The following is an excerpt from an essay that is the common product of 12 undergraduate students from across the United States who participated in the Global Climate Change and Society Program (www.colorado.edu/Research/GCCS) during the summer of 2001. Through their research on issues related to global climate change, the students concluded that the core question of uncertainty does not lie within climate science, but comes instead from an inability to predict human activity. Based on that observation, this article issues a call for a much more wide-ranging discussion of the values relevant to how we live with each other and how we collectively inhabit the world.

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If we move beyond the call for more scientific research, what do we do? Society's choices regarding climate change will depend upon our values and how we speak about them, not on whether climate change science reaches greater degrees of certainty. Since the driving force that will shape our world is the value-based decision-making we engage in as individuals and communities, we should frame our discussion about climate change accordingly.

The significance and power of community decisions based on values is supported by the IPCC storylines' primary role in shaping climate predictions. The scenarios described above are only a few of the stories that could define the future, and yet even they reflect significantly different pictures of human values and actions. Regional versus global interaction, fossil fuel versus renewable energy sources, and population growth versus population stabilization are some of the first value-based choices societies must face. For example, a regional approach to international relations would demonstrate values of autonomy and self-sufficiency, either leaning toward an "every man for himself" mentality or engendering some geographically limited form of cooperation. A globalized approach would be based on overall cooperation, where knowledge and services are shared and people value contributing their talents while accepting those others might offer. The variety of development possibilities before us emphasizes the importance of actively deciding what kind of world we want to inhabit. Being conscious of our decision-making will help ensure that the future accurately reflects things we value.

The Columbia River Pastoral Letter Project provides an outstanding model for the kind of values discussion we are calling for [*Skylstad et al.*, 2001]. Over the last 3 years, the project's goal has been to provide a forum for Native American communities, industry, and other economic interests, theologians, scientists, and environmentalists to voice their opinions on the future of the Columbia River, in order to "promote a vision of a just and sustainable way for the people of the region to relate to the river and its watershed." Such forums have helped to open discussion and empower Northwest communities to direct their development.

Global climate change can and should be addressed in the same way. Community discussions about values can do for the global climate change debate what more research and computer models cannot. For example, we might consider how we feel about our powerful position to alter the world by asking ourselves whether we value humility toward, or dominance of, nature. Embracing a more humble approach toward the natural world, as in the way we think about where we would like to live, we would consider the environment into which we were moving. For example, we would not choose to live in places prone to natural disaster, such as flood plains, or places naturally inhospitable to humans, such as deserts. On the other hand, if we valued the human ability to dominate nature, we would undertake projects such as building dikes and levees to control rivers and importing vast quantities of water to support ourselves in desert environments. Discussing values that underlie the global climate change debate—values like dominance and humility—will help us to move beyond bickering over the predictive science of global climate models. If we can decide how to live based on what we value, we can become actively involved in the creation of our own future.

The political and societal discussion of global climate has reached a state of gridlock. Current climate research focuses on developing more accurate models. However, such research rests upon the assumption that we have failed to recognize—that these models rely on predictive storylines that are based on our choices and the values we hold. Our values, not scientific prediction, lie at the center of the global climate change debate. To move beyond the state of gridlock, we must discuss our values in an open and direct fashion. The problems we face with global climate change require thought and a deep dialogue about the ways we live with the Earth and will for the generations to come.

Authors

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Solar-Heliospheric Group "SHINE" Sheds Light on Murky Problems

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Like a flashlight beam in muddy water, attention focused on murky science issues scatters a great deal, but reveals broad features of fundamental importance for future progress. The value of this approach was apparent at a recent meeting of the Solar Heliospheric Interplanetary Environment (SHINE) community. SHINE held its third annual workshop this summer simultaneously with those of its sister organizations, Geospace Environment Modeling (GEM) and Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR). All three meetings were held in close proximity and were sponsored by the National Science Foundation.

The kind of workshop environment provided by SHINE for solar and heliospheric physicists is unique. Staged exchanges between modelers and observers and between specialists in solar, energetic particle, and heliospheric physics strongly encourage participants to think about their own work in the context of larger issues. At SHINE 2001, these kinds of exchanges even extended to magnetospheric physicists at two joint sessions with GEM. The first addressed geomagnetic and energetic particle effects of CMEs and high-speed streams, and the second addressed ways in which CME and substorm modelers might share their expertise.

SHINE 2001 was organized into working groups addressing three broad topics: origins of coronal mass ejections (CMEs), their interplanetary manifestations, and solar energetic particles. In each group, concerted efforts were made to bridge the gap between modelers and observers. Focused questions returned a scattering of responses, revealing just how wide that gap can be, but they allowed the group to identify specific ways in which progress might be made, and provided the community with challenges for the coming year.

For example, in a discussion about the role of photospheric magnetic field evolution in the working group on CMEs, it quickly became clear that the types of evolution that differentiate CME models—emergence, shearing, convergence, and cancellation of magnetic flux—occur together during the period leading up to CMEs. It is not readily apparent which, if any, plays a dominant role. To make progress on this issue, the group decided to challenge the community to provide quantitative measures of each type of surface field evolution and to document their correlations with CMEs. Dis-

cussion of a similar issue regarding the timing and role of reconnection in CMEs resulted in a plan to organize a campaign of coordinated observations from specific events.

In a quest to understand CME origins and evolution, the group on interplanetary manifestations focused on the difference between simple and complex interplanetary CMEs (ICMEs). Participants discovered that definitions of these types vary widely and that observers can disagree substantially on what constitutes the boundaries of a given ICME. Questions were raised about the energetics and multiplicity of the source structures and the number and kinds of interplanetary structures involved in complex cases. As in the CME group, pushing ahead on campaigns to analyze specific events was offered as the best way to make progress in the coming year.

In addition, to highlight the topic, SHINE members convened a special SH session at AGU's 2001 Fall Meeting titled "Interacting CMEs and Their Relationships to Interacting Ejecta." Like the three well-attended special SH sessions organized by SHINE members for the 2001 Spring Meeting, the session was an effective way to accelerate research in this area. The SHINE 2001 workshop group also discussed the possibility of using interplanetary observations to distinguish between different models of CME initiation. Although existing models are still highly idealistic, the observers challenged the modelers to provide predictions for signatures in interplanetary space.

The group on solar energetic particles (SEPs) focused on SEP relationships to CMEs, inviting members of the other working groups to speak on how their expertise on CME dynamics and shock propagation could be applied to various SEP problems. A large number of complications were discussed, including those surrounding the ever-popular issue of the relative roles of flares and shocks in producing the high-energy ions in very large SEP events. The most heated debate centered on whether radio signatures indicate a larger role for flares in large particle events, which normally are assumed to be shock-accelerated.

Two additional topics discussed were the complications of re-acceleration of remnant energetic particles from preceding flare activity by subsequent CME-driven shocks, which can explain why many large CME-associated SEP events show characteristics traditionally associated with flare acceleration; and the possibility of improving on plane-of-sky projections as substitutes for true CME speeds (and hence shock characteristics) through modeling efforts based on Large Angle Spectrometric Coronagraph (LASCO) images.

Relevant to shock propagation, an important insight was discussed regarding the coronal Alfvén speed profile. Near-Sun speeds are much lower than often thought, which allows the fastest CMEs to drive shocks there, and a local maximum at ~3.5 R_s can explain why most SEP-producing CMEs become efficient particle accelerators only beyond ~4 R_s. Fortified with new ideas stimulated by these discussions, SEP group members plan to make progress in the coming year primarily on data-based modeling projects.

SHINE 2001 was held 17–21 June 2001, in Snowmass, Colorado.

Next summer, SHINE 2002 will be held in Banff, Canada. Information about working group topics, registration, and housing will appear on the SHINE Web site: http://www.sec.noaa.gov/shine.

Acknowledgments

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GEOPHYSICISTS

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In Memoriam

Earl G. Droessler died on 30 December 2001, at age 81. He was a retired life member (Atmospheric Sciences) and AGU Fellow who joined in 1947.

Walter Podney died on 25 July 2001, at age 62. He had been an AGU member (Seismology) since 1971.

Honors

Robert Gurney was made an Officer of the Order of the British Empire in Her Majesty the Queen's 2001 Birthday Honors List "for services to Earth observation and environmental science" at a ceremony in Buckingham Palace in November 2001.

Gurney is director of the NERC Environmental Systems Science Centre at Reading University, U.K. He has been an AGU member (Hydrology) since 1981.

D. Howell Peregrine has been given the 2001 Oceanography Award by the Society of Underwater Technology at the annual general meeting on HQS Challenger, London, in December 2001. The award was given for "contributions to oceanography in the area of wave mechanics."

Peregrine is professor of applied mathematics and head of the Applied Mathematics and Numerical Analysis Group at Bristol University, U.K. He has been an AGU member (Ocean Sciences) since 1992.

FORUM

Time to Support Journals of Scientific Societies

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The scientific community needs to take action now to ensure that our journals continue to meet the priorities of science. To achieve this, we should focus our support on journals owned by scientific societies rather than those owned by commercial publishers. This is needed to contain a subtle threat posed by the current growth and development of intellectual property rights (IPR) and the priorities that drive the exploitation of those rights by commercial organisations.

Intellectual property rights are a set of legal rights that allow the creators of intellectual products to control and exploit those products. The best known example for scientists is the copyright of their papers, which is often transferred to the publisher as a condition of publication. With the development of electronic publishing, new intellectual property rights are emerging such as data base (or sui generis) rights—namely, the right of data base compilers to control the result of their efforts. This right was introduced in the European Union in 1998 and is currently a subject of discussion in the U.S. Data base rights are relevant to science, both in their application to data bases of scientific papers, and more deeply, in their application to data sets used in scientific research.

We must recognise that intellectual property rights are important to society as a whole because they are often the basis for new economic activities. A classic example is the sale of pre-recorded video material for home viewing, which has developed as a major market over the past twenty years. This market is strongly protected by copyright and that protection is set to expand further as copyright owners embed protective devices in new technologies; e.g., the ability to restrict home