



Souvenir

INTROMET-2021

**Virtual International Symposium
on
Changing Climate : Consequences and Challenges**

23 - 26 November, 2021

Cochin University of Science and Technology (CUSAT), Cochin, India

Organised by

Indian Meteorological Society

Compiled and Edited by

D. R. Pattanaik

S. Abhilash

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डॉ. एम. रविचंद्रन
Dr. M. Ravichandran

सचिव
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पृथ्वी भवन, लोदी रोड, नई दिल्ली-110003
SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
PRITHVI BHAWAN, LODHI ROAD, NEW DELHI-110003



MESSAGE

I am glad to learn that the Indian Meteorological Society (IMS) is organizing the International conference on Tropical Meteorology (INTROPMET - 2021) on "Climate Change Consequences and Challenges (C4-21)" at Cochin University of Science and Technology, Cochin, India during 23-26 November, 2021, using virtual platform.

It is universally accepted fact that the possible consequences of global warming and Climate Change are spreading to all spheres of life. Climate change will have adverse impacts over many parts of the globe, with a developing country like India impacted more compared to other regions. In the changing climate scenario, the demand for weather and climate services by the society has increased many folds. This is because many production systems in different areas of technology want to explicitly account for weather/climate-based vulnerabilities in their planning strategy.

Considering this, Indian Meteorological Society (IMS), in collaboration with Cochin University of Science & Technology (CUSAT), Cochin, India is organizing Virtual International Symposium on Tropical Meteorology (INTROMET-2020) on "Climate Change Consequences and Challenges (C4-21)" at CUSAT, Cochin, India, during 23-26 November, 2021. This conference will make efforts to bring together atmospheric scientists, research professionals, policy makers, disaster managers and other related experts to discuss and share information for the benefit of the society.

I am confident that the National Conference "INTROMET-2021 will provide a common platform to the academicians, scientists, numerical modeling, communities and industrialists from different organizations and help in drawing purposeful recommendations on the issues of the weather and climate services during the period of climate change.

I convey my best wishes for the success of this conference.


(M. Ravichandran)

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Cochin University of Science and Technology

Cochin University P.O., Kochi - 682 022, India

(Re-accredited by NAAC with 'A' Grade)

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MESSAGE

I am happy to see that, Indian Meteorological Society - Cochin Chapter and Cochin University of Science and Technology are jointly organizing the International Symposium on Tropical Meteorology (INTROMET-2021). First of all, I congratulate organizers for conducting this conference with contemporary theme "Climate Change: Consequences and Challenges". Extreme weather events are taking place around the world and will only become more common as a result of climate change. Flash floods and landslides are the realizations of an accelerating pattern of extreme weather in Kerala in response to global warming.

The proposed INTROMET-2021 at CUSAT, Cochin, will provide an excellent opportunity for the national and international Climate Scientists to discuss various issues related to Changing Climate and its consequences and challenges in recent times.

I am sure that this international conference will come up with sector specific solutions to deal with the Climate change issues in general and the climate related extreme events and disasters in particular. The state of Kerala is becoming most vulnerable state in India in terms of extreme climate events as evident from the extreme events during recent years. I hope that, the scientific community and policy makers in Kerala will benefit from this important conference and I see that the topics selected for deliberations are very relevant in the era of climate crisis. I wish grand success to the conference.

Kochi – 22
18.11.2021

Dr.K.N.MADHUSOODANAN

डॉ. मृत्युंजय महापात्र

मौसम विज्ञान विभाग के महानिदेशक,
विश्व मौसम विज्ञान संगठन में भारत के स्थाई प्रतिनिधि
एवं कार्यकारी परिषद के सदस्य

Dr. Mrutyunjay Mohapatra

Director General of Meteorology,
Permanent Representative of India with WMO,
Member of Executive Council, WMO



भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम भवन, लोदी रोड़
नई दिल्ली-110003
Government of India
Ministry of Earth Sciences
India Meteorological Department
Mausam Bhawan, Lodi Road
New Delhi - 110003

Message

It gives me immense pleasure to know that Indian Meteorological Society (IMS) is organizing its International Symposium on Tropical Meteorology (INTROMET-2021) on the theme "Climate Change Consequences and Challenges (C4-21)" at Cochin University of Science and Technology, Cochin, India during 23-26 November, 2021.

Recently, India Meteorological Department (IMD), Ministry of Earth Sciences (MoES) has taken major steps in improving the weather, climate and hazards warning services capabilities in the country with the support of sister organizations of MoES like Indian Institute of Tropical Meteorology, National Centre for Medium Range Weather Forecasting, Indian National centre for Ocean Information Services etc. With the improvement in observational and forecasting tools including augmentation of NWP Models, Radar network and satellite products, forecasting/warning services in respect of tropical cyclones, severe thunderstorms, now casting, flash/urban floods, urban climate, climate change, heavy rainfall, advisories to farmers, pilgrimage forecast, heat waves/cold wave etc has been further strengthened.

It is very well known fact that Global warming and Climate Change is a reality and it's possible consequences are spreading to all walks of life. In the changing climate scenario, the demand for weather and climate services by the society has increased many folds. Accordingly there is need of enhanced technology to explicitly account for weather/climate-based vulnerabilities. IMD in collaboration with other institutes of MoES and R&D institutes in the country and outside is continuously upgrading and enhancing the capabilities by augmenting modelling and observational network. The services to different sectors including the sectors with vulnerable population like farmers and fishermen are being enhanced to safeguard the lives & economy of the Country.

I am very optimistic that the INTROMET-2021 symposium organized by IMS will provide an excellent opportunity for interaction among weather scientists, academicians, numerical weather modeling communities and industrialists to discuss different aspects of weather and climate forecasts and share information for the benefit of the society considering the challenges faced by the society due to the climate change.

I wish the event a grand success.

(Mrutyunjay Mohapatra)

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**An overview of the
DEPARTMENT OF ATMOSPHERIC SCIENCES
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY**

(Prepared by Prof. H. S. Ram Mohan)



Department of Atmospheric Sciences is part of the School of Marine Sciences of the Cochin University of Science and Technology.

Cochin University of Science and Technology

The University was initially constituted as the University of Cochin through an Act of Kerala Government on 10th July 1971. The University of Cochin was re-constituted as Cochin University of Science and Technology (CUSAT) in February 1986, redefining its objectives as "promoting Graduate and Post-Graduate studies and Advanced Research in Applied Sciences, Technology, Industry, Commerce, Management and Social Sciences."

Cast in the mould of a federal University, CUSAT is now a premier Science and Technology University in the country. In its five decades of service to the nation, it has made quantum leaps in its academic pursuits and has spread its wings far and wide. The University has entered into several collaborative ventures with reputed Universities and

Institutions worldwide. With the active support of the Government of Kerala and various Central agencies and international collaborations, the University has made its mark as arguably the best University in the State.

True to Kerala's legacy of being the friendliest state with an avowed dedication to education, CUSAT is home for students from across the globe and from all parts of the country. The University takes pride in the fact that it has an envious record in campus recruitments. The pool of its highly successful and talented alumni, who adorn vital positions in several highly acclaimed R & D institutions and corporate in India and abroad, are the standing testimony of the academic excellence of CUSAT. CUSAT is now celebrating its "Golden Jubilee.



(CUSAT: administrative building)

The School of Marine Sciences

The School of Marine Sciences of CUSAT is the only institution in India and the biggest of its kind in South East Asia where interdisciplinary courses and research facilities are available in all branches of Marine Sciences. The School is poised for development into an international nodal centre in imparting education, training and research facilities in all basic and applied aspects of Marine Sciences and Technology.

The School had its humble beginnings in 1938 with the establishment of Department of Marine Biology and Fisheries under Travancore University in the year 1938 to foster marine science education and research. A significant development was the establishment of an Oceanography laboratory in 1956 at the Naval Base in Cochin. The academic programme began with a two-year M. Sc. course in Marine Biology and Oceanography in 1958. This laboratory had a new building in Ernakulam city by the year 1962 with a new name "Department of Marine Biology and Oceanography" and was affiliated to the University of Kerala till the University of Cochin was established in 1971.

After that, the Department of Marine Sciences, as it was later named, grew in stature offering post graduate courses in Marine Biology, Oceanography, Meteorology and Marine Geology. In particular, the four Semester M.Sc. programme in Meteorology was instituted in 1975 and conducted with the support of Visiting Professors. Prof. R. Ananthakrishnan who had retired as Director of IITM Pune was the person singularly responsible for planning and implementing the course almost singlehandedly. He was later joined by Air Commodore P.A. Menon (IAF) and Sri A.R. Ramakrishnan (Retired Director, IMD) who complemented his efforts. Many teachers from Andhra University and scientists from IMD and IITM helped as Guest Faculty till Dr. H.S. Ram Mohan and Dr C.K. Rajan joined as regular Faculty members.

In 1984 the Department was reorganized, in accordance with the guidelines of the University Grants Commission, into a School of Marine Sciences with four constituent, but academically and administratively independent, Divisions. In 1986, the University itself was converted into a full-fledged Cochin University of Science and Technology (CUSAT). In 1996, the four Divisions were elevated to the status of five independent Departments under the broad umbrella of the School, as a part of the academic restructuring of CUSAT.

- Department of Atmospheric Sciences
- Department of Chemical Oceanography
- Department of Marine Biology, Microbiology and Biochemistry
- Department of Marine Geology and Geophysics
- Department of Physical Oceanography

Over the years the School has been recognized and acclaimed as an established institution of research and education in Marine Sciences. The School has earned special recognition of the UGC under the DRS, COSIST and SAP programmes. It has also MOU's with several universities and institutions in many countries. The Ocean and Atmospheric Science and Technology Cell (OASTC) funded by the Ministry of Earth Sciences, Govt. Of India, the Inter University Centre for Marine Biotechnology and the Centre for Integrated Management of Coastal Zones (C-IMCOZ) are actively engaged in interdisciplinary research.

Located in the Lakeside Campus in the Fine Arts Avenue, Ernakulam, the School has a waterfront with access to the backwaters and the Arabian Sea through its own boat jetty. It has two research vessels for training and research activities. The Marine Sciences library has an enviable collection of books, journals and valuable expedition reports and is considered as one of the finest in the field of marine Sciences in the country.

Ever since its inception, the School has had a tradition of academic excellence, which is CUSAT's pride and everyone's envy. The School has an excellent faculty contingent trained at renowned marine science institutions of the world and is well known through the competence and capabilities of the students passing out every year through its portals and the rich research output evidenced by the publications in high impact journals. The school has organized over 100 international / national symposia. About one fifth of the faculty and students have produced one third of the research output of CUSAT – very impressive statistics indeed. The alumni of the School include Vice Chancellors, Directors of National Laboratories, eminent oceanographers, marine biologists, geologists, marine chemists, meteorologists and illustrious teachers across the globe --- all owing their existence and career to this alma mater.

Department of Atmospheric Sciences:

The Department of Atmospheric Sciences was formed on 1st January 1996 by bifurcating the erstwhile Physical Oceanography and Meteorology Division of the School of Marine Sciences with Prof Ram Mohan being appointed as the first Head of the Department. By then the School/Department of Marine Sciences, was already offering a 4-semester M. Sc Programme in Meteorology since 1975 and added a 4-semester M. Tech in Atmospheric Science in 1989.

The Department also took the initiative to establish the Cochin Chapter of the Indian Meteorological Society in 1996. Therefore both the Department of Atmospheric Sciences and the Cochin Chapter of IMS have now completed twenty-five years of service.

Apart from teaching activities, research work in observational, diagnostic, theoretical and modeling studies in the field of Meteorology/Atmospheric Sciences have been in full swing. The Department had successfully completed the Phases I & II of the ambitious project under the *New Millennium Indian Technology Leadership Initiative (NMITLI)* of CSIR.

The University Grants Commission had selected the Department of Atmospheric Sciences for special assistance for Augmentation of Infrastructure under its Special Assistance Programme(SAP) based on the quality of teaching, academic achievements, research in thrust area and viable potential for future development. The essence and primary aim of SAP of the UGC is the combination of teaching and research to encourage group research efforts. The project entitled, Monsoon Cloud Characteristics under UGC – SAP - Level DRS Phase III was granted in 2013 with a financial support of Rs.64 lakhs for five years.

The Department of Science and Technology (DST) identified the Department of Atmospheric Sciences as one of the premier centres in India in the field of Atmospheric Research and Teaching and sanctioned Rs.30 lakhs under its FIST – Level I and another Rs.165 Lakhs in December 2016 as Level – II of the FIST Programme.

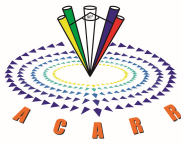
We are very proud that the first Stratosphere Troposphere Wind Profile Radar operating on 205 MHz installed in the world is now commissioned at the Advanced Centre for Atmospheric Radar Research, CUSAT. The brain behind it has been Prof K.Mohan Kumar who also was the first Director of the Centre. This is the highest funded project funded by Ministry of Science and Technology to a State University.

The renowned Prof P.V. Joseph has been part of the Department as an Honorary Professor since the nineties and has been inspiring and mentoring teachers and students alike. Eight young and dynamic faculty members of the Department are now carrying the baton forward. Prestigious awards such as BOYSCAST, Commission of the European Communities (CEC) Fellowships, etc. were awarded to the faculty. International and national awards for the academic excellence and achievements were also received. A large number of research projects have been carried out in the Department. Many are in progress. The thrust areas of doctoral and post-doctoral research in the Department include studies on Monsoon Dynamics, Middle Atmosphere interactions, Tropical Weather systems, Climate variability and change, Atmospheric Remote Sensing, Ocean-Atmosphere Interactions, Environmental Meteorology, Agro- Hydrometeorology and Agrometeorology.

The Department has high-speed computational facilities and full-fledged surface weather observatory. The Department has started releasing weather balloons into the atmosphere to obtain upper air weather information using Radio Sonde. A 2D Video Distrometer is added to our instrument lab. It has also setup a data bank, which has NCEP/NCAR, ERA-INTERIM reanalysis data, UARS data from NASA, Rocket data, MST Radar data, surface weather observations, TOMS data, IMD gridded data (1901-2013) etc.

Research Facilities in the Department include a number of Laboratories -Meteorological Instrumentation Laboratory, Synoptic Lab, Computer Lab, Surface Meteorological Observatory, Modelling Lab, Atmospheric Data Bank. The Major equipments include High Resolution GPS Radiosonde (GRAW), Next Generation Aethalometer, Automatic Weather Station, 20 m Meteorological Tower. A Rack Server is installed in the Modelling lab. There is an atmospheric Data bank in the Department with Meteorological data from IMD, Re analysis Data from NCEP/NCAR etc.

Advanced Centre for Atmospheric Radar Research



(ACARR -A Centre of Excellence in Atmospheric Observations
and Modelling)



(Prepared by Prof. K. Mohankumar)

Overview: Advanced Centre for Atmospheric Radar Research (ACARR) is a multidisciplinary research centre established by the Cochin University of Science and Technology (CUSAT). A state-of-the-art indigenously developed Stratosphere Troposphere (ST) wind profiler radar operating at 205 MHz frequency (which is the first wind profiler radar in the 200 MHz frequency range) is successfully functioning at ACARR from (December 2016) onwards, with the support of the Science Engineering Research Board (SERB), Department of Science and Technology, Govt of India. This versatile wind profiler radar provides high-resolution wind information from 315 m to 20 km in all weather conditions facilitating a better understanding of the dynamics and physics of the atmosphere and the weather systems.

In response to the Government of India's vision plan, Cochin University of Science and Technology had proposed a state-of-the-art and highly sophisticated new 205 MHz VHF Stratosphere Troposphere (ST) Wind Profiler radar at Cochin, the gateway of Indian Summer Monsoon, to the Department of Science and Technology, Government of India, under its *Intensification of Research in High Priority Area (IRHPA)* scheme to study and predict the variability of monsoon, extreme weather events like severe droughts and floods, and the regional climate change effect over the Kerala region. A grant of Rs. 25.00 crore was sanctioned for this project.

Stratosphere-Troposphere (ST) Radar is the most powerful and versatile wind-profiling instrument. It has got several advantages over other conventional observational methods. ST wind profiler radar monitors wind nearly continuously (24 x 365) almost directly above the site. The vertical air velocity is the most important and sensitive weather parameter, which can be measured accurately only with the wind profiler radar (WPR). The cost per observation is much cheaper compared to other forms of atmospheric observations. It can be operated unattended in nearly all weather conditions. The data consequently provides unique opportunities for atmospheric research as well as operational purposes. No other measurement technique will present comparable advantages in the near future, including satellite-borne sensors.

The uniqueness of 205 MHz ST Radar: The conventional wind profiler Radars operate at 50 MHz, 400 MHz and 1000 MHz frequency bands. Nevertheless, they have certain limitations in terms of entire height coverage, vertical resolution, signal-to-noise ratio, high costs etc. ST Radar operating at 205 MHz has got several advantages over those conventional radars. The noise from external sources such as galactic or cosmic noise is an important issue for radars operating in the frequency range of 50-1000 MHz. The ST radar at 205 MHz is less affected by cosmic noise, and hence the accuracy of its measurements would be much better than the conventional 50 MHz radars. The 205 MHz radar does not get saturated under rainy conditions, whereas UHF radars are not

so. It is a trade-off between the 50 and 400 MHz radars in terms of galactic noise, cost-effectiveness, the physical size of the antenna, better vertical resolution, and height coverage, especially when the tropical tropopause height could go beyond 15 km.

Geographical Importance: Kerala is the land of Monsoons. The first burst of the southwest monsoon over the Indian subcontinent takes place over Kerala. The timely onset, optimum duration and reasonable strength of the southwest monsoon are of vital importance to the life and economy not only of India but of the entire South Asian region.

Meteorologically, Cochin is a sensitive region bordered by the Arabian Sea on the one side and flanked by the Western Ghats on the other side. In addition, Cochin is considered the gateway of the Indian summer monsoon. Monsoon arrives in the state in June and remains there till September though not much temperature difference can be felt.

The rainfall over Cochin is influenced by both the coastal effect and the orographic effect due to its nearness to the Sea and the hills. The highest mountain peak of Western Ghats, *Anamudi*, lies just 100 km to the east in the same latitude belt of Cochin. During the southwest monsoon season, the Arabian Sea behaves as a reservoir of water vapour, which gets pumped into the land region under the forcing of strong westerly winds reaching a maximum speed of 15 to 25 m s⁻¹. On the other hand, the presence of Western Ghats, extending to an altitude of about 2 km, orographically lifts the strong wind. This vertical forcing of humid air mass enhances the cloud formation and precipitation in the windward side of the Western Ghats.

Supporting Facilities: In addition to the wind profiling Radar, the Radar Centre hosts a myriad of complementary remote sensing equipment such as Radiosonde (for deriving atmospheric state variable profiles), Microwave Radiometer (temperature and water vapour measurement), Disdrometer (raindrop size distribution), Ceilometer (cloud macro-physical properties), Automatic Weather Stations (monitoring of surface weather parameter including soil temperature and heat fluxes), Pyranometer (solar radiation intensity) etc. Compiled together, these advanced facilities are expected to cater to the needs of early warning systems. The Centre is regularly issuing Weekly Weather Reports in both English and Malayalam in the prospect of civil society.

ACARR- A National Facility: The ST radar at Cochin functions as a National Facility, with open data access to all national research Institutes in Atmospheric and Climate Sciences. The future stages are atmospheric research and operational utilization with good research potential in weather prediction and extension to Global change. A high-level meeting under the auspices of *NITI Aayog, Govt. of India*, held at New Delhi on 22nd June 2016, decided to showcase the Cochin ST Radar under the Prime Minister's 'Make in India' Program. Ministry of Earth Sciences, Govt. of India is currently supporting ACARR for its advancement in observational and modelling studies in Atmospheric Sciences, utilizing state-of-the-art observational facilities.

Scientific Collaborations: ACARR is actively involved in international scientific collaborations with (i) Swedish Institute for Space Physics, Kiruna, (ii) Indo-French joint research program on Stratoclim, (iii) European Space Agency on Aeolus, (iv) LMD, France, and many others. Also have collaboration with national institutions, such as (i) Indian Institute of Tropical Meteorology (IITM), Pune, (ii) *Space Physics Laboratory (SPL)*, VSSC, Thiruvananthapuram, (iii) *National Atmospheric Research Laboratory (NARL)*, Gadanki, (iv) *National Centre for Polar Research (NCPOR)*, Goa; *CSIR_CMMACS, Bangalore, and many others.*



MoU with CUSAT, Swedish Institute of Space Physics, Kiruna & NCPOR, Goa

Open Data Policy of ACARR: *The data procured from the ST Radar at Cochin will be open to all scientific communities in India. Any user from academic institutions like universities, Colleges, Research Institutions of Central and State Governments can submit proposals to conduct special experiments of their views and ideas. Regular observations taken during the synoptic hours will be available through the website. Wind data obtained from ST Radar can also be utilized to verify the quality of NCMRWF/NCEP/ECMWF gridded data and their reliability in our tropical belts. This will be useful for modifying/improving the input data in atmospheric models.*

ST Radar at Cochin Dedicated to the Nation: *The ST Radar Facility at Advanced Centre for Atmospheric Radar Research, Cochin University of Science and Technology was inaugurated and dedicated to the Nation on 11th July 2017 by Dr Harsh Vardhan, Hon'ble Union Minister for Science & Technology & Earth Sciences, Govt of India.*



ST Radar Facility at ACARR, CUSAT is dedicated to the Nation by Dr Harsh Vardhan, the Hon'ble Minister of Science and Technology & Earth Sciences, Govt of India on 11gth July 2017

Overview of IMS Activities Since its Inception

D. R. Pattanaik

Secretary, Indian Meteorological Society, New Delhi
Email : drpattanaik@gmail.com

1. Establishment of IMS

The Indian Meteorological Society (IMS) established in 1956 during the Session of the Indian Science Congress, has made more than 3500 members at present. It was registered as a Society under the Societies Registration Act in 1972 in New Delhi. The society has its head Quarter in Delhi with 32 chapters spread across the country. The society is a non-profit organization and none of its income or assets shall accrue to the benefit of its members. A well discussed constitution is its major assets of IMS. The constitution is available at IMS website at the following URL: <http://www.imd.gov.in/ims/>



IMS Local Chapters

2. The main objectives of the society are :

- Advancement of Meteorological and allied sciences in all their aspects.
- Dissemination of the knowledge of such sciences both among the scientific workers and among the public.
- Application of Meteorology and allied sciences to various constructive human activities, such as, agriculture and land uses, irrigation and power development, navigation of sea and air, engineering and technology, medicine and public health etc.

3. Membership of IMS

Any person who is interested in the aims and objectives of the Society is eligible to become a Member. He shall apply for membership in the prescribed form available in the website and shall be notified on acceptance by the Council.

- **Life Member (LM)**
A Member who pays all his dues in a lump sum as prescribed by the General Body shall be a Life Member. The society has about 3000 life members.
- **Annual Member (AM)**
A Member who pays all his dues in a lump sum as prescribed by the General Body shall be a Life Member. The society has about 3000 life members.
- **Student Members (SM)**
In order to encourage students to become IMS member, IMS recently introduced student membership where a student can become IMS student member by paying Rs. 1000/- along with the forwarded application from head of the institution where he/she is working. The membership will be valid till the time he/she becomes 30 years of age or get some employment in any place whichever is early. He/she can become a regular life member of IMS by paying the balance amount.
- **Institutional Members (Annual)**
Any institution which is interested in the aims and objectives of the Society is eligible to become an Institutional Member on payment of an annual subscription. The institution shall apply for Membership and shall be notified on acceptance by the Council. The Institutional Member may nominate its representative to exercise the Membership privileges.
- **Patron**
A person or an institution who is interested in the aims and objectives of the Society and makes a donation of substantial sum to the Society will, at the discretion of the Council, be admitted as Patron.

SUBSCRIPTION

Annual Member	Indian : Rs.300
Life Member	Indian : Rs. 3000; Foreign : US\$ 150
Entrance Fee	Indian : Rs. 00 ; Foreign : US\$ 10
Student Member	Indian : Rs. 1000
Institutional Member	Indian : Rs. 10000 (annual); : US\$ 250
Patron	Indian : Rs. 100000 ; Foreign : US\$ 2500
Institutional Patron	Indian : Rs. 1000000 ; Foreign : US\$ 25000

4. IMS Fellows

Honorary Fellow and Fellow

- Persons of acknowledged eminence in Meteorology and allied fields of Science and Technology or in their furtherance may be elected as honorary fellows by the General Body on proposal from the Council. **The society will be awarding IMS Fellow to Dr. M. Ravichandran, Secretary, MoES during the opening ceremony its international symposium (INTROMET 2021) on 23rd November, 2021.**
- Life members, who have made outstanding contribution of Meteorology and allied fields of Science and Technology, may be elected as Fellows by the General Body on proposal from the council. The following outstanding members of the society have been elected as Fellows/Honorary.
- IMS has also given Life Time Achievement Awards to three eminent scientists.

- **IMS LIFE TIME ACHIEVEMENT AWARDS**

S. No.	Name
1	Prof. P. V. Joseph
2	Shri Soundararajan Raghavan
3	Late Shri Dev Raj Sikka

- **List of IMS Honorary Fellows**

S. No.	Name
1	Late Dr. A. P. J. Abdul Kalam
2	Late Dr. J. S. Fein
3	Dr. P. S. Goel
4	Late Prof. V. R. Gowariker
5	Prof. Murli Manohar Joshi
6	Dr. Ramesh Kakar
7	Dr. K. Kasturirangan
8	Late Prof. T. N. Krishnamurti
9	Prof. G. O. P. Obasi
10	Dr. Kamal Puri
11	Prof. V. S. Ramamurthy
12	Prof. Veerabhadran Ramanathan
13	Dr. P. Krishna Rao
14	Dr. M. V. K. Siva Kumar
15	Dr. M. S. Swaminathan
16	Dr. Petteri Taalas
17	Er. Avinash Chand Tyagi
18	Dr. Upendra Narayan Singh



Dr. MUTHALAGU RAVICHANDRAN

**INDIAN METEOROLOGICAL SOCIETY
FELLOWSHIP**

Dr. MUTHALAGU RAVICHANDRAN was born on 18th May, 1965 in a small village “Badrakalipuram” in Theni district of Tamil Nadu. Dr. Ravichandran did his Post-graduation in Physics from Alagappa University, Karaikudi, Tamil Nadu in the year 1987 and Ph.D. in Physics from University of Pune, Maharashtra in the year 1997. Dr. Ravichandran joined the Indian Institute of Tropical Meteorology (IITM) as a Scientist in 1988 and continued till the year 1997. Dr. Ravichandran had displayed his innovative skills and leadership talent quite early and rapidly moved to very senior positions in the premier institutions of the country including the National Institute of Ocean Technology (1997-2001), Indian National Centre for Ocean Information Services (2001-2016) and became the Director of National Centre for Polar and Ocean Research (NCPOR), which is India’s premier R&D institution responsible for the country’s research activities in the polar and Southern Ocean realms. While continuing as Director of NCPOR, Dr. Ravichandran was appointed as the Secretary of Ministry of Earth Sciences (MoES), Government of India and assumed the charge on 11th October, 2021.

Dr. Ravichandran was actively involved in several national/international programmes, occupying important positions in the associated governing bodies. As a Co-Chair of Global Ocean Observation System (GOOS)/CLIVAR Indian Ocean Panel, he has contributed significantly by implementing in-situ ocean observations in the Indian Ocean (IndOOS). These observations are not only beneficial to India but also to the Global community. He was also an Executive member of International Argo Steering team to lead Indian Ocean Argo implementation as a part of GOOS.

Dr. Ravichandran has also contributed to various National and International bodies for several activities pertaining to local and Global issues and solutions: viz., Vice-President, Scientific Committee on Antarctic Research (SCAR) of International Science Council (2018-present); Member, CLIVAR Scientific Steering Group (SSG) since 2020; Council Member, International Arctic Science committee (IASC) (2016-present), Delegate-India, Antarctic Treaty System (2016-Present); Indian Rep: Council of Managers of National Antarctic Programs since 2016; etc. He is the author of more than 100 research papers published in peer reviewed national and international Journals and also contributed many chapters in books published by leading publishers.

In recognition of his outstanding contribution leading to the modernization of Ocean Observations and Services over the Indian Ocean region, and his brilliance & expertise in Polar Science, Indian Ocean modelling resulting in establishing the operational Ocean modelling system in India, **the Indian Meteorological Society is privileged to confer upon Dr. MUTHALAGU RAVICHANDRAN, the Fellowship of the Indian Meteorological Society on this day, the 23rd November, 2021.**

Cochin, India
23rd November, 2021

(Dr. M. Mohapatra)
President, IMS

- List of IMS Fellow

S. No.	Name
1	Late Dr. R Ananthakrishanan
2	Late Dr. G.C. Asnani
3	Dr. Swati Basu
4	Prof. G. S. Bhat
5	Dr. V. K. Dadhwal
6	Late Prof. P. K. Das
7	Late S. K. Das
8	Prof. S. K. Dash
9	Dr. R.K. Datta
10	Dr. U. S. De
11	Dr. B. L. Deekshatulu
12	Late Dr. O.N. Dhar
13	Prof. S.K. Dube
14	Prof. (Mrs.) Sulochana Gadgil
15	Dr. B. N. Goswami
16	Dr. Akhilesh Gupta
17	Dr. George Joseph
18	Prof. P.V. Joseph
19	Dr. P.C. Joshi
20	Dr. A.K. Kamra
21	Dr. R.R. Kelkar
22	Prof. R. N. Keshavamurthy
23.	Late Dr. P. Koteswaram
24	Dr. R. Krishnan
25	Dr. S. M. Kulshrestha
26	Dr. Rupa Kumar Kolli
27	Sh. A. S. Kiran Kumar
28	Dr. Santosh Kr. Mishra
29	Prof. U.C. Mohanty
30	Late Dr. D.A. Mooley
31	Dr. Shailesh Nayak
32	Prof. P.C. Pandey
33	Late Dr. G.B. Pant
34	Late Prof. P.R. Pisharoty
35	Late Mr. S. Raghavan
36	Dr. M. Rajeevan
37	Late Dr. Y. Ramanathan
38	Dr. K. J. Ramesh
39	Dr. DV Bhaskar Rao
40	Dr. L. S. Rathore
41	Late Prof K. R. Saha
42	Late Dr. R. P. Sarkar
43	Dr. N. Sen Roy
44	Prof J. Shukla
45	Late Sh. D.R. Sikka
46	Prof. J. Srinivasan

47	Dr. S.K. Srivastav
48	Dr. H. N. Srivastava
49	AVM. Dr. Ajit Tyagi
50	Dr. G.Viswanathan
51	Prof. B. Padmanabha Murty
52	Prof. Ravi Sankar Nanjundiah
53	Dr. Mrutyunjay Mohapatra
54	Prof. S. K. Satheesh
55	Dr. (Mrs.) N. Jayanthi
56	Dr. G. Srinivasan
57	Dr. M. Ravichandran

- **List of IMS Presidents**

S. No.	Name	Period
1	Dr. P. Koteswaram	1971-74
2	Sh. Y. P. Rao	1974-78
3	Dr. P. K. Das	1978-83
4	Sh. S. K. Das	1983-86
5	Dr. R. P. Sarkar	1986-89
6	Dr. S. M. Kulshrestha	1989-91
7	Prof. P.R. Pisharoty	1991-93
8	Dr. N. Sen Roy	1993-95
9	Dr. R.K. Datta	1995-97
10	Dr. R. R. Kelkar	1997-99
11	Dr. S. K. Srivastav	1999-2001
12	Prof. S. K. Dube	2001-2003
13	Dr. S.K. Srivastav	2003-05
14	Dr. G. B. Pant	2005-07
15	Sh. R. C. Bhatia	2007-09
16	Dr. L. S. Rathore	2010-12
17	Dr. Shailesh Nayak	2012-14
18	Dr. Akhilesh Gupta	2014-16
19	AVM Dr. Ajit Tyagi	2016-18
20	Prof. S. K. Dash	2018-20
21	Dr. M. Mohapatra	2020-22

- **List of IMS Associate Fellow**

S. No.	Name
1	Prof. Sandeep Pattnaik
2	Dr. Ayantika Dey Choudhury

- **IMS National Council (2020-22)** : The IMS new National Council took over the charge from the previous council On 10th July, 2020.

Indian Meteorological Society National Council 2020-22	
President	Dr. Mrutyunjay Mohapatra
Immediate Past President	Prof. Sushil Kumar Dash
Vice President	Dr. Atul Kumar Sahai Sh. Anand Kumar Sharma
Secretary	Dr. D R Pattanaik
Jt. Secretary	Dr. S I Laskar
Treasurer	Dr. Ananda Kumar Das
Member	Ms. Samanti Sarkar Prof. P V S Raju Dr. R K Giri Sh. Sanjay Bist Sh. Sikandar M Jamadar Dr. Satyendra M. Bhandari Dr. Ranjeet Singh Dr. K. Satheesan

5. General IMS Activities

To achieve the objectives the IMS involves in carrying out the following work.

- Encourages research activity.
- Organizes lectures, meetings, symposia, discussions etc.
- Arranges to publish suitable pamphlets, books, periodicals, brochures etc.
- Promotes Co-operation in scientific work.
- Encourages the members to foster common interests of the Meteorological professions
- Give awards and fellowship to distinguished scientists.

6. Sponsor Scientific Events and Organization of Symposia/Conferences

To Sponsor Scientific Events

- The Society sponsored for the first time a scientific event in April 1970. This was a symposium on Satellite Meteorology held at Pune.
- Later on it sponsored the International Symposium on Monsoons which held in March 1977 at New Delhi.
- It also sponsored the National Symposium on Early Results of Monsoon Experiments held at New Delhi in March 1981.

Organisation of Scientific Symposia

- With a beginning in 1976 the Society has organised the following National Symposia/Seminars so far:
- Seminar on Weather Modification New Delhi February **1976**
- Symposium of Local Severe Storms Calcutta February **1982**
- Symposium on Tropical Cyclones and Disaster Preparedness Bhubaneswar January **1984**

Annual National Symposia Series on Tropical Meteorology (TROPMET)

- Monsoon Variability, Satellite Application and Modelling, Ahmedabad, February **1992**
- Meteorology for National Development, New Delhi, February **1993**
- Climate Variability, Pune, February **1994**
- Advanced Techniques in Meteorology, Hyderabad, February **1995**
- Meteorology and Natural Disasters, Visakhapatnam, February **1996**
- Symposium on Monsoon, Climate and Agriculture, Bangalore, February **1997**
- Meteorology beyond 2000, Chennai, **1999**
- Ocean & Atmosphere, Cochin, February **2000**
- Meteorology for Sustainable Development, Mumbai, February **2001**
- Forecasting & Mitigation of Meteorological Disasters: Cyclones, Floods & Droughts, Bhubaneswar, February **2002**
- Role of Meteorology in National Development, Pune, **2006**
- Advances in Meteorology and their Applications, Bhopal, **2007**
- Meteorology, Atmospheric Science, Weather & Climate and allied services and disaster management, Kolkata **2010**
- Meteorology for Socio-economic Development, Hyderabad, **2011**

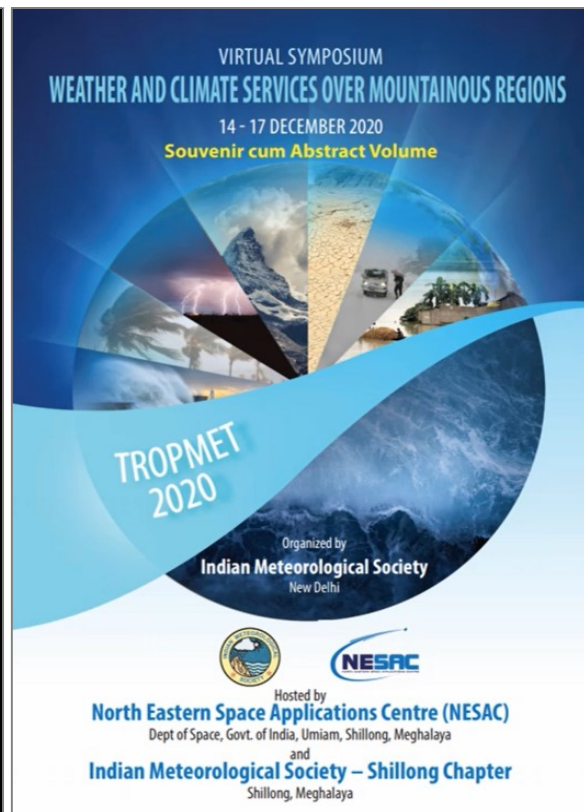
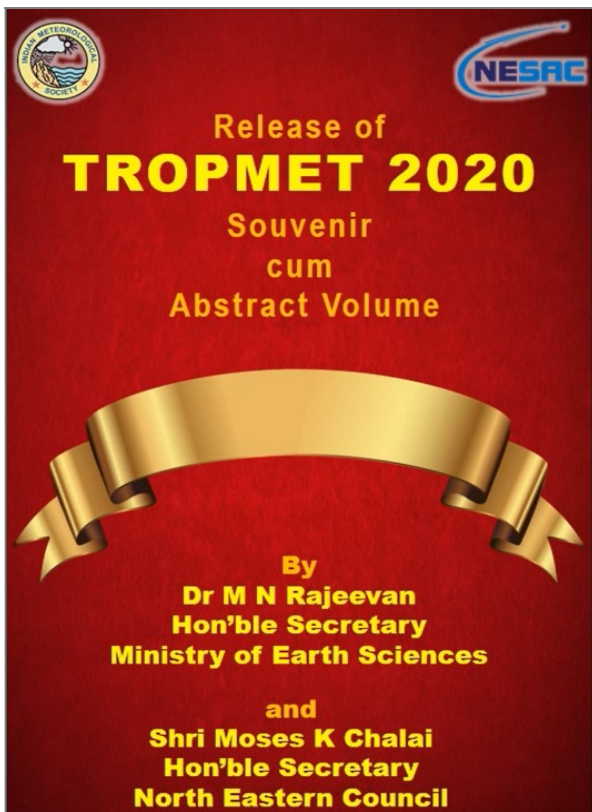
- National Symposium on Frontiers of Meteorology with special reference to the Himalayas. Dehradun **2012**
- National Symposium on Weather & Climate Extremes, Chandigarh – **2015**
- National Symposium on Tropical Meteorology: Climate Change and Coastal Vulnerability, Bhubaneswar **2016**
- National Symposium on Tropical Meteorology: Understanding Weather and Climate Variability: Research for Society, Varanasi **2018**
- National Symposium on Tropical Meteorology: Land, Ocean and Atmosphere Interactive Processes in the Context of Weather and Climate, Visakhapatnam **2019**
- National Symposium on Tropical Meteorology on “Weather and Climate Services over Mountainous Regions” at NESAC, Shillong during 14 - 17 December **2020**.

International TROPMET (INTROPMET) Organised by IMS

- International Symposium on Asian Monsoon & Pollution over Monsoon Environment, (INTROPMET-1997) New Delhi, December 2-5, **1997**
- International conference on monsoon (ICOM) and WMO Workshop on forecasting monsoons from days to years, New Delhi. March 21-26, **2001**
- International conference on Seismic Hazard with particular reference to Bhuj Earthquake of January 26, 2001. New Delhi, 3-5 October, **2001**
- International Symposium on Natural *hazards* (INTROPMET 2004) February 24-27, **2004**, Hyderabad.
- Monex-25, Celebrating 25th Anniversary of Summer Monsoon Experiment-**1979** (Monex-25 and its Legacy), New Delhi, 3-7 February, **2005**
- International symposium on Challenges & Opportunities in Agro-meteorology (INTROPMET – 2009), New Delhi, 23-25 February **2009**.
- International Tropical Meteorology Symposium on Monsoons- Observation, Prediction and Simulation (MOPS) (INTROPMET -2013), Chennai, Originally scheduled in 2013 but was organized during 21-24 February, **2014**.
- International Tropical Meteorology Symposium on Advancements in Space-based Earth Observations and Services for Weather and Climate (INTROPMET- 2017), 03-07 November, **2017**, Ahmedabad.
- **Virtual International Symposium on Tropical Meteorology (INTROPMET-2021) on “Changing Climate: Consequences and Challenges” at CUSAT, Cochin, India during 23 - 26 November 2021.**



On behalf of NSF, Jay Fein accepts a bouquet expressing thanks from the Indian research community for NSF's support of MONEX-1979. Also pictured are (left to right) Late D. R. Sikka, V. S. Ramamurthy (India Department of Science and Technology), S. K. Dube (Indian Institute of Technology), and Peter Webster (Georgia Institute of Technology). IMS function, Delhi 2005.



Release of Souvenir cum abstract volume (TROPMET-2020)

7. IMS Publications

To popularize Meteorology and Atmospheric Sciences, the Indian Meteorological Society (IMS) brings out the Research journal “Vayu Mandal”, which is the official Bulletin of IMS. This is brought out twice a year since 1971 to encourage research work and provide information on latest developments in the atmospheric sciences. At present the Chief Editor, Managing Editor and Executive Editor are given below.

Chief Editor: Prof. S.K. Dash, skdash@cas.iitd.ernet.in, IIT Delhi, New Delhi

Managing Editor: Dr.D.R.Pattanaik, drpattanaik@gmail.com, IMD, New Delhi

Executive Editor: Dr. Kamaljit Ray, kamal.ray@nic.in, MoES, New Delhi

The article can be submitted to :

Executive Editor

Vayu Mandal

Indian Meteorological Society

Room No. 605, VI Floor, Satellite Meteorological Building,
Mausam Bhavan Complex, Lodi Road, New Delhi-110 003.

Email: vayumandal.ims@gmail.com



Release of VayuMandal 46-(2) July–Dec 2020 on 18th November, 2021 during the GB meeting

8. IMS Awards and Fellows

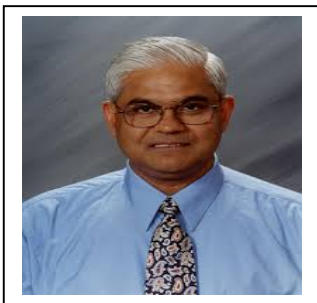
8.1 IMS International Award : “Sir Gilbert Walker Gold Medal”

IMS has instituted “Sir Gilbert Walker Gold Medal” in 2001 to be given biennially to an eminent Indian or foreign scientist of international recognition in the field of monsoon studies. There is no bar on the age and nationality. Now the Prize money for this award is Rs. 100000/- and a gold plated silver medals (100 gm weight) and a Citation. The selection will be made by a judging committee with IMS President and minimum two Fellows of IMS as members. Sir Gilbert Walker, the legendary meteorologist who did pioneering and monumental work on long range forecasting of Indian monsoon, was the Director General of India Meteorological Department for 20 years (1904-1924).

“List of Sir Gilbert Walker Gold Medal Awardees” so far are :

- (1) **Prof. J. Shukla**, COLA, USA
- (2) **Late Prof. P. K. Das**, Former DGM, IMD
- (3) **Prof. U. C. Mohanty**, IIT Delhi
- (4) **Late Shri. D. R. Sikka**, Former Director, IITM, Pune
- (5) **Late Prof. T. N. Krishnamurti**, Professor FSU, USA
- (6) **Prof. (Mrs) Sulochana Gadgil**, IISC, Bangalore
- (7) **Prof. R. N. Keshavmurty**, Former Director IITM, Pune.

Sir Gilbert Walker Gold Medal Awardees of IMS



Prof. J Shukla is a Distinguished University Professor at George Mason University, USA, where he founded the Department of Atmospheric, Oceanic, and Earth Sciences and Climate Dynamics PhD Program. Prof. Shukla's scientific contributions include studies of: the dynamics of monsoon depressions; the climate variability; the influences of SST on seasonal variability; the intraseasonal and inter-annual variability of monsoons; the predictability and prediction of monsoons, tropical droughts, and ENSO.



Late Prof. P. K. Das, former Director General of Meteorology, India Meteorological Department (during 1979-1983) passed away on 14 January, 2011 at the age of 84. He had joined the IMD in 1949. Prof. Das made pioneering research and contributions to Meteorology, in particular to the development of Numerical Weather Prediction in India. He worked on cloud physics with Sir John Mason at Imperial College, London. He also worked with Prof. Jule Charney, Prof. Norman Philips and Ed Lorenz of the MIT and Reid Bryson at the University of Wisconsin.



Prof. U. C. Mohanty worked at IIT Delhi before shifting to IIT Bhubaneswar as Visiting Professor, in the School of Earth Ocean and Climate Sciences (SEOCS). He has made outstanding contribution in the field of tropical meteorology, in particular, Asian summer monsoon dynamics, tropical cyclone research, numerical weather prediction in tropics, mesoscale modeling of extreme weather events over Indian monsoonal regime, extended range prediction of Indian summer monsoon and regional climate modeling.



Late Prof. D. R. Sikka, Former Director of IITM (1986-1992) is an international expert on monsoon in particular and on Tropical Meteorology in general. His knowledge and experience of last six decades are considered brilliant. He never retired from the limits of his scientific capability. He was very active even at the age of more than eighty. He was spearheading many important projects/missions of Ministry of Earth Sciences, Department of Science & Technology related to Atmospheric Sciences.



Late Prof. T. N. Krishnamurti, at present is Professor Emeritus in the Department of Meteorology, Florida State University, where prior to his retirement he was the Lawton Distinguished Professor of Meteorology. He has specialized in studies of monsoon, hurricanes and numerical weather prediction and more recently on multi-model super-ensemble forecasts for global weather (including hurricanes) and climate. He has published over 250 papers and two textbooks.



Prof. Sulochana Gadgil: Worked at the Centre for Atmospheric and Oceanic Sciences (CAOS) in Bangalore, India for most of her career. She has studied the how and why of monsoon, including farming strategies to cope with rainfall variability and modeling ecological and evolutionary phenomena. Her research led to the discovery of a basic feature of the sub-seasonal variation in the monsoon cloud bands. She demonstrated monsoon is a manifestation of the seasonal migration of a planetary scale system.



Prof. R. N. Keshavamurthy was born on 6th May 1936. He did M.Sc. in Physics and Ph.D. in Physics/Atmospheric Science. He joined IMD in the year 1959 and later he joined IITM, Pune as Senior Scientist in the year 1968. Other important positions held by him was Associate Professor and Professor at Physical Research Laboratory, Ahmedabad (1978-1992), Director of Indian Institute of Tropical Meteorology, Pune (1992-1996) and Member, WMO/ICSU Joint Scientific Committee of the World Climate Research Programme (WCRP) during 1987-1990.

8.2 **IMS National Biennial and Annual Awards**

The IMS had instituted three biennial research awards from the endowment gifted by the sponsors viz., Dr. B.N. Desai Award, V. Bhavnanayana Award, J. Das Gupta Award, Dr. P. Krishna Rao and Prof. A.D. Vernekar awards. In 2011 IMS re-designed these awards by increasing the prize money by contributing from IMS along with the endowment gifted earlier by the sponsors. These awards are as per the details given below.

- (i) **IMS Award for Best Paper Published on Monsoon Research (Formerly B.N. Desai Award)** : A Citation and cash prize of Rs.15,000/-.
- (ii) **IMS Biennial award for best paper published on Atmospheric Observations & Technologies (Formerly J. Das Gupta Award)** : A Citation and cash prize of Rs.15,000/-.
- (iii) **IMS Biennial award for best paper published on Weather and Climate Services (Formerly Bhavanarayana Award)** : A Citation and cash prize of Rs. 15,000/-
- (iv) **IMS Biennial award for best paper published on Application of Satellite data and Remote Sensing in Meteorology (Formerly P. Krishna Rao Award)** : A Citation and cash prize of Rs. 25,000/-
- (v) **IMS Biennial award for best paper published on Modelling study on Atmospheric and Oceanic Sciences (Formerly A. D. Vernekar Award)** : A Citation and cash prize of Rs. 25,000/-
- (vi) In addition to above five awards, IMS has also introduced another biennial award viz., “ **Vayu Mandal Award**” from (2017-2018) for the best paper published in IMS journal – VayuMandal (Citation & Rs. 15,000/-).

(vii) **IMS Young Scientist Award**

During 2012 IMS has also instituted a young Scientist award (Below 45 years) to be given annually for the Best Paper Published in Tropical Meteorology with a Citation and award money of Rs. 50,000/-.

Constitution of IMS New Biennial Award

- (viii) IMS has constituted another biennial award based on the contribution money donated by **Prof. DVB Bhaskar Rao** during the inaugural function of TROPMET 2019 held in Vishakhapatnam. The first award in this series will be given for the period 2020-2021 and it will be given for the first time in 2022. The announcement for this may be given in January 2022. It was also decided that two biennial awards out of 5 announced for 2019-2020 as mentioned above will be announced again for 2020-2021 along with the Prof Bhaskar Rao award with one time additional expenditure by IMS. Subsequently, the same cycle will continue with 3 Biennial awards and one young scientist award in every two years like 2020-2021, 2021-2022 and so on.

Winner of IMS Biennial Awards (2019-2020)

IMS has announced the winner of above mentioned six Biennial awards for the year 2019-2020. They will be awarded the same during the inaugural function of annual international symposium INTROMET, 2021 on 23rd November, 2021.

S. No	Name of the Award	First Author	Full Paper
1	Best Paper Published on Monsoon Research	M. M. Nageswararao	M. M. Nageswararao, M. C. Sannan & U. C. Mohanty, (2019) : Characteristics of various rainfall events over South Peninsular India during northeast monsoon using high-resolution gridded dataset (1901–2016), <i>Theoretical and Applied Climatology</i> , Vol. 137, 2573–2593.
2	Best Paper published on Atmospheric Observations & Technologies	Munn Vinayak Shukla	Munn Vinayak Shukla and Pradeep K. Thapliyal (2020) : "Development of a Methodology to Generate In-Orbit Electrooptical Module Temperature-Based Calibration Coefficients for INSAT-3D/3DR Infrared Imager Channels," in <i>IEEE Transactions on Geoscience and Remote Sensing</i> , Vol. 59, 240-246. DOI: 10.1109/TGRS.2020.2998523.
3	Best Paper published on Weather and Climate Services	Sourabh Bal	Sourabh Bal and Sahar Sodoudi , (2020) : Modeling and prediction of dengue occurrences in Kolkata, India, based on climate factors. <i>International Journal of Biometeorology</i> , Vol. 64, 1379–1391. https://doi.org/10.1007/s00484-020-01918-9 .
4	Best paper published on Application of Satellite data and Remote Sensing in Meteorology	Raghu Nadimpalli	Raghu Nadimpalli, Akhil Srivastava, V. S. Prasad, Krishna K. Osuri, Ananda K. Das, U. C. Mohanty and Dev Niyogi, (2020) : "Impact of INSAT-3D/3DR Radiance Data Assimilation in Predicting Tropical Cyclone Titli Over the Bay of Bengal," in <i>IEEE Transactions on Geoscience and Remote Sensing</i> , Vol. 58, 6945-6957. DOI: 10.1109/TGRS.2020.2978211
5	Best paper published on Modelling study on Atmospheric and Oceanic Sciences	Sudarsan Bera	Sudarsan Bera and Thara V. Prabha, (2019) : Parameterization of Entrainment Rate and Mass Flux in Continental Cumulus Clouds: Inference From Large Eddy Simulation. <i>J. Geophys. Res. Atmos.</i> , Vol. 124, 13127-13139. https://doi.org/10.1029/2019JD031078 .
6	Best paper published in Vayu Mandal	N. UmaKanth	N. UmaKanth, G. Ch. Satyanarayana and D. V. Bhaskar Rao, (2019): Analysis and Prediction of Thundrstorms over Andhra Pradesh using INSAT 3D and MODIS Satellite Data. <i>VayuMandal</i> , Vol. 45, No. 1 (jan-Jun), 30-48.

8.3 IMS National Annual Award [IMS Young Scientist Awards (Annual)]

IMS young scientist award for best paper published on Tropical Meteorology. (Citation & Rs. 50,000/-; At least the 1st author should be below 45 years of age)

Winner of IMS Young Scientist Award for 2019 and 2020

IMS has also announced the winner of two young scientist awards for the year 2019 and 2020. They will be awarded the same during the inaugural function of annual international symposium INTROMET, 2021 on 23rd November, 2021.

S. No	Name of the Award	First Author	Full Paper
1	Best Paper Published in Tropical Meteorology (2019)	Raju Mandal	Raju Mandal, Susmitha Joseph, A. K. Sahai, R. Phani, A. Dey, R. Chattopadhyay and D. R. Pattanaik, (2019) : Real time extended range prediction of heat waves over India. Sci Rep 9, 9008. https://doi.org/10.1038/s41598-019-45430-6
2	Best Paper Published in Tropical Meteorology (2020)	Vimal Mishra	Vimal Mishra, Anukesh Krishnankutty Ambika, Akarsh Asoka, Saran Aadhar, Jonathan Buzan, Rohini Kumar and Matthew Huber, (2020) : Moist heat stress extremes in India enhanced by irrigation. Nature Geoscience, Vol. 13 (11), 722–728.

List of “IMS Young Scientist Awardees” so far since its inception in 2012 are :

S. No.	Name	Year
1	Dr. Hemant Chaudhary, IITM, Pune	2012
2	Dr. Randhir Singh, SAC, Ahmedabad	2013
3	Dr. D. R. Pattanaik, IMD, New Delhi	2014
4	Dr. Roxy Mathew, IITM, Pune	2015
5	Dr. (Ms.) P Rohini, IITM, Pune	2016
6	Dr. (Ms) Gayatri Kulkarni, IITM, Pune	2017
7	Dr. Siddarth S Das, VSSC, Trivandrum	2018
8	Shri Raju Mandal, IITM, Pune	2019
9	Dr. Vimal Mishra, IIT Gandhinagar	2020

9. Recent Activities of IMS and Photo Gallery

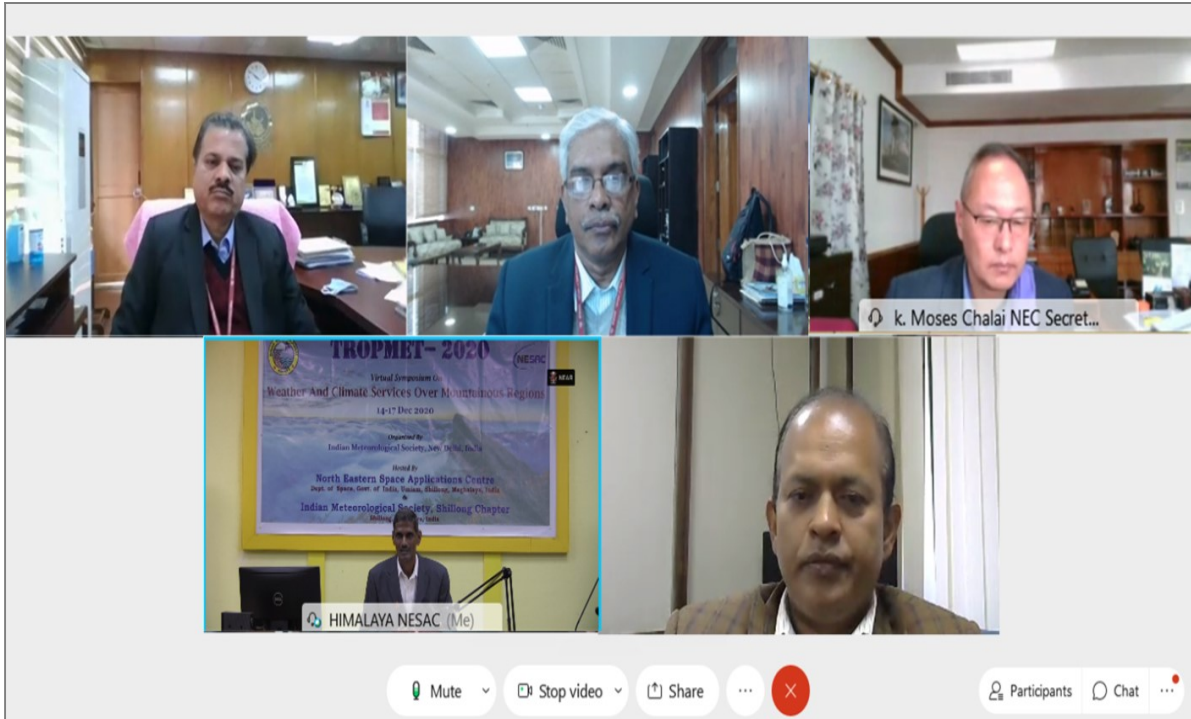
IMS Annual Symposium TROPMET-2020

As in the past years, this year also IMS organized the National Symposium called TROPMET in the midst of COVID-19 pandemic, 14-17 December, 2020 jointly by the North Eastern Space Applications Centre (NESAC) and Indian Meteorological Society – Shillong Chapter. The theme of TROPMET-2020 was “Weather and Climate Services over Mountainous Regions”. The symposium was organized in the virtual mode and it focused on all the aspects of weather and climate over the mountainous regions. The atmospheric processes over these regions are different from those over the plains and therefore need a different analysis and modeling approach to include the complexities of such regions. Such terrains are also more prone to extreme weathers. TROPMET-020 provided the platform to bring together atmospheric scientists, oceanographers, agricultural scientists, policy makers, disaster managers and other related experts to discuss and share knowledge, experience, and information for the benefit of the society.


For the first time in the history of IMS, this symposium was conducted virtually with all the controls set at NESAC, Shillong with the support from the conference management partner M/s ALPCORD Network. Efforts were made to provide uninterrupted, user friendly, real 3D feel with a nicely designed lobby, three separate halls namely Himalaya, Brahmaputra, and Ganga hall for three parallel technical sessions, e-poster area, e-exhibition areas, etc. Most of the programs were conducted at the Himalaya Hall, while the other two halls were used only for the parallel sessions during the technical program. The symposium was hosted on the web-based platform www.tropmet2020.webcnevents.com for ease of access and was provided with video guide on how to use and explore the entire virtual platform. Each registered delegate was given a user ID and password to log-in in the portal. The presentations were made using a separate CISCO WEBEX link and the presentations along with the video of the speaker were fed to the web-portal. The participants could ask questions using the CISCO-Webex chatbox as well as using the Q&A tab available in the symposium portal. The whole program at the Himalaya hall was also made available at the YouTube channel of IMS.

A dedicated web portal www.tropmet2020.in was created to facilitate registration of delegates which commenced on September, 2020 and continued till the end of the symposium. 470 delegates from India, United States of America, United Kingdom, Sri Lanka, and Myanmar registered using the portal. A nominal registration fee was charged for the delegates to meet the required expenditures. The symposium received overwhelming response with 314 abstracts submitted. The review committee recommended 201 abstracts for oral presentation and 113 for posters. The entire symposium was divided into 21 technical sessions, four plenary sessions, 3 sessions for popular and memorial lectures, one session for industry presentations, in addition to the inaugural and valedictory sessions. One special talk by Dy Secretary General of World Meteorological Organisation (WMO) was organised.

The inauguration of the symposium was held during 10:00 to 11:15 AM on 14 December, 2020 at the Himalaya hall. Hon'ble Secretary of Ministry of Earth Sciences, Dr. M. N. Rajeevan was the Chief Guest while Shri Moses K. Chalai, Hon'ble Secretary of North Eastern Council, Shillong was the Guest of Honour. The panel during the inauguration program also included Dr. M. Mohapatra, President IMS and Director General IMD; Shri P. L. N. Raju, Director, NESAC; and Dr. D. R. Pattanaik, Secretary, IMS.



The Inauguration program of TROPMET-2020.



WMO OMM
World Meteorological Organization
Organisation météorologique mondiale
Organización Meteorológica Mundial
Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
世界气象组织

Secrétariat
7 bis, avenue de la Paix – Case postale 2300
CH 1211 Genève 2 – Suisse
Tél: +41 (0) 22 730 81 11
Fax: +41 (0) 22 730 81 81
wmo@wmo.int – public.wmo.int

Message from WMO

WMO congratulates the Indian Meteorological Society for organizing the virtual symposium on weather and climate services over mountain regions.

WMO attaches great importance to the development of better climate services for the mountainous Hindu-Kush region, known as the Third Pole, which provides water supplies for about 45% of the world's population.

Mountains are often referred to as “the water towers” of the world. Rising global temperatures are causing changes to mountain meteorology, hydrology, and ecology, and increasing the risk of local and downstream disasters.

In this context, the symposium is an important event for fostering coordination on adapting the weather and climate services to meet evolving needs of mountain and downstream regions.

We wish you a successful event.

Dr Elena Manaenkova, the Deputy Secretary General of WMO, will be pleased to address the symposium during the concluding segment.

Message from WMO.



Virtual lobby in the TROPMET-2020 Symposium.



The Himalaya Hall during the symposium. Other Halls were of similar design.

The program started with an invocation by NESAC students and lighting of holy lamp digitally. This was followed by welcome address by Shri P. L. N. Raju. He welcomed all the panelists and the participants and thanked IMS for giving the opportunity to NESAC and IMS-Shillong Chapter to host TROPMET-2020. He informed that it was initially planned to be a physical symposium, however due to the movement restrictions because of COVID-19 pandemic, the symposium was conducted virtually. He briefed about all the preparations made and requested delegates to actively participate in technical sessions and plenary talks. Dr. D. R. Pattanaik welcomed the participants and the panelists on behalf of IMS. He briefed on IMS activities and the importance of TROPMET symposium at the national level. He informed that two legendary meteorologists from India, Dr. S. Raghavan and Dr. G. B. Pant left us for the heavenly abode. IMS paid digital tribute to both of them. Dr. Pattanaik also informed that the Secretary General of WMO has wished for the success of the TROPMET-2020 and has deputed Dr. Elena Manaenkova, Deputy Secretary-General, WMO to deliver a talk during the valedictory session. He read out the message from WMO on this occasion. He also mentioned that WMO conducted a High Mountain Summit during 2019 and a video depicting the proceedings of the Summit was sent from WMO for screening during the event. The documentary was screened during the inauguration program and was also screened during the break times.

Dr. M. Mohapatra during his address explained the reason for selecting the theme of the current TROPMET symposium. The importance of weather and climate services for the mountainous regions including the complex NE region of India and its challenges were highlighted by him. This was followed by virtual release of the souvenir cum abstract volume by the Chief Guest and Guest of Honor.

Guest of Honor, Hon'ble Secretary, NE council stressed on the importance of improved services and enhancement of observatories to address the challenge posed by severe weather and climate change that can derail the livelihood options for the indigenous population living over the mountainous regions.



Release of Souvenir cum abstract volume.

Chief Guest of the program, Hon'ble Secretary, MoES stressed on the utilization of advanced technology and greater involvement of younger generation to develop solutions for the problems faced by the population living in mountainous regions. There was a consensus that different department need to join hands to address the complex problems of weather and climate services over the mountainous regions.

Plenary Sessions:

The first plenary session was conducted just after the inauguration program during 11.30-13.15 Hrs at Himalaya Hall. The session was chaired by Prof S. K. Dube and Prof. U.C. Mohanty. There were three lectures during this session by Dr. M. N. Rajeevan, Secretary, MoES on India's Monsoon Mission, followed by Dr. M. Mohapatra, DG, IMD on Impact Based Forecasting & Risk Based Warning: Advancement & Challenges. The last lecture of the session was by Dr. Satish Sheno, Former Director, INCOIS on Discovery of Barotropic sea level variability in the tropical Indian Ocean driven by Madden-Julian Oscillation. Dr. Rajeevan explained the details of Indian Monsoon Mission in a very efficient and brief manner. He pointed out how the monsoon mission growing up in India day by day. He further extended his explanation regarding the future prospect of the monsoon research and its necessity. Dr. M. Mohapatra further added the IMD's new concept of Impact based forecasting system & Risk based warning circulation. He explained how such methodology combines the traditional Numerical weather prediction model and big data analyses using Artificial Intelligence. Later on Dr. S. Sheno elaborated the research on the discovery of barotropic sea level variability in the tropical Indian Ocean driven by the Madden-Julian Oscillation.

The second day started with commencement of the second plenary session of TROPMET, which was conducted during 10:00 to 11:30 Hrs at Himalaya Hall. The session was chaired by Prof S. K. Dash and Dr. K. J. Ramesh. There were three lectures during this session by Dr. R. S. Nanjundiah, Director, IITM on Use of AI/ML in Weather and Climate Studies The second lecture was by Dr. R. Krishnan, Executive Director, CCCR, IITM on Understanding the recent observed changes in the activity of western disturbances over the Western Himalayas. The third and final lecture was by A.K. Sahai, Scientist G, IITM on Sub-seasonal to Seasonal Prediction Initiatives and Progress.

The third plenary session of TROPMET-2020 was conducted during 10:00 to 11:30 Hrs at Himalaya Hall on 16 December, 2020. The session was chaired by Dr. R. K. Datta and Dr. L. S. Rathore. There were three lectures during this session with the first one by Prof B N Goswami on "Looking beyond TOGA for Prediction and Predictability of Indian Summer Monsoon Rainfall". The second lecture was by Dr. Sunil Singh on "Ocean Circulation - Plate Tectonics - Climate Coupling", while the third and final lecture was on "A possible research framework to link weather and climate with COVID-19" delivered by Dr. S. K. Behera. The lectures focussed on varied areas on what can modulate climate and the impact of weather and climate on human health.

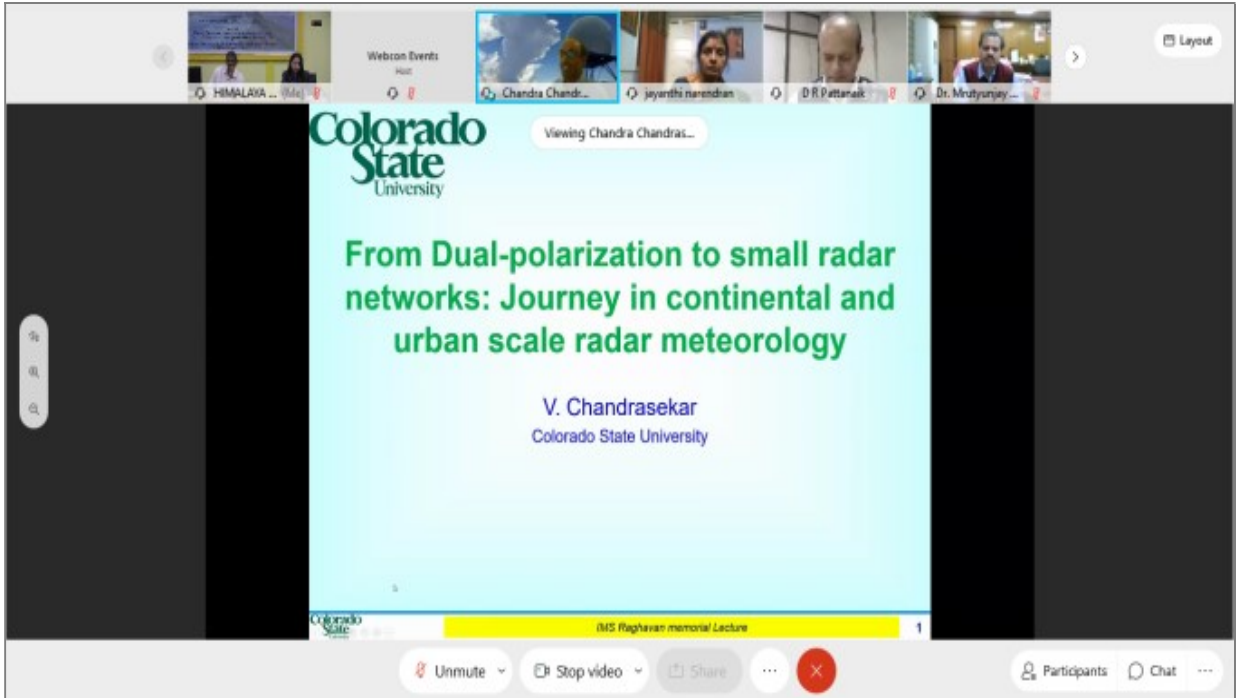
The 4th Plenary session consisted of three presentations. This session was conducted during 10:00 to 11:30 Hrs at Himalaya Hall. The session was chaired by Dr. H. N. Srivastava and Prof. D.V. Bhaskar Rao. Shri P L N Raju, Director, NESAC was also present and welcomed all the speakers and session chairs. The first lecture was delivered by Dr V K Dadhwal, Director of Indian Institute of Space Science and Technology, while second and third lectures were delivered by Dr. Akhilesh Gupta, Advisor, Department of Science and Technology, Government of India and Dr. Kala Chand Sain, Director of Wadia Institute of Himalayan Geology, respectively. Dr Dadhwal spoke about “Understanding Biogeochemical Cycle of Carbon for India using earth observation data” and stressed on use of space technology for different components of carbon related studies associated with climate and climate change. Dr. Gupta delivered his lecture on “Climate Research in India: Recent Progress and Way Forward” and informed about different initiatives taken by DST to study, quantify, and mitigate climate change impacts. Dr. Sain spoke on “Climate Change Impact on Himalayan Glaciers” and highlighted the very important issue on climate change impact on the very fragile ecosystem of the Indian Himalayan region. The lectures were followed up by question and answer sessions by the audience where several questions and clarifications were raised.

Memorial lectures:

Two eminent Scientists, Mr. S. Raghavan and Dr. G. B. Pant, who contributed immensely to the field of Atmospheric Sciences left for heavenly abode during 2020. IMS paid tribute to these great scientists and organised two memorial lectures during the TROPMET-2020. Dr. Raghavan memorial lecture was organized in the first day during 18:30 to 19:30 so that everybody can attend it after first technical session. Dr. N. Jayanthi, Former ADGM, IMD was the Chairperson for this session. The lecture was delivered by Dr. V. Chandrasekar, University Distinguished Professor, Colorado State University, USA on Radar Meteorology for Complex Terrain: Small Radar networks. The talk highlighted the importance of Radar, particularly the small radar for nowcasting of severe storms. His experience with US radar network was explained and covered many basic parameters of polarimetric radar.



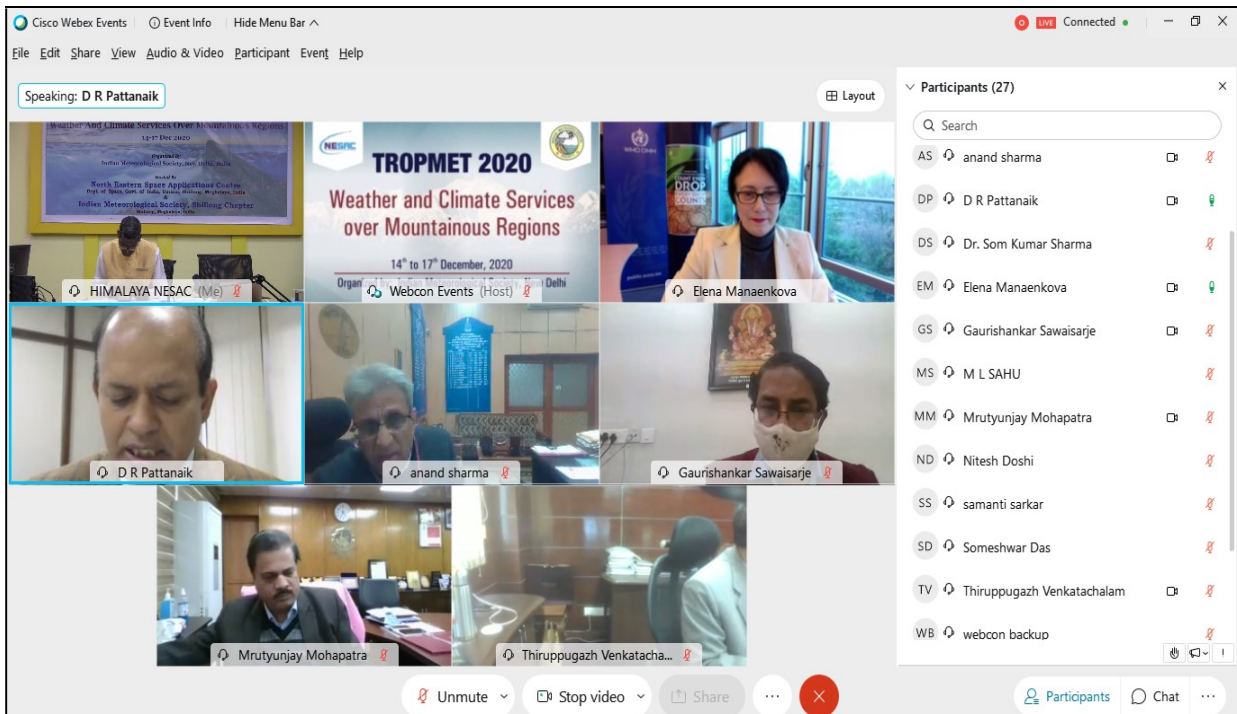
Tribute to Mr. S. Raghavan and Dr. G. B. Pant.



Mr. S. Raghavan Memorial Lecture in progress.



Panelists during the Dr. G. B. Pant memorial lecture.



Dy. Secretary General, WMO (top right corner) during the special talk.

He also emphasised on challenges of extreme precipitation and its forecasting. He highlighted the gap between the observation and modeling and called on to reduce the gap. He mentioned that the scenario is poor in India. He also stressed on citizen centric instrument network to encourage interest in meteorology. The last program of the second day of TROPMET-2020 symposium was Dr. G. B. Pant Memorial Lecture. Dr. P. C. Joshi, Former Group Director from SAC was the Chairman for this session. He gave a brief life history of Dr. G. B. Pant and explained his contributions in development of atmospheric science research in India. The memorial lecture was delivered by Dr. Rupa Kumar Kolli, Executive Director, International CLIVAR Monsoon Project Office (ICMPO), on Understanding Climate and Climate Change over the Himalayas: Dr. G. B. Pant's legacy. The importance of Himalaya for the Indian sub-continent and also for the world weather and climate was very efficiently explained by Dr. Kolli. Dr. S. K. Dash mentioned about his fond memories of Dr. Pant. Dr. M. Mohapatra also shared his memories with Dr. G. B. Pant and thanked Dr. Kolli for delivering the lecture.

Popular talk:

A popular talk was organized on the third day of symposium during 16:30 to 17:30 at Himalaya Hall. Dr. Shailesh Nayak, Director, National Institute of Advanced Studies (NIAS) & Former Secretary, MoES has delivered a talk on Recent Developments of Remote Sensing in Weather and Climate Applications. The session was moderated by Shri P. L. N. Raju, Director, NESAC and Dr. D. R. Pattanaik, Secretary, IMS. Dr. Sailesh Naik highlighted the progress achieved in the fields of weather and climate research with the progress of the space technology and with the utilization of other remote sensing tools.

Special Talk:

A special talk was organised on 17th December, 2020 before the valedictory session. This talk was delivered by Dr Elena Manaenkova, Deputy Secretary-General, WMO. She delivered her talk on “WMO - International Cooperation for Improved Weather and Climate Services for Mountain Regions”. She briefed about the WMO’s initiatives on mountain meteorology and discussed about the outcome of the High Mountain Summit organized by WMO in 2019. She congratulated IMS and NESAC for the successful conduct of TROPMET-2020.

Technical Sessions:

There were seven technical sessions running in parallel in three different halls at Himalaya Hall, Brahmaputra Hall, and Ganga Hall respectively. Altogether there were 21 sessions with 21 lead talk by eminent scientist or subject experts covering all 17 themes.

Industry Presentations:

This session was chaired by Shri P L N Raju, Director, NESAC and Co-Chaired by Shri M Somorjit Singh, Scientist, NESAC. Two industries named as M/s NEEPCO (North East Electric Power Corporation) and M/s EARTH NETWORKS presented during this session.

E-Poster presentations:

TROPMET-2020 had a dedicated poster presentation session. Posters were arranged theme wise with different links. All the poster presenters were requested to send a video recording of their presentations. However, only 32 poster presenters send the video recorded presentations. Those video presentations were put using a separate link “E Poster Videos”. The posters were reviewed by a committee by making phone call to the presenters and based on their reply, six awards have been given to the poster presenters.

TROPMET-2020 also had provided opportunities for exhibition by the Industry, research organisations, academic institutes, etc. A dedicated hall was arranged for online exhibition by each participant. Altogether 13 institutes and industries participated in e-exhibition. Each exhibitor was provided dedicated digital stall to showcase their products and services. In addition to displaying posters in each stall, the exhibitors could also share their product videos, demonstrations in their respective areas. The exhibition area was visited by a large number of delegates.

9.2 INTROMET – 2021

Virtual International Symposium on Tropical Meteorology (INTROMET-2021) on “Changing Climate: Consequences and Challenges” at CUSAT, Cochin, India during 23 - 26 November 2021.

INTERNATIONAL SYMPOSIUM ON TROPICAL METEOROLOGY (INTROMET-2021)



ON

CHANGING CLIMATE : CONSEQUENCES AND CHALLENGES (C4-21)

IN VIRTUAL MODE
23-26
NOVEMBER, 2021



ADVANCED CENTRE FOR ATMOSPHERIC RADAR RESEARCH

JOINTLY ORGANIZED BY

Cochin University of Science and Technology (CUSAT)
Cochin, Kerala State, India



Indian Meteorological Society
Cochin Chapter



UNDER THE AUSPICES OF
Indian Meteorological Society, New Delhi

About Symposium

Background

Cochin University of Science and Technology in association with Cochin Chapter of the Indian Meteorological Society (IMS) proposes to host INTROMET-2021 with the theme Changing Climate: Consequences and Challenges. It will provide an excellent opportunity for the national and international community of Atmospheric Scientists to discuss various issues of the changing climate and their consequences and challenges.

50th Anniversary year of the Cochin University of Science and Technology

Cochin University of Science and Technology (CUSAT) is a state funded autonomous science and technology university Kerala, India. Founded in 1971, it has three campuses: two in Kochi and one in Kuttanad, Alappuzha. The university awards degrees in science and engineering subjects at the undergraduate, postgraduate and doctoral levels. CUSAT has at present 29 departments of study and research offering graduate and post-graduate programs across a wide spectrum of disciplines in frontier areas of Science, Engineering, Technology, Humanities, Law and Management. The University has academic links and exchange programs with several institutions across the globe. CUSAT has won the Chancellor's award for the best university in Kerala in 2018 and 2020, for the overall excellence. The year 2021 marks the golden jubilee year for CUSAT.

Advanced Centre for Atmospheric Radar Research (ACARR) is a benchmark center of CUSAT fostering inter and multidisciplinary research activities. The Stratosphere Troposphere (ST) Radar at Cochin is the first Wind Profiler Radar in the near-equatorial site to study the monsoon features operating at 205 MHz VHF range. Cochin ST radar operating at 205 MHz range is an active phased array is the World's first atmospheric wind profiler radar in the 200 MHz frequency range. The ST Radar at Cochin is designed, developed and installed altogether indigenously, and become a part of the Make in India Program of the Government of India. The Centre is offering both short-term and long term training programs to students of various capacity and produced several PhDs and facilitating inter-disciplinary doctoral research programs in atmospheric sciences, electronics and technology.

About Indian Meteorological Society

The Indian Meteorological Society (IMS) is a non-profit organization, established in 1956 to promote the advancement, dissemination of knowledge, and application of Meteorology and related sciences. The IMS Cochin Chapter was formed in the year 1996 at the Cochin University of Science and Technology (CUSAT), Cochin. Since its inception, the Chapter has been organizing various seminars, lectures, student colloquia, stakeholder workshops and special lectures to benefit the meteorological community. TROPOMET-2000 was organized by the IMS Cochin Chapter in February 2000.



Publication in the Special Issue of a Reputed Journal

The organizing committee facilitates the participants to submit their original research work as a full paper in the special issue of a reputed international journal. Details will be available in the INTROMET website soon.



Symposium themes

Focal Theme of INTROPMET-2021

Changing Climate: Consequences and Challenges (C4-21)

Sub themes

- 1 - Changing Climate – Observations, Attribution and Model Projections (CHC)
- 2 - Ocean-Land-Atmosphere Interactions (OLA)
- 3 - Clouds, Convection and Precipitation Processes (CCP)
- 4 - Climate Variability and Extreme Weather Events (CVE)
- 5 - Monsoons: Seasonal Variability, Prediction and Predictability (MPP)
- 6 - Tropical Cyclones in Changing Climate (TCC)
- 7 - Aerosols, Air Pollution and Climate Sensitivity (AAP)
- 8 - Stratospheric Processes and their Role in Weather and Climate (SPC)
- 9 - Data Assimilation Techniques and Numerical Weather Prediction (DAP)
- 10 - Radars and Satellites in Observations and Prediction (RSO)
- 11 - Geo-spatial Techniques and Earth Observations (GTE)
- 12 - Water Resources, Agriculture and Climate Change (WAC)
- 13 - Coastal and Marine Ecosystems in Changing Climate (CME)
- 14 - Climate and Human Health Issues (CHH)
- 15 - Disaster Management and Climate Change (DMC)
- 16 - Adaptation, Mitigation and Sustainable Development (AMS)
- 17 - OSI joint session on "Role of Ocean in Climate" (ROC)

*Best Student Paper Awards for each theme

Call for papers

Global warming and climate change is a reality now and possible consequences of global warming will not be limited to one country or even continent but will permeate almost every aspect of the environment and all life forms. Extreme events such as heat waves, heavy rains, intense cyclones are becoming more frequent and better understanding of the physical climate system through observations and modeling will improve the future projections and help the policy makes for taking appropriate action. Research papers of original contributions are invited for Oral/ Poster presentations in the conference. The Symposium will have plenary sessions and invited talks to be delivered by international experts on various themes and contributory papers. Contributing authors are invited to submit their original contributions in the form of extended abstracts in English.

Submission of Abstracts

Authors must prepare their abstract for direct reproduction in the abstract book; the abstract text will appear precisely as the author prepared it. Abstracts (one-page limit) should be single-spaced Times New Roman font with 12 points limited to 300 words. No figures and tables allowed in the abstract. We encourage you to send an informative abstract (complete abstract) which is a summary of a paper's substance including the research problem, background, purpose, methodology, results, and conclusion. Download the abstract template from the website (intromet2021.org) and follow the format carefully. If the abstract template is not followed as is, you will be asked for revisions.

CATEGORY	BY 31 AUG 2021	AFTER 30 SEPTEMBER STANDARD REGISTRATION FEE SHOULD BE APPLIED	REGISTRATION FEES
IMS Members	INR 500/-	INR 750/-	
Non-IMS Members	INR 750/-	INR 1000/-	
Scholars/Students	INR 500/-	INR 750/-	
Foreign National	USD 50	USD 75	
Industry	INR 1000/-	INR 1500/-	

Registration fee should be paid by online transfer at conference website www.intromet2021.org. Additional services charges from bank should be borne by participants.

ASSOCIATED EVENTS

- 23 Nov 2021
Interaction Meet of Experts with Stake Holders, Media and NGOs :
- 24 Nov 2021
Students Session :
- 23 - 26 Nov 2021
Exhibition :
- 25 Nov 2021
IMS-OSI joint session on "Role of Ocean in Climate" :

- 30 Aug 2021
ABSTRACT SUBMISSION ENDS
- 15 SEP 2021
ACCEPTANCE OF ABSTRACT
- 01 SEP 2021
ONLINE REGISTRATION STARTS
- 30 SEP 2021
EARLY BIRD REGISTRATION ENDS
- 15 OCT 2021
SUBMISSION OF ABSTRACTS

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www.intromet2021.org

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10 Popularisation of Meteorology and Atmospheric Sciences (*IMS Activity by chapters*)

The various Chapters of the Society Organised the following Programmes :

- Scientific lectures on important topics Weather Quiz for students Publication of Illustrative Weather Calendar-cum-book/Chart etc.
- Publication of articles in newspapers Production of educative video programmes.
- IMS Pune (IMSP) chapter organises Annual Monsoon Review of southwest monsoon each year regularly.
- Some special events like WMO Day, Earth Day, National Science Day, etc are being arranged by different chapters.

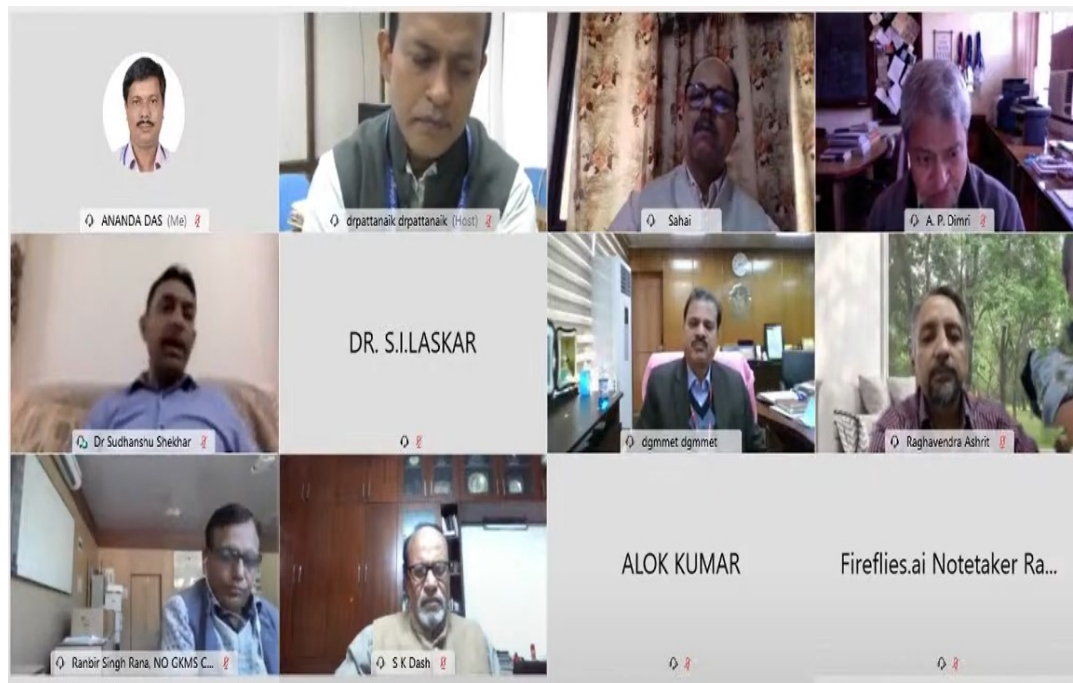
10.1. IMS Webinar on Winter Weather Systems and Their Impacts

Indian Meteorological Society (IMS), India Meteorological Department (IMD) and the Ministry of Earth Sciences (MoES) jointly organized a half-day Webinar on “Winter Weather Systems and their Impacts” on 27th November 2020 starting from 2:30 up to 5 PM (<https://youtu.be/O80R4HD01vw>).

It is well known that India experiences moderately cool weather in winter from November to February with December and January as the coldest months. The Western Disturbances (WDs) are the major weather systems that affect both the hilly regions of northern India and also the Indo-Gangetic plains. Snowfall over J&K, Ladakh, Himachal Pradesh, Uttarakhand and nearby areas are very common during this season. The heavy snowfall causes cold wave and cold day conditions for many days over northern plains of India. Fog during the season disrupts daily life and also disrupts air travel. The onset of winter brings a haze over north India with increase in pollution and causes cardiovascular and respiratory diseases. Extreme cold or warm winter impacts winter crops. In the winter months, cold weather leads to more demand for heating in the residential and commercial sectors and can impact the demand and distribution of power.

The proceedings of the webinar started with the welcome address by Dr. D. R. Pattanaik, Secretary IMS. It was followed by the opening remarks given by Dr. M. Mohapatra, DGM IMD and the President IMS, where he highlighted the impact of winter weather systems on various sectors and the NWP & observational products that are being generated operationally in IMD for the use of various sectors. The inaugural talk on “Winter Weather Systems and Their Impacts -Scope and Objective of the Workshop” was delivered by Dr. D. R. Pattanaik. This was followed by the Technical Session-I entitled “Winter Weather Systems and Operational NWP Products” Chaired by Dr. A. K. Sahai. The speakers in this session consisted of experts like Dr. Sachin Gude, IITM; Dr. R. Ashrit, NCMRWF; Dr. A. P. Dimri, JNU and Dr. M. S. Sekhar, SASE RDC (DRDO) delivered talks on various aspects of winter weather systems. The Technical Session-II entitled “Impacts of Winter Weather on Various Sectors” was chaired by Prof. S. K. Dash, Immediate Past President IMS. The

sectoral experts from Agriculture, Health, Aviation and Power delivered their talks. The speakers included Dr. Ranbir Singh Rana CSK HP Ag University; Dr. Sanjeev Kumar, Director, IIHMR (Retd.); Shri P. P. Singh Chief Airside Officer, GMR DIAL, IGI Airport; and Shri Alok Kumar, POSOCO.



Webinar on Winter Weather Systems and Their Impacts, 27 November 2020.

10.2. E-Conference on Environmental Determinants of Infectious Diseases in India (Focus on COVID-19).

This e-conference was organized by IMS on 7th to 10th December 2020 while focusing on the prevailing COVID-19 pandemic. The epidemiological triad for infectious diseases, including COVID-19, consists of environment, agent and host factors. There is a large body of evidence linking environmental factors such as temperature and humidity with infectious diseases such as malaria, cholera and the like. However, particularly in the case of COVID-19, the impact of climatological, environmental and extreme weather risk factors such as temperature, humidity and air pollution are less clear. The e-conference also addressed critical challenges of multiple disasters such as when cyclones and COVID-19 co-exist. The indoor environment is also of particular concern including workplace, school and industry settings, especially in terms of ventilation and air-conditioning. Based on the above facts, the following objectives of the conference were set to:

- (i) Comprehend the association of climate, environment and natural disasters with infectious disease in India with a focus on COVID-19.
- (ii) Orient students and scholars with research methods in these areas.

(iii) Understand how this knowledge can be applied in practice. The main conference was over 4 half-days, with focus on Climate, Air Pollution, Extreme Weather and Indoor Environment. This e-conference consisted of keynote lectures, expert sessions, panel discussions, posters and oral sessions by scholars.


The key note address was delivered by the Chief Guest Dr. Randeep Guleria, Director AIIMS during the opening session. Dr. M. Mohapatra, DGM IMD and President IMS also addressed the participants during the inaugural session. A dedicated “Expert Session on Climatological Determinants of Infectious Diseases” was conducted by IMS and was chaired by Dr. A. K. Sahai, Vice President IMS. Three experts from IMS (Dr. Sagnik Dey, IITD; Dr. Nitish Dogra, IIHMR and Dr. D. R. Pattanaik, IMD) and Dr. Ben Zaitchik from Johns Hopkins University delivered their talks during this session.

The e-conference culminated in Bringing out its proceedings, Strengthening scholar research skills, Dissemination via social media and other channels, Expanding the UCHAI community of practice (uchai.net) and the web-link.


Environmental Determinants of Infectious Diseases in India (Focus COVID-19)

Inaugural Session


EMINENT SPEAKERS



Dr. Gwen Collman
Acting Deputy Director
NIEHS/NIH
United States




Dr. Randeep Guleria
Director,
AIIMS,
New Delhi, India




Dr. M Mohapatra
Director General,
India Meteorological Department

KEYNOTE ADDRESS




Dr. Preetha Rajaraman
Health Attache
U.S. Embassy
New Delhi, India




Dr. V M Katoch
NASH/ICMR Chair on Public Health,
Rajasthan University of Health Sciences

Expert Session on Climatological Determinants of Infectious Diseases

DAY: 1, SESSION 2
TIME: 7:30 TO 8:30 PM




Session Chair
Dr. A.K. Sahai
Scientist G, IITM,
Pune




SPEAKERS




Dr. Ben Zaitchik
Associate Professor,
Johns Hopkins University,
United States




Dr. Sagnik Dey
Associate Professor,
Centre for Atmospheric Sciences,
IIT Delhi




Dr. Nitish Dogra
Associate Professor,
IIHMR Delhi,
New Delhi




Dr. D. R. Pattanaik
Scientist F,
IMO, New Delhi



National Institute of Environmental Health Sciences



IIHMR DELHI



AIIMS DELHI

Registration link: <https://bit.ly/IIHMRDeconf>

The Technical session-III on 'New Modelling Plan for Monsoon 2021' was chaired by Prof. J. Srinivasan, IISc and co-chaired by Dr. Ravi Nanjundiah. There were 4 talks on new modelling plan on data assimilation, model development and new model forecasting strategy to be adopted from 2021 monsoon season by scientists from NCMRWF & IITM.

After the daylong deliberations on the topic of monsoon, the Concluding Session was chaired by Dr. M. Mohapatra, DG IMD. He summarized the day long presentations and discussions. He invited comments & suggestions from seniors, chairmen of the technical sessions and experts in the meeting. Based on these comments and the discussions the final recommendations were prepared. A formal vote of thanks was presented by Dr. D. R. Pattanaik, Secretary, IMS

The e-workshop on "Cloud and Precipitation Processes" on day 2 and day 3 (19-20 Jan 2021) was co-ordinated by IMS Pune Chapter.

10.4. Azadi Ka Amrit Mahotsav: E-Conference on "The Ocean, Our Climate and Weather"

On the occasion of the World Meteorological Day, IMD, IMS and Ocean Society of India (OSI) jointly organized a half-day E-Conference on the theme of World Meteorological Day "The Ocean, our Climate and Weather" from 2:30 to 5:15 PM on 23rd March, 2021. The Secretary, MoES was the Chief Guest on this occasion. There were four talks by four distinguished scientists in the areas of Atmospheric and Oceanic Sciences. (<https://youtu.be/JqXma9Vpd10>).

"Azadi ka Amrit Mahotsav"

National E-Symposium
THE OCEAN, OUR CLIMATE AND WEATHER

World Meteorological Day
March 23, 2021

Jointly Organized by
India Meteorological Department (IMD)
Indian Meteorological Society (IMS), &
Ocean Society of India (OSI)

Chief Guest
Dr. M. N. Rajeevan
Secretary, Ministry of Earth Sciences (MoES)

E-Symposium Link:
<https://youtu.be/JqXma9Vpd10>

INAUGURATION OF THE EVENT
[1430-1500 IST]

Welcome Address: Dr. D. R. Pattanaik, Secretary, IMS

Opening Remarks: Dr. M. Ravichandran, President, OSI

Address by Chief Guest: Dr. M. N. Rajeevan, Secretary, MoES

Vote of Thanks: Dr. B. K. Jena, Secretary, OSI

Signing of MoU between IMS & OSI

TECHNICAL SESSION : The Ocean, Our Climate and Weather
Chairs: Dr. M. Mohapatra and Dr M. Ravichandran
[1500-1700 IST]

Ocean and Blue Economy (1500-1530 IST): Dr. Shailesh Nayak, Director NIAS & Former Secretary, MoES

Advances in Prediction of Tropical Cyclone over North Indian Ocean (1530-1600 IST): Prof. U. C. Mohanty (IIT, Bhubaneswar)

Importance of Indian Ocean dynamics and thermo-dynamics for Indian Monsoon (1600-1630 IST): Dr. Sathesh C. Shenoi, Former Director, INCOIS

Role of oceans on future changes in the regional monsoons (1630-1700 IST): Dr. R. Krishnan, Head CCCR, IITM

CONCLUDING REMARKS
Dr. M. Ravichandran, President, OSI
Dr. M. Mohapatra, President, IMS

Azadi Ka Amrit Mahotsav (23 March, 2021)

10.5 Awareness Workshop on Lightning and Thunderstorms” on 28th June during 1430-1800 hrs

“Awareness workshop is intended for the Disaster managers, stake holders, Print, television and radio media”

Most parts of India experience thunderstorms at some or the other time of year. Thunderstorm activity is at its peak during pre-monsoon period over most part of the country while some regions experience thunderstorm during monsoon and post-monsoon periods also. Lightning strike is prominent visual manifestation of thunderstorm. Damage due to lightning are wide spread and lightning is the single most killer compared to all other natural disasters, over India. More than 2000 people die every year due to lightning over India. Over the recent years, there is an increasing trend in death toll and damages reported due to lightning all over the country. Further, extreme weather events like flash flood, hailstorms, heat/cold waves etc. are also take heavy toll on human life and property. In view of the widespread loss caused by lightning despite the improved understanding, monitoring and prediction capability, it is very much essential to understand the changing characteristics of lightning and thunderstorm and last mile connectivity from forecast/warning to vulnerable population.

Organizing Committee

Dr. P.Mukhopadhyay (Organizing Secretary)

Dr. R. Ashrit, NCMRWF, Member

Dr. D.R. Pattanaik, IMD, Member

Dr. Soma Senroy, IMD, Member

Dr. S.D. Pawar, IITM, Member

Dr. M. Mohapatra (Chairman)

Dr. A.K. Sahai (Co-chair)

Dr. V. Gopalkrishnan, IITM, Member

PROGRAMME

Agenda for Awareness workshop on "Lightning and Thunderstorms"

28 June 2021, Monday, 14:30-18:00 hrs

- 1430-1440hr Welcome address & Background of the Workshop:
Dr. A. K. Sahai, Vice-President, Indian
Meteorological Society
- 1440-1450 Guest of Honour: Address by Dr. M. Mohapatra,
Director General, India
Meteorological Department
- 1450-1500 Guest of Honour: Address by Shri Rajendra Singh,
Member, NDMA
- 1500-1515 Address by Chief Guest: Dr. M. Rajeevan, Secretary
to Govt. of India, Ministry of
Earth Sciences.
- 1515-1520 Vote of Thanks by Dr. D. R. Pattanaik, Scientist F,
IMD & Secretary, IMS
- 1520-1545 Lightning Monitoring by Lightning Sensors: Dr. S. D.
Pawar, Scientist F, IITM,
Pune
- 1545-1610 Lightning and Thunderstorm Forecasting and Early
Warning: Dr. Soma Sen Roy,
Scientist F, IMD, New Delhi
- 1610-1635 Film on Lightning and thunderstorms Dos and Don't's by
NDMA
- 1635-1700 Lightning Resilience India Campaign-Community Centric
Outreach Programme by Col.
(Retd) Sanjay Srivastava
- 1700-1730: Open discussion/short presentation: "On prevention,
mitigation and response by
states" by Sri P. N. Rai,
Member, BSDMA
- 1730-1800: Q&A Interaction by Media, stake holders. Initiated
by Dr. P. Mukhopadhyay,
IITM, Pune

10.6 Azadi ka Amrit Mahotsav lecture series

To commemorate the 75th anniversary of Independence of India, our country is celebrating Azadi ka Amrit Mahotsav. This celebration will continue till 15th August 2023 and is an intensive countrywide campaign to visualise and inform citizens about the cultural, social, political and economic progress of our country during the past 75 years. Indian Meteorological Society (IMS) is also participating in this Mahotsav by showcasing its commitment to disseminate knowledge of meteorology and allied sciences and its application to various constructive human activities, such as, agriculture and land uses, irrigation and power development, navigation of sea and air, engineering and technology, medicine and public health etc., among the scientific workers, public and policy makers. IMS is celebrating this Mahotsav by organising a series of popular lectures and discussions to foster and encourage communication and exchange of knowledge, ideas, resources for adapting climate variability and change, climate risk management, disaster risk reduction, detection and attribution of extreme events, severe weather forecasting and improvement of prediction models for various application in climate-based services and support; and improvement of observations, data management and infrastructure during the last 75 years. This lecture series will provide an opportunity to know about the availability of data and products to scientists engaged in impact studies in various sectors viz., agriculture, human health, water availability and environmental sciences and those who are eager to use climate data in order to examine the present and future relationships of important parameters in their sectors with the climatic variables.

The first talk of the series was delivered by **Dr. R R. Kelkar**. The details are given below.

Name : Dr. Ranjan Ratnakar Kelkar

Date : 18 October, 2021

Time : 0300-0430 PM

Title : Progress of Meteorological Services after Independence

YouTube Link : <https://youtu.be/Qh7LuaVf8DM>

The second talk of the series was delivered by **Prof. Sulochana Gadgil**. The details are given below.

Name : Prof. Sulochana Gadgil.

Date : 16 November, 2021

Time : 0300-0430 PM

Title : Monsoon Science: Achievements and Challenges

YouTube Link : <https://youtu.be/6QVhhVuf35g>

11. ACTIVITIES REPORTS OF DIFERENT IMS CHAPTERS

1 IMS Ahmedabad (IMSA) Chapter

Ahmedabad chapter is one of the active chapters of IMS dedicated to spreading awareness of meteorology and allied subjects in different parts of the society. Although its activities in the last year were severely affected by the Covid-19 pandemic, yet a good number of events were organized with the help of digital platforms. All the events were Highly successful and it all happened because of the active supports and well wishes of our members.

1.1 Annual Monsoon talk

This annual talk organized on October 16, 2020. This time the talk was delivered online by Dr. M. Mohapatra, DG IMD on “Monsoon-2020: Scientific Issues and Challenges”. More than two hundred members from different chapters of IMS attended the event.

1.2 Antarctica Day

IMSA in collaboration with Indian Society of Remote Sensing, Ahmedabad Chapter (ISRS-AC) and Indian Society of Geomatics, Ahmedabad Chapter (ISG-AC) celebrated the Antarctica Day on December 1, 2020. In this event, an online talk on “India in Antarctica” by Dr. Rasik Ravindra, former DDG, GSI and former Director NCPOR was organized.

1.3 National Science Day

In 2021, IMSA began its activities by celebrating this day jointly with ISRS-AC and ISG-AC. On that occasion, a popular talk on “Raman Scattering: Its usefulness in Science and Society” by Dr. Som Kumar Sharma, Associate Professor, Physical Research Laboratory was held on February 28, 2021.

1.4 World Meteorological Day

IMSA jointly with ISRS-AC and ISG-AC celebrated the WM Day on March 23, 2021 by organizing a popular lecture on “Ocean Observations, Information and Advisory Services” by Dr. T. Srinivasa Kumar, Director, Indian National Centre for Ocean Information Services (INCOIS).

1.5 Publication of Monsoon and Winter Issues of Society Newsletter E-Megha (<http://imsa.net.in/emegha.php>)



Release of Monsoon edition of E-Megha by Dr. M. Mohapatra.



Offering Dr. M. Mohapatra a small token of appreciation on behalf of IMSA after Annual Monsoon Talk (16-October-2020).



Release of Winter edition of IMSA newsletter E-Megha by Dr. T.Srinivasa Kumar.



Offering Dr. T. Srinivasa Kumar a small token of appreciation on behalf of IMSA on World Meteorological Day (23-March-2021).

2. IMS Chennai (IMSCh) Chapter

One event was organised by IMSCh Chapter during October 2020 to March 2021. Under the joint auspices of Regional Meteorological Centre, Chennai and IMSCh Chapter a webinar on "Review of Monsoons 2020" was conducted on the occasion of World Meteorological Day on 23 March 2021. The keynote lecture on the theme "The ocean, our climate and weather" was delivered by Dr. R. Venkatesan, Scientist-G from NIOT Chennai. Advances in ocean technology and observational techniques over the oceans were highlighted. The other speakers from IMD reviewed the performance and salient features of southwest and northeast monsoons 2020. Over 60 online participants attended the webinar.

3. IMS Cochin (IMSCo) Chapter

The annual General Body Meeting of IMSCo was conducted on 29.1.2020 through online mode and 36 members attended the meeting. As per the agenda, the meeting unanimously elected the new office bearers of IMSCo Chapter. The committee agreed to organize INTROPMET-2021 at Cochin under the chairmanship of Prof. K. Mohankumar and Dr. S. Abhilash as organizing secretary. Subsequently the proposal for conducting INTROMET-2021 with the main theme "Changing Climate: Consequences and Challenges" was approved by IMS National Council. The first circular was released in March.

The following webinars were held by IMSCo during this period:

Dr. K. Mohankumar delivered the key-note address in "FDP on Climate Science" organized by the School of Environmental Sciences, CUSAT & Advanced Center for Atmospheric Radar Research, CUSAT during 9-13 November, 2020.

Prof. B. Chakrapani delivered invited talks in "FDP on Climate Science" on the topics Present Climates on Earth and Energy Feedbacks & Role of Oceans in Climate.

Dr. S. Abhilash delivered 10 invited talks as resource person on (i) "Global Warming and its Impacts" in the Short Term Course on Disaster Management conducted by UGC-Human Resource Development Centre (HRDC), University of Calicut on 27.2.2021; (ii) "Climate Change & Challenges in Attaining Sustainable Development Goals" in the Short Term Course on Disaster Management conducted by UGC-Human Resource Development Centre (HRDC), University of Calicut on 3.3.2021; (iii) "Climate Change and Extreme Weather Events" in the refresher course in Earth sciences by UGC-Human Resource Development Centre (HRDC), Kannur University on 17.3.2021; (iv) "Climate change and disaster risk reduction" in the webinar series conducted by M. S. Swaminathan Botanical Garden on 13 March 2021; (v) "Challenges posed by climate change" in the Training of Trainers (ToT) program on Climate change & Climate adaptive agricultural practices jointly organized by NABARD and Shreyas, Wayanad on 9.2.2021; (vi) "Global warming and Extreme weather events" in the webinar conducted by MES College, Marampally on 4.3.2021; (vii) "The climate factors on the recent extreme

rainfall events over Kerala“ in the Annual Monsoon E-Workshop and National E-Symposium on “Cloud and Precipitation Processes” jointly organized by Indian Meteorological Society and Savitribai Phule Pune University during 18-21 January 2021; (viii)“ Climate change and Extinction crisis” in the High-end workshop on Solar activities and their influences in the Heliosphere and Planetary Atmospheres conducted by National Institute of Technology, Calicut during 8-14 March 2021; (ix)“Genesis, Evolution and Future Prospects of the Operational Extended Range Prediction System” in the webinar organized by Indian Meteorological Society, Pune Chapter during 25-26 March 2021 and (x)“Science of Climate Change: Past Climate: How do we Detect Climate Change & Natural Causes”, in “FDP on Climate Science” organized by School of Environmental Sciences, CUSAT & Advanced Center for Atmospheric Radar Research, CUSAT during 9-13 November, 2020.

Dr. M.G. Manoj delivered four invited talks which includes (i)‘Changing Climate and Disaster Risk Reduction’ in the Session on Climate Change and Extreme Events organized by the Kerala State Disaster Management Authority, Govt. of Kerala on 17th October 2020; (ii)‘Mitigation and Adaptation in Climate Change: Sustainable Solutions’ for the Faculty Development Program in Climate Science by School of Environmental Studies, Cochin University of Science and Technology, held during 9-13 November, 2020; (iii)‘Floods and Climate Change’, in the Workshop in ‘Utilizing the Potential of Bamboo and other Bioengineering Methods for Landslide Risk Reduction and Stream bank stabilization’ held at Kerala Forest Research Institute (KFRI), Thrissur on 26th January 2021 and (iv)‘Potential role of aerosols in altering the dynamics of monsoon and convection’ during the Webinar organized by the India Meteorological Society (IMS), Pune during 25-26 March 2021.

Dr. P. Vijayakumar also delivered four talks such as (i)“FDP on Climate Sciences during 9-13 November, 2020 organised by School of Environmental Studies and Advanced Centre for Atmospheric Radar Research (ACARR); (ii)“IQAC Webinar Series” on 19/8/2020 organised by Alphonse College Pala; (iii)“National Webinar” on 10/11/2020 organised by Ansr Training College for Women, Perumpilavu and (iv) “Lecture on Climate Change and Human Life” on 12/6/2021 organised by Peace Hub Foundation.

4. IMS Dehradun (IMSD) Chapter

4.1 Youth Climate Action Day 2020

Youth plays a pivotal role in spreading the awareness and mitigating the impacts of climate change at global level. IMSD in collaboration with Indian Institute of Remote Sensing (IIRS), Dehradun and Indian Society of Remote Sensing, Dehradun Chapter (ISRS-DC) organized an online lecture series in December 2020 on 4th and 10th on the behest of Youth Climate Action Day 2020. The lecture series was aimed to sensitize youth (9th-12th standard school and under graduate college students) about the essence of climate and weather and their implications on society. The first lecture on “Weather and climate: observations and prediction” in the series was delivered by Dr. C.M. Kistwal, former scientist, ISRO. Dr. Kistwal has tremendous experience of more than

35 years in weather and climate studies using satellite observations. Dr. Arijit Roy Scientist and Head, Disaster Management Studies Department, IIRS, ISRO delivered the second lecture on “Remote Sensing for disaster risk management”. The lectures were well appreciated by youth around the country with viewership of more than 1 lakh. Although few of the questions from students were answered after the lectures, the lecturers also received significant number of questions on email. Overall, the event was a grand success.

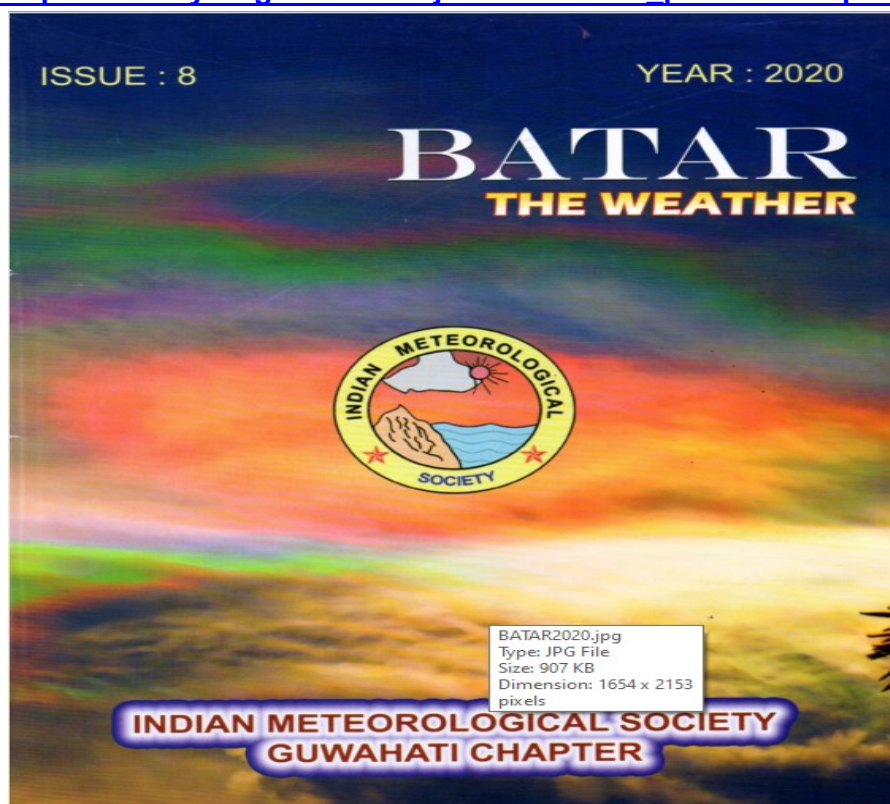
4.2 Paper in Tropmet-2020

A paper entitled “Heavy rainfall forecasting for Dehradun capital city during monsoon season 2020” was presented in Tropmet-2020. The authors are Rohit Thapliyal and Bikram Singh.

5. IMS Guwahati (IMSG) Chapter

5.1 Release of BATAR

On 15.12.2020, during the meeting of local chapters of IMS, 'BATAR-The Weather' published by IMSG Chapter was released by Dr. M. Mohapatra, President, IMS. The link for BATAR is https://drive.google.com/file/d/1RHeYT0TqV8BKn0betdkR0lba8EifNw6l/view?fbclid=IwAR3AoNq4wd7JlbnYvC-gMmeTP6PZjRLWXTnHcVV_pnM_44zu6cpHshtOHJ8.



Release of BATAR

5.2 Papers in Tropmet-2020

The following six papers were presented in Tropmet-2020.

(a) The skill of maximum temperature forecasts for major cities of North-East region of India during summer 2020 by S.O. Shaw, S. Das, S.K. Gogoi, J. Ganguly, R.C. Debnath and K.C. Sarkar.

(b) Temperature and Rainfall trends over Meghalaya (1970-2019) by Rakesh Kumar, Ranjan Phukan, A. Kumar, S. Das and S.O. Shaw.

(c) Spatial and temporal variation of maximum and minimum temperature over North-East Region of India by S.O. Shaw, S. Das and A.K. Maurya.

(d) Affect of Weather, Environment and Wastes on Human Health by Sanjay O'Neill Shaw, Krishna Kumar Sinha and Mukesh Kumar Gupta.

(e) Role of convective available potential energy (CAPE) and total total index (TTI) in the genesis of lightning during convective weather by M. Sarma and S.O. Shaw.

(f) Analysis of rainfall and temperature trends in Assam and the comparative study of climate of different regions of Assam by Pankaj Kumar Das.

6. IMS Jaipur (IMSJ) Chapter

The World Meteorological Day was organized by the IMSJ Chapter in association with Amity University Jaipur; Poornima University Jaipur and the Central University of Rajasthan, Ajmer on March 23, 2021, 10:00-11:00 AM. The theme of this World Meteorological Day was "The Ocean, our Climate and Weather". The program started with the welcome address of Prof. Rajesh Kumar, Dean, SES, CURAJ and President, IMS Jaipur Chapter. Professor Kumar welcomed the event's speaker, Dr. Abhijit Sarkar, and all distinguished guests, faculty members, participants, and IMSJ Chapter members. The speaker of the occasion, Dr. Abhijit Sarkar is Scientist E at the National Centre for Medium Range Weather Forecasting, Noida. He delivered the technical session on "Uncertainty in NWP and Ensemble Prediction System". This technical session was conducted online through <https://meet.google.com/tos-dbux-pmw>). About 100 participants from different organizations, i.e., Central University of Rajasthan, Ajmer; Banaras Hindu University, Varanasi; Indian Institute of Technology Madras; Birla Institute of Technology Jaipur; Poornima University Jaipur; IITM Pune; Central University of Jammu; Dibrugarh University; Amity University Jaipur; Pondicherry University; HNB Garhwal University Srinagar etc. attended the program.



Indian Meteorological Society (IMS-Jaipur)

WMO Day Celebration, 23 March 2021

(Theme: The Ocean, our Climate and Weather)

(Topic: Uncertainty in NWP and Ensemble Prediction System)

[Jointly organized with Central University of Rajasthan, Poornima University and Amity University of Rajasthan]

23rd March 2021, 10:00 AM – 11:00 AM (IST)

Programme

10:00 – 10:05 Welcome Address by Prof. Rajesh Kumar, Dean, SES, CURAJ Ajmer

10:05 – 10:45 Distinguished lecture by Dr. Abhijit Sarkar,

Scientist E, NCMWRF,



Ministry of Earth Sciences



10:45 – 10:55 Question & Answer/Discussions

10:55 – 10:57 Group Photo

10:57 – 11:00 Vote of Thanks: Dr. Divya Prakash, HoD, Civil Engineering Dept, Poornima University

Uncertainty in NWP and Ensemble Prediction System

Abhijit Sarkar
abhijit@ncmrwf.gov.in

National Centre for Medium Range Weather Forecasting

Flyer and the 1st slide of the talk held on March 23, 2021.

The talk ended with the discussion and question-answer session, which was appreciated by all. In the end, Dr. Divya Prakash, Head of Department, Civil Engineering, Poornima University Jaipur, and Treasurer of IMS-Jaipur Chapter, proposed a vote of thanks to all the delegates, participants, volunteers and IMSJ Chapter members.

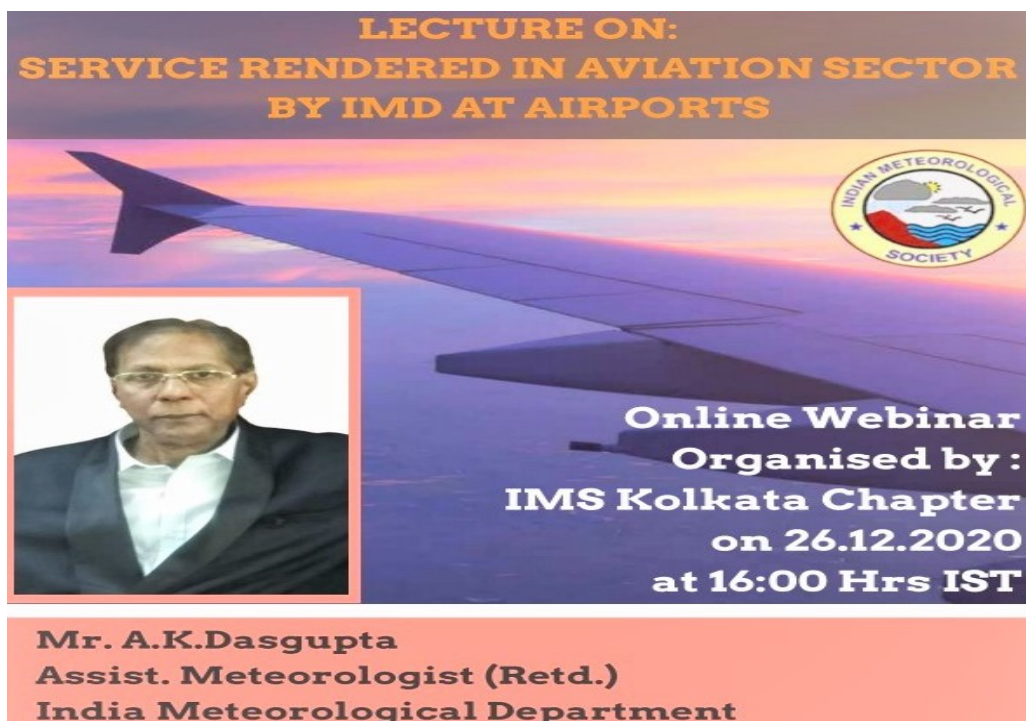
7. IMS Kolkata (IMSK) Chapter

7.1 Webinars

The year 2020-2021 was a very difficult period for arranging seminar, lecture etc. Though a new system emerged due to the demand of the time to arrange webinars. In this connection, it may be mentioned that Chairman Dr. Sanjib Bandyopadhyay, Scientist F. DDGM, RMC Kolkata advised, in the first Executive Committee Meeting on line, to arrange the Topic according to the Seasonal Weather Events.

As arranging webinars is a less known subject to IMSK and hence immediate change over to this system is not easy. However, finally the following five webinars were organized by IMSK:

- (i) December 12, 2020 , 3:30-4:30 PM by Dr. Devendra Pradhan, Scientist G , Retired ADGM (Instruments) IMD on the topic “Tropical Cyclone Amphan: Tracking by DWR and satellite”.
- (ii) December 26, 2020, 4:00-5:30 PM by Mr. Alaykanti Dasgupta, Retired Assistant Meteorologist Gr. I, IMD on the topic “Services Rendered by IMD personnel at Airports”.



**LECTURE ON:
SERVICE RENDERED IN AVIATION SECTOR
BY IMD AT AIRPORTS**

**Online Webinar
Organised by:
IMS Kolkata Chapter
on 26.12.2020
at 16:00 Hrs IST**

**Mr. A.K. Dasgupta
Assist. Meteorologist (Retd.)
India Meteorological Department**

(iii) January 2021, 2:30-4:00 PM by Mr. Debdip Chakraborty, Polar Meteorologist, (Team Leader, Indian expedition Team from Antarctica) IMD on the topic “Unknown Antarctica and Indian Expedition”.

(iv) January 30, 2021, 4:00-5:30 PM Dr. Somnath Dutta, Scientist F, Head MTI Pune, IMD on the topic “Basics of Numerical Weather Prediction”.

IMS Kolkata Chapter

4th Webinar on Saturday, 30th January, 2021

Time: From 04:00 PM

Topic: "Basics of Numerical Weather Prediction"

Links for Google Meet:
<https://meet.google.com/jdm-epnz-why>

Links for you tube streaming:
<https://youtu.be/tef8ZXTTfxU>

Speaker: Dr. Somnath Dutta, Scientist F, Head MTI Pune, IMD

All are cordially invited to join the Google Meet

(v) February 13, 2021, 4:00-5:00 PM by Dr. Parthasarathi Mukhopadhyay, Scientist F, IITM, Pune on the topic “NWP: The current Status in India and the future Pathways”.

7.2 Papers presented in TROPMET 2020

The following papers were presented in Tropmet-2020, held during 14-17 December:

(i) Prognostication on changing tidal environment due to climate change in estuarine parts of Sundarbans, a geographic approach by Dr. Jayanta Gour.

(ii) Analysis of TCMI feature of three very Severe Cyclonic storms over the Bay of Bengal utilizing Brown Ocean Theory by Dr. Rishiparna Guha.

(iii) Rainfall Variability in Hilly Terrain of Jharkhand particularly in Damodar Valley area during premonsoon, monsoon, post monsoon and winter seasons in last 20 years by Suman Chattopadhyay and Raja Acharjee.

8. IMS Nagpur (IMSNa) Chapter

IMSN Chapter arranged a virtual lecture by Dr P. Sivaswaroop, Regional Director, IGNOU, Nagpur Centre on “ Environment Education: Past, Present and Future” at RMC, Airport Nagpur. In his speech he advised that individuals have to have deeper understanding of environmental issues for betterment of mankind. Dr. Sivaswaroop said that like moral values, environmental issues are also concerned with everyone and everyone has individual responsibility towards the environment. He explained how the environmental education was part of daily life in ancient India and later with Supreme Court Judgment it became compulsory in education. He shared how the future education will be and explained IGNOU’s contribution towards Environment Protection (Like Online admissions, Digital Study Material) and also various Environment Programmes offered by IGNOU. This programme was held under the guidance of Shri M. L. Sahu, Head, RMC, Nagpur. Dr. R. S. Akre, Secretary, IMSNa Chapter gave the introductory remarks of the event. Smt. Lata Sridhar conducted the programme and Miss Sulekha Sonal proposed vote of thanks. The event was successfully organized with the efforts of Shri Kanholkar, Ghormade, Sainis, Albert and Bidyanta, Ambarte. Shri M. L. Sahu, Head, RMC, Nagpur Presented memento to Dr. P. Sivaswaroop.



Shri M. L. Sahu presenting memento to Dr P. Sivaswaroop. Dr. R. S. Akre sharing the dias.

9. IMS Noida (IMSNo) Chapter

NCMRWF and IMSNo Chapter organized online program to celebrate the World Meteorological Day 2021 on 23rd March from 11:30 AM to 12:30 PM with the theme “The Oceans, Our Climate and Weather” as per the following schedule:

11:30 to 11:35	Welcome by Dr. Indira Rani Scientist, NCMRWF.
11:35 to 11:40	Address by Head Dr. A.K.Mitra NCMRWF Sc-G, & Head NCMRWF.
11:40 to 12:00	Address by Prof. U. C. Mohanty Chief Guest IIT, Bhubaneswar.
12:00 to 12:20	WMO Day Prof. A. D. Rao Guest Speaker CAS, IIT, Delhi.
12:20 to 12:30	Vote of Thanks by Dr. Ashish Routray NCMRWF Secretary IMS Noida.

10. IMS Pune (IMSP) Chapter

10.1 AMW-2020 and National e-Symposium on 'Cloud and precipitation processes'

In association with MoES, IITM, NCMRWF, S. P. Pune University, IMS, and IMSP Executive Council successfully organized the “Annual Monsoon e-Workshop (AMW2020) and National e-Symposium on 'Cloud and precipitation processes' during 18-20 Jan 2021. IMSP hosted the first day for 'A Brain Storming Workshop on Monsoon 2020' conducted by the IMS and MoES. Remaining two days meant for the National Symposium; were divided into oral and continuous 3-day poster display for the proposed 4 themes in 5 sessions. Highlights of these events are given below:

- (i) Virtual e-Platform was provided for MoES and IMS for the first day.
- (ii) The National e-symposium received a total of 150 abstracts on four themes. There were 15 invited talks, 33 orals, 31 poster presentations done on the last two days.
- (iii) Special oral upgraded best poster session was conducted at the end.
- (iv) Three-day continuous online Poster Session was conducted for the first time with internal R&D efforts. For short audio-video visual clip and online comments posted to the author via IMSP filter was the novel addition. This idea has been utilized quickly by IITM for the online RAC.
- (v) More than 25 best IMSP AMW cash awards were declared by the Chairman IMSP in the concluding session.
- (vi) IMSP demonstrated the most economical ways of conducting virtual workshop cum symposium using Teams virtual conferencing platform that gave the feel of personal presence.

10.2 Weekend IMSP Scientific Bash

IMSP would like to reach the societal interests through the science of weather events for the awareness and knowledge by echoing a Weekend IMSP Scientific Bash. The first Scientific Bash was done on the "Recent central India Hailstorm: Forecast and Dynamics" by Dr. J. R. Kulkarni arranged at 1430 IST on Sunday, 28 February 2021.

10.3 Felicitation to Dr. A.K. Sahai

IMSP conducted a national workshop to felicitate Dr. A.K. Sahai during 25-26 March.

10.4 WhatsApp Group

IMSP has been maintaining a “IMS Pune Chapter” WhatsApp Group since 2019 for scientific communication and information sharing among all the IMSP Life members and

students especially on topics related to Earth Sciences. This group has more than 216 members. Mr. Sikandar Jamadar, NEC Member, has been coordinating and administrating the WhatsApp IMSP Group and Dr. J. R. Kulkarni has been educating and explaining monsoon online questions.

10.5 Executive Council for 2020-2022 term

The newly elected IMSP Executive Council took charge in October with Dr. C. Gnanaseelan as its Chairman. Intimation of Cooption of Dr. MCR Kalapureddy as Secretary and Mr. S. Raskar as EC Member of IMSP Chapter was made in the 19th Oct 2020 meeting through a letter No. IMSNC/2020-21/1 Dated 5 January 2021.

11. IMS Shillong (IMSS) Chapter

Training program on Satellite Meteorology and its Applications in NWP

A one-week virtual training programme on “Satellite Meteorology and its Applications in Numerical Weather Prediction” was jointly conducted by the North Eastern Space Applications Centre and IMSS Chapter at NESAC during 5-9 October, 2020. Dr. Mrutyunjay Mohapatra, DG, IMD graced the inaugural programme as the Chief Guest. The course was a compact 5-day experience on basic concept of satellite meteorology, numerical weather prediction using Weather Research and Forecasting (WRF) model and Geographic Information System (GIS) in meteorological applications. The course consisted of oral lectures and online practical demonstrations. Apart from the lectures by NESAC scientists, a few lectures were delivered by prominent Scientists from ISRO, IMD, and Professor from Cotton University. In total 35 participants from all over India attended this training program on virtual mode. The valedictory program was graced by Dr. D. R. Pattanaik, Senior Scientist, IMD and Secretary, IMS. The participants expressed satisfaction during the valedictory program and desired NESAC and IMS to conduct more such programs with longer durations. This was the first course conducted by Space and Atmospheric Science group at NESAC and IMSS Chapter.

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Climate and Health". The slide content is as follows:

- Climate** (represented by an orange octagon) points to a box labeled **Human exposures**.
- Human exposures** box contains:
 - Regional weather changes
 - Heat waves
 - Extreme weather
 - Temperature
 - Precipitation
 - Humidity
- A red arrow points from the **Human exposures** box to a box labeled **Health effects**.
- Health effects** box contains:
 - Temperature-related illness and death
 - Extreme weather-related health effects
 - Air pollution-related health effects
 - Water and food-borne diseases
 - Effects of food and water shortages
 - Effects of population displacement
 - Vector-borne diseases

At the bottom of the slide, a citation reads: "Patz, J.A., Engelberg, D. and Last, J., 2000. The effects of changing weather on public health. Annual Review of Public Health, 21: 271-307".

On the right side of the meeting window, there is a "Meeting details" panel showing a list of 28 participants. The list includes names like Shyam Sunder Kundu (You), ABHAY BHATTARAI, Arundhati Kundu, Avijit Maity, Bhubaneswar Maity, D.R. Pattanaik, D.R. Pattanaik (Presentation), Kalyan, Krishnakumar C M, and Kumarji Saha.

At the bottom of the Zoom window, there is a row of participant avatars and names, including "You", "Kumarji Saha", "Krishnakumar C...", "ABHAY BHATT...", "MANSHALANG...", "Arundhati Kundu", and "D.R. Pattanaik".



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