

CHANGING OF CLIMATIC CONDITIONS THROUGH GLOBAL WARMING

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ABSTRACT

The Changing of Global climatic condition is prominence to mounting scientific evidence that the enhanced green house effect is predominantly of anthropogenic origin. Climatic observations indicate significant warming in global temperatures by about 0.3-0.7°C, in past century. Human activities have been increasing the concentration of green house gases in the atmosphere, mostly CO₂ (from combustion of coal, oil etc.) and a few other trace gases. This is mainly due to increasing population, rapid industrialization, urbanization and deforestation. At the rate of increase observed over the past few decades, the CO₂ concentration is expected to double the pre-industrial levels by about 2050. These changes are expected to result in an increase in the global mean temperature by about 1°C by 2025 and 3°C by end of 21st century. Apart from the changes in the mean climate, manifest the extreme event like cyclones, severe rainstorms, heat/cold waves, etc., which can be of tremendous socio-economic consequence. Conclusive information on such changes is yet to emerge, but there are indications of a possible intensification of the hydrological cycle in a warmer world, that can give rise to more intense precipitation events.

India has a wealth of observational records spanning the past 150 years, enabling us to estimate the observed changes in the Indian summer monsoon rainfall and surface air temperature. While there is a wide spectrum of observed changes and variability, the following highlights provide their basic character: (i) Indian monsoon rainfall has shown stable long term characteristics since the historical times with extremes being a part of its natural variability: (ii) The past 200 years of instrumental observations indicate that the summer monsoon

rainfall has undergone means variations in terms of the frequencies of droughts/ floods (i.e., alternating 20-30 year periods of more and less frequent droughts); (iii) However, on a smaller space scale, there are areas showing both increasing (e.g., west coast) and decreasing (e.g., east central India) long-term trends in monsoon rainfall; (iv) Mean annual surface air temperature shows a significant warming of $0.5^{\circ}\text{C}/100$ yrs in this century, and recent data indicate a substantial acceleration of this warming after the 1990s. Climate model simulations under scenarios of increasing greenhouse gas concentrations and sulphate aerosols indicate marked increase in both rainfall and temperature towards the end of the 21st century. The warming (3 to 4°C) is widespread over the country (more pronounced over the northern regions), but there are substantial spatial differences in the projected rainfall changes (10 to 30%); west central India shows maximum expected increase in rainfall. Extremes in maximum and minimum temperature are also expected to increase in the future. Extreme precipitation shows substantial increase over a large area, particularly over the west coast of India and west central India.