

Draft

***Proceedings of the of meeting of
Core Group III for steering
activities South Asia Forum on
Agricultural Meteorology***

Under the Theme :

**Utilisation of satellite derived
products in Agromet Advisory
Services for South Asian Countries**

Date: 27th February 2021

Time: 1600 Hrs IST to 1900 Hrs IST

Venue: Virtual Platform (The Google meet)



The meeting was started by welcoming all the members of the Core Group III (list of the members is available in Annexure I) for steering activities of South Asia Forum on Agricultural Meteorology (SAFOAM) under the theme “Utilisation of satellite derived products in Agromet Advisory Services for South Asian Countries.” At the outset, quick round of

introduction of the members was made. **Dr. Chattopadhyay** said that present theme is very important as it has been agreed in the first meeting that there is a large gap, need in the area of application of satellite and satellite derived information in agriculture. He said that in depth discussion would be made on current status and gap areas for the utilization of satellite-based agromet/biogeophysical products in agromet advisory services for South Asian Countries. He continued that it has been shown in the first meeting of SAFOAM that Honourable Prime Minister of India dedicated SAARC satellite for the Services of Meteorology & its Application in South Asia. Honourable Prime Minister of India has actually extended his slogan '**Sab Ka Saath Sab Ka Vikas**' to India's neighbourhood essentially to service the needs of the poor in South Asia. He added that it is expected the meeting would be highly productive and useful under the leadership of Dr. Bimal Bhattacharya and all the honourable Advisors i.e., Dr. L.S.Rathore &, Dr. V. Geethalakshmi and all other esteem members of this group. Before, handing over to Dr. Bimal Bhattacharya for moderation of the meeting, Dr. Chattopadhyay presented a brief introduction of Dr. Bimal Bhattacharya. Group Director, Biological and Planetary Sciences and Applications Group (BPSG), Earth Ocean Atmosphere Planetary Sciences and Applications Area (EPSA), Sci./Eng. - G & Science Team Leader (AVIRIS-NG Airborne campaign), Co-Chair, Indo-French (ISRO-CNES) spaceborne thermal IR (TRISHNA) mission, Space Applications Centre (SAC), ISRO, Ahmedabad 380015, Gujarat, India.

While introducing himself **Mr. Manoj Thakur**, former Senior Scientist & Communication Officer, National Agricultural Research Council was referring his association with the climate resilience project in Nepal. He said earlier days farmers never cared and gave attention to the effect of



weather parameters. However, at present farmers in Nepal have shown confidence and appreciate the information generated by the meteorological and hydrological fusion products for agriculture in Nepal. He also mentioned some good studies made in Nepal in this regards. He also mentioned that under the PPCR project on agromet funded by the World Bank Agromet Advisory Services (AAS) bulletins were prepared for 26 districts based on 72 hours forecast and also his association with this project particularly in preparation of agromet bulletins. He also said that that the PPCR project has

been completed and further initiatives were taken up for further continuation of the project. He has a high hope that the farmers would be immensely benefited by the initiatives taken under SAFOAM.

Dr. Bimal Bhattacharya said that we are fortunate to have with us the mentor like **Dr. L.S.Rathore**, Former Director General of Meteorology, India Meteorological Department (IMD). He requested **Dr. Rathore** to set up the tone of the meeting based on his rich experience on different dimension of the subject of agrometeorology especially on operational agromet advisory services.



Dr. Rathore mentioned that there are number of constrains in application side of agrometeorology especially in South Asia. Therefore, need was felt to establish the SAFOAM to resolve the shortcomings of operational agrometeorological services in South Asia Region (SAR). He mentioned that

though many of us at present are not associated directly with the profession, but still, most of us have the concept of institutional mechanism back in our mind. He said that three important requirements in operational Agromet Advisory Services (AAS) in SAR are (i) characteristics of crop, (ii) characteristics of soil and (iii) characteristics of pests and diseases. He said that today it is possible to use the high-resolution space products after proper massaging with the ground observations. Under this forum, one of the important tasks before us would be to generate products for entire South Asia and place in seamless digital platform to prepare agromet advisories and corresponding AAS bulletins. He was referring three challenges on the use of remote sensing products in agriculture. These are (i) identify and enlist the remote sensing products, (ii) preparation of quality of products using different techniques and using ground truth, (iii) establish the mechanism for hand holding to the user community to use these products for preparation of more robust agromet advisory bulletins. According to him, these satellite products may be generated daily, weekly and also other temporal scale as per the need of the user community. He mentioned that more challenges would be on the development of institutional mechanism along with good Standard Operating Procedure (SOP). for process-based simulation of remote sensing products. Besides, biggest challenges would be the manual intervention. He said that in today's meeting these issues may be discussed at length.

Mr. Abhijit Basu, Founder and CEO Smartex Cognitive, XCED, APAC CEDMA, California, USA appreciated the way **Dr. Rathore** highlighted the meeting points for wider discussion. He wanted to know how the information, as mentioned above, would be reached to the farmer for their use and how the Government of India would be approached for dealing and sharing with the cost intensive remote sensing data in South Asia Region (SAR).

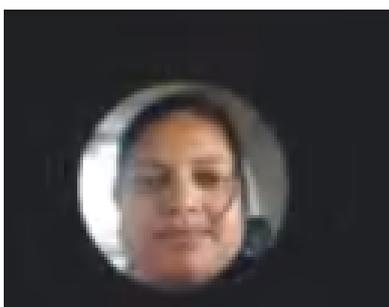
Dr. Rathore said that in South Asia the operational agromet advisory services are in different stages. In India and Bangladesh, it is at advanced stage, in Nepal, Sri Lanka, Pakistan in modest stage, in

Bhutan & Afghanistan it is initial stage and it has yet to start in Maldives. As per the capability, these remote sensing data would be chewed by those who prepare the bulletins. Even some progressive farmers can use this information from the website. Secondly as far the Govt. of India's involvement on this initiative and sharing of data is concerned, **Dr. Rathore** informed that Govt. of India is very keen in such collaboration in South Asia. Initially, there is need to establish a good footings in the forum and subsequently Govt. of India might be approached with clear transparency.

Dr. Bhattacharya said that it would better if he could informed the members what is the present status and on-going activities on the utilisation of satellite data in agriculture in India. Initially he has given the functions and the data generated from geostationary and polar orbiting satellite. He said polar orbiting satellite is used



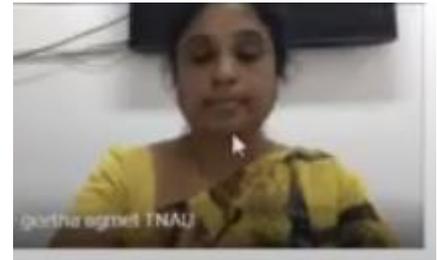
for primarily crop discrimination, crop acreage etc. and geostationary satellite generate meteorological products and also products for agricultural sectors. Also mentioned the manual intervention & automation required to generate quality information and made useful for preparation of agromet advisories. He added that from 2008, SAC and IMD have been working in this regard. NDVI data from INSAT CACCD was used for preparation of agromet advisories. He also mentioned the road map prepared in 2014 jointly by IMD, SAC and other organisation on "Use of meteorological information in agriculture in India". He mentioned the INSAT DATA PROCESSING SYSTEM called **IMDPS** system developed in IMD, New Delhi by SAC to obtained the data and information from the geostationary satellite. At present number of products like maximum and minimum LST, NDVI, predicted NDVI, surface soil moisture at the block level for 32 districts are provided to IMD for preparation of advisories. He also mentioned how these products could be used for irrigation advisories, forewarning of pests & diseases incidences. He informed that INSAT coverage is all over South Asia. He informed on the Govt of India's policy on sharing data with the neighbouring countries. He also suggested for validation of the products from INSAT 3D & INSAT 3R for use to reduce the error for effective use. He flagged the recent development in data sharing policy of SAC.



Dr. Bhattacharya requested **Ms. Malathi Seetamraju**, Agricultural Meteorology Division, India Meteorological Department, Pune, , India to inform the members on the present activities between IMD & SAC. **Ms. Malathi** said that in two modes i.e., operational and research, the satellite data are used. Two indicators i.e., NDVI and VCI are respectively used for monitoring crop vigour and yield forecasting whereas TCI, VHI etc. are used primarily on research mode. At present PET data obtained

from satellite is also used in water balance studies. She mentioned the future activities to be taken up on this area.

After the deliveration of **Dr. Bhattacharya** and welcoming **Dr. V. Geethalakshmi, Director** (Crop Management), Directorate of Crop Management,, Tamil Nadu Agricultural University,, Coimbatore , India, **Dr. Rathore** mentioned that this is the most oportune time to initiate the proposed activities under SAFOAM. He added that as far as the use and availability of geospatial data at fair resolution are concerned, these are now available in public domain. At this juncture modesoperandi should be established. According to him, World Bank has already supported the activities of Hydromet Forum and in principle agreed to form and support the SAFOAM. He also said that we may explore some funding from World Bank or other donar agencies for generation of products on operational mode.



Dr. Geethalakshmi, mentioned that is a great initiative and she is excited to the part of the same. She added that under the climatic variability and climate vagaries, such approaches are need of the hour in SAR. She informed that at present weather data are generated on daily basis from a good network of observatories in Tamil Nadu and the same data might be used for validation of the products already been generated by SAC.

Dr. Rathore has mentioned that at this stage we need to develop the strategies and road map to use the satellite product in agriculture in SAR looking at the priority. First priority would be what we can launch immediately considering the different level of use of remote sensing in the respective country followed by the capability to use remote sensing products and the remote sensing products skill level. Initially i.e., in phase 1. identify the remote sensing products/data which are globally and freely available and can be shared with SAR. Prepare the list of the products and concurrently put and display in proposed web portal of SAFOAM and then it would be recognised worldwide. Add value in phase two and three. In phase two, enhancement of capacity building programme should be taken up. In phase three, research work as discussed by **Dr. Geethalakshmi and Mr. Abhijit** might be taken up. According to him, paddy is a good suggestion for working with remote sensing data in SAR.

Dr. Bhattacharya appreciated the advices made by **Dr. Rathore** on the proposed priority works, challenges and ultimately the road map and works to be taken up at different stages of SAFOAM activities and said that his suggestions would be taken up subsequently.



Shri R.R. Mali, Technical Consultant, Government of Maharashtra, India & Former Deputy Director General & Head & Scientist F, Instrument Division, Division, India Meteorological Department mentioned his association with the World Bank Funded Pokra project of the Govt. of Maharashtra. Elaborate discussion was made on the validation

of soil moisture index derived from the soil moisture sensor, to be installed shortly under the project, with the soil moisture data generated by the SAC. It has been agreed that **Shri Mali** would take up the work further with SAC in consultation with the Govt. of Maharashtra.

Dr. Chattopadhyay elaborated the overall future activities of SAFOAM and also the preparation of the concept paper collectively and its presentation in the proposed workshop inviting all the founding members of the forum for finalisation the same.

Replying to query from **Dr. Chattopadhyay**, **Dr. Bhattacharya** said that a proper mechanism would be worked how training programme for the representatives of SAR could be organised shortly without much hindrance involving SAC, IMD and other organisations. He also mentioned the different training programmes for SAC for national and international participants.

Mr. Manoj Thakur from Nepal said that the SAFOAM activities are very much pertinent. He mentioned details of the four level of information i.e., surface analysis map for various parameters, 3 days WRF forecast, visible and infrared satellite pictures and extended range weather forecast along with the weather outlook are used in preparation of AAS bulletins for 26 districts on weekly basis in Nepal. He also mentioned the shortcomings in respect of crop models, limited manpower, training with limited skill in translation of remote sensing information in operational mode. He explained how they are getting the satellite for public and commercial mode

Mr. Abhijit said that there is need to develop common strategy on availability of satellite data and also said as far the requirement of advisory, a few indicators may be chosen to begin with.

Dr. Bhattacharya agreed to **Mr. Abhijit** suggestion to take up and focus on some common products available and which can serve the farmers requirement in SAR. He informed **Mr. Thakur** that though there are some restrictions, INSAT products are freely available to research purpose and consumption by the public organisation also.

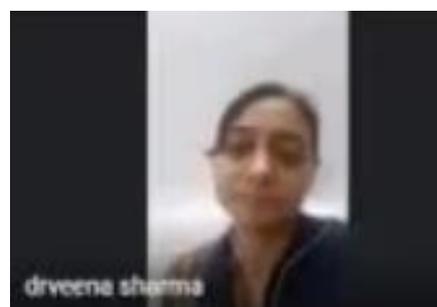
Dr. Bhattacharya discussed on research in modelling, use of current products, need of the product and also flagged the requirement for the R & D and operational use. He specially mentioned on irrigation & pest advisory. He said that at present in collaboration with ICAR, forewarning of mustard aphid in Rajasthan are being issued operationally 15 days before incidence of the pest at different levels including economic threshold level using both weather and satellite information.

Dr. Geethalakshmi appreciated the irrigation advisories taking consideration of satellite information to replace supply-based irrigation to demand based irrigation as more than 50 per cent water could be saved by this approach. He was referring the supply-based irrigation during monsoon season in Tamil Nadu. She also mentioned the potential of satellite information in forewarning of pest and disease incidence by citing some experiments she carried out some field experiments using reflectance data from handheld instruments and also added that such methodology might be applied to control fall armyworm incidence in maize crop. If satellite data is available, such experiment could be taken up on wider areas.

Dr. Bhattacharya explained the on-going activities on demand-based irrigation advisories based on graphical interface technique, generalised crop coefficient, local information and development of Apps connected to server.

Dr. Chattopadhyay said that this could be considered as excellent research problem. However, at present we may discuss more on the operational aspects with the readily available information followed by display in appropriate platform and capacity building as advised by **Dr. Rathore**. He said that, if agreed to, we may send request all the founding members of SAFOAM in the SAR to send their requirements in respect of present status of remote sensing data, access of remote sensing data, capability of use the data, training requirements, success stories etc. **Dr. Bhattacharya** was requested to prepare the form in the form of questionnaires for onward sending the same to the concerned as mentioned.

Dr. Veena Sharma, Technical Officer/Assistant Professor, Agromet Section, SKUAST-Jammu, Jammu, J&K, India was mentioning the importance of soil moisture information in providing irrigation advisory particularly in drought prone areas and drought year. She added that soil moisture information from satellite is useful to those areas when network of observatory is



relatively poor. Thus, under SAFOAM, if this information could be provided to SAR, it would be very useful for preparing the irrigation advisory. Dr. Bhattacharya informed that satellite derived soil moisture in coarse resolution (36 km * 36 km) are available globally. But with some radar data and other method soil moisture information at 10 km resolution is possible. He wanted to know with justification that what is best resolution for soil moisture information required for giving proper agromet advisories



Afterwards, a very important discussion was made on application of satellite information on livestock and poultry. **Dr. A. Natarajan**, Professor and Head, Animal Feed Analytical and Quality Assurance Laboratory, Veterinary College and Research Institute, Namakkal, Tamil Nadu, India, said that as on today not much work was on this subject was done in India and probably in South

Asia. Participating into the discussion, **Dr. Bhattacharya** mentioned that satellite information might be very useful on preparation of fodder map and type of fodder map especially green fodder assessment. This would help in livestock management involving logistic also. Besides, discussion was also made on the utilisation of satellite information on pasture, dairy, forestry etc. **Dr. Rathore** appreciated the discussion and given his advised and direction in including the subject as one of the important activities of SAFOAM. As the subject is interesting and emerging in South Asia, **Dr. Natarajan** would be requested to prepare a concept note on this subject for SAR and present the same virtually in front of the members of SAFOAM.

At the end **Dr. Geethalakshmi** mentioned about the weather insurance supported by the remote sensing data and yield forecasting using weather and satellite information would useful in SAR. Besides, initiatives mentioned throughout the meeting need to be operational.

Dr. Bhattacharya said that he is thankful to all the members of the meeting for valuable suggestions. He said that he has noted all the major points. He said that the forms as discussed earlier sent to all the countries in SAR. Initiatives would be taken on capacity building on the generation and using satellite data in agriculture, involve academia in exchange programme on research and development, use of satellite information in livestock management, satellite derived high resolution soil moisture, use of remote sensing in weather-based insurance. All the above comments/suggestions need to documented in the form of proceedings within a month and ultimately be presented in the proposed workshop for the finalisation of the document in the form of road map. He said this is a good initiative but it is long drawn process. Though there are in built institutional formalities/restrictions/modalities exist, but efforts would be made to effectively use the huge information satellite information in agriculture sectors in SAR.

Recommendations of the Meeting

It has been agreed that efforts need to be made to utilise the satellite information in agriculture in South Asia with proper planning looking at the different levels of availability of skilful satellite information/products and capability of use of same in agriculture etc. Following recommendations were made in this regard.

1. Implementation of the activities should be done at different levels.
2. In the first level, identification of the common & skilful satellite products/indicators, which have proper value and usages in agriculture should be made in South Asia.
3. Display of all the products/indicators in South Asia should be made on digital platform.
4. Mechanism should be developed to get access the satellite products/indicators by all the countries in South Asia obliging the data policy among different member countries.
5. Promotion of exchange programme on Research and Development especially on irrigation advisory, forewarning of pest and disease, crop yield forecast, weather-based insurance etc.
6. Explore to prepare fodder map, types of fodder map for green fodder assessment utilising the satellite information. Usability of satellite information in dairy, pasture, forestry sectors also may be ventured.
7. Preparation questionaries for obtaining information from the countries in SAR in respect of present status of remote sensing data, access of remote sensing data, capability of use the data, training requirements, success stories etc

Dr. Chattopadhyay once again thanked **Dr. Bhattacharya** and all the members for their active participation, sharing their ideas and also patient hearing for an extended time period and also wishing to meet all virtually shortly and periodically

Meeting was ended at 19.00 hrs with vote of thanks.

Annexure I

List of Members

Core Group III for steering SAFOAM activities

Theme : Utilisation of satellite derived products in Agromet Advisory Services for South Asian Countries.

Leader

***Dr. Bimal K Bhattacharya**

Group Director, Biological and Planetary Sciences and Applications Group (BPSG), Earth Ocean Atmosphere Planetary Sciences and Applications Area (EPSA), Sci./Eng. - G & Science Team Leader (AVIRIS-NG Airborne campaign), Co-Chair, Indo-French (ISRO-CNES) spaceborne thermal IR (TRISHNA) mission, Space Applications Centre, ISRO, Ahmedabad 380015, Gujarat, India

Advisors

1. Dr Akhilesh Gupta

Adviser/Scientist-G & Head, STIP-2020 Secretariat, Head, Policy Coordination & Programme Management (PCPM) Division, Head, Strategic Programmes, Large Initiatives and Coordinated, Action Enabler (SPLICE) Division and Climate Change Programme, Chief Vigilance Officer (CVO), Room No 16B, Administrative Block, Department of Science & Technology, Technology Bhavan, New Mehrauli Road, New Delhi-110 016, INDIA

2. Dr. Sibendu Roy

Director, Mahalanobis National Crop Forecast Centre, New Delhi, India

3. Mr. A Karunanayake

Director General of Meteorology,
Sri Lanka

***4. Dr. V. Geethalakshmi**

Director (Crop Management), Directorate of Crop Management, Tamil Nadu Agricultural University, Coimbatore, India-

Members

1. Dr. Giriraj Amarnath

International Water Management Institute

Sri Lanka

2. Mr. Tshencho Dorji

Dy. Chief Meteorology Officer
Weather & Climate Services Division
National Center for Hydrology & Meteorology
Royal Government of Bhutan, Thimphu, Bhutan

***3. Mr. Manoj Thakur,**

Senior Scientist, NARC, Nepal

4. Ms. Swe Swe Oo,

Head of Seed Division, Assistant Director, Department of Agriculture, Yangon office, Myanmar

5. Dr (Md). Mizanur Rahman

Senior National Consultant, Agro-Meteorological Information Systems Development Project, Component-C of Bangladesh Weather and Climate Services Regional Project, Department of Agricultural Extension (DAE), Khamarbari, Farmgate, Dhaka, Bangladesh

6. Mr. Zahiruddin Imampoor

Director of Agricultural Statistics & Information System
Ministry of Agriculture, Irrigation and Livestock
Afghanistan

7. Dr. Vinay Sehgal

Division of Agricultural Physics
Indian Agricultural Research Institute, New Delhi, India

***8. Mr. Abhijit Basu**

Founder and CEO Smartex Cognitive, XCED, APAC CEDMA, California, USA

9. Dr. Abdul Wadood

Prof. & Chairman, Deptt. of Agrometeorology and Environmental Science & Director Research, Birsa Agril. University Ranchi, Director Research, Ranchi, Jharkhand, , India

***10. Dr. Natarajan A**

Professor and Head
Animal Feed Analytical and Quality Assurance Laboratory
Veterinary College and Research Institute,
Namakkal - 637 001
Tamil Nadu, , India

11. Dr. Abdus Sattar

Assistant Professor (Agrometeorology)
Principal Investigator, AICRP on Agrometeorology
Principal Investigator, AICRPAM-NICRA Project
Nodal Officer, Gramin Krishi Mausam Sewa (GKMS) Project
Principal Investigator, FASAL Project
Principal Investigator, Modelling Radiative and CO2 Fluxes in Rice-Wheat System (SAC, ISRO)
Officer In-charge, Agrometeorology Division
Centre for Advance Studies on Climate Change
Rajendra Prasad Central Agricultural University, Bihar
Pusa, Samastipur, , India

***12. Dr. Veena Sharma**

Technical Officer/Assistant Professor, Agromet Section, SKUAST-Jammu, Jammu, J&K, , India

***13. Dr. Nabansu. Chattopadhyay**

President, International Society for Agricultural Meteorology

Executive Secretary, Global Federation of Agrometeorological Societies (Global FAMS)
Former Deputy Director General & Head & Scientist F, Agricultural Meteorology Division, India
Meteorological Department.

***14. Shri R.R. Mali,**

Former Deputy Director General & Head & Scientist F, Instrument Division, Division, India
Meteorological Department.

***15. Ms. Swati Chandras,** Agricultural Meteorology Division, India Meteorological Department,
Pune, , India

***16. Ms. Malathi Seetamraju,** Agricultural Meteorology Division, India Meteorological
Department, Pune, , India

*** = Attended the Meeting**

Photo Gallery

