Geophysical Research Abstracts
Vol. 13, EGU2011-12909, 2011
EGU General Assembly 2011

The Role of Ethane in Titan's Convective Clouds

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Clouds are a recurring feature in Titan's atmosphere. Methane, as the dominant volatile species, is thought to compose the bulk of these clouds. However, a number of other trace species are formed from the photochemical destruction of methane and are able to condense in Titan's stratosphere. Ethane is the most abundant of these, and has been measured in the stratosphere by both ground-based and Cassini observations, as well as detected at the surface by the Huygens probe and seen in liquid form in a South polar lake. Ethane, like nitrogen, mixes with methane and depresses the saturation vapor pressure, making it easier to form clouds in a subsaturated environment. Ethane also condenses at higher altitudes than methane and could be a component of the cloud tops observed by Cassini instruments. The Titan Regional Atmospheric Modeling System (TRAMS) has been successfully used a number of times to show the conditions necessary to promote methane convective cloud formation and describe the resulting cloud morphology and precipitation. Simulations will now be presented where ethane cloud formation has been included. A convective methane cloud can trigger the formation of optically thin ethane cloud layers in the lower stratosphere.