

Editorial

Since Thomson Reuters (present Clarivate Analytics) intimated in 2014 that it would re evaluate performance of JIGU in 2017 to take a decision regarding granting SCOPUS accreditation, I have decided to bring out the soft copy of November issue before time so that all the six issues of volume 21 will be available for timely initiation of JIGU impact factor evaluation. To my request letter communicated to customer service wing of Clarivate Analytics about up gradation of JIGU as an SCI journal , I have received a detailed mail in third week of August from the concerned officer of customer service wing(Customer Support Representative, Customer Care - Asia Pacific, Clarivate Analytics).She has intimated that SCOPUS accreditation is no longer connected with Clarivate Analytics and JIGU performance evaluation would be taken up after completion of two years as ESCI journal. It is intimated by the Customer Support Representative *“with respect to your question about moving the journal to SCI, a journal selected for the WoS Core Collection’s ESCI (http://wokinfo.com/products_tools/multidisciplinary/esci/) will remain there for at least two years, before being considered for a potential move, out of ESCI, to one or more of our flagship citation indexes -- AHCI, SCIE, SSCI, SCI. This period of time allows us to, in part, monitor the journal’s citation activity and track timely delivery of content. In the meantime, inclusion in ESCI is a very important first step in the rigorous selection process required of the Collection’s principal citation indexes. A journal in ESCI is discoverable, citable, and indexed with the same detail as any other journal in WoS.”* This development has added a new dimension to our efforts to get full fledged SCI status. Since the last 12 to 15 months interaction with Thomson Reuters/ Clarivate Analytics is being solely carried out by me with the assistance from the Organising Secretary of IGU. Because of this, there is a possibility that any change (as desired earlier by me) in the journal` s management at this juncture may affect JIGU up gradation plans. To avoid such a possibility I wish to continue till 31st March, 2018 (end of present editorial board two year term).I have requested Clarivate Analytics to take up evaluation of JIGU quality and performance in January, 2018 (2 year term of JIGU as ESCI journal will be completed by 31st, December, 2017). I sent above details to President of IGU and sought his permission to continue as Chief Editor of JIGU till 31st March, 2018. Since soft copy of November issue will be released in the first week of October and uploaded on to JIGU website before end of October, Clarivate Analytics can objectively evaluate JIGU performance during the last 4 years (including 2 years as ESCI journal), without any hindrance. Even though I will be constantly in touch with Clarivate Analytics I earnestly

request help and support from IGU management to ensure success of our initiative. While the evaluation result will take some time, it is my duty to let our readers know about a positive and encouraging development. Indian Citation Index (ICI), a full-fledged accreditation channel recognised by University Grants Commission (UGC) has intimated us that JIGU is recognised by UGC as one of the quality journals published from India and papers published in it entail authors in meeting stipulated norms in submitting Ph.D, getting scholarships and recruitments. I do hope this positive development would help our young researchers.

In 2017 the long stretch of heat wave during April, May and first quarter of June sapped my energies considerably and troubled me very much in meeting my obligations to JIGU. Like me many ailing senior citizens suffered a lot. It is projected by number of research groups, from different parts of the earth that the heat wave trend noticed this year will become a regular feature from now onwards, with intensity increasing year after year. To bring in to light some useful information I give below details of some recent studies. It is time the vulnerable segments of our population (children and senior citizens) plan from now onwards to face next year heat wave.

More Intense, More Frequent, and Longer Lasting Heat Waves

A global coupled climate model, prepared by two US scientists, shows that there is a distinct geographic pattern to future changes in heat waves. The researchers examined future behaviour of heat waves in a global coupled climate model, the Parallel Climate Model (PCM). This model has a latitude-longitude resolution of about 2.8° in the atmosphere and a latitude-longitude resolution of less than 1° in the ocean, and it contains interacting components of atmosphere, ocean, land surface, and sea ice. The PCM has been used extensively to simulate climate variability and climate change in a variety of applications for 20th- and 21st century climate. Model results for areas of Europe and North America, associated with the severe heat waves in Chicago in 1995 and Paris in 2003, show that future heat waves in these areas will become more intense, more frequent, and longer lasting in the second half of the 21st century. Observations and the model show that present-day heat waves over Europe and North America coincide with a specific atmospheric circulation pattern that is intensified by ongoing increases in greenhouse gases, indicating that it will produce more severe heat waves in those regions in the future. Heat waves are generally associated with specific atmospheric circulation patterns represented by

semi stationary 500-hPa positive height anomalies that dynamically produce subsidence, clear skies, light winds, warm-air advection, and prolonged hot conditions at the surface (**PS:** Geopotential height is a vertical coordinate referenced to Earth's mean sea level — an adjustment to geometric height (elevation above mean sea level) using the variation of gravity with latitude and elevation. Thus it can be considered a “gravity-adjusted height”. One usually speaks of the geopotential height of a certain pressure level, which would correspond to the geopotential height at which that pressure occurs. “500 hPa” tells us that the height map is at the 500 hectoPascal pressure level. hPa is the International standard unit).

The 500-hPa height anomalies are most strongly related to positive warm season precipitation anomalies over the Indian monsoon region and associated positive convective heating anomalies that drive mid-latitude teleconnection patterns in response to anomalous tropical convective heating in future climate. Thus, areas already experiencing strong heat waves could experience even more intense heat waves in the future. But other areas could see increases of heat wave intensity that could have more serious impacts because these areas are not currently as well adapted to heat waves.

(**Source:** Gerald A. Meehl and Claudia Tebaldi. REPORTS 996 13 AUGUST 2004 VOL 305 SCIENCE; www.sciencemag.org/cgi/content/full/305/5686/994/DC1)

A scientific observation reveals human being's role in record heat waves in China. A new study suggests that even hotter events will follow unless greenhouse gases emissions are reduced considerably. Details are given below.

Are Humans to Blame for Worsening Heat Waves in China?

At least 40 people died during China's record-breaking 2013 heat wave, when temperatures spiked to more than 105°F. The deadly event was just one of a string of intensifying heat waves that have hit the country over the past 50 years, and a new study finds that these events can be attributed in part to human-made climate change. Under business-as-usual carbon emissions, such extreme temperatures will become the new normal across roughly 50% of China's landmass, the authors warn.

Sun et al. investigated heat waves across China from 1961 to 2015 using daily temperature and precipitation data from more than 2400 monitoring stations across the country. Then, the researchers used computer models to assess past and future changes in heat waves. In some simulations, they included only natural drivers of heat

waves and drought, including climatic oscillations such as El Niño, and volcanic eruptions. In other simulations, they included known human contributions to heat waves, through warming caused by greenhouse gas emissions. The simulations that most closely resembled China's real heat wave history were those that included the human influences, showing that natural causes alone were not enough to explain the country's observed heat waves. In fact, including factors such as rising greenhouse gas emissions from burning fossil fuels led to more than a tenfold increase in the likelihood of the most intense heat waves occurring again in the future, the scientists found.

Under even a “moderate” future emissions scenario, the Intergovernmental Panel on Climate Change's Representative Concentration Pathway 4.5, these once unusual heat waves will occur more frequently, last longer, reach higher temperatures, and occur in more regions of China, the authors expect. (**Source:** Geophysical Research Letters, <https://doi.org/10.1002/2017GL073531>, 2017).

Compared to China we are in no way better, as per a recent study.

Indian Scenario:

The mean temperature across India has risen by 0.5 degree C during the period 1960 and 2009 and this has led to a significant increase in heat waves in the country. Based on modelling studies, researchers from Indian Institute of Technology (IIT) Bombay, Indian Institute of Technology (IIT) Delhi and the University of California, Irvine have found that when the summer mean temperature during this period increased from 27 to 27.5 degree C, the probability of a heat wave killing in excess of 100 people shot up from 13% to 32% — an increase of 146%. For instance, there were only 43 and 34 heat-related fatalities in 1975 and 1976 respectively when the mean summer temperature was about 27.4 degrees C. But in 1998, at least 1,600 people died due to heat wave when the mean summer temperature was more than 28 degrees C. Similarly, when the average number of heat wave days in the country increased from six to eight, the probability of heat wave-related deaths increased from 46% to 82% — a 78% increase. The average number of heat wave days between 1960 and 2009 was 7.3 per year. In the last four years (2014-2017), India has witnessed as many as 4,620 deaths caused by heat wave, out of which 4,246 people died in Andhra Pradesh and Telangana alone. The figures according to the Ministry of Earth Sciences paint a grim picture for the future.

With more than 2000 dead in a year in extremely hot weather across India, a recent Indian Institute of Technology-Bombay study predicts more intense and longer

heat waves, more often and earlier in the year in future. In a changing climate, newer areas, including large swathes of southern India and both coasts – hitherto unaffected – will be severely hit, resulting in more heat stress and deaths (as per the publication in the journal *Regional Environmental Change-2013*). From climate model projections, researchers have pointed out that there is a possibility of high occurrences of heat waves in South India in future (which is already witnessing higher temperatures). Such a forecast is in line with global and Indian studies. Other recent assessments have predicted that intense heat waves will grow with rising global temperatures, up by 0.9°C since the start of the 20th century. The Intergovernmental Panel on Climate Change records that from 1906 to 2005, the mean annual global surface-air temperature increased by about 0.74°C (land-surface air temperature increases more than sea-surface temperature). As a result, there will be significant changes in the frequency and intensity of extreme weather events, including heat waves, as IPCC's 2014 report warns. Even though it is difficult to directly link present single-year high heat-wave occurrence to climate change, however, there is a good possibility that such heat waves may indicate the adverse impacts of global warming. A rise in the frequency and intensity of heat waves would increase the risk of heat stroke and heat exhaustion, and even deaths from hot weather, the IIT-B team predicted, echoing concerns raised by IPCC scientists.

With a large proportion of people without sufficient access to water, electricity and primary healthcare facilities, India could be very vulnerable to heat waves, the study noted. Heat waves are an important class of climate hazard that may have serious consequences on health and ecosystem, keeping existing vulnerabilities of population in mind. The study highlights the need to better understand the direct temperature-related consequences in order to develop better adaptation strategies. The IIT-B study is important because it is particularly exhaustive. The team projected intensity, duration and frequency of severe heat waves for low, middle and high range rates of climate change as shown in long-term projections called representative concentration pathways (RCPs).

As per the study Future heat zones will be South India and both coasts. Under the most probable-case and the worst-case scenarios, 2070 onward, there could be an increase in intensity, duration and frequency of severe heat waves. In particular, a large part of southern India, east and west coasts, which have been unaffected by heat waves, are projected to be severely affected after 2070. Severe heat waves are expected to appear early in future years, starting in early April, under the worst-case scenario. A sizeable

part of India is also projected to be exposed to extreme heat-stress conditions, intensification of heat wave and heat-stress leading to increased mortality. Heat-stress is a condition in which the body cannot cool off to maintain a healthy temperature—resulting in rashes, cramps, dizziness or fainting, exhaustion, heat stroke, and a worsening of existing medical conditions (P.S: during mid April to first quarter of June I suffered due to all these ill effects). (Source: <https://www.civil.iitb.ac.in/~subimal/&https://journosdiary.com/2017/06/10/heat-waves-deaths-india/>)

Study by the Long Range Forecasting division at the National Climate Centre in Pune, at the India Meteorological Department, has shown a noticeable increase in the heat wave and severe heat-wave days over the country during 2001-2010– the warmest decade recorded – compared to the previous four decades. The IMD team used heat-wave information from 103 stations on the Indian mainland during the hot-weather season of March to July over the past 50 years (1961-2010). They examined various statistical aspects of heat waves and severe heat waves, such as long-term climatology, decadal variation, and long-term trends. IMD team also found heat waves linked with El Niño-Southern Oscillation, denoting fluctuating ocean temperatures in the equatorial Pacific, known for its global impact. The study indicates the complexity of future weather predictions. They found that heat waves of eight or more days peak a year after the El Niño (warm) phase of this cycle and are at a minimum a year after the La Niña (cool) phase. (Source: D. S. Pai et al (2013), http://www.scidev.net/filemanager/root/site_assets/sa/long_term_climatology_and_trends_of_heat_waves_over_india_during_the_recent_50_years_1961-2010_.pdf)

I have specifically selected this topic to advocate the necessity to safeguard the interests of all those senior citizens who are beyond 65 years of age. Youngsters, especially those who are physically capable should show needed empathy towards this segment of our population, who have served our country in a significant way when they were young and energetic.

In this Issue

In the sixth and last issue of 2017 (Volume 21), there are 10 research articles, an “editorial”, a “News at a Glance” and one Technical News.

Hope you would enjoy the contents and suggest ways and means to enhance quality of the manuscripts. While expressing my sincere thanks to one and all I solicit your continued support to JIGU.

P.R.Reddy