

Optical Scattering at the Moon: Predictions for the LADEE UV-VIS Spectrometer

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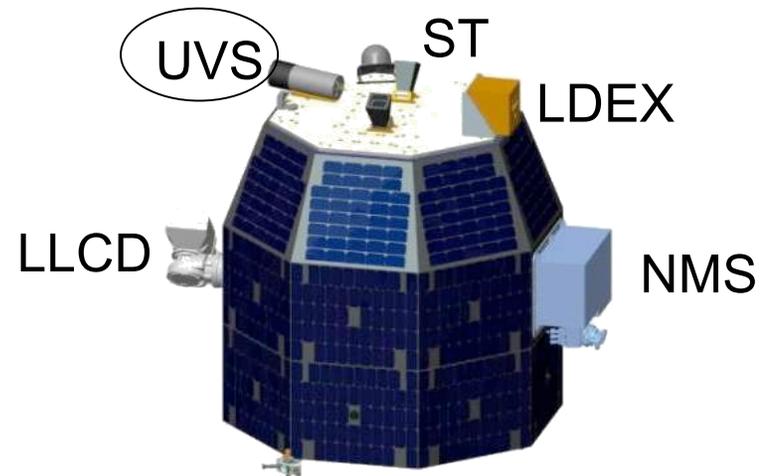
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LADEE Spectrometer

- ❑ Aft-pointing spectrometer ($\sim 1^\circ$ FOV)
- ❑ Spectral coverage: $\sim 230 - 830$ nm
- ❑ Spectral resolution $\Delta\lambda \sim 0.70$ nm



Nominal “Limb-Mode” Observing Configuration

Points at horizon after orbital sunset. Tangent height \sim constant.

Measurement

UVS will measure a superposition of:

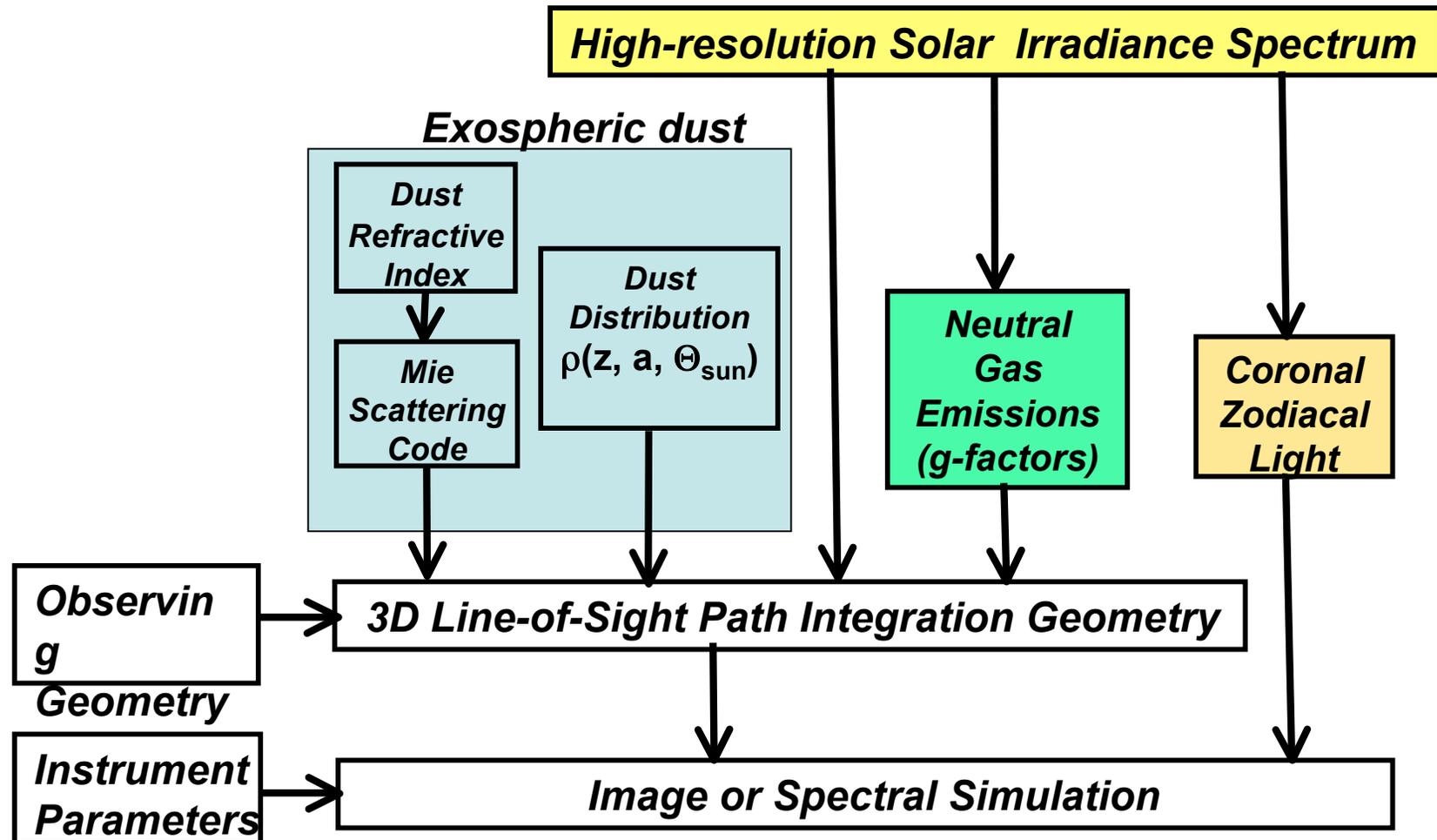


Needed !

Simulation tools for predicting . . .

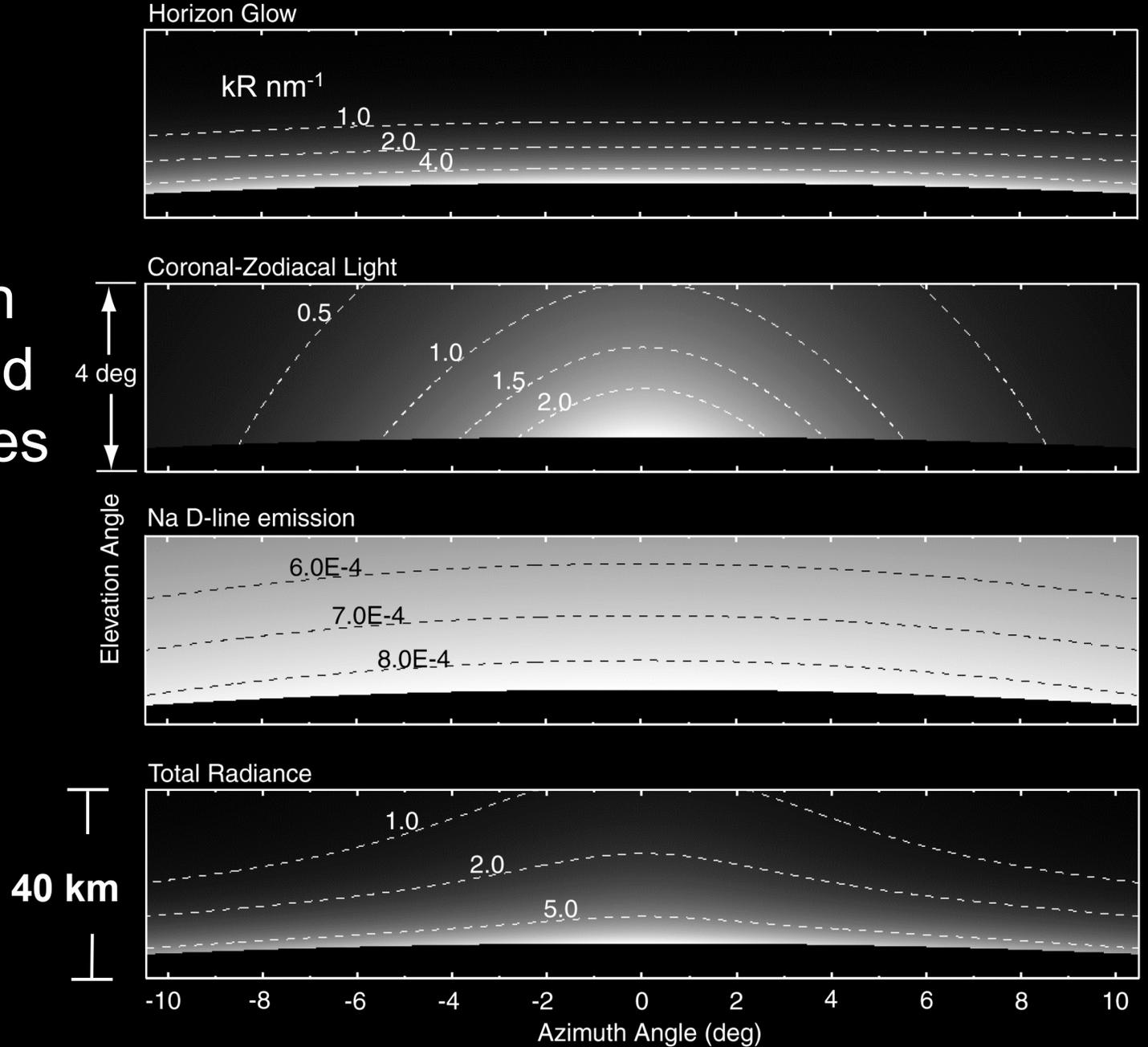
- Absolute intensities, colors and spatial distributions**
- Line-to-continuum ratios for emission lines**
- 2D context images, which can be acquired with a star-tracker**
- Observing approaches for detecting HG and neutrals in the presence of CZL, i.e. best choices for:**
 - > tangent heights**
 - > azimuth**
 - > terminator distance**
 - > wavelength(s)**

Code Architecture

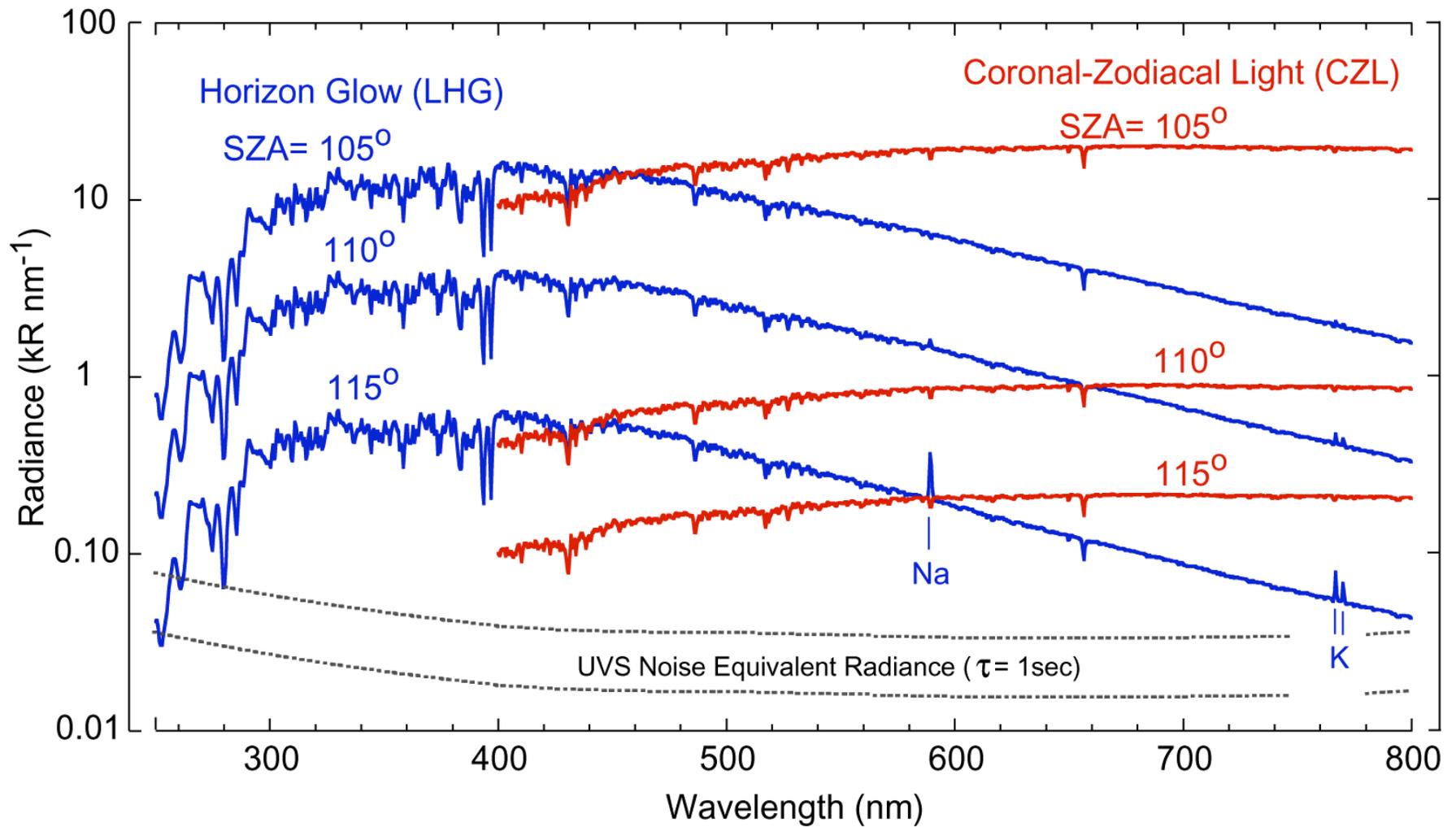


Spatial Distribution Of Scattered Light Sources

($z = 50 \text{ km}$
 $\text{SZA} = 110^\circ$)



Spectral Simulations



ANIMATION 1 (2 LOOPS)

Horizon Glow + Coronal/Zodiacal Light

LADEE TERMINATOR CROSSING

Some Predictions

Horizon glow

- ❑ LHG, CZL are comparable, but that depends on position:
- ❑ Photometric colors of LHG, CZL are very different. LHG exhibits a “blue” slope and CZL a “red” slope to at least $\lambda \sim 600$ nm.

Look for horizon glow at blue wavelengths, small tangent heights and offset from sunset position (azimuth~ 20 deg).

Emission lines

- ❑ Line-to-continuum contrast from Na (and probably K) easily measured at spectrometer resolution ($\Delta\lambda \sim 0.7$ nm).

Spacecraft location

- ❑ Optimal solar elongation angles exist for enhanced detection of LHG and neutral gas emissions.

Bottom line

- ❑ All three sources should be *easily* detectable by LADEE spectrometer and star trackers !!