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3D modeling of organic haze in Pluto's atmosphere

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1 Highlights

- 2 • We obtained a maximal photolysis rate of CH₄ of 1.3×10^{21} g cm⁻³ s⁻¹ in
3 2015, at 250 km altitude, and a haze extending up to 500 km altitude with
4 a density scale height of 40 km.
- 5 • Due to the weak meridional circulation, the haze precursors are not easily
6 transported in the lower atmospheric layers and remain at high altitudes
7 and in larger amount at high northern latitudes, leading to a more extensive
8 haze in the northern hemisphere.
- 9 • If we assume a condensation flow of N₂ from the northern towards the south-
10 ern hemisphere, then the haze precursors can be transported faster at lower
11 altitude above the south pole, leading to a latitudinally more homogeneous
12 haze density.
- 13 • The column mass of haze computed by our model primarily depends on
14 the sedimentation velocity and thus on the pressure and the considered
15 monomer radius. Between 1990 and 2015, the column mass of haze obtained
16 follows the trend in surface pressure: an increase by a factor of 3.
- 17 • We computed the UV and VIS opacities of the haze as a diagnostic of our
18 simulation results and in all simulation cases, the column visible opacities
19 have similar values around 0.001-0.01 (slightly higher for large fractal par-
20 ticles).

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