

CHARACTERISATION OF THE SPECTRAL AND BIDIRECTIONAL REFLECTANCE
PROPERTIES OF WATER BODIES AS STANDARD REFERENCE TARGETS
IN REMOTE SENSING DATA

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ABSTRACT

The reflectance spectrum of typical lakes in the Canadian Shield has been measured in order to characterize them as standard reference targets. Such targets can then be used to remove atmospheric effects from remote sensing data. While this technique is not new, it has hitherto only been applied at nadir over fairly broad spectral bandpasses. In order to develop atmospheric correction techniques for high spectral resolution, off-nadir looking sensors an accurate characterization of water as a reference target which included these features was necessary. Also, since polarisation effects are now being included in radiative transfer codes, a preliminary assessment of the effects of polarisation on the water reflectance spectrum was made.

Both the surface and volume components of the reflectance of lake water were measured at various view angles and azimuths as a function of solar elevation. The measurements were made with a spectrograph at a spectral resolution of 8nm in the range from 400nm to 750nm. These measurements were conducted from a boat with a second spectrograph recording the global downwelling and sky irradiance. The approach to the radiometric calibration of the instruments and observational procedure are discussed in terms of the error budget of the experiment. It is found that the surface component of the water reflectance in the principal plane usually includes a component caused by specular reflectance which varies according to the surface wave structure. Outside of the principle plane, it is shown how the *magnitude* and *spectral distribution* of the surface reflectance is affected by the viewing geometry. The volume component of the water reflectance behaves as a typical isotropic scattering medium and is found to be a function of the viewing path length. The spectral distribution is found to be sensitive to the surrounding environment. Also it is shown how the water reflectance changes with increasing solar zenith angle.