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#AzadiKaAmritMahotsav

Lecture Series on

Cloud and Precipitation Physics and Dynamics

सत्यमेव जयते

Ministry Of Earth Sciences

Government of India

Formation of microphysical structure of convective clouds by internal cloud vortex dynamics

Professor Alexander Khain

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About the speaker:

Prof. Khain is a professor at the Institute of Earth Sciences, The Hebrew University of Jerusalem, Israel.

His primary research interests include cloud physics, theoretical microphysics, cloud-aerosol interaction, Tropical Meteorology, hurricanes, boundary layer physics.He is an author of a spectral bin microphysical scheme (SBM) that is used in many cloud-resolving models. He has published about 260 scientific papers and 4 books. The last book "Physical Processes in Clouds and Cloud Modelling" (Khain and Pinsky, 2018, Cambridge Univ. Press, 625 pp, www.cambridge.org/9780521767439) presents the basic knowledge, as well as new findings in cloud physics and microphysics and provides the major information about numerical approaches used in Cloud modeling.

Aabstract : Mechanisms of mixing and entrainment and their effects microphysical structure of growing convective clouds are analyzed using semi-analytical methods and using 10 m resolution cloud model with spectral bin microphysics (SBM). Using wavelet technique motions in clouds are separated into convective (regular) motions and stochastic turbulent motions.

Characteristics of these motions are evaluated. It is shown that turbulent motions (turbulent diffusion) are likely responsible for the formation of narrow (several tens of meters) interface zones near cloud edges where gradients of liquid water content are high. The dilution of cloud air at larger distances from the cloud edges is caused by convective scale motions related largely to toroidal vortexes forming at the upper part of developing clouds. These motions form radial profiles of the adiabatic fraction.

A strong dependence of the shape of droplet size distributions on the adiabatic fraction is illustrated both using high-frequency in-situ measurements and 10m resolution LES. The relationship between these results and the cloud representation in the

https://youtu.be/Efi9SVhHk7o