Geophysical Research Abstracts,
Vol. 11, EGU2009-7583, 2009
EGU General Assembly 2009

Aperture size effects on backscatter intensity measurements in remote sensing

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Most materials show a peaked intensity vs. phase (light source-target-detector angle) curve. For non-negligible angular apertures of the source and/or the detector, the measured intensity at and near zero phase (backscatter) is lower than the real one. We derive an averaging aperture integral that represents this effect, and with it invert measured intensity values to obtain the actual intensity curve. We also give a practical formula for estimating the magnitude of the aperture effect in zero-phase intensity measurements, and show that only two such measurements made at different apertures are sufficient for deriving the real intensity. These corrections are needed in the comparison of measured reflectances in an increasing
number of validation efforts for remote sensing applications requiring ground truth measurements.