GLACIAL MELT

On glaciers’ trail

MUCH debated, researched and widely discussed, all environmental events, glacier melt is something that never fails to trigger an aura of interest in the scientific world or amongst the public. It is likely to affect us directly or indirectly, and researchers have taken turns to highlight their importance in supporting life as we understand it and how the glaciers’ gradual receding will affect long-term changes. However, scepticism has trailed ever since the first event of unseasonal glacial melt was observed. These are changes that certain groups fail to acknowledge as results of humanity-induced damage to climate. But, despite the wide-spread refusal to see reasons in the rapid reduction of glacier size, research in the area has been increasing and bringing forth unusual data, a fact that was discussed in detail and supported by papers presented during the Asian Snow-Glaciers and Climate Change session on the second day of the AGS’10 meet.

While research activity in the area has witnessed an upsurge, remote sensing techniques as tools are also finding increasing application, highlighting which Dr Anil Kulkarni from Indian Space Research Organisation said that remote sensing techniques have facilitated the observation of areas that may perhaps be too difficult to reach. Studies carried out in the Wanger Gud basin have highlighted large-scale melting, with the mean glacial extent decreasing from 1.4 to 0.32 sq km. Even more shocking is the fact that 1317 glaciers in the Himalayas are retreating. The Bhaga and Alakananda basins have been extensively observed for snow accumulation and ablation patterns and a definite change has been noticed according to him. Not only is the melting depicted as a sharp curve (observations made in 2006-2007) but has started early too. Moreover, avalanches in the Himalayas have caused the snow to become hollow.

Deliberating on the event of an increase in 1°C in global temperatures, Dr Kulkarni observed that the glacial mass balance would change with the snow extension decreasing to 209 sq km in 2040 as compared to 234 sq km in 2004. This clearly stresses the need for a renewed thrust on studying Himalayan Glaciology, which incidentally was the title for the next presentation by Mr Kulkarni and P Sanjeev Rao from the Department of Science and Technology, Delhi. Emphasizing the importance of studying the Himalayas he said that they are the youngest fold mountain and act as a natural boundary for India. In addition to affecting the monsoon cycles they also keep a tap on the country’s climate while supporting its rivers and sustaining its economy.

The National Programme on Himalayan Glaciology, launched in 1986 (the 7th five-year plan) specifies a clear objective to study Himalayan glaciers and explore their interaction with climate. So far, the study of glacial systems such as Gangotri, Doksani, Chota Shigri and Dwarka Dong glacier amongst others is being carried out to analyse it amongst other factors and to study their respective reactions with warming and if it is, it is alarming. The objective is to capture the trend and predict future scenarios and analyse for the possible adverse effects that glacial melt is likely to produce. According to the presenters, work has been initiated by several institutes, but there is an urgent need for coordination, so that a reliable database on the Himalayan glaciers can be generated. Additionally, trained manpower, with specialised focus on cold regions will have to be produced. However, despite the advances that have been made in glacier research technology, India is still ill-equipped to carry out snow/ice chemical and physical studies.

The last presentation by Joes George Potakkal from Jawaharlal Nehru University, in the first slot, discussed the Gangotri glacier in detail and Gomukh in particular. George, who has been a part of the project that studies Gomukh, pointed out that there has been a debate on whether Gangotri’s retreat has stopped. However, a closer look at the glacier has revealed a fractured base and the formation of ponds in the area due to melt waters coming into the glacier. The study observed that the Jakarsan Nala (which was earlier a smaller glacial system which fed the Gangotri) was feeding melt water and causing the glacier’s hydology to change, to study which dye injection experiments were conducted by the team.

Notwithstanding the debate on whether glaciers are receding or not, it is a fact that our food security will have to be studied and analysed, keeping in mind the size of the glacier and the environment surrounding it, as a member of the audience was quick to point out.

The session threw open several questions, many of which basically focused on why the decision-making authorities in the country have failed to see that facts are screaming from the data; that glaciers are retreating. More importantly, why don’t the researchers come out in the open and share their results with sceptics who are trying to paint a wrong picture of ‘all is well with the Himalayan glaciers’.

CHANGING CLIMATE

Heeding to global warming signals

It’s a concept that is being deliberated with repeated consistency, given the urgency of the situation, the possible consequences it can have on the way the earth behaves, the manner in which the planet reacts and the disaster it may unleash. Global warming and climate crises are not mere concepts anymore; they are under the scanner, so that facts can be unearthed and they in turn, help us combat the looming deluge.

This was the underlying purpose of Professor Jai Hoo Scl’s talk on Tuesday. Instead of focussing on the term and what it connotes, Professor Hoo, from the Department of Energy and Atmospheric Sciences, Pukyong National University, South Korea, spoke about ways in which global warming and climate crisis need to be probed. “For one, the indices are important. They should be simple, but comprehensive, measurable and, make common sense.”

According to him, the conditions for basic data to study the climate crisis index should be availability, accessibility, safety and stability. The factors which determine it are primary causes like carbon dioxide concentration and temperature, while the potential crisis is food, energy and water crisis.

PRIMARY CAUSES

• Carbon dioxide index: New computer simulations have revealed the extent to which the average air temperatures at the earth’s surface could warm by 2080-2090 if the greenhouse gas emissions continue to increase. Having carbon emissions can help combat global warming.

• Temperature: Studies have revealed that over the years, the Earth has definitely become hotter. Through graphs, it was explained how temperature rise would affect the world.

• Potential crisis: The most expensive in Japan, where domestic electricity prices are calculated.

Water: Experts examining the water security index found that India was the highest.

Also, in crisis vulnerability, the aspect of governance was discussed. In this the climate crisis index was examined from the 50% to 90% and 2000. It was revealed that from 2016 to 2020, India was in the climate mortality zone and hence, measures must be taken to tackle the problem.

CLIMATE CHANGE

It is believed that climate change could make future conflict more likely. A study by a senior scientist was quoted to explain that even a one-degree Celsius temperature rise would increase the risk of African wars by 53 per cent by the year 2030.
Science with a human face

What is the use of scientific research if it doesn’t affect the lives of people in a positive way? The common man is not interested in the nitty-gritty of research and the intricate details that go into it. What he is interested in is how it will affect him. The Gateway Media team met up with some scientists from various streams to know what they have been working on and how it is going to change the lives of people and the planet.

When this question was posed to Dr. Michael Brown, Professor of Geology & Department Chair, Laboratory for Central Periglacial, College Park, Maryland, this is what he had to say:

“Science has to be accessible to the public. The work that I am involved in is on high temperature evolution of the continental crust. It provides a context to understand mineral deposits. For instance, gold, which occurs in old crust that peninsula India is made of. The knowledge of the areas of old crust, he feels, will go a long way in tapping resources.”

Denise J. Massey, Associate Professor of Environmental Engineering & International Affairs, Princeton, New Jersey, who works on black carbon, states, “Black carbon has detrimental effects on health and is carcinogenic. Not only does it increase premature mortality and warm the planet, it also gets deposited on glaciers and increases their melting. There is a lot of research work going on in this area.” Echoing the same sentiment is Sukriti Momin from the Lawrence Berkeley National Laboratory. She adds, “If we know the amount of work that is happening on glaciers and measurements.”

Global warming looming large, all the work on glaciers is surely going to help mitigate the problems.

Hiren Jethwa, a post-doctoral researcher f r o m the Hampton University, US, says that this is the second time that he is attending AGOS. The first time he attended the meet was when it was held in Singapore. “I work on quantifying the atmospheric aerosol load in case of forest fires and biomass burning using satellite measurements.”

Dr. Vidit Kumar, head of the Geosciences Division at NRSC says, “Remote Sensing inputs help in understanding natural disasters.” He quickly adds, “Now-a-days, the concept is to look at Earth Sciences as a system. Unlike yesteryears, each branch was studied in its bit, this conference brings all scientists from different fields of Earth Sciences together. At the same time, there is a group sharing the Planetary Science experience as well.”

Heeding to warming signals

In the second part of the session, Krishna Achuta Rao, associate professor at the Centre for Atmospheric Sciences, IIT, New Delhi, spoke on the inter-annual to decadal variations in extreme precipitation over India. Explaining why he undertook the study, Prof. Rao said, “The main reason why I chose to do this was because in the last three years, there have been very few papers which examine changes over extreme rainfall in India and the increase in rainfall events.”

The purpose of his study, he added, was to examine whether the changes in the last 30 years are a threat to us. For the methodology, the Gridded IMD Rainfall Data was used and the focus was on 1×1 degree (1901-2001) dataset. However, he chose to avoid regionalism, a move which he said was deliberate. “The aim was also to find out, at what resolution one can pick up differences in variability,” Prof. Rao exclaimed.

Using the climatological 90th percentile values for each month, from 1961 to 1990, it was found that Delhi’s rainfall was above the 90th percentile in the period from January 1901 to January 2005. It was also found that different locations have different periods of high and low rainfall. The cities chosen for the study were Kolkata, Mumbai, Delhi and Bangalore. Interestingly, when the 90th, 95th and 99th percentile were examined, it was found that the percentage of grid for the low end was almost the same. The period of the 60s and 70s vs the 80s and 90s was also studied, the question being, is there a decadal variability? Is there some variation?

Prof. Rao found that the variability of extremes is different in different locations. Also, there was a change in spatial extent, in some parts of India. In the future, he said that he aimed at examining the higher resolution data set as well.

“We need to understand variability instead of the trend if we have to examine the effect of climate change,” he concluded.

5 9 9 0 3 J U L Y 2 0 1 0 | HYDERABAD
7TH ANNUAL MEET
PUBLISHED BY RAMFRAS, ON BEHALF OF GATEWAY MEDIA PVT LTD, # 437, FIFTH FLOOR, FABIAN FLA, MAHINDRA HUB, HYDERABAD - 500 084, INDIA. TEL: +91-40 233 50 061. FAX: +91-40 233 00 666. www.gatewaymedia.in PRINTED AT PRINTING PALT, HYDERABAD