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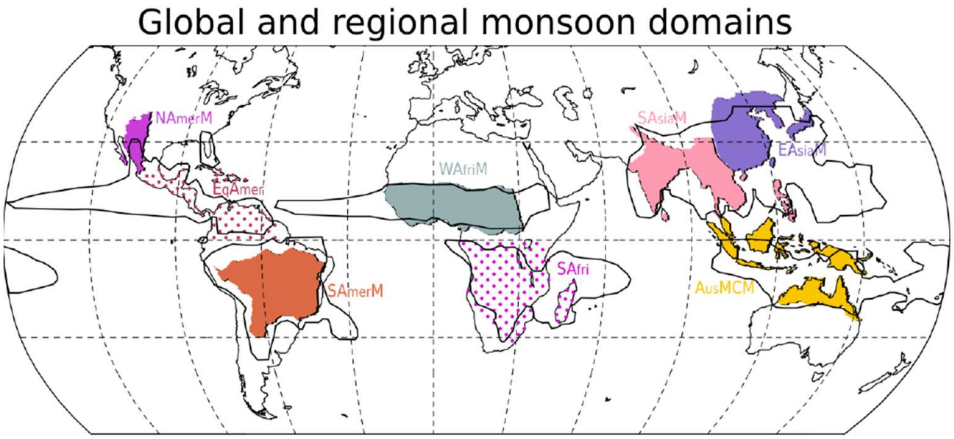
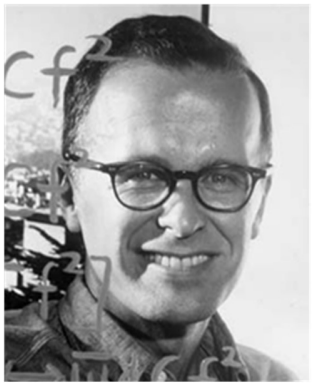
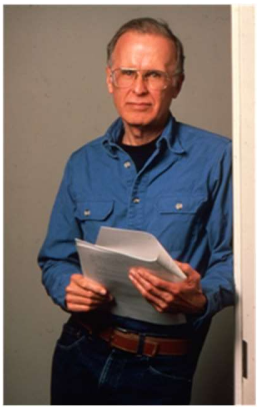
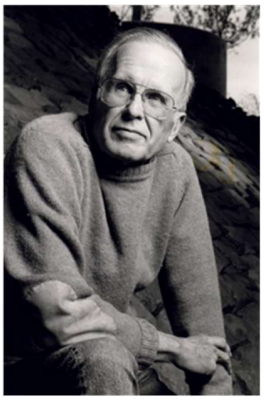


Domains of Global (black contour) and regional monsoons (Asian-Australian, African & American monsoons, in different color shades) [Source: IPCC, 2021]

JOHN BACKUS (1924 – 2007), Designer of FORTRAN

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Objectives of the Society:

1. Advancement of Meteorological and allied sciences in all their aspects
2. Dissemination of the knowledge of such sciences both among the scientific workers and among the public and
3. Promotion of application of Meteorology and allied sciences to various constructive human activities

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"Bulletin of IMSP" is generally published quarterly. Correspondence and contributions to the bulletin may be sent to Editorial Board (**mahap@tropmet.res.in**), with copy (**Cc**) to the IMSP Chairman (**ks_hosalikar@yahoo.co.in**). The manuscript should be typed at 1.15 space using Times New Roman font size 12, in MS-Word file. The author's name should be typed on the line below the title, the affiliation and email ID should follow on next line. The first author is requested to send softcopy of his/her passport size photograph.

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Contents:

Thrilling Experience of Amarnath Yatra and the Problem of Weather Forecasting over this Region

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1. Amarnath yatra experience

Some 10 years ago, Indian railway touring and catering corporation (IRCTC) had organized a tour for Amarnath yatra with a special train from Pune. Some of our family members had registered for it. As per the schedule, our journey commenced from Pune with the passengers boarding from Mumbai, Baroda and other places on the route. Whole train was booked carrying about 700-800 passengers with the banner as "Amarnath Yatra".

We reached Jammu and went to Srinagar by a bus. Accommodation was made in different hotels as it was not possible to arrange the stay in same hotel for all passengers. However, for taking breakfast or lunch for all of us, we had brought in one big pandal. Next day, we were to proceed to Amarnath via Chandanwadi. The Amarnath cave is located in Anantnag district, at about 100 km from Srinagar at the elevation of 3888 m. This is a difficult and long route, with several ups and downs. However, it is a traditional way followed by the ancient sages. So, many people undertake this route, at least for the one side journey. On that day, due to hazardous weather, the yatra was suspended by the Shrine board. One member of this board was invited by the railway management to brief us about the precautionary measures to be followed during the journey. On the following day, after the improvement in the weather,

permission was granted to us, to proceed for the yatra. Then, we went to Chandanwadi and had a night halt there. Arrangements for the food, beds, blankets etc were made by some social organisations. Several pilgrims in different groups had assembled in the camp. Next day morning, at about 7 o'clock, we commenced the yatra with the horse rides. Yatris are allowed to travel in the batches, up to some specific time. Whole journey of 30-35 km was very difficult, as one has to travel in different weather and the terrain conditions. During the journey, we experienced cold weather, rain spells, the sunshine and the snowy hills. The ground conditions varied with the land, ice and the glaciers. At some places, steep hills are there on one side, and the deep valleys on the other. Horse riders have to hold tightly to the handle of the seat to keep the balance as the horses used to run or jump according to the terrain. The horse men support the passengers at certain turning points or under difficult situations. At some locations, passages are very narrow and thousands of the pilgrims are travelling simultaneously. Some devotees also walk with the support of the sticks. Therefore, it is difficult to wait in between, even for 5-10 minutes at certain points. In one family, the members travel with the distance of 100s of metres away and they meet directly at the final destination. Some passengers also fall down from the horses.

One lady (not from our group) was carrying her baby along with her. Probably, the baby was kept in the basket that was tied to her. Her husband might have been on another horse at some distance away. **Suddenly, at one point, the horse jumped so high, that her baby was tossed up and fell in the valley.** The lady cried and asked the horseman to stop. Horseman said, "*अभी बच्चा गया। वो नही मिलेगा। हम इधर नही रोक सकते। जगह भी नही है और पिछेसे भीड है। चलो चलो*". **What a tragic incidence!** ☹ The lady was shocked and would never forget this incidence in her entire life. Other passengers did not know what had happened there, as they were continuing their journey in the hurry.

At present, the children below six years and the adults with more than 75 years are not allowed for this yatra. Some persons can go by using the helicopter service when it is available. Many times, these rides are cancelled due to severe weather conditions.

Langars, run by the Sikhs on the route, are providing snacks, water etc to the tourists. The soldiers are present at different places for the security purpose and they also help the devotees whenever needed.

We reached Shrine at about 3 pm. Finally, all the yatrees had very peaceful darshan of the **Lord Shiva**. They were very happy for fulfilling their desire of many years. Then, we came back by other route of Baltal in the evening, at about 9 pm. This is comparatively a steep route, but it is a short cut. From Baltal, we started our return journey to Pune, after the darshan of Mata Vaishno Devi via Katra, a town in the vicinity.

Thus, it was the most memorable and thrilling experience of Amarnath yatra, with so many devotees in a group, without any major trouble to anyone. **Salute to the IRCTC !!!**

2. Problem of weather forecasting over this region

Amarnath yatra takes place during July-August every year and lasts for about 45-50 days. Lakhs of devotees, from India and some other countries, undertake it. Sometimes, due to cloud burst like situations and during events of the landslides, mishaps take place and several pilgrims succumb to death. This year, many pilgrims lost their lives due to very heavy rainfall. Therefore, the question arises whether it is possible to forecast such weather conditions or natural disasters, well in advance, so that the life-threatening instances can be avoided.

Here, I have narrated my experience of the Amaranth Yatra, to describe about the difficult terrains and the continuously changing environment & weather conditions of this region.

As seen from above description and several reports, more meteorological observations are needed at a distance of a few Km over this region, to improve the weather forecasting. Therefore, one has to think whether it is possible to install more weather observatories and RADARs on such terrain, following the WMO norms. The RADAR signals will also be contaminated with the noise, due to mountainous surroundings. Similarly, it is also very difficult to get the useful satellite data with frequency of a few hours in varying surface background of the land, snow and the water at the foot prints.

Further, even though such data are available, a fine mesh numerical model, required for this region, may not support this type of varying topography of the high hills and the valleys in a distance of a few Km. Moreover, the present data assimilation system and the parameterization schemes of the model may not predict the rainfall of the order of 10 cm/hr for the cloud burst like situation, at least one day in advance, so that it would be useful for the authorities to suspend the yatra in order to avoid the accidental damages. This is my opinion.

However, an experienced meteorologist may infer the likelihood of such calamity and provide the warnings accordingly, if the observation network can be further strengthened. The public and Government authorities should also be cautioned about the limitations of the weather forecast.

Although, the Amarnath Yatra lasts only for couple of months, the recording of the weather data should be continued throughout the year, so that the climatology of this region can be prepared with better network. Such a data base will be useful for the residents and soldiers in that region.

Further, such data networks also need to be extended for other parts of the Himalayan region, for the necessary developments, as well as the other issues of the national interest.

The experts in these fields can suggest about the necessary plans to provide better forecast over this region and similar regions, to avoid or reduce the tragic instances, like one mentioned above.

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Brief Quiz on Sir Issac Newton

Compiled By

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See how you fare in this simple quiz on Sir Issac Newton.

SN	Query	Answer
1.	In what century was Issac Newton born?	Seventeenth Century December 25, 1642
2.	What did Newton develop using Leibniz?	Infinitesimal Calculus
3.	Which French philosopher was one of Newton's most important early influences?	Rene Descartes
4.	Which model of the solar system did Newton's laws validate?	Heliocentric Model
5.	Which Newton book laid the foundation of "**Classical Mechanics**"?	Mathematical Principles of Natural Philosophy
6.	What theory did Newton formulate after the apple incident?	Gravity
7.	What was Issac Newton's alma mater?	Trinity College, Cambridge
8.	Which generalized algebraic theorem did Newton discover in 1665?	Binomial Theorem
9.	What does Newton's first law deal with?	Inertia
10.	True or false – "Newton was the first scientist to be knighted".	FALSE – Newton was the second scientist to be knighted.
11.	In what century Issac Newton died?	Eighteenth Century, March 31, 1727
12.	What was Issac Newton's nationality?	British English
13.	When was Issac Newton knighted?	On April 16, 1705 by Queen Anne
14.	Who was Issac Newton's wife?	He never married
15.	Who invented calculus?	Issac Newton and Gottfried Leibniz

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CLIVAR/GEWEX Monsoons Panel of WCRP

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1. About World Climate Research Programme (WCRP):

WCRP coordinates climate research initiatives at an international level. It facilitates analysis and prediction of Earth system climate variability and change, for use in an increasing range of practical applications of direct relevance, providing benefit and value to the society. WCRP aims to determine the predictability of climate and the effect of human activities on climate (for details, please visit the website: **https://www.wcrp-climate.org/**). Basically, it is an International research coordination programme, co-sponsored by the World Meteorological Organization (**WMO**) [website: **https://public.wmo.int/en**], the Intergovernmental Oceanographic Commission (**IOC**) of the United Nations' Educational, Scientific and Cultural Organization (**UNESCO**) [web-site: **http://www.ioc-unesco.org/**] and the International Science Council (**ISC**) [website: **https://council.science/**]. It may be noted that the ISC was created in 2018 as the result of a merger of two councils, namely, the International Council for Science (ICSU) and the International Social Science Council (ISSC).

WCRP supports various science activities to address cutting-edge topics, which cannot be tackled by a single nation or agency or any discipline alone. WCRP fosters innovation and collaboration through the organization of global meetings, workshops and conferences. The actual research projects are carried out by scientists worldwide within projects at their home institutions. To ensure that policy makers and end users can benefit from latest scientific advances, WCRP represents the state-of-the-art knowledge of its community toward high-level policy for all and toward the producers of operational climate predictions.

In the selection of its focus areas, WCRP is guided by the two main objectives (stated in its Sponsor's Agreement): (1) to determine the predictability of climate; and (2) to determine the effect of human activities on climate. The better we understand variability and change in the climate-system, the better will be society's knowledge on climate predictability and its own predictive capacity.

Equipped with tools for seamless climate predictions, global communities can better respond to impacts of climate variability and change on major social and economic sectors including food security, energy, transport, environment, health and water resources. WCRP contributes to such services to society by advancing and communicating the global state of the art in climate science. WCRP collaborates closely with related programmes at international and national level, including on observations, modelling, interactions between society and the climate system, and similar relevant topics.

Important activities of WCRP: WCRP organizes meetings, workshops and conferences to coordinate and facilitate climate research. The research itself is done by individual scientists working in national and regional institutes, laboratories and universities. WCRP committees, working groups and projects, assisted by the Joint Planning Staff (JPS), are the main vehicles for setting the research agenda and mobilizing the broader research community on specific activities. WCRP utilizes a multidisciplinary approach, organizing large-scale observational and modelling projects and providing an international forum to align the efforts of thousands of climate scientists working to provide the best possible climate information.

WCRP Core Projects:
At present, there are **6 WCRP core projects to organize the core of WCRP research** through research communities [website: **https://www.wcrp-climate.org/core-projects**], where researchers from around the world work together to ensure and address the most pressing climate challenges. **These six WCRP core projects are**:

- **Climate and Cryosphere (CliC):** CliC encourages and promotes research into the cryosphere in order to improve understanding of the cryosphere and its interactions with the global climate system, and to enhance the ability to use parts of the cryosphere for detection of climate change.
- **Climate and Ocean Variability, Predictability and Change (CLIVAR):** CLIVAR's mission is to understand the dynamics, the interaction, and the predictability of the coupled ocean-atmosphere system. To this end it facilitates observations, analysis, and predictions of changes in the Earth's climate system, enabling a better understanding of climate variability, predictability, and change.
- **Earth System Modelling and Observations (ESMO):** ESMO will promote the science and technologies for modelling, observations, and model-data fusion. ESMO will unite and strengthen the work of the Working Group on Coupled Modelling (**WGCM**), (**including CMIP**), the Working Group on Numerical Experimentation (**WGNE**), the Working Group on Sub-seasonal to Inter-decadal Prediction (**WGSIP**), and the Sub-seasonal to Seasonal Prediction (**S2S**) Project.
- **Global Energy and Water Exchanges (GEWEX)**: GEWEX is an integrated program of research, observations, and science activities that focuses on the atmospheric, terrestrial, radiative, hydrological, coupled processes, and interactions that determine the global and regional hydrological cycle, radiation, and energy transitions and their involvement in global changes.
- **Regional Information for Climate (RIfS)**: The science and capability needed for providing societally relevant climate information for regions, including the work of the Coordinated Regional Climate Downscaling Experiment (**CORDEX**).

- **Stratosphere-troposphere Processes And their Role in Climate (SPARC):** SPARC provides intellectual leadership to address key issues in atmospheric dynamics and predictability, chemistry and climate, and long-term records for climate understanding.

Four of the WCRP Core Projects (namely, CliC, CLIVAR, GEWEX and SPARC) were established in the 1990s, and two (namely, ESMO and RifS) were established in 2021 in response to a need to bring together climate observations and modelling (ESMO) and to ensure that climate data and information are useful to and usable by society (RIfS).

WCRP Grand Challenges: The WCRP Grand Challenges represent areas of emphasis in scientific research, modelling, analysis and observations for WCRP and its affiliate projects in the coming decade [website: **https://www.wcrp-climate.org/grand-challenges/grand-challenges-overview**], developed by the WCRP **Joint Scientific Committee (JSC)** through consultation with WCRP sponsors, stakeholders and affiliate networks of scientists. WCRP promotes the Grand Challenges through community-organized workshops, conferences and strategic planning meetings to identify exciting and high-priority research that requires international partnership and coordination, and that yields "actionable information" for decision makers. **The current Grand Challenges of WCRP are as follows:**

- **Melting Ice and Global Consequences**
- **Clouds, Circulation and Climate Sensitivity**
- **Carbon Feedbacks in the Climate System**
- **Weather and Climate Extremes**
- **Water for the Food Baskets of the World**
- **Regional Sea-Level Change and Coastal Impacts**
- **Near-term Climate Prediction**

WCRP Lighthouse Activities: WCRP developed **five new activities, called Lighthouse Activities,** that aim to make critical near-term progress towards meeting WCRP's Vision, Mission, and four Scientific Objectives, as outlined in the WCRP Strategic Plan 2019–2028 [details available at weblink: **wcrp-climate.org/lha-overview**]. These **5 Lighthouse activities** are respectively: (1) **Digital Earths**, (2) **Explaining and Predicting Earth System Change**, (3) **My Climate Risk**, (4) **Safe Landing Climates**, and (5) **WCRP Academy.** These are designed to be ambitious and transdisciplinary (integrating across WCRP and collaborating with partners) so that they can rapidly advance some of the new science and technologies, and institutional frameworks, that are needed to manage climate risk and meet society's urgent need for robust and actionable climate information more effectively. To do this, the Lighthouse Activities will need to draw on WCRP's core scientific and technical capabilities, and strategic partnerships. Their scope encompasses building new knowledge of the Earth's climate system, its near-term predictability, and longer-term trajectories, for harnessing emerging technologies to better simulate the Earth system via a digital "twin", as well as exploring new approaches for managing climate risk that start with decision context and user needs. The science plans of the Lighthouse Activities were approved at the 42nd Session of the WCRP Joint Scientific Committee in July 2021.

2. About CLIVAR (Climate and Ocean: Variability, Predictability and Change):

CLIVAR was established in March 1993, based on the decision of the 14th Session of the WMO/ICSU/IOC Joint Scientific Committee (JSC) for WCRP, that endorsed CLIVAR as the WCRP project to study climate variability and predictability with a focus on the role of the coupled ocean and atmosphere within the climate system (based on the legacies of the WOCE and TOGA projects). **CLIVAR's mission** is to understand the dynamics and the predictability of the coupled ocean-atmosphere system, with a goal to improve the understanding and prediction of ocean-atmosphere interactions and their influence on climate variability and change on seasonal, inter-annual, decadal, and centennial time-scales, through the collection and analysis of observations, and the development & application of models of the coupled climate system, in cooperation with other relevant climate-research and observing activities. The International CLIVAR Project Office, or ICPO, supports these activities by planning meetings, implementing research goals, and producing newsletters called "CLIVAR Exchanges" to keep the CLIVAR community informed.

3. About GEWEX (Global Energy and Water cycle Exchanges):

The Global Energy and Water cycle Exchanges (GEWEX) project is dedicated to understand Earth's water cycle and energy fluxes at the surface and in the atmosphere. It has a network of scientists for gathering information on and researching the global water and energy cycles, which will help to predict changes in the world's climate. The International GEWEX Project Office, or IGPO, supports these activities by planning meetings, implementing research goals, and producing a quarterly newsletter to keep the GEWEX community informed. GEWEX coordinates science activities to facilitate research into the global water cycle and interactions between the land and the atmosphere. One of the primary influences on humans and the environments they live in, the global water cycle encompasses the continuous journey of water as it moves between the Earth's surface, the atmosphere, and beneath the Earth's surface. Clouds, precipitation, water vapour, surface radiation, aerosols, and other phenomena each play a role in the cycle. Many GEWEX scientists conduct research on those and other elements to help fine-tune our understanding of them and their impact on the climate. GEWEX also points out important gaps in knowledge and implements ways to fix those gaps, whether through new studies, reviews of datasets, gatherings of experts, or other opportunities.

4. CLIVAR/GEWEX Monsoons Panel (MP):

CLIVAR/GEWEX Monsoons Panel (MP) was established for taking a more global view of monsoon activities, and to coordinate global monsoons research over various regions of the Earth. Monsoons are identified as seasonal transitions of atmospheric circulation and precipitation regimes in response to the annual cycle of solar insolation and the distribution of moist static energy. Tropospheric temperature gradients, developing during spring-time, and differential heating of underlying land and ocean are precursors and triggers in most of the monsoon regions. Monsoons are grouped into Asian-Australian, African and American, according to their location and summer versus winter precipitation regimes seasonality **(Figure-1**).

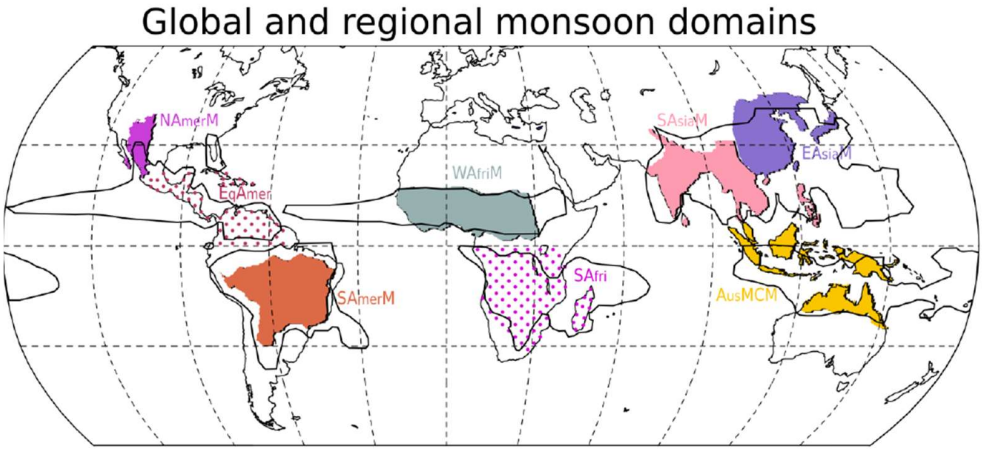

Figure 1: Global (black contour) and regional monsoons (colour shaded) domains. The global monsoon (GM) is defined as the area with a local summer-minus-winter precipitation rate exceeding 2.5 mm/day. The regional monsoon domains are defined based on published literature and expert judgement and accounting for the fact that the climatological summer monsoon rainy season varies across the individual regions (**Source: IPCC, 2021**).

Overall progress in our scientific understanding of monsoons will benefit by the interaction of individuals and groups, involved in study of the monsoon regions. The CLIVAR project is related to research into ocean-atmosphere interaction and the role of slowly varying modes (like ENSO, IOD, etc.) that lend predictability to the monsoons. Thus, CLIVAR is of direct relevance to the Monsoons. The efforts of the GEWEX project are highly relevant to the terrestrial & hydro-thermodynamic aspects of monsoons, especially for land-atmosphere interaction and convective scale processes, which are key to understanding monsoons from regional to global scales. As a result, a joint Monsoons Panel, spanning both CLIVAR and GEWEX, has been formed with membership drawn from both communities. The panel will make correspondences to both CLIVAR and GEWEX Scientific Steering Groups (SSGs).

CLIVAR/GEWEX Monsoons Panel was established in July 2014 (following the 7th International GEWEX Conference at Hague), with main objectives of (a) taking a more global view of monsoon activities, enabling knowledge and best practices to be shared between the various monsoon regions (like Asian-Australian Monsoons, African Monsoon & American Monsoons) regions, and (b) better coordination of monsoons research between GEWEX and CLIVAR, particularly in emphasizing the role of convection and the land-surface processes in monsoons. The Monsoons Panel membership crosses CLIVAR and GEWEX research interests and all monsoon regions. The Monsoons Panel explores a more global view of monsoon activities, enabling knowledge & best practices to be shared between the various monsoon regions. It attempts to better coordinate monsoons research between GEWEX and CLIVAR, particularly in emphasizing the role of convection and land surface in the monsoons, in addition to ocean-atmosphere interaction [details available at weblinks: **https://www.clivar.org/clivar-panels/ monsoons** and **https://impo.tropmet.res.in/wcrp-monsoon.html**].

At present, this panel (MP) is being co-chaired by **Dr Suryachandra Rao Anguluri** from Indian Institute of Tropical Meteorology (IITM) Pune India, and **Dr Leila M.V. Carvalho** from Earth Research Institute (ERI), UCSB, USA. In addition to **2 Co-Chairs**, there are **12 other members** in this panel from various parts of the world. The panel conducts regular teleconferences for communications and decision making for various activities, from time to time. This panel is well supported by the International Monsoons Project Office **(IMPO),** which is hosted within the IITM campus at Pune, India, and operates under the overall supervision of the Director of IITM. IMPO is a joint effort by WMO and IITM to help coordinate monsoon research across the world [website: **https://impo.tropmet.res.in/**]. At present**, Dr E. N. Rajagopal** is the **Executive Head of IMPO** and Dr Rupa Kumar Kolli is involved with IMPO as Honorary Scientist, Dr Susmitha Joseph and Mr. Somnath Mahapatra are Senior Scientists (part time) at IMPO [details at the weblink: **https://impo.tropmet.res.in/aboutus.html**]. It may be noted that **I have been involved in the activities of IMPO and former ICMPO** (International CLIVAR Monsoons Project Office) **as a Senior Scientist** (part time) **for last 5 years** (**the longest period for such a position**) for supporting coordination of global monsoons research.

Regional Monsoon Working Groups (WGs) of MP:

The Monsoons Panel has established a structure of **3 Regional Monsoon Working Groups** (WG) beneath it, comprising **(1) Asian-Australian Monsoons WG** (WG-AAM), **(2) African Monsoons WG** (WG-AFM) and **(3) American Monsoons Working Groups** (WG-AMM).

These three Regional Monsoon Working Groups (WGs) are responsible for focusing on the monsoon research over Asian-Australian, African & American monsoon regions respectively. Regional Monsoon Working Group activities have also been supported by IMPO, especially for organizing online teleconferences for important discussions among WG members, re-organization of WGs with new memberships (whenever tenures of some members are over or some members discontinue due to some reasons or due to some unfortunate events)**.** The scientific works include supporting Observational field campaigns and process modelling works (mainly in India, Africa and South China sea regions), coordinating the Global Monsoons MIP (Model Inter-comparison Project) contributions to CMIP6 (Coupled Model Inter-comparison Project, version-6), various aspects of Climate change detection, attribution and modelling and Sub-seasonal to Seasonal (S2S) activities.

At present, the **Asian-Australian WG** comprises of **2 Co-Chairs**, and **15 other members** from various parts of the world (details at the weblink: **https://impo.tropmet.res.in/mpwg-aam-members.html**). Their activities relate to South Asian monsoon, East Asian monsoon and Australian monsoon. Similarly, the **African WG** comprises of **2 Co-Chairs** along with **19 other members** from Africa, USA, France & UK (details at the weblink: **https://impo.tropmet.res.in/mpwg-afm-members.html**). Their activities relate to monsoons over Western Africa, Central Africa, Eastern Africa, Southern Africa, as well as Pan-Africa. The **American WG** comprises of **2 Co-Chairs**, along with **12 other members** (details at the weblink: **https://impo.tropmet.res.in/mpwg-amm-members.html**). Their activities mainly relate to monsoons over South America and North America.

Working groups under Monsoons panel will continue to lead the regionally-focused monsoon research in each of the three areas of globe. Defining concrete activities to be fostered in the coming years, coordinating the regional working groups, and acting as a hub to facilitate meetings and linkages among international research efforts, are parts of a continuous process. Advancing understanding of monsoon variability and improving prediction remain the principal goals promoted by the Monsoons Panel, but greater emphasis is being placed on linkages across scales and to phenomena that have historically been outside the purview of classical monsoon research. Observation and modelling are still the cornerstones of the research efforts, but scientists seek to bring new methods and fresh perspectives to the problem that can enhance monitoring, advance diagnostic efforts, and improve component and coupled models. Key to these efforts will be the development of new and better process studies, coordination with relevant modelling efforts including those related to climate change, and empowering the next generation of bright young scientists from around the world to advance our knowledge of monsoon systems. Scientific works include observational field campaign and process modelling work, coordination of and contribution to climate change efforts in CMIP, and utilising our understanding of sub-seasonal-to-seasonal variability to aid enhancement of monsoon prediction on these scales. For coordination of these activities, the Monsoons Panel is supported by the International Monsoons Project Office (**IMPO**), hosted by the Indian Institute of Tropical Meteorology (IITM) located in Pune, India.

Near-term and Long-term Plans of the CLIVAR/GEWEX Monsoons Panel:

The Monsoons Panel will actively pursue better integration of CLIVAR and GEWEX monsoons activities, such as CLIVAR Oceanic regional panels, e.g., Indian Ocean Regional Panel (**IORP**), GEWEX Global Land/Atmosphere System Study (**GLASS**), Global Atmospheric System Study (**GASS**) and Hydro-climatology panels (land-atmosphere interaction and convection, in particular). The Monsoons Panel will foster better utilization of model outputs such as those from the Global Monsoons **MIP and CMIP6 DECK experiments**, including through coordinated analysis at the regional and global monsoon scales. The panel can interact with communities of other core projects of WCRP (like **SPARC**), and also with Working Group on Tropical Meteorology Research (**WG-TMR**) of World Weather Research Program (**WWRP**), **through necessary support & coordination by IMPO**. **The regional working groups of this panel** will promote and facilitate active engagement and interaction among research and operational prediction stakeholders in the different monsoon regions, and provide authoritative information on processes understanding, models' fidelity in their monsoon representations, and forecast skill assessment. Members will participate in the many different Regional Climate Outlook Forums (**RCOFs**) to provide guidance on model strengths and weaknesses. The Monsoons Panel will continue to identify cross-regional commonalities in their activities. One of the key-identified-activities of interest across the regions is better understanding of sub-seasonal-to-seasonal variability and exploiting it for better prediction. Regional priorities will continue to be identified by the regional working groups.

Terms of Reference of GEWEX/CLIVAR Monsoons Panel (MP):

- Indicate and update the research priorities, gaps and milestones regarding monsoon studies as outlined in the GEWEX/CLIVAR MP annual work plan.

- Coordinate strategies, advise on plans and define concrete activities, if possible, to carry out studies on the suggested research priorities, including selecting, limiting and concluding such activities as appropriate.
- Encourage studies on priority themes by groups from different monsoon domains, using common methods and tools, in order to allow global analyses or comparable results, and encourage, facilitate or promote collaboration between monsoon researchers (from existing groups).
- Enhance involvement/Promote/Stimulate the interest of researchers and students in monsoon-related topics, by organizing or supporting workshops and advanced schools, in addition to organizing, in scientific congresses, sessions on monsoon themes. Promote interactions among scientists from different disciplines (atmospheric scientists, oceanographers, hydrologists, and relevant others) interested in monsoon science activities.
- Coordinate the formation and function of regional working groups and to advise WCRP on the development of mechanisms of support for meetings of the regional working groups.
- Advise and coordinate with other WCRP and WWRP panels on issues important for advancing monsoon research, including new observational studies, process studies, and strategic priority setting for modelling/prediction studies.
- Support work in cooperation with regional, national and multinational programs that collaborate in improving the understanding of monsoon systems and are directed at improving regional weather forecasting, seasonal climate prediction and decadal to long-term climate projection.
- Communicate existing products and provide guidance on their (adequate) application and limitations to the operational community, (relevant) impacts community and participate in relevant training activities.
- Report to the CLIVAR and GEWEX Scientific Steering Groups (SSGs) on an annual basis or when requested.

References and Acknowledgements:

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Development of FORTRAN since its Design in 1950s

Manoj Kumar Tandon[1, 2, 3]

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Digital computer technology dates from an era just before the World War II, i.e., from the late 1930s to the early 1940s. The second half of the twentieth century may well be called the beginning of the age of computers. Development of numerically based programming languages was taken up first in the early 1950s and **FORTRAN** has dominated this category since its inception. FORTRAN was the first high level computer programming language to become widely used. FORTRAN is widely used for scientific and engineering computations. It has undergone much evolution in its 50-year life. FORTRAN was designed and intended for batch processing operating and programming environment. FORTRAN is an imperative computer programming language and it supports imperative paradigms. FORTRAN is problem oriented high level programming language and its name is an acronym of **FORmula TRANslation**, because it was designed to allow easy translation of math formulas into computer code. FORTRAN was developed in April 1957 by a team of computer scientists at IBM for its execution on IBM-704 computer. During the initial years of FORTRAN, input for FORTRAN code was done through 80-column computer cards and 80-column FORTRAN coding form. 80-column computer card is also known as '**Hollerith Card**' after the name of its designer **Herman Hollerith (1860 – 1929)**.

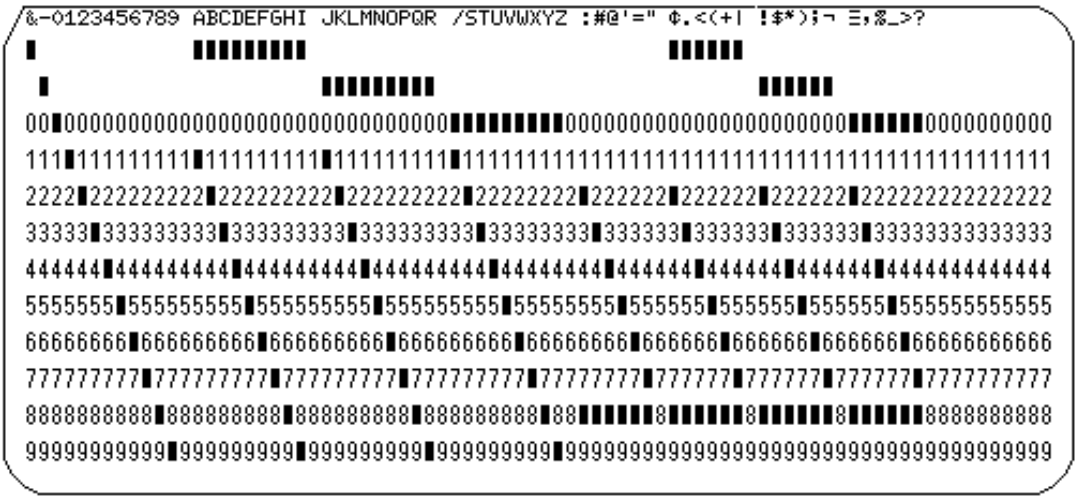


Figure-1: 80-column punched computer card, also known as '**Hollerith Card**'

A sample 80-column punched computer card used during the infancy days of FORTRAN for punching codes of FORTRAN programs is shown above (**Figure-1**). **John Backus** was leader of the team which designed the first version of FORTRAN, a.k.a. FORTRAN-I, for the IBM-704 computer. FORTRAN-I was later revised as FORTRAN-II in 1958. FORTRAN-II was available on IBM computers such as IBM-704, **IBM-1620** (**IITM's First Computer**) and others. FORTRAN-II was later on modified as FORTRAN-III in year 1958 itself. Like FORTRAN-I, FORTRAN-III was however not released to the public. At that time, the utility of any high-level programming language was open to question by programmers schooled in assembly language programming, their most serious complaint concerned the efficiency of execution of code compiled from high level language programs. As a result, the design of the earliest versions of FORTRAN was oriented heavily towards providing execution efficiency. The successes of this early FORTRAN and its dependence on features oriented towards efficient execution on the IBM-704 computer have been a problem with the language. Very few at this time believed that FORTRAN could compete with hand coded assembly language; every effort was thus put into the efficient execution of FORTRAN on IBM-704. Concepts like three-way arithmetic branch of FORTRAN came directly from the hardware of IBM-704. FORTRAN-III was later modified as FORTRAN-IV in the year 1961. The first standard version of FORTRAN was adopted in 1966, which led to the emergence of FORTRAN-66 and it was released to the public in the year 1972. FORTRAN-IV was the base document for the standard version FORTRAN-66. A major revision was again made in the FORTRAN-66 standard in 1970s leading to the advent of next standard version called FORTRAN-77 which was released to the public in 1980.

TABLE-1: Various Versions of FORTRAN and kind of Scientific Computing

Version	Kind of Scientific Computing
Pre-77 Fortran	Basic Computations and Control Abstractions.
Fortran-77	Structured Programming.
Fortran-90	Array Programming. Modular Programming. Generic Programming.
Fortran-95	High Performance Fortran (HPF).
Fortran-2003	Object Oriented Programming.
Fortran-2008	Concurrent Programming.
Fortran-2015	Better Interoperability between 'C' and Fortran.

FORTRAN–77 continued the tradition of the original standard by allowing all data to be statically allocated. FORTRAN-77 was modified into the current standard version FORTRAN-90 (**TABLE-1**) which was released in 1991. The current revision of the standard, viz. FORTRAN-90 radically changed the focus of FORTRAN by allowing dynamic data. In addition, it adds the concepts of obsolescence and deprecated as indication of features that may be omitted from a future revision of FORTRAN-90, a radical departure from most standards that require compatibility with previous versions of the FORTRAN standard. The design of all versions of FORTRAN generally centers on the goal of execution efficiency. The language structures are generally simple and much of the design in inelegant, but nevertheless the goal of execution efficiency is achieved. FORTRAN-90 adds most of the modern data and control features, classically missing from FORTRAN since its inception in 1957, to give it the computing power of languages like 'C' and PASCAL. Only a restricted set of data types is provided in FORTRAN. An extensive set of operations and mathematical functions is provided in FORTRAN-90 reflecting orientation of the language towards engineering and scientific computations. Fortran-90, Fortran-95, Fortran-2003, Fortran-2008 and Fortran-2015 are the post-77 versions of FORTRAN which are currently in use in different parts of the world. The greatest weakness of FORTRAN-77 was its restricted data structuring facilities, which are essentially restricted to arrays and strings of fixed declared length. FORTRAN-77 does not have any facilities for data abstraction. Subprograms (subroutines and functions) provide the only procedural abstraction mechanism in FORTRAN-77. FORTRAN-66 was heavily influenced by the underlying computer architecture upon which it executed. FORTRAN-77 has only two levels of referencing environment viz. global and local; however, FORTRAN-90 does add the concept of nested subroutines like the internal procedures of PASCAL.

FORTRAN coding form used for writing FORTRAN codes during the earlier days of FORTRAN is shown below (**Figure-2**).

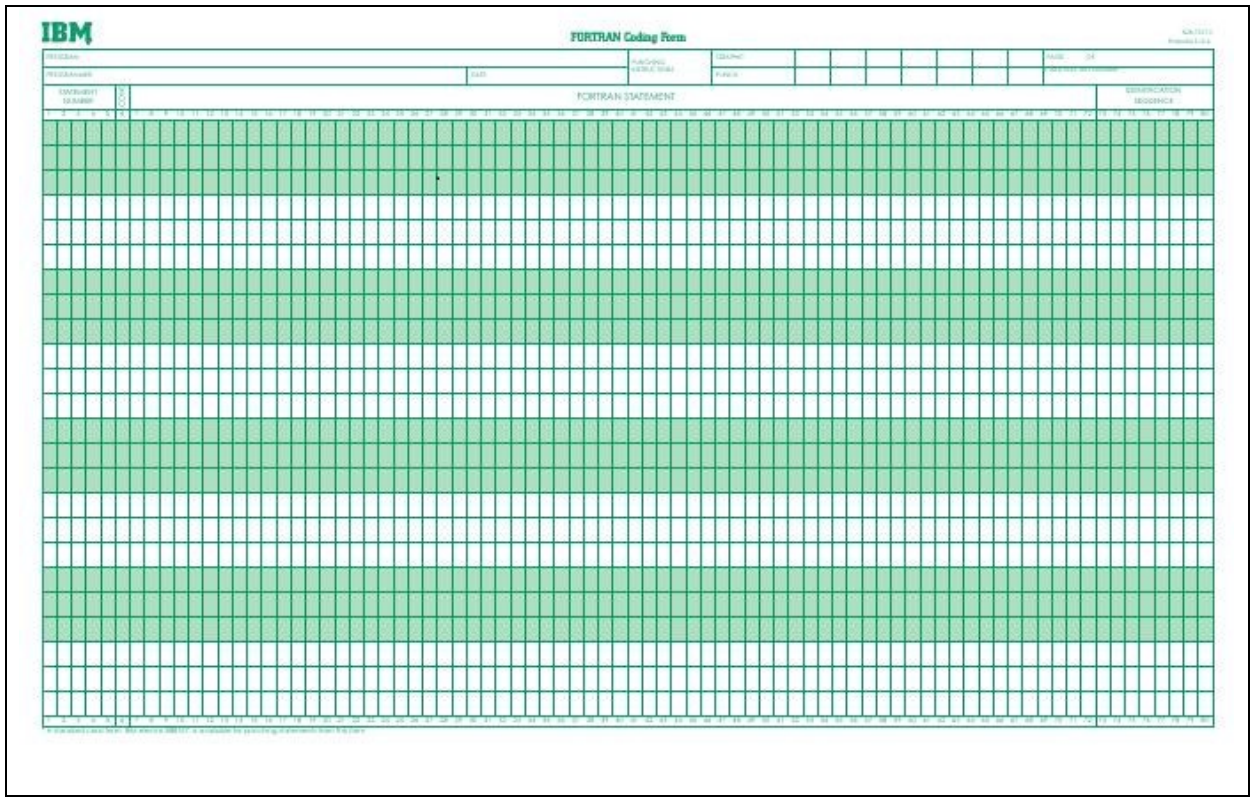


Figure- 2: FORTRAN coding form, used for writing FORTRAN codes during earlier days of FORTRAN

FORTRAN-90 has brought in the concept of dynamic variable and the phenomenon of dynamic memory management in the scientific and engineering computing. FORTRAN-90 has built in tools for implementing information hiding features of object-oriented programming languages such as C++, JAVA and C# C-Sharp. There are computer languages that are considered to be superior to FORTRAN for some types of problems, but FORTRAN continues to be an excellent language for a wide variety of mathematical problems for areas like robotics and engineering design. The primary objective of all the revisions of FORTRAN has been to ensure portability, reliability, maintainability and efficient execution of FORTRAN on a diverse variety of computing systems. FORTRAN is a language supporting imperative paradigms.

Following is the recommended order of Statements in any ANSI FORTRAN-90 source program.

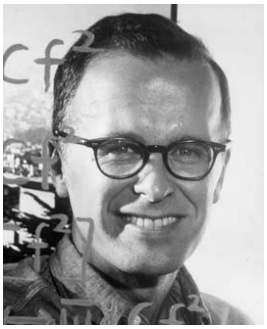
<table>
<tr><td colspan="3">PROGRAM, FUNCTION, SUBROUTINE
or
MODULE Statement</td></tr>
<tr><td colspan="3">USE Statements</td></tr>
<tr><td rowspan="4">FORMAT
Statements</td><td colspan="2">IMPLICIT NONE Statement</td></tr>
<tr><td>PARAMETER
Statements</td><td>IMPLICIT
Statements</td></tr>
<tr><td>PARAMETER
and
DATA Statements</td><td>Derived-type Definitions,
Interface Blocks,
Type Declaration
Statements,
And Specification
Statements.</td></tr>
<tr><td colspan="2">Executable Statements</td></tr>
<tr><td colspan="3">CONTAINS Statement</td></tr>
<tr><td colspan="3">Internal Subprograms
or
Module Subprograms.</td></tr>
<tr><td colspan="3">END Statement</td></tr>
</table>

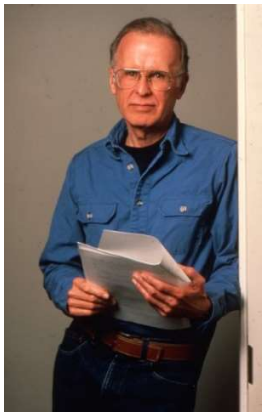
FORTRAN is perhaps not as popular today as it once was, but is still the programming language of choice in scientific and engineering computing environments. Individual lines of code of a FORTRAN program are easily understandable. The overall structure of FORTRAN programs, however, tends to be rather opaque because of extensive use of statement labels and GOTOs in the control sequence mechanisms. Thus, it sometimes makes it very difficult to see the overall flow of control in a FORTRAN program. Use of mnemonic identifiers is hampered by a restriction of six-character identifiers in the pre-90 versions of FORTRAN. The inclusion of recursive subprograms, user defined data types, user defined operators, pointers and a dynamic array in FORTRAN-90 gives FORTRAN a powerful execution model. As the language is continually evolving, some of its older limitations are becoming less important. Statement labels are no longer felt necessary in FORTRAN-90 because of the inclusion of nested multi-statement control structures

JOHN BACKUS

(1924 – 2007)

Designer of FORTRAN





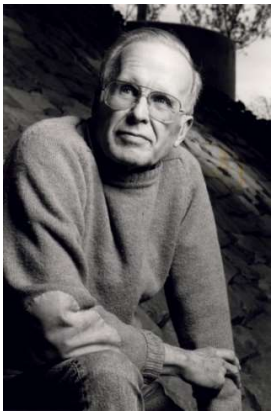


Figure – 3: JOHN BACKUS, the Designer of FORTRAN

FORTRAN-90 enables its user to define his/her own data types and operators based on the computational requirements of his/her problem. FORTRAN-90 has also introduced the concept of array (dimensioned variable) of zero size in scientific and engineering computations. There are various criteria for classifying programming languages. FORTAN-90, despite its revolutionary features and design, still has a stilted look which carries over from its batch processing "80-column card deck" image. FORTRAN-90 is not just an evolutionary improvement of FORTRAN-77, it is quite different from FORTRAN-77 and has ushered a revolution in the traditional FORTRAN environment and design.

An enterprising FORTRAN educationist has given the following lyrics for FORTRAN:

Hello **FORTRAN**
Computers are alive with sound of **FORTRAN**
They add and subtract with sound of **FORTRAN**
My code will be blessed with sound of **FORTRAN**
And I have to code in only **FORTRAN**
You have to learn to pace yourself **FORTRAN**
You're just like anybody else **FORTRAN**
But you will come to a day
When only things that count
Are the Peta Flops on a Cray
You'll have to deal with **FORTRAN**
You used to call me paranoid **FORTRAN**
Even you cannot avoid **FORTRAN**
You swore ENTRY's a sure road to ruin
Now here you are with an old code
Your COMMON blocks are misaligned
Assigned GOTOs disturb your mind
And you cannot handle **FORTRAN**
What does it all mean?
You'll have to code it on your own **FORTRAN**
I'm sure you'll have some cosmic rationale
And write all your codes in **FORTRAN**

Design of all versions of FORTRAN is purposely kept simple so that any user who has the knowledge of algebra up to higher secondary standard and can think logically can easily use and understand the FORTRAN language. FORTRAN-90 is a language which has salient features of programming languages such as PASCAL, 'C' and C++. Its use is no more restricted to scientific and engineering computing, but can be used in applications ranging from linguistic analysis to image processing with both qualitative and quantitative results.

FORTRAN-90 can become a good tool for professional software engineering practitioners as it has all features, concepts and facilities relevant to software engineering (SE). FORTRAN-90 can be used for "programming in the small" and "programming in the large". Unfortunately, FORTRAN-90 is a reasonably large sized programming language. FORTRAN-90 contains an elegant and powerful core language that is intellectually and educationally very appealing. Programming languages are classified and categorized on different criterion. Table-1 shows one such classification of programming languages on the criterion of generation and level of languages. FORTRAN is an imperative third generation high level compiled programming language. Maintaining consistency with the current philosophy in language design, FORTRAN-90 has introduced the concept of slices in its dimensioned variables (arrays). PL/I was one of the earliest languages to implement slices of arrays. Like some object-oriented programming languages, such as C++, FORTRAN-90 also provides the mechanism for the overloading of its subprograms and operators via INTERFACE block there by introducing the concept of polymorphism in scientific computing. Subprograms form the only abstraction mechanism in FORTRAN-77, although FORTRAN-90 does add MODULE and data types. MODULE shall be replacing COMMON blocks of pre-90 versions of FORTRAN from FORTRAN-2003 onwards. The development of FORTRAN-90 standard has been a long procedure involving several hundred people spread in many countries.

FORTRAN-90 represents a rebirth of the FORTRAN computer programming language with modern features which enabled computer scientists to embed parallel computing capabilities in Fortran-2008 using Co-Arrays. **High Performance FORTRAN (HPF)** – dialect of Fortran-90 is specially designed to accomplish FORTRAN enabled High Performance Computing. FORTRAN is still a dominant language for **(a)** large scale simulation of physical systems like astrophysical modeling of stars and galaxies, **(b)** hydrodynamics code, **(c)** large scale molecular dynamics, **(d)** electronic structure calculation codes, **(e)** large scale climate models etc. In the field of high-performance computing (HPC), of which large scale numerical simulation is a subset, there are only two languages in use today viz. ANSI C+ + and '**Modern FORTRAN**'. Modern FORTRAN is any post-77 version of FORTRAN, i.e. Fortran 90, 95, 2003, 2008 and 2015. If you have not been banished to computing oblivion, then you must have observed astonishing awe-inspiring evolution and growth of FORTRAN since its inception in early 1950s. Impressive growth of FORTRAN in tune with the ever-changing domain requirements of scientific computing has flabbergasted its critics and won critical acclaims of its devoted and dedicated users.

Significant sections of scientists were expecting some post-77 version of FORTRAN to introduce following in the scientific computing:

(1) **SET** as a built in and derived data type, as available in PASCAL programming language, to enable scientists to **use set algebra in scientific computing** thereby heralding era of **SETs based numerical models**.

(2) Data type for representing collections of fractional dimensions aka FRACTAL to enable correct digital representation of a cloud (which is a fractal) in scientific (**Meteorological**) computing.

(3) Multidimensional arrays consisting rows of different sizes and columns of different sizes, representing collections of irregular dimensions (unlike existing regular 2-D array) with suitable syntax for declaring and processing such variables.

We are currently passing through an age which is witnessing the advent of '**Quantum Computers**'. Quantum mechanics is the foundation of Quantum Mechanics and Quantum Computing. Quantum computing is performed through **quantum bits – qubits**. **Quantum bits have bra vector** like representations, **|0> and |1>**, unlike **classical bits** which **have digital, 0 and 1**, representations (please refer **Figure-4**). **Classical bits 0 and 1 are scalars while qubits |0> and |1> are bra vectors**. Bra vector notation is extensively used in quantum mechanics. Some enterprising physicist has an analogy between a coin and quantum and classical bits. In this analogy, classical (digital) is like a tossed coin after coin has fallen on the ground whereas quantum bit is like a tossed coin while the coin is still spinning in the air. As on today, quantum computers do not have high level language like FORTRAN. In quantum computing a qubit is the basic unit of quantum information which is the quantum version of classical binary bit physically realized with a two-state device. A qubit is a two-state quantum mechanical system displaying the peculiarities of quantum mechanics.

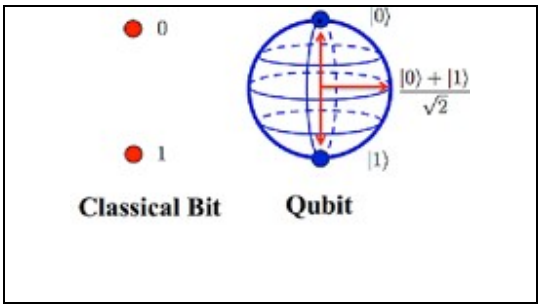


Figure-4: Classical Bit and Qubit

In spite of leaving certain expectations and aspirations of scientists unfulfilled, FORTRAN has however evolved exceptionally well during the last seventy years. **FORTRAN being the oldest programming language is often referred as the mother of all programming languages**. Awe inspiring and phenomenal growth and evolution of FORTRAN, in its design and functionality, since its inception in the early 1950s has flabbergasted scientists and has significantly improved the traditional landscape of scientific and engineering computing. With current contents of FORTRAN, scientists and engineers can now personalize their scientific and engineering computing. Scientists throughout the world consider **FORTRAN as the scientific computing engine**.

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Varun's Weather World - A Journey & Beyond....

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[2]E-Mail: headshiva@gmail.com , Mobile 9445674499

Thoughts of Mr. S. Sivakumar (Shiva), script with a weather connect …

From Ambattur, Madras. Behind the time … October 25, 2005, … birth of a "Weather-blogger"

Quite a warm and humid day … An unusual late October evening ...

Varun's gingerly walks into his home bit shaken, fearing what his parents would say … Three long hours of cricket with his Colony friends has left him drained, exasperated to the core. Huge sigh of relief as he finds his parents not there ... With just his sister to give some company, Varun narrates his exploits in the cricket field to her with great interest ...

After a quick bite of rusk toasted in milk, Varun heads to main hall, searches for the Television remote for quite some time, to finally find it in a remote place near the veranda ...

The brand-new Panasonic LCD Television is almost blurring like a roadside loudspeaker with the latest Tamizh hits. Varun takes control of the remote, keeps swapping channels and to his surprise and unbound joy, finds Ramanan Sir on the screen … eye's lit up gets closer to the tely-box (Television) and his all glued to it now … **Yes … that's the piece of info Varun, an avid rain lover, was so eager to listen** … It was music to ears for him to listen Ramanan Sir explaining the possible development of a depression, deep depression and the resultant torrential downpour that would ensure a stretch of break from school activities.

Varun, understandably over the moon, on cloud nine, calls up his class mates to share what he has just heard ...

Nothing short of few rain holidays would satisfy him … The excitement reaches feverish pitch as the D-day arrives …Yes, it's 26 October and Varun is all set to embrace the heavenly downpour that has been forecasted … It's well past midnight and the heavens open up with a huge thunder clap that could be heard far and wide …

Weary eyed Varun is still awake peeping thru the wooden window as the monsoon depression lets loose with some mind-boggling intensity …The street lights go off and its pitch dark now ... What could be heard is the loud roar emanating from the relentless spell that's unleashed with all its fury.

Varun, totally engrossed, eyes and ears glued to the sight and sound of the monsoon music that's in no mood to relent even a bit …

His eyes relent though after all the adrenaline rush, a well-deserved sleep that follows immediately after …

Its day break, Varun gets up in a jiffy to check if the show is still on … finds there's a break of sorts though he's shell shocked to find a river flow in front of his home …The power hasn't come to switch on the Television, check the latest update on the deep depression that has flooded the streets of the city ...

The manic rains have left an indelible mark on the way he would observe, enjoy It ... The quest for learning, understanding weather begins in all earnest … How did this event happen, why such abrupt change in the weather pattern...plenty of questions flood his inquisitive mind...

A fresh new flower blooms here ... a brand-new approach to the way he would see things … heads to the internet-world, the library near-by to seek answers … **Meteorology is indeed the new subject of interest for him …**

Amidst the knowledge search via the computer, he finds **a weather blog** to his surprise...Couldn't believe his eyes as he finds few enthusiastic bloggers chatting about weather events and the monsoon rains …

Slowly but surely gets addicted to the discussions as he finds some answers to his million questions … From being a passive observer, decides to get into the thick of things straightaway …

The user-name **"Varun & weather" is born** ... an odd post or a question turns, takes a different direction here … from a mere fifteen minutes of time spent in the weather blog initially, becomes hours and hours in few months' time... there's no stopping here as its monsoon season and an active one at that...system after system takes shape in the bay leaving no room for Varun to concentrate on his studies ... Gets chided by his parents for being a weather aficionado …

Year's pass by and the routine would continue … his passion, his zeal & zest brings in a new avatar in himself as he finds lot of takers for his knowledge sharing posts in the social media sites ... gets flooded with lot of questions, debates and the like … enjoys every bit of accolades that start pouring on him within a short span of time … it's a new world of sorts ... an unimaginable journey, which was not in the wildest of dreams for him ...

His understanding of the subject surprises one and all. His friends look up to him for his acumen and happy to be enlightened every now and then …

The thirst doesn't stop here, as his understanding of the subject of Meteorology is questioned, put to endless debates, in where he participates or where he's being part of …

The spark is ignited yet again … Not the one to be contended with what he has achieved, got himself acquainted to the weather world without a formal training, a professional course in the subject of Meteorology ...

Finally, after an year of deliberation, consultation takes the first step towards taking up Meteorology as a career … **enrols himself in a two year course of Atmospheric Science** …

A new beginning indeed … been there and being there moment for our Varun ... A whole new weather world unfolds in front of him … a thought he realizes in the very first class-room session …

Passion is one thing ..., enlightenment is more than one ...

The journey of enlightenment continues for him ...

****

IMSP News:

1. Minutes of the Inaugural Meeting of IMSP new Executive Council (EC, 2022-24 term), held on 26th July 2022

The **First meeting of the newly elected Executive Council** members of IMS, Pune chapter was held on **26th July, 2022** at 3.30 pm at the cabin of Head CRS, IMD, Pune under the chairmanship of **Shri. K S Hosalikar. Chairman** started the meeting by congratulating all the newly elected members. He addressed the important role of IMS and how IMS activities are helpful in bringing awareness related **to** weather and climate in the common public. The main agenda of the meeting was to plan the future activities of IMSP. **Shri. Sanjay Raskar**, new treasurer of IMSP presented the bank account statements and expenditure of IMS, Pune Chapter (for Both accounts in Bank of Maharashtra and Union Bank of India).

Following actionable points emerged during the discussions:

- **Co-opting more members to the EC from IMD and IITM** for the easy and proper functioning of IMS activities. The names suggested are as below:

    1. **Mr. Sandip Ingle, IITM, Pune**
    2. **Dr. Milind Mujumdar, IITM, Pune**
    3. **Dr. Sudarshan Patro, IMD, Pune**
    4. **Smt. Sandhya Ravikiran, IMD, Pune.**

- **IMSP Bulletin activities**

    1. **Addition of more members to the Editorial board**. (Names suggested: **Dr. Rajib Chattopadhyay and Smt. Aparna Khedkar from IMD, Pune and Shri. Abhay Singh Rajput from IITM**)
    2. **Fixing some articles related to the important weather events/forecasts** happened during the bulletin quarter, e.g., some articles related to the LRF issued for the current monsoon season can be included in the bulletin of second quarter (Apr-June) **or third quarter (July-Sept.)**, Or **some article related to an extreme rainfall event**, **which happened recently.**
    3. **Adding more crosswords, puzzles and quizzes related to weather and climate**.
    4. **Designing of new cover page**.

- **Updating all the information in the newly developed website**

1. Update the details of all IMSP members with their contact number and email address.

- **Creation of Facebook page for IMS Pune activities**

- **Conducting a membership drive for adding more members to the IMS, Pune chapter.**

- **Circulation of TROPMET-2022 circular and to encourage the students and staff for submitting abstracts.**

- **Discussion related to the IMS calendar program planning**.
    1. Conduct **poster designing or elocution competitions** every month, at least for one school in Pune city or surrounding with the help of the teachers from respective schools. Topic of poster/elocution and the resources (papers, color pencils, etc.) for conducting the competitions will be provided by IMS Pune Chapter.
    2. **Annual Monsoon workshop for 2022: Tentative date: in February 2023.**

The meeting ended at 5 p.m.

Name of the people who attended the meeting are as follows.

1. Shri. K.S. Hosalikar
2. Dr. Divya Surendran
3. Shri. Sanjay Raskar
4. Shri. Ranjan Phukan
5. Smt. Archana Rai
6. Smt. Shahenaz Mulla
7. Mr. Somnath Mahapatra.

2. IMSP Outreach program:

As a part of outreach program, Indian Meteorological Society, Pune Chapter (**IMSP**) conducted two lectures, respectively by **Dr. Divya Surendran and Dr. Boragapu Raja,** for the **students of Department of Civil Engineering, JSPM College, Narhe Campus, Pune** on **28th September 2022**. The lectures were entitled "Role of Meteorology in Air Pollution" by Dr. Divya Surendran, and "Precipitation Chemistry in India" by Dr. Boragapu Raja.

3. Membership drive for adding more members to the IMS:

Scientists, researchers, PG students and persons interested in Meteorology/Atmospheric Sciences/Allied Sciences, if not still a member of Indian Meteorological Society (IMS), can become a Life Member of IMS through **submission of the Application Form** (directly or online submission of the scanned copy of the duly completed application form) **along with the required fee** (preferably, through online transfer to the given Bank account). **Become a Life Member (LM) of IMS, "Application Form for IMS LM Enrolment" is provided in Pages 31-32 of this Bulletin.**

INDIAN METEOROLOGICAL SOCIETY **Affix latest Photograph**

FORM FOR ENROLLMENT

Proposal for Individual Membership

I wish to become Annual/Life member of Indian Meteorological Society.

1. Name in Full (Block Letter)

2. Office Address with Tel No.

3. Permanent Address with Tel No.

4. Residential Address with Tel No.

5. Mobile Number. **6. Email ID:**

7. Profession and present appointment

8. Nationality

9. Date of Birth

10. Academic and Technical qualifications:

11. Professional Record (appointments held)

12. Research Papers/Publications (Attach list, optional):

13. Member of Societies and Institutions:

14. Amount paid as Membership fee:

I hereby declare that I shall abide by the Statutes and Regulations of the Society and offer my co-operation in promoting its objectives:

Date: **Signature…….**

References

Name	Designation	Email	Mobile No.
1.			
2.			

Recommendation by Secretary, IMS

Signature…… Date……..

Approved / Not Approved, by IMS President

Signature…… Date……

Note All communication should be sent to the Honorary Secretary, Indian Meteorological Society, Room No. 605 Satellite Meteorological Building New Delhi – 110003 can be paid online or Cheque/DD should be made in favour of "INDIAN METEOROLOGICAL SOCIETY" payable at Delhi.

Bank details for Online payment towards IMS Life Membership

Bank Name: Central Bank of India

Branch address: 10, Loknayak Bhawan, Khan Market, New Delhi-110003

Branch Code: Khan Market / 0280310

Account No.: 1614232144

IFSC Code: CBIN0280310

MICR Code: 110016018

SWIFT Code: CBININBBPAR

Membership Fee for Indian Members & Foreign Members

Annual Membership: Rs. 300/ -

Life Membership: Rs. 3000/- (for Indian Members); US $ 300 (for Foreign Members)

BIMSP Managing Editor: Somnath Mahapatra, IITM Pune

IMSP

INDIAN METEOROLOGICAL SOCIETY,
PUNE CHAPTER
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