OVERVIEW OF THE LADEE ULTRAVIOLET-VISIBLE SPECTROMETER: DESIGN, PERFORMANCE AND PLANNED OPPERATIONS. A. Colaprete[1], R. C. Elphic[1], D. Landis[2], J. Karcz[1], L. Osetinsky[1], M. Shirley[1], K. Vargo[1], D. Wooden[1], [1]NASA Ames Research Center, Moffett Field, CA 94035 USA, [2]Draper Laboratory, Tampa, FL 33612.

Introduction: The Lunar Atmosphere and Dust Environment Explorer (LADEE) is an orbital lunar science mission currently under development to address the goals of the 2003 National Research Council decadal survey, the Lunar Exploration Analysis Group Roadmap, and the "Scientific Context for Exploration of the Moon" (SCEM) report, and has been recommended for execution by the 2011 Planetary Missions Decadal Survey. The mission's focus is to study the pristine state of the lunar atmosphere and dust environment prior to possible lunar exploration activities by countries, including the United States, China, India, and Japan, among others. Activity on the lunar surface has the potential of altering the tenuous lunar atmosphere, but changing the type and concentration of gasses in the atmosphere. Before these activities occur it is important to make measurements of the current lunar atmosphere in its unmodified state. LADEE will determine the composition of the lunar atmosphere and investigate the processes that control its distribution and variability, including sources, sinks, and surface interactions. It will monitor variations in known gasses, such as sodium, potassium, argon and helium, and will search for other, as-yet-undetected gasses of both lunar and extra-lunar origin. LADEE will also determine whether dust is present in the lunar exosphere, and reveal the processes that contribute to its sources and variability. Launch is planned for August, 2013.

The Ultraviolet-Visible Spectrometer (UVS): One of three instruments on LADEE, the Ultraviolet and Visible Spectrometer (UVS) will make observations of the lunar exosphere and search for dust (Figure 1). UVS will routinely monitor two known atmospheric species, potassium and sodium, and search for other, previously-sought species including OH, H_2O, Si, Al, Mg, Ca, Ti, and Fe. UVS will also be able to detect the scattered light from lofted dust between the altitudes of a few km up to 50 km using its limb telescope, as well as search for dust very near the surface using solar occultation measurements. The UVS instrument operates between 230 – 810 nm with a spectral resolution of <1 nm. This wavelength range and resolution was chosen as it includes various emission lines for the gasses of interest (e.g., 589.6 nm for sodium and 309 nm for OH). UVS has two means of observing: a "Limb Telescope" and a "Solar Occultation Viewer".

The Limb Telescope is pointed just above the surface of the moon, at its limb, looking for emission by exosphere gasses and the scattering of sunlight by dust grains. For a typical orbit, limb observation will be centered on the morning and evening terminators and local noon. During each of these activities the LADEE spacecraft will keep the telescope pointed no more than 20 km above the lunar surface. Each limb "stare" is accompanied by a "nod" during which the telescope field of view is nodded down to below the lunar limb (so that the moon is entirely in the Field of View (FOV) of the telescope) and then up to an altitude of 50 km. The "nod" will help to resolve any altitude variations in gasses or dust and provides a calibration point for zodiacal light and light scattered into the telescope from the surface of the moon.

In addition to the limb telescope UVS has a Solar Occultation Viewer (SOV) which allows it to stare at the sun, monitoring it as it rises or sets across the lunar limb. The advantage of a solar occultation observation is the very high signal-to-noise achieved (SNR>500) in the instrument for very short (<20 msec) integration times. The high SNR and rapid sample rate allows UVS to search for extinction due to dust at very low altitudes above the lunar surface (<1.5 km).

This talk will detail the design, performance and planned operations of the LADEE UVS instrument.

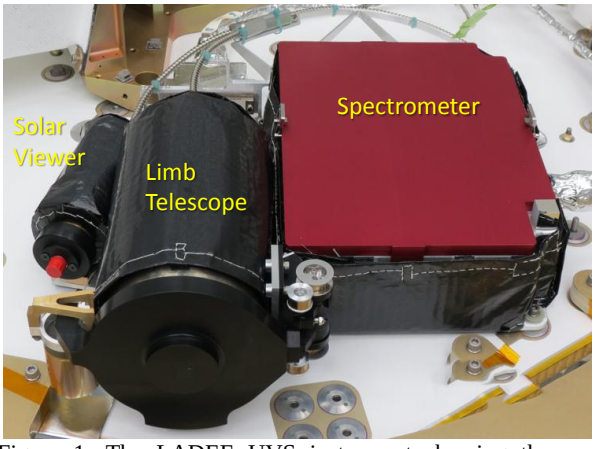

Figure 1. The LADEE UVS instrument showing the spectrometer, limb telescope, and solar viewer, integrated onto the top-deck of the LADEE spacecraft.