Editorial

Two year term of present editorial board ends on 31st March, 2018. On the same day present term of office bearers of Indian Geophysical Union also comes to an end. Some of the editorial board members and IGU executive committee members will continue, making the change over reasonably smooth.

As Chief Editor of JIGU for the last 4 years I wanted all our fellow editorial board members (Fellow volunteers) to feel comfortable, listened to, and truly part of the whole process of publication. I have partly succeeded in achieving this. A small group of volunteers succeeded in making the journal structuring a real team effort. I can happily say that support extended in general by majority of editorial board members helped us in introducing various innovative measures, to attract the attention of not only Indian scientists (especially young researchers) but also some from Iran, Nigeria, USA and Canada. My term is ending without causing any disruption to JIGU publication (which at one juncture worried me due to some problems, especially my health). In addition to overall enhancement of quality of the journal we have succeeded in making JIGU a recognised Indian journal by Clarivate Analytics, ICI, NISCAIR and UGC. In spite of some irritants I've had a lot of freedom to implement my ideas. I don't want to anticipate what my successor will propose and implement. I only wish him the success in making JIGU reach higher targets. However, every one of us must maintain our commitment to unequivocally support JIGU and ensure it remains the place to be for the upcoming generations to use happily in publishing their research articles. We cannot ignore environmental and political changes occurring in India and worldwide, and this important topic deserves visibility through articles under the subsection "opinions". I am modestly proud to remain the first retired scientist in charge of JIGU and also the first to be reappointed after my earlier tenure as an editor for about ten years. I am passionate in contributing to the growth of JIGU as a loyal volunteer, something I don't consider exceptional. I have done my duty, like others who contributed to our science in many ways.

I have written unconventional editorials. Some of the readers including highly talented youngsters and experienced seniors have liked them and others criticised them. In bringing out these editorials I acted both as a student and a teacher. Since I have extended voluntary services that kept me busy all the time in shaping up a bi-monthly issue, with limited assistance on a daily basis I have taken a decision to bring out these unconventional editorials basically to motivate young researchers in developing a liking for our science. With this last editorial from my computer (not from my pen, in literal sense) such unconventional editorials may cease to exist and something better may emerge.

Interested may please read the below and propagate the importance of constantly upgrading our knowledge base by reading many illuminating scientific articles.

***Need to carry out scientific research on natural hazards using frequently updated field data to resolve many issues associated with natural phenomena and anthropogenic interventions**

What Precursors Foretold Greenland's recent 100-Meter Tsunami?

On 17 June 2017, one of the tallest tsunamis in recorded history struck the small fishing village of Nuugaatsiaq in north-western Greenland. The 100-meter wave surprised scientists because earthquakes, which typically drive such waves are not common in that area. Soon after the event, researchers tied the tsunami to a large landslide that had plunged into a nearby fjord, releasing as much energy as a magnitude 4.1 earthquake. Now a new study identifies patterns in seismic data from hours before the slide occurred, which might be helpful in predicting future landslides in glacial regions.

Days or hours before a large earthquake, scientists can often use seismic signals generated by slippage along faults in Earth's crust to predict the size and severity of the coming quake. In the new study, *Poli* analyzed seismic data recorded about 30 kms from where the mass of rocks and dirt fell into the fjord. In the hours before the slide, he found repetitive waves of energy, likely caused by a series of ruptures in the brittle rock, similar to those that happen before earthquakes.

The pattern the author observed fits with a growing body of evidence that the velocity of slippage along weak faults increases exponentially before materials such as Earth's crust or rocks and dirt in a landslide fail. If the physics underlying earthquakes and landslides are indeed similar, as the study suggests, scientists may be able to develop better detection systems for future slides. As the climate warms, causing more landslides in glacial regions, such predictions could help communities better prepare for disaster. (**Source**: *Geophysical Research Letters*, https://doi.org/10.1002/2017GL075039, 2017).

Future Looks Drier as Drylands Continue to Expand

Drylands currently constitute about 41 per cent of the Earth's land surface and are home to more than 38 per cent of the world's population. Drylands are particularly vulnerable to environmental change. In fact, the areas categorized as dry land have been increasing over recent decades, with further expansion set to continue under the influence of climate change. This will have knock-on effects on communities in regions on almost every continent, their crops and livestock, health and livelihoods. A recent review article in *Reviews of Geophysics* described recent progress in dryland climate change research.

Drylands are areas where the annual potential evapo-transpiration greatly exceeds annual precipitation. Over drylands, the air is almost always "thirsty" for water but precipitation is not enough to meet this demand. The locations of drylands are determined mostly by atmospheric circulation and topography. They are primarily found in middle and low latitudes such as northern and southern Africa, Central and East Asia, south-western North America, the west coast of South America, and much of Australia. Both observations and model simulations indicate that global dry lands have expanded over recent decades. For example, the area classified as drylands in the period 1990 to 2004 was 4 per cent larger than that for the period 1948 to 1962.

Each of the subtypes of dryland region: hyper arid, arid, semiarid and dry sub humid has expanded, although the largest expansion has been in semi-arid regions, which now account for more than half of total dryland expansion. Semiarid regions on five continents have all expanded but East Asia accounts for nearly 50 per cent of this global growth. The landscapes of drylands are characterized by low vegetation cover, low nutrition content of soil, and low capacity for water conservation. Dryland expansion means vegetated and fertile land permanently degrading into this state, a process known as "desertification." Climate change model results suggest that under a high emission scenario about 78 per cent of dryland expansion by the end of this century will occur in less developed countries, increasing the dryland coverage rate in these countries to 61 per cent. These areas are already home to disproportionality, more poor and vulnerable people; environmental changes including rising temperatures, water shortages and soil loss will exacerbate poverty and may stimulate large scale migrations.

Recent findings indicate that long-term trends in aridity are mainly attributable to increased greenhouse gas emissions, while anthropogenic aerosols exert small effects but alter its attributions. Meanwhile, human-induced land use or land cover change has likely contributed to aridity trends on regional scales. Research has shown that the greatest atmospheric warming over land during the last 100 years was over drylands, this accounted for more than half of all continental warming. However, the global pattern and inter decadal variability of aridity changes are modulated by oceanic oscillations. The different phases of those oceanic oscillations induce significant changes in land-sea and north-south thermal contrasts, which in turn alter global changes in temperature and precipitation.

So far, we are still not in the position to distinguish quantitatively between increasing aridity caused by natural variability in the climate system and the changes caused by human activities. On the other hand, studies on dryland climates should pay attention not only to long-term trends but also to decadal, multi decadal, and even inter annual variability and their impacts on ecosystems and society. More practically, another pending task is to identify a catastrophic threshold of drylands for developing an early warning system of dry climate related disasters, to take a proactive adaptation, and to mitigate their impacts. The changes occurring in drylands are part of the dynamics of the global climate system so we need "big data" including high-quality ground-based observations and improved satellite retrieval products, as well as climatic proxies from paleoclimate research. Well-developed global and regional climate system models with more reasonable parameterization schemes suitable for dryland areas and so on are particularly required. A special international project comparing dry land climate simulations is planned as part of the current Phase 6 of the World Climate Research Programme's Coupled Model Intercomparison Project (CMIP6) and this will also yield useful information. (**Source:** Jianping Huang and Congbin Fu; email: hjp@lzu.edu.cn)

The above two research articles emphasize the need to carry out field investigations on a regular basis to collect useful and reliable data, instead of over reliance on extrapolated results based on simulated computer models developed using scanty data; even though models based on quality data can help us arrive at a better solution. No single data set taken on a particular day can yield proper results. Natural hazards continue to occur and repeat at a site or area and as such one has to collect repeat data in a fixed time window to know area specific dynamics of a natural hazard. In the first article scientists have collected useful data pertaining to a mega tsunami genesis. However, such data can help significantly only when we have repeat data sets to realistically gather unique signals to extrapolate the obtained on surface information on tsunami genesis due to land slide by comparing the unique signals from past earthquakes through real time earthquake models. If we can pick up similar signals before onset of an earthquake we can use these signals as probable precursors. Similarly, unique signals of different type from field data can be used as pre disaster warning to prepare to face onset of different types of natural hazards. In the second article authors have clearly brought out slow spreading temporal changes in drylands that affect both the soil and water (the vital ingredients to help those living in such lands in producing and conserving life saving food and water and safeguarding soil fertility and erosion). Effective prevention of desertification requires both local management and macro policy approaches that promote sustainability of ecosystem services. Since onset and spreading of this disaster is temporally slow compared to earthquakes and tsunamis it is advisable to focus on prevention, because attempts to rehabilitate desertified areas are costly and tend to deliver limited results. Desertification is having major impact in many places on our planet today, and is expected to affect humanity even more in the future as we experience an increase in human population, and as our planet faces scarcity of natural resources such as clean water. The process happens due to a number of reasons, but much of the desertification that is occurring around the world today is caused by human activity on lands that are extremely vulnerable to overexploitation and improper agricultural methods. In arid regions, grass and other vegetation is necessary to keep the soil in place. If the vegetation is overgrazed by livestock, there is nothing that remains to prevent soil from blowing or washing away, and if this process occurs long enough, it can lead to desertification. Desertification makes natural disasters worse. Events such as flooding, dust storms, and pollution, all become stronger in areas with heavily degraded soils. Without any plants stabilizing the soil and slowing down the runoff, rainwater easily accumulates and floods human settlements in the blink of an eye. Except causing damage, flood water also picks up unwanted pollutants while making its progress through urban areas, and that's how pollution spreads over vast areas.

As stated by the authors dryland vulnerability can slowly but steadily lead to desertification if ecosystem health is not improved and area specific evapotranspiration is not controlled. Assessment of future scenarios shows that major interventions and shifts in ecosystem management will be needed to overcome challenges related to desertification. Such interventions are to be implemented at local to global scales, with the active engagement of stakeholders and local communities. Societal and policy responses vary according to the degree of desertification that a society faces. This intensity of responses needs to be rejected accordingly in National Action Programmes. The new project (CMIP6) under execution (mentioned in the second article) can help if experts from vulnerable regions exchange real field data based models and eliminate the lapses in our preventive measures. Since there are many semi arid tracts in our country we can plan concerted research efforts in these tracts using the expertise (through direct interaction) of scientists fighting desertification in many countries.

All the important observations brought out in these two articles stress the necessity to give due importance to repeatedly acquired real field data as earth system data are intricately intertwined and need to be studied precisely following a viable strategy, instead of coming to conclusions mainly based on statistical data. Such an approach helps us to better understand the role of nature and man in degrading our environment and generating local, regional and global natural hazards. If properly implemented the well conceived strategies can help us to face the ill effects with well articulated resilience attitude.

It is time for us to change our research approaches that are confined to lab / internet based models and concentrate on real time data to address local, regional and global natural hazards assuming every segment of our earth has direct or indirect link with other segments. Such large scale co-operation in data generation, processing and interpretation is vital for us to make our research useful in every sense.

***In This Issue**

In addition to Editorial and News at a Glance this issue contains 15 research articles, Book Review and a report on 54th Annual Convention of IGU. It is heartening to note that 4 of the articles have addressed some of the basic problems faced by the common man. I am happy to publish two articles on forecasting earthquakes adopting entirely different approaches.

One important phase of my life comes to an end on 31st March. I have been inspired and motivated by number of challenges, which helped me to live my life with an amount of satisfaction. Managing JIGU helped me to learn many lessons; both good and not so good; an essential part of LIFE. I thank one and all for their support and help.

P.R.Reddy

Quotations to Inspire Success in Your Life and Profession

"I find that the harder I work the more luck I seem to have."

***Thomas Jefferson** (1743-1826) was an American statesman, one of the Founding Fathers of the United States.*

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"Success usually comes to those who are too busy to be looking for it."

***Henry David Thoreau** (1817 -1862) was an American philosopher and historian.*

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"It is better to fail in originality than to succeed in imitation."

***Herman Melville** (1819 -1891) was an American novelist and short story writer.*

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"Don't be afraid to give up the good to go for the great."

***John D. Rockefeller** (1839 -1937) was an American oil industry business magnate, industrialist and philanthropist.*

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"Success is not final; failure is not fatal: It is the courage to continue that counts."

***Winston S. Churchill** (1874 - 1965) was a former Prime minister of United Kingdom.*

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"If life were predictable it would cease to be life, and be without flavor."

***Eleanor Roosevelt** (1884-1962) was an American politician, diplomat and activist.*

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"You're only here for a short visit. Don't hurry, don't worry. And be sure to smell the flowers along the way."

***Walter Hagen** (1892 -1969) was an American professional golfer.*

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"All of life is peaks and valleys. Don't let the peaks get too high and the valleys too low."

***John Wooden** (1910 -2010) was a head coach of basketball at the University of California.*

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"The road to success and the road to failure are almost exactly the same."

***Colin R. Davis** (1927 -2013) was an English conductor.*

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"There are two types of people who will tell you that you cannot make a difference in this world: those who are afraid to try and those who are afraid you will succeed."

***Ray Goforth** (1931-1990) was leader of technical staff at Boeing.*

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"However difficult life may seem, there is always something you can do and succeed at."

***Stephen Hawking** (1942--) is an English theoretical physicist, cosmologist and author.*