Volume 17, No. 4
Winter 2007
Fourth Quarter

PSF NEWS

Planetary Studies Foundation

Inside this issue:

The PSF would like to wish its members and families a happy new year in 2008!

CLIMATE CHANGE : A SOUTHERN HEMISPHERE PERSPECTIVE

BY: DR. DOUGLAS L. HICKS, OREWA, NEW ZEALAND

PSF members in the States see and hear a great deal about global warming on U.S. television networks these days. In the scientific magazines, you read articles or even entire feature issues on the topic. Carbon dioxide levels are at a global average of 380 ppm, the highest ever measured and still rising. Average annual air temperatures in the decade 1996-2005 include the warmest since records were first kept. Arctic sea ice's summer extent has steadily shrunk since the 1950s. Glaciers from Iceland west to the Rockies and east to the Himalayas are receding so fast, that some may disappear entirely in another fifty years. Hurricanes are on the increase, seemingly more powerful and destructive than they used to be.


Lake Hawea, Otago, South Island, New Zealand *


Karamea, West Coast, South Island, New Zealand *

Whether climate change is due to natural or human causes or a bit of both, continues to be debated - not by scientists so much as by environmentalists, industrial lobbyists, administrators and politicians. In January 2007 the United Nations IPCC (International Panel on Climate Change) issued a five-yearly report.

Continued on Page 6

*Photos courtesy of fortressnewzealand.com

A SPECIAL THANKS TO OUR YEAR-END DONORS

Joe Auer, Jr.
Dave & Theresa Butts
Cecilia Cooper
Lauren & Tony Dow
Farmer's Guest House
David & Debra Kahn
Steve Koppes
Scott Kristensen
Jim Lancaster
Marlin Environmental, Inc.
Jim Plaxco
Doris Rudoff
Sipiera Science Consultants
Linda Virag
Herb Windolf

PRESIDENT'S MESSAGE

As 2007 quickly comes to a close, we can look back upon a very productive year for our organization. Many of the things that we had to address were very serious problems with our infrastructure. To remedy this situation the PSF Executive Board expanded the responsibilities of Andrea M. Cosentino, our Administrative Assistant, and changed her title to Operations Manager. She is now involved in almost every aspect of the business side of the organization from publications, to members' services, to fundraising. Perhaps one of her most obvious 2007 achievements can be found in the improvement and quality of our *PSF Newsletter,* and in its timely publication. The Fall issue interview with Hugh Downs was a *PSF Newsletter* highpoint! The *PSF Newsletter* and our website are the "life-lines" of our organization. Recently Andrea has been able to improve our direct communications with our membership through either personal phone calls or e-mails. In 2008 we will direct considerable attention to our website and make it even better. Things are also shaping-up very well for the PSF 20th Anniversary Gala that will be held on September 20, 2008. This event will "jump-start" the "celebration year" of PSF**. Apollo 16 Moonwalker**, and PSF life member, **Charlie Duke** will be our honored guest. In addition, he will make a special presentation to PSF in honor of our anniversary. The Gala is currently in the developmental stage, with specific details for the event being released in early March. This will be an event that you will not want to miss. I can hardly wait to share with you all the excitement that awaits us as we draw nearer to that September 20th Gala date! 2008 is already "shaping-up" to be a pivotal year in PSF's long history, and our organization is well positioned for the future.

I wish to offer my sincere thanks to all of you who participated in our events, and contributed to our organization this year. PSF could not accomplish its mission without your continued support and financial help.

Paul P. Sipiera

END OF YEAR GIVING CAMPAIGN

(as of December 22nd)

$1,000-$1,999

JAMES R. LANCASTER FAMILY FOUNDATION

$500.00 - $999.00

ROBERT RENGUSO

(Marlin Environmental, Inc.)

$100.00 - $499.00

DAVE & THERESA BUTTS

SIPIERA SCIENCE CONSULTANTS

LARRY KNIGHT

STEVE KOPPES

LINDA VIRAG

HERBERT WINDOLF

$25.00 - $99.00

CECILIA COOPER

LAUREN & TONY DOW

FARMER'S GUEST HOUSE

DAVID & DEBRA KAHN

SCOTT KRISTENSEN

JIM PLAXCO

DORIS RUDOFF

DONOR'S SPOTLIGHT

$2,000 - $5,000

AUDREY AND ALBERT RATNER

To Honor Their Son

James N. Pritzker

Colonel (IL), IL ARNG (Ret.)

RENEWING MEMBERS

LIFE

MONICA VAN GLAHN

SUPPORTING

LINDA KOLBUSZ-KOSCH

CONTRIBUTING

BILL AND MARY SUE COATES

CAROL DEHNBOSTAL

FAMILY

MARTIN LANDWEHR

INDIVIDUAL

JAN A. BUEDEL

STEVE KOPPES

BLAINE REED

KAREN SABATINI

CHRIS ZIRTZMAN

MEMBER'S CORNER

- Our condolences go out to ***Elena and Jerry Marty*** on the recent passing of Elena's parents. It's good that Jerry gets to spend time holiday at home this year. He will be returning to South Pole after the holiday season.
- PSF's best wishes to ***Jan Buedel*** on her recent move to the Sunshine State of Florida. Although Florida is a bit further south than Streamwood, she promises never to miss a PSF dinner since she is our "official" videographer.
- As if creating one of the largest meteorite collections in the world wasn't enough, now ***Jim Schwade*** has moved on to even bigger things. Jim is president of the Kankakee Railroad Museum and has been involved in the restoration of the Railroad Depot, trolley barn, and now the trolley too. What a magnificent "train set" that will make!
- Our congratulations to ***Birgit Sattler*** on the recent announcement of her selection as a 2008 ***Wings Women of Discovery Award*** Winner. She will receive their Air & Space Award at a Gala Dinner in New York City on March 5, 2008 for her scientific research in microbiology in polar and alpine regions.
- Congratulations also go out to ***Violetta Pollara DuPont*** for being honored by the Baroque Orchestra of New Jersey during their Oct. 20th performance at Fairleigh Dickinson University for her work as benefactor and board chair of Opera at Florham.

GLOBE TROTTERS

- It is a well-known fact that ***Bill and Mary Sue Coates*** have always been known for their travel adventures. Before moving from their Hinsdale home of 43 years they decided to embark on a 10,000 mile, 38 days cruise above the Mid-Atlantic Ridge to mentally prepare themselves for their next move.
- In August, ***Betty Hull*** and her daughter Barbara were off to China and Japan to attend literary conferences and take in many of the most interesting historical sites. Along the way Betty ran into many interesting people including a Russian cosmonaut!
- The "traveling Learys", ***Richard and Ellie,*** are two people you just can't hold down. This past spring it was Malta, Sicily, and southern Italy where they have been fascinated by the Roman culture since Nero was Emperor, and Richard knew him personally! In the fall they were off to Slovenia, Croatia, Bosnia and Montenegro, all part of the "old" Yugoslavia. Looks like they favor the Mediterranean lifestyle.
- "Can't keep a good traveler down". ***Cathy Rudolph,*** who injured her hip back in May, refused to sit around and let the world pass her bye, so off to South America she went in November on a previously planned vacation. She had to fore-go climbing Manchu Pichu with a llama on her back, but still had a wonderful time.

Tsunami

The History, Causes, Effects, and Types of this Phenomenon.

by Herb Windolf

Horrific images of death and destruction from the Indian Ocean tsunami of December 26, 2004 were broadcast around the world within hours of the incident. People saw first-hand the destructive power of these giant waves and the large loss of life that occurred throughout the region. However, most people do not understand what is taking place during a tsunami. For one thing, the tsunami came without warning. Some, ignorant of its warning signs, were actually drawn closer to watch the surging waves. Often sea level recede prior to the surge exposing the near shore environment and stranding sea life. Local people, unfamiliar with this exciting event, may even venture out to collect stranded fish. Obviously, shoreline dwellers as well as visiting landlubbers need to be educated about tsunamis, for it may save their lives one day.

Tsunami, is a Japanese word meaning 'harbor wave'. Such sudden surges were often observed within harbors. Due to the high frequency of earthquakes in Japan, the Japanese were one of the first trying to understand this phenomenon.

Unfortunately, this is not the case with many other cultures living along shorelines. Due to the relative infrequency of tsunamis most potentially affected people have no experience in dealing with tsunamis. The occasional local tsunami is often unknown at distant locales. Even the memory of a past destructive tsunami fades with time and subsequent generations live without the knowledge of their danger.

The greatest danger from a tsunami is a lack of warning time. In the early 1960's, a tsunami warning system was established in Hawaii by UNESCO's IOC for the Pacific Ocean region. Once an earthquake is being recorded, the center informs countries around the Pacific Rim about a potential tsunami hazard. Following the 2004 Indian Ocean tsunami such a network was also established for this region. However, such systems are not fail-safe due to many variables that affect the reliability of the network. Due to the high number of earthquakes occurring, a tsunami warning may not be issued every time, for, if it turns out to be false, people may loose confidence in future reports. Then there is the cost. Many poorer countries do not have the means for evacuations, or a country's warning system may not be operative.

Photo courtesy of www.whyfiles.org

Almost all tsunamis are caused by some form of tectonic movement. Its three causes are: Sudden pressure release of sub-ducting crustal plates, flank failure of submarine slopes, and flank failure on mountains above sea level. The displacement of earth materials caused by these events can be in the hundreds of cubic kilometers. Each of these displacements produce a like displacement of water – becoming the tsunami, made visible once the traveling energy reaches shore.

The 1964 Alaskan earthquake displaced about 500 km^3 of rock, while the 1960 Chilean event displaced a huge 1,500 km^3! Each such displacement produces a like displacement of water – becoming the tsunami. The most devastating tsunamis originate from subsidence or uplift of the ocean floor. Examples include Sumatra, Indonesia (2004), 230,000 deaths; Messina, Italy (1908), 90,000, and Lisbon, Portugal (1755), with 100,000 earthquake & tsunami deaths. Smaller events touched Hilo, Hawaii, swamped by the Chilean (1960) tsunami. Crescent City, CA, experienced a one meter surge from the 1964 Alaska event.

Above surface flank failure like at Letuya Bay, Alaska (1958), produced a giant splash reaching a height of 520 m. Being a scarcely populated area few deaths resulted. Occasionally, island volcanoes like Krakatoa, Indonesia, (1883) erupt. It produced a tsunami of up to 37 m in height. Along the shores of nearby islands over 30,000 people lost their lives. Krakatoa's offspring, Anak Krakatoa, is growing again and, it too, may someday explode causing even

greater losses due to the shoreline's increased population. The volcanic eruption on the Island of Thera (Santorini) about 1490 BC destroyed most of the island and its culture.

Other events include face collapse on volcanic islands (Hawaii, 1868/1975). Smaller ones may not be as destructive, and affect a relatively small region. However, there is evidence of late Holocene Hawaiian flank failures, whose effects were felt as far as the southeast coast of Australia. On Molokai and Lanai paleo marine conglomerates have been found at 170 m above today's sea level. It is thought that they were deposited by the flank failure of a nearby island and the resulting local tsunami.

Evidence for massive flank failures, none of which have occurred in historic times, has been found on the ocean floor surrounding the Hawaiian islands, Reunion in the Indian Ocean, La Palma in the Atlantic, and elsewhere. While the likelihood for one of these catastrophic events to happen soon is low, some must be expected in the more distant future.

Submarine flank failures can occur on many earthquake-prone coast lines and on sea mounts. Such debris avalanches happen on unstable coastal scarps. Being proximal to coasts, they permit little, if any, warning time of impending tsunamis to local populations. Evidence for such events in historic and prehistoric times exists for the Oregon and California coasts. While tsunami height at these locations is unlikely to exceed 10m, losses in today's times would be substantial. Other submarine landslides have happened on New Guinea (1998), and the Balearic Islands (2003).

Shifts of rock material cause a like displacement in the volume of water. The resulting change in water level on the open ocean may vary at most 2 m from the surrounding wave action, and may not even be noticeable. The speed of a tsunami depends upon the depth where the displacement occurred: the deeper the event, the faster the rate of travel. The 1960 Chilean earthquake generated tsunami wave speeds of up to 900km/h. While tsunami waves can travel around the globe, their effects diminish with distance, reaching their minimum amplitude (height) after 12,000 km and there may raise water levels by only a meter.

Wave motion is not water flow, but a flow of energy. The medium (water) itself does not travel. Ocean waves at the interface between air and water are called orbital waves. They have a length from crest to crest of up to 400 m and travel at speeds between 25 to 90 km/h, whereas tsunami wave lengths are in excess of 200 km. When such a surge reaches shore its length shortens. The onrushing water column is forced upward by the shallow shore, producing the tsunami surge. Such waves generally max out at 15 m, however, heights of 30 m (Okashiri, Japan, 1993), and (Ceylon, 2004) have been reported. Tsunami wave period on the open ocean is up to 90 minutes, but with increasing speed near shore, crests shorten to 10-45 minutes. Tsunami surges are usually repetitive and subsequent wave surges are often higher than the first one(s). A common misconception is that oncoming tsunami waves are always indicated by a retreat of the water from shore. If a crest reaches shore first, it leads to an immediate surge of water! It is only because of the extremely long wave lengths of tsunamis and their long troughs, that retreats are observed more often than surges.

Photo courtesy of www.tsunamis.com

Beyond the three major tectonic causes a least likely, but eventually to be expected event, is the ocean impact of a large asteroid, which could cause a tsunami of several hundred meters in height. The Yucatan impact 65 million years ago with its resulting tsunami and other effects, appears to have caused a major extinction. Tsunamis of varying magnitude will continue to happen roughly every five years around our 'living' globe. Some will produce horrific results, yet most will see only minor loss of life – a footnote in the lives of millions – but a terrifying and deadly experience for those directly exposed.

Continued from Front Page

CLIMATE CHANGE : A SOUTHERN HEMISPHERE PERSPECTIVE

BY: DR. DOUGLAS L. HICKS, OREWA, NEW ZEALAND

Its summary, prepared by administrators from public environmental agencies, is dire and certain in tone about what's going to happen around the world. The report's main text, prepared by scientists, is more cautious. The scientists state that climate change is real and it's happening now, but emphasize that their predictions have wide margins of error, because there are things about climate that they don't yet understand.

Photo(s) courtesy of www.fortressnewzealand.com

Global warming or climate change?

For several years I worked at a research station where the scientist in charge encouraged his staff to avoid using words vaguely. The term "global warming" is a good example of what he wished us to avoid. Literally it means the globe is getting warmer. But geophysicists would tell us that there's no evidence of a recent increase in heat flux from the globe's core through its mantle!

Colloquially the word "global" is used to denote something world-wide. For instance a television network might say that it has global news coverage, or a scientific report might say that climate change has global impacts. Such usage is acceptable. But to say that warming is global, creates a misleading impression in people's minds : that some unstated things - air masses, water bodies or land surfaces? - are getting warmer everywhere in the world, all at the same time.

If what's meant, is that carbon dioxide (and other) gas emissions are building up in the planet's atmosphere, and trapping a greater quantity of solar radiation reflected or re-emitted from the earth's surface, that's what needs to be said. Technical and boring, but accurate. What's really happening, is that there's more energy in the atmosphere because more heat is being stored there, instead of escaping out into space. The increased energy manifests itself in different ways:

- higher atmospheric temperatures on some parts of the globe - but not all
- altered air circulation everywhere - more airflow, more turbulence, more storms,
- changing ocean circulation - due to heat transfer from moving air masses,
- on some land areas - higher surface temperatures, lower rainfall, and less snow,
- on others - cooler surface temperatures, greater rainfall and more snow.

Let's take a brief look at the science behind these phenomena.

Higher temperatures some places but not others

Remember your elementary school geography lessons? Different places get heated more or less by the sun. How much, is controlled by their latitude on the globe, the tilt of its axis as the globe spins around every twenty-four hours, and the globe's position in its annual orbit around the sun. So any extra CO_2 in the atmosphere will trap variable amounts of re-radiated heat (reflected or re-emitted from the earth's surface), depending

"The scientists state that climate change is real and it's happening now"

on what place we're at, and also the time of year. Overall, that raises the amount of energy in the atmosphere, but unevenly around the globe.

Altered air and ocean circulation world-wide

Now think back to your high school physics lessons. If a gas is heated in one spot, it expands, and hot gas molecules flow to another spot where the gas is denser and colder. The same process drives atmospheric circulation. The "high pressure cells" and "low pressure cells" that you see on TV Where a hot air mass moves across a cold ocean, the air cools by radiative heat transfer to the water. To some extent this cooling is counter-acted by latent heat of evaporation (heat stored by water molecules evaporated from the ocean's surface by moving air); but only until the air mass becomes saturated with water vapour. Sea water, if warmed by heat transfer, expands slightly and starts flowing as a warm surface current until it cools again (though other factors are also involved in ocean current generation, such as frictional wind drag, and salinity differences). As the warmed water cools it sinks, displacing even colder water which starts flowing as cold currents near the ocean floor. Eventually these cold currents upwell to the ocean's surface. So if atmospheric circulation becomes warmer and faster, it begins to alter the rates and directions of ocean currents around the globe. Paradoxically a warmer current at one place can cause a colder current some place else.

Local changes to land surface temperature, rainfall, and snow

Which set of changes we get - warmer and drier, or colder and wetter - depends on whether the air currents are moving over land or over sea; also on how the ocean currents are changing. As I write this, a ferocious wind is dropping the temperature and rattling hailstones against our windows today; in December which is mid-summer in the Southern Hemisphere. Brrr! - what's happened to the weather? A stronger-than-normal westerly air flow has passed over cooler-than-normal sub-Antarctic ocean water for several thousand kilometres before getting here. At a similar latitude in the Northern Hemisphere, a westerly air flow reaching Illinois close to the summer solstice would have passed over several thousand kilometres of mountain, desert and prairie, so would be quite hot and dry.

So what's going on around the world?

There's certainly more carbon dioxide - and other "greenhouse gases" such as methane - in the atmosphere than there used to be. The increases have been measured for decades. The scientific evidence for "greenhouse gases" trapping more re-radiated heat in the atmosphere is also indisputable. However a basic law of physics is that heat dissipates from a hot mass towards any adjacent mass that's colder. Another basic law of physics is that different substances emit or absorb heat at different rates. Apply the two to "greenhouse gases", and what we have is greater heat flux in the atmosphere than there used to be - which alters atmospheric and oceanic circulation world-wide.

Photo(s) courtesy of www.fortressnewzealand.com

Planet earth is a big place, with lots of different climates. How they change, will depend partly on what local climates are to start with; but also on where they are, relative to any changes in weather circulation patterns. The same weather phenomenon can have a quite different effect in the Southern Hemisphere, from what people observe in the Northern - as you can see from my example of stronger westerly airflow in New Zealand and Illinois. So what else is going on south of the Equator? Read the next PSF newsletter to find out!

Kid's Corner: Jacquelyn Schrank

By: Paula Sipiera

When many adults think of teenagers, they usually think of a self-focused individual. Often times, adults only see one side of this in-between (mostly awkward) age group. They think of teenagers talking back to authority, the risks and pressures of taking drugs, and being disrespectful to the elderly. But as many adults are also aware, many teenagers are very trustworthy, loyal and have new ideas that can be exciting. With that brief description, I would like to introduce Jacqui Schrank.

Jacqui & her horse

Jacquelyn, along with her family, has been a PSF member for about seven years. Many of you saw her as a young girl blossoming into a very pretty young lady. Jacquelyn was born in Winfield, Illinois on June 1, 1990. She is a senior at Central High School in Burlington, Illinois. She is graduating high school this month because she has all her high school credits completed. This winter she plans on attending a community college to get a jump start on college. She does plan on formally graduating this coming May with her classmates in a formal ceremony.

When you ask Jacquelyn, what are her hobbies? She would answer, "Without a doubt, I love horses!" They are her number one hobby. She has been riding horses since she was a toddler. She has competed in several state horse championships. Her horse is quite young and she is always trying to improve her skills. Grooming horses is just as important as practicing riding them, according to Jacquelyn.

Besides horses as her hobby, she also likes to dance. At the present time she is taking jazz dance and hip-hop classes. Jacquelyn is an excellent dancer and loves to dance to anything. She has only taken dance for about three years, but she enjoys performing in dance recitals. She would like to have the ability to keep up this hobby for the future.

At the present time she is working at Howling Acres, the barn where she keeps her horse at. Howling Acres pays her well, she gets to picks her own hours to work, and she gets to work with her horse every day. Jacquelyn is saving her money to help pay for her college tuition. It is the perfect job for her at the present time.

Jacquelyn is a very good student. Her grade point average is around a 3.6 and she works very hard to get the best grades she can. Throughout high school, she was placed in Honors, Accelerated, and Advanced Placement classes. Some of the classes that she took were Advanced Placement in Chemistry, Advanced U.S. History and Honors Biology.

She would like to attend college at either Augustana University or the University of Illinois in Champagne-Urbana. She would like to major in veterinary medicine. It has been her dream since she was a little girl. Her love for animals is an attribute to her serene personality.

Jacquelyn has been a wonderful volunteer to PSF. You can find her helping my mom run Starlab, working the auction tables at the fundraising dinners, helping out behind a table at stargazing events, our "Vanna White" at fundraising dinners, physically demanding work during our "moving to different locations", and she often helps as a cashier. Wherever we need her, she is there. Jacquelyn is a thoughtful and trustworthy, young individual. PSF is very proud to have Jacquelyn as a wonderful young volunteer. She's a very special person, she makes time for her studies, her horses, dancing and volunteer work. PSF wishes her the very best in the future and we are very thankful she is one of our unique young individuals.