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Rapidly Changing Earth

"The Hadley Computer Lab Center in Britain's Meteorological Office warned in October that unless global greenhouse gas emissions start reducing 3% a year beginning in 2010, the average global mean temperature of Earth will rise by at least 4 degrees Fahrenheit over the next 90 years - 4 times *the rate of global warming in the 20th Century."*

Summer ice melt in Arctic has accelerated as fall temperatures broke all record highs - averaging 5 degrees Celcius (9 degrees Fahrenheit) above normal. Image courtesy NOAA.

October 24, 2008 Albuquerque, New Mexico - In October, scientists reported that the fall temperatures in the Arctic broke all record highs – averaging 5 degrees Celcius above normal, which is 9 degrees Fahrenheit above normal!

All that Arctic warming has caused the highest sea level rise on record. It doesn't seem like a big number – only .254 centimeters a year – but it still means Arctic waters are rising as more and more ice melts from the warmer and warmer Arctic temperatures.

All the Arctic sea ice melt in 2008 was the second greatest since satellite measurements began in 1979. The volume of Arctic ice melt might be even more than 2007, which holds the number one spot for area of ice melt. That makes two years in a row of record-breaking Arctic ice melt.

The consequences so far are:

a) the decline of reindeer herds;

b) green shrubs are now moving into Arctic areas that used to be permafrost;

c) and the saltiness of the Arctic Ocean and North Atlantic is being diluted by all the fresh ice water runoff. Less salt in the North Atlantic water means less density. Less density could slow down – or even stop – the North Atlantic Oscillation that brings warm equatorial waters to the North Atlantic. It's that oscillation of warm water from the equator to the British Isles that helps keep the U. K. and Europe warmer. The reason the oscillation might stop is that less salty water is lighter and won't sink as deeply and rapidly.

If the North Atlantic Oscillation stopped, the warmer waters would not reach the North Atlantic. So, in one of the great ironies of global warming, the faster the warming North Pole melts, the more likely temperatures will drop in the U. K. and Europe.

3rd Annual Arctic Report Card

"The planet is interconnected, so what happens in the Arctic does matter to the rest of the world. Changes in the Arctic show a domino effect from multiple causes more clearly than in other regions of our planet." - 3rd Annual Arctic Report Card

This latest data was released in the "Third Annual Arctic Report Card" compiled by 46 scientists from ten countries, who are monitoring what's happening in the Arctic.

The Hadley Computer Lab Center in Britain's Meteorological Office warned in October that unless global greenhouse gas emissions start reducing 3% a year beginning in 2010, the average global mean temperature of Earth will rise by at least 4 degrees Fahrenheit over the next 90 years - *4 times* the rate of global warming in the 20th Century. And a 4 degrees Fahrenheit rise or warmer is the tipping point where scientists and computer models forecast serious sea level rise measured in feet, not centimeters.

Earth Life That Faces Extinction in the Face of Rapid Global Warming

A 4-degrees-Fahrenheit global warming and sea level rise also means extinctions of Earth life that won't be able to adapt fast enough to their rapidly changing ecosystems.

At the top of the list of larger animals that will probably be gone by the end of the 21st Century are polar bears. Those beautiful, powerful Arctic mammals are already being forced by unprecedented Arctic ice melt to swim miles for a meal – and then drown when they can't find ice floes to get out of the water.

Polar bear swimming underwater in Arctic.
Image source Dailygalaxy.com.

Other large and beautiful creatures at the opposite end of the world that might not survive rapid 21st Century warming are penguin colonies in Antarctica. The World Wildlife Fund reported in October that a 3.6 degrees Fahrenheit (2 degrees Celsius) global warming this century could kill 75% of the Adelle Penguins and 50% of the great Emperor Penguins.

Antarctica wildlife facing extinction in 21st Century global warming are (left) Adele Penguin parent and chicks and (right) Emperor Penguins. Image source Teachersnetwork.org.

Earth Warming More Quickly Than Expected

Some computer models now show that if the current rate of greenhouse gas build up is not reduced, the now projected 3.6 degrees Fahrenheit/ 2 degrees Celcius global warming could be reached by 2050 – only 4 decades from now - much earlier than the originally projected end of century in 2100.

It's not only the North and South Poles that are warming. The tropics near the Equator in only the last 30 years have experienced average temperatures rising by 1.4 degrees Fahrenheit (.78 degrees Celcius), making the tropics as warm as they were 2 million years ago. And in an even greater warming increase, climate models predict tropical forests in Central and South America will warm up 6 more degrees Fahrenheit over the rest of this century.

Costa Rica lowland tropical rain forest. Image © 2008 by MonteverdeInfo.com.

Ecologist Robert Colwell at the University of Connecticut decided to document what species of plants and creatures are living in the tropics now and what might happen to them in such increasing temperatures. He and a science team surveyed 1900 species of plants and insects from sea level to about 10,000 feet along the slopes of a volcano in northern Costa Rica.

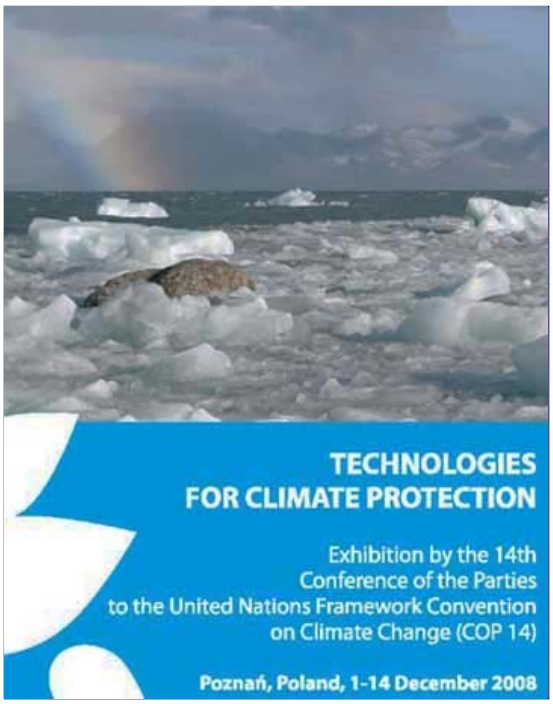
Their findings were published in the October 13, 2008, journal *Science*. More than *half* of the plants and insects will have to move 2,000 feet higher up the mountain as temperatures warm. That means moving into completely new territories which will be a stress. But even worse, many species won't be able to move upward because most mountainside forests in the tropics have been severely fragmented by human land use.

Prof. Colwell concluded, “Because lowland tropical forests are already the warmest forests on Earth, there are no replacement species waiting in the wings to replace these lowland species, as there are for many places at higher latitudes.”

That means there could be an emptying of life in tropical lowland forests – including the middle of the Amazon – sort of like dead zones in the oceans, but these would be tropical lowlands without much life.

Other scientists argue that over the past 45 million years, Earth temperatures have often fluctuated without large extinctions of life in lowland tropics. But one thing is certain: lowland tropical creatures will only be able to cool off by going upward to higher elevations where they can. That means tropical mountain sides and mountain tops could become Noah’s Ark refuges for thousands of plants, insects and other species as this century unfolds.

Poland Conference On Climate Change, December 1 - 14, 2008



The scientific global warming data keeps piling up with implications that our world is changing so much and so rapidly that by 2100, some regions might be unrecognizable - try to imagine Brazil without the Amazon rainforest. In December 2008, various nations are scheduled to have representatives meet in Poland to discuss a new international treaty to cut down global greenhouse emissions – going beyond the Kyoto Protocol. But many scientists are warning that the proposed 3% reduction in greenhouse gas emissions beginning in 2010 would be almost impossible to achieve.

Beyond scientists, the American public is finally paying serious attention to climate change. It cannot be ignored after 5 years of intense hurricane damage, devastating floods and tornadoes in the Midwest and southeast with roads and houses cracking and buckling in melting Alaskan permafrost and the beloved polar bears drowning in the expanding Arctic waters.

On October 20th, Yale and George Mason Universities surveyed more than 2,000 adults and found that two thirds to three quarters of voters say that global warming is one of the most significant issues that will influence their vote on November 4, 2008.

“Engineering Earth to Stop Climate Change”

- *Discover* Magazine, November 2008

In fact, there is so much growing concern about how to slow down global warming that in the November 2008 issue of *Discover* Magazine, under the title: "Engineering Earth to Stop Climate Change" – some surprising facts and proposals are outlined.

1) According to the Natural Resources Defense Council, the projected cost of climate change worldwide by 2100 – if nothing is done to reduce greenhouse gas emissions and the earth warms up at least another 4 degrees Fahrenheit – the cost will be at least:

$ 1,873,000,000,000

What will eat up over $1 trillion? More erratic weather with flooding, droughts and severe tornadoes and hurricanes. Global warming produces both extremes of too much water and not enough water around our planet.

2) Atmospheric physicist Wallace Broecker, Ph.D., at NOAA's Goddard Institute for Space Studies (GISS) in New York proposes building 60 million, 50-foot-high towers to capture all of the world's carbon emissions that can then be pumped into saline aquifers.

3) Another proposal is to launch into orbit around Earth stacks of reflective discs every 5 minutes for 10 years until 850,000 discs are circling in Earth orbit and reflecting back some of the sun's heat.

4) Yet another sunshine-reducing idea is copied after Mt. Pinatubo's huge eruption in 1991 where the volcano blew its top in the Philippines and spewed 20 million tons of sulfur dioxide into the atmosphere. All that volcanic sulfur dioxide reduced solar heat for quite awhile.

Ash plume of Pinatubo after June 15, 1991, eruption. 20 million tons of sulfur dioxide spewed into the atmosphere and temporarily reduced solar light and heating. Image courtesy USGS.

That gave Nobel laureate and atmospheric chemist, Paul Crutzen, the idea to shoot 5.3 million tons of sulfur dioxide into the atmosphere each year in order to keep CO2 emissions

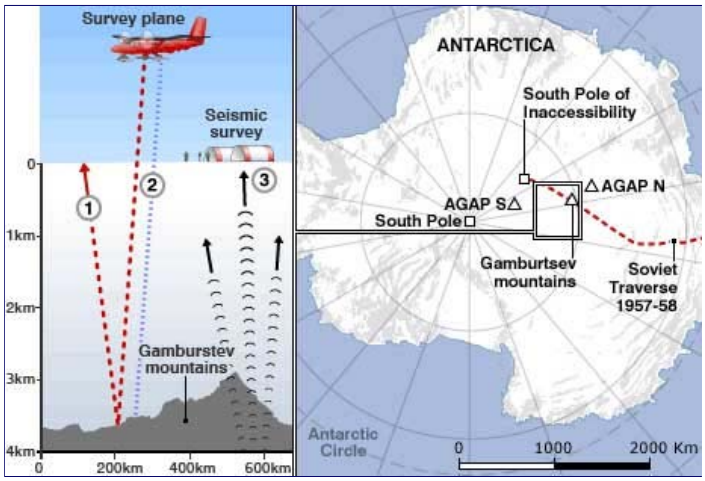
from doubling.

But if scientists and politicians start launching sulfur dioxide, little reflecting discs and other sunshine-deflecting substances to reduce global warming, the amount of worldwide rainfall could be reduced beyond control, causing global droughts. It's like that old saying, "Don't fool with Mother Nature or you'll regret it."

Human civilization and all its industrialized gases *have* been changing the balance of Nature on Earth quickly. The painful consequences of our ignorance are going to keep increasing for the foreseeable future.

Antarctica Ice Mystery

"You can almost think about it as exploring another planet -
but on Earth. This region (of Alps-size mountains) is a complete enigma.
It's in the middle of the continent. Most mountain ranges are on the edges
of continents, and we really can't understand what these mountains are
doing in the center (down 4 kilometers beneath ice)."
- Fausto Ferraccioli, Ph.D., British Antarctic Survey



Aircraft will use radar to detect ice thickness and map shape of the subglacial Gamburtsev Mountains underneath 2.5 miles (4 kilometers) of Antarctic ice. Gravity and magnetic surveys will help determine structure, and seismic waves will probe mysterious mountains' rock properties. The subglacial mountains were discovered by a 1957-1958 Soviet team where scientists thought the interior would be flat. An international team of scientists from the U. K., U. S., Germany, Australia, China and Japan will set off in December for about three months of work. Graphic courtesy **AGAP, Antarctica's Gamburtsev Province project.**

But this won't be the first time that our planet changes temperatures and ice distributions rapidly. The center of Antarctica is covered by 2.5 miles of ice. And yet below all that ice is one of Earth's greater mysteries: the subglacial Gamburtsev Mountains as big as the Alps are encased at the bottom of all that Antarctic ice. No one knew there was a huge mountain chain beneath Antarctica until a Soviet team of scientists explored there in 1957 to 1958. No one knows how the tall mountains formed in the middle of the Antarctic continent. But there might be more answers about the mysterious under-ice mountains by the spring of 2009.

In December 2008, an international team of scientists from the U. K., United States, Germany, Australia, China and Japan will set off for about three months of work. Aircraft will use radar to detect ice thickness and map shapes of the subglacial Gamburtsev Mountains underneath the 2.5 miles (4 kilometers) of Antarctic ice. Gravity and magnetic surveys will help determine structure, and seismic waves will probe mysterious mountains' rock properties. from the U. K., U. S., Germany, Australia, China and Japan will set off in December for about three months of work.

Prof. Fausto Ferraccioli, Ph.D., one of the British Antarctic Survey team members, describes their scientific challenge this way: "You can almost think about it as exploring another planet - but on Earth. This region (of Alps-size mountains) is a complete enigma. It's in the middle of the continent. Most mountain ranges are on the edges of continents, and we really can't understand what these mountains are doing in the center (down 2.5 miles/4 kilometers beneath ice)."

More Information:

For further information about Antarctica and Arctic ice melts, please see Earthfiles reports below in the **Earthfiles Archive**:

• 03/27/2008 — Ice Block Size of Northern Ireland Has Broken From Wilkins Ice Shelf in West Antarctic Peninsula
• 10/05/2007 — Earlier, Faster and Deeper Arctic Ice Melt Down
• 08/08/2007 — 2007's Warm, Erratic Global Weather
• 07/11/2007 — Mystery of Night Shining Clouds - Another Global Warming Change?
• 06/21/2007 — Large Lake in Southern Chile Has Disappeared
• 06/01/2007 — Is Earth Close to Dangerous Tipping Point in Global Warming?
• 05/18/2007 — Antarctica: Unprecedented Western Ice Melt and CO2-Saturated Southern Ocean
• 02/02/2007 — Updated: New U. N. Global Climate Change Report: Earth Could Warm Up 3.2 to 11.52 Degrees Fahrenheit by 2100
• 01/10/2007 — 2006: USA's Warmest Year On Record
• 12/08/2006 — NASA Wants Permanent Moon Base by 2024
• 12/07/2006 — Earth Headed for Warmest Period in 55 Million Years?
• 09/09/2006 — Methane - Another Threat in Global Warming
• 08/19/2006 — Repair of Earth's Ozone Layer Has Slowed
• 07/18/2006 — 2006 - Hottest Year So Far in U. S. History
• 06/24/2006 — "High Confidence" Earth Is Warmest in 400 Years - Maybe Even 2,000 Years
• 03/17/2006 — Planet Earth's Ice Melt
• 01/03/2006 — Antarctic Earthquakes and Edgar Cayce Pole Shift Prediction
• 11/18/2005 — Is the Sun Heating Up?
• 09/23/2005 — Phenomenon of "Instant" Hurricanes in 2005
• 05/07/2005 — Did Milky Way Gas and Dust Turn Earth Into Icy Snowball Four Times?
• 04/01/2005 — What's Killing Off Marine Life Every 62 Million Years?
• 04/01/2005 — Soft Tissue - Even Blood Cells? - Found in Tyrannosaurus rex Leg Bone
• 02/03/2005 — Kyoto Protocol Goes Into Effect February 16, 2005. British Scientists Warn Global Temperatures Could Climb Higher Than Earlier Estimates.
• 01/07/2005 — 9.0 Sumatra Earthquake Update
• 09/04/2004 — Hillsboro, Ohio Corn Formation - High Strangeness in Soil and Plants
• 08/16/2004 — NASA Has Launched Aura Satellite to Study Ozone-Destroying Chemicals in Atmosphere
• 08/14/2004 — Oceans Are Absorbing A Lot of Greenhouse CO2. As Chemistry Changes, What Happens to Sea Life?
• 02/27/2004 — Abrupt Climate Change: Scenario from A Pentagon-Commissioned Report
• 02/23/2004 — Is There Liquid Water on Martian Surface?
• 02/21/2004 — Update On Mars with Cornell Astronomer Steve Squyers,Principal Investigator on the Mars Rover Missions
• 05/30/2003 — Scientists Surprised by Common House Fly Fossils in Antarctica
• 01/05/2003 — What Are the Grooves in the Martian South Pole?
• 10/21/2002 — Mt. Kilimanjaro's Ice Cap Is Melting Fast
• 06/01/2002 — Scientists Surprised by Abundance of Water On Mars
• 03/21/2002 — Antarctic Peninsula Is Melting - And So Is Arctic Ice
• 02/13/2002 — January 2002 Warmest On Record For Whole World
• 01/30/2002 — Latest Satellite Data Shows Surprisingly Thicker Ross Ice Shelf in Antarctica
• 12/22/2001 — Scientists Warn That Climate and Earth Life Can Change Rapidly
• 03/04/2001 — Disappearing Glaciers - Evidence of A Rapidly Warming Earth
• 02/07/2001 — 94% Decline In Aleutian Islands Sea Otter Population
• 01/28/2001 — U. N. Global Warming Forecast: Up to 10.5 Degrees F. Hotter At End of 21st Century
• 12/24/2000 — Martian Bacteria?
• 04/20/2000 — Severe Arctic Ozone Loss and Deep Ocean Warming
• 12/02/1999 — Is There Water - And Life - On Mars?
• 09/26/1999 — Could Ancient Microbes in Polar Ice Cause Epidemics?
• 06/27/1999 — Microbes Two Miles Below Earth Surface in South Africa
• 05/16/1999 — Edgar Evans Cayce About His Father and Atlantis
• 05/05/1999 — Two Antarctic Ice Shelves Almost Gone

Websites:

Arctic Report Card 2008: http://www.arctic.noaa.gov/reportcard/index.html

World View of Global Warming: http://www.worldviewofglobalwarming.org/pages/tropics-oceans.html

"Extinction and the spatial dynamics of biodiversity," *PNAS*, August 2008: http://www.pnas.org/content/105/suppl.1/11528.full

National Snow and Ice Data Center: http://nsidc.org/

British Antarctic Survey: http://www.antarctica.ac.uk/about_bas

/news/press_releases.php

Larsen B Ice Shelf Collapse: http://www.sciencedaily.com/releases/2008/02/080210100441.htm

AGAP: Antarctica's Gamburtsev Research: http://www.ldeo.columbia.edu/~mstuding/AGAP/

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