Using Multi-angle Polarimetry to Derive $\chi$ 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 $\chi$ factor.

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

2. Natural $\chi_p$ varies significantly (Xiong et al. 2017)

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

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