2014

The Grand Thaw: Our Vanishing Cryosphere

Richard Snow
Embry-Riddle Aeronautical University, snw4fc@erau.edu

Mary Snow
Embry-Riddle Aeronautical University, snwm@erau.edu

Follow this and additional works at: https://commons.erau.edu/publication

Part of the Environmental Education Commons, Environmental Monitoring Commons, and the Sustainability Commons

Scholarly Commons Citation

This Article is brought to you for free and open access by Scholarly Commons. It has been accepted for inclusion in Publications by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu, wolfe309@erau.edu.
The Grand Thaw: Our Vanishing Cryosphere

Rich Snow* and Mary Snow1
1Professors of Meteorology, Embry-Riddle Aeronautical University, USA

*Corresponding author: Rich Snow, Professors of Meteorology, Embry-Riddle Aeronautical University, USA, Tel: 386-226-7104; E-mail: snow46c@erau.edu

The world’s largest ice sheets are in Antarctica and they too are swiftly melting. In West Antarctica between 1950 and 2000, the average annual temperature increased some 2.5° Celsius; however, wintertime temperatures rose to 4.5° Celsius above normal. The West Antarctic Ice Sheet is comprised of nearly 30,000 cubic kilometers of ice and is surrounded by ice shelves that serve as dams preventing the glaciers from slipping into the Southern Ocean. In 2000, a massive section of the Ross Ice Shelf so large it could be seen by satellite suddenly calved off, and later in 2002, a 3100 square kilometer chunk of the Larson B Ice Shelf broke free and drifted into the sea raising concerns that sea levels could rise as much as six meters if the West Antarctic Ice Sheet were to disintegrate.

In addition to the rapid melting of glaciers and ice sheets, much of the world’s permafrost, which makes up 20 to 25 percent of the global landmass, is softening due to thawing. Since 1960, the temperature of the Siberian permafrost has risen by more than 1° Celsius causing building foundations to crack and the forests of the taiga to lean drunkenly as the underlying soil liquefies. In the Alaskan tundra, the same type of damage is occurring accompanied by wildfires and the relentless northward migration of the bark beetle as the permafrost has warmed by nearly 3° Celsius. Billions of tons of methane, which is 21 times more potent a greenhouse gas than carbon dioxide, are locked in the frozen permafrost. If these vast stores of methane are released, the negative impact on the atmosphere would be devastating.

Earth’s temperature is predicted to increase from 2° Celsius by the end of this century to as much as 6° Celsius by the end of this century if the current rates of warming continue. Such temperature increases are unfathomable in that they have no equal in the past half million years and certainly have not been witnessed in the history of humankind. The unequivocal evidence for global warming is overwhelming and includes not only melting glaciers, sea ice, and permafrost, but also rising sea levels, higher storm surges, an increase in the acidity of the world’s oceans, and greater frequencies of severe weather accompanied by more floods, droughts, and wild fires. The burning of fossil fuels and deforestation during the last 100 years has increased the level of carbon dioxide from 280 parts per million (ppm) to 396 ppm in 2013 based on data from the Mauna Loa Observatory. Higher temperatures and rising carbon dioxide emissions are inextricably linked, and regardless of our actions, the atmosphere will continue to warm and glaciers will continue to retreat throughout the next century. Leaders from countries around the globe convene regularly seeking a resolution to this pressing problem, and as of yet have been unsuccessful in negotiating a binding agreement to reduce greenhouse gases. In each of their Special Reports on Emission Scenarios (SRES) the highly esteemed Intergovernmental Panel on Climate Change (IPCC) has repeatedly outlined the importance of the choices made by society in determining the degree to which the planet will continue to warm. The die is cast. Climate change is upon us. The boldness and efficiency with which individuals and governments act will make a substantial difference in the depth of the disasters that will ensue.