

Wilderness Imagery Used to Calibrate the Camera(s) of WV02

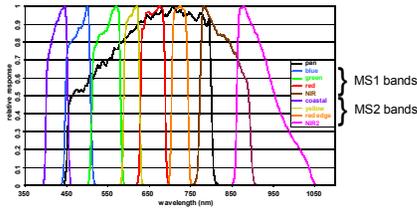
Any wilderness area with flat terrain, high contrast, and low cloud cover makes an excellent calibration target.

This poster reveals some of the most useful (and beautiful) sites in the world used for the geometric calibration of WV02.

sensor description

WV02 has one panchromatic band and 8 multispectral bands

PAN pixel = 0.46 meters (at nadir)
MS pixel = 1.84 meters (at nadir)
4x larger than PAN



featured sites

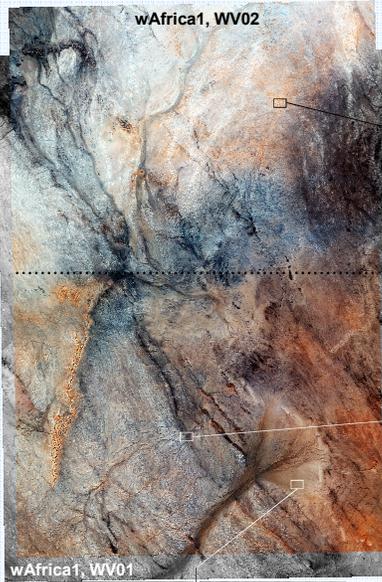


Site	Latitude (°)	Longitude (°)	average annual cloud cover (%)
wAfrica1	24.915434	-6.782236	35.289
cAustralia1	-19.894923	130.913897	56.486
Somalia1	9.440419	-48.414754	33.341
Oman2	21.158898	57.386652	32.184
wAustralia1	-24.364045	115.227192	32.127
Atacama1	-21.513818	-69.203876	40.403

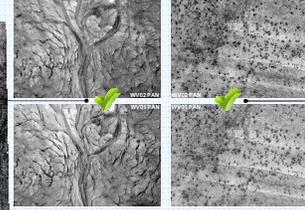
PAN camera calibration

The WV02 panchromatic band was calibrated against WV01 images of the same place. Tie points between the WV02 images and the WV01 references were easy to create.

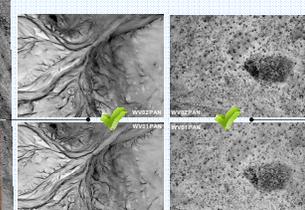
desert



Nearly perfect correlation between the two images, even though the WV01 reference was months older.



Full width rows of the points were used to calibrate the WV02 PAN camera model. Focal length and optical distortion polynomials were fitted in a least squares sense.



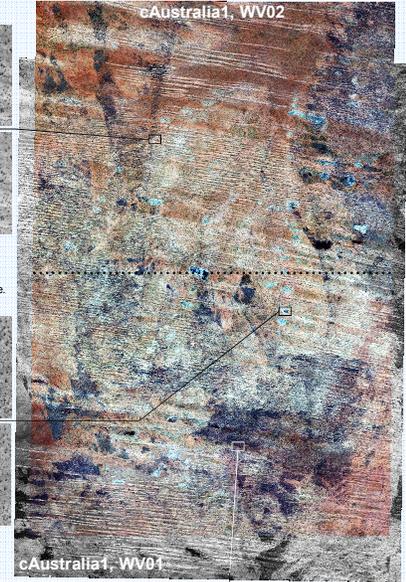
✓ = good correlation

✗ = bad correlation

Featureless spots are bad. A row of tie points that intersected this bland spot would be discarded.

The vegetation was so dense, this strip had no featureless spots!

savannah/grassland



MS camera calibration

The WV02 multispectral bands were calibrated against the panchromatic band of the same image. Tie points were found between each MS band and PAN. It was challenging to find imagery with good contrast in all 9 spectral bands.

Legend: ✓ = good correlation, ✗ = bad correlation

Blue: Most of the vegetation follows the river tributaries, enhancing contrast in all 9 bands.

Green: Water covered canyons and dissected hills, both features have high contrast in all 9 bands.

Red: Terrain (and tire tracks) have stark contrast in all 9 bands.

NIR: At small scale, the tiger stripes resolve into parts (and the tracks; each has high contrast in all 9 bands).

SWIR: Most of the vegetation follows the river tributaries, enhancing contrast in all 9 bands.

MWIR: Water covered canyons and dissected hills, both features have high contrast in all 9 bands.

LWIR: Terrain (and tire tracks) have stark contrast in all 9 bands.

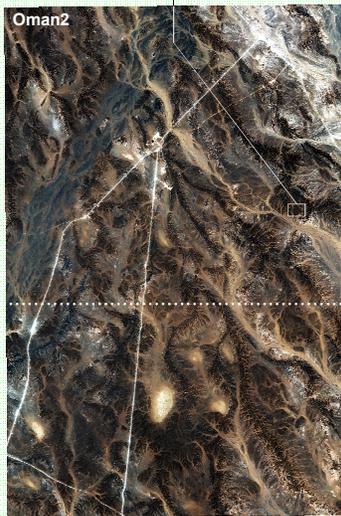
TIR: At small scale, the tiger stripes resolve into parts (and the tracks; each has high contrast in all 9 bands).

deserts

river deltas



At large scale, the Somalia desert looks like tiger stripes.



The Oman desert is covered in fractal formations.



Dendritic river tributaries characterize this region.



In the parched Atacama region, river deltas are stable for years.

Full width rows of tie points were used to calibrate all 8 multispectral camera models.

Focal length and optical distortion polynomials were optimized for each MS band, creating nearly perfect registration with the PAN band and the other MS bands.