PREFACE

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Rain plays a great role in the national economy by affecting the agriculture yields. But the rain is a natural phenomenon and it does not fall as and when man wants it. Therefore man has been trying for a long time to create artificial rain. The process which is being used at present for creating artificial rain is seeding. In this process chemicals such as silver iodide, calcium chloride or sodium chloride are spread from the aircraft in the cloud region. But the success rate of this process is very low and the process is also very expensive. Besides it is harmful to mankind, because it brings the harmful chemicals on earth along with the rain.

Seeing occasional drought and suicides of many farmers in our country, S.K. Chopkar, President of Atmospheric Rainmaking Research (ARR) Society started thinking of creating artificial rain when he was just a college student. He was puzzled to notice that in lightning, temperature rises as high as 30,000K in fraction of a second; but, for rain, a temperature as low as -10K is needed. How a region which rose to a temperature of 30,000K attains a temperature of -10K? Who removes the heat? He researched and found that it is endothermic reactions which take place after the lightning which removes heat and creates rain. He thought that if we could initiate endothermic reactions like lightning in the atmosphere then we would succeed in producing artificial rain. He published this theory in Indian Journal of Radio and Space Physics (New Delhi) in 1993.

ARR Society has been doing research on this subject for more than two decades. The latest proposal of this group is to use laser to create artificial rain in conjunction with satellite. Extensive research is being done in many countries

like Germany, France, USA, China, Japan, Israel etc. with laser for the formation of rain. In 2011, a French group succeeded in producing tiny water particles by laser. But the water droplets were about a hundred times too small to fall as raindrop; instead, they remained suspended in the air. But the team concluded that it is feasible to get larger droplets if the power of laser is increased to petawatt (10^{15} watts) or exawatt (10^{18} watts) level. In the 2011 experiment, they used a 100 terawatt (1tw = 10^{12} watts) power laser. French group considers that laser beam ionizes O_2 and N_2 in the atmosphere and these ions act as seed for the formation of rain where as our method is initiation of endothermic reactions. Our methodology has been described in several of our research papers. See for example "Artificial rain making by laser system" published in International Journal of Meteorology, (UK), Nov. 2010, vol. 35, No. 355, pp. 363-370, www.ijmet.org.

We presented our idea before the scientists of Indian Institute of Tropical Meteorology, Pune; Aryabhatta Observatory, Nainetal; India Meteorological Department, New Delhi and Indian Institute of Technology, New Delhi. No body found any fault in our idea but nobody was willing to take up this experiment. Their reply was if this method were feasible, then foreigners would have done this long ago. That means we want to be copy-cat. We want to wait till foreigners are successful. Why don't we do the experiment? This topic is contemporary. It has both academic and application scope. In fact, a foreign scientist while reviewing our one paper said that it was a very novel technique to produce artificial rain because it is a onetime investment, eco-friendly and comparatively cheap.

We aim for rain at any place, at any time, as per our human need, for the green revolution of the world. But due to lack of funds we are not able to move further. If any organization/government gives fund or do this research, we would be happy to work with them. Results of research work carried out by the ARR Society since 1993, have been presented and published on international and national forum. International and national patents have also been made. The present book is a collection of all the articles published since 1993.