

The monsoon and its variability - Video course

COURSE OUTLINE

In this course, observations of the monsoon and its variability on different spatial and temporal scales will be discussed. The necessary background for understanding the physics of the monsoon and its variability involves basic understanding of cloud systems in the tropics, tropical dynamics as well as of phenomena such as El Nino to which it is linked. After a detailed exposition of the background, the present understanding about the nature of the system responsible for the monsoon and mechanisms which lead to its variability will be elucidated. Skill of the state of art models in simulating and predicting the variability of the monsoon will be assessed and problems and prospects of improvement of predictions will be considered. In addition, the impact of the Indian monsoon on agriculture and the economy will be discussed.

COURSE DETAIL

Sl. No.	Topic/s	Number of Hours
1	Introduction: Monsoon definitions, summer monsoon, post-monsoon and winter monsoon, nature of the variability of the Indian summer monsoon	3
2	Background about the atmosphere and rotating systems	1
3	Convection and rainfall in the tropics, organization over different spatial scales, conditional instability of the first and second kind Active and weak spells, breaks in the monsoon	2
4	Basic system responsible for the monsoon	4
5	Tropical Convergence Zones (TCZs) and the Indian monsoon	2
6	Variation of convection/rainfall over the Ocean: SST-rainfall relationship	1
7	Heat lows, TCZ and monsoonal regions of the world	2
8	Seasonal transitions (onset and retreat) and climatic clusters	4
9	Intraseasonal variation and intraseasonal oscillation	3
10	Tropical Oceans: background	1
11	El Nino and Southern Oscillation	6
12	Indian ocean and the Indian monsoon	4
13	Interannual variation of the Indian summer monsoon rainfall: links	1



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Atmospheric Science

Pre-requisites:

- The exposition will assume no background in atmospheric science and all the necessary jargon and concepts will be defined and explained.
- Masters level in science or Bachelor level in engineering is adequate for understanding a substantial part of the course.

Additional Reading:

- Philander S G H. 1990. El Nino, La Nina, and the southern oscillation. Academic, San Diego, California.
- Sarachik E S and M. A Cane 2010 The El Nino-Southern Oscillation Phenomenon, Cambridge University Press.

Hyperlinks:

- Nil.

	to events over the Indian and Pacific Ocean	
14	Monsoon variability, agriculture and economy	5
15	Monsoon Prediction: problems and prospects	2
	Total Hours	41

Coordinators:

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References:

- Blanford HF. 1886. Rainfall of India. Mem. Ind. Met. Dept., 2,
- Ramage CS. 1971. 'Monsoon meteorology'. International Geophysics Series, Vol.15, Academic Press, San Diego, Calif.,
- Rao YP. 1976. Southwest Monsoon. Meteorological Monograph (synoptic meteorology). No. 1, India Meteorological Department, New Delhi
- Riehl H. 1979. 'Climate and Weather in the tropics', Academic Press, San Diego, New York
- Chang C P and T N Krishnamurti (ed) 1987 'Monsoon Meteorology' Oxford University Press
- Fein J. S. and P. L. Stephens (ed) 1987 , 'Monsoons' John Wiley, New York, N. Y
- Hastenrath S 1991' Climate Dynamics of the tropics' Kluwer Academic Publishers
- Wang B (ed) 2006, 'Asian Monsoon' Springer, Praxis
- Asanani G C, U S De, H R Hatwar, A B Mazumdar (ed) Monsoon Monograph (vol 1)2011 India Meteorological Department, Ministry of Earth Sciences Govt. of India
- Chang C P, Y Ding, N C Lau, R H Johnson, B Wang and T Yasunari 2011 'The Global Monsoon System", World scientific