CONVERSATIONS WITH SCIENTISTS

John C. Moore: Making Geoengineering "Fail-Safe"

May 2018

University of Lapland

"I think one key thing is simply having a broad understanding of issues, not only in a favorite science, but also what that science means socially and politically. Everything is connected, and you need to see as much of the picture as possible to see where to go."

John C. Moore is head of China's geoengineering research program and the chief scientist at Beijing Normal University's College of Global Change and Earth System Science. In addition, the British-born Moore is a research professor at the University of Lapland's Arctic Centre in Finland.

In 30-plus years, Moore has published more than 150 peer-reviewed journal articles with over 10,500 citations, and co-authored one textbook. Since 2013, he has served as editor of the American Journal of Climate Change. *He is a member of the Finnish Academy of Sciences and Letters, and sits on the International Arctic Science Committee working group on glaciology. In 2014, Moore was the recipient of the China Friendship medal.*

Moore's research focuses on glaciology and climate change. In particular, Moore is exploring the geoengineering of polar glaciers to slow sea-level rise and buy time to deal with global warming. His work combines ice core chemical analysis, supercomputer Earth system models and mathematical modeling of climate records and glacier evolution. His other research projects include Arctic albedo modification simulations, Antarctic marine ice simulations and Arctic land ice studies.

Below are John Moore's May 9, 2018 responses to questions posed to him by Today's Science. *Some of the questions deal with how he became interested in science and began his career in glaciology and climatology, while others address particular issues raised by the research discussed in Protecting Glaciers, Buying Time.*

Q. When did you realize you wanted to become a scientist?

A. After I tried working for an oil exploration company. That was the dark side, and I realized I did not like it.

Q. How did you choose your field?

A. Accidentally. I had a degree in geophysics and applied to British Antarctic Survey for a job as a geophysicist, but instead they offered me a glaciology

Related Content

Protecting Glaciers, Buying Time
About a billion people worldwide live along a coastline. While many likely enjoy their ocean view, sea-level rise is rapidly making a home by the sea a...

position. I didn't know much about it until after the interview, except from books about [Ernest] Shackleton and [Robert F.] Scott..

Q. Are there particular scientists, whether you know them in person or not, that you find inspiring?

A. Historically, Fridtjof Nansen and Carl Sagan because of their science and their humanity. James Hansen now for similar reasons. [See Rolling the Dice with Climate, September 2012.]

Q. What do you think is the biggest misconception about your profession?

A. Nowadays, I lead China's geoengineering research program. Many people imagine we are a front for military-industrial science, or private companies that can make tons of money from solving climate change or slowing sea level rise. Literally, nothing could be further from the truth.

Q. Some scientists who are quite concerned about climate change are nevertheless skeptical of geoengineering projects for a variety of reasons. Do you see the measures you are proposing, which have to do with containing glaciers/ice shelfs, as inherently less risky than other geoengineering ideas (i.e., injecting sulfur or other materials into the atmosphere)? What do you see as the main concerns that have to be addressed in connection with your proposals?

A. Yes, they ought to be less risky because they are local in implementation. They are in a sense "fail-safe"; that is, really the worst that can happen if the methods don't work is that the ice sheet collapses, as it will do anyway as climate warms.

Obviously there are risks attached to large engineering schemes; certainly local environmental damage happens in construction—but that happens all the time globally, requiring politicians to make cost-benefit analyses about the risks.

Q. As I understand it, some of the sea level rise that is predicted would come about because of thermal expansion of ocean waters. Supposing an aggressive effort was made to contain glaciers/ice shelfs, etc., along the lines you suggest, how much of the predicted sea level rise do you think that would stave off in the medium term (say, the next 50 years)?

Shutterstock

"Thermal expansion and melting of smaller mountain glaciers will raise sea level as well, especially over the next few decades. Much of the next 50-year rise is already in the pipeline, as the warming over the last century affects the ice sheets with a time lag."

A. Yes, thermal expansion and melting of smaller mountain glaciers will raise sea level as well, especially over the next few decades. Much of the

next 50-year rise is already in the pipeline, as the warming over the last century affects the ice sheets with a time lag. Doing glacio-geoengineering is for longer time frames than 50 years ahead (when it could save rises of several meters in 200 years). We can use the next few decades to collect observations of what's happening under the ice shelves, and off the continental shelves of Greenland and Antarctica, and maybe build some small-scale structures in the Greenland fjords to learn how to do such construction.

Q. There are clearly many things we still do not know about climate change; some U.S. political figures suggest that this means it would be a mistake to make decisions with significant economic consequences in dealing with anticipated problems stemming from global warming. What is your view on this?

A. This is sadly misunderstanding what we do know. The longer decarbonizing the economy is delayed, the larger the eventual sea level rises will be, and the worse the eventual environmental damage. This is beyond doubt.

Q. Where do you spend most of your workday? Who are the people you work with?

A. Mostly with my Ph.D. students and postdocs, or guys trying to get supercomputers running as we want. But sometimes talking with ministry people (in China they really are already experts in climate change), or decision-makers; e.g., one day I went with the Beijing deputy mayor on a tour of some village development schemes near the city.

Q. What do you find most rewarding about your job? What do you find most challenging about your job?

A. It's rewarding to get a novel idea through the peer-review process and published, and it's challenging to grow a new student into a well-rounded, creative person.

Q. What has been the most exciting development in your field in the last 20 years? What do you think will be the most exciting development in your field in the next 20 years?

A. Geoengineering is really very new: at least in terms of serious climate modeling terms, maybe 10 years old. Rapid advances in physical understanding of the ice sheets and their interaction with climate is really exciting and of course holds the key to future sea level rise.

I am curious about what portable instruments will be developed in the future. Many relatively uninvasive analyses can already be done on site, but, hopefully, even less destructive analyses will become possible in the future.

Q. How does the research in your field affect our daily lives?

A. I think it's pretty obvious to the developing world and in places like Beijing, with its pollution, that humans are drastically impacting the climate, air, land and water. People here would love to find ways they can live better and more sustainably with nature. Humans already have their hand on the climate controls; it would be good to accept that responsibility and try to adjust those controls wisely.

Q. For young people interested in pursuing a career in science, what are some helpful things to do in school? What are some helpful things to do outside of school?

A. This really varies enormously by country. But I think one key thing is simply having a broad understanding of issues, not only in a favorite science, but also what that science means socially and politically. Everything is connected, and you need to see as much of the picture as possible to see where to go.