John Priscu's response to the award of the SCAR Medal for Excellence in Antarctic Research 2012

It is an honor and privilege to be awarded the SCAR Medal for Excellence in Antarctic Research. There are many, many excellent scientists working in Antarctica, and this award could have gone to any of them. I am honored that my peers thought that my contributions to polar science have been significant.

When I first started my work in the McMurdo Dry Valleys in 1984, many scientists doubted that it was a functional ecosystem. Our early work on life in this icy environment was originally called 'hand-waving' by these same scientists. Indeed, as we drilled through the lake ice and sampled the soils, we never knew exactly what we were going to find, and often times our discoveries were serendipitous. It quickly became clear that the polar deserts of Antarctica are unique functional ecosystems containing microorganism "living at the edge" that produce truly novel biogeochemical signatures. For example, the phytoplankton in the permanently ice-covered lakes are uniquely adapted to the low light environment and maintain their chlorophyll-a levels through the winter using physiological mechanisms similar to those of evergreen trees. We also observed levels of dimethyl sulfide (DMS) that are hundreds of times higher than that in the Southern Ocean, and levels of nitrous oxide that exceed atmospheric concentrations by more than 70,000 percent. Applying biogeochemical and genomic tools, we concluded that these gases are not contemporary, but rather were produced hundreds to thousands of years ago during the evolution of the lakes. While drilling through the 4-6 m thick permanent lake ice in the McMurdo Dry Valleys, we consistently encountered a layer of sediments located about 2 m beneath the surface that dulled out bits and tested out wits. Following several seasons of debate over the origin of this sediment layer, we found that this layer contained elevated levels of nitrous oxide, which we originally thought originated from the water column. Upon closer look, we found that a viable ecosystem lived in the ice cover itself driven by water made available by the meager amounts of solar radiation penetrating the ice, and by nutrients leaching from the sediments themselves. Publications resulting from this research were the first to describe this ice-bound ecosystem and show that organisms can thrive in "solid ice".

Our seminal research on the lakes of the McMurdo Dry Valleys put us in a position to draw strong hypotheses about life within and beneath the Antarctic ice sheet. During the XXVI SCAR (July 2000) meeting in Tokyo, SCAR recognized the importance of the Antarctic subglacial environment as an unexplored frontier and had the foresight to organize the Subglacial Antarctic Lake Exploration Group of Specialists (SALEGoS), a cross-disciplinary committee that spanned all of SCAR's working groups. As Convener of this group, our first task was to develop our terms of reference and convince our peers and the public that subglacial lakes and rivers did indeed exist and that they were of regional and global significance. Based to a large extent on the guidance provided by SALEGoS and its successor, the Scientific Research Program SALE, we now know that there are more than 200 lakes and huge rivers beneath the Antarctic continent which harbor active ecosystems that contribute to Southern Ocean geochemistry, and to overlying ice sheet dynamics. We have taken this field from a curiosity to a focused area of research that has an international following. Three national programs are now poised to obtain samples from three locations around the Continent (Russia, Lake Vostok; U.K., Subglacial Lake Ellsworth, U.S., Subglacial Lake Whillans) during the 2012-2013 field season. It is truly a fantastic time to be an Antarctic scientist.