Acceptance speech

16 June of 2022

# **Lonnie G. Thompson,** awardee in the Climate Change category (14th Edition)

It is a great honor to receive the BBVA Foundation's Frontiers of Knowledge Award in Climate Change. Ellen and I are humbled to share this award with previous honorees in our field. We thank the BBVA Foundation for establishing the award and Bjorn Stevens and the selection committee for this recognition and we offer our congratulations to our fellow laureates. This prestigious award from the BBVA Foundation recognizes the importance of studying and addressing climate change. We also acknowledge the members of our research team including our postdoctoral scholars and graduate students, the hundreds of participants in our many field expeditions, and our international colleagues. The success of our projects to recover ice cores requires a tremendous collective effort by all team members and collaborators both at home and abroad.

Since 1974 we have conducted 64 expeditions to the world's highest mountain tops to recover the ice core histories preserved in Earth's rapidly disappearing glaciers. In total we have collected ice cores from 78 locations in 16 countries, and in Antarctica and Greenland. We have systematically archived 7000 meters of core, representing the most geographically diverse collection of its kind, which is stored in freezers at The Ohio State University. By archiving these cores collected from the tropics to both poles, we have ensured that they will be available for study by the next generation of researchers.

Ice cores provide an amazing medium for investigating Earth's climatic and environmental changes, as they record everything in the atmosphere and freeze it in time. They contain keys that unlock mysteries of the past recorded by proxy indicators of variations in temperature and precipitation over thousands of years, as well as atmospheric chemistry, the strength and direction of atmospheric circulation, fire histories, and biological changes, among others. Moreover, they record the forcings of short and long-term climate change, such as ash emissions from massive volcanic eruptions that cool the planet and increasing greenhouse gas concentrations that warm the planet. We can reconstruct the history of

variations in solar energy by measuring cosmogenic species produced in the atmosphere and recorded in the ice. More recently the investigation of the evolution of microorganisms such as bacteria and viruses has gained widespread interest, both in the scientific community and in popular media.

The high mountain glacier component of our program began in 1974 on the 5670-meter high Quelccaya ice cap in the Andes of southern Peru. Subsequently we have focused on retrieving and analyzing ice cores from carefully selected mountain glaciers and reconstructing past climate histories to assess the magnitude and nature of today's changing climate and environment. After the successful program on Quelccaya, for which we built the first light-weight, solar-powered ice core drill, we have collected ice cores throughout the Tibetan Plateau, in the Himalayas, in the Bolivian and Peruvian Andes, on Kilimanjaro, and in Papua, Indonesia (New Guinea). Individually these records yield an abundance of valuable information on climate change in their respective regions over thousands of years, but when combined they provide valuable but worrisome data regarding the magnitude of recent climate change globally, particularly the rapid rise in global temperatures over the last 50 years.

Due to their small size, these low latitude glaciers also respond quickly to climate changes. Since 1974, we have been monitoring the retreating margins and thinning of many of these glaciers. Our observations, along with those by other researchers using remote sensing and ground measurements, have conclusively demonstrated that we are losing not only the histories they preserve, but critical water resources for millions of people who live nearby or downstream. These observations led me to join other scientists in 1992 to testify before the U.S. Senate on the reality of extreme climate change as documented in remote parts of the world. Since then, scientific documentation of climate change and its anticipated impacts have continued to accumulate but unfortunately, Earth's inhabitants and their governments have done little to slow the accelerating rise of atmospheric greenhouse gas concentrations.

We have a potential path forward as there are many innovative people in the fossil fuel industry who can help us accelerate the transition to a carbon-free society. For example, the technology required to slow greenhouse gas emissions from carbon consumption is under development, primarily by the private sector. The cost per megawatt hour of solar and wind energy is now cheaper than that from most fossil fuels. We are also witnessing great advances in battery technology. In addition, over the past decade, global awareness of climate change has grown and young people around the world are protesting for immediate action as they realize that their generation will have to carry the burden of climate change inaction and denial.

Unfortunately, it may be too late to save many of our mountain glaciers, including the iconic ice fields on top of Kilimanjaro. However, there is time for us to work together, nationally and internationally, to slow and ideally eliminate the global threat posed by climate and environmental change and the resulting impact on our societies, economies, and livelihoods.