NEWS AT A GLANCE

Forthcoming Events:

1) SEGH 2016 — 32nd International conference of Society for Environmental Geochemistry and Health
04 Jul 2017 - 08 Jul 2017,
Brussels, Belgium
Topics: Environmental Chemistry and Geochemistry
Event website: http://segh-brussels.sciencesconf.org/

2) Exoplanet science in the coming decade: The bright and nearby future
26 Jun 2017
Prague, Czech Republic
Topics: Astronomy, Astrophysics and Cosmology
Event website: http://eas.unige.ch/EWASS2017/session.jsp?id=S1

3) IGARSS 2018 - 2018 IEEE International Geosciences and Remote Sensing Symposium
22 Jul 2018 - 27 Jul 2018
Valencia, Spain
Topics: Geography, Global Positioning System, Earth Observation
Event website: http://www.igarss2018.org

4) Conference on Classical and Geophysical Fluid Dynamics: Modeling, Reduction, and Simulation
26 Jun 2017 - 28 Jun 2017
Virginia Tech, Blacksburg, Virginia, United States
Topics: Applied Mathematics (in general), Thermodynamics, Fluid Dynamics and Statistical Physics
Event website: http://www.math.vt.edu/GFD_conference2017/index.html

Awards and Recognition

*Shanti Swarup Bhatnagar Prize for 2016

Dr.Sunil Kumar Singh has been awarded for Earth, Atmosphere, Ocean and Planetary Sciences 2016

*American Meteorological Society has awarded The Roberte Horton Lecture in HYDROLOGY for 2017 to Hoshin V. Gupta for research into calibration and optimization of hydrological models, and for fundamental contributions towards quantifying uncertainty in hydrologic model predictions

* Dr.N.Purnachandra Rao, Chief Scientist of NGRI has been selected as the Director of National Centre for Earth Science Studies (NCESS), Thiruvanathapuram, under the Ministry of Earth Sciences, Govt. of India

Science and Technology News

Since Kyoto conference, nearly two decades back, a large number of international conferences were held in different parts of the globe to take measures to lessen greenhouse gas emissions that are responsible for global warming resultant climate change. It is unfortunate that nothing substantial has been achieved in these meetings/ conferences as reduction of fossil fuel emissions would have significant impact globally on the socio economic structures of developing and developed countries. As something tangible seems to have been achieved during the recent interaction in Paris conference, strong opposition to such fossil fuel reductions by USA in the last couple of months by the new government of USA has in general dampened the spirits of the environmental protagonists. While none can unequivocally quantify the role of natural and manmade causes for climate change, none can argue that global warming has not created significant changes to our environment and thereby to the overall wellbeing of Man, Flora and Fauna. Debates still continue to know explicitly the cause and outcome….Global warming led to climate change or climate change led to global warming. Since it is essential to know some important aspects of global warming in the last one decade I have given below results of some useful studies in the recent past so that young researchers can take measures to address global warming resultant ill effects. These studies also tell us the varied nature of the opinions expressed by the knowledgeable scientists and technological innovators, who in spite of their invaluable expertise could not specifically focus on aspects that could help Man (human race as a whole belonging to one colony-Earth), to lessen the negative impacts due to global warming. I feel sad to agree with intelligent industrial and business lobbies that scientists have become self centred and blinkered in defending their findings, instead of making a concerted focused co-operative effort to solve the climate change and global warming issues. Let us look at the significant studies carried out by scientists belonging to different branches and sub branches of earth system sciences and try to develop one powerful lobby of the scientists to overcome many hurdles in saving life on Earth.

***The Proof of Our Science Lies in the Telling**

Scientists conduct scientific research. It's what they can do. Researchers identify a question and apply all the techniques they can to obtain a solution. Then they publish their results for others to build upon and advance the science and our understanding of the earth, its environment, and the geophysical processes involved. It's a beautiful thing.

Meanwhile, back in the "real" world, the broader public can be left behind, and along with them, the policy community, congress, and the federal agencies. How can this be? Is this merely an expected consequence of the increasing specialization throughout modern society? Or is it an avoidable result of an operationally sequestered scientific community that has stayed in its ivory tower and eschewed contact with policy-makers?

This issue came to the fore at the recent conference on the National Council for Science and the Environment (NCSE), whose theme in 2016 was the Food-Energy-Water Nexus. While numerous technical sessions explored the many aspects of the interaction between food, energy, and water, some focused more broadly on the ways that the scientific community can more effectively provide data, analysis, and advice to the world at large. Though in one keynote lecture, Paul Lussier explained that merely explaining the facts of our science is not enough to inspire the public to alter their behavior to avoid impending social and environmental problems.

Consider the issue of the societal impacts of climate change. Sea level is rising twice as fast in the 21st century as it did in the 20th century because ice is melting and oceans are warming faster in response to radiative forcing. The public does not respond to descriptions of global data sets, measures of Arctic ice, or maps of sea surface temperature–a number like 3 mm/yr does not invoke a public response to alter behavior. They respond more immediately to their home washing away in a storm or to the threat of damage to things to which they are emotionally or financially connected. Emissions reductions and land use planning for sea level rise mitigation, water and energy use for resource conservation, and food production and diet for enhanced human health are only a few examples of areas around which behaviors could be altered for the public good. Yet behaviors are not changing because the knowledge generated by scientific inquiry is not disseminated in terms that the public understands or appreciates. It is our mindset as much as the words we use.

For example, scientists seek to be accurate and objective, while policy-makers want to be realistic and popular, the media needs to be dramatic and persuasive, and businesses must be accountable and visionary. These communities have very different goals, means, and measures of success, as well as contrasting and often conflicting operational languages. In order for the scientific community to help each of these communities to achieve their goals, including the ones they may have in common (such as leaving a planet for their grandchildren that can support them comfortably by providing a sufficient and sustainable flux of environmental goods and services), we must each couch our discussion in terms that have meaning for the communities we are engaging. Only then can our science be put to use for the benefit of society, and subsequently be appreciated, supported, and sustained. (**Source:** https://eos.org/editors-vox/the-proof-of-our-science-lies-in-the-telling)

***Better Tools to Build Better Climate Models**

Developing, maintaining, and enhancing a predictive climate model demand enormous human and computing resources. Decades' worth of observational data must be compiled, vetted, and integrated into a database. Parameters and variables must be identified and built into algorithms that simulate physical processes. Massive calculations can then convert past observations into predictions of the future. To determine the accuracy of predictions, results are validated by comparing them to present-day observations. As new data are fed to the model and scientific understanding of climate systems evolves, new information gets built into the model, and the testing and validation continue. One of the most resource-intensive aspects of climate modeling is the creation of a system for calibrating climate models, where model simulations are used to validate model output against observational data sets that span the globe. It is called a "climate model test bed." Such test bed environments typically evaluate each component of the model in isolation, using a skeleton framework that makes the module behave as if it were functioning within the larger program. To calibrate the model against regional observational data sets, uncertainty quantification techniques assess the accuracy of predictions, given the limitations inherent in the input information. If model developers could compare test bed output to observational measurements as the output was being generated, the comparison could facilitate aligning the model with the observed data. This capability could eliminate some of the more tedious activities associated with model development and evaluation.

If successful, the capability could accelerate the development of climate sub-model components, such as atmosphere, land, ocean, and sea ice. Researchers from five Department of Energy (DOE) laboratories of USA are developing this real-time comparison capability. If successful, the capability could accelerate the development of climate sub-model components, such as atmosphere, land, ocean, and sea ice. It could also improve the process by which the sub-models are integrated with each other to form the resulting coupled Earth system climate model.

For this effort, which began in mid-2011, the test bed developers fed representative observational data sets—for example, satellite data from NASA's Atmospheric Infrared Sounder (AIRS) and Earth Radiation Budget Experiment (ERBE)—into the specialized model testing and verification platform that they developed. This prototype platform allows for the rapid evaluation of model components and algorithms. To build the test bed prototype, the Climate Science for a Sustainable Energy Future (CSSEF) team has employed DOE's high-performance computing resources to make use of several open-source software projects that are steadily gaining recognition and usage in their respective research communities. The team has unveiled a unique and flexible prototype that they hope will accelerate the development of future climate models. The tools and experiences resulting from these DOE-sponsored projects provide the foundation for the prototype test bed's infrastructure. Now, through the integration of existing technologies, open standards, and community expertise, the CSSEF team has unveiled a unique and flexible prototype that they hope will accelerate the development of future climate models.

The prototype test bed team is now under the banner of the newly formed Accelerated Climate Modeling for Energy (ACME) project. Under ACME, the team will continue its efforts to deliver an advanced model development, testing, and execution workflow and data infrastructure production test bed for DOE climate and energy research needs. (**Source:** https://eos.org/project-updates/better-tools-to-build-better-climate-models)

***Himalayan Climate Change Affects Regional, Global Environments**

The high-elevation region that includes the Tibetan Plateau and its surrounding mountain ranges has been dubbed the "Third Pole." This region encompasses approximately 5 million square kms of unforgiving terrain, with an average elevation of more than 4000 meters above sea level, and it straddles tense geopolitical borders. The Third Pole includes an estimated 100,000 square kms of glaciers.

The annual variability of snow in the Third Pole region affects drinking and irrigation water that sustains roughly 1.5 billion people downstream. Cumulatively, this region holds the planet's largest concentrated stock of ice outside the Arctic and Antarctic. The annual variability of snow extent affects global atmospheric circulation patterns, monsoon variability, and, more important, drinking and irrigation water that sustains roughly 1.5 billion people in India, Nepal, China, and Bangladesh.

Scientists from around the globe gathered in May 2016 at the Byrd Polar and Climate Research Center at Ohio State University to address climate issues facing the Tibetan Plateau and surrounding mountain ranges. Climate records from low and middle latitudes are crucial to understanding Earth's changing climate. "It has to do with water resources," said Lonnie Thompson, a renowned

glaciologist and senior researcher at Ohio State. He added, "It has to do with the atmospheric processes that drive the monsoon system in that part of the world."

The workshop included sessions on glacial fluctuations, the Asian monsoon, hydrology, geohazards, and climate change in the Third Pole. Participants also focused on research related to the Third Pole biosphere and anthroposphere. The TPE program and its workshops provide an invaluable opportunity for data, resource, and methods sharing. The new Center for Tibetan Plateau Research aims to serve as a hub for strengthening global cooperation, for example, by assisting with young scientist training programs. In addition to this new center, the TPE program opened its Kathmandu center in 2013 and is planning to open a European center in the near future.

(Citation: Joswiak, M., D. Joswiak, and T. Yao (2017), Himalayan climate change affects regional, global environments, *Eos, 98,* https://doi.org/10.1029/2017EO069289).

***Earth's orbital variations, sea ice synch glacial periods**

New research shows how sea ice growth in the Southern Hemisphere during certain orbital periods could control the pace of ice ages on Earth. The Southern Hemisphere has a higher capacity to grow sea ice than the Northern Hemisphere, where continents block growth. New research shows that the expansion of Southern Hemisphere sea ice during certain periods in Earth's orbital cycles can control the pace of the planet's ice ages. Earth is currently in an interglacial period, a warm pulse between long, cold ice ages when glaciers dominate our planet's higher latitudes. For the past million years, these glacial-interglacial cycles have repeated roughly on a 100,000-year cycle. Now a team of researchers has a new explanation for that timing and why the cycle was different before a million years ago. According to researchers` models, it has to do with the fact that the planet has been generally cooler over the past million years than it was prior to that. The models show that, when Earth was generally warmer than today, precession-related sea ice expansion in the Southern Hemisphere is less likely to occur. That allows the obliquity cycle to dominate the global temperature signature. After a million years ago, when Earth became a bit cooler on average, the obliquity signal starts to take a back seat to the precession/eccentricity signal. Researchers believe their models present a strong new explanation for the history of Earth's glacial cycle -- explaining both the more recent pace and the puzzling transition a million years ago. As for the future of the glacial cycle, that remains unclear state the scientists. It's difficult at this point to predict how human contributions to Earth's greenhouse gas concentrations might alter the future of Earth's ice ages. (**Source:** Jung-Eun Lee et al; Hemispheric sea ice distribution sets the glacial tempo**.** *Geophysical Research Letters*, 2017; DOI: 10.1002/2016GL071307).

***Understanding How Climate Engineering Can Offset Climate Change**

Participants at a meeting in Oslo, Norway, presented new developments in modeling and simulating climate engineering approaches, including stratospheric aerosols, marine cloud brightening, cirrus thinning, and land and ocean brightening.

Climate intervention, also called geoengineering or climate engineering, is an emerging, important area of climate science research. This research focuses on deliberate climate modification to offset some of the effects of anthropogenic greenhouse gas emissions. The Geoengineering Model Inter-comparison Project (GeoMIP) was formed to better understand climate intervention through simulations conducted by multiple climate models.

GeoMIP held its sixth annual meeting at the University of Oslo in Oslo, Norway, in June 2016. The meeting was held in conjunction with the Norwegian project Exploring the Potential and Side Effects of Climate Engineering (EXPECT), which seeks to understand the implications of climate intervention and to stimulate interdisciplinary collaboration among scientists in the natural and social sciences. Participants from a variety of natural science backgrounds presented modeling results from multiple climate intervention methods, including stratospheric aerosols, marine cloud brightening, cirrus thinning, and land and ocean brightening. The first results from multi-model sea spray climate intervention simulations showed strong features of commonality among the responses of different models.

Descriptions of these new areas of research are being added to the GeoMIP website, which is the most up-to-date source of information on past, present, and future simulation designs. Also on the site are a timeline of start dates for the new simulations for Coupled Model and a current list of Testbed experiments. After the conclusion of the 1.5-day GeoMIP meeting, EXPECT held an open forum in which natural and social science experts on climate intervention presented to the general public the current thinking of the research community. In the future, GeoMIP will continue its mission of providing knowledge about key uncertainties in climate intervention research, particularly as an officially endorsed project under CMIP6. As new important areas of research emerge in this field, GeoMIP will continue to provide a scientific focus for addressing important unknowns and a forum for consideration of the full range of approaches to climate intervention. (**Source:** Kravitz,B et al (2017), Understanding how climate engineering can offset climate change, *Eos, 98,* doi:10.1029/2016EO005279).

***Good Night Sunshine: Geoengineering Solutions to Climate Change?**

The goal of 2016 Paris Agreement to limit global warming to 2°C, if not 1.5°C, are admirable, but it's unlikely that this inspirational goal can be reached with voluntary greenhouse gas emission reductions alone. Already, we are nearing the 1.5°C global warming level, with predictions for reaching 2°C not far into the future. The implications of global warming are recognized widely, both in short-term events like coastal inundation and extreme weather, and long-term in the form of permanently shifting climate zones and higher sea level. The range of our actions, however, is not limited to greenhouse gas generation only. Climate engineering takes two approaches: (1) Carbon dioxide removal (CDR), and (2) solar radiation management (SRM). CDR addresses the cause of climate warming by removing greenhouse gas from the atmosphere ("treat the illness"). SRM offsets the warming effects of greenhouse gases by allowing Earth to absorb less solar radiation ("treat the symptoms"). Reduction of greenhouse gas emissions, as proposed in the Paris Agreement, is desirable, but is not a prerequisite for climate engineering. Among the range of techniques, SRM is the main source of professional and public anxiety and has mostly remained taboo. There are concerns about unintended consequences, local applications with global consequences, runaway effects, and even climate warfare.

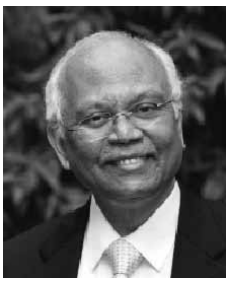
Given that climate engineering remains highly controversial, a set of thoughtful research papers and scientific commentaries have been published on this topic in AGU's open-access

journal *Earth's Future*. The contributions highlight our much improved understanding of the environmental, political, and societal risks and benefits of climate engineering, but they also recognize that the current state of our knowledge is insufficient for reliable deployment. Computer modeling and integrated assessments have advanced the positive and negative aspects of various techniques, allowing for an informed public debate and eventual decision-making. Some nations are advancing this understanding and are considering some implementation. However, more extensive scientific efforts and social study that includes real-world, outdoor experimentation will be needed to adequately assess near-term deployments and their impact.

Climate engineering has unquestionable potential to limit global warming when coupled with currently available technologies, but the scientific, social and ethical dimensions of implementation are not sufficiently examined. Given the worldwide impact of most deployment approaches, planning should occur on a global scale, involving all nations, both rich and poor, and not be limited to a few technologically advanced, wealthy stakeholders. Judging by the resilience of today's human society to global environmental change, ignoring the potential of climate engineering solutions does not seem prudent and realistic. (**Source**: http://www.climate-engineering.eu/single/eos-editors-vox-good-night-sunshine-geoengineering-solutions-to-climate-change.html).

Details given above clearly indicate the openness in projecting importance and limitations of data, data based modelling. The lack of proper interaction between various scientific groups to build a strong platform from which scientists can leap forward to receive the support of common man and policy makers has been realised in principle. While there is a positive stride in the last couple of years the significant negative impact of US President Trump`s opposition to climate change research and support to fossil fuel usage has negated the positive strides. For us in India we need to initiate various measures to reduce all types of pollution, the negative factor that is hampering our economic growth and affecting quality of life.

Outstanding Contribution in Re-Vitalising CSIR



Raghunath Anant Mashelkar (born on 1st January, 1943) is an Indian chemical engineer and a former Director General of the Council of Scientific & Industrial Research (CSIR).

Life and work

Mashelkar studied at the University of Bombay (now the Institute of Chemical Technology, Mumbai) and obtained a Bachelor's degree in Chemical engineering in 1966, and a PhD degree in 1969. Mashelkar is presently the President of Global Research Alliance, a network of publicly funded research and development institutes from Asia-Pacific, South Africa, Europe and USA with over 60,000 scientists. He is the Chairperson of India's National Innovation Foundation. He has been appointed as the first Chairperson of Academy of Scientific and Innovative Research (AcSIR).

Positions held: • Director General, Council of Scientific & Industrial Research, New Delhi, INDIA, (1995-2006) • Director, National Chemical Laboratory, Pune, INDIA (1989-1995) Different Grades of scientist including Director's Grade, National Chemical Laboratory, Pune, INDIA (1976-1989) • Lecturer in Chemical Engineering, University of Salford, UK (1970-1976) • Leverhume Research Fellow,University of Salford (1969-1970).

Honorary Doctorates in Science and Engineering: • Symbiosis International University (2010) • Mahatma Gandhi Kashi Vidyapith, Varanasi (2009) • University of Goa (2009) • Lucknow University, Lucknow (2007) • Deendayal Upadhyay Gorakhpur University, Gorakhpur (2007) • Sri Venkateswara University, Tirupati (2006) • Visva Bharati, Santiniketan (2006) D.Lit. (Desikottama) • Mohanlal Sukhadia University, Udaipur (2006) • Guru Nanak Dev University, Amritsar (2005) • Maharishi Dayanand University, Rohtak (2005) • Govind Ballabh Pant University of Agriculture & Technology, Pantnagar (2004) • Narendra Deva University of Agriculture & Technology, Faizabad (2004) 2 • University of Kalyani, Kalyani (WB) (2004) • M.S. University of Baroda, Varodara (2003) • University of Allahabad, Allahabad (2002) • University of Wisconsin, USA (2002) • Banaras Hindu University, Varanasi (2002) • Tilak Maharashtra Vidyapeeth, Pune (2002) • University of London, UK (2001) • Pretoria University, Pretoria, South Africa (2000) • Anna University, Chennai (2000) • Guwahati University, Assam (2000) • Bundelkhand University, Jhansi (2000) • University of Delhi, Delhi (1998) • Indian School of Mines, Dhanbad (1997) • University of Roorkee, Roorkee (1997) • University of Kanpur, Kanpur (1995) • University of Salford, UK (1993).

Civilian Honours by President of India: • Padmashri (1991) • Padmabhushan (2000)

Election to Prestigious Academies and Scientific Bodies (India and Abroad): • Foreign Fellow, Australian Academy of Technological Sciences and Engineering (ATSE) (2008) • Fellow, Royal Society of Chemistry, Cambridge, UK (2006) • Foreign Associate, US National Academy of Sciences, USA (2005) • Fellow, Indian Association for the Cultivation of Science, Kolkata (2005) • President, Indian National Science Academy (2005-2007) • President, Materials Research Society of India (2004-06) • President, Institution of Chemicals Engineers, UK (2007-08) • Foreign Associate, National Academy of Engineering, USA (2003) • Fellow, Royal Society (FRS), London (1998) • General President, Indian Science Congress (1999-2000) • Fellow, World Academy of Art & Science, USA (2000) • Fellow, The Institute of Physics, London (1998) • Fellow, Institute of Electronics and Telecommunication Engineers (IETE) (1998) • Foreign Member, Royal Academy of Engineering, UK (1996) 3 • Fellow, UK Institute of Chemical Engineering (1996) • Fellow, Third World Academy of Sciences (1994) • Fellow, Indian National Science Academy (1984) • Fellow, Indian Academy of Sciences (1983) • Fellow, Maharashtra Academy of Sciences (1985) • Fellow, National Academy of Engineering (1987) • Fellow, National Academy of Sciences (1989) • Fellow, Indian Institute of Chemical Engineers (1992) • President, Physical Sciences, National Academy of Sciences (1991) • President, Maharashtra Academy of Sciences (1991-94) • President, Society for Polymer Science in India (1986-92) • President, Indian Society of Rheology (1986-93) • Vice-President, Materials Research Society of India (1993-95) • Vice-President, Indian Academy of Sciences (1995-2000) • Foreign Fellow, Australian Academy of Technological Sciences and Engineering (ATSE) (April 2008).

Awards:

He received number of awards, for A) Scientific Research; B) Technology & Industrial Research; C) Leadership; and D) All Round Excellence: Out of more than 100 awards selected are listed below**.**

• Asutosh Mookherjee Memorial Award (2005) by Indian Science Congress Association; • The TWAS medal (2005) by TWAS, the Academy of Sciences for the Developing World; • Life Time Achievement Award (2004) by Indian Science Congress Association; • Hari Om Ashram Prerit Senior Scientist Award (2002) by Physical Research Laboratory, Ahmedabad; • Shanti Swarup Bhatnagar Medal (2001) by Indian National Science Academy, New Delhi; • Shanti Swarup Bhatnagar Award (2001) by Indian Science Congress Association, Calcutta; • Material Scientist of the Year Award (2000), by Materials Research Society of India; • GD Birla Award for Scientific Research (1993); • Shanti Swarup Bhatnagar Prize (1982) for engineering sciences by CSIR, New Delhi; • World Federation of Engineering Organisations (WFEO) Medal of Engineering Excellence (2003) by WEFO, Paris; • Dr. M. Visvesvaraya Memorial Award (2002) by Engineers Foundation, Kolhapur; • H.K. Firodia Award (2000) by H.K. Firodia Foundation, Pune; • Durga Prasad Khaitan Memorial Gold Medal (1996) by Asiatic Society, Calcutta; • National Research Development Corporation (NRDC) Republic Day Award (1995); • OP Bhasin award (1991) by Bhasin Foundation, Delhi; • Pandit Jawaharlal Nehru National Award in Engineering & Technology (1991) by Govt. of Madhya Pradesh; • Vishwakarma medal (1988) by Indian National Science Academy; • Federation of Indian Chamber of Commerce and Industry Award (1987) in physical and mathematical sciences; • IIFA Ben Gurion Award (2009) for contributions in Science & Technology • Rajiv Gandhi Life Time Achievement Award (2007) by Rajiv Rural Development Foundation, Tirupati; • Lakshmipat Singhania – IIML National Leadership Award (2004) by Indian Institute of Management, Lucknow • **IMC Juran Quality Medal (2002)** by Indian Merchants Chamber ***for leadership and continuous involvement as a role model for improvement of quality in CSIR;*** • **JRD Tata Award** for Corporate Leadership (1998) by All India Management Association ***for exemplary leadership provided to CSIR***. • Inaugural BP Lecture, Judge Business School, University of Cambridge (2010); • ETH Presidential Lecture at French Academy of Sciences, (2007) Zurich; • Star of Asia Award (2005) of Business Week (USA); • Shiromani Award (2002) for outstanding achievements in the field of science and commitment to national progress and human welfare; • Lifetime Achievement Award (2001) by Chemtech Foundation for all time lifetime achievement .

Professorships (Honorary & others) :

• Visiting Professor at Laboratory of Nanomedicine, Harvard University, Boston (2010); • Sir Louis Matheson Distinguished Visiting Professor, Monash University, Australia (2007 to 2010); • Visiting Professor at the Harvard/MIT, Boston (2007, 2008); • Fellow, University of Salford, UK (1992-93); • Visiting Professor, University of Delaware, USA (1975-76 & 1988); • Visiting Professor, Technical University of Denmark, Lyngby (1982).

Chairmanship/Membership of National Level High-Powered Committees/Bodies:

• Member, World Economic Forum's Global Agenda Council on Emerging Technologies (2009-) • Chairman, Thermax Innovation Council (2008-) • Chairman, Reliance Innovation Council (2007-) • Chairman, National Innovation Foundation (2000-) • Chairman, Marico Innovation Foundation (2005-) • Member, Scientific Advisory Board, VTT, Finland (2007-09) • Chairman, Scientific Advisory Committee on Hydrocarbons, Ministry of Petroleum & Natural Gas (2002) • Member, Governing Body, Indian Council for Research on International Economic Relations (2001-) • Member, Prime Minister's Knowledge Task Force (2000) • Member, Science Advisory Council to the Prime Minister (1988-90), (2004-2006).

International Bodies/Committees:

• I-20 Global Innovation Leaders, San Francisco, USA (2009) • Member, External Research Advisory Board, Microsoft, USA. (2007-) • Chairman, CSIR (South Africa) International Review Committee (2003) • Member of the Committee of Third World Academy of Sciences (TWAS) in Engineering Science and Technologies (2003) • Member, Research Advisory Committee, Department of Chemistry, Imperial College of Science & Technology, UK (2003) • Member, Review of Chemistry Research in UK Universities (2002) • Chairman, Innovation in Developing World Committee, Third World Academy of Sciences, Trieste (2000) • Member, Advisory Board, World Wide Academy (WIPO), Geneva (1999-) • Chairman, Standing Committee on Information Technology (WIPO), Geneva (1998).

Original contributions to Scientific and Industrial Research

Mashelkar has made some path-breaking contributions in transport phenomena in and thermodynamics of swelling, superswelling and shrinking polymers, modelling of polymerisation reactors, and engineering analysis of non-Newtonian flows. ***His exceptional leadership has transformed CSIR, world's largest chain of national laboratories engaged in industrial R&D.*** In post-liberalised India, Mashelkar has been the dominant force in shaping the direction of S&T in India. His contribution to the interpretation of the phenomenon of unusual retardation and enhancement in polymer dissolution is pathbreaking. In addition he was known for significant contributions in Engineering Analysis of Non-Newtonian Flows, Role of energetic networks in non-Newtonian Flows and Modelling of Industrial Polymerisation Reactors.

Leadership in Science and Technology

As Director General of CSIR (38 laboratories and 22,000 employees), which is the largest chain of industrial R & D labs, conceived & successfully led the process of transformation of CSIR. His white paper "CSIR 2001: Vision & Strategy" set up a new agenda. The story of the transformation of CSIR has been internationally acknowledged. Its appreciation by the Indian business world, has been captured as a cover page story by Business India in 1998 and also in 'World Class in India', a book brought out by Penguin, which has ranked CSIR among the top twelve organisations, who have managed the radical change the best in post-1991 India. [www.csir.res.in].

P.R.Reddy