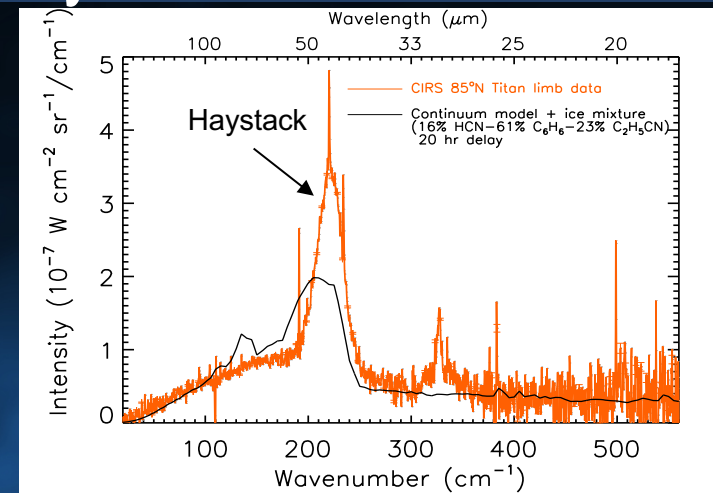


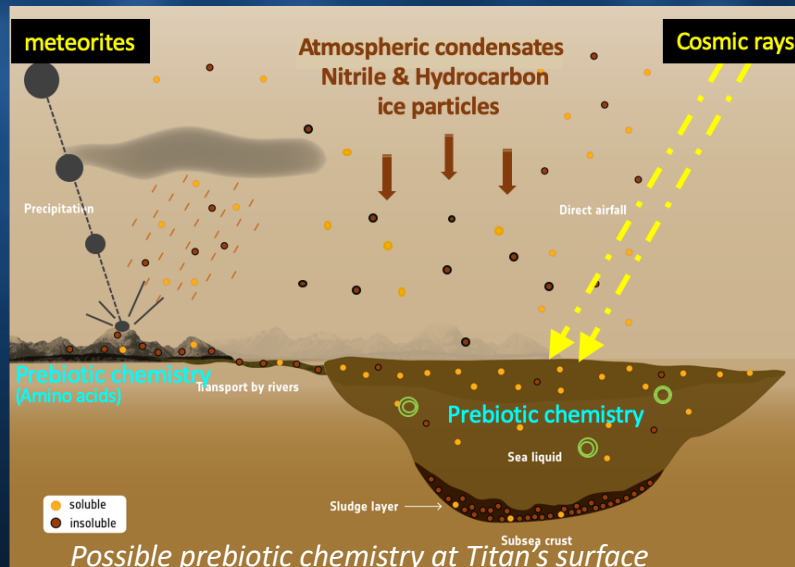
Molecular Complexity of Titan's Enigmatic Haystack Ice Cloud

Laboratory studies of complex mixtures provide improved understanding of the composition of ice cloud particles in Titan's atmosphere.

- Clouds on Saturn's moon Titan have a rich chemical diversity compared to Earth's water vapor clouds, but are usually assumed to be formed by the condensation of either a single pure chemical compound or layers of single chemical compounds.
- New laboratory research indicates that co-condensed ice made of a vapor mixture of ethyl cyanide, hydrogen cyanide, and enriched in benzene



Synthetic spectrum of a co-condensed C_2H_5CN - HCN - C_6H_6 ice cloud (derived from the laboratory data) compared to a CIRS-observed spectrum.



- rather than any single chemical condensate - is the best candidate for the intriguing Haystack ice cloud observed by the Cassini CIRS instrument, providing concrete evidence for the complexity of chemical interactions in Titan's atmosphere.

- The atmospheric components, production, loss, and evolution on exotic, Earth-like worlds like Titan provide clues to the possible prebiotic chemistry that occurs in potentially habitable environments in the Solar System and beyond.

Nna-Mvondo, D., et al. (2019), *Icarus*.