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Cloud Formation on Titan JULIA GARVER, YUE YU, XINTING YU, XI ZHANG, University of California, Santa Cruz — Titan's atmosphere is composed of mainly nitrogen and methane. Photochemically produced hydrocarbon and nitrile species in the upper atmosphere may further react and aggregate to produce the complex organic particles that form the atmospheric haze layers. The particles may serve as cloud condensation nuclei (CCN) in the process of cloud formation for organic ices and liquids. Our goal is to better understand the cloud formation processes on Titan using wetting and nucleation theories. The surface energy of Titans haze analogs was measured, enabling us to evaluate the wetting scheme between the Titan haze particles and possible cloud condensates. The wetting scheme (contact angle) between haze-cloud condensates has consequences on whether heterogeneous nucleation can occur efficiently. Using the surface energies, we can calculate the contact angle between them. We found that most condensates form small contact angles on the haze particles ($\theta < 30$), implying that the haze particles are good CCN for most clouds to nucleate and grow to form visible clouds. From the estimated contact angle, we calculated the nucleation rates, the rates at which clouds form, for individual condensates. Nucleation rates provide us with a deeper understanding of cloud formation on Titan.

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