

Indo-US Science & Technology Forum

Connect

Newsletter of IUSSTF

Volume 4 (2) | September 2012



Tropical Cyclone Predictions

Eye on the storm



CONTENTS

cover story

- 04** Modeling and Data Assimilation for Tropical Cyclone Predictions
Predicting Landfalls

report

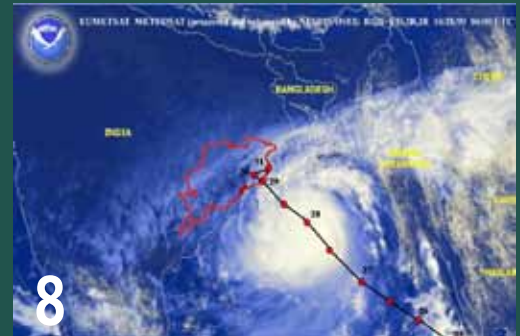
- 12** Indoor Air Pollution and Environmental Lung Diseases
Whiff of Fresh Air
- 16** Global challenges: Climate change, Water, Environment and Society
Connecting the Dots
- 19** Joint Commission Meeting on Science and Technology Cooperation
More Steps in Tandem
- 20** Botanicals Agent Development Research
All Guns Firing

feature

- 22** Third U.S.-India Strategic Dialogue
Excerpts from the Joint Statement
- 24** India-U.S. Partnership on Innovation
Common Goals...Shared Vision
- 28** Khorana Program Student Symposium
Quest for Excellence

news and events

- 30** Events Diary



From the Editor-in-Chief

Editor-in-Chief

Rajiv Sharma
Executive Director, IUSSTF

Editor

Manoj Dabas
Aravali Foundation for Education

Editorial Advisory Group

Michael Cheetham
Director, India Science and Technology
Partnership (INSTP)

Timothy D. Neely
Chief, Environment
Science and Technology Affairs
U.S. Embassy, New Delhi

Smriti Trikha
Sr. Science Manager, IUSSTF

Nishritha Bopana
Science Officer, IUSSTF
(Member Convener)

Layout / DTP
Pramod Jha

Opinions:

Opinions expressed in *Connect* do not necessarily reflect the opinion of IUSSTF or other organizations associated with publication of *Connect*.

Comments and Suggestions:

Please email the *Connect* Team at
connect@indousstf.org

Designed, Produced and Circulated by:

Communication & Outreach Division
AFE Consultants Private Limited
Aravali House, 431/D-22, Chhatarpur Hills
New Delhi-110074, India

Published and Printed by:

Nishritha Bopana on behalf of Indo-US S&T
Forum from Fulbright House
12 Hailey Road, New Delhi - 110 001.

Printed at Montoo Printers & Packers
A-43/1, Naraina Industrial Area
Phase - 1, New Delhi - 110028



It has always been the endeavor of IUSSTF to catalyze, promote and support capacity building and networking activities in areas of importance to the US and India. Over the years, we have been getting a large number of proposals for joint workshops/training schools and joint networked research and development centers through our regular call for proposals. Health and Environment are two major areas of cooperation between India and the US. This trend has also been reflected in the IUSSTF programmatic activities and several feature articles and reports may be found in this issue of *Connect* covering these areas.

The tropical cyclones, also known as hurricanes or typhoons in different parts of world, are one of the deadliest weather phenomena worldwide. The National Oceanic and Atmospheric Administration (NOAA), Purdue University and Indian Institutes of Technology, Delhi and Bhubaneswar came together to organize a joint training school with the support of IUSSTF on Hurricane Weather Research and Forecasting (HWRF) in Bhubaneswar. Eminent scientists from these organizations agreed to contribute for our cover story in this issue of *Connect*.

The second meeting of Indo-US Joint Commission on Science and Technology Cooperation (JCM) was held on 11 June 2012 to develop the Action Plan 2012-14 for enhancing bilateral science and technology cooperation. A major outcome of this meeting is establishing of three standing expert working groups to implement activities in areas of basic and applied sciences; health and medical sciences; and atmospheric, environment, and earth sciences. A brief report on JCM is given in this issue.

An important theme of discussions of JCM was on policy initiatives to strengthen bilateral research cooperation and best practices for retaining and advancing women in science and engineering. The IUSSTF in partnership with the US Embassy in India and the Indian Department of Science and Technology is organizing a Symposium on Women in Science in November 2012 at Delhi. IUSSTF is also proud to have supported an event on Women Engineers during the last week of August 2012 in Bangalore, organized by Society for Women Engineers, US and the Indian Institute of Technology, Bombay. More than 150 engineers mostly women participated in this event.

Technology commercialization is an important tool for taking benefits of scientific research to the society. IUSSTF has supported in past training programs covering various aspects of technology transfer and commercialization for scientists. A new program 'Khorana Technology Transfer Course' was launched in partnership of Indian Department of Biotechnology (DBT) and the University of Wisconsin, Madison. A training program on technology commercialization was also organized by the Michigan State University, East Lansing for Indian and US Agricultural scientists with IUSSTF support.

The Khorana Scholars Program being organized by the University of Wisconsin, Madison in partnership with the Department of Biotechnology and IUSSTF has now been expanded beyond UW to include several other premier U.S. Universities such as MIT, University of Michigan, University of Iowa, University of Illinois, University of Minnesota, Michigan State University, Indiana University and Georgetown University to enable highly talented students to motivate them for undertaking S&T research as a career through exposure to international S&T research facilities. To showcase the research work done by these talented scholars, a Khorana Scholars Symposium was organized in August. We feel very encouraged that Sam Pitroda, Advisor to the Prime Minister on Public Information Infrastructure and Innovations and M.K.Bhan, Secretary, DBT interacted with these scholars and inspired them.

We have tried to provide a glimpse of diverse portfolio of programmatic activities of IUSSTF in this issue of *Connect*. IUSSTF's role in strengthening US-India S&T Cooperation has been applauded at various bilateral platforms including the US-India JCM on S&T Cooperation and the US-India Strategy Dialogue held in June 2012. We look forward to feedbacks and continued support from our stakeholders to match up to their expectations from us. ●

Rajiv Sharma
Executive Director, IUSSTF



U.C. Mohanty
Centre for Atmospheric Sciences
Indian Institute of Technology
Delhi, INDIA



Dev Niyogi
Department of Earth and
Atmospheric Sciences
Purdue University, Indiana, USA



Subhasish Tripathy
School of Earth, Ocean and Climate Sciences
Indian Institute of Technology
Bhubaneswar, INDIA

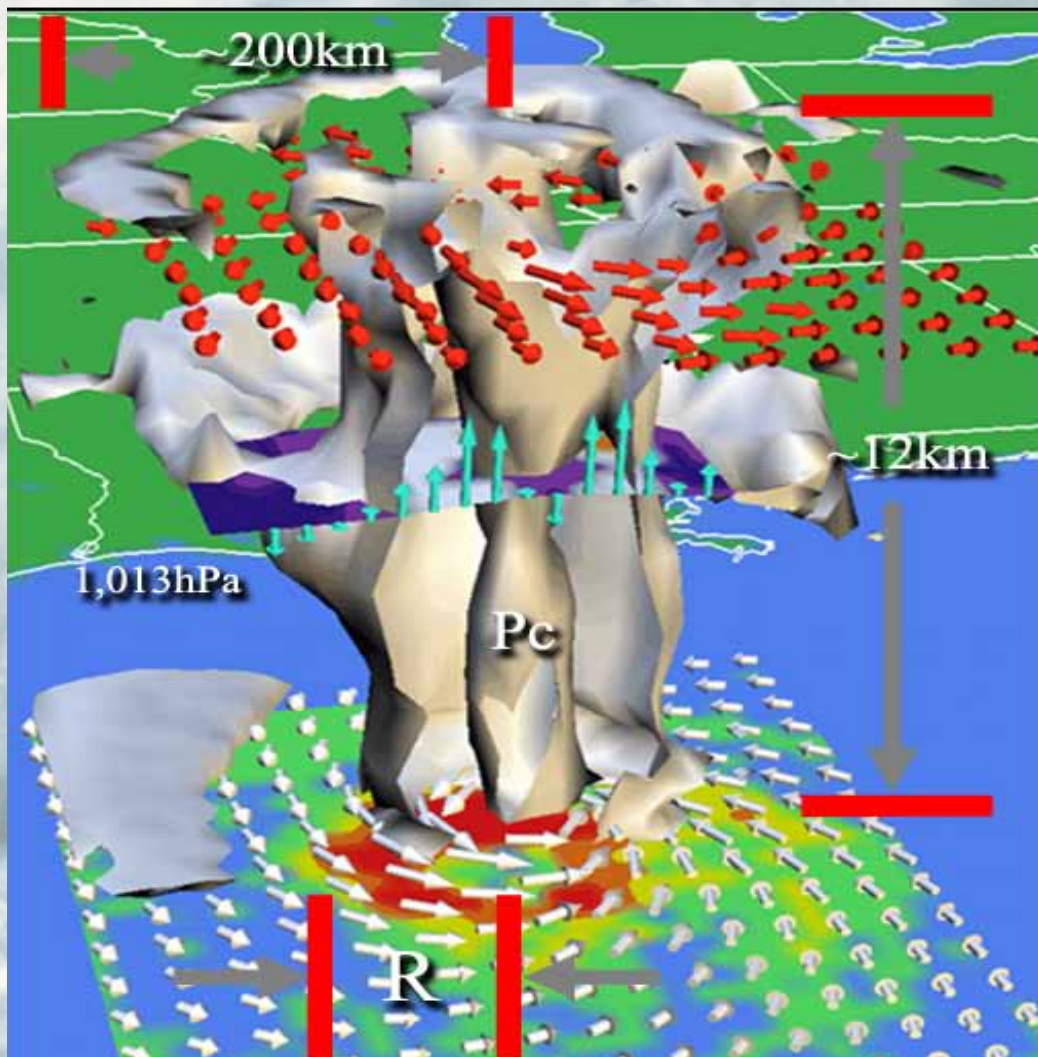
Predicting Landfalls

Tropical cyclones are one of the deadliest and costliest weather phenomena worldwide. As a killer, tropical cyclones are far ahead of many other natural disasters. The word 'Cyclone' was coined in 1848 by Henry Piddington, British meteorologist, and is derived from the Greek word 'kuklos' i.e. the coil of a snake as the air flow of the storm resembles it. The nomenclature of tropical cyclones is different in different parts of the world. In the Atlantic and eastern Pacific, they are known as 'hurricanes' and in western Pacific as 'typhoons'. In the Indian region, they are simply known as 'tropical cyclones'. Almost all these storms form within 25° latitude on both sides of the equator except over the 5 °N to 5 °S equatorial region.

In the Atlantic region, tropical cyclones form during June to October. However, the genesis of tropical cyclones over the Indian seas is highly seasonal, with primary maximum in the post-monsoon season (mid-September to December) and secondary maximum during the pre-monsoon season (April and May). The post-monsoon storms are more devastating in nature. As a storm intensifies from a loosely organized state, it passes through several stages. Based on pressure drop and maximum sustainable surface wind, the World Meteorological Organization (WMO) broadly classifies the tropical cyclones over the Indian Seas into seven categories and the same is provided in *Table 1*. These classifications

are also used by the India Meteorological Department (IMD), New Delhi.

The Bay of Bengal (BoB) is a potentially active region for the formation of tropical cyclones. *Table 2* shows the total number of cyclones that crossed different parts of the BoB coastal region based on 120 years of track and intensity data ranging from 1891 to 2010. The climatology of cyclone genesis shows that a total of 606 cyclonic disturbances (which include DD, CS and SCS) formed in the Bay of Bengal. Out of 606 cyclones, 325 (54 %) crossed India, 95 (16 %) Bangladesh, 61 (10%) Myanmar, 25 (4 %) Sri Lanka and as many as 100 (17 %) dissipated over the sea



Frank D. Marks
Jr. Hurricane Research Division,
National Oceanic and Atmospheric
Administration, Miami, USA



S.G. Gopalakrishnan
Hurricane Research Division
National Oceanic and Atmospheric
Administration, Miami, USA



Vijay Tallapragada
NOAA National Weather Service,
Maryland, USA

Figure 1 : Schematic representation of tropical cyclone with characteristic, Pressure drop ($\Delta P=1013 - P_c$), Maximum sustained wind (V_{max}), Radius of maximum wind (R)

Cyclones in India

The Indian seas- Bay of Bengal (BoB) and the Arabian Sea (AS) - are impacted by only 5-6 global tropical cyclones each year. However, the Indian sub-continent accounts for the highest number of cyclone related fatalities globally. The Indian region is unique in nature in comparison to any other basin in the world and as far as the genesis/period of occurrence of cyclones and death tolls due to such systems are concerned. These are :

- Two cyclone seasons: Pre-monsoon (April-May) and Post-monsoon (October-December) with primary maxima in the month of November.
- Cyclones are of relatively moderate intensity as compared to West Atlantic hurricanes and West Pacific typhoons.
- Only 7% of the world's total cyclone genesis but highest death toll amongst all regions.
- Of the 23 recorded deadly storms (>10,000 fatalities over last 300 years) , 20 cyclones were formed over the BoB.
- High death toll is the consequence of highly vulnerable storm surges in east coast of India.

These unique features are mainly due to:

- Shallow bathymetry (relatively highest surge : 8-12 m).
- Near funnel shaped coastline.
- Densely populated coastal region.
- Large stretch of low lying delta regions in the cyclone prone east coast of India with presence of relatively large number of river systems (in particular the Odisha coast).

without making landfall on any of the above countries. Again with respect to the total number of severe cyclonic storms crossing different countries of the region, out of 197 severe cyclonic storms, 109 (55%) crossed the Indian coast, 47 (24%) to Bangladesh, 23 (11%) to Myanmar, 9 (5%) to Sri Lanka and 9 (5%) dissipated over the ocean without making landfall.

Table 3 shows the total number of cyclones that crossed different parts of the Arabian Sea coastal region based on 120 years (1891 – 2010) of track and intensity data. The climatology of cyclone genesis shows that a total of 58 cyclonic disturbances (which include DD, CS and SCS) formed over the

Arabian Sea. Out of these, 53 % crossed India, 9 % to Pakistan, 35 % to Iran, Arabia and the coast of Africa and 3 % dissipated over the sea. The detailed climatology of Arabian Sea tropical cyclones is provided in Table 3.

Concentrating on the Indian coast, there are 8 maritime states along the eastern and western coast of India that have deeply suffered from tropical cyclones. Figure 2 describes the total number of cyclones that crossed different maritime states of India during 1890 to 2011. This clearly reflects the higher frequency of tropical cyclones over the BoB, of which maximum crossed through the Odisha coast. The Super cyclone of the century (OSC99) struck the Odisha coast on October 29,

Sl. No.	Category of System	Pressure Drop (hPa)	Maximum Wind Speed knot (kmph)
1.	Low (L)	< 1.43	< 17 (< 32)
2.	Depression (D)	1.43 – 3.61	17 - 27 (32-50)
3.	Deep Depression (DD)	3.91 – 5.40	28 - 33 (51-61)
4.	Cyclonic Storm (CS)	5.73 – 10.95	34 – 47 (62-88)
5.	Severe Cyclonic Storm (SCS)	11.43 – 19.68	48 – 63 (89 – 117)
6.	Very Severe Cyclonic Storm (VSCS)	20 – 49	64 – 119 (118-220)
7.	Super Cyclonic Storm (SUCS)	≥ 50	≥ 120 (≥ 221)

Table 1 : Terminology adopted by the India Meteorological Department for different intensity of tropical cyclones over the Indian Seas (as per WMO).

Country	Total No. of Tropical systems	Total number of cyclonic and severe cyclonic storms		Total number of severe cyclonic storms	
		% of total systems	% of total in the respective country	% of total systems	% of total in the respective country
India	325 (54%)	190 (53%)	190/325 (58%)	109 (55%)	109/325 (34%)
Bangladesh	95 (16%)	67 (19%)	67/95 (70%)	47 (24%)	47/95 (49%)
Myanmar	61 (10%)	44 (12%)	44/61 (72%)	23 (11%)	23/61 (38%)
Sri Lanka	25 (4%)	17 (4%)	17/25 (68%)	9 (5%)	9/25 (36%)
Dissipated over Sea	100 (17%)	44 (12%)	44/100 (44%)	9 (5%)	9/100 (9%)
Total	606	362	362/606 (59%)	197	197/606 (33%)

1999, with an intensity of about 300 kmph accompanied by a 7 meter high storm surge. Out of a total of 30 Districts, 11 coastal districts were heavily affected, leading to a death toll of more than 10,000 people. The track of the OSC99 with the NOAA METEOSAT satellite picture is shown in Figure 3.

Tropical cyclones can cause a variety of damages. The major causes of destruction are strong winds, heavy precipitation and storm surges. The potential damages due to several factors associated with tropical cyclones are depicted in Figure 4.

The Indian Seas tropical cyclone with climate change perspective clearly shows that though the occurrence of tropical cyclones remains steady, the frequency of severe cyclonic storms is increasing. A significant increase of nearly 46% with a confidence level of 99% is noticed for severe cyclonic storms, while the increase of cyclonic disturbances and cyclones is not statistically significant.

Thus advanced forecasting techniques with improved warning systems are expected to lead to a significant reduction in loss of life and property owing to these natural weather events. There is a need for further enhancement in observing networks such as coastal Doppler Weather Radar (DWR), aircraft reconciliation, drop sondes, satellite products etc.

There have been considerable advancements in research and operational models which have demonstrated significant improvements in prediction of the movement of tropical

Table 2 : Number of cyclones that crossed different countries surrounding the Bay of Bengal during the period 1891-2010.

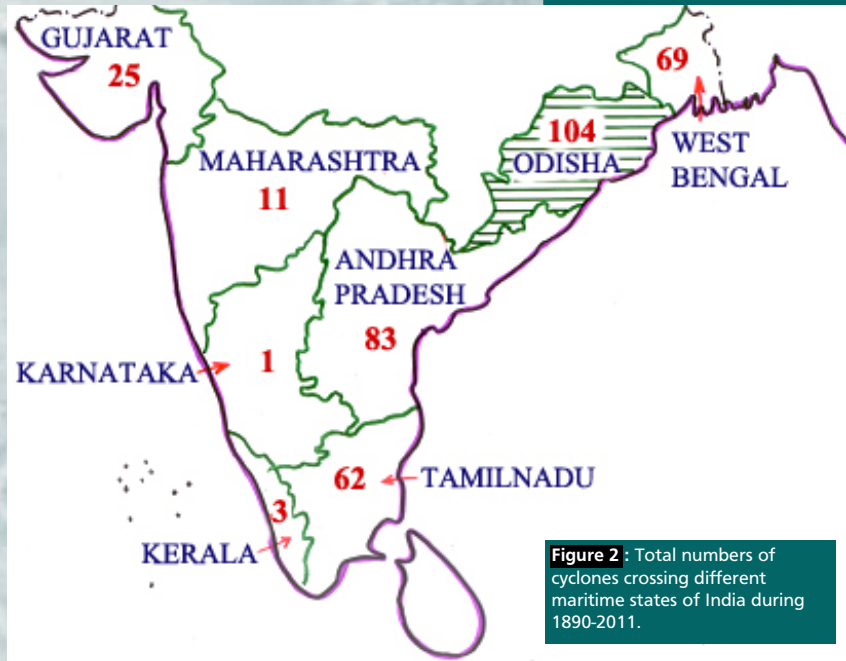


Figure 2 : Total numbers of cyclones crossing different maritime states of India during 1890-2011.

Table 3 : Number of cyclones that crossed different countries surrounding Arabian Sea during the period 1891-2010.

Country	Total No. of Tropical systems	Total number of cyclonic and severe cyclonic storms		Total number of severe cyclonic storms	
		% of total systems	% of total in the country	% of total systems	% of total in the country
India	31 (53%)	22 (51%)	22/31 (71%)	16 (53%)	16/31 (52%)
Pakistan	5 (9%)	4 (9%)	4/5 (80%)	4 (13%)	4/5 (80%)
Iran, Arabia & Africa	20 (35%)	17 (40%)	17/20 (85%)	10 (33%)	10/20 (50%)
Dissipated over Sea	2 (3%)	0	0	0	0
Total	58	43 (74%)	43/58 (74%)	30 (52%)	30/58 (52%)

Modeling and Data Assimilation for Tropical Cyclone Predictions

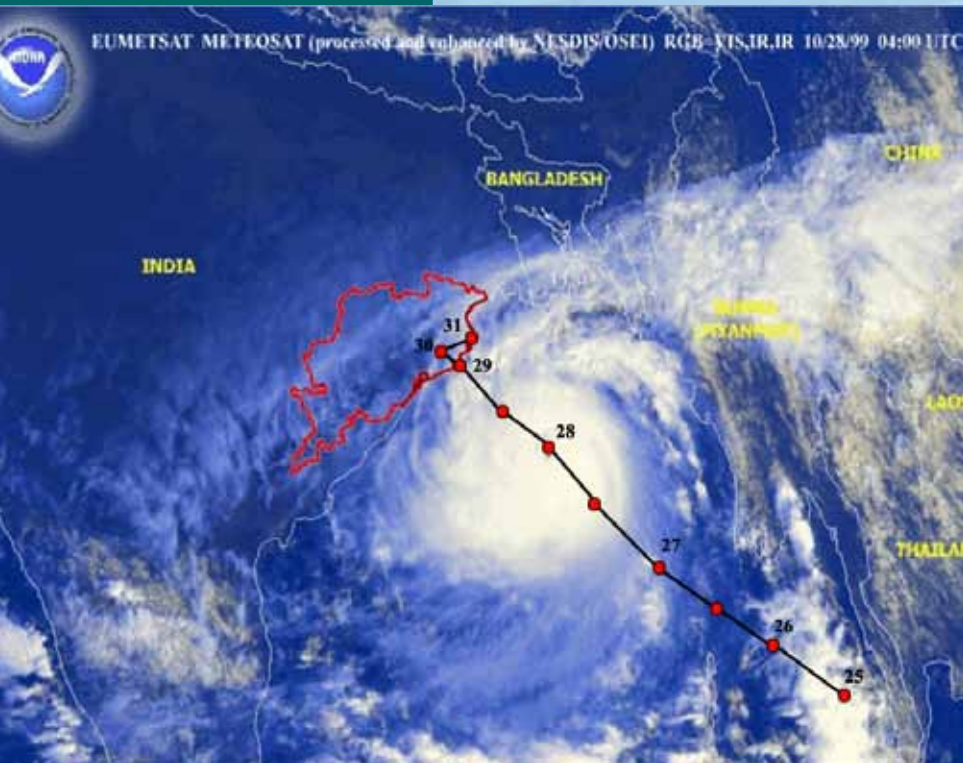
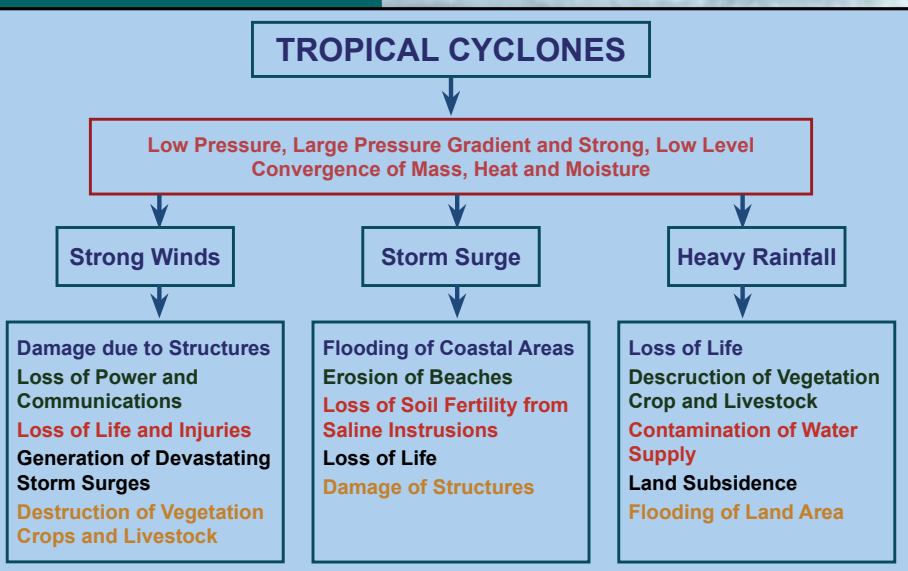


Figure 3 : Track of the Odisha Super Cyclone 1999 with satellite imagery.

Figure 4 Potential damages due to tropical cyclones.



cyclones over the Indian seas. The India Meteorological Department (IMD) has operationalized a state-of-the-art mesoscale model (WRF system) for tropical cyclone prediction over the Indian seas. In recent years, IMD has also enhanced its observational network with coastal DWR, automated weather stations (AWS) and automatic rain gauge (ARG) systems. In India, a number of research / academic institutes have been working in R&D mode to improve the skill of the mesoscale models for track and intensity prediction of tropical cyclones by utilizing the high spatial and temporal observations through an advanced data assimilation technique. The IMD in collaboration with academic and research organizations has recently launched the Forecast Demonstration Project (FDP) for improvement in monitoring and prediction of tropical cyclones over the Indian seas. The Centre for Atmospheric Sciences, Indian Institute of Technology Delhi (IIT Delhi) mesoscale modeling group has been very actively involved as a leading team in the country in simulation and prediction of tropical cyclones and associated storm surges.

In the US, the National Oceanic and Atmospheric Administration (NOAA) has been continuously improving its observational network to track and monitor hurricanes over the Atlantic (Figure 5).

NOAA, has been continuously striving towards improving tropical cyclone forecasts to save life and property. For instance, today's average 5-day track forecast is as good as the 3-day track forecast was ten years ago (Figure 6). These improvements have been possible because of improved numerical models, observations in the region of tropical cyclones and data assimilation techniques for initialization of these forecast models. In an unprecedented effort, NOAA has initiated the Hurricane Forecast Improvement Project (HFIP) to further improve the tropical cyclone

forecast skills by 20% in 5 years and 50% in 10 years. Through the development of the advanced high-resolution Hurricane Weather Research and Forecast (HWRF) modeling system and the associated data assimilation techniques at the Atlantic Oceanographic and Meteorological Laboratory (AOML) and National Centers for Environmental Predictions (NCEP), NOAA has started making significant advances in tropical cyclone track, intensity and structure forecasts.

The HWRF modeling system became operational at NCEP in 2007 and has undergone significant improvements with annual upgrades ever since its initial implementation. For the first time, an advanced high-resolution HWRF model operating at cloud-permitting 3km resolution was implemented into NCEP operations for the 2012 hurricane season. The HWRF is composed of several key components for providing accurate tropical cyclone track and intensity forecast guidance. These include the Weather Research and Forecasting (WRF) software infrastructure, the Non-Hydrostatic Mesoscale Model (NMM) dynamic core, the three-dimensional Princeton Ocean Model (POM), and a physics suite tailored to the tropics, including air-sea interactions over warm water and under high wind conditions, boundary layer and cloud physics developed for hurricane forecasts. The HWRF model employs an advanced hurricane vortex initialization and cycling technique coupled to NCEP's Gridpoint Statistical Interpolation (GSI) data assimilation system for representing the initial vortex structure of the storm.

In October 2010, NOAA signed an Implementing Arrangement (IA) and Memorandum of Understanding (MoU) with Ministry of Earth Sciences (MoES), Govt. of India to improve tropical cyclone forecasting over the Indian seas. Researchers from NOAA AOML, NCEP and Purdue University from

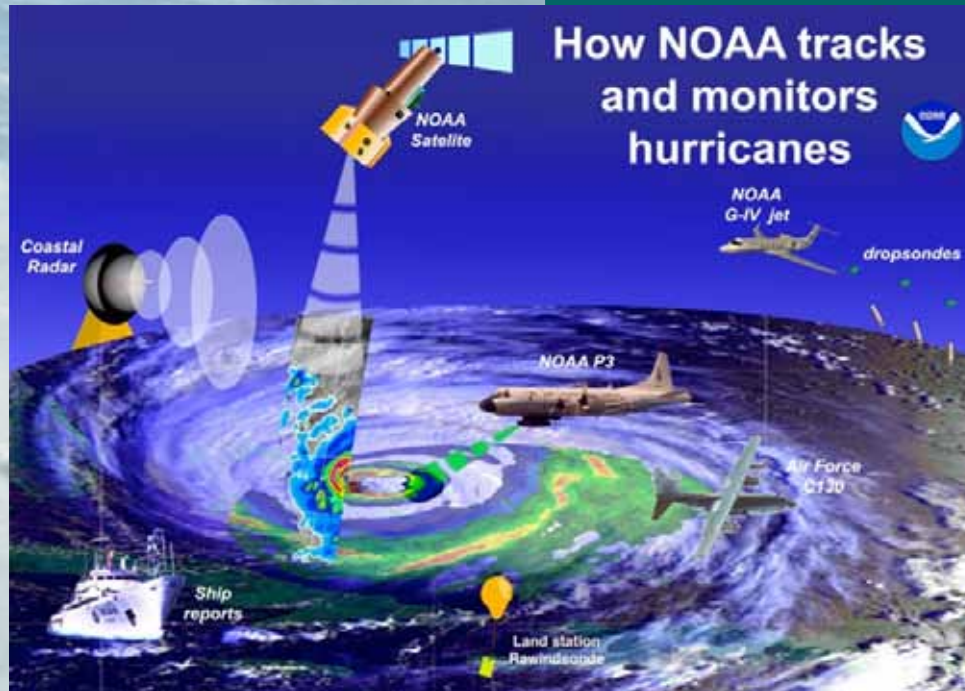
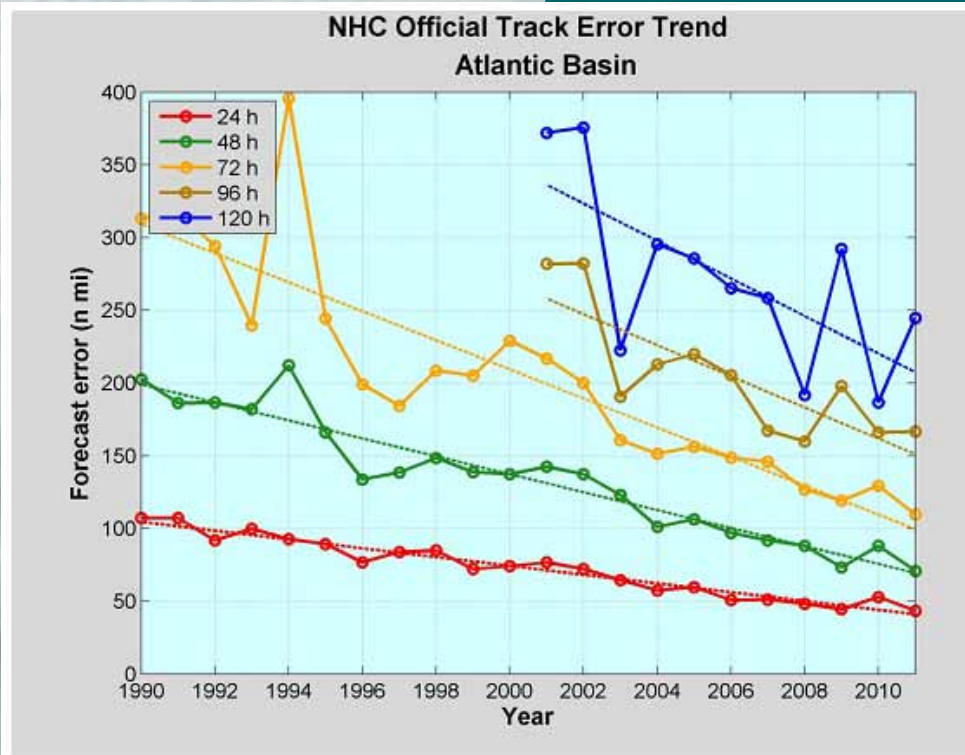
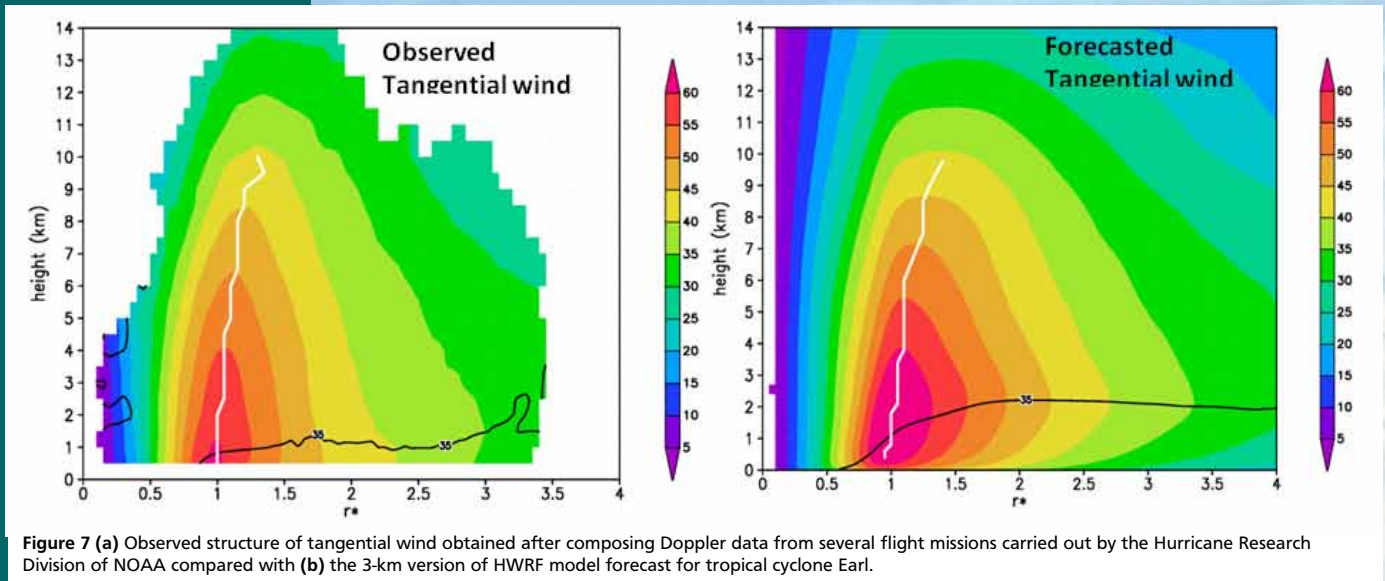


Figure 5: Tracking and monitoring of hurricanes over Atlantic by NOAA, USA.

Figure 6: Improvement of track prediction skills over the Atlantic Basin.



Modeling and Data Assimilation for Tropical Cyclone Predictions



the US side and IMD and IIT Delhi from Indian side are working closely in this project. Under this IA, NOAA has transferred the state-of-the art operational HWRf modeling system to IMD and its partnering research institute IIT Delhi. In order to share advanced understanding and forecasting techniques acquired in the last few years by NOAA

and its partnering institutions in the USA, a 6-day advanced workshop and training was organized by IIT-Delhi and IIT-Bhubaneswar at Bhubaneswar, Odisha, India during 9 - 14 July 2012. The program was coordinated by Dr. S.G. Gopalakrishnan (AOML, NOAA), Prof. U.C. Mohanty (IIT-D) and Prof. Subhasish Tripathy (IIT-Bhubaneswar).

Dr. Shailesh Nayak (Secretary, Ministry of Earth Sciences) delivering the Inaugural Address at the Indo-US Workshop on 'Modeling and Data Assimilation for Tropical Cyclone Predictions'.



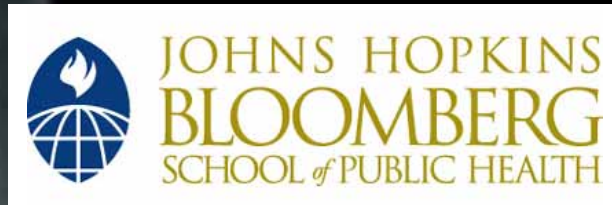
This event was jointly sponsored by the Indo-US Science and Technology Forum (IUSSTF), Council of Scientific and Industrial Research (CSIR), MoES, NOAA and the US National Science Foundation (NSF). The IIT Bhubaneswar is one of the leading academic and research institute in Odisha. The institute has established a “School of Earth, Ocean and Climate Sciences” and an “Innovative Centre for Climate Change” to provide an intellectual and congenial research atmosphere on integrated earth-ocean-atmosphere interaction processes. Recently, the School emphasized the research on extreme weather events and climate science studies. These initiations may lead to the better prediction of high impact weather events and associated hazards emergent to Odisha state and the east coast of India as well.

Dr. Shailesh Nayak, Secretary, MoES, inaugurated the workshop in the presence of Dr. L.S. Rathore, Director General of IMD, Dr. Nishritha Bopana (Science Officer, IUSSTF), and a gathering of more than 100 eminent dignitaries from India and USA. The week-long workshop brought together 12 eminent scientists from NOAA and USA universities, 5 Indian experts, 4 NSF sponsored students from USA, and 27 young scientists from various organizations across India including IMD, National Centre for Medium Range Weather Forecasting (NCMRWF), Indian National Centre for Ocean Information Services (INCOIS), Indian Institute of Tropical Meteorology (IITM), Indian Air Force, Indian Navy, Indian Space Research Organization (ISRO), Indira Gandhi Centre for Atomic Research (IGCAR), Indian Institute of Technology campuses, and other Indian universities. All the participants have active R&D efforts for advancing tropical cyclone predictions. The workshop consisted of 36-hours of lectures and 10 hours of colloquium besides several

hours of discussion and interactions among the resource persons and participants. The US delegation was led by Dr. Frank Marks, Director of the Hurricane Research Division (HRD) of AOML/NOAA and Principal Investigator (PI) of Indo-US MoU, along with two other Co-PIs of the project, Dr. Vijay Tallapragada, (NCEP/NOAA) and Prof. Dev Niyogi (Purdue University).

The workshop accomplished the prime goal of capacity building and infrastructure sharing under the NOAA-MoES agreement for weather ready nations (US and India). In addition, the exchange of state-of-the-art knowledge and prediction techniques immensely benefited not only the participants but also the resource persons from both countries. The proceedings from this workshop will be published as a special monograph on Modeling and Data Assimilation for Tropical Cyclone Predictions, which will serve as a useful reference for students and researchers.

The outcome of this event has set the stage for extensive advancement in tropical cyclone and heavy rainfall prediction over the Indian monsoon region so as to reduce the current track prediction errors by at least 20% by 2015. Further, present intensity and rainfall forecast skill of 3-days may be achieved in the 5-day forecast by 2015. It should be noted that the NOAA’s state-of-the-art HWRF modeling system (atmospheric component) is in use at IMD in a collaborative mode with active participation of IIT Delhi scientists. It will be the basis for pursuing the joint efforts among IMD, IIT Delhi and INCOIS and USA counterparts at NOAA-AOML, NCEP, and Purdue University to have a coupled HWRF system for the Indian monsoon region in the future. In this endeavor the Indo-US Science & Technology Forum is expected to play a pivotal role in fostering such bilateral collaboration and exchange of visits. ●



Whiff of Fresh Air



Shyam Biswal

Center for Global Clean Air
Bloomberg School of Public Health,
Baltimore, USA



Patrick Breysse

Center for Global Clean Air
Bloomberg School of Public Health,
Baltimore, USA



Thomas Sussan

Center for Global Clean Air
Bloomberg School of Public Health,
Baltimore, USA

Approximately 3 billion people, nearly half of the world's population, are exposed to high levels of indoor air pollution due to the burning of solid fuels such as wood, cow dung and crop dust for cooking and heating purposes. Evidence is emerging that this indoor air pollution is associated with increased risks of many diseases, including chronic obstructive pulmonary disease (COPD), lower respiratory tract infections, tuberculosis, asthma and cardiovascular diseases.

Indoor air pollution is also a major contributor to childhood mortality, primarily due to pneumonia. Additionally, the exposure of infants and children to indoor air pollution is likely to impair lung growth and pulmonary immune defenses, leading to the onset of chronic lung diseases during adulthood. Thus, indoor air pollution due to biomass and other solid fuel use for cooking is perhaps

the greatest environmental risk factor for respiratory diseases, globally. Women and young children are particularly vulnerable to the harmful effects of indoor air pollution due to their prolonged exposure. There are additional concerns that this exposure undermines public health interventions, such as nutritional supplementation.

In response to this growing threat, the Johns



Sundeep Salvi
Chest Research Foundation
Pune, INDIA



Sanjay Juvekar
Vadu Rural Health Program, KEM
Hospital Research Centre
Pune, INDIA



Anurag Agrawal
CSIR Institute of Genomics &
Integrative Biology, Delhi, INDIA

Hopkins Bloomberg School of Public Health was awarded funding by the Indo-U.S. Science & Technology Forum (IUSSTF) to establish a Joint Center to study *Indoor Air Pollution and Environmental Lung Diseases* in nonsmokers living in rural India. The Indo-U.S. Center for Environmental Lung Diseases is led by Shyam Biswal, PhD, professor at the Johns Hopkins University (JHU) Bloomberg School's Department of Environmental Health Sciences; Sundeep Salvi, MD, PhD, FCCP, Director of India's Chest Research Foundation in Pune; Anurag Agrawal, MD, of the Institute of Genomics and Integrative Biology, Council of Scientific and Industrial Research in Delhi; and Stephanie London, MD and Jane Hopkins, PhD from the National Institute of Environmental Health, National Institutes of Health, USA. Research at the Joint Center will focus on a large rural cohort of more than 80,000 individuals enrolled in the Health and

Demographics Surveillance System at Vadu, Pune, led by Sanjay Juvekar, PhD.

The Center has been an effective catalyst for capacity building by providing funds for three faculty exchanges and three graduate student exchanges from either side every year for the next two years to provide training in the assessment of how biomass exposure affects the lungs. Drs. Patrick Breyse, Thomas Sussan, and Shyam Biswal from JHU have traveled to India to provide training to their Indian colleagues on particle collection and air sampling. Several Indian students and principal investigators from India have visited JHU to receive training on biomass related biological research and exposure assessment. The concentration of indoor air pollution in homes that cook with biomass in India is 10-100 times greater than the concentration of outdoor air pollution. The initial efforts of the Joint Center focussing on assessment of exposure to indoor air pollution



Indo-US Center on Indoor Air Pollution and Environmental Lung Diseases

will be the cornerstone of future trials led by the IUSSTF to improve the health of the Indian population. Exposure assessment will be a key component of Center-supported research. Another focus of the Center is to understand the mechanisms by which indoor air pollution causes impairment of immune system, which predisposes exposed adults and children to respiratory infections. As a result of these efforts, the Center will lay the groundwork for large-scale public health research projects to study exposure, pathobiology and gene-environment interactions that alter susceptibility to lung diseases, and to develop novel prevention and treatment strategies in the affected populations.

This Joint Center has already begun to show progress from combined efforts. The US-Indian team has recently received funding from the Fogarty International Center, National Institutes of Health (USA) and the Johns Hopkins Center for Global Health to initiate small-scale intervention trials in Vadu, Pune, India. The US-Indian team has assessed various sources of biomass fuels and determined that fuel source

(i.e. wood, cow dung, and crop residues) may have a tremendous effect on the health impacts caused by exposure to biomass fuel smoke.

The emerging evidence from previous intervention trials demonstrate that replacing traditional cookstoves with improved efficiency cookstoves shows only marginal benefits to health, and the results have been particularly disappointing among trials that attempt to disseminate improved cookstoves to large groups of households. It is clear that interventions will be rejected without proper training, maintenance, risk communication, and behavioral reinforcement. Thus, future interventions will only be successful if they consist of concerted efforts from investigators from a variety of disciplines, including both social and biological sciences. In addition to the ongoing research on health effects and mechanisms, the Center is also planning a conference to bring together health professionals and public health researchers from different disciplines in both countries to develop effective intervention strategies. ●



VITERBI-INDIA PROGRAM

The Viterbi School of Engineering, University of Southern California (USC) and the Indo-US Science and Technology Forum (IUSSTF) have partnered to support the **Viterbi-India Program**. This program will provide opportunities to Indian students to undertake a research internship at the Viterbi School of Engineering in summer 2013 for a period of 8 weeks.



The Viterbi-India Program is envisaged to:

- Provide an opportunity to the best and brightest Indian students to gain exposure and access to world class research facilities in the Viterbi School.
- Promote research and capacity building in frontline areas of engineering and technology.
- Encourage outstanding students to take up research as a career.
- Pave the way for the next generation engineers from India to interact with American peers, thus help building long-term R&D linkages and collaborations.

Eligibility:

- Indian students currently pursuing a Bachelors or Masters degree at recognized institutions of higher education in India.
- Open to students of Electrical Engineering, Computer Sciences and Computational Sciences.

Scholarship includes:

- Stipend
- Airfare

For application format and guidelines please visit: www.indoustf.org

For program information contact:

Dr. Nishritha Bopana

Indo-US Science and Technology Forum (IUSSTF)

12, Hailey Road, Fulbright House, New Delhi-110001, E-mail: viterbi-india@indoustf.org

APPLICATION DEADLINE: 15 November 2012

Connecting the Dots



Ram Karan Singh

Professor & Head
Department of Civil Engineering
ITM University, Gurgaon

An Indo-US bilateral workshop was held from 5-6 March, 2012 at ITM University Gurgaon on “*Global Challenges: Climate change, Water, Environment and Society*”. Sponsored by the Indo-US Science and Technology Forum (IUSSTF), New Delhi the workshop was organized by the Department of Civil Engineering, ITM University, Gurgaon in association with the Department of Civil and Environmental Engineering, Centre for Water and Society, Michigan Technological

University, USA. Seven technical sessions of the workshop had over twenty presentations on the various themes including climate change scenario and its interactions with water resources, glacier hydrology, agriculture, transportation, eco-system and society.

The topics covered in the Indian context included:

- a regional study on the changing environment and solar radiation response;
- a case-study on the climate change imperatives;
- trends and analysis of spatial distribution of rainfall in complex terrains in India;
- a case-study on the Sabarmati basin in Gujarat;
- the impact of climate change on water resources and the Indian response to urban climate systems;
- urban heat island and urban flood mitigation in India;
- climate change and its impact on water resources of the western Ganga plain;
- the impact of climate change on urban water resources;
- a study of attitudinal change among youth in north India;
- the retreat of Himalayan glaciers and its impact on river hydrology;
- impact of auto-fuel policy norms on vehicular pollution loads in Delhi;



- India's concerns and adaptation strategies to combat the impact of climate change on human health; and,
- the role of civil society in mainstreaming climate change adaptations.

The topics covered under the US context included:

- adaptive management of water resources in the United States in response to climate change;
- impact of climate change on water supply systems in the US; life cycle assessment-based tools and methods to mitigate highway infrastructure emissions;
- climate change impact on freshwater ecosystem services in Laurentian Great Lakes; and finally,
- the historical perspective of political and social responses to climate change in the United States.

One major point that emerged from the deliberations of the workshop was the lack of reliable empirical data for the Himalayan region. The dependence of Indian agriculture on the monsoon and river systems led to the analysis of the equitable and sustained distribution of water in the river basins. It was also felt that the scope of climate change research targeting forests and forest ecosystems should be broadened with the inclusion of less-researched topics as well. Climate change presents a significant challenge for water management because of the uncertainties regarding its impact on water availability and quality, frequency and magnitude of floods and droughts, coastal inundation and salinity intrusion. In the context of climate change, rapid development is sustainable development in the case of a low-income country. If they fail to develop rapidly, low-income countries will be unable to adapt to climate change with any degree of success. Future generations in these countries will have to pay a heavy price if the present generation fails to achieve rapid development. For low-income countries, development is the best form of adaptation.

Water resource systems across the United States are expected to be impacted by increases in temperature, changing precipitation patterns, variations in the timing of runoff, and potentially more extreme hydrologic events as a result of a changing climate in the 21st

century. To deal with the uncertainty of the climate in the future; adaptive management is proposed as a framework in which hydro-climatic systems are monitored and decisions are made sequentially over time and adjusted as more information becomes known. The inhabitants of the Great Lakes basin depend on a wide range of ecosystems provided by the water resources of the lakes themselves and the contributing watersheds. However, the water-rich Great Lakes basin is particularly vulnerable ecologically to the effects of climate change. The challenges of climate change are increasingly motivating transportation agencies to adopt practices and technologies that reduce the life cycle greenhouse gas emissions of highway infrastructure.

The workshop considered it important that the future scientific collaborations between India and the US should include climate change and options available regarding mitigation and adaptation. Integrated watershed management that recognises traditional knowledge and the social context should also be a key focus area in which water is to be managed as a public resource with sustainability as one of the key management objectives.

The workshop evoked engaging discussions on common concerns, their possible solutions and research interests in relevant fields of science and technology. The broadbased involvement of professionals from academia, industries, government organizations and numerous research scholars and students added to the success of the event. ●



Michigan Tech

Release of the Abstract Book at the Indo-US workshop on "Global Challenges : Climate Change, Water, Environment and Society"



US-INDIA SCIENCE AND TECHNOLOGY ENDOWMENT FUND

SECOND CALL AWARDEES

A NOVEL WAY TO MANAGE FECAL INCONTINENCE IN NON-AMBULATORY PATIENTS

LEAD PARTNERS



Nishith Chasmawala
Consure Medical Pvt. Ltd., Surat



Matt Durack
Lunar Design, San Francisco, CA

THE PROBLEM

Fecal incontinence, the inability to control the release of stool, is a ubiquitous clinical problem that affects more than 50 million patients globally. The absence of an adequate management solution for fecal incontinence leads to dermatitis, maceration, skin denudation, increased length of stay in hospitals, increased utilization of hospital resources and adversely impacts the mortality by 7%. Fecal incontinence is also the second leading cause for geriatric patients to move to nursing homes.

THE SOLUTION

The team has developed a self-expanding device with a unique placement, deployment and withdrawal mechanism. Some salient features of the device are:

- Requires minimal training and can be administered without the need for imaging.
- The product works on all patients, irrespective of their stool type or sphincter tone.
- The product offers a hygienic insertion mechanism and is overall very sanitary.
- Small insertion and profile diameter. The inherent design of the product is patient friendly.

BRANCHLESS BANKING AND FINANCIAL SERVICES FOR THE UNBANKED AND UNDER-BANKED

LEAD PARTNERS



Abhipriya Gupta
Eko India Financial Services Pvt. Ltd., Delhi



Angela Schmuck
IDmission LLC, Mesa AZ

THE PROBLEM

A large section of the Indian population (~500 million) still remains without access to banking services. Traditional financial service delivery models have failed to serve low income populations.

THE SOLUTION

Building a low-cost payment infrastructure for instant small value financial transactions by leveraging existing retail shops, tele-connectivity and banking infrastructure to extend branchless banking services to the common man. Eko's uniqueness lies in:

- Handset agnostic, number dialing initiated financial transactions
- Low-cost paper based transaction authentication mechanism

The Unique Identity Authority of India (UIDAI) aims to provide a unified database of residents to support biometric authentication. Eko has partnered with IDmission - an identity management solutions provider with a focus on UID enablement - to deliver financial services efficiently and at scale through smart phone based applications.

MOBILE PHONE BASED HBA1C ANALYZER

LEAD PARTNERS



Sidhant Jena
Janacare Solutions Pvt. Ltd., Delhi



Stephen Chen,
Teco Diagnostics, Anaheim, CA

THE PROBLEM

There is an acute need for a low-cost and portable HbA1c monitor to screen and manage diabetes in the developing world. However, most standardized HbA1c monitors are expensive, bulky and assay based systems and thus not suited for mass adoption.

THE SOLUTION

The team proposes to develop a low-cost mobile phone platform to measure HbA1c. Their novel platform comprises of two components - a colorimetric test strip for HbA1c and a software application that uses the phone's camera to analyze the test strip. Additionally, the software application can provide automated decision support and transmit data to remote specialists, thus enabling millions of field health workers to screen and manage diabetes in even the most remote communities.

More Steps in Tandem



John Holdren (Director of the White House Office of Science and Technology Policy) with T. Ramasami (Secretary, Department of Science and Technology, Govt. of India)
Photo Courtesy : U.S. Department of State - Bureau of Oceans, Envir's Photostream

The United States hosted the second U.S.-India Joint Commission Meeting on Science and Technology Cooperation in Washington on June 11, 2012. The U.S. and India Joint Commission for Science and Technology Cooperation is working to finalize a new 2012-2014 Action Plan to enhance cooperation over the next two years, and recently established three new standing expert working groups to implement activities in the following areas: basic and applied sciences; health and medical sciences; and atmospheric, environment, and earth sciences.



John Holdren (U.S. Science and Technology Advisor to President Obama) and T. Ramasami, (Secretary, DST) present awards to the three grant winners from the first call of the U.S-India Endowment Fund Program. [L to R: Rajiv Sharma (ED, IUSSTF), Arabinda Mitra (DST), John Holdren, Sorin Grama (Endowment Awardee), Sam White (Endowment Awardee), and Rustom Irani (Endowment Awardee), T. Ramasami, Blair Hall (US Embassy, New Delhi) and T.S. Rao (DBT)]

Photo Courtesy : U.S. Department of State - Bureau of Oceans, Envir's Photostream

The second Joint Commission meeting featured thematic discussions on policy initiatives to strengthen bilateral research cooperation and best practices for retaining and advancing women in science. The U.S.-India Science and Technology Endowment Board also reported its progress. The Endowment Board, established by Secretary Clinton and Minister Krishna in 2009, announced in May the Board's first grant recipients for entrepreneurial projects that commercialize technologies to improve health and empower citizens.

In preparation for this meeting, the United States and India also held several workshops to explore ways the United States and India can work together to build innovative capacity and technology commercialization and to foster science, technology, engineering, and math (STEM) education. ●

Text courtesy: Fact Sheet, U.S. Department of State
<http://www.state.gov/r/pa/prs/ps/2012/06/192271.htm>



Nagi Kumar

Moffitt Cancer Center University of South Florida College of Medicine Tampa, USA

All Guns Firing



Medha Dhurandhar

Centre for Development of Advanced Computing, India

Botanical and biologic agents have been used for hundreds of years in India to treat/prevent several diseases, including cancer. In the past two decades, a better understanding of the molecular basis of carcinogenesis has been achieved in addition to emergence of new and evolving technologies in bioinformatics, genomics and proteomics. As a result the field of research in botanical and biologic agents for cancer prevention and treatment has continued to experience a significant growth. Several hundreds of these botanicals and biologics have been isolated and characterized in both countries. These agents appear promising in their potential to make a dramatic impact in cancer prevention and treatment, with a significantly superior safety profile than most therapeutic agents. It is clear that both India and the US have their respective strengths and resources. These can be synergized to build an interdisciplinary community harnessing system of Information and Communications Technology for accelerating botanicals and biologic drug development on an international scale for cancer prevention and treatment. The impact this approach is likely to have on the economics of drug discovery is of great significance. We predict that this collaborative effort will result in research breakthroughs that will bring new hope. It will also create a new class of anticancer drugs that will help millions of cancer patients and those who are at a high risk for this disease in both our countries.

With the evolving evidence of the promise of botanicals and biologics for cancer chemoprevention and treatment and the significant impact these discoveries can make to the Indian, US and the global population, Dr. Nagi Kumar from Moffitt Cancer Center, USA and Dr. Medha Dhurandhar from Centre for Development of Advanced Computing India, conducted an Indo-US collaborative Workshop focused on “Accelerating Botanicals Agent Development Research for Cancer Chemoprevention & Treatment”. Funded by the Indo-US Science and Technology Forum (IUSSTF) and the Moffitt Cancer Center, the workshop was held at Tampa, Florida, USA between May 29-31st, 2012.

One goal of this workshop was to enhance the knowledge (agents, molecular targets, biomarkers, approaches, target populations, regulatory standards, priorities, resources) of a multi-national, multidisciplinary team of researcher’s to systematically accelerate the design, conduct successful clinical trials to evaluate botanicals and biologics for cancer chemo-prevention and treatment. Another goal was to achieve efficient translation of these discoveries into the standards for clinical practice that will ultimately impact cancer morbidity and mortality. The workshop addressed several key areas including epidemiology of cancer, pre-clinical laboratory and early clinical trials using botanicals and molecular targets, intermediate endpoints,

high risk target populations, regulatory issues, cancer, culture and literacy as it applies to clinical trials. It also discussed statistical considerations and representative clinical trial designs that are ready for immediate translation into efficient prevention trials. Expert panelists were drawn from a diverse group of stakeholders, representing the leadership from the National Cancer Institute's Office of Cancer Complementary and Alternative Medicine (OCCAM), NCI Experimental Therapeutics (NExT), Food & Drug Administration and national scientific leadership from India. In addition to a distinguished group of population, basic and clinical scientists from the two countries, including leading expert from the fields of bioinformatics, social sciences and bio-statistics also participated in workshops. The workshop focused on translation of botanicals and biologics into cancer chemoprevention and treatment using a systematic scientific approach. The workshop provided expert insights on the magnitude of the problem of cancer in both countries, exchange of ideas and resources, the current epidemiological, pre-clinical, laboratory, early clinical evidence of the utility and safety of several botanicals and biologics for cancer chemoprevention and treatment. It also outlined potential approaches to accelerating the research in this area, identified gaps, challenges and solutions to ultimately develop strategies to achieve efficient translation of these discoveries into the standards for clinical practice.

Future Directions

At the end of the workshop, four collaborative working groups were formed to focus on major cancers that affect both the US and India, namely: head & neck, lung, prostate, colorectal and breast/ovarian cancers. It was clear

that the bioinformatics and drug screening infrastructures, both in the US and India were ready for use by the international scientific community. It is now planned to establish a joint repository of botanicals and biologics ready for prioritization for pre-clinical and clinical trials, targeting major cancers in both countries. We intend to initiate collaborative research projects using the traditional and novel funding mechanisms in both countries. Prioritizing novel agents from this repository, mechanism of action, relevant biomarkers and target populations were also discussed during the workshop. Guided by an independent advisory board of scientists and stakeholders from both countries, members of the consortium will meet in the future in specific teams during various national and international conferences with and expand and enrich this collaborative mechanism.

The authors thank IUSSTF for funding this workshop. We would also like to take this opportunity to thank the National Cancer Institute, Food and Drug Administration and the Moffitt Cancer center for the additional support for this workshop. ●



Excerpts from the

June 13, 2012,



Energy:

Secretary Clinton and Minister Krishna welcomed the progress in India-U.S. cooperation in the energy sector, including in the areas of clean and renewable energy, and energy conservation and efficiency.

They noted that the Partnership to Advance Clean Energy (PACE), launched by President Obama and Prime Minister Singh in November 2009, has mobilized more than \$1.7 billion dollars towards a wide range of clean energy projects. They expressed appreciation for the efforts of several U.S. agencies to support development and deployment of clean energy projects. They confirmed that both countries would continue to exchange best practices on low-carbon growth strategies to support a greener and more prosperous future.

They welcomed the selection of three public-private consortia for funding under the U.S.-India Joint Clean Energy R&D Center, announced by Prime Minister Dr. Manmohan Singh and President Obama in November 2010, with annual commitment of \$5 million each from the two governments

and matching private contributions from the winning consortia, to promote research and development in the areas of advanced biofuels, solar energy and energy efficiency in buildings.

They welcomed the productive discussions between India and the United States on energy security in May 2012 and planned to continue this conversation, through the Energy Dialogue and other appropriate forums. The two sides also agreed to continue exchanges on assessment of shale and other unconventional gas resource potential in India and on hydrocarbon potential in the Indian Ocean and other regions, and its



Joint Statement

Washington D.C.

impact on global energy security. Recognizing the importance of natural gas as a bridge fuel to a clean energy future, the United States reiterated its support as India seeks to secure stable supplies of natural gas.

Education and Development:

Secretary Clinton and Minister Krishna applauded the expansion of the U.S.-India Higher Education Dialogue, which made significant strides in fostering cooperation between the two countries in higher education, research and innovation, and community

colleges. The United States and India plan to hold the next annual Higher Education Dialogue in 2013 in India.

They welcomed the announcement of the award of the first eight grants under the Obama-Singh Knowledge Initiative, which aims to strengthen teaching, research, and administration of both U.S. and Indian institutions through university linkages and junior faculty development. The next call for proposals will be announced in July 2012, with both governments having committed \$5 million dollars over 5 years.

Science & Technology, Health and Innovation:

Secretary Clinton and Minister Krishna reviewed the outcomes of the second Science and Technology Joint Commission Meeting, held on June 11, which covered bilateral research cooperation on basic and applied sciences, atmospheric, environment and earth sciences, health and medical services, STEM education, facilitating technology commercialization for societal impact and retention and advancement of women in science and engineering. They applauded the first award of grants by the U.S.-India Science

Contd. on pg. 27





Common Goals.....

Remarks by (Late) **Shri Vilasrao Deshmukh**
Former Minister for Science & Technology and Earth Sciences, Govt. of India



“The visit of President Clinton in 2000 to India was a defining moment in our science and technology cooperation agenda. Secretary Clinton, we recall with fondness that the bi-national Indo-U.S. Science and Technology Forum was founded during the visit of your husband as President. You might like to convey that the Forum he seeded has grown into a full fruit-yielding tree. It is the Forum which has catalyzed several of the major joint initiatives we are witnessing today.

I wish to recognize the ongoing outcome of our Stanford-India Biodesign program supported by the Department of Biotechnology and the Indo-U.S. Science and Technology Forum involving Stanford University, AIIMS and IIT-Delhi. Under this program, about 25 high-quality minds have been trained to identify major healthcare needs and develop cost effective solutions. I’m convinced that this program will provide deployable healthcare solutions covering a wide socioeconomic spectrum.

Contd. on pg. 26



Secretary Clinton meets with the fellows of the Stanford India Biodesign Program



Secretary Clinton meets Rajiv Sharma (Executive Director, IUSSTF)

Shared Vision

Remarks by **Hillary Rodham Clinton**
U.S. Secretary of State

“Our two great democracies share an enduring commitment to innovation. For decades, scientists, engineers, and social innovators from India and the United States have worked side-by-side. The most famous example, perhaps, are the agricultural improvements that led to the Green Revolution.

We also want our governments to embrace the spirit of innovation to improve our own work and strengthen our partnership. And let me give you a few examples as to how we’re doing this: First, I am proud to announce the winner of the first *U.S.-India Science and Technology Endowment Board* grant. That is an initiative that I was privileged to launch with Minister Krishna on my first visit in early 2009 as Secretary here. The grant goes to a partnership between an American startup, Promethean Power, and India-based Icelings. They have developed a solar-powered system for refrigerated storage to keep fresh fruits and vegetables from spoiling. And this is a huge advance for India because lack of storage causes Indian farmers to lose approximately

Contd. on pg. 26



Kranthi Kiran Vistakula explains ClimaGear – a product that allows the wearer to maintain a specific body temperature regardless of the external environment. Also pictured is Blair Parks Hall Jr. (Counselor for Economic Affairs and Environment, Science and Technology, US Embassy, New Delhi)



Secretary Clinton meets Rustom Irani and Sorin Grama, winners of the first U.S. India Science and Technology Endowment award for their cold-storage technology to reduce agricultural produce spoilage. Also in the picture is Madhuri Behari (AIIMS) who along with her collaborators at the University of Delaware developed a shoe for Parkinson's disease patients that won the Endowment runners-up award

India-U.S. Partnership on Innovation

May 8, 2012 | New Delhi, India

Remarks by (Late) Shri Vilasrao Deshmukh (Contd..)

Second program of interest today is the *India Innovation Growth Program* supported by Department of Science and Technology and Lockheed Martin Corporation. 200 business engagements agreements have already been entered involving both India and U.S. enterprises. Products of some technologies have entered the global marketplace and an impact analysis report prepared by FICCI reveals that committed revenue generated by the innovators there in 2007 and '10 amount to more than 70 U.S. million dollars.

The third major program of value showcased today is the *U.S.-India Endowment Fund* established by the two governments in 2009. The creation of this fund is another landmark in our belief to work together in the space of technology commercialization. I'm certain that our joint effort through this fund would foster commercialization of technology leading to societal impact. The program funded by DST and U.S. State Department have started to roll out project grants. We have witnessed today the first batch of such investment in the broad priority areas covering health issues and empowering citizens.

The fourth flagship is the *Indo-U.S. Joint Clean Energy Research and Development Center*. This is a bilateral initiative of my Ministry of Science and Technology with the U.S. Department of Energy. We have committed 25 million U.S. dollars from each side. The joint center will support multi-institutional network project using consortia partnerships based on public-private model of funding. We are focused on the areas of mutual interests covering solar energy, second generation bio-fuels, and energy efficient buildings.

Undoubtedly, our bilateral relationship today is a true partnership that uses the soft progress of science, technology and innovation for the benefit of people, the priority in both our countries. When the most powerful, large economies of the world join and develop their innovation agenda, it is bound to deliver values of global good. The world would want us to work together.” ●

Remarks by Hillary Rodham Clinton (contd....)

\$10 billion in crops each year. This innovation promises farmers more income while also improving consumer's access to fresh produce throughout the year. This partnership united different experiences and areas of expertise, and now with a little help from the endowment fund, Promethean Power and Icelings are helping solve a practical challenge that will make a real difference to people's lives and incomes.

One of the displays I had a chance to see earlier – and if the press and the people in attendance haven't seen the displays, I hope that you will have a chance to do so – but one of them was the *Stanford-India Biodesign* project, which has developed an infant resuscitator, and the *Lockheed Martin Innovation Growth program* has awarded a grant to 3nethra for an eye scanner that can detect treatable diseases before they cause blindness. Both these cutting-age innovations cost a fraction of other medical devices that address these same problems, make lifesaving healthcare available to people who may not otherwise be able to afford treatment.

Some of the brightest minds of our two societies are already working together. They are seeking solutions for shared problems, and they are building the industries and creating the jobs for tomorrow.

So we can and do – we can and must do more on the government level to spur institutional partnerships. These public-private partnerships are really an incredible way to bring the best of government and the best of industries, academia, and non-for-profit organizations together. And I hope that we will see even more sprouting forth. We look to you, the innovators, the inventors, the researchers, the dreamers, in this audience today for your leadership. The minister and I are happy to be in receive mode. We want to hear from you about what you think will work. We are working hard to set up the institutions that will then be responsive, but it's really up to each of you who has that idea and is willing to work hard in order to see it come into reality.” ●

Excerpts from the Joint Statement

June 13, 2012, Washington D.C.

Contd. from pg. 23

and Technology Endowment Board for entrepreneurial projects that commercialize technologies to improve health and empower citizens, which include a partnership to create a cold-chain storage solution to keep farmers' produce fresh. ***They noted the ongoing activities of the Indo-U.S. Science & Technology Forum, now in its eleventh year, which have brought together 11,000 Indian and U.S. scientists and technologists.***

The two leaders welcomed the rich array of public and private science and technology cooperation between U.S. and Indian institutions and partners. These include the new initiatives between India's Department of Science and Technology and U.S. National Science Foundation on a Virtual Institute on Mathematics and Statistical Sciences and DST-NSF Summer Internship; the recent initiative (PC3) of the Department of Electronics and Information Technology and U.S. NSF to jointly fund collaborations between universities and institutions in the two countries on the application of electronics and IT for societal challenges, which has already resulted in five collaborations in the areas of wildlife management, air quality, water sustainability, healthcare and smart electric grids; India's recent commitment of more than \$100 million to the California Institute of Technology's Thirty-Meter Telescope Project; the exchange of weather and monsoon forecasting, climate change information and global precipitation under the Civil Space Working Group; and the collaborative project of the U.S. National Science Foundation and the Indian Department

of Atomic Energy and Department of Science & Technology to develop a Laser Interferometer Gravitational Wave Observatory, with a likely contribution of USD 100 million from India. The two sides also intend to explore opportunities for cooperation in the study of groundwater information systems and Decision Support Systems for optimal management of groundwater resources. The two sides plan to host the next Civil Space Joint Working Group in Washington, D.C. in the summer of 2013.

The two leaders acknowledged the June 9 launch of the Global Ring Network for Advanced Applications Development (GLORIAD), the first direct U.S.-India advanced science and education network supporting enormous data flows between the U.S. and India.

Secretary Clinton and Minister Krishna lauded the completion of 25 years of the Vaccine Action Programme, a collaborative research venture between the two countries; welcomed the establishment of the Global Disease Detection India Center, announced by Prime Minister Dr. Singh and President Obama in November 2010; the proposed collaboration between the Department of Biotechnology of India and the U.S. Department of Health and Human Services on stem cell regenerative medicine research; and collaboration between the U.S. Department of Health and Human Services and Indian Ministry of Health and Family Welfare on Diabetes Research. These are part of the wide-ranging collaboration between the two countries in the health sector. ●

Text courtesy: <http://newdelhi.usembassy.gov/pr061412e.html>

Quest for Excellence

The Department of Biotechnology (DBT) Govt. of India, the University of Wisconsin (UW) Madison and the Indo-US Science and Technology Forum (IUSSTF) hosted the Khorana Scholars Symposium on 3rd August 2012 at India International Center, New Delhi.

Named after Dr. Har Gobind Khorana, who won the Nobel Prize in 1968 for his work in chemistry and biology while being a member of the University of Wisconsin-Madison faculty, the Khorana Program aims to identify and nurture future “Khoranas”. It is also designed to build long-term Indo-American science and technology relationships. Based on the success achieved, the Khorana Program has been expanded beyond UW to include several other premier U.S. Universities such as MIT, University of Michigan, University of Iowa, University of Illinois, University of Minnesota, Michigan State University, Indiana University, and Georgetown University to enable highly talented students to gain a transformative international S&T research experience.

The **Khorana Program Students Symposium** allowed the Khorana Scholars to share their

research experiences with top policy makers and innovation leaders, faculty mentors, program administrators and other Khorana scholars.

The keynote speaker, **Mr. Sam Pitroda**, Advisor to the Prime Minister on Public Information Infrastructure and Innovations spoke on the importance of nurturing young talent. He urged the Khorana Scholars to break traditional constraints on thought and follow their dreams by charting their unique paths to success and live up to the legacy of Prof. Khorana. The Secretary of the Department of Biotechnology, Govt. of India, **Dr. M.K. Bhan**, presided over the function and together with Sam Pitroda distributed certificates and medals to the 2012 Khorana Scholars. The co-founders, **Dr. Kenneth Shapiro** and **Dr. Aseem Ansari**, added that the program’s true impact will be felt in a generation as scholars make significant contributions to science and society. Executive Director of IUSSTF, **Dr. Rajiv Sharma**, noted that the program honored the true spirit of collaboration and partnership between India and the United States.

Learn more at:

http://indousstf.org/Khorana/khorana_program.html and http://www.biochem.wisc.edu/faculty/ansari/khorana_program





May - July – 2012

ACCELERATING BOTANICALS AND BIOLOGICS AGENT DEVELOPMENT RESEARCH FOR CANCER CHEMOPREVENTION, TREATMENT AND SURVIVAL

29-31 May 2012
Tampa, Florida, USA



From ancient times, botanical and biologic agents have been used to treat/prevent several diseases, including cancer. Research has demonstrated that these agents affect a number of proteins involved in various molecular pathways that regulate inflammatory and carcinogenic responses, various enzymes, transcription factors, receptors, and adhesion

proteins. However, although several of these agents have shown efficacy in laboratory and preclinical studies, very few have moved from the bench to the bedside. The Indo-US workshop on *Accelerating botanicals and biologics agent development research for cancer chemoprevention, treatment and survival* was organized by **Medha Dhurandhar** (Centre for Development of Advanced Computing, Pune) and **Nagi B. Kumar** (University of South Florida College of Medicine, Tampa) to bring together trans-disciplinary stakeholders represented by research scientists and clinical oncologists, pharmaceutical industry, regulatory bodies, biotechnology industry representatives and bio-informatics professionals in the two countries to exchange expertise, ideas and resources; and, identify gaps, challenges and solutions to ultimately develop strategies to achieve efficient translation of these discoveries into the standards for clinical practice that will ultimately impact cancer morbidity and mortality. ●

SERC SCHOOL IN CHRONOBIOLOGY

20 June-03 July 2012
Shillong, India



Chronobiology intends to understand and leverage oscillatory phenomena in living organisms and their adaptation to geophysical cycles. Over the last three decades it is becoming increasingly clear that complex biological systems integrate signalling, transcription, energy management and metabolite turnover along a 24-hour timescale. Leveraging the temporal controls holds untapped potential to address emerging challenges in areas ranging from food production, ecosystem restoration, to management of non-communicable chronic diseases. Hence chronobiology offers an ideal framework for integrative

biology and it encompasses diverse fields including but not limited to comparative anatomy, development, physiology, medicine, genetics, molecular biology, behaviour, ecology and evolution. To develop human resources and train a new breed of scientists on the integrative nature of chronobiology, the *SERC School on Chronobiology* was organized by **A. S. Dixit** (North Eastern Hill University, Shillong) and **Vinod Kumar** (University of Delhi, New Delhi). The 15-day event provided intense training to young investigators and students who have chosen Chronobiology as their field of enquiry. The topics covered included basic concepts and methods (organization of central nervous system in invertebrates and vertebrates, neurotransmitters, transcription and translation, feedback mechanisms, formal properties of the clock vis-à-vis physical principles, deep sequencing, genomics etc.); understanding what constitutes the clock, and how the clock functions at molecular, cellular, organ, system and whole organism levels; and, the role of circadian organization in humans, implications of circadian disruption in diseases involving sleep, metabolism and aging. ●

TECHNOLOGY COMMERCIALIZATION THROUGH PUBLIC-PRIVATE SECTOR PARTNERSHIPS

08-14 July 2012
East Lansing, USA



Public institutions in India and the US are generating numerous innovations and technologies that can benefit society in terms of enhancing food and nutritional security, environmental quality, and economic growth. Public sector institutions in the United States have accumulated a wealth of experience in technology transfer, management, and commercialization and in working with the private sector through public-private sector partnerships, so that society can benefit from the new innovations and technologies. An Indo-US workshop on

Technology commercialization through public-private sector partnerships was organized by **Ram Srivastava** (CCS Haryana Agricultural University, Hisar), **Suresh Kumar Kunhikannan** (Technology Information, Forecasting and Assessment Council, New Delhi), **Karim M. Maredia** (Michigan State University, East Lansing) and **Callista Ransom** (Michigan State University, East Lansing) to bring together technology managers and practitioners from public and private sector institutions in India and the US to share experiences and lessons learned. The workshop focussed on sharing experiences of US Land Grant Universities and USDA Agricultural Research Service (USDA-ARS) with the technology managers from public and private sector institutions in India for mutual benefits. The workshop included field visits, case studies, business plan development, technology valuation, licensing, negotiation skills, and development of a roadmap for technology commercialization. In addition, participants used real-world case studies from their own institutions, companies, and regions that have commercial potential to develop a business plan for product commercialization and deployment. ●

ADVANCED MODELING AND DATA ASSIMILATION FOR TROPICAL CYCLONE PREDICTIONS

09-14 July 2012
Bhubaneswar, India



In their November 2010 Joint Statement, Prime Minister Singh and President Obama renewed their commitment to the relationship between India and the United States as a defining partnership of the 21st Century. They identified weather and climate forecasting for agricultural production as a priority area for collaboration between the two countries. The National Oceanic and Atmospheric Administration (NOAA) has since signed a bilateral agreement with India's Ministry of Earth Sciences (MOES) to improve tropical cyclone forecasting over the Indian seas. In order to share NOAA's advanced understanding and forecasting techniques acquired in the last few years, an Indo-US workshop on *Advanced modeling and data assimilation for tropical cyclone predictions with special reference to the hurricane weather research and forecasting (HWRF) system* was organized by **U.C. Mohanty** (Indian

Institute of Technology-Delhi), **S.K. Roy Bhowmik** (India Meteorological Department, New Delhi), **Sundararaman G. Gopalakrishnan** (National Oceanic and Atmospheric Administration, Miami) and **Frank Marks** (National Oceanic and Atmospheric Administration, Miami). The first half of the workshop covered various aspects of tropical cyclone research, developments and future advancements. This was followed by advanced training on research aspects of the Hurricane Weather Research and Forecasting (HWRF), high-resolution regional modeling system currently used in USA for track, intensity and structure predictions with a focus on the following topics: tropical cyclone inner core initialization and data assimilation issues over Indian seas; joint development of a next generation research and operational system, including a HWRF coupled storm surge prediction system for tropical cyclone prediction over the Indian seas and the subsequent flooding of land falling storms; and, impact analysis, risk and vulnerability assessment aspects of tropical cyclones. ●

July-August – 2012

SPACE SITUATIONAL AWARENESS, SPACE WEATHER AND DEBRIS RESEARCH

19-20 July 2012
Mysore, India

The Indo-US workshop on *Space situational awareness, space weather and debris research* organized by **Siraj Hasan** (Indian Institute of Astrophysics, Bangalore) and **Rengasamy Ponnappan** (Air Force Office of Scientific Research, Arlington) was aimed to address and brainstorm future directions the

research community needs to take in finding innovative scientific solutions for the global issues on space situational awareness including space debris. The areas of discussion included advances in ground- and space-based surveillance and tracking; in-situ measurement techniques; debris and meteoroid environment models; debris flux and collision risk for space missions; on-orbit collision avoidance; re-entry risk assessments; debris mitigation and debris environment remediation techniques and their effectiveness with regard to long-term environment stability; national and international debris mitigation standards and guidelines; hypervelocity accelerator technologies; on-orbit shielding concepts plus dynamical interaction and modeling of vehicles to develop a full 6-DOF theory of space vehicles and orbit debris; methods for accurate and precise recovery and prediction of space object; improved abilities for predicting collisions; and, advanced computational and visualization methods. ●

"TRIPLE TROUBLE": MALNUTRITION, TUBERCULOSIS AND HIV IN INDIA

03-05 August 2012
Chennai, India

In a setting where HIV infection and tuberculosis (TB) are operating in a population characterized by poverty and malnutrition, there is a greater need to focus on nutrition in those individuals with HIV infection or with both HIV infection and TB. Policy makers in resource-poor regions need

information on both the efficacy and feasibility of providing nutritional supplements (of various types) in different settings. Although there have been many calls for integration of HIV and nutrition programs, data is lacking on how such programs can be implemented in resource-constrained settings, what the composition of the supplement should be, and which subgroups should be targeted. The Indo-US workshop titled "*Triple trouble*": *malnutrition, tuberculosis and HIV in India* was organized by **Soumya Swaminathan** (National Institute for Research in Tuberculosis, Chennai) and **Christine A. Wanke** (Tufts University, Boston) with the following objectives: to review existing data on HIV infection, tuberculosis and malnutrition in India and to identify research gaps; to develop concept notes for future research and identify areas for potential collaboration between India and US partners on HIV-TB and nutrition; and, to develop recommendations on nutrition for HIV and TB, focusing on the acceptability, effectiveness and feasibility of nutritional supplementation in India. ●

FLAME STABILISATION AND COMBUSTION STABILITY

06-08 August 2012
Chennai, India

Flame stabilization and combustion stability is an area of active research interest and industry focus in both India and the United States. With this in mind **S. R. Chakravarthy** (Indian Institute of Technology Madras), **T. M. Muruganandam** (Indian Institute of Technology Madras), **S. K. Aggarwal** (University of Illinois at Chicago, Chicago) and **T. C. Lieuwen** (Georgia Institute of Technology, Atlanta) organized an Indo-US workshop on *Flame stabilisation and combustion stability* to bring together researchers from both academic/research institutions and the industry of the two countries. The key topics covered at the workshop included: modeling combustion instability – role of nonlinearity and non-normality; dynamical systems approach to flame stabilization and combustion stability – bifurcations and chaos; experimental database and characterization on

flame stabilization and combustion stability; study of flame stabilization and combustion stability in practical energy systems using biofuels or syngas; role of chemical kinetics of biofuels/syngas in dynamic flame stabilization; receptivity of flame-stabilizing shear layers to acoustic oscillations; aero-thermo-acoustic sources from bluff-body/swirl-stabilized combusting flows in practical burner devices; role of oscillatory liquid fuel spray injection and its response to acoustic oscillations; practical events of combustion instability and flame de-stabilization, and approaches to combat them; active and passive control approaches to flame stabilization and combustion stability; and, impact of control strategies on pollutant emissions. ●

CLOUD COMPUTING AND WEB SERVICES

08-10 August 2012
Coimbatore, India

Cloud computing has raised concerns about deviation of control from the owners of infrastructure and information, since it moves management of information and software to a service provider. It brings multiple fundamental shifts in how computing infrastructure is acquired and managed. This revolution in IT services has forced changes in information security approaches, application development models, capital and operational expense decisions, and the IT operations workforce size and skill set. The main objective of the Indo-US conference on *Cloud computing and web services* organized by **A. Kannammal** (Coimbatore Institute of Technology, Coimbatore) and **Subhash Kak** (Oklahoma State University, Stillwater) was to bring together researchers and industry experts working in cloud computing and related technologies

with a focus on recent technological developments, opportunities in a variety of domains like services computing, business models, e-government, agriculture, and challenges like security, privacy, management, and legal issues. The conference provided a forum for the delegates from India and the United States to discuss concepts, state of the art, research, implementations and applications and to shape and define the future of cloud computing in multiple directions. Given that inimical forces will continue to test the integrity of the Cloud in years to come and that India and the US have much convergence in their strategic interests, this conference helped identify problems on which researchers from these two countries should collaborate. ●

SYSTEMS ARCHITECTURES FOR BIG DATA

16 August 2012
Kochi, India

The confluence of innovation in mobile technologies, high speed networks, affordable data analytics architectures/algorithms, social network infra-structures, and scalable cost effective data center server, network and storage architectures are enabling the generation, sharing, analysis and archival of data like never before in human history. Increasingly, the data being generated in this information highway is in the form

of streaming media (text, audio and video) where the data is continuously generated analyzed and stored. The Indo-US workshop on *Systems architectures for big data* organized by **P. Venkat Rangan** (Amrita University, Kochi), **Krishnashree Achuthan** (Amrita University, Kochi), **Sreeranga Rajan** (Fujitsu Lab, Sunnyvale), **Kaladhar Voruganti** (NetApp Advanced Technology Group, Sunnyvale), **Michael Franklin**

August – 2012

(University of California Berkeley), **Ethan Miller** (University of California Santa Cruz), **Guha Ramanathan** (Google), **C. Mohan** (IBM), **Patrick McDaniel** (Pennsylvania State University) and **Margo Seltzer** (Harvard University, Boston)

focussed on the streaming aspects of data impacts the following different areas: system architectures, algorithms, security/privacy, and human usability factors. ●

WOMEN ENGINEERS LEADING GLOBAL INNOVATION

29-31 August 2012
Bangalore, India

Engineering and technology leaders should take advantage of increased globalization to improve collaboration and innovation. As the global marketplace becomes more accessible, academia and industry both can leverage the shrinking landscape to exchange ideas and implement cutting edge programs. Globally, the number of engineers and technologists is dropping which increases the need of fully utilizing all resources. Acting upon these dynamics, an Indo-US workshop titled *Women engineers leading global innovation* was organized by **Anuradda Ganesh** (Indian Institute of Technology-Bombay, Mumbai) and **Karen Horting** (Society of Women Engineers, Chicago) to target women and

their managers in India and the US, to advance communication, collaboration, and education. This symposium used synergies to advance the personal and professional development of the attendees. The objectives addressed the following needs: to introduce and create active linkages between industry and academia leaders in engineering and technology across borders; to develop a network, and cohort, of US and Indian leaders in engineering and technology; to provide insights regarding the cutting edge innovations effecting engineering and technology; and, to recognize the unique challenges of gender diversity in the engineering and technology workforce and propose potential solutions to increase gender diversity. ●

VILASRAO DESHMUKH | (1945 – 2012)



From a village ‘Sarpanch’ to a chief minister and Union minister, Vilasrao Deshmukh was adept at turning challenges into opportunities.

Mr. Deshmukh was an alumni of the ILS Law College, Pune. Starting his political career as a panchayat member (he was ‘Sarpanch’ of Babhalgaon from 1974 to 1976) Mr. Deshmukh was elected to the Maharashtra Legislative Assembly for the first time in 1980.

He held important portfolios of revenue, cooperation, agriculture, home, industries and education as a minister in the state between 1982 and 1995. His was elevated as Chief Minister of Maharashtra for the first time in October 18, 1999, a post he relinquished on January 17, 2003. He was sworn in again on November 1, 2004 for a second innings as Chief Minister.

On being elected to the Rajya Sabha, he was inducted as Union Minister for Heavy Industries and Public Enterprises and later as Minister for Rural Development.

He was appointed as Union Minister of Science and Technology and Minister of Earth Sciences on July 12, 2011, a position he held till his sad and untimely demise on August 14, 2012.



KHORANA Program for SCHOLARS

The Department of Biotechnology, Govt. of India, University of Wisconsin-Madison (UW) (and partner universities) and the Indo-US Science and Technology Forum (IUSSTF) are partnering to support the prestigious **Khorana Program for Scholars** named in honor of Dr. Har Gobind Khorana, who won the Nobel Prize in 1968 for his work at the interface of Chemistry and Biology while a member of the UW faculty. **The Khorana Program will provide opportunities to Indian students to undertake research at University of Wisconsin-Madison and partner universities in Summer 2013 for a period of 10 weeks.** A list of UW partner universities is available at https://www.biochem.wisc.edu/faculty/ansari/khorana_program/

The Khorana Program is envisaged to:

- Provide encouragement to young scholars to undertake R&D
- Enable students to carry out research at a premier University in the United States
- Transform research into societal benefits
- Build a seamless scientific community between India and the United States

Eligibility:

B.Tech, M.Tech and M.Sc. students currently enrolled in a recognized institution of higher education in India in the areas of biotechnology including agricultural, health and biomedical sciences.

Scholarship includes:

- Stipend • Accommodation • Airfare

For application guidelines refer to:
www.indousstf.org

For program information contact:

Dr. Nishritha Bopana
Indo-US Science and Technology Forum (IUSSTF)
12 Hailey Road, Fulbright House,
New Delhi- 110 001
E-mail: scholar@indousstf.org

Application Deadline : 30 NOVEMBER 2012

Indo-U.S. Science & Technology Forum

Who we are

The Indo-U.S. Science and Technology Forum (IUSSTF), established under an agreement between the Governments of India and the United States of America, is an autonomous, not for profit society that promotes and catalyzes Indo-U.S. collaborations in science, technology, engineering and biomedical research through substantive interaction among government, academia and industry.

What we do

Foster excellence by capitalizing on the scientific and technological synergy
Disseminate information and create awareness through scientific exchanges
Build linkages through networking between academia and industry
Explore new frontiers by nurturing contact between young and mid-career scientists
Pave way to sustainable interactions and establish long term relationships
Encourage public-private partnership to inculcate elements of innovation and entrepreneurship

We support

Exciting and innovative collaborative programs cutting across disciplines and institutions

Academia-Industry Connect Programs
Advance Schools & Training Programs
Bilateral Workshops & Symposia
Flagship Events
Industry Driven Programs
Visiting Professorships

Programs on Innovation
Public-Private Networked Joint Centers
Special Initiatives for Strategic Partnerships
Student Internships
Knowledge R&D Networked Joint Centers

We invite

IUSSTF solicits joint proposals for Indo-US workshops, training programs and joint networked centres twice a year and awards activities for every call on the basis of peer reviews both in India and USA.

Submission Deadlines

15 February
15 August

Award Announcements

30 June
31 December

**Next
call closes on
15th February
2013**

How to contact us?

Further information available at <http://www.indousstf.org>

We value your interactions with us towards promoting Indo-U.S. Science and Technology collaborations

Rajiv Sharma, Executive Director
Indo-U.S. Science and Technology Forum (IUSSTF)

Fulbright House, 12 Hailey Road
New Delhi 110 001, India
E-mail: rajiv@indousstf.org
Phone: 91-11-42691700
Fax: 91-11-23321552

Michael Cheetham, Head
US Representative Office

Indo-US Science and Technology Forum (IUSSTF)
American Association for the Advancement of Science
1200 New York Avenue NW, Washington, DC 20005, USA
E-mail: mcheetha@aaas.org
Fax: 1-202-326-6664



IUSSTF

Indo-US Science and Technology Forum

Indo-U.S. Science and Technology Forum: A Catalyst for Indo-U.S. Science & Technology Cooperation