

Annual Report: 0636475

Annual Report for Period: 05/2007 - 05/2008 **Submitted on:** 04/03/2008

Principal Investigator: **Aizen, Vladimir B. Award ID: 0636475**

Organization: **University of Idaho**

Title:

Collaborative Research: 2000+ Year Detailed, Calibrated Climate Reconstruction from a South Pole Ice Core Set in an Antarctic - Global Scale Context

Project Participants

Senior Personnel

Name: Aizen, Vladimir

Contribution to Project:

Prof., Dr. Vladimir Aizen has provided control of the ice-core dust particle analysis and data interpretation according with the project tasks and assisted one graduate student in routine analysis.

Graduate Student: Jennifer Kendall

Contribution to Project:

Jennifer Kendall has studied ice-core melt process in the Climate Change Institute dedicated ice-core laboratory at the University of Maine (one month) and prepare dust particle analyzer at test it in ice-core laboratory at the University of Idaho. She also complete first dust particle data statistical analysis using data from Altai ice core processed in Japan.

Organizational Partners

University of Maine

Prof., Dr. Paul Mayewski, Director of the University of Idaho Climate Change Institute

Dr. Karl Kreutz, UofM Climate Change Institute

Dr. Andrei Kurbatov, UofM Climate Change Institute

New Mexico Institute of Mining and Technology (NMT)

Dr. Nelia Dunbar, Cameca SX-100 Electron Microprobe Laboratory.

Other Collaborators or Contacts

Activities and Findings

Research and Education Activities:

Findings:

Training and Development:

At the University of Idaho, Moscow, Vladimir Aizen has used project developed materials in general graduate and undergraduate courses. During 2007/2008 he participated at the National and International Conferences and Seminars presenting our results. V. Aizen had four invited lectures: at the Hokkaido University (JAPAN); at the NEESPI Dry Land Symposium in Urumqi (China), 2-d Asia CliC Symposium (China), San Francisco AGU Fall Meeting, Climate Change Session (USA). V. Aizen presented elements of ice-core dust particle, isotope-chemistry results analyses methodology that will be applicable in research with South Pole ice-core processing and analysis.

Jennifer Kendall, the UofI graduate student had extensive training in Climate Change Institute at the University of Maine on ice-core processing with the UofM Continuous Melting System (CMS) and test the UofI “Klotz” Laser Particle Counter (LPC) in the UofM Tephra/Particles laboratory. Jennifer melted the Mill-Q core (pure water) and tested IC line with a particle counter inline to see how well system works using the old South Pole core samples. Test IC line was done to avoid possible contamination by particle counter instrument. Discrete sample and melt a SPRESSO South Pole core were completed using tephra stick and proceeded to melt 4-4 samples per year. All received samples were run through LPC. The training and experience received by J. Kendall allow her to start build an adjusted CMS with LPC at the University of Idaho Ice-Core dedicated laboratory. After a month of training at UofM in August-September 2007, Jennifer returned to UofI and work on assembling new CMS and LPC to run South Pole core samples for dust micro-particles at UofI. In fall semester Jennifer took UofI class on isotope chemistry and learned how to work with ice core dust particle and meteorological data statistical analysis using the Siberian Altai data.

Outreach Activities:

Vladimir Aizen gave one lecture at fall semester and one lecture at spring semester on ice-core data analysis and interpretation for graduate students of the University of Idaho. V. Aizen took part in discussion and development new science-strategic plan for International Climate Cryosphere Program in Lanzhou, China being a member of the Asian CliC science steering committee.

Jennifer Kendall prepared the UofI seminar at the Department of Geography on method of Polar ice-core processing through the Continuous Melting System.

Journal Publications

Books or Other One-time Publications:

Aizen, V., P. Mayewski, E. Aizen, D. Joswiak, A. Surazakov, B. Grigholm, S. Kaspari, M. Krachler, S. Sneed, M. Handley, A. Finaev. **2008**. Stable-Isotope and Chemical Time Series from Fedchenko Glacier Firn Core (Pamir). *J. of Glaciology* (in press).

Product Type: Data or databases

Sharing Information:

All data produced as part of this project will be made publicly available as specified under NSF data sharing agreements after publication, and also archived at the National Snow and Ice Data Center and the World Data Center for Paleoclimatology. The ice-core chemical and isotopic data will be available on the UofI and UofM webstes: (www.ume.maine.edu/iceage/sil; and www.sci.uidaho.edu/cae/index.html).

Product Description: an analytical interpretation code for the software: "Log and Show" for "Klotz" Laser Dust Particle Counter.

Sharing Information:

This software will be used for further ice-core analysis and interpretation among the active research members.

Contributions within Discipline:

Specific contributions to advancing scientific knowledge that will be derived from this research include:

- extracting and evaluating South Pole ice-core dust micro-particle seasonal and annual distribution to understand inter-annual to decadal-scale climate variability in South Hemisphere.
- evaluating the inter-annual to decadal-scale variability in aridity and atmospheric dust loading over the past 100 to thousand years;
- assessing pollutant deposition in the South Hemisphere;
- determine the traces of anthropogenic pollutants and their impact on climate and Antarctic glacier ice dynamics;

The results of our research will be used in undergraduate and graduate courses at UI and will be disseminated to the general public via outreach programs at all three institutions. In addition, the graduate student trained as part of this research. Our research is a collaborative effort that involving the University of Idaho (UofI), the University of Maine (UofM), and the New Mexico Institute of Mining and Technology (NMT).

The dust micro-particle records will be compared with meteorological data from the robust station network in the Antarctic and outlet area of the southern Hemisphere to determine the extent to which the ice core record can be used to develop paleoclimate and paleoenvironmental records in the region.

Contributions to Other Disciplines:

The spatial paleoclimatic records from South Pole are relatively rare, but critical for improving our understanding of climate change in the interior of Antarctic, South America, Australia and south Africa. The research outlined in this proposal will also contribute to the World Climate Research Program (e.g., World Glacier Monitoring Service; WMO), International Climate

Cryosphere Program (CliC) and Scientific Committee on Antarctic Research (SCAR) by developing valuable paleoclimatic records of aerosol dust distribution at southern Hemisphere. The results of this research can also be applied in improving our understanding of physical processes associated with the transfer of heat, moisture and momentum across the land/atmosphere interface that is directed by Global Energy and Water Cycle Experiment (GEWEX).

Contributions to Human Resource Development:

Based on extensive aerosols mineral dust long term data received in our research used to develop educational materials for the graduate and post-graduate students at the University of Idaho.