Hyperspectral Glossary of Terms:

Spectral Range: The range of electro-magnetic wavelengths (e.g. light) in nm over which the instrument collects signal. For reference, visible wavelengths span from approximately 400 nm to 700 nm.

Spectral Channels: The number of bands, or brightness values, the instrument measures across the Spectral Range.

Spectral Resolution: A measure of the narrowest (in nm) spectral feature you can measure with the instrument. Alternatively, it is the width of each spectral channel of the instrument in nm.

Spectral Pixels: The number of pixels across which the spectral signal is imaged. Line-scan or push-broom hyperspectral imagers distribute spectral data along one-axis of the two-axis camera focal plane array and spatial data along the other axis.

Spectral Sampling: The Spectral Sampling is the Spectral Range divided by the Spectral Pixels. The Spectral Sampling is often narrower than the actual Spectral Resolution.

Spatial Channels: Resonon hyperspectral imagers are line-scan or push-broom imagers. The Spatial Channels are the number of pixels along this line.

Max. Frame Rate: The maximum line-scan rate of the imager. (Note: This is NOT the frame-rate for acquiring 2-dimensional images, which will be slower and will depend on the number of lines in the image.)

Bit Depth: The bit level of the data recorded for each channel. For example, a Bit Depth of 12 means 2^12, or 4096, discrete values that each signal acquisition is stored at.

f/# (“f-number”): The f/# is a measure of the lens speed, and is a quantity that is needed to determine the system’s radiometric performance. f/# for a hyperspectral imager means the same as it does for a conventional camera.

Average RMS Spot Radius: This is a measure of the resolution of the instrument and is averaged across the Spectral Range of the instrument.

Smile (peak to peak): Smile is an optical distortion associated with hyperspectral imaging that manifests itself by mapping the same wavelength to different columns of the focal plane array for different spatial channels. The diagrams below show the signal that a “Perfect” hyperspectral imager would obtain for a uniformly-lit sample with narrow-band red, green, and blue signal, along with an exageration of the signal that a “Real-Life” hyperspectral imager obtains. Peak to peak Smile for the red signal is the distance between the black vertical lines. All real hyperspectral imagers have some

smile, usually measured in pixels. Smile will lead to spectral signatures looking slightly differently at different spatial channels.

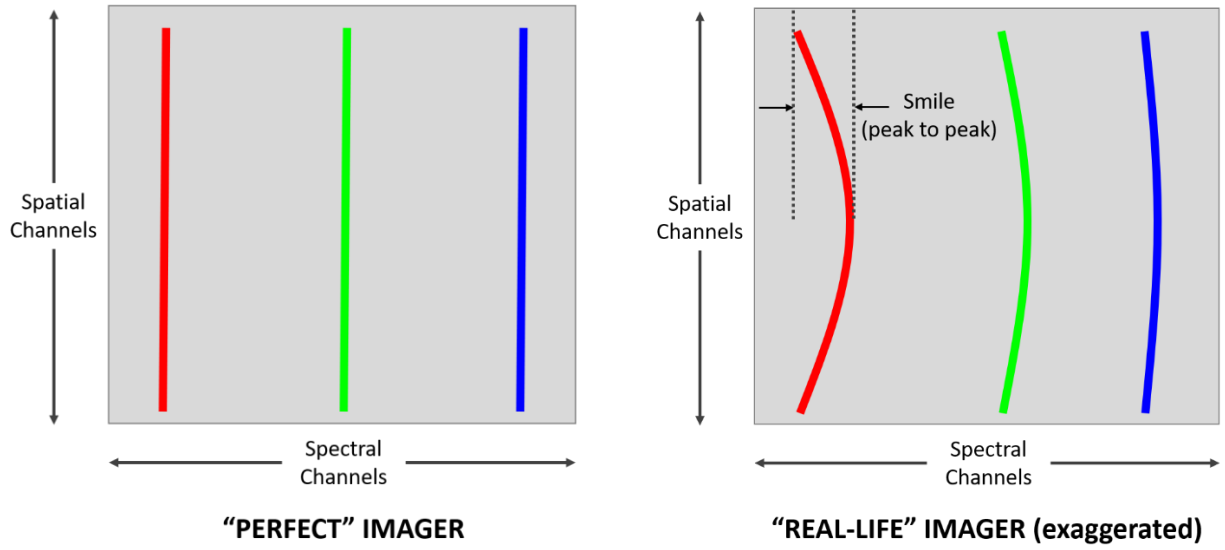

Fig. 1: Smile distortion.

Keystone (peak to peak): Keystone is an optical distortion associated with hyperspectral imaging. Keystone is a measure of how much a signal does not map to the correct spatial channel across the focal plane array. The diagrams below show how a "Perfect" imager would map the signal from three spatial channels, one at the top of the field of view, one in the middle, and one at the bottom of the field of view, and how a "Real-Life" imager maps the same signal. The peak to peak Keystone is the distance between the dashed lines, measured in pixes. All real hyperspectral imagers have some Keystone. Keystone causes the signal to be "mixed" between spatial channels.

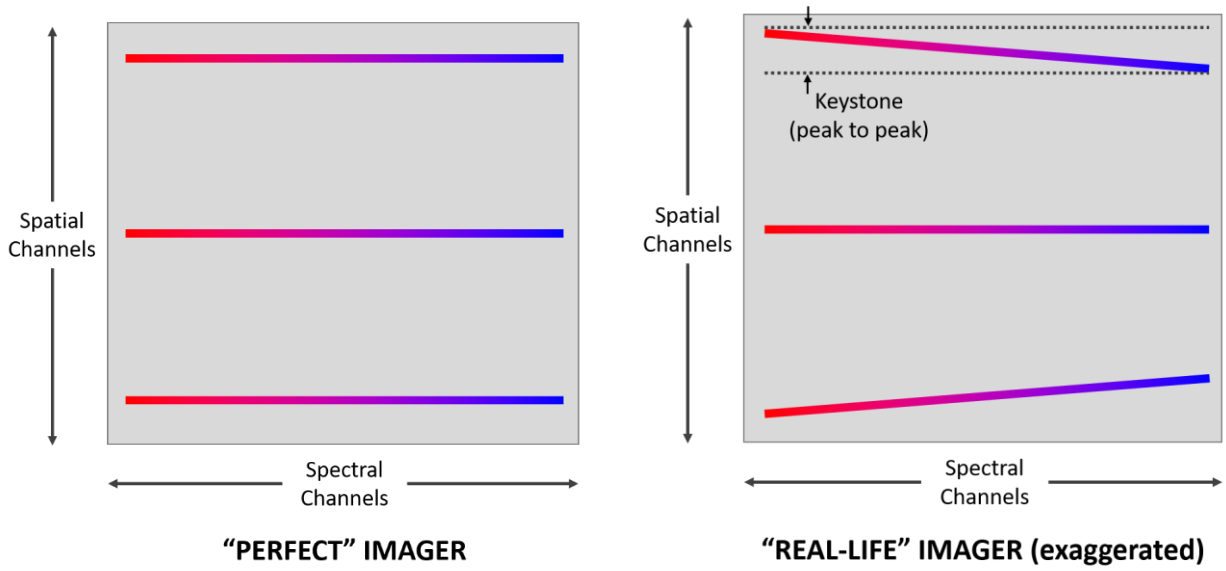

Fig. 2: Keystone distortion.