RSC
REMOTE SENSING CENTER
at the Naval Postgraduate School
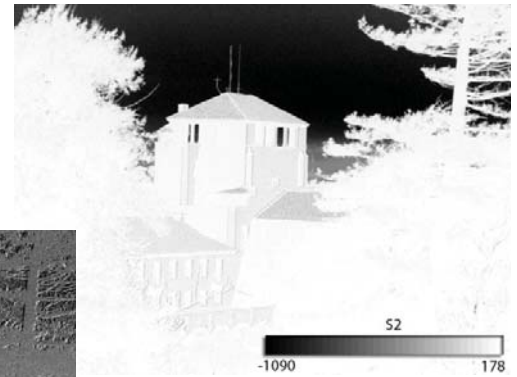
POLARIMETRIC IMAGING

Technology/Applications

The Remote Sensing Center is developing a Polarimetric Image (PI) database using our recently acquired PI camera. Initial imagery has been collected, & experiment design is in progress to analyze the utility of PI for Helicopter Brown-out, Improvised Explosive Device (IED) detection, & land-cover classification.
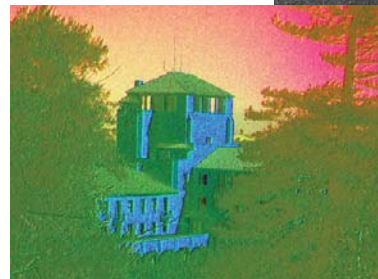

Stokes vector images of Hermann Hall, Naval Postgraduate School, Monterey CA.

Light, a form of electromagnetic radiation, has as one of its fundamental characteristics an intrinsic polarization. The polarization of the light refers to the direction of wave vibration in relation to the direction of propagation. The degree of polarization in reflected light is affected by a variety of factors including the illumination, surface roughness, color, and sensing geometry.

SAMBA PI camera

DOLP and RGB image, where Red = DOLP, Green = S1 and Blue = S0.

The Polarization Imaging camera measures the amount of polarized light at -45°, 0°, 45° and 90° nearly simultaneously. These measurements are used to calculate Stokes vectors for each pixel in the image. Stokes S0 vector is the total intensity, S1 is the difference in vertical polarization, and S2 is the difference in 45° and -45° polarization.

Degree of Linear Polarization, DOLP, is calculated according to the following relationship:

$$DOLP = \sqrt{\frac{S_1^2 + S_2^2}{S_0^2}}$$

BECAUSE THE **W**ORLD IS **W**ATCHING

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