INDIAN METEOROLOGICAL SOCIETY

AHMEDABAD CHAPTER

Issue: January- June

MEGHA

2011

From Chairman's Desk

It was nice working for IMSA for the past 2 years. A good number of activities happened during the past year like the SATMET-50 , Prof. Satish Dhawan lecture etc. About 35 new members were enrolled in this tenure. I thank all the executive committee members for their co-operation and support. I also thank the returning officer for smoothly conducting the IMSA election. I take this opportunity to welcome the new executive committee headed by Shri A. S. Kirankumar.

Dr. P. K. Srivastava

Secretary's Report

In this period, IMSA arranged the following activities:

An educational excursion to Udaipur solar observatory during 16-18 December 2010 was organized in association with other professional societies. Dr. Paul Menzel, Senior Scientist, SSEC, University of Wisconsin, Madison, USA delivered 7th Prof. Satish Dhawan Lecture on February 7, 2011. Topic of the lecture was: *The Beginnings of Satellite Meteorological Remote Sensing 50 Years Ago*. The lecture booklets are also printed and are ready for distribution. Dr. Stan Wilson, NOAA, USA delivered World Meteorological Day lecture on 23 March 2011. Topic of this year's lecture was *Global sea level rise: Observations, causes, projections, impacts and you*. On 22 July 2011, Dr. Kamaljit Ray, Director, IMD, Ahmedabad and Joint Secretary-IMSA delivered a lecture on *Monsoon 2011: A mid-season review*.

On 22 June 2011, announcement for the new IMSA executive committee election was made. Dr. P.C. Joshi, Senior Member, IMSA was appointed as election officer. Election results were declared on 22 July 2011 during the Annual General Body meeting. Newly elected members have taken charge of the IMSA executive committee on 22 July 2011.

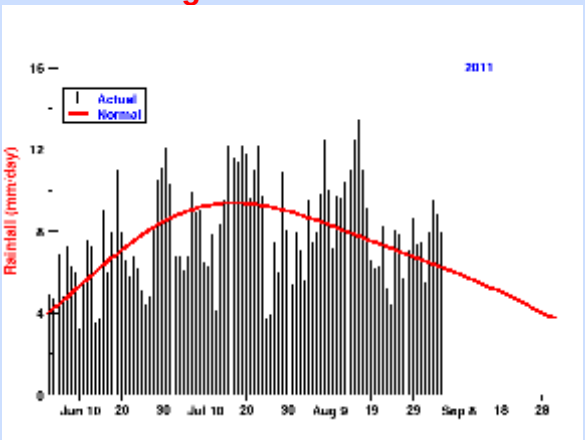
During 2010-2011, 20 new life members have joined IMSA.

Dr.V.Sathiyamoorthy<*sathya@sac.isro.gov.in*>

News / Events

- Astronautical Society of India award was conferred to Dr. CM Kishtawal, SAC (LM-229) for the year 2009 for his significant contribution in the field of Space Science and Space Applications.
- " ISRO Team Excellence Award -2009" for "Ku-band Scanning Scatterometer Payload Development and Scatterometer Data Processing for Oceansat-2" was conferred to the team members: Dr. B.S. Gohil(LM-226), Dr. Raj Kumar(LM-230), Dr.Sandip Oza(LM-246), Dr. A.K. Verma(LM-238) and Mr. Rajesh Sikhakolli (LM-1401).
- ISRO–NASA-NOAA meeting on Oceansat-2 Scatterometer was held to finalize the data product from OSCAT for users' forum on 10-11 August 2011 at Space Applications Centre (SAC), Ahmedabad.
- The National Conference of Ocean Society of India (OSICON' 11) was held on "Technologies for Ocean Exploration" during 13-15 July 2011 at National Institute of Ocean Technology, Chennai.
- Annual Convention of Indian Society of Remote Sensing and National Symposium on "Empowering Rural India through Space Technology" would be held 9-11, November 2011 at Bhopal.

Progress of Monsoon



Source: www.tropmet.res.in

Fifty Glorious Years of Satellites for Meteorology

Abhijit Sarkar (LM-65)
Space Applications Centre, ISRO, Ahmedabad

On April 1, 1960, the first weather satellite TIROS-1 (Television and Infra-Red Observation Satellite), was launched into orbit from Cape Canaveral, Florida. During its 78-day orbital life at 700 km, it beamed about 23 thousand pictures. April 1 thus can be rightfully named Satellite Meteorology Day. One of the earliest images is reproduced in this article (acknowledgement - WMO Bulletin).

Figure1: TIROS-I, first weather satellite image, 1 April 1960. The picture shows New England coast of USA.

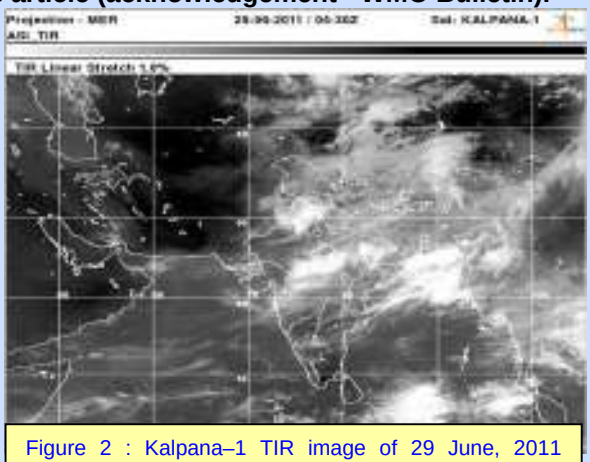


Figure 2 : Kalpana–1 TIR image of 29 June, 2011 showing Indian subcontinent. These weather images have now become a household item.

50 years is a long period, but the advancement of Satellite Meteorology during this period has been fabulous. Thanks to the fact the UN General Assembly in 1961/62 appealed that the development of meteorology and atmospheric science be aimed towards benefit of all mankind. This indeed reflects the spirit of "International Cooperation in Peaceful Uses of Outer Space". The concept of World Weather Watch (WWW) was proposed by two well-known scientists Dr H Wexler of the US and Academician V Bugaev of the-then USSR. Meteorological Satellites became an important component of WMO's WWW plan and they became an essential part of Global Observing System (GOS).

In the following decade, several US meteorological satellites were launched. They were the forerunners of GOES (Geostationary Operational Environmental Satellite). The GOES-1 was launched in 1975. Soon the European Space Agency and Japan joined the Met-Sat 'club'. It was around this time that CGMS – the "coordination of Geostationary Meteorological Satellite" group came into existence. To have a constellation of five Geostationary Satellites within a few years of its formation was a remarkable achievement of CGMS. India joined CGMS in 1979 with its plan to launch INSAT in geostationary orbit with meteorological payload having imaging capability. The first INSAT with this capability was commissioned in 1983.

In the Eighties, several polar orbiting satellites with capability to measure meteorological parameters were launched. During the first decade after the launch of TIROS-1, images obtained from satellites were used for qualitative analysis towards – Types of Clouds, Cloud Coverage, Location of Frontal Systems, Centres of Cyclones and Tropical Storms. With the addition of Vertical Sounders in late Sixties, quantitative retrieval of several geophysical parameters became popular. Most of these parameters benefit weather predictions by numerical models resulting in significant improvement in the quality and timeliness of prediction over the last two decades. In recent years, the concept of "Constellations" is emerging with WMO and International community of scientists keen in planning of parameter/ sensor constellations (such as Precipitation Constellation). Yet another development is the concept of the Global Earth System of Systems (GEOSS), accepted by several countries. Societal benefit areas of GEOSS are Weather, Water, Climate and Disaster. It is expected that WMO will play a lead role not only in its conceptualization but also in its implementation through transparent data and information sharing mechanisms in fastest possible communication links.

India has always been actively participating in field of satellite meteorology with its INSAT series of satellites. Currently since 2002, 2003 and 2009, India's Kalpana-1, INSAT-3A and Oceansat-2 are respectively providing atmospheric and oceanic data. In the current decade India will participate in the Global Satellite Observing System with two new satellites – INSAT-3D and Megha-Tropiques. These satellites are expected to open new avenues for observations and weather forecasting.

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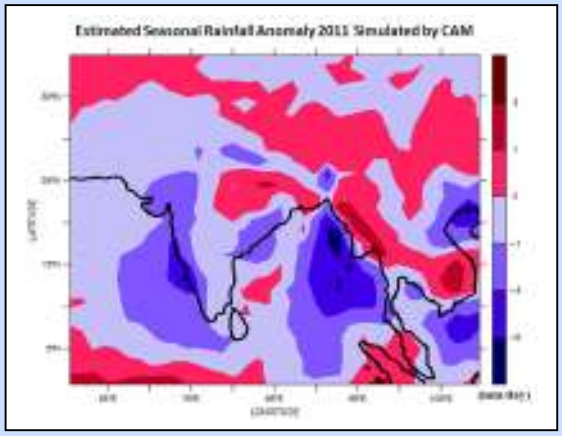
Seasonal Prediction of Indian Summer Monsoon –2011 by SAC

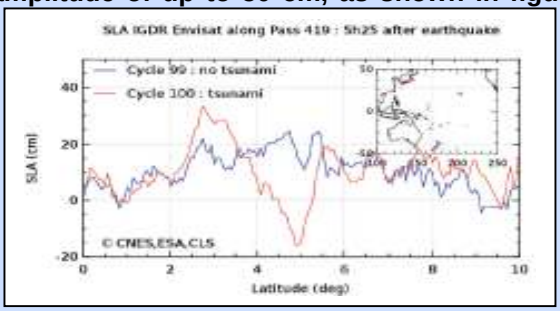
Monitoring the perspective onset precursors from TRMM/TMI and other satellite data indicated the monsoon onset in 2011 was on 30 May ± 2 days and the actual onset took place on 29 May 2011. Seasonal prediction of Indian Summer Monsoon (ISM) was done by SAC for the current year 2011 using the National Centre for Atmospheric Research's (NCAR) Community Atmospheric Model (CAM)-V3. CAM3 is one of the latest atmospheric General circulation model that is based upon the Eulerian spectral dynamical core with spatial resolution approximately ~1.4° latitude and longitude, 26 vertical sigma-pressure levels. The seasonal prediction of ISM 2011 has been carried out in forecast mode using 10-member ensemble experiment.



The May persistent SST for 2011 derived from the observed Reynolds SST has been used as the boundary conditions for each simulation through June to September 2011. The monthly mean rain rate from June to September2011 and the seasonal accumulated rainfall June through September has been estimated by the 10-member ensemble model simulation. The spatial as well as temporal distribution of model estimated rainfall anomaly suggest a below normal monsoon condition throughout the season. However, the rainfall anomaly shows some positive signature over east part of India in the month of June and August whereas the central Indian landmass has the positive anomaly during August and September. Over the Bay of Bengal, the model shows quite low rain rate compared to the normal. The accumulated all India rainfall (AIR) over land for the months of June to September 2011 are 95% (17.6 cm), 85% (24.3 cm), 91% (21.0 cm) and 89% (15.3 cm) respectively of normal monthly AIR. This makes the seasonal accumulated AIR 78.4 cm, which is 9% below the normal. The normal AIR for the season over the country as a whole in the period 1998 to 2010 is 86.5 cm. Another empirical model based on the genetic algorithm predicted the all India summer monsoon rainfall to be 93 % of Long Period Average (LPA). Quantitatively it comes out to be 82.3 cm for June to September 2011.

Altimeter measures Tsunami

On 11th March 2011, a 9.0-magnitude earthquake off Japan's north-eastern coast generated a huge wave. By measuring sea surface height, altimetry satellites can theoretically detect tsunami waves in the open ocean. Envisat detected the first wave front 5 hours and 25 min after the earthquake with a trough-to-crest amplitude of up to 50 cm, as shown in figure below.



(Courtesy AVISO Users Newsletter June 2011, #6)

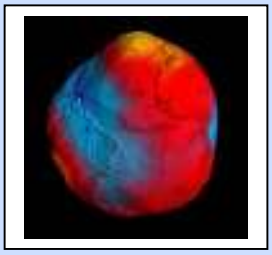
Aquarius Mission: Studying Salty Seas From Space

(Courtesy: http://www.nasa.gov/)

The United Launch Alliance Delta II rocket carrying the Aquarius/SAC-D spacecraft launched from NASA's Space Launch Complex 2 at Vandenberg Air Force Base on June 10, 2011, beginning a 3 year mission to study our planet's salty seas. Aquarius/SAC-D will provide essential ocean surface salinity data needed to link the water cycle and ocean circulation. This information, will help scientists improve the accuracy of climate models.

Earth's gravity mapped with GOCE

(Courtesy: ESA/HPF/DLR)



ESA's GOCE mission has delivered the most accurate model of the "geoid" ever produced. Red corresponds to points with higher gravity and blue to points with lower gravity.

ENSO state remains neutral over the Pacific

(Courtesy: http://www.bom.gov.au/climate/enso/)

Climate indicators of ENSO remain at near normal levels, with neutral conditions now firmly established in the tropical Pacific. The majority of international climate model forecasts of ENSO suggest neutral conditions are likely to continue into late 2011.

A weakly positive Indian Ocean Dipole event has been forecast to develop during winter of 2011.

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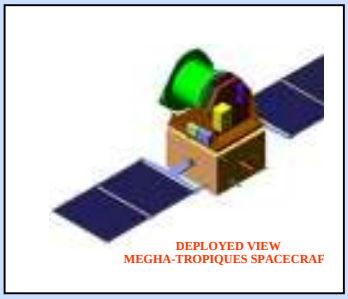
Megha Tropiques Mission

Megha in Sanskrit is 'cloud' and Tropiques in French is 'tropics'. The Megha-Tropiques (MT) mission is an ISRO-CNES (Indo-French) collaborative programme intended for studying the water cycle and energy exchanges in the tropics using a satellite platform. The sensors selected for the MT mission are:

- **Microwave Analysis & Detection of Rain & Atmospheric Structures (MADRAS) – This is a microwave imager aimed at measurements for precipitation, cloud micro-physics, ocean surface winds, total water vapour and liquid water content of the atmosphere.**
- **Sondeur Atmospherique du Profil d'Humidite Intertropicale par Radiometrie (SAPHIR) – This is a Millimeter wave humidity sounder for retrieving the vertical profiles of humidity.**
- **Scanner for Radiation Budget (ScaRaB)- An optical-IR radiometer for radiation budget measurements at the top-of-atmosphere.**
- **GPS Radio Occultation (GPS-RO) sensor for measurement of water vapour and temperature profiles.**



DEPLOYED VIEW
MEGHA-TROPIQUES SPACECRAF

To improve the time sampling of the tropical region, the satellite is being placed in a highly inclined orbit(~20°) at an altitude of 867 kms. Low orbiting satellites with low inclinations provide high repetitivity. An inclination at 20° provides 6 observations of each point on the Inter-Tropical Convergence Zone (ITCZ). This is essential in fulfilling the mission objectives of studying processes at various scales and the inter-scale interactions, with special emphasis to understanding the life cycle of the convective systems and their interactions with the environment.

New Executive Committee (2011-2013)

On the basis of IMSA election results declared on 22 July 2011, following new executive members have taken over the charge of IMSA executive committee:

Chairman	**Shri. A. S. Kiran Kumar, SAC**
Vice-Chairman	**Prof. A. M. Sheikh, AAU**
Secretary	**Dr. Sandip Oza, SAC**
Joint Secretary	**Dr. Som Kumar Sharma, PRL**
Treasurer	**Dr. P.K. Thapliyal, SAC**

Executive Committee Members

1. **Shri. B. M. Rao, SAC**
2. **Dr. Kamaljit Ray, IMD**
3. **Shri. Abhisek Chakraborty, SAC**
4. **Ms. Minal Sampat, SAC**
5. **Dr. Mehul Pandya, SAC**
6. **Ms. Suvarna A Deshpande, DECU**
7. **Dr. V. Sathiyamoorthy, SAC**

Photo Gallery – 7th Prof. Satish Dhawan Lecture

Dr. Paul Menzel, Senior Scientist, SSEC, University of Wisconsin, Madison, USA, delivered the 7th Prof. Satish Dhawan Lecture on 7 February 2011 at Vikram Hall, SAC

Shri. A. S. Kiran Kumar, Associate Director, SAC delivers memento to the speaker