

09<sup>th</sup> SEPTEMBER 2022  
Friday, 16:30 IST  
(11 UTC)

#AzadiKaAmritMahotsav

Lecture Series on

Cloud and Precipitation Physics and Dynamics



सत्यमेव जयते

MINISTRY OF EARTH SCIENCES



INDIAN INSTITUTE OF TROPICAL METEOROLOGY PUNE

## Theory of In-Cloud Activation and Microphysical Quasi Equilibrium in Deep Ascent

### About the speaker:

Vaughan Phillips is a senior lecturer at Lund University and does research about cloud physics from a modeling perspective. By creating new schemes to treat ice and droplet initiation by various pathways (primary and secondary ice production) and to represent other processes (ice morphology, sticking efficiencies in ice-ice collisions, time-dependent freezing and melting), he studies how the environment controls cloud properties. Recent interests are bioaerosol impacts on clouds, lab/field experiments to observe fragmentation of ice and use of AI to represent clouds in global models.

### Abstract:

When the supersaturation in an ascending cloudy parcel aloft in a deep cloud exceeds the peak value at cloud-base, interstitial aerosol particles are converted to cloud-particles by 'in-cloud activation'. To elucidate theoretically how in-cloud activation happens during deep ascent and the nature of feedbacks controlling microphysical equilibria, a 0D analytical model is constructed. It consists of three prognostic variables for a cloud of a single phase, either liquid or ice. The talk will describe results from this model, which were published in a recent paper. These show that during deep ascent, there is a quasi-equilibrium of cloud-particle number concentration due to an approximate balance between continual initiation of cloud-particles by activation. There is also a quasi-equilibrium of cloud and precipitation mass fields involving condensation, accretion and sedimentation.

**Dr. Vaughan Phillips**

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<https://portal.research.lu.se/en/persons/vaughan-phillips>



<https://youtu.be/e-N2rMwrziY>