

Science Diplomacy: United States and Chile Partner to Tackle Global Challenges

Michael A. Hammer

United States Ambassador to the Republic of Chile

The United States and Chile have been working together on scientific endeavors since the visit of US Navy Lieutenant James Gillis in 1849, when he established an astronomical observatory on the Santa Lucia hill in the center of Santiago. Fast forward to today, Chile houses 40 percent of the world's astronomy infrastructure and, by 2020, it will increase to 70 percent. In fact, the National Science Foundation (NSF) has invested over a billion dollars in equipment, infrastructure, and operations in Northern Chile's Atacama Desert, the driest place on earth. And, over the next decade, the NSF plans to add yet another billion dollars in support of its telescopes in Chile—projects that will help to unlock the mysteries of the universe.

US-Chilean collaborative efforts in the field of astronomy are replicated across multiple scientific fields. Astronomy, seismology, volcanology, oceanography, bryology, robotics, clean energy, health, Antarctic research, you name it; our two countries are partnering to advance science and address today's important global challenges. The upcoming "Our Ocean" conference in October in Valparaiso continues the momentum started by Secretary Kerry in June 2014 to harness international conservation efforts aimed at making progress in sustainable fisheries (i.e., by ending overfishing in the ocean and preventing illegal, unreported, and unregulated fishing), reducing marine pollution, stemming ocean acidification, and creating more marine protected areas. These cooperative engagements provide the foundation for one of our core missions at Embassy Santiago—science diplomacy. Secretary Kerry recently said, "Science and technology are obviously central to America's diplomacy, and our diplomacy is central to advancing American science and technology." It is hard to imagine another country where this is truer than in Chile.

President Obama's 2015 National Security Strategy identifies climate change as an urgent and growing threat to our national security, and while Chile is not a major greenhouse gas emitter, it has much to contribute to our scientific understanding of the impacts of climate change. For example, through our collaboration on glacier monitoring, NASA's Operation IceBridge missions over Antarctica, and a host of research projects based at our respective research stations in Antarctica, Chile and the United States are at the forefront of documenting climate change's impacts on our ocean and shared environment. In January, Chilean President Michelle Bachelet traveled to the southernmost town in the world, Puerto Williams, Chile, to open the International Association of Bryologists' (scientists who study mosses, lichens, and related plant species) 2015 World Congress. The conference was jointly organized by the University of North Texas and the University of Magallanes, which play leading roles in a consortium that monitors the impacts of climate change in the sub-Antarctic. Chile's location makes it a natural launching point for scientific researchers heading to Antarctica, where according to the

National Oceanic and Atmospheric Administration over 60 percent of the world's water not found in the ocean is stored in the continent's ice.

Preparing for my post in Chile, I became intimately familiar with Chile's economic miracle and remarkable peaceful transition from General Augusto Pinochet's military rule to democracy in 1990. Chile's success story is a result of successive governments pursuing a combination of free market orthodoxy and institutional development that delivered impressive results: free and fair elections with peaceful transitions of power; a reduction in poverty, from 45 percent in 1986 to less than eight percent in 2014; robust freedom of the press, speech, and association; and transparent institutions with corruption levels that are among the lowest in Latin America. Furthermore, in its ten years, the US-Chile Free Trade Agreement (FTA) quadrupled goods trade between our countries to \$28 billion.

A lesser-known benefit of the FTA has been its positive impact on the conservation of the natural resources that are vital to our economies and our quality of life. The US-Chile Free Trade Agreement's corollary, the Environmental Cooperation Agreement, provides funding for institution-strengthening and capacity-building to improve environmental stewardship. These US investments directly benefit not just the scientific community, but Chile's broader economy as well, creating jobs and boosting scientific exchanges for computer engineers, physicists, and specialists in the movement and storage of data.

Our scientific research to better understand and measure the impacts of climate change is complemented by our efforts to help Chile become a leader in renewable energy. Chile and the United States face many of the same challenges in securing access to affordable, secure, and clean energy. When President Bachelet visited Washington in June 2014, shortly after winning a second mandate, US Secretary of Energy Ernest Moniz and Chilean Energy Minister Maximo Pacheco agreed to work closely together to encourage the transition to cleaner and more efficient sources of energy. Chile recognizes its need to advance its energy generation and distribution technologies, and has made progress in moving its economy towards greater reliance on renewable sources of energy, which President Bachelet has pledged will account for 20 percent of the country's energy matrix by 2025 (up from only six percent in 2013). The United States has partnered to help Chile achieve this objective; for example by providing over one billion dollars in loans for renewable energy projects through the Overseas Private Investment Corporation.

Similarly, our cooperative efforts in the area of seismology and disaster preparedness are impressive. Chile is one of the globe's most seismically active places and its location on the Pacific "rim of fire" makes our two countries' cooperation particularly important. This is science that saves lives. Massive earthquakes in Chile can trigger far-reaching tsunamis that impact not just the country but potentially across the Pacific Ocean.

An excellent illustration of how our seismologists are working and learning together to strengthen earthquake and volcano monitoring is the cooperation between the United States Geological Survey, Incorporated Research Institutions for Seismology (IRIS), and both the Government of Chile and the University of Chile. IRIS is working with the University of Chile in Santiago and their national earthquake-monitoring program through

the Centro Sismológico Nacional. The primary component of our current collaboration, which is funded in part by the NSF, has been to assist the University of Chile in establishing a backbone network of ten permanent global reporting geophysical observatories along the entire length of Chile. This project grew out of successful international collaboration to install more than 100 temporary stations to record aftershocks of the February 2010 mega earthquake. In the event of a powerful earthquake, our Mission works closely as a bridge between the Chilean Ministry of Interior and Security (ONEMI) and the Office of US Foreign Disaster Assistance to ensure all of our collective resources are made available in a strategic way. In addition, research on the origins and impact of great earthquakes along the Andes has important relevance to earthquake hazards in the United States—especially in the Pacific Northwest and Alaska. Therefore, our team is working with seismologists in Chile and the United States to plan an international workshop and symposium in Santiago next year to encourage expanded regional and international cooperation.

The health science relationship with Chile remains vibrant and strong. Our Department of Health and Human Services has a myriad of research projects with Chile. We have joint research with the Chileans fighting infectious and tropical diseases as well as areas such as aging; dentistry; environmental health sciences; child health (iron deficiency in anemic infants, early childhood development interventions, congenital heart defects); cardiovascular research; minority health and disparities; mental health; neurological disorders and stroke; and research training in HIV/AIDS. Furthermore, during the height of the Ebola crisis in West Africa last year, the Centers for Disease Control and Prevention (CDC) was invited to Santiago to share its experience with infectious disease protocols, particularly regarding use of personal protective equipment and transport of infected patients. During their visit, these experts also participated in a Pan American Health Organization preparedness workshop for Latin America.

Science engagement is also prevalent in our excellent military-to-military relationship and in our military-to-academia interactions. For example, the US Navy and US Army have supported research in signal processing for speech recognition at Chilean universities, which is vital for the Department of Defense (DoD) to better enable robots and unmanned vehicles to become more autonomous and less dependent on human interaction, and therefore less expensive and more capable. The technology developed will improve performance time for unmanned systems by utilizing improved speech commands. Additionally last fall, our Embassy DoD team worked with their Chilean military counterparts on improved logistics in the polar regions. This led to proposed future funding from the Office of Naval Research-Global to a Chilean start up that seeks to modify a standard snowmobile into an autonomous vehicle capable of crevasse detection, a leading problem for logistic convoys in Antarctica. US government and higher education sector engagement with universities abroad produces international collaboration on advanced scientific joint research and experiments that help solve real world problems and build even stronger relationships among leaders and scientists.

Our Mission also strongly promotes both scientific professionals and students to look to US academia, the best in the world with cutting edge research in nanotechnology, energy, physics, and polar science, among many other fields. The US-Chile Fulbright

Commission celebrates its 60th anniversary this year and is the oldest in Latin America; it is truly a bi-national effort. Chilean government support has helped make the Chilean Fulbright graduate program one of the largest in the world. Fulbright partnerships with Chile and other nations strengthen our relationships and increase our capacity to advance shared foreign policy goals and solve global problems. For example, the Fulbright NEXUS Program fosters collaborative and multidisciplinary research in the Americas to address challenging regional issues such as climate change, energy, and water.

Recognizing the value of educational exchanges, President Obama launched the 100,000 Strong in the Americas Initiative when he visited Santiago in 2011, the objective of which is to increase the number of international educational exchanges of students, scholars, and teachers between the United States and Latin America, the Caribbean, and Canada. Our goal is to reach 100,000 annual exchanges in each direction. In partnership with governments and the private sector throughout the region, we support Fulbright and other educational exchanges, we promote US higher education through our EducationUSA advising network and study abroad for Americans, and we offer Spanish and English language learning opportunities.

We have also worked to promote and facilitate international study partnerships, encouraging private partners and foreign governments to invest in the next generation of our region's leaders. Prior to organizing the aforementioned bryology conference, the University of North Texas and the University of Magallanes received support from the 100,000 Strong in the Americas Innovation Fund for an annual "Tracing Darwin's Path" educational exchange through which American and Chilean students experience firsthand the ecological diversity and historical significance of the region. Our Embassy actively encourages youth education in science, technology, engineering, and mathematics (STEM) by offering opportunities such as dialogues between scientists and youth. Chile knows that a scientifically literate citizenry and a vibrant science culture are key to sustained economic development and evidence-based decision-making.

Chile's amazing transformation since the military dictatorship is a success story that demonstrates how sound policies and world-class science and research capabilities can power an economy into the 21st century. Chile, like the United States, recognizes that responding to today's world problems requires international cooperation. From Chile's current non-permanent seat on the United Nations Security Council, to its peacekeeping forces serving in Haiti, to its decision to host the second Our Ocean conference, Chile is a leader on the international stage. Fostering cooperation to tackle global challenges is a strategic imperative and a top priority for Embassy Santiago—actively pursuing science diplomacy will help get us there. After all, dating back to Lieutenant Gillis, science diplomacy has proven to be extremely beneficial to both our nations.