Workshop Conclusions

The workshop ended with an extended panel discussion featuring comments from scientists, risk modelers, and insurers. The discussions covered three main themes and included some recommendations to improve understanding of climatic extremes and their impact.

First, data limitations require the use of models to understand better the statistics of extreme events and how they might change in the future. The concept of a 100-year event is easy to misunderstand and difficult to quantify. Ideally, one would have a record of nearly 1000 years to have a good estimate of the 100-year event. Improved models and the ability to run them for long simulations are the only way to simulate this type of information. It was noted that reinsurers are also interested in adequately modeling the entire exceedance probability curve, not just the low-probability tail.

Second, there was a general appreciation, or perhaps apprehension, of the potential for changes driven by anthropogenic climate change. However, workshop participants noted that although the 'global warming era' is too short for developing robust statistics on changes in extreme events, there is insufficient understanding of how extreme events respond to natural climate variability. In particular, it is difficult to separate the contribution of natural and anthropogenic climate change to the recent upswing in hurricane activity in the Atlantic basin.

Third, Hurricane Katrina could be a transformational event for risk modeling. Although catastrophe risk models predicted large losses from an intense hurricane striking New Orleans, the losses from Hurricane Katrina will most likely be far beyond most model estimates. The huge losses and massive devastation were due in part to the non-linearity of consequences. For example, the extensive flooding was produced in part by the interaction between the design of levees, the loss of power, and the abandonment of pump houses.

An unusual feature of this workshop was the extended interaction between scientists and individuals in the property catastrophe industry, and the workshop underscored that many problems related to extreme events are applicable to individuals from both fields. The RPI will continue to encourage communication between these two communities.

Summer School on Board an Arctic Icebreaker

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It has been reported widely that the climate in the Arctic is changing rapidly, maybe faster than anywhere else. In addition, northern sea ice is shrinking, especially in the coastal seas of the Russian Arctic, such as the Laptev Sea. Since 2002, the International Arctic Research Center (IARC), based at the University of Alaska Fairbanks, has been recording long-term oceanographic observations in this region through the Nansen and Amundsen Basins Observation System (NABOS) project.

In 2005, the annual NABOS expedition was conducted in parallel with a summer school on board the icebreaker Kapitan Dranitsyn. This was the third IARC-supported summer school. Two previous summer schools were held in Fairbanks. A total of 24 university students and early career scientists had been chosen, out of about 140 summer school applicants: six from the United States, five from Russia, five from Canada, two from Norway, and one each from Belgium, Denmark, France, Germany, New Zealand, and Sweden. Vladimir Alexeev of IARC, the author of this meeting report, served as the director of the school; Louis Fortier of Laval University (Quebec City, Canada) was co-director.

The ship left Murmansk on 5 September 2005 with the Russian participants on board. The next day, international students and expedition members from 10 different countries joined the Russians in Kirkenes, Norway. The boat then sailed north of Novaya Zemlya to Severnaya Zemlya, and further to the Laptev Sea, the area of the field program. NABOS’ summer 2005 plan was to recover two previously deployed moorings and deploy five new moorings, along with carrying out oceanographic measurements at about 40 stations on the way.

Thirteen instructors taught during the summer school, and most were also involved in the field program. Lectures on board covered a wide variety of subjects, from simple climate models to microbiology, astrobiology and marine isotope analysis. Overview lectures by Roger Barry (National Snow and Ice Data Center, Boulder, Colo.) and Genrikh Alekseev (Arctic and Antarctic Research Institute, St. Petersburg, Russia) on the history of Arctic exploration were well attended and inspired many questions. General discussions on various problems concerning Arctic science and performing research in the Arctic were also a large part of life on board.

The International Polar Year (IPY) theme was one of the most exciting topics during these informal meetings. The general feeling among the participants was that a more active role by U.S. funding agencies in IPY is desirable.

In addition to attending traditional lectures and seminars, the students aboard the icebreaker had a unique chance to experience Arctic exploration and acquire valuable skills in oceanographic fieldwork under harsh conditions. Students learned firsthand about oceanographic, biochemical, ice, and meteorological observations in this dynamically important area of the Arctic. Working with the international team of experienced polar researchers provided them with an excellent opportunity to learn more about modern methods of high-latitude observations and analyses, and to personally participate in the study of a fast changing environment.

All of the students were assigned to projects. Some were related to the field measurements program, and other themes were offered by the instructors. The students spent long hours in the lounge completing the projects and interacting with the instructors, and the final presentations proved a great success. Some of the students may even have collected enough data to publish an article. The project reports are being compiled for the summer school’s final expedition report. The books of abstracts, for both the lectures and the students’ projects, are available online at http://www.iarc.uaf.edu.

The atmosphere on the boat was friendly and cooperative. We experienced no difficulty communicating with the crew, because there were enough people able and willing to translate Russian to English. The crew did its best to accommodate the needs of the summer school and the expedition. The friendly service of the Murmansk Shipping Company, represented by Nikolay Rumyantsev, provided all that was needed to make the cruise a success. Not only did students learn about the fundamentals of Arctic research while enjoying good Russian cuisine (especially everyone’s ‘favorite’ beef tongue), they also experienced the culture of life aboard a research vessel. Close quarters, sea sickness, and the endlessness of the open ocean were new to some. The boat stayed on Moscow time during the cruise, and therefore when we floated in the Laptev Sea (which is about five to six hours ahead of Moscow time) it was dark by 5:00 PM, and the Sun rose around 11:00 AM. With these hours of daylight, students often performed all-nighters on experiment work shifts or completing projects.

Acknowledgments

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References


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Geiss Receives 2005 William Bowie Medal

Johannes Geiss was awarded the 2005 William Bowie Medal at the AGU Fall Meeting Honors Ceremony, which was held on 7 December 2005 in San Francisco, Calif. The medal recognizes outstanding contributions to fundamental geophysics and unselfish cooperation in research.

Citation

I am most pleased and honored to present this citation to Johannes Geiss, a truly great space scientist and investigator of the solar system and universe. His pioneering work, spanning over half a century, has paved the way toward understanding the physical world in which we live, its origins, and its destiny. He is a strong and effective advocate of science and ingenious in his ability to influence science policy and foster good science. Space limitations allow me to highlight only a few of Geiss’s outstanding scientific accomplishments, service to science and society, and contributions to the conduct of science.

Geiss is a world leader and foremost expert on measurements and interpretation of composition that reveals the history, present state, and future of astronomical objects. He was first to measure the composition of the solar wind noble gases in the late 1960s with his brilliant solar wind collecting foil experiments on five Apollo missions to the Moon. Many successful and innovative space experiments followed, aimed at finding the composition of matter near the Earth, of the Sun, planets, comets, and the interstellar gas.

Geiss’s leadership was crucial in the development of modern time-of-flight spectrometers capable of measuring the mass and charge compositions of space plasmas. These instruments have provided the most comprehensive record of the solar wind composition as we know it today, under all solar wind conditions, at all heliolatitudes, with profound implications for the origin of the solar wind and the composition of the Sun.

Discovery and extensive studies of interstellar pickup ions by Geiss and coworkers stimulated and revitalized theoretical work on the interstellar medium and its interaction with the heliosphere. Geiss’s discovery of the ‘inner source’ pickup ions came as a complete surprise, revealing the importance of dust near the Sun in converting solar wind ions to slow moving atoms.

Moreover, the summer school students were able to interact—and foster international cooperation and collaboration—not only through science, but also through the shared experiences of life in the field. A big joke on the cruise was the Arctic cod trophy fishing contest, conducted by Louis Fortier’s group as a part of the group’s research of ecosystems in the Arctic. The winners, Danny Dumont and Romain Langlois, reeled in a ‘giant’ 6.9-centimeter trophy fish.

Students also experienced the hindrances to collecting data in extreme environments. One long-term IARC mooring, deployed in September 2002 and scheduled for collection by the expedition, had become completely buried under a vast multiyear ice floe. This mooring contained long-term data of temperature, salinity, and ocean currents, which were later used for several students’ projects. All activity stopped for 14 hours and everyone was called to the bridge to look for the buoys connected to the mooring. The icebreaker had to crush many ice floes before the mooring popped to the surface. The mooring was recovered despite the darkness, and the measurements program continued.

The summer school helped instructors and students establish professional and personal contacts. Maybe even more important, all of those aboard the Kapitan Dranitsyn during the three weeks at sea together became good friends.

For 2006, there are plans to organize a summer school for international K-12 teachers onboard the icebreaker.

NABOS is funded primarily by the U.S. National Science Foundation (NSF), the U.S. National Oceanic and Atmospheric Administration (NOAA), and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). The summer school was supported by NSF (through IARC), NOAA, ArcticNet, the Network for Centers of Excellence (Canada), the Russian Foundation for Basic Research, the Ministry of Science, and JAMSTEC.

The main organizers included IARC (University of Alaska Fairbanks, United States), Laval University (Canada), the Institute for Atmospheric Physics (Moscow, Russia), and the Arctic and Antarctic Research Institute (St. Petersburg, Russia).

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—VLADIMIR ALEXEYEV, IARC, University of Alaska Fairbanks (UAF); IGOR DIMITRENKO, IARC, UAF; Louis Fortier, Laval University, Quebec, Ontario; Irina REPINA, Obukhov Institute for Atmospheric Physics, Moscow, Russia; and Igor MOKHOV, Obukhov Institute for Atmospheric Physics

Geiss has contributed many original ideas and interpretations to account for his observations. In 1972, Geiss and Hubert Reeves found the deuterium abundance in the protosolar cloud, using the newly measured solar and meteoritic abundance of helium-3. Later, using measurements of solar and interstellar helium-3, Geiss showed that the deuterium plus helium-3 to hydrogen ratio remained surprisingly constant over the lifetime of the universe, and placed limits on its baryonic density. Most recently, he proposed a galactic mixing model, involving infall of gas from dwarf galaxies to explain the puzzling low metallicity of galactic gas.

As impressive as Geiss’s contributions are to fundamental science, he unselfishly promotes science and is an able spokesman for the societal benefits of scientific research. He was among the key players shaping the science policy and current science program of the European Space Agency. He is a strong advocate for international scientific cooperation and successfully promoted international space missions such as Ulysses, SOHO, and Cassini/Huygens. He is largely responsible for the excellent space science program in Switzerland.

Perhaps Geiss’s most important contribution to the conduct of science came late in his career through his creation and leadership of the International Space Science Institute (ISSI). Today, ISSI is flourishing and is the leading place for topical international space science workshops and team meetings, bringing together scientists from around the world.

Geiss, a pioneering space physicist, is a modest person who freely shares his knowledge and ideas with colleagues, and is most stimulating to interact with. He is devoted to science and its conduct and promotion. He truly epitomizes all those qualities that the William Bowie Medal honors.

—GEORGE GLOECKLER, University of Maryland, College Park