

Clouds : Ciphers in the Sky

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Clouds, appropriately described by P.B. Shelley as “daughter of Earth and Water” and “nursling of the Sky”, are not only extremely beautiful and enigmatic structures but are also an invaluable component of the Earth system. Clouds occupy 70% of the Earth surface at any given time and are vehicles of energy – transporting heat and mass from one part of the globe to another in the form of weather systems. They act as gatekeepers between Earth and Space by reflecting solar radiation, absorbing and emitting thermal radiation to maintain global temperature. According to Intergovernmental Panel on Climate Change (IPCC), clouds are the “largest source of uncertainties” in prediction of climate change. The journey of a photon (packet of radiative energy) - born from the powerful nuclear fusion on the Sun – through the cosmos to reach Earth’s atmosphere is a long one - only to get absorbed or scattered off by a cloud droplet, gas molecule or land/ocean surface. In my research, I use radiative transfer models, cloud models and in-situ data from field campaigns to study very important yet not very well-understood cloud processes like cloud-radiation interactions to help reduce uncertainties in numerical weather prediction and climate models.