

Editorial

As I started writing this editorial both Navaratri and Deepavali festivals have been celebrated in the usual way. They made me nostalgic. I was always benefitted by the stories told by my mother about the victory of good over the bad. The 9 day festival urges mankind in general and the educated in particular to wake up from slumber of ignorance, remove all negativity, cleanse the mind and nurture positive values to help the needy in every respect to overcome many hassles to lead a decent life. The Deepavali festival reminded us about the necessity to drive away darkness from our lives and lives of many deserving human beings. As I was worrying about the amount of pollution created by fire crackers I was thrilled to see a photo of the Golden temple at Amritsar. Without polluting the environment every one enjoyed Deepavali looking at the sky glittering with thousands of flying lights. We can follow this tradition and help one and all enjoy Deepavali.

2017 in many ways destroyed the serene atmosphere due to ever increasing misery all over the world due to Nature's fury and overambitious behaviour of Men in power. The powerful leaders of developed countries have no interest in seeing the world full of ever smiling Human beings, in place of ever suffering millions. The series of traumatizing natural and human induced impacts have significantly affected everyone in one way or the other. The traumatising effect should not lead to irrational acts destroying the human race much before the natural catastrophes. Irrespective of threatening dark clouds we have to optimistically look forward to a ray of hope. I wish you all a **Happy New Year** and a Prosperous 2018. I also wish you bountiful of happiness on "Makara Sankranti".

It is the last but one editorial by me before retiring by the end of March, as the two year term of present editorial board ends on 31st March, 2018. I am fortunate to have the full support of the editorial board, which helped me to introduce ongoing research initiatives in different parts of the earth and useful news items, in addition to reasonably interesting and good research studies, which helped the young researchers to have an overall comprehension of various facets of research covering all the branches of earth system. I am happy to learn from some distinguished senior scientists that they enjoyed reading articles published in JIGU, starting from "Editorial" and ending with "News at a Glance".

Fury of Nature:

It is time to pool up our energies to have a more focused approach to understand the might of Nature and reorient our strategies to better align with Nature to overcome series of setbacks faced by us due to the fury let out by Nature. After total solar eclipse in August, 2017 and enhanced solar flares some believers in the might of Nature pointed out that we might face enhanced fury due to disturbed balance between atmosphere, oceans and solid earth. Since the total solar eclipse was witnessed only in USA and some of the Caribbean islands the believers in planetary congregation strength mentioned about negative impact to USA and surroundings. After seeing the catastrophic devastation caused by Harvey and Irma hurricanes to Caribbean islands, Cuba, Houston, Florida and surroundings of U.S.A learned weather experts have pointed out "Hurricane Harvey and Irma reminded us just how vulnerable are those residing in low-lying cities like Houston & Florida and chain of Caribbean islands and Cuba in a climate-changed world – especially when we degrade the living ecosystems that regulate floods and absorb greenhouse gasses." Grade 4 Harvey and grade 5 Irma with winds crossing 250 km/hr dumped in few hours rain water crossing 550 to 600 mm all along their paths of travel causing immeasurable damage to men and material.

One of the Eos staff editors based in Houston chronicled her horrendous day by day experiences, starting from 25th August and ending on 6th September. Some details are given below.

She pointed out "As geoscientists, we know well the power of water. We harness energy from it. It nourishes our crops. It fuels civilizations. We use its flow to connect goods and services across the planet. It brings our planet life. These days, it's the Holy Grail in the search for life beyond our planet. But water has a dark side that geoscientists also know well. Its force can carve canyons and topple dams. It makes volcanoes explosive. It lubricates landslides. It swells rivers and floods homes. Within it, disease festers. It's one thing to know about the power of water. It's another thing to see it firsthand. "Acts of God." "Mother Nature's fury." These terms have value when learned discuss hazard—the strength of the winds at landfall, the unprecedented amount of rain dumped on southeast Texas. Fifty inches fell in some places over the course of the storm. I've seen graphics that show the total water unleashed in terms of a

volume above ground, I've read comparisons that give the amount of rainfall as one sixth the volume of Lake Erie. I'm trained as a geoscientist, and I know that more is needed to turn an event into a disaster. That something extra is risk. Risk is where the population interfaces with the hazard. Behaviors and our built environment can exacerbate or lessen that risk. How do I tell my 5 year son and 2 year daughter that their daddy and mummy, with our geoscience degrees and jargon-filled theses, now wonder what all those years of study were for if we're not answering questions that can help save lives? And that even if science does have answers the flow of information to policy makers and to people on the ground is far from watertight? I'll start with the basics. I'll tell them that water brings life. But it also has a dark side." (Source: Some excerpts from; Kumar, M. (2017), A diary of a storm, Eos, 98, <https://doi.org/10.1029/2017EO081385>. Published on 07 September 2017.).

WMO Expert Team on Climate Impacts on Tropical Cyclones issued a statement on possible linkages between Hurricane Harvey and anthropogenic climate change. They have mentioned that "Model simulations also indicate that hurricanes in a warmer climate are likely to become more intense, and that it is more likely than not that the frequency of category 4 hurricanes will increase over the 21st century, even if overall tropical cyclone numbers do not increase. Such changes are not yet clearly detectable in observed data due in part to limitations of existing datasets. Ongoing sea-level rise, attributable in part to anthropogenic climate change, also exacerbates storm surge for land-falling hurricanes such as Harvey. Damage resulting from the geophysical event itself will be influenced by the vulnerability of the affected region, which is increased by factors such as population and infrastructure growth, and potentially decreased by mitigation measures such as flood control systems. Extensive coastal development has generally led to large increases in hurricane damage in U.S. coastal communities over the past century."

If Harvey's devastation was horrendous the devastation caused by hurricane Irma was nothing but hell. The fury of Irma was at least three fold stronger compared to Harvey.

Hurricane Irma caused devastation in low-lying Caribbean islands, made landfall in Cuba as the first category 5 hurricane since 1924 and made landfall again in Florida, USA, on 10th September as a very dangerous category 4 hurricane on the Saffir-Simpson windscale. The US National Weather Service and US National Hurricane Center warned of life-threatening storm surge, floods, tropical storm force winds, torrential rain and tornadoes as large parts of Florida were paralysed by the storm.

As millions of battered residents of Caribbean islands were reeling from the after effects of Irma, hurricane Maria started pummeling Puerto Rico on 19th September bringing "catastrophic" 155mph winds and dangerous storm surges, after battering the Virgin Islands. The "monster" storm is one of the strongest to ever hit the US territory, with warnings that heavy rain could cause landslides and storm surges of up to 9ft that risk swamping low-lying areas. Describing the storm as "potentially catastrophic", the US National Hurricane Centre said: "Some fluctuations in intensity are likely during the next day or two, but Maria is forecast to remain an extremely dangerous category four or five hurricane until it moves near or over the Virgin Islands and Puerto Rico." Fortunately Hurricane Jose, which developed prior to Maria spared Caribbean Isles and hit eastern states of mainland USA, with reduced intensity.

Studying these chain of hurricanes Harvey, Irma, Jose and Maria the climate experts have stated that occurrence of such a cluster of hurricanes is not simply coincidence- instead, it is a demonstration of global warming in action. They also warned that the response to these hurricanes shows how terrifying unprepared the world is for the kind of extreme weather events that will become more and more common as the Earth gets hotter.

(Sources:<https://public.wmo.int/en/media/.../hurricane-irma-causes-devastation-breaks-records> & www.telegraph.co.uk/News; [https://en.wikipedia.org/wiki/Hurricane_Jose_\(2017\)](https://en.wikipedia.org/wiki/Hurricane_Jose_(2017)));<http://www.independent.co.uk/environment/hurricane-irma-harvey-jose-climate-change-proof-real-get-worse-florida-texas-houston-global-warming-a7941501.html>).

As I have been pondering about the ill luck of residents of Caribbean islands I have come across a scientific article. A research study states that while strong seasonal hurricanes have devastated many of the Caribbean and Bahamian islands in 2017, geologic studies on several of these islands illustrate that more extreme conditions existed in the past. A new analysis published in Marine Geology shows that the limestone islands of the Bahamas and Bermuda {Bermuda Triangle area} experienced climate changes that were even more extreme than historical events. In the interest of our future world, scientists must seek to understand the complexities of linked natural events and field observations that are revealed in the geological record of past warmer climates. Hearty and Tormey(2017) state "Our global society is producing a climate system that is racing forward out of humanity's control into an uncertain future. If we seek to understand the non-anthropogenic events of the last interglaciation, some of the consequences

of our unchecked forward speed may come more clearly into focus...a message from the past; a glimpse into the future." (Source: P.J. Hearty, B.R. Tormey. Sea-level change and superstorms; geologic evidence from the last interglacial (MIS 5e) in the Bahamas and Bermuda offers ominous prospects for a warming Earth. *Marine Geology*, 2017; 390: 347 DOI: 10.1016/j.margeo.2017.05.009). The information given by the two scientists has dampened my spirits to a considerable extent.

Having gone through these details and seen TV pictures I am convinced that all of us, who boast ourselves as cutting edge scientists should first behave like any other normal human being to understand the misery faced by millions of sufferers due to natural hazards and disasters and empathise with them. Natural disasters bring out the best and worst in people. There are some who race to the rescue of people they don't even know. They are our everyday heroes. Men and women who see a need and just go do something to help. I love these people. We all do. It builds my faith in the goodness of people. There are still lots of good people on planet Earth. Then there are others who take advantage of a bad situation; the liars, cheaters, and thieves. Some people see a disaster as a quick way to take advantage of people in distress. Be wise my friends. Disasters bring out the best and the worst of people. As pointed out by Ralph Waldo Emerson "The purpose of life is not to be happy. It is to be useful, to be honorable, to be compassionate, and to have it make some difference that you have lived and lived well."

Our role as fellow citizens of millions:

Millions are forced to suffer year after year from devastating floods in north and north east India and tropical cyclones that are regularly battering our coastal corridor. To provide on spot answers to many routine problems it is time to divert at least 30% of research activity in addressing problems faced by the common man. Let us set aside our myopic view on low end research activities that are helping in one way or the other our hapless fellow citizens who are suffering from natural hazards. Even though these research initiatives may be routine in nature they are useful in solving many area specific problems. I urge heads of reputed research organisations to encourage those associated with water, pollution, irrigation, agriculture, safety of our coastal corridor, monsoon activities, sustainable and resilience

measures to strengthen post disaster mitigation measures and allow them to publish their results in journals like our own JIGU(which has already attracted the attention of reputed organisations like University Grants Commission and many state government research centres). If there is no change in our outlook towards the field oriented area specific routine research activities we may have to suffer for want of useful data to understand area specific changes with time, as those useful results usually end up as less important institute reports. At that time models developed using sophisticated soft ware would be of no use, as the basic objective in developing those models is entirely different. I am not against cutting edge scientific research and publication of research results in highly cited reputed journals, as those publications encourage researchers to do more to go up the ladder. I am only requesting various selection committees and heads of research organisations to give equal importance to research initiatives that benefit our society. Since these studies are of local importance reputed international journals usually refuse to publish those studies. As detailed above such studies can be published in our own journals, which have reached a stage that is given due weightage by researchers and accreditation channels.

In this Issue:

This issue has twelve research articles, an "editorial" and "News at a Glance". I do reiterate that the significant efforts made by a large number of learned editorial board members, starting from 1997, has helped us to enhance quality of the journal step by step. All of them, including myself, are aware that lot more has to be done following ethical standards to make the journal a reputed one. I am of the opinion that we have achieved reasonable success in spite of limited support from well known research organizations. I thank profusely different universities and couple of well established research organizations for extending needed support by encouraging their employees to contribute articles to JIGU. I do hope other organizations will also encourage their scientists and technical experts to publish in JIGU. Such a support will help our Indian journals (like JIGU) to prosper and serve young researchers of our country in publishing their studies without any hindrance. I profusely thank university grants commission (UGC) for recognising our journal.

I thank one and all for their continued support to JIGU.

P.R.Reddy

Quotes on Hurricanes

*“He knew too what it was to live through a hurricane with the other people of the island and the bond that the hurricane made between all people who had been through it. He also knew that hurricanes could be so bad that nothing could live through them.”

-Ernest Hemingway (1899-1961) was an American novelist, short story writer, and journalist.

* “Anyone who says they’re not afraid at the time of a hurricane is either a fool or a liar, or a little bit of both.”

-Anderson Cooper (1967--) is an American journalist, television personality, and author.

*“Demons never die quietly, and a week ago the storm was a proper demon, sweeping through the Caribbean after her long ocean crossing from Africa, a category five when she finally came ashore at San Juan before moving on to Santo Domingo and then Cuba and Florida. But now she’s grown very old, as her kind measures age, and these are her death throes. So she holds tightly to this night, hanging on with the desperate fury of any dying thing, any dying thing that might once have thought itself invincible.”

- Caitlín R. Kiernan (1964--) is an Irish-born American author of science fiction and dark fantasy works.

*“Some people can find peace in the middle of a hurricane; that’s the person I’m striving to be.”

-Stephen F. Campbell (1962--) Managing Director and Head of Credit Strategy, Annaly Capital Management.

* “Through meteorology, we know essentially how hurricanes form, even though we can’t say where the next storm will arise.”

-Eric Maskin (1950--) is an American economist and 2007 Nobel laureate

* “I think the Caribbean countries face rising oceans and they face increase in the severity of hurricanes. This is something that is very, very scary to all of us. The island states in the world represent - I remember this number - one-half of 1 percent of the carbon emissions in the world. And they will - some of them will disappear.”

-Steven Chu (1948--) is an American physicist, known for his research at Bell Labs and Stanford University

* “Hurricane season brings a humbling reminder that, despite our technologies, most of nature remains unpredictable.”

-Diane Ackerman (1948--) is an American poet, essayist, and naturalist.

* “It was like being in the eye of a hurricane. You’d wake up in a concert and think, Wow, how did I get here?”

-John Lennon (1940-1980) was an English singer, who co-founded the Beatles.

* “Despite the fact we give hurricanes names like Katrina and Rita, a hurricane isn’t a self-contained unit. A hurricane is an impermanent, ever-changing phenomenon arising out of a particular set of interacting conditions - air pressure, ground temperature, humidity, wind and so on. The same applies to us: we aren’t self-contained units either. Like weather patterns, we are also an impermanent, ever-changing phenomenon arising out of a particular set of interacting conditions. Without food, water, air and shelter, we’d be dead.

Without our genes,