Signal-to-Noise Ratios (SNR)
For
Resonon Hyperspectral Cameras

The Signal-to-Noise Ratios (SNR) are commonly used metrics used to evaluate the performance of hyperspectral imagers. Briefly, SNRs are determined for every spectral channel of an instrument, thereby providing a plot that is a function of wavelength. During typical operation, the noise is dependent on the input signal strength and camera operating parameters. For the results presented here, the imaging spectrometers are measuring the signal from a solar-illuminated Lambertian object with 100% reflectivity, which results in the spectral radiance profile shown in Figure 1. The integration time for each imaging spectrometer is chosen such that the strongest channel is at approximately 90% of the pixel full-well. The integration time and associated maximum frame rate is provided for each model of Resonon's imaging spectrometers. For additional detail on the SNRs of hyperspectral imagers, see here ???.

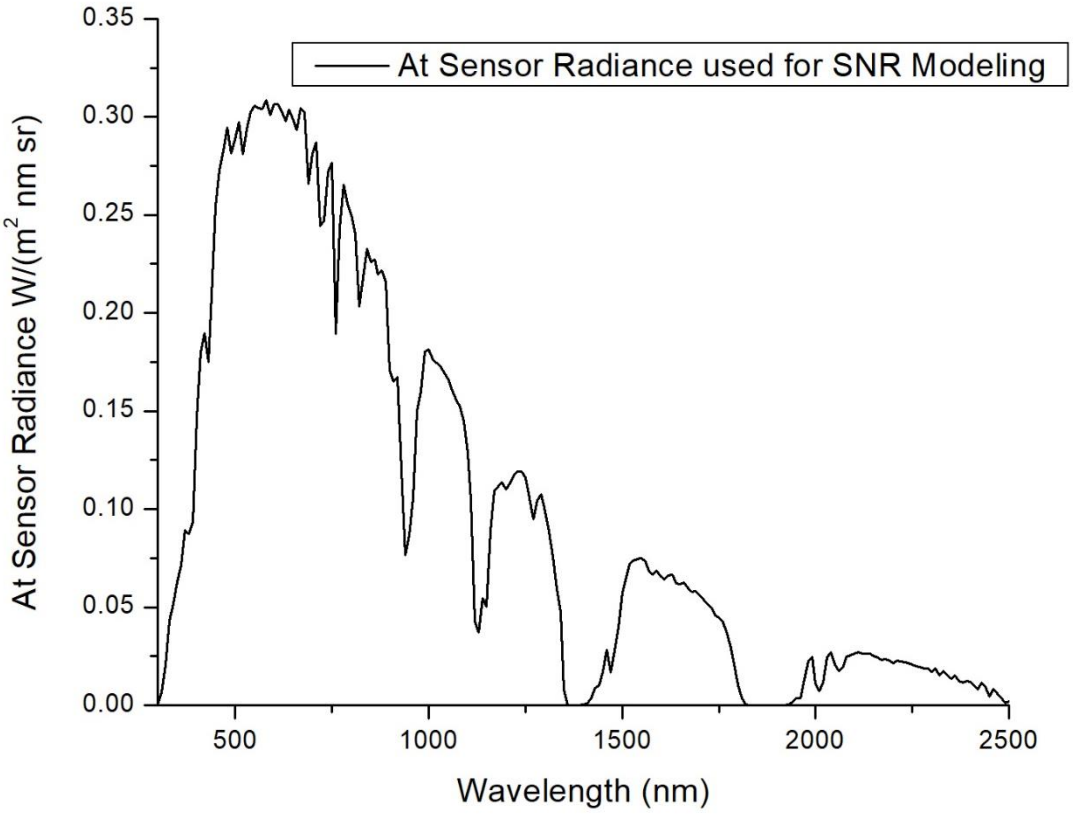
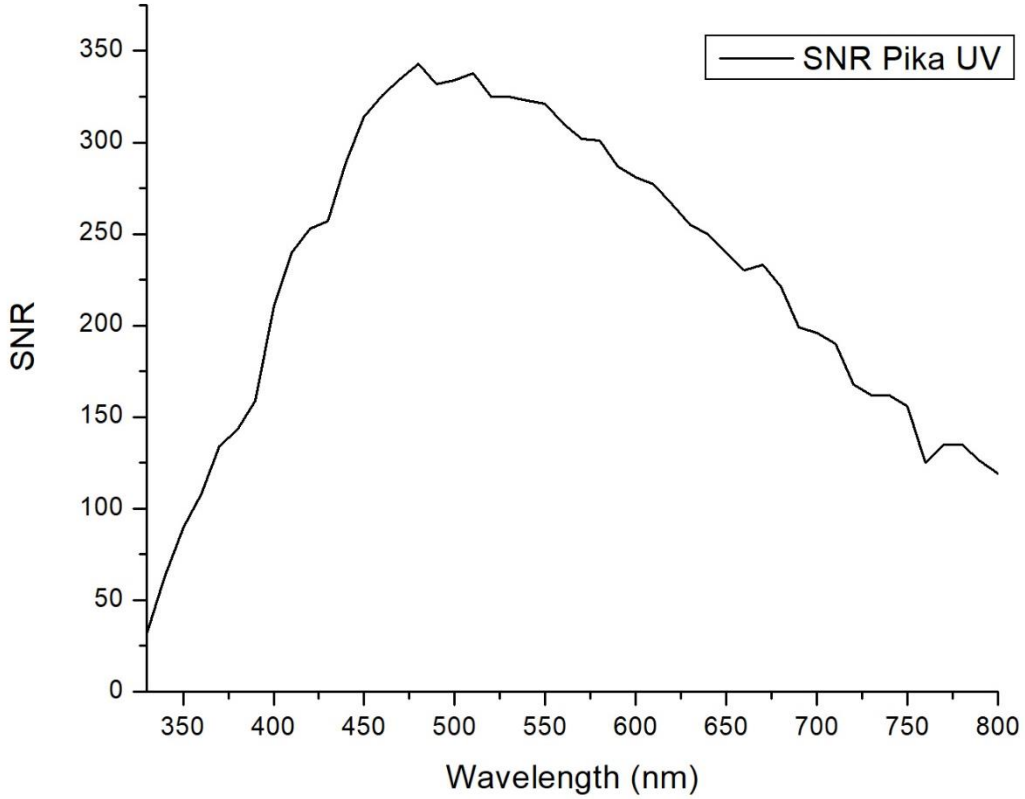


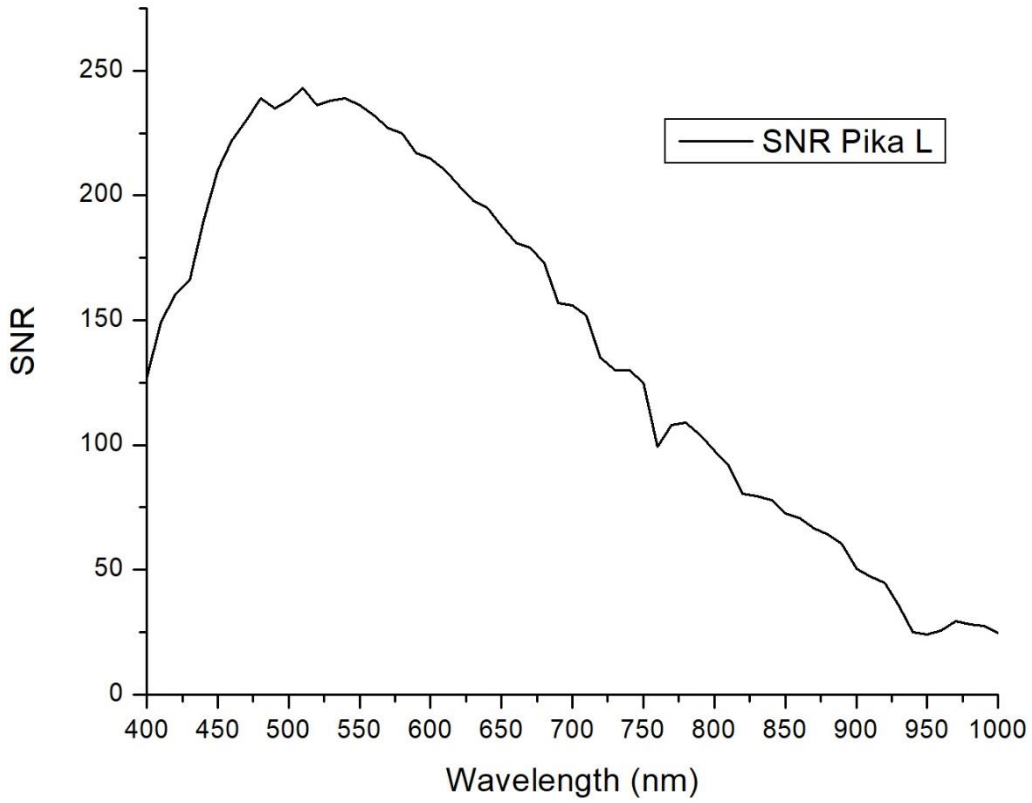
Figure 1. Spectral radiance as a function of wavelength from a solar-illuminated Lambertian surface with 100% reflectivity.

SNR models for Resonon hyperspectral imagers are provided in the following order: Pika® UV, Pika® L, Pika® XC2, Pika® IR, Pika® IR+, and Pika® SWIR.



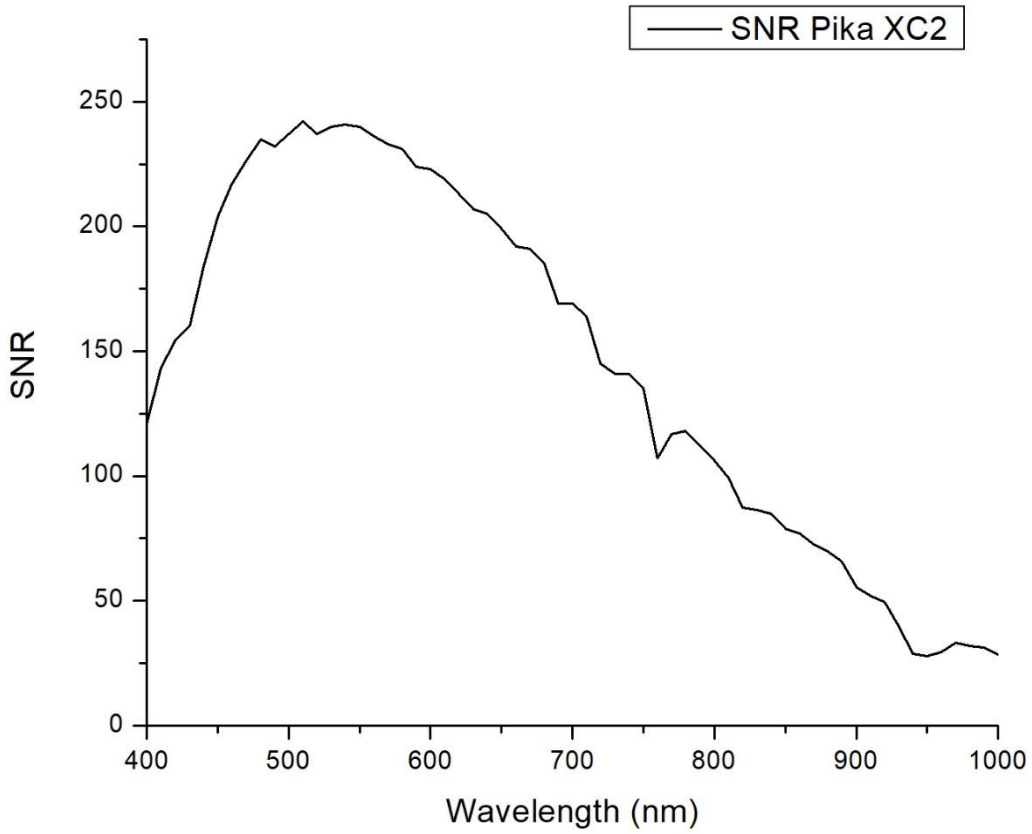
Pika UV: Signal-to-Noise Ratio (SNR) for the Pika UV with the maximum pixel at 90% of full well. The integration time was 21.7 ms with default binning of 4. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.

The falloff SNR at short wavelengths for the Pika UV is largely due to the weak solar illumination at these wavelengths.

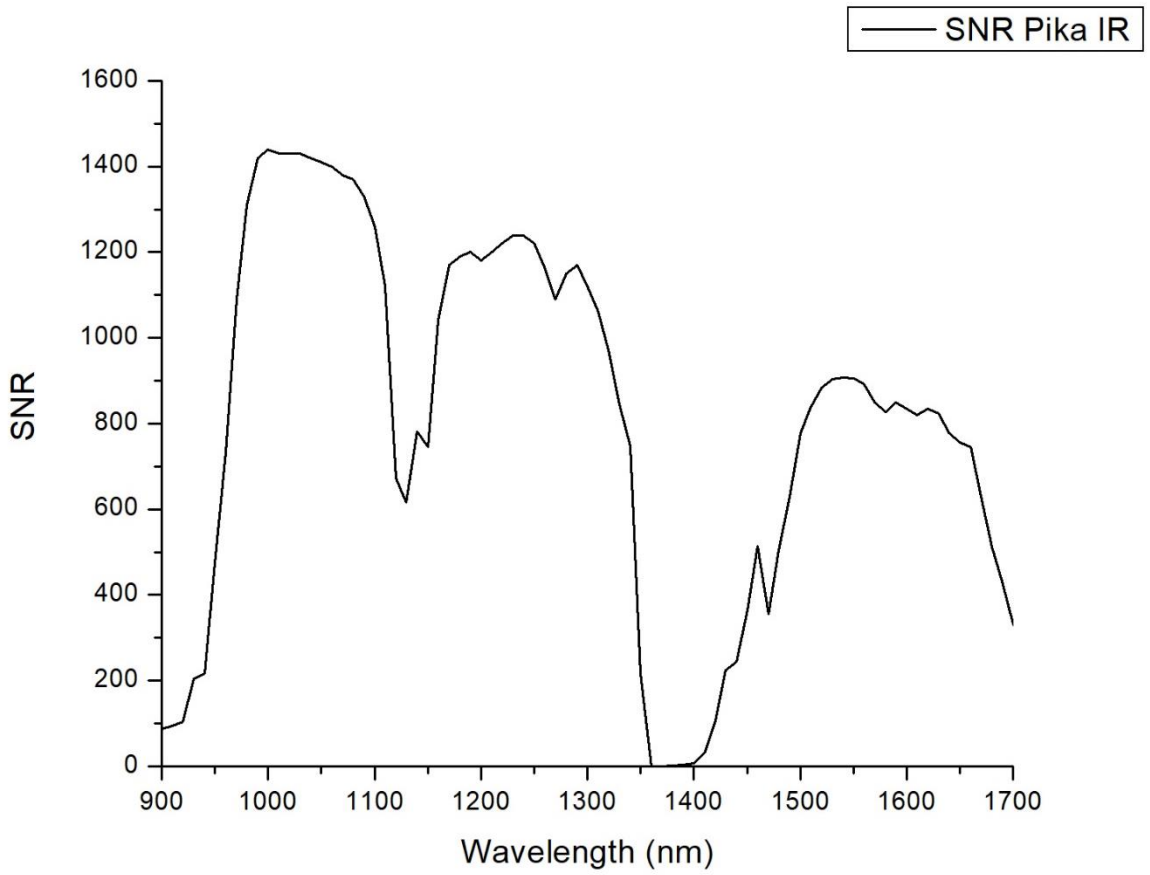


Pika L: Signal-to-Noise Ratio (SNR) for the Pika L with the maximum pixel at 90% of full well. The integration time was 18.5 ms with default binning of 2. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.

The SNR profile is similar to the solar spectrum. Weak detector response at longer wavelengths contributes to small SNRs at these wavelengths.

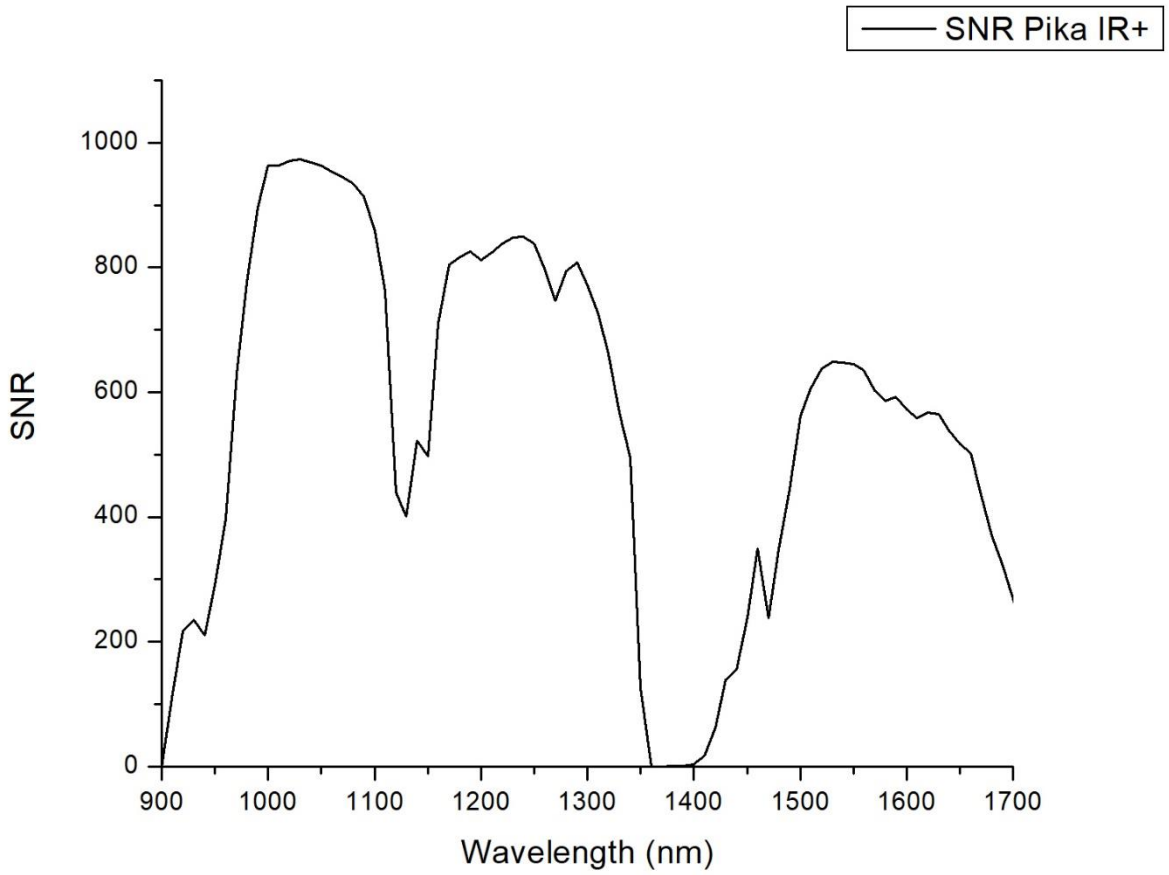


Pika XC2: Signal-to-Noise Ratio (SNR) for the Pika XC2 with the maximum pixel at 90% of full well. The integration time was 19.25 ms with default binning of 2. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.



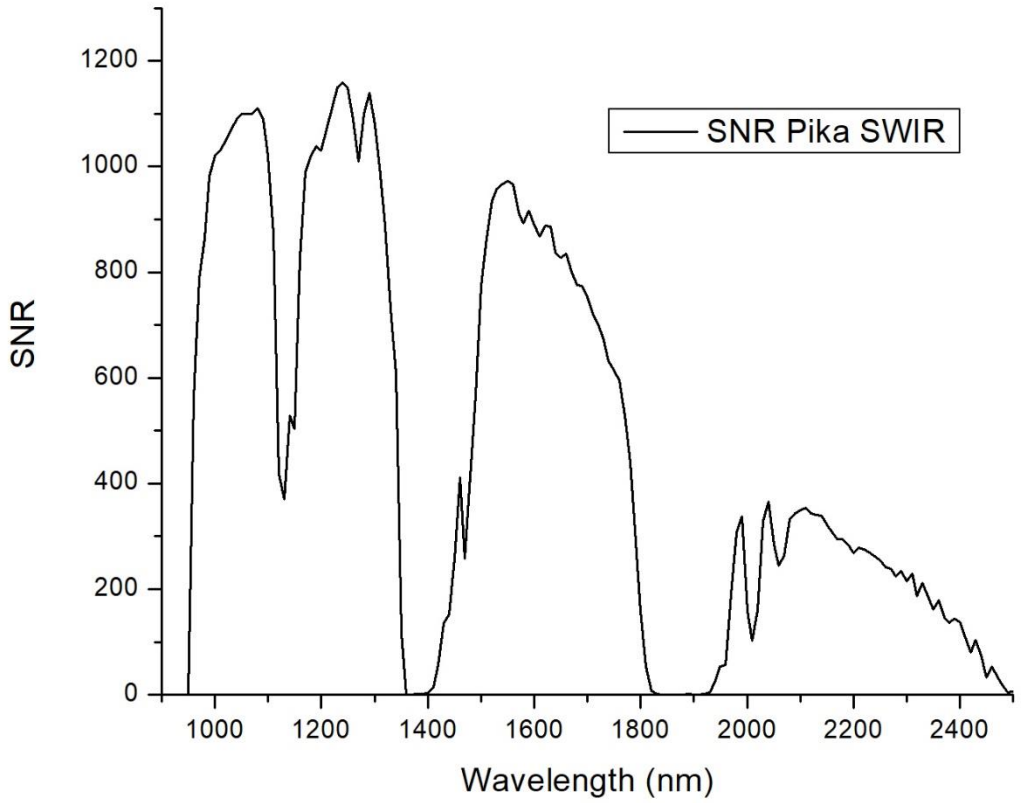
PIka IR: Signal-to-Noise Ratio (SNR) for the Pika IR with the maximum pixel at 90% of full well. The integration time was 5.32 ms with no binning. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.

The strong spectral features in the SNR plot are due to the shape of the solar spectrum in this wavelength range.



Pika IR+: Signal-to-Noise Ratio (SNR) for the Pika IR+ with the maximum pixel at 90% of full well. The integration time was 19.3 ms with no binning. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.

The strong spectral features in the SNR plot are due to the shape of the solar spectrum in this wavelength range.



Pika SWIR: Signal-to-Noise Ratio (SNR) for the Pika SWIR with the maximum pixel at 90% of full well. The integration time was 22 ms with no binning. The signal was from a uniform Lambertian surface with a reflectance of 100% illuminated by the sun under typical conditions.

The strong spectral features in the SNR plot are due to the shape of the solar spectrum in this wavelength range.