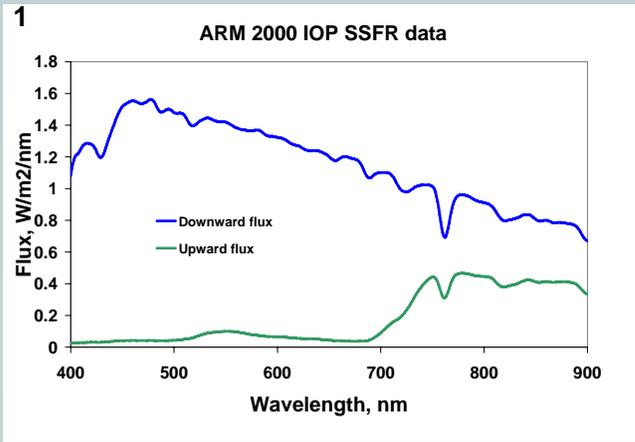


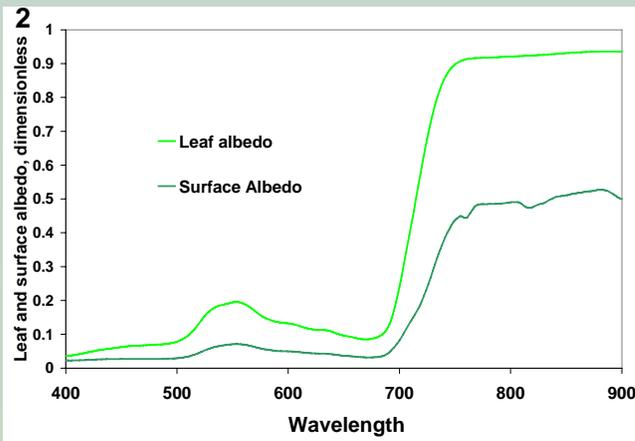
A new approach to interpret aircraft spectral measurements of surface reflectance around ARM Central Facility

Y. Knyazikhin,¹ A. Marshak,² J. C. Chiu,³ D. Huang,⁴ W. Wiscombe,² and P. Pilewskie⁵

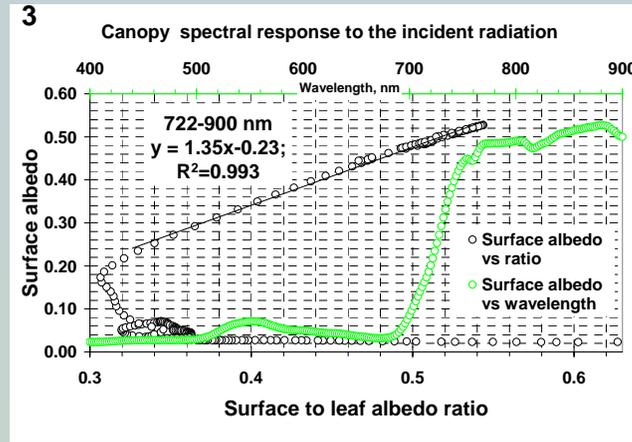
¹Boston University, ²NASA GSFC, ³University of Maryland Baltimore County, ⁴Brookhaven National Laboratory, ⁵University of Colorado



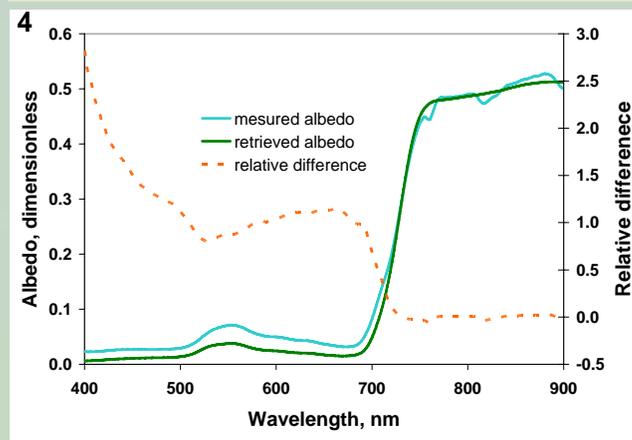
Up- and downward spectral fluxes acquired by the Solar Spectral Flux Radiometer (SSFR) over vegetated surface during the 2000 cloud IOP under clear sky conditions.



Surface and leaf albedo. The surface albedo is calculated as the ratio between measured up- and downward fluxes. The spectral albedo of a green healthy leaf is quite stable although its magnitude can vary with leaf age and among species.



Retrieved surface albedo. If the vegetated surface is illuminated by a parallel beam, the surface albedo can accurately be approximated by a linear function of the surface to leaf albedo ratio. Given slope and intercept, the spectral surface albedo for the condition of direct illumination can be obtained.



The difference between measured and retrieved surface albedo is related to the single scattering albedo, scattering anisotropy and aerosol optical depth.

Problem: To separate aerosol and surface contributions from airborne spectral measurements of surface reflectance.

➤ The poster shows how to retrieve surface spectral albedo for *direct illumination only* from spectral measurements of up- and downward fluxes above the vegetation under ambient illumination conditions (Fig. 1).

➤ Our approach is based on the canopy spectral invariant relationship: *the surface-to-leaf albedo ratio (A_λ/ω_λ) is a linear function with respect to the surface albedo (A_λ), see Fig. 2), i.e.,*

$$A_\lambda/\omega_\lambda = pA_\lambda + R_0,$$

from which A_λ for *all wavelengths* can be retrieved (Fig. 3).

➤ Since the vegetation is highly sensitive to the angular anisotropy of the *incident radiation*, the difference between the retrieved and measured surface albedo (Fig. 4) is a signature of the aerosol optical properties (single scattering albedo, scattering anisotropy and optical depth). It also determines the ratio of direct to the total flux at the surface.