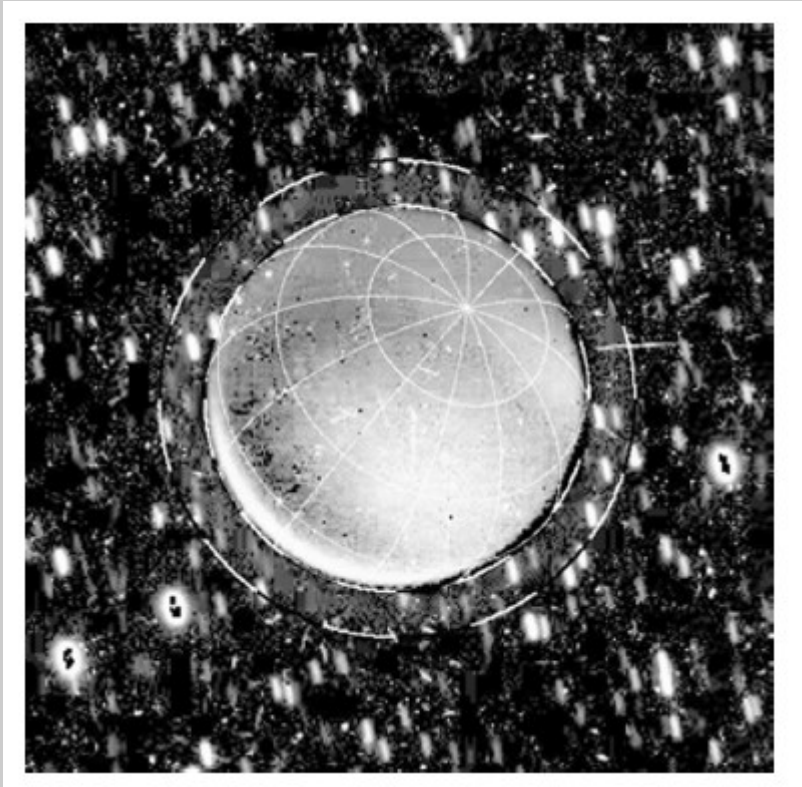
Simulation of the Emission of Titan's Eclipsed Atmosphere



Lavvas et al. (2014)

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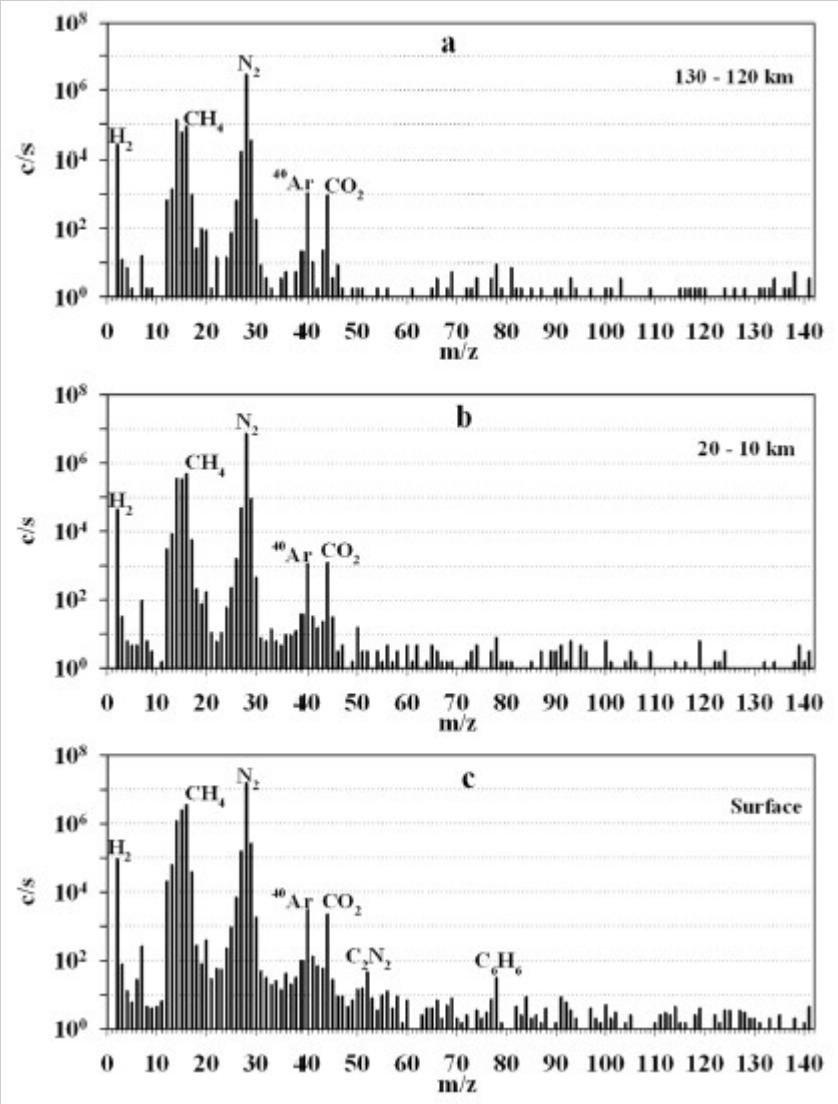
December 11, 2014

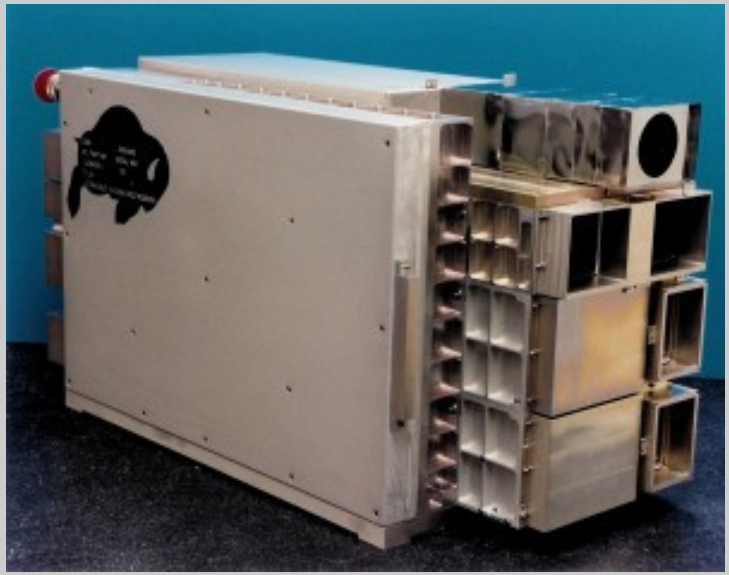
Atmosphere of Titan



- 98.4% Nitrogen
- 1.4% Methane
- Normally heavily energized by solar wind
- Cassini observed during an eclipse in 2009
  - Can now isolate other sources of emission

Niemann et al. (2014)

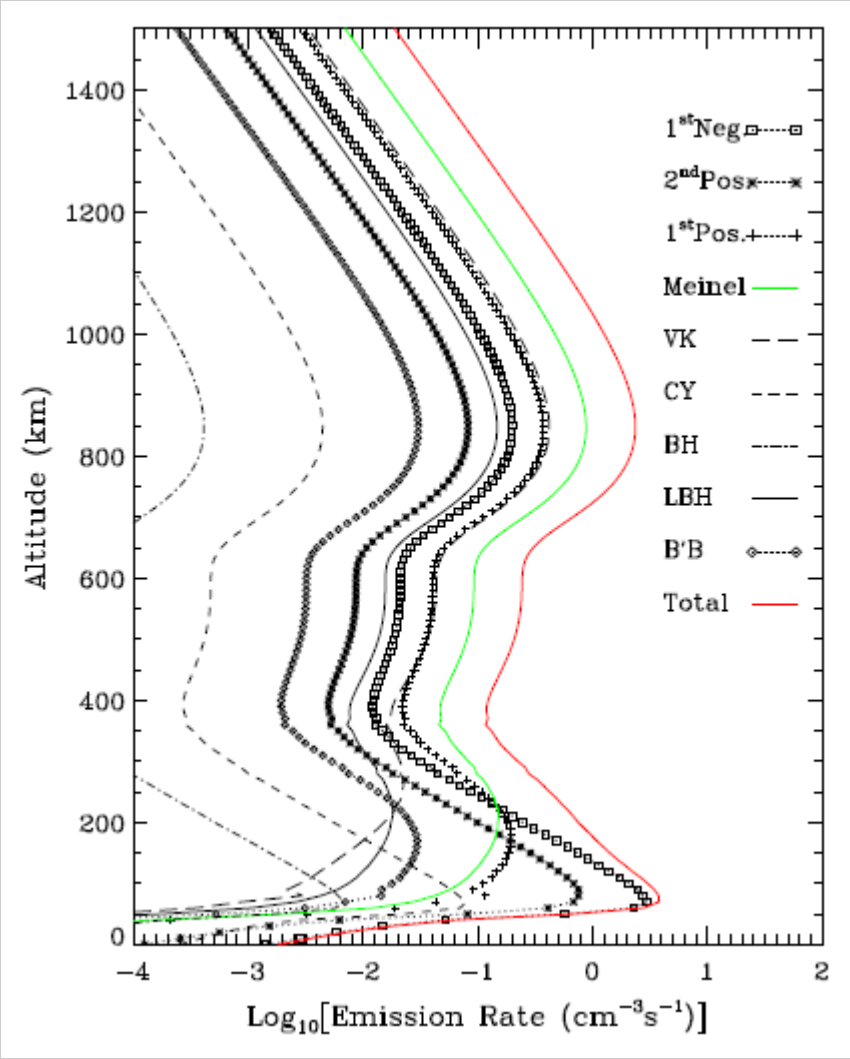
Instrument Corrections - UVIS



Esposito et al. (2004)

- Observations made using Cassini probe
- UVIS Channels
  - Extreme UV
  - Far UV
- Focus on FUV observations
  - Dominated by Nitrogen

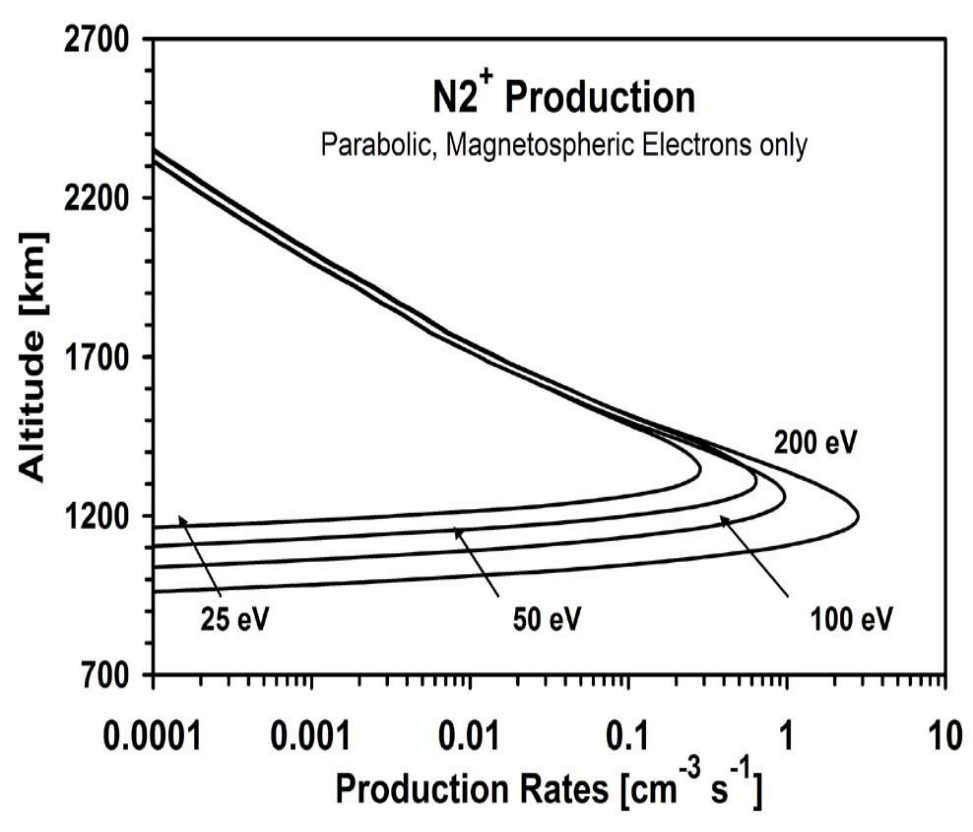
Nitrogen Emissions



Lavvas et al. (2014)

- Molecular Spectra are Complicated
- States excited by particles of varying energies
- Can decay in a number of ways:
  - Electronic
  - Vibrational
  - Rotational

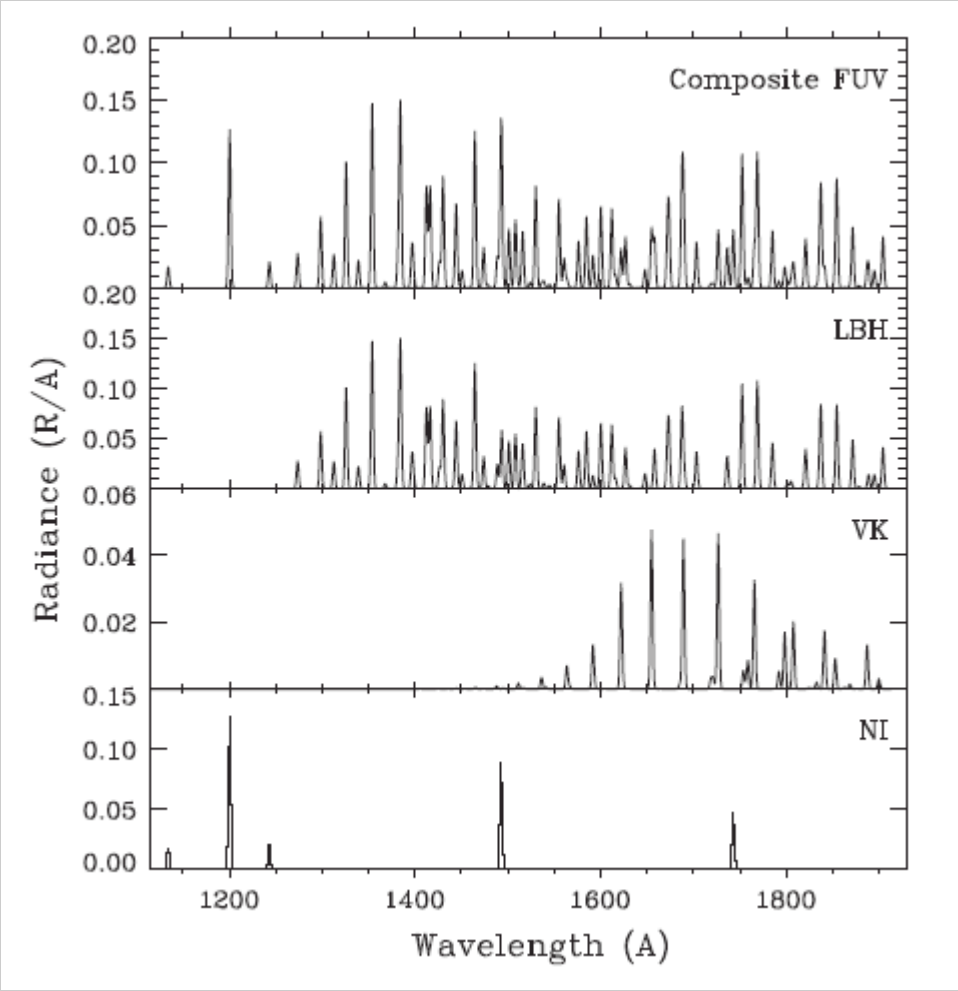
Effects of Excitation



Cravens et al. (2005)

- Lavvas et al. (2014) attempt to reproduce observed spectra
- Simulate different source of emissions
  - Cosmic Rays
  - Magnetospheric Plasma
  - Reflected Starlight

Simulations of Emissions



- Nitrogen Emission dominates the FUV
  - Lyman-Birge-Hopfield
  - Vegard-Kaplan
  - Excited Atomic Nitrogen

Lavvas et al. (2014)

References

- Cravens, T. E. et al. 2005. GRL, 32, 12
- Esposito, L. W. et al. 2004. SSR, 115, 299
- Lavvas, P., West, R.A., Gronoff, G., & Rannou, P. 2014, Icar, 241, 397
- Niemann, H. B. et al. 2010. JGRE, 115, 12006
- Stamnes, K., Tsay, S.C., Jayaweera, K., Wiscombe, W., 1988. Appl. Opt. 27, 2502–2509