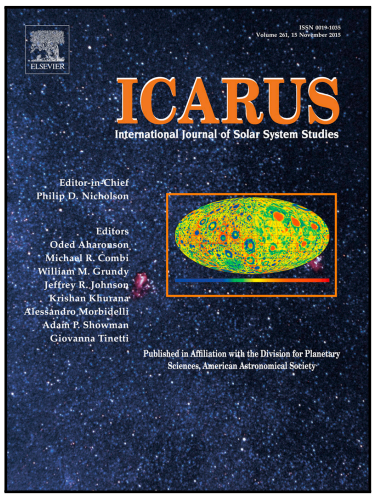

3D modeling of organic haze in Pluto's atmosphere

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Highlights

- We obtained a maximal photolysis rate of CH4 of 1.3x1021 g cm-3 s-1 in 2015, at 250 km altitude, and a haze extending up to 500 km altitude with a density scale height of 40 km.
- Due to the weak meridional circulation, the haze precursors are not easily transported in the lower atmospheric layers and remain at high altitudes and in larger amount at high northern latitudes, leading to a more extensive haze in the northern hemisphere.
- If we assume a condensation flow of N2 from the northern towards the southern hemisphere, then the haze precursors can be transported faster at lower altitude above the south pole, leading to a latitudinally more homogeneous haze density.
- The column mass of haze computed by our model primarily depends on the sedimentation velocity and thus on the pressure and the considered monomer radius. Between 1990 and 2015, the column mass of haze obtained follows the trend in surface pressure: an increase by a factor of 3.
- We computed the UV and VIS opacities of the haze as a diagnostic of our simulation results and in all simulation cases, the column visible opacities have similar values around 0.001-0.01 (slightly higher for large fractal particles).