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Constraints on haze structure, formation and transport in the ice giant planet atmospheres

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Images of Uranus and Neptune at different wavelengths clearly reveal the presence of hazes in their atmospheres and regions with different brightness patterns caused by latitudinal variations in the properties of aerosol. The haze formation in these planets is attributed to photochemical processes that take place in the stratosphere where methane dissociation by solar UV and energetic particles leads to a network of chemical reactions. In this work, observations performed by the SINFONI Integral Field Unit Spectrometer on the Very Large Telescope (VLT) and by the Wide Field Camera 3 (WFC3) of the Hubble Space Telescope (HST) in 2014 were analyzed with a microphysical model and a radiative transfer code to constrain the haze structure in both planets and also constrain the haze microphysics timescales. Our analyses show, for example, haze production rates in Neptune's atmosphere 10 times bigger than those found in Uranus's, or timescales for haze particles to grow and settle out to be greater than $\sim$ 30 years at pressure levels greater than 0.1 bar. We will discuss the implication of our results for the haze structure and formation, as well as the different factors that may control the spatial and temporal distribution of the haze over these planets.