Regd No. 21693/71

ISSN 0970 1397

## **VAYUMANDAL**

**July-December 2020** 



### **CONTENTS**

From the President's Desk Editors' Page

1.	Satellite Remote Sensing Applications for Agriculture: A Review in Indian Context Shibendu S. Ray, Vinay K. Dadhwal, Jai Singh Parihar and Ranganath R. Navalgund	1
2.	A Review on Long Range Transport of Air Pollution in South Asia Umesh Kulshrestha and Manisha Mishra	21
3.	Cloud Seeding in Karnataka – Initial Results Kamsali Nagaraja and Balakrishnan Manikiam	31
4.	A Study of Extreme Weather Events in Relation to Landslides over India in Recent Years <b>D. M. Rase, S. H. Bhandari and U. S. De</b>	44
5.	Spatial Decision Support System for Climate Change Impact Assessment in Selected Blocks of Purulia and Bankura Soubhik Biswas, Arka Ghosh, Niloy Pramanick, Anirban Mukhopadhyay and Sugata Hazra	53
6.	Analysis of Rainfall Trends in Damodar Valley Area Suman Chattopadhyay, Raja Acharya and A. K. Sen	61
7.	Characteristic Features of Very Severe Cyclonic Storm TITLI and Disaster Management Aspects Sunanda Moka, SVJ Kumar, Prayek and Ramachandra Rao	73
8.	Report on Extreme Weather Events during January-May 2020  D. R. Pattanaik	83
9.	A Report from Indian Meteorological Society and its Local Chapters	88
10.	New Members of IMS	96

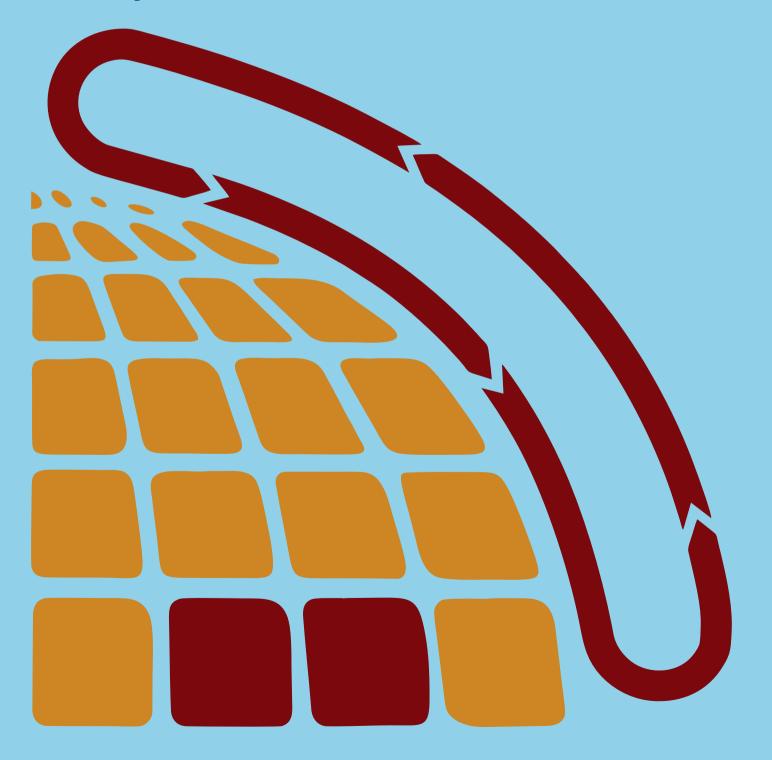
## VAYUMANDAL

Vol. 46 No.2

July-December 2020

Bulletin of Indian Meteorological Society





#### **Indian Meteorological Society**

## NATIONAL COUNCIL (2020-2022)

Sh. Sanjay Bist

Dr. Ranjeet Singh

Dr. K. Satheesan

Sh. Sikandar M. Jamadar

Dr. Satyendra M. Bhandari

# PresidentCouncil MembersDr. Mrutyunjay MohapatraMs. Samanti SarkarImmediate Past PresidentProf. P. V. S. RajuProf. Sushil Kumar DashDr. R. K. Giri

Dr. A. K. Sahai Sh. Anand Sharma

Secretary

**Vice-Presidents** 

Dr. D.R. Pattanaik

Jt. Secretary
Dr. S.I. Laskar

Dr. S.I. Laskaı Treasurer

Dr. Ananda Kumar Das

- 1. The Society was established in 1957 and was registered on 26 May, 1972 under the Societies Registration Act of 1860 as amended by Punjab Amendment Act 1957 and applicable to the Delhi State. Registration Number of the Society is 5403.
- 2. Objectives of the Society
  - i. Advancement of Meteorological and Allied sciences in all their aspects
  - ii. Dissemination of knowledge of such sciences both among the scientific workers and among the public and
  - iii. Promotion of application of Meteorology and allied sciences to various constructive human activities.
- 3. IMS is a non-profit organization and none of its income or arrears accrues to the benefit of its members.
- 4. Activities of the Society
  - i. To encourage and expand research activity.
  - ii. To organize meeting, discussions, symposia & conferences.
  - iii. To arrange to publish suitable publications.
  - iv. To promote cooperation in scientific work as far as it may be practicable between Government Department, academic and other research institutions, scientific societies and industries.
- 5. The Society's Headquarter is located at New Delhi and its local chapters are functional at various places in India.
- 6. Any person who is interested in the aims of IMS is eligible to become a member. The annual subscription of membership is Rs.300. Life membership subscription is Rs.3000 (U.S.\$300) for scientists from India (abroad). Student membership fee is Rs.1000.

### EDITORIAL COMMITTEE (VayuMandal)

#### **Chief Editor:**

Prof. S.K. Dash, Formerly in IIT Delhi

skdash@cas.iitd.ernet.in

#### **Managing Editor:**

Dr. D.R. Pattanaik, IMD, drpattanaik@gmail.com,

#### **Executive Editor:**

Dr. Kamaljit Ray, MoES, kamal.ray@nic.in

#### Member

Dr. K.J. Ramesh, IMD, kj.ramesh@nic.in

Dr. Akhilesh Gupta, DST, akhilesh.g@nic.in

Dr. C. M. Kistwal, SAC, ISRO chandra k@sac.isro.gov.in

Dr. M. Ravichandran, NCAOR, mravi@ncaor.gov.in

Dr. M. Sudhakar, CMLRE, director@cmlre.gov.in

Dr. S. S. Ray, MNCFC, shibendu.ncfc@nic.in

Dr. A.K. Sahai, IITM, sahai@tropmet.res.in

Dr. D.S. Pai, CRS IMD, sivapai@hotmail.com

Prof. D.V. Bhaskar Rao, Andhra Univ., dvbrao@gmail.com

Dr. H.N.Srivastava,Formerly IMD,hnsrivastava1936@gmail.com Prof. Someshwar Das,CU of Rajasthan,somesh03@gmail.com

Dr. N.Jayanthi, Formerly IMD, jayanthinarendran@gmail.com

Dr. Sudhansu Shekhar, SASE, raja6043@yahoo.com

Dr. P. Mukhopadhyay, IITM, parthasarathi64@gmail.com

- VayuMandal, which is the official bulletin of the Indian Meteorological Society, is Rs. 300/- per copy. The annual subscription is Rs. 500/-. For Foreign Subscription, the rates are US \$50 (by air mail) and US\$ 25 (by ordinary mail). Members of the Indian Meteorological Society receive a free electronic copy.
- 2. Correspondence and contribution to the Journal may be sent to the Executive Editor, VayuMandal, Mausam Bhawan, Lodi Road, New Delhi-110003. The papers should be typed in double spacing. The number of figures, photographs and tables should be kept to the minimum possible and they should be in a form ready for photo reproduction. Use of mathematical expressions may be minimized and lengthy list of references avoided. Subscription by Demand Draft/Local Cheque Payable to Indian Meteorological Society at Delhi may be sent to the Secretary
- 3. Authors will receive the copy of the issue of Vayu Mandal containing their contributions. Extra copies can be provided on advance payment.
- 4. The society can use any material published in Vayu Mandal in other publications.
- 5. The editor and the society are not responsible for the views expressed by any author in their contribution published in VayuMandal.

#### **DISCLAIMER & LIMITATIONS**

The contents published in this bulletin have been checked and authenticity assured within limitations of human errors. The geographical boundaries shown in this report do not necessarily correspond to the political boundaries.

Email: vayumandal.ims@gmail.com

#### **Guidelines to Authors**

#### General

Only original work should be submitted. It should not have been published earlier in any form or should not be under consideration elsewhere. Manuscripts should be sent to the Executive Editor, Vayu Mandal by email to vayumandal.ims@gmail.com

#### Presentation

Articles should be as brief as full documentation allows. They should not usually exceed 5-6 printed pages (approximately 4000 words) including diagrams. Invited articles can be upto 10 pages. Paper must be written clearly and concisely with consistency in style and spelling, and typed double spaced on good paper. The format is 'Abstract', 'Keywords', 'Introduction', 'Data and Method', 'Discussion', 'Summary/Conclusion', 'Acknowledgements' (if any), and 'References'.

#### Titla

Title should be specific, brief and informative of the subject discussed.

#### Keywords

Up to five key words should be provided.

#### **Abstract**

The abstract should be typed on a separate page and should not exceed 100 words.

#### Text

Only standard abbreviations should be used. All measurements should be in SI units. Avoid beginning of a sentence with numbers.

#### **Fables**

All tables must be numbered serially and be placed at the end. Tables should carry brief titles. Abbreviations used in the table should be defined at the bottom of the table.

#### Illustrations

A set of original figures must be sent along with the manuscript. All diagrams must be neatly labeled. Maximum size of a diagram can be A4 size.

#### References

References in the text should be cited by authors name and year of publication. The references should contain the author(s) name(s), year, title, name of the journal, (in standard abbreviations), Vol. No., and pages. References to book should contain name of Editor, if any, preceded by, Ed(s), place of publication, publisher, and year of publication and chapter or pages referred to. References to thesis should contain the degree, the year in which submitted, the university and the place. Samples are given below:

Mooley D.A. and Munot, A.A., 1993, 'Variation in the relationship of the Indian Summer Monsoon with global factors', Proc. Indian Acad. Sci., (Earth Planet Sci.) Vol. 102, No. 1, pp. 89-104.

Asnani G.C., Tropical Meteorology, Pune, 1993, pp 120-134.

Phillips N.A. The atmosphere in Motion', Ed. B. Bolin, New York Rockfeller Inst. Press., 1959, pp 501-504.

Singh U.S., 'Some studies on Vertical Motion and diabatic heating over the Indian Monsoon region', Ph.D Thesis 1975, Banaras Hindu University, India.

**Executive Editor** 

#### Vayu Mandal

Rates of Advertisement per issue

Half Page : Rs. 10,000 Full Page : Rs. 15,000 Inner Book Cover (Colour) : Rs. 25,000

## The Managing Editor VAYUMANDAL

IMS office, Room No. 605, Satellite Building, Mausam Bhawan, Lodi Road, New Delhi-110003 E-mail:vayumandal.ims@gmail.com