

Annual Report for Period:07/2008 - 06/2009**Submitted on:** 05/07/2009**Principal Investigator:** Aizen, Vladimir B.**Award ID:** 0636475**Organization:** University of Idaho**Submitted By:**

Aizen, Vladimir - Principal Investigator

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**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Post-doc

Graduate Student

Name: Joswiak, Daniel**Worked for more than 160 Hours:** No**Contribution to Project:**

Daniel Joswiak has worked on the South Pole ice-core processing and dust particle analysis at the University of Idaho dedicated ice-core laboratory during the fall 2008 semester. He completed his PhD thesis using a method of ice-core dust analysis we developed in FY 2007/2008 in his PhD thesis. The data he received from ice-core analysis he sent to the Climate Change Institute at the University of Maine for scientific analysis and interpretation.

Undergraduate Student

Name: Kendall, Jennifer**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Jennifer Kendall (100% of time, 2 months during the year one). Two months' salary and fringe benefits, \$4,010 total was paid to J. Kendall for the first year project to study 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.

Technician, Programmer

Other Participant

Research Experience for Undergraduates

Organizational Partners

Other Collaborators or Contacts

Activities and Findings

Research and Education Activities:

During Fall Semester 2008 Vladimir Aizen used received research results in Alpine Glaciology and Alpine Environmental classes to teach the UofI graduate students with new methods of ice-core dust particle analysis. In 2008/2009 Vladimir Aizen has participated at the National and International Conferences and Seminars presenting results received at the University of Idaho and University of Maine (our project partner). V. Aizen had three invited lectures: at the German Geo-Center in Potsdam (Germany); at the University of California Santa Barbara Workshop (USA), and an International Workshop on ice-core processing in National Polar Research Institute in Tokyo (Japan). The UofI research team had one oral and three poster presentations at San Francisco AGU Fall Meeting 2008, where Vladimir Aizen and his co-authors included the project research results. The results of South Pole ice-core processing and analysis have been also included in annual report completed and submitted by the project team from University of Maine.

Daniel Joswiak, the UofI PhD student had work in dedicated ice-core laboratory at the University of Idaho on the South Pole ice-core samples using our new 'Klotz' Laser Particle Counter (LPC).

Findings:

The data received from dust particle analysis were contributed to the South Pole data base for scientific interpretation at the University of Maine by Prof. Paul Mayewski team. The South Pole ice-core dust micro-particle analysis showed constant low dust concentration but clear seasonal variability. The dust concentration spikes do not reveal relationship with adequate changes in mid- low latitude ice-core dust particle series obtained by UofI team in Siberian Altai, Tien Shan and Pamir, which shows different sources of mineral dust deposited at the South Pole area.

Training and Development:

V. Aizen has taught a methodology of ice-core dust particle, isotope chemistry analyses in his Alpine Glaciology and Alpine Environment classes that has been developed using South Pole ice-core samples processing results.

The South Pole ice-core processing and analysis has been done at the University of Idaho dedicated ice-core laboratory by Daniel Joswiak (our team PhD student) in cooperation with Jennifer Kendall (our graduate student, who has been trained at the University of Maine in fall 2007).

Jennifer Kendall uses her results in preparing her master thesis on mineral dust temporal variability in Central Asian and Antarctic ice-cores, and she has been graduated at the University of Idaho in December 2008.

Daniel Joswiak completed his PhD thesis: 'Industrial and Pre-Industrial Climate and Environmental Changes in Siberian and Antarctic Ice-Core Records' in October 2008 and received a fellowship of the Chinese Academy of Sciences for two years to work on ice-core research in the Tibetan Plateau Research Institute in Beijing. From the spring 2009.

Since the spring semester 2009 we have new PhD student Zhou Hang who will continue work with the South Pole dust particle analysis after he will have training at the University of Maine in summer 2009.

Outreach Activities:

Vladimir Aizen prepared two seminars during fall and spring semester and he taught a class of Alpine Glaciology and Alpine Environment in fall semester where he used new results from the South Pole ice-core analysis. V. Aizen took part in discussion and development new International High Elevation Program (CEOP-HE) where his role as an ice-core expert was clearly illuminated.

Daniel Joswiak gave seminar in Tibetan Plateau Research Institute presenting his results from South Pole ice-cores dust particle analysis as a part of his research in the South Pole and Asian high mountains projects.

Journal Publications**Books or Other One-time Publications****Web/Internet Site****URL(s):**

www.sci.uidaho.edu/cae/index.html

Description:

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 processed and analysed under the awarded project will be available on the UofI and Uof Maine webstes

Other Specific Products

Product Type:

Software (or netware)

Product Description:

An analytical interpretation Code for the software: "Log and Show" for ?Klotz? Laser Dust Particle Counter. This small software interface allow to have output from the "Klotz" LDPC to computer.

Sharing Information:

This code will be used both - at Climate Change Institute, UofM, the New Mexico Institute of Mining and Technology, and ice-core laboratory at the University of Idaho.

Contributions

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) and new CEOP-HE Project (Coordinated Energy-water-cycle High Elevation Project).

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.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Conference Proceedings

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Organizational Partners

Any Journal

Any Book

Contributions: To Any Resources for Research and Education

Contributions: To Any Beyond Science and Engineering

Any Conference