

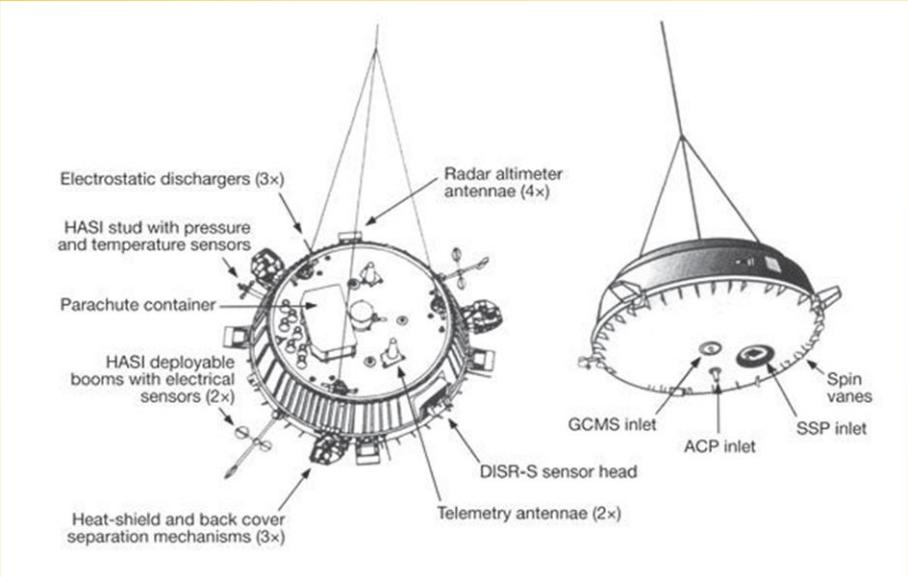
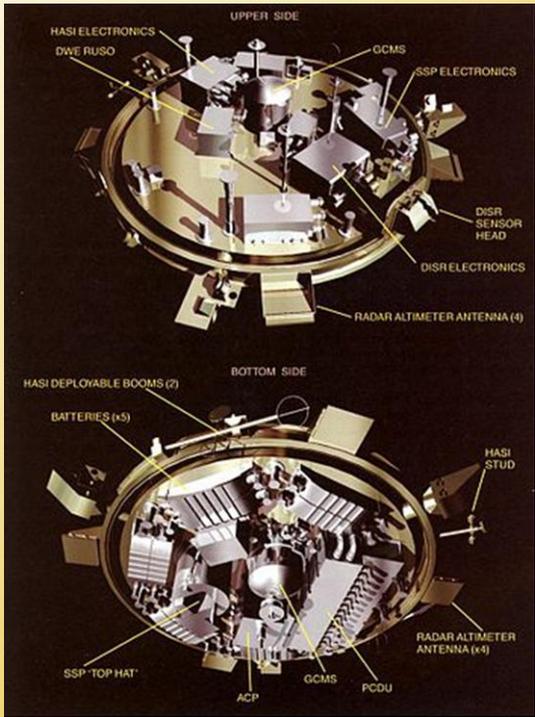
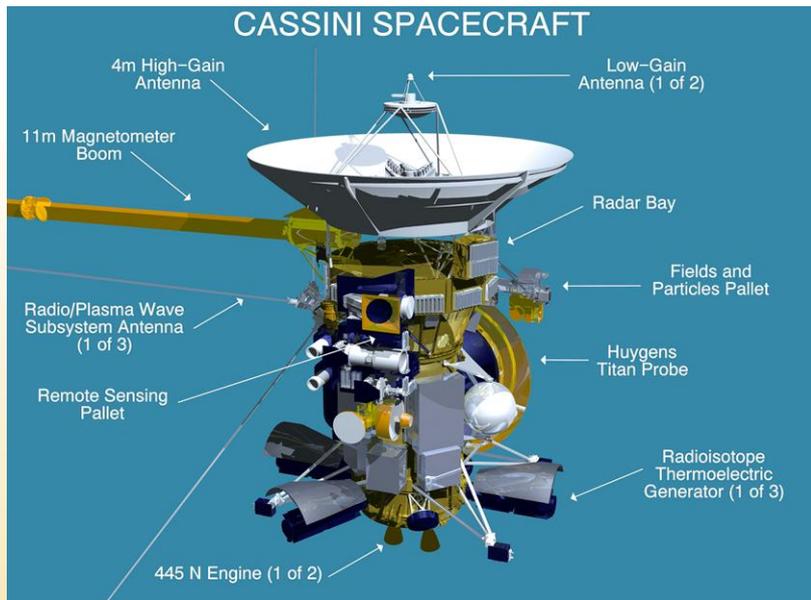




**I sent NASA a mail,  
asking to receive information  
about  
Cassini and Huygens mission in  
2005.**



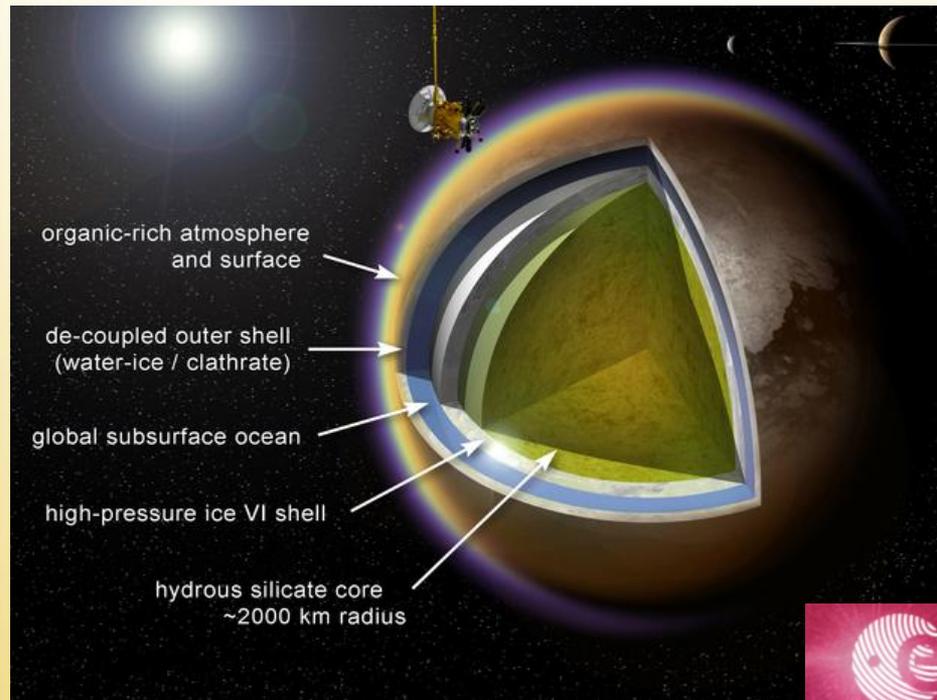
**Does Titan has the right conditions  
to sustain biological life?**



# Titan vs Earth

	<b>Titan</b>	<b>Earth</b>
<b>Main atmospheric component</b>	<b>nitrogen</b>	<b>nitrogen</b>
<b>average temperature</b>	<b>-180° C</b>	<b>15° C</b>
<b>Surface pressure</b>	<b>1500 mbar</b>	<b>1013 mbar</b>
<b>Solar constant</b>	<b><math>15 \frac{W}{m^2}</math></b>	<b>Solar constant</b>

# Titan's structure



# Titan atmosphere

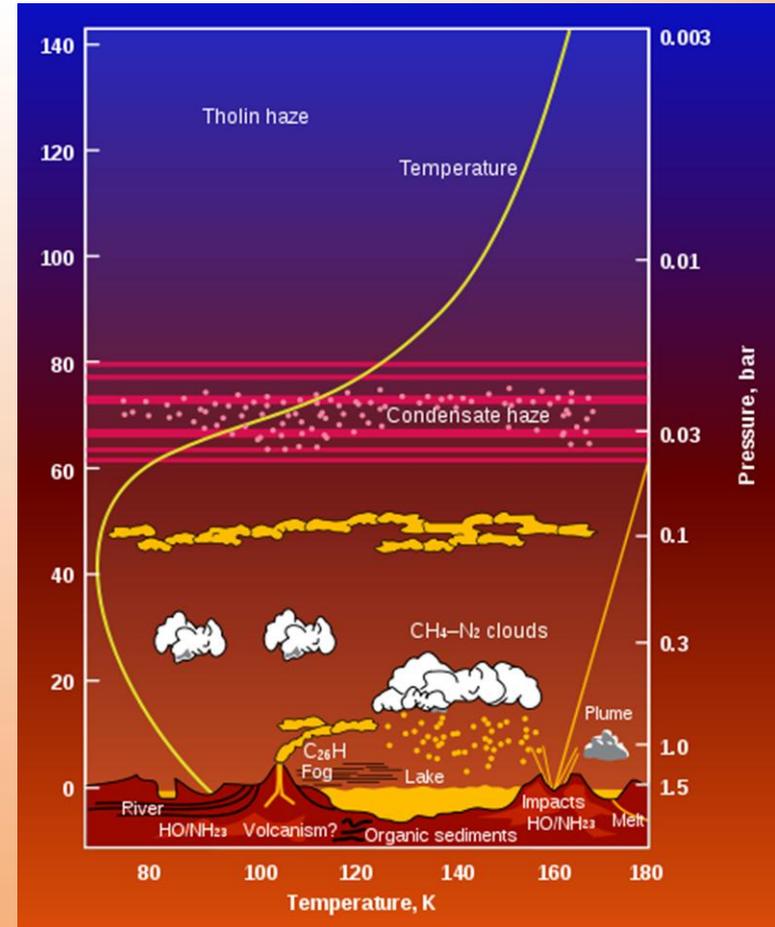


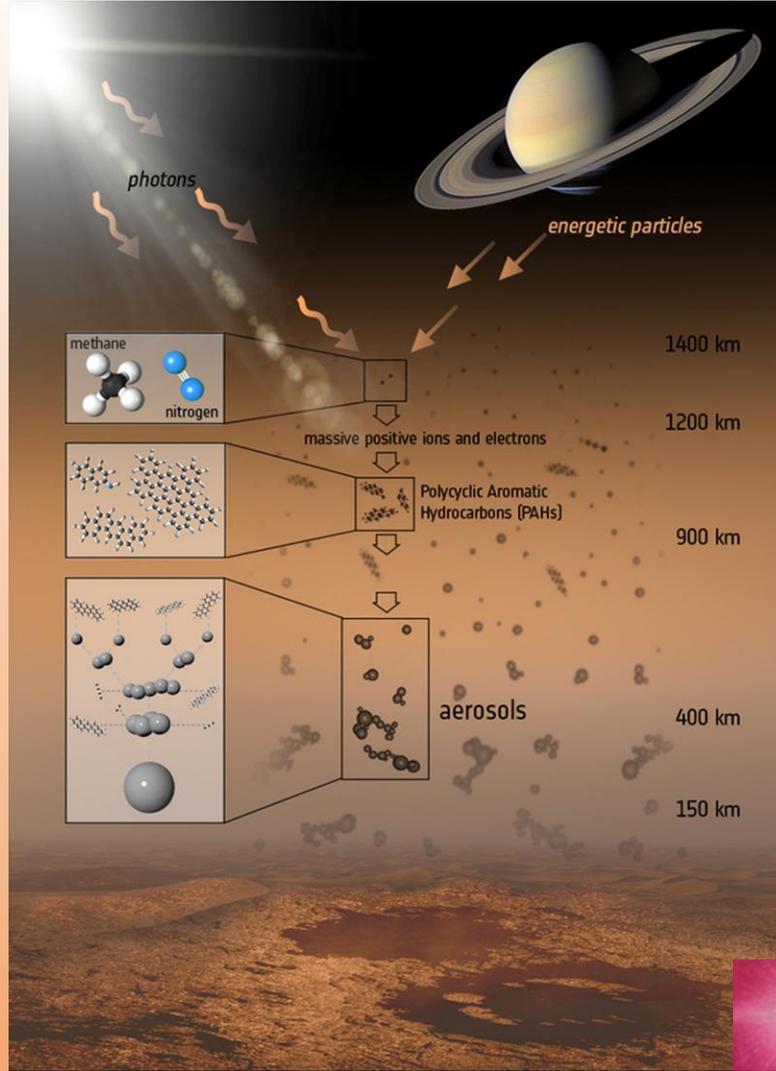
Nitrogen ( $N_2$ )

Methane ( $CH_4$ )

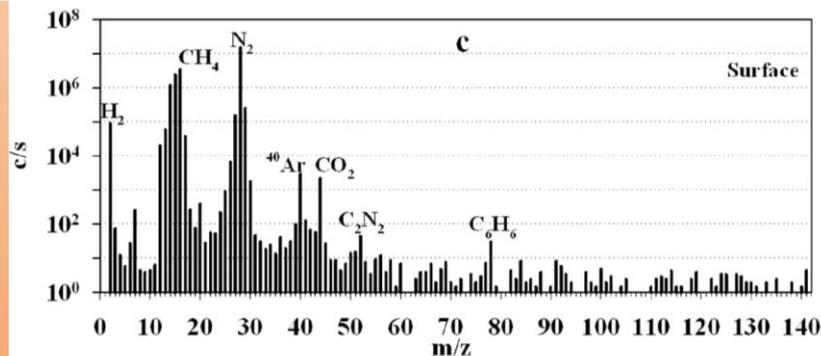
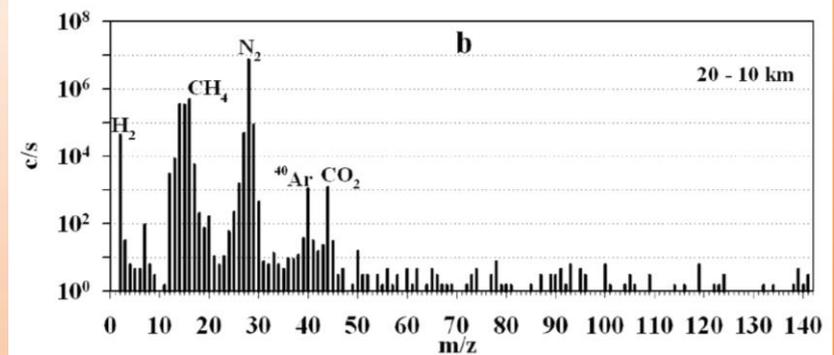
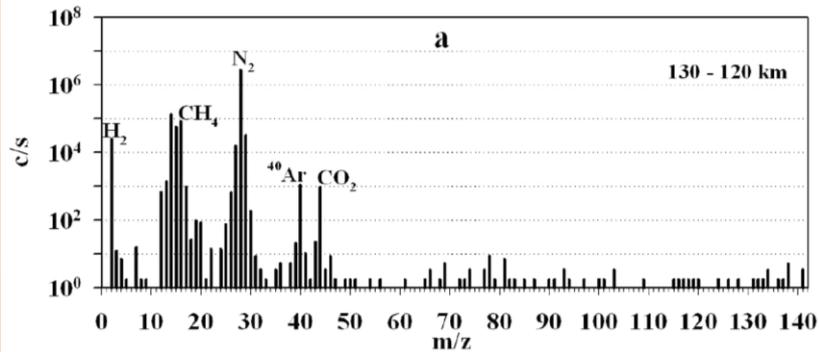
Hydrogen ( $H_2$ )

# TITAN'S ATMOSPHERE AND SURFACE VOLATILES





# TITAN'S ATMOSPHERE AND SURFACE VOLATILES



Niemann et al  
2010

# Titan surface

Methane ( $CH_4$ )

Ethane ( $C_2H_6$ )

Ammonia ( $NH_3$ )

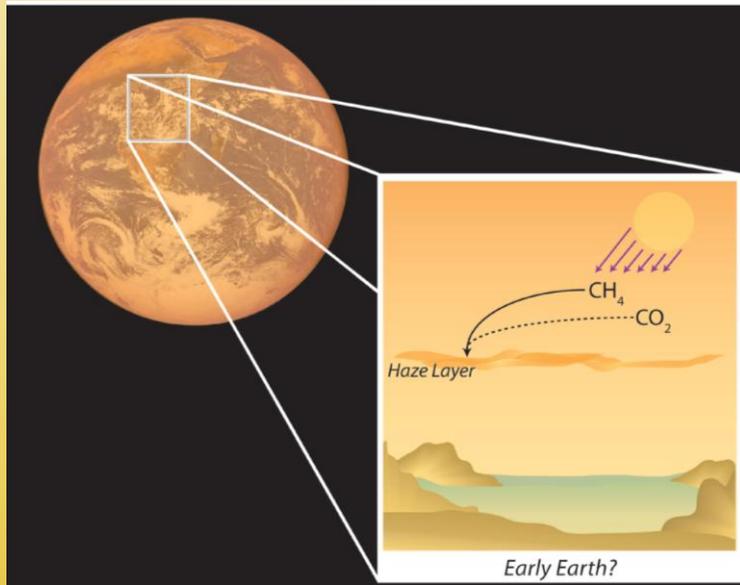
Acetylene ( $C_2H_2$ )

Carbon dioxide ( $CO_2$ )

Cyanogen ( $C_2N_2$ )

# Organic haze

Is it possible that early earth  
and Titan today  
are more similar  
than we thought?



Exploring Titan's lake  
for microbiology!

# Diamidophosphate (DAP)



Prebiotic phosphorylation of (pre)biological substrates under aqueous conditions is a critical step in the origins of life.

# Conclusions



- Titan and earth have both nitrogen based atmosphere
- Early earth organic haze may have been a trigger to the beginning of life.
- We should be looking for DAP (Diamidophosphate) or similar molecules on Titan, it might indicate beginning of life.
- The components of Titan's atmosphere and surface are showing us that biological life can start there, the difference between the solar constant might be more important than we think.

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