APPLICATIONS OF THE ALICE UVS FOR OUTER PLANET STUDIES. G. R. Gladstone, D. Slater, *Southwest Research Institute, San Antonio TX 78238-5166, USA (randy@whistler.space.swri.edu)*, L. A. Young, S. A. Stern, *Southwest Research Institute, Boulder, CO 80302, USA*, J. T. Clarke, *SPRL, U. of Michigan, Ann Arbor, MI 48109-2143, USA*.

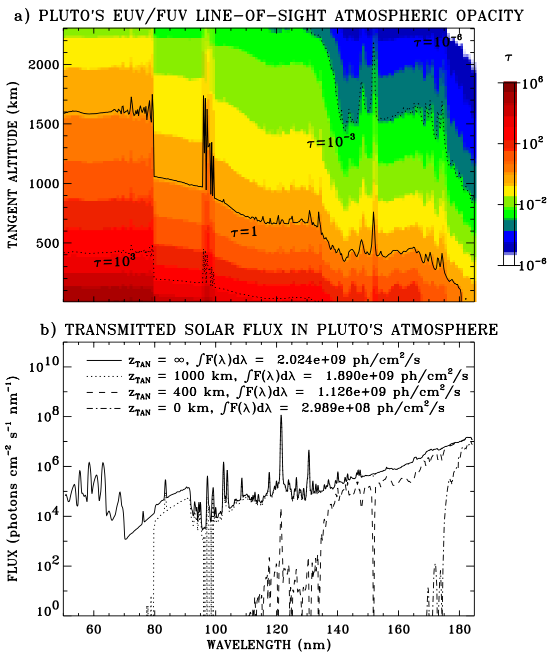

Figure 1: Figure 1. a) The limb-viewing, line-of-sight opacity of the model atmosphere is shown as a function of wavelength and tangent altitude, with contours showing $\tau = 10^{-6}$, 10^{-3}, 1, and 10^3. The $\tau = 1$ profile indicates that this wavelength range will allow sounding of Pluto's atmosphere from 0–2000 km in altitude. b) Limb-viewing, line-of-sight transmitted solar flux through Pluto's atmosphere, for several tangent altitudes, as a function of wavelength. The integrated transmitted solar flux over the 50–185 nm wavelength range is indicated.

The ALICE Ultraviolet Spectrometer (UVS) designed for the Rosetta mission has potential applications for other solar system studies as well. As a particular example, we investigate the abilites of the ALICE UVS for observing a solar occultation and airglow at Pluto. Solar occultations observed from spacecraft yield the radial distribution of both major and minor atmospheric constituents through their particular absorption signatures on the solar UV spectrum. Observations of UV airglow emissions, stimulated by photoelectron impact and photoionization-excitation of ambient gases, also help characterize the structure and composition of an atmosphere. Since most materials absorb very strongly in the extreme and far ultraviolet, EUV and FUV airglow emissions excited in planetary upper atmospheres generally have very little background contamination to affect their interpretation.

We present here several simulations of the occultation spectra and airglow emission that could reasonably be expected at Pluto, using the most recent model atmosphere calculations [1]. We find that the dominant contributions to Pluto's atmospheric opacity in the EUV and FUV are N_2, Ar, CH_4, C_4H_2, C_2H_2, and C_2H_4 (from shortest to longest wavelengths, respectively). Airglow emissions are in the sub-Rayleigh range for all species (even N_2) with the exception of Lyα (excited by resonantly scattered solar and interplanetary medium Lyα), which should have a brightness of a few tens of Rayleighs.

The results suggest that an ALICE-like EUV/FUV spectrometer covering the wavelength range from 55–185 nm would provide excellent results for both the solar occultation and the airglow experiments, although detection of CO may be a problem.

References:

[1] Krasnopolsky, V. A., and Cruikshank, D. P. (1999) J. Geophys. Res., 104, 21,979.