MELTING GLACIERS DRIVE GLOBAL WARMING…AND WARS

Melting glaciers have been for years utilized as a key tool in the public awareness of global warming. However, in many places the loss of glaciers means much more than rising temperature. For this reason, scientists devote themselves to studying glaciers and the rates at which their ice is melting away.

Aerial photographs and satellite imagery in places such as Denali National Park(Alaska) and the Himalayan Mountains show year after year these glaciers retreating up the mountains from which they came. The runoff water flowing to the oceans where they'll eventually lead to a rise in sea level and the loss of millions of acres of coastal land. These snapshots, however, don't hold as much information as scientists who study them would actually like. In fact, while glaciers are undoubtedly shrinking, they do not do so at a steady rate. Even without climate change, glaciers will melt and grow in a cyclic manner along with the seasons. Therefore, the timing of satellite imagery used to study overall ice loss is important.

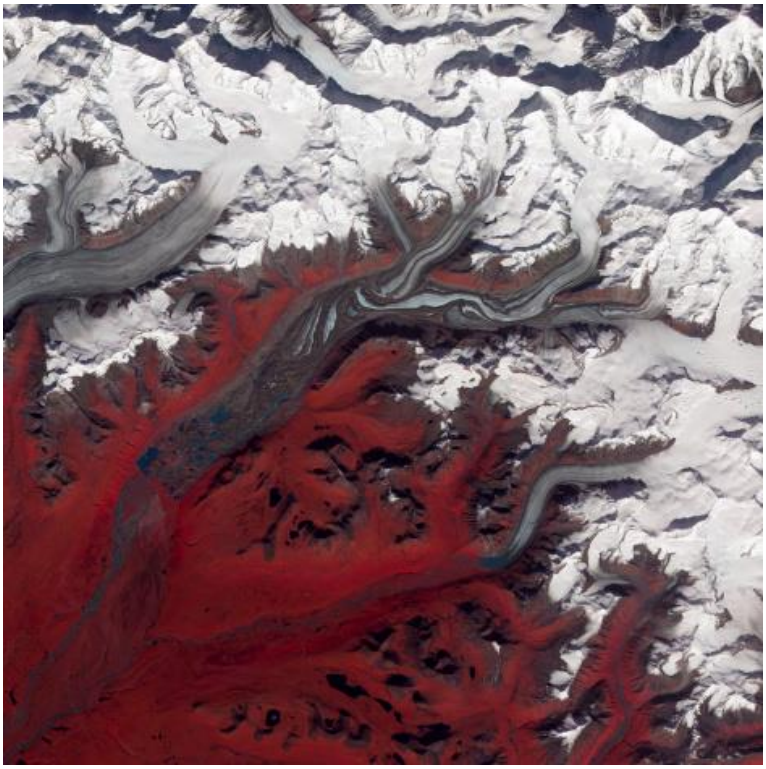
Athabasca Glacier, Columbia Icefield, Canadian Rockies (photo taken Aug 2008)

A recent study by Ian Howat, an assistant professor of earth sciences and member of the Byrd Polar Research Center at the Ohio State University, is aimed at refining the way in which glacier ice loss is measured. Howat's research focuses on Greenland, which is home to hundreds of glaciers and the second largest deposit of ice on the planet. Howat's study, published in the current issue of *Geophysical Research Letters*, uses a *mass balance* approach, which centers around the flow of ice/water out into the sea versus the rate of new ice being formed as snow falls. While this isn't exactly a new method (it has been used in many surface/ground/atmospheric water studies for quite a long time), it is one that Howat is applying on the scale of a single glacier at a time. In his study, Howat focuses on the three largest of the glaciers in Greenland – Helheim, Kangerdlugssuaq and Jakobshavn Isbrae – which when combined are responsible for as much as one-fifth of the ice melt from the country. What really makes his approach more accurate is the frequency of sampling along with detailed studies from multiple sources including imagery from over seven remote sensing satellites and airplanes. According to Howat, "This new research pumps up the resolution and gives us a kind of high-definition picture of ice loss."

Glacier in cirque, Alaska (photo taken Aug 2008)

Based on this study, Howat and colleagues have determined that in the last decade, the ice which has melted from these three glaciers alone would be enough to fill Lake Erie. While this is the shallowest of the five Great Lakes, Lake Erie still holds an impressive 480 cubic kilometers (that's 480 trillion liters or 126.8 trillion gallons) of water. Interestingly enough, one of the three glaciers studied actually grew in size over the past decade. Further showing that a simple, one-size-fits-all explanation is not appropriate and that more detailed studies like Howat's are necessary to get a better idea of ice loss of specific glaciers.

The next step? As you may imagine, imagery can only go so far. Currently, most data collected from airplanes and satellites focus on spatial extent of ice on the surface, as they collect data based on reflected light and energy. However, ice thickness will also play an important factor in this mass balance equation. Luckily, Howat has explained that NASA has already dealt with this issue and is currently collecting ice thickness data by means of aircraft. Soon, Howat and his colleagues will perform similar studies on additional glaciers and begin to translate their findings to glaciers in other parts of the world.



Sustina Glacier, Alaska from space. False color image clearly shows glaciers in gray/white.
(Photo courtesy of NASA Goddard Space Flight Center, taken Oct 2010)

Why is the study of melting glaciers important? It's not to prove climate change…even if it may help to drive that point home. It's not even because places such as Glacier National Park in Montana are in danger of losing their namesake tourist attractions. It is because about 80% of the world's fresh water is tied up in ice. In much of the world, the disappearance of glaciers won't necessarily have a direct impact on the lives of the population. Indeed, I don't feel that I would suffer any great personal loss if this were to happen even tomorrow, short of never having the opportunity to enjoy the beauty of seeing a glacier up close. Yet there are many places where these glaciers provide an integral part of people's lives by providing them with their only supply of fresh water…something which no human can live without and yet so many take for granted.

Implications of potable water loss due to melting glaciers can be even greater than simply dehydration – which I know is what most of you thought of as the only down-side. In fact, this loss in water supply also has implications in agriculture, ecosystem loss, and even hydroelectric power. The latter of which is worth mentioning further because a loss of power produced by hydroelectric sources will force those relying on it to turn to other methods. What other methods are available? Wind? – yes, but this technology is still insufficient to provide for large populations independent of other means. It is reasonable to presume, then, that a reduction of glacial melt water – brought on by the disappearance of its source – will result in a population relying more and more on fossil fuels. As a byproduct, carbon dioxide and other greenhouse gases will be produced, further driving climate change and, as these cycles work, accelerating the melting of glaciers.

What's more is that the ice and snow associated with glaciers helps to reflect energy from the sun rather than to absorb it. As the glaciers retreat, rock and deposited glacial sediments are exposed allowing for radiant energy to be absorbed at the earth's surface and stored for a longer period. This process, believe it or not, only exacerbates the global warming

phenomenon already accelerated by greenhouse gases produced by increased fossil fuel usage.

Additionally, for centuries – or even millennia – access to fresh water has been a source of conflict between nations. In current times, these nations may be smaller, but still exists in Africa and other parts of the world. In a paper by Maarten de Wit and Jacek Stankiewicz in *Science* magazine, it is very likely that these types of conflicts will intensify in the next few decades as a result of predicted climate changes.

Furthermore, studies have shown that increased global climates result in greater evaporation and, consequently, greater precipitation. In regions which already experience rainy seasons, this could be a devastating result. An article in *Nature News* already reports a rising trend in monsoons in India. This heavy rainfall, especially when experienced over prolonged periods, can result in over US$500 million in weather-related damages each year. This economic loss is only expected to increase as time goes on.

So why are melting glaciers important to you? Most likely not because you'll lose some land on your beach-front property, but because of the global socioeconomic impacts that will undoubtedly result and eventually impact you – whether directly or not.

Source : http://adventuresingeology.com/2011/05/27/melting-glaciers-drive-global-warming-and-wars/