Using Multi-angle Polarimetry to Derive χ factor and Improve BRDF Correction for PACE's OCI

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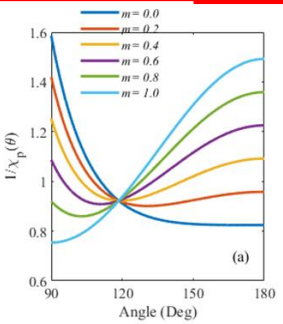
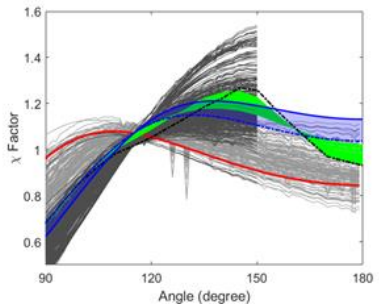
1. Based on Zaneveld (1995), He et al. (2017) derived that the angular variation of remote sensing reflectance (BRDF) depends on χ factor.

$$r_{rs}(\theta_0,\theta,\varphi) = \frac{1}{2\pi\bar{\mu}_d(\theta_0)g(\theta_0,\theta,\varphi)}\left(\frac{1}{\chi_w(\gamma_m)}\frac{b_{bw}}{b_b}+\frac{1}{\chi_p(\gamma_m)}\frac{b_{bp}}{b_b}\right)\frac{b_b}{a+b_b}$$

$$\frac{1}{\chi_p(\gamma)} = m\frac{1}{\chi_S(\gamma)} + (1-m)\frac{1}{\chi_L(\gamma)}$$





2. Natural χ_p varies significantly (Xiong et al. 2017)

3. 90% of natural variability of χ_p can be accounted for by two end members, corresponding to extremely small and large particles (Zhang et al. 2017).

4. One pixel and λ, 3 unknowns a(λ), b_{bp}(λ), and *m* vs. 5(SPEXone) or 10(HARP2) $r_{rs}(\lambda;\theta_0,\theta,\phi)$, *m* and hence χ_p can be solved. The estimated χ_p from MAP can then be used to estimate BRDF for OCI at its own viewing geometry