Prof. J. Srinivasan

Prof Srinivasan has made wide range of contributions to climate science during the past 46 years. His early work was on the radiative cooling of the surface of Moon and Mercury in 1971. He explored the impact of departure of local thermodynamic equilibrium on the radiative cooling of the upper atmosphere during his doctoral work in Stanford University.

After coming back to lndia, he embarked on the development of simple monsoon models in collaboration with Prof. Sulochana Gadgil He used simple axisymmetric models of the monsoon to unravel the mechanism that govern the poleward migration of cloud bands in the tropics. He highlighted the important role played by the merdional gradient of moist static energy. As a visiting scientist at NASA, Langley he showed for the first time the role played mixed Rossby-Gravity waves in the meridional migration of cloud bands. Lately he underscored the role played by the vertical shear of meridional wind in the migration of cloud bands. He collaborated with Dr.Rajeevan to show that the clouds in the Bay of Bengal were unique since they contributed to cooling of the atmospheric column in view of the high reflectivity of these clouds. He worked with Prof. Roddam Narasimha and Dr. Vasudeva Murthy to unravel the mechanism governing the paradox called the "Lifted minimum" that was observed by Dr. Ramdas of India Meteorological Department in 1930s.

Since 1950 the elevated heat source over Tibet was believed to be one of the important factors that controls the intensity of the lndian monsoon. Prof. Srinivasan (in collaboration with Prof. Ravi Nanjundiah and Prof. Arindam Chakraborty) showed that the elevated heat source plays no role in controlling the intensity of the Indian monsoon. They argued that Western Himalayas (to the west of 80oE) played an important role in preventing cold air from higher latitudes from coming into India and weakening the Indian monsoon. This work has undermined the claim made by geologists that the intensification of the Indian monsoon coincided with the elevation of the Tibetan plateau. Another result that emerged from this work is the role of Kenyan highlands. They showed that the longitude at which the Somali jet crosses the equator is not related to the barrier created by east coast of Africa but by the heat source created by condensation of water vapour in the Bay of Bengal. The work highlighted the fact that the winds in the Somali jet intensify three days after an intense rainfall in the Bay of Bengal. This body of work undermined the traditional view that the Indian monsoon is driven the contrast in the surface temperature between the Indian land and the surrounding oceans. Prof. Srinivasan proposed a simple diagnostic model that showed that monthly mean rainfall over India is directly proportional to the net radiation at the top of the atmosphere and inversely proportional the vertical stability of the atmospheric column. ln this paradigm, the contrast in surface temperature between the Indian land and the surrounding ocean plays no role but an important role is played incoming solar radiation and the vertical structure of the atmosphere. Most of the climate models indicate that an increase in carbon dioxide in the atmosphere will lead to the intensification of the Indian monsoon. These models are not that reliable because their horizontal resolution is not high and hence they are not able to resolve the complex topography of the Western Ghats. Prof. Srinivasan collaborated with Prof. Akio Kitoh and Dr. Rajendran to examine the simulation of the Indian monsoon in a high-resolution model of the Meteorological Research Institute in Japan. These simulations show that although rainfall increased in most of India due to increase in carbon dioxide, there was a decline in rainfall the state of Kerala and this was attributed to change in the direction of the winds striking the west coast of India.

Prof. Srinivasan was invited to be a lead author in the second and fourth assessment report of the lntergovernmental Panel on Climate Change (IPCC). He contributed to the chapter on radiative forcing of climate change in the second assessment report and the chapter on the evaluation of climate models in the fourth assessment report. He was also a review editor for the chapter on radiative forcing of climate change in the third assessment report of IPCC. The three IPCC reports led to the increase in awareness about the threat of climate change and hence led to the recognition of this achievement by the Nobel committee. Prof. Srinivasan has given more than 100 public lectures in all over India (during the period 2000 to 2017) to improve the public understanding of the impact of climate change.

A term called "Asian Brown cloud" was coined in a report published by the United Nations Environment Program (UNEP) in 2002. This led to a concern that this cloud could have an adverse impact on the Indian monsoon. Prof. Srinivasan worked with Prof. Sulochana Gadgil to highlight the fact it was not a cloud but an aerosol layer that occurs all over the world and not in Asia alone. They disputed the claim that the soot aerosol will have an adverse impact on the monsoon. This view was later supported by scientists all around the world who showed that the presence of soot increases monsoon rainfall in May and June. Prof. Srinivasan worked with Prof. Satheesh to show that dust aerosols are as important as soot in the lndian region and highlighted the need understand the role of both natural and anthropogenic aerosols.

Prof. Srinivasan was the principal investigator in the lndo-French satellite mission from 1999 to 2011. This satellite mission, called Megha-Tropiques, was unique since it used a low-inclination orbit instead of the traditional polar orbit. The satellite was launched in October 2011 and has provided valuable data on the role of humidity and ice in the evolution of tropical convective systems.

Prof. Srinivasan established the Divecha Centre for climate Change at the Indian Institute of Science in 2009 with a generous grant from Arjun and Diana Divecha (Berkeley, California) and the Grantham foundation for the protection of the environment. This was first such centre created in India: This centre encouraged students to enter this field through the creation of Grantham fellowship. An annual public lecture delivered by an eminent scientist led to a wider dissemination of the knowledge about climate change. An annual inter-collegiate "Climate Science Quiz" has been conducted to enable college students to know more about climate change.

This centre has proposed methods to adapt to and mitigate the impact of climate change. The centre demonstrated the potential of installing solar photovoltaic panels in railway coaches in India. A technique to prevent Glacial Lake Outburst Flood (GLOF) through the use of a siphon was recommended and later this method was used in south Lohnak glacier in Sikkim.

In recognition to his outstanding research contributions the Ministry of Earth Sciences honours Prof. J. Srinivasan with the “Lifetime Excellence Award” for the year 2019.