Application note: Pixel value to irradiance using the sensor calibration model

The quantities used to determine the calibration coefficients are exposure time ε in seconds, ISO γ, pixel value p, f-number f = 2.2 and measured irradiance I in arbitrary units (homogeneous to $W.sr^{-1}.m^{-2}$) common to all Sequoia cameras.

$$p = (A\varepsilon\gamma + C)\frac{I}{f^2} + B$$

The calibration coefficients A, B and C measured per unit in production are stored in that order in the Xmp.Camera.SensorModel.

Xmp.Camera.SensorModel	XmpSeq of String		A,B and C calibration coefficients separated by comma

Said differently,

$$I = f^2\frac{p - B}{A\varepsilon\gamma + C}$$

After applying this pixel transform, the image gets in a non-standard "color" space: a normalized irradiance space with a range [0, ∞ [.

Warning: tag Xmp.Camera.BlackCurrent is not used for irradiance estimation in Sequoia.

The values below are given as example of calibration coefficients.

Band name	A	B	C
Green	315443.40033763903	2988.8704019800452	4683.507118796941
NIR	287299.4697122022	4996.422813154824	2757.3593611361816
Red	290442.1371557925	4846.935650747429	2942.271286595907
REG	85034.63266328324	5078.301978746599	717.3057367012013

Applying the formula above, in a Red image acquired at ISO 100, 1/333s exposure time with a f-number f = 2.2, a pixel value of 22434 is equal to a 0.94 irradiance in arbitrary units common to all Sequoia and Sunshine.

Due to continuous updates of our products, some tags may be missing in your images.
If so please check that you updated your camera to the latest firmware available.
If the problem persists, contact us at sequoia@parrot.com to discuss recalibration options.