EPSC Abstracts
Vol. 13, EPSC-DPS2019-1357-1, 2019
EPSC-DPS Joint Meeting 2019

EPSC
EPSC-DPS Joint Meeting 2019
15–20 September 2019 | Geneva, Switzerland

A Fourier-Optics Approach to Modeling the 15-AUG-2018 Pluto Occultation

Ariella Goldberg (1), Eliot Young (2) and the PHOT Occultation Team

(1) Amherst College, USA, (2) Southwest Research Institute, USA (acgoldberg19@amherst.edu)

Abstract

Pluto's atmosphere was discovered when it occulted a star [1] in 1988. Multiple occultations from 1988 through 2016 indicate that Pluto's column abundance has been doubling approximately every 10 years [2]. Pluto's haze optical depth has varied by at least a factor of ten since 2002 [3]. Central flash features have been observed in several occultations: they suggest either an oblate atmosphere or occultations that probe down to Pluto's surface and are obstructed by high terrain.

We present a Fourier-optics approach to modeling occultation lightcurves. Pluto and its atmosphere are modeled as a complex phase and opacity screen. This approach permits arbitrary 3-d distributions of haze, inhomogeneous temperature and pressure profiles and non-circular models of Pluto's projected disk.

We observed Pluto's stellar occultation on 15-AUG-2018 from over two dozen sites, including ten sites from which we observed central flash features. Three sites obtained lightcurves in separate filters in order to constrain haze opacity. We report on Pluto's column abundance, upper limits on the haze optical depth, the possibility of Pluto's surface topography affecting central flashes and whether an oblate atmosphere is consistent with the central flash observations

References

[1] Elliot, J.L. et al.: Pluto's Atmosphere, Icarus, Vol. 77, pp. 148-170, 1989.

[2] Meza, E. et al.: Pluto's lower atmosphere and pressure evolution from ground-based stellar occultations, 1988-2016, DOI: https://doi.org/10.1051/0004-6361/20183428, 2019.

[3] Young, E.F. et al.: The 15-AUG-2018 stellar occultation by Pluto: evidence for and against changes in haze opacity and atmospheric oblateness, American Astronomical Society, DPS meeting #50, id.502.01, 2018.