS II SUNPHOTOMETERS

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In the framework of AERONET (AERosol Robotic Network) scientific project the cooperation between Université de Lille and Taras Shevchenko National University of Kyiv the CIMEL CE 318 (polarization version) sunphotometer was put in operation in Ukraine. The measurements started from the end of March, 2008. The post calibration controls performed at LOA in April 2009 have shown the good stability of the photometer characteristics thus allowing analysis of the first year of data (level 1.5). Data can be seen at webpage http://aeronet.gsfc.nasa.gov/ AERONET site 'Kyiv'.

AERONET is one of the power techniques for aerosol remote sensing in the atmosphere of the planet. The technique assist to derive a wide number of atmosphere parameters that are important for comprehensive interpretation of the optical and microphysical properties of the aerosol layer which serve for understanding of recent climate changes. The report presents the preliminary analysis of columnar aerosol properties retrieved from Kyiv sunphotometer at site and mobile Microtops II sunphotometer. AERONET Version 2 product (total and fine mode AOD, Angstrom parameter as well as single scattering albedo, particle size distribution and refractive index are considered in the analysis, showing low AOD for Kyiv observational site during one year period. The developed methods and data are planned to calibrate during next Antarctic season Microtops II measurements.

The research was partly supported by Taras Shevchenko National University of Kyiv, projects 06BF051-12 and 09DP051-02, by Ministry of Education and Science of Ukraine, project M/68-2009 in the framework of 'Dnipro' France-Ukraine cooperation project.

THE INFLUENCE OF GLOBAL CLIMATE CHANGE ON ARCTIC TUNDRA AND ADJACENT MARINE SHELF ECOSYSTEMS

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We have a unique opportunity to observe manifestation of the global warming. Sufficient climate change is visible in Polar Regions. Arctic and Antarctic regions are the most suitable experimental “laboratories” to study marine shelf and adjacent terrestrial ecosystems under conditions of the glaciers retreat. Previously we have explored and documented some Marine and Terrestrial communities in the Antarctic region. That is why we plan to study similar communities of the Arctic region, particularly on Spitsbergen island (Svalbard), including both surface ecological investigation of marine phyto- and zoobenthos of the adjacent shelf and an ecological survey of some Arctic vascular plants in the context of terrestrial ecosystems persistence. The project is aimed at revealing the impact of climate change on different types of natural communities, obtaining the total profile of natural communities from the land surface to the bottom of adjacent shelf.

Marine part: Landscape ecological survey of phyto/zoobenthos of the shelf
Research goals:

- To analyze benthic ecosystem biodiversity as a basis for subsequent monitoring
- To investigate indicators of benthic communities response to the climate change.

Terrestrial part: Examination of some Arctic vascular plants as a part of the terrestrial ecosystems and comparison with similar Antarctic species
Research goals:

- Examination of Arctic vascular plant populations, revealing their morpho-anatomical, molecular and cytogenetic peculiarities, investigations of the plants - animal interactions (in comparison with Antarctic and temperate zones).
- Identification of the dominate and pioneer species of plants;
- Investigation of cytogenetic and molecular genetic variability of Arctic vascular plants in context of philogeography.

Expected results: Phyto- and zoobenthos, terrestrial communities of the region will be properly documented. The maps of the distribution of species, communities and biomasses will be compiled. A landscape ecological model of the benthos and terrestrial communities will be elaborated. Phylogenetic trees of selected animal taxa will be built to trace evolutionary pathways and phylogenetic relationships of the Arctic biota. The structure of the marine communities of the Arctic and Antarctic will be compared. The structure and adaptation mechanisms of some vascular plants communities will be compared too. The causes of bipolarity will be investigated.

Poster Session

RESEARCHES OF THE LARGE-SCALE AND MESO-SCALE VARIABILITY OF HYDROMETEOROLOGICAL CONDITIONS IN THE ANTARCTIC COASTAL REGIONS BY EXPERIMENTAL MEASUREMENT DATA

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In the work the seasonal and interannual variability of large-scale hydrometeorological conditions are analyzed in the South Polar Region and their influence on the characteristics of mezoscale variability of ocean-atmosphere interaction processes above different underlying surfaces in the off-shore districts of Antarctic Continent is estimated.

For research of variability of large-scale hydrometeorological conditions used: monthly-averaged array of satellite SST values on 54×54 km grid for period from 1985 to 2002 (archive of AVHRR Ocean Pathfinder Data JPL NOAA/NASA); monthly-averaged SST values on 1°×1° grid from the World hydrological database (World Ocean Atlas, 2005) and data set of British Atmospheric Data Centre HadISST SST for 1870-2003; the data, obtained during the Russian Antarctic expeditions on R/V *"Akademik Fedorov",* arrays of atmospheric circulation indexes South Oscillation (SOI) and North Atlantic Oscillation (NAO), archived arrays of the hydrometeorological measurements at the Antarctic Polar stations.

The mezoscale processes were analyzed on the basis of the unique high-frequency measurements of meteorological characteristics, carried out during four summer seasons (2001-2002, 2002-2003, 2006-2007, 2008-2009) at the Antarctic polar station "Bellingshausen" and two seasons at the station "Novolazarevskaya" (2004-2005, 2006-2007).

Essential interannual variations of average energy exchange characteristics above different underlying surfaces due to variability of large-scale hydrometeorological conditions in the Antarctic region are founded.

Aerodynamic Drag coefficient and roughness parameter of the Antarctic surface, influencing on energy exchange characteristics, are changed substantially in time and in space, and largely depend on the state of snow cover, the atmospheric stability, wind velocity and directions, variability of which is connected with the climatic situation above circumambient aquatoriums. This situation, in same queue, is conditioned interannual variability of global processes in the system ocean-atmosphere.

RESEARCHES OF SEASONAL AND INTERANNUAL VARIABILITY OF ANTARCTIC SEA ICE CLOSENESS

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Seasonal and interannual variability of sea ice closeness in the Antarctic region is investigated on the base of the data set of British Atmospheric Data Centre HadISST ICE on 1°×1° grid for 1969-2002. For this purpose the integral areas occupied with ice of different closeness are calculated for each month of every year. Then monthly-averaged and annual-averaged anomalies of these areas are obtained. Using monthly-averaged values of anomalies of the ice areas of each closeness process the interannual root-mean-square deviations (RMS) are defined. Besides, the values of seasonal and interannual RMS of sea ice closeness are calculated in every knot of the regular grid. It is shown, that due to differences in the orography, meteorological conditions and water circulation, the different regions of the aquatorium have their own seasonal and interannual variability features of ice conditions.

Seasonal variability of sea ice closeness is most pronounced in the Weddell, Lazarev, Sodruzhestvo seas, on the north boundary of the Ross, Amundsen and Bellingshausen seas. Maximal interannual variations are characteristic for the sea ice closeness in the Weddell, Bellingshausen, Amundsen seas and in the region between 130-150°W и 63-70°S. Essential variation of interannual RMS of anomalies of the sea ice areas of the various closeness processes for different months is observed. It is shown that maximal interannual variations are characteristic for the ices of 90-100% closeness.

Minimal interannual variability of ice closeness is noted in January-March, in the period of minimum ice amount around the continent. RMS for 100% ice closeness achieves its maximum in June, when it is intensively formed. In August-September packed-ice formation slows down, at the same time the level of its interannual variability in this period change insignificantly.

In contrast to the packed-ice, the area of 80-90% ice closeness increases slowly up to November. RMS maximum values are observed in September. In October-November, when ice starts to melt intensively, RMS values for 90-100% ice closeness decrease.

Maximum of interannual variability of the ice whole closeness is less than 80% is observed in December. At that time the areas occupied with floating and icebergs grow due to maximum ice melting. Maximal anomalies of ice closeness in ENSO periods are observed in the Antarctic Peninsula region and the Sodruzhestvo and Ross seas. Response to the El Niño events is most pronounced in the behavior of positive anomalies of ice closeness.

THE GENERAL ATMOSPHERE CIRCULATION INFLUENCE ON THE TOTAL OZONE IN MIDDLE AND POLAR REGIONG IN SOUTH HEMISPHERE

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The average monthly values of geopotential and total ozone content in the period from September, 1957 to August 2002 for South Hemisphere were chosen for analysis. Data were developed for the knots of regular points net with interval 10 degrees. The fields of geopotential were examined for the eight geopotential heights in the troposphere and stratosphere: AT-500, AT-400, AT-300, AT-250, AT-200, AT-150, AT-100, AT-50. Analysis was provided for each month separately that allows forming the proper matrices of basic data of 360x45 arrays.

The geopotential and ozone fields mean values were calculated. The procedure of the centering mean values of matrices was undertaken. The mean square deviation field for geopotential heights and for was given, and for total ozone content was calculated.

The initial data matrices were processed by the component analysis method. It gave us the possibility to get the value of the first, second and third eigenvectors. First three eigenvectors were calculated which gives 85% of general dispersion. The analysis results allowed forming the matrices of correlation and building the fields of spatial correlation of the geopotential and total ozone content fields.

ASYMMETRY IN TOTAL OZONE DISTRIBUTION IN ANTARCTIC REGION AND SOUTH OCEAN ECOSYSTEM

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The asymmetry in the total ozone distribution in Antarctic region in connection to South Ocean ecosystem changes is studied. The existence of the considerable zonal asymmetry in total ozone content (TOC) distribution over Antarctica observed last decades based on the satellite TOMS measurements in 1979-2005. In the latitudinal interval of 55-75°S in Antarctic spring months the area of zonal total ozone minimum experienced the systematic shift to the East. A minimum and maximum of quasi-stationary wave in TOC distribution are located over the Antarctic Peninsula area and in the Ross Sea area. We expect that zonal asymmetry in total ozone distribution and its long-term spatial changes should impact to South Ocean ecosystem food chain, especially in primary level. The systematic eastern shift of the quasi-stationary minimum in ozone distribution over north Weddell Sea area should cause the increased UV radiation on sea surface in comparison to Ross Sea area, where the lack of UVR should exist in spring month. To study this influence the available data of phytoplankton and krill catch distribution in South Ocean in 1997-2007 will be analyzed.

The research was partly supported by project 06BF051-12 of the Taras Shevchenko National University of Kyiv.

THE *DESCHAMPSIA ANTARCTICA* ADAPTIVE REACTIONS TO UV-B IRRADIATION

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The Antarctic geobotanical zone is unique for investigation of endemic flora. *Deschampsia antarctica* Desv. (*Poaceae*) is only native *Gramineae* found in the Antarctic. It's naturally adapted to cold maritime Antarctic climate. Low temperatures, high light, stratospheric ozone depletion and enhanced solar UV-B irradiation are the typical factors of this region. Thus, *D. antarctica* is the unique object for investigation of UV-B action on photosynthetic parameters and lipid composition in context of global environmental changes.

The intensive UV-B irradiation (UV-B for 20 hours by 5-times exposition for 4 hours on light period is 6.17 kJ m^{-2} d^{-1}) induced degradation of chlorophylls *a* and *b*, but Chl *a*/*b* ratio were unchanged in leaves of *D. antarctica* plants. Analysis of carotenoids revealed the absence of reliable changes in xanthophylls pool (Lu + Zea, Vio and Neo) and degradation of *β*-carotene in the irradiated plants.

Glycolipid analysis demonstrate relatively stable SQDG content in *D. antarctica* plants under UV-B irradiation while there were variety differences in galactolipid content. Treated plants were characterized by significant (40 %) MGDG decrease and slight DGDG decrease. As result, these galactolipids transformation was observed the decline of MGDG/DGDG ratio (22 %).

The analysis of fluorescence parameters indicated the *qN* values increase and φ_p decrease under UV-B irradiation in leaves of *D. antarctica* plants. The analysis on structural and functional parameters of photosynthetic apparatus demonstrates that the adaptation of *D. antarctica* to UV-B irradiation may occur with the involvement of carotenoids and anionic lipid (SQDG). CPa PS II degradation and the decrease φ_p induced by UV-B in *D. antarctica* plants can be compensated by CP1a + CP1 PS I accumulation, which may indicate the existence of UV-B mechanism energy distribution on the electron transport level.

REPRODUCTION PECULIARITIES OF GALINDEZ ISLAND BRYOPHYTES, ANTARCTICA

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It's common for Antarctic bryophytes lacking of sexual structures and sporophytes, thus relying on asexual reproduction, or presence of gametophytes of one sex. Capsule development and sporogenesis occur under conditions of cold Antarctic only at less than 25% of moss species. For most bryophyte species are typical to form specialized asexual propagules – auxiliary or leaf gemmae, rhizoid tubers, or propagation by pieces of the shoots, leaves or leaf fragments (Rudolph 1971; Ando 1979; Longton Schuster, 1983; Smith 1984; Longton 1988; Seppelt 1986, 2004).

The rapid climate change on the Western Antarctic Peninsula side has induced speeding of vascular plants probably due to increasing of its seed production (Fowbert and Smith 1994; Gerighausen et al. 2003). Concerning to this it's interesting to investigate reproduction peculiarities of bryophytes from the same locality. For several mosses in the Argentine Islands were noted the increased fertility (Smith, Corner, 1973).

Our identification of mosses and liverworts from Galindez Island collected with a support of the National Antarctic Scientific Center by V. Bezrukov (February 2002, 8 samples), L. Manilo (February 2004, 28 samples), V. Polishchuk (March 2005, 10 samples), I. Dykyj (February-March 2006, 8 samples) and V. Trohymets (March 2007-March 2008, 85 samples) at terrestrial habitats of Galindez Island determined 20 species of bryophytes: *Andreaea depressinervis*, *A. regularis*, *Brachythecium austrosalebrosum*, *Bryum pseudotriquetrum*, *Ceratodon purpureus*, *Chorisodontium aciphyllum*, *Polytrichastrum alpinum*, *Polytrichum juniperinum*, *P. piliferum*, *P. strictum*, *Pohlia cruda*, *P. nutans*, *Sanionia georgicouncinata*, *Syntrichia princeps*, *Warnstorfia fontinaliopsis*, *Barbilophozia hatcheri*, *Cephaloziella varians*, *C. hispidissima*, *Lophozia excisa*, *L. cf. groenlandica*. Among totally 139 samples only *Bryum pseudotriquetrum* from one sample (13.03.2006, Penguin-Point, S 65°14,528`, W 64°14,332`, between rock ledges) was registered with capsules.

Through the cultivation under laboratory conditions of *Pohlia nutans*, *Sanionia georgicouncinata, Warnstorfia fontinaliopsis, Ceratodon purpureus, Polytrichum strictum* and *Barbilophozia hatcheri* from frozen and herbarium samples on soil substrate and agar medium we have registered the successive vegetative reproduction by forming secondary protonema from the stems, leaves or gemmae but none of cultivated species have formed the gametangia and sporophytes. Thus we don't find evidences of bryophytes spore production increasing on Galindez Island in new climatic conditions.

The research was undertaken in the framework of the ClicOPEN IPY project.

NUMERICAL STUDY ANTARCTIC PRECIPITATING CLOUDINESS

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The study is focused on the investigation of mesoscale and microphysical characteristics of clouds and precipitation over the Antarctic Peninsula for the different seasons with aid of the Combined Model of the Cloudy Troposphere (CMCT) developed in UHMI, which allows to study mesoscale features of real cloud systems and cloud microphysics initialized by approximated to observed thermodynamical conditions in the troposphere. To test the model for the Antarctic continent the CMCT was applied for the study of a few cases with precipitating cloud systems over the Antarctic Peninsula for different seasons (January, April and June). Chosen cases corresponded to prolonged mixed-phase precipitation recorded at Bellingshausen station and obviously caused by synoptic-scale frontal lows. There were found that at least 5 successive upper-air sounding datasets should be used for the model construction to obtain reliable outputs. Considerable updrafts (up to 30 cm/s) were derived from the model for all chosen cases and they indicated on intensive cloud and precipitation formation processes in the troposphere. Since ice phase for high latitude clouds is crucial, forms of ice crystals were varied. Plate form of ice crystals resulted in much intensive and prolonged precipitation since plates stayed longer in moist layers and grew larger. Processes of sublimation and freezing of liquid cloud particles for ice crystals forming were tested under different thermodynamic conditions for summer and winter cloud systems in the Antarctic Peninsula region too. Obtained parameters for ice microphysics in the antacrctic precipitating clouds differed and were generally two orders of magnitude higher than for the middle latitude clouds. Unfortunately, there are no detailed experiments and data on cloud and precipitation measurements in the Antarctic conditions yet and there is a little possibility to verify the model results just with half-day precipitation sum measured at the Bellingshausen station. Nevertheless, conducted numerical experiments on CMCT testing have shown that the model can be used for theoretical interpretation of field experiments on cloud and precipitation microphysics measurements in Antarctic thermodynamic conditions.

SHORT CIRCUIT CO-EVOLUTION BY THE PERFECT PARASITE: ANTIFREEZE GLYCOPROTEINS OF FISH LEECHES (HIRUDINEA, PISCICOLIDAE) IN ANTARCTICA

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Antifreeze glycoproteins (AFGPs) play an important role in biochemical adaptation to supercooled waters and the survival of notothenioid fish in Antarctica. These fishes have a well-developed parasitic epifauna, which in turn are also exposed to freezing conditions. In order to retain their association with Antarctic fishes as the environment progressively cooled during the Miocene, leeches and other fish-associated ectoparasites had to either (i) adapt their own genome to confer protection from freezing or (ii) adapt a short circuit strategy by acquiring the necessary life-saving chemical compounds from their host.

In a pilot study, we have found that the Antarctic leech *Cryobdella antarctica* (Hirudinea, Piscicolidae), feeding on a variety of notothenioid fish species, contains fish antifreeze compounds. This PhD project aims to characterize these AFGPs to determine their physical and biochemical properties and to trace their origins (leech or host) through genetic analysis. The main goal is to obtain information on behavioural ecology from this marine host-parasite system to evaluate the possibility of an instantly effective adaptive advantage provided by another species in a quasi short circuit co-evolution. The knowledge of trophic links and driving forces in the evolution of parasites is essential for our understanding of ecosystem interactions in the Southern Ocean and thereby should be an important part of international research efforts in Antarctica.

ASYMMETRIES IN ANTARCTIC TOTAL OZONE DISTRIBUTION AND TROPOPAUSE HEIGHT

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The zonal anomalies data in total ozone and thermal tropopause height shows that ozone depletion during austral spring has a strong influence on the height and sharpness of the tropopause over West Antarctica. Measured elevation of the tropopause is explained by low stratospheric temperature due to the seasonal temperature minimum in winter and ozone losses in spring. Accordingly, tropopause zonal asymmetry is determined by strong east-west asymmetry of the surface temperatures in the winter and total ozone asymmetry in spring. Lowering of the elevated tropopause over the boundary of the Antarctic continent is explained by the influence of the cold continental troposphere both in winter and spring. We show some details of relative contribution of radiative and dynamical processes to the Antarctic tropopause formation. The sloping meridional profile of the tropopause and widening of the transition layer between the troposphere and stratosphere over West Antarctica suggest the possibility of enhanced air mixing not only vertically but also horizontally.

The research was partly supported by Taras Shevchenko National University of Kyiv, project 06BF051-12 and Australian Antarctic Science project 737. The research was undertaken in the framework of the ORACLE-O3 IPY project and the Polar Atmospheric Chemistry at the Tropopause (PACT) SCAR Action Group.

REGIONAL DIFFERENCES OF RATES AND DIRECTIONALITY OF TEMPERATURE CHANGES IN ANTARCTICA

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Antarctica is generally determined «survey loop» in survey of climate changes. As long as survey grid in Antarctic is very irregular and the main dataset was stored in Antarctic Peninsula zone, point of view on impetuous warming as the main vector of climate changes in all South Polar Region was recently prevailed. Over a last years irregularity of climate changes in different regions of Antarctic are shown by a number of research groups, for example if fast increase of average annual temperatures is really observed, low-level but actual cooling are shown as opposite tendency for an individual areas of East Antarctica. Newest research results of regional differences of climate changes in Antarctica are shown in article by Steig and others (Nature 457, 459-462, 22 January 2009). In this article the authors divide all Antarctic continent by «warming zone» (West Antarctic) and «cooling zone» (East Antarctic) drawing the line between them on the main watershed, Transantarctic Mountains.

Unfortunately survey grid (and, accordingly, available dataset for the authors) very irregularly covers even Antarctic coast much less their hinterlands, therefore an extrapolation by the authors of some weather data on zones are sufficiently distant from observation station invites a number of serious question. However the existence of not only warming, but cooling in Antarctica and tare regional differences of vectors of climate changes can be considered as evidential fact.

The goal of our research was revealing of regional differences of change of temperature conditions on the territory of Antarctica for 50-year and 30-year periods. Values of average annual temperature and average values of temperature for January and July on 13 stations (*Amundsen Scott, Arturo Prat, Bellingshausen, Casey, Davis, Dumont Durville, Esperanza, Vernadsky, Halley, Mawson, McMurdo, Mirny, Vostok*) in 1958–2008 and additionally on *Novolazarevskaya, Syowa, Rothera* stations in 1978–2008 was taken for analysis.

Long-term trends have been plotted separately for every station using standard method in EXCEL. Few gaps in data series have bridged using average value of two nearest years.

The charts of speed of temperature change were plotted in Surfer 7.0. Tilt function of line of linear regression was used as temperature change speed measure and calculated as:

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

x and y – average sampling values of time and temperature.

It is shown that tendency to warming is the best reflected in Antarctic Peninsula zone, and essentially decrease even at a small distance. Increase of average annual temperatures is mainly determined by warming of winter menthes with almost trifling alterations of summer temperatures. At the same time tendency to cooling is determined by decrease of temperature of winter menthes.

It is shown that tendency to cooling not embraces all East Antarctic, but is observed on rather large their areas, at also is the best expressed in coastal zones (*Dumont Durville* and *Halley* stations). Considerable change of rate of climate changes during last decades is shown. Thus tendency to warming in West Antarctica is traced during all observation period (1958–2008), however is strongly marked during last thirty years (1978–2008) (according from -0,015 to +0,06 ^{o}C/year and from -0,06 to +0,07 ^{o}C/year). Nevertheless the main interesting is that tendency of cooling in East Antarctica is traced only in last 30 years and were almost not traced earlier. Consequently opposite direction of temperature changes in different zones of Antarctica and acceleration of rate of climate changes in last decades have to be specified while this acceleration concerns both oppositely directed trends.

For Notes