Analysis of Errors in LP Aerosol Retrieval

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Aerosol Scattering Index (ASI)

$$ASI = \frac{I_{nc} - I_{n0}}{I_{n0}}$$

where, I_{nc} are radiances calculated using a nominal aerosol profile,

I_{n0} are radiances calculated assuming a pure Rayleigh atmosphere.

subscript n represents normalization at 40.5 km

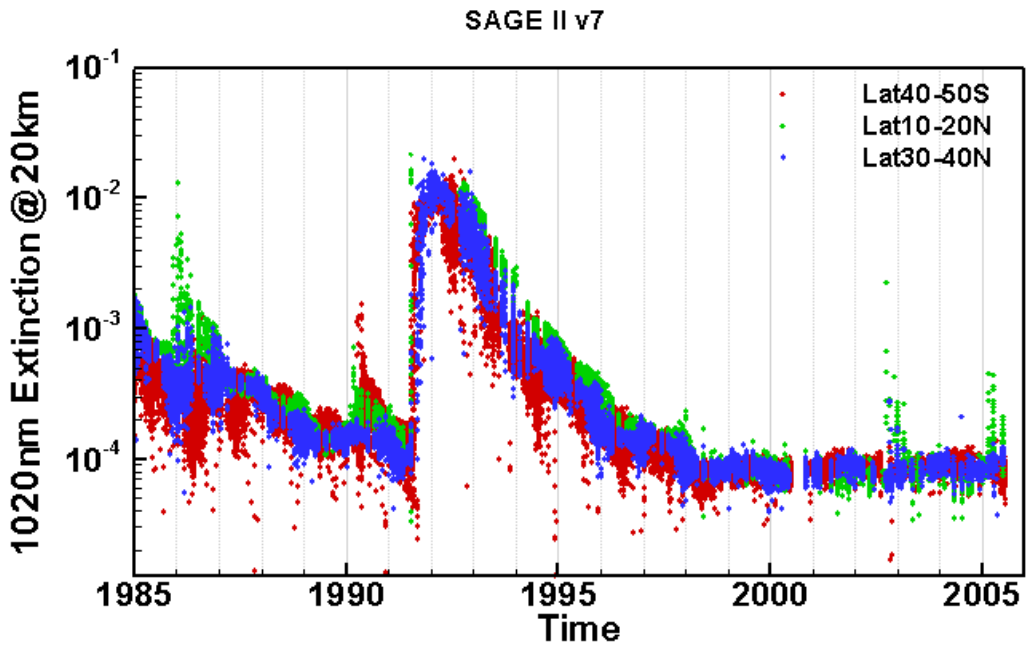
In SS approx: (I_{nc}-I_{n0}) is roughly $\propto n_{aer}\wp(\Theta)$

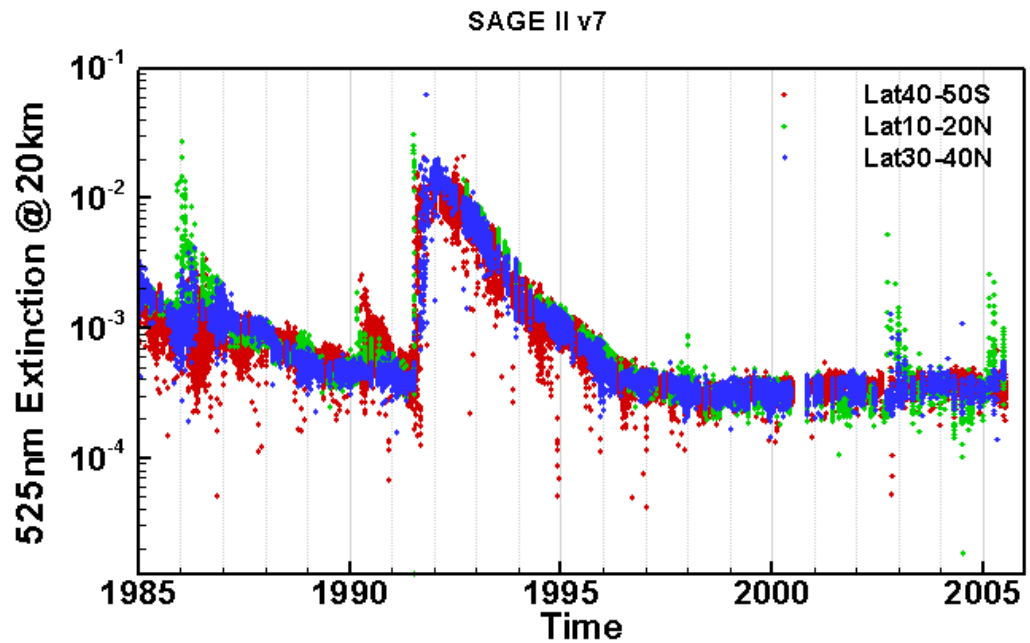
where, $\wp(\Theta)$ is aerosol scatt. phase fn at single scatt. angle Θ

So, ASI is roughly $\propto$ aerosol MR x $\wp(\Theta)$

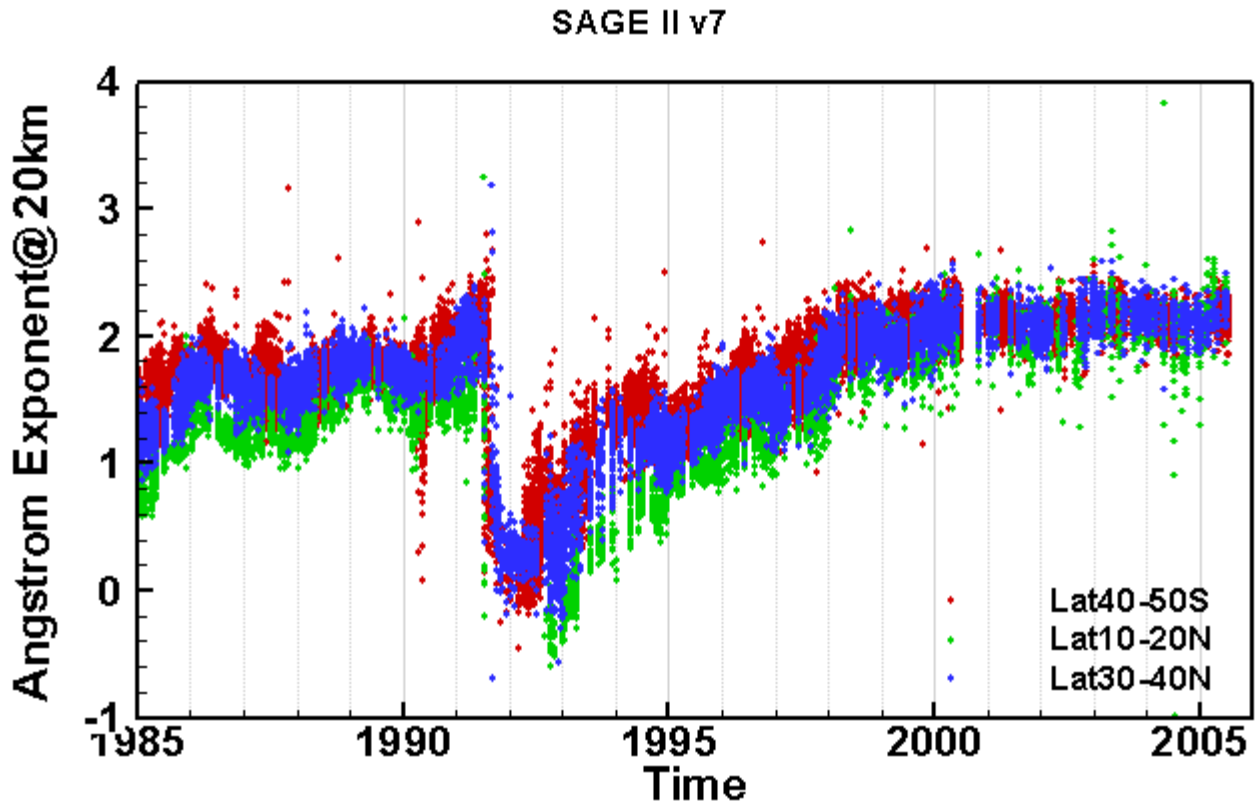
1% error in ASI produces 1% error in retrieved aerosol extinction

Extinctions @20km from SAGE v7 data

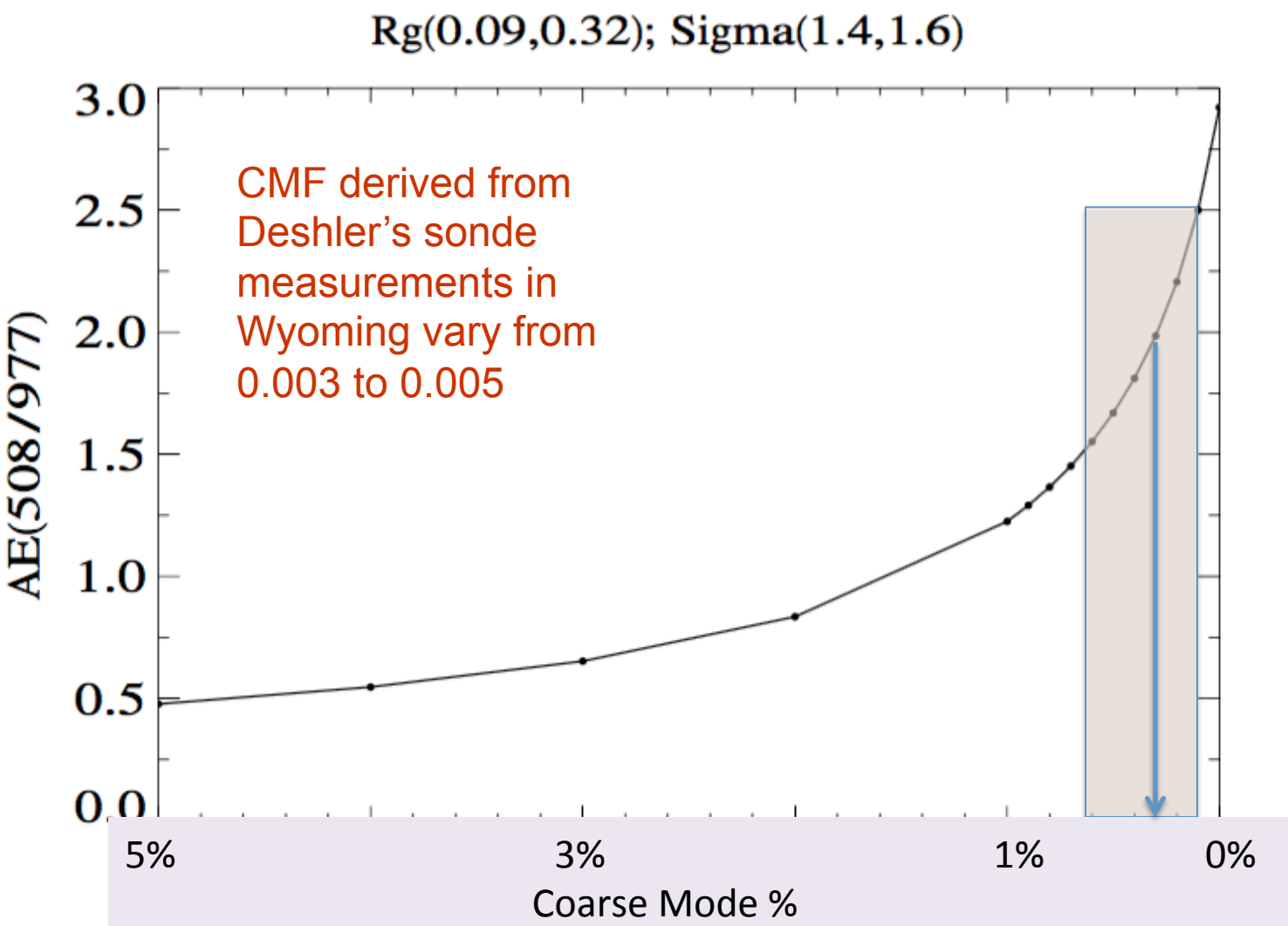




α(525/1020) @20km from SAGE v7 data

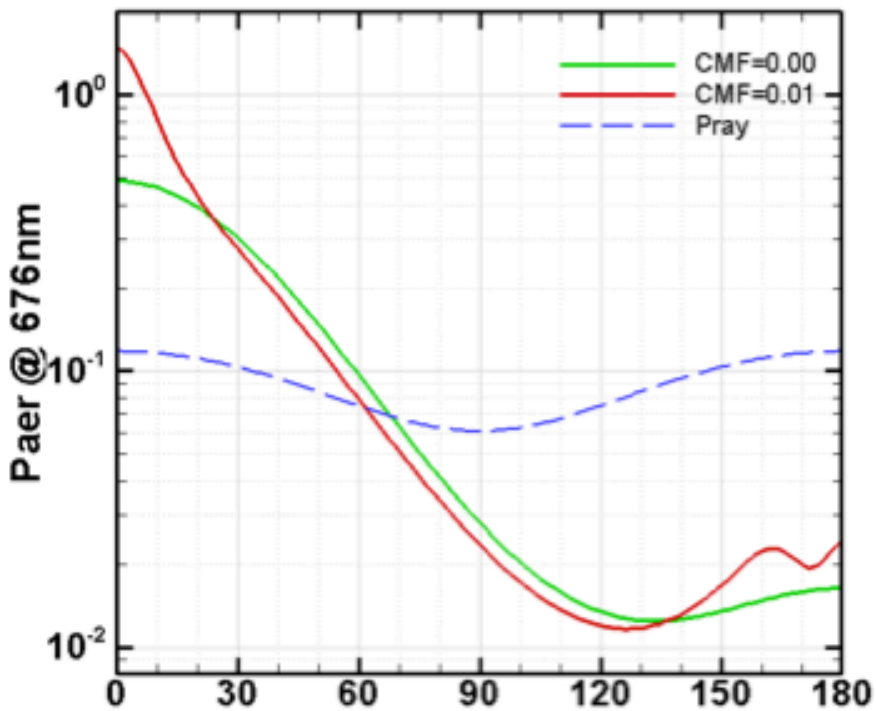


Effect of coarse mode fraction (CMF) in bimodal lognormal size distribution on AE



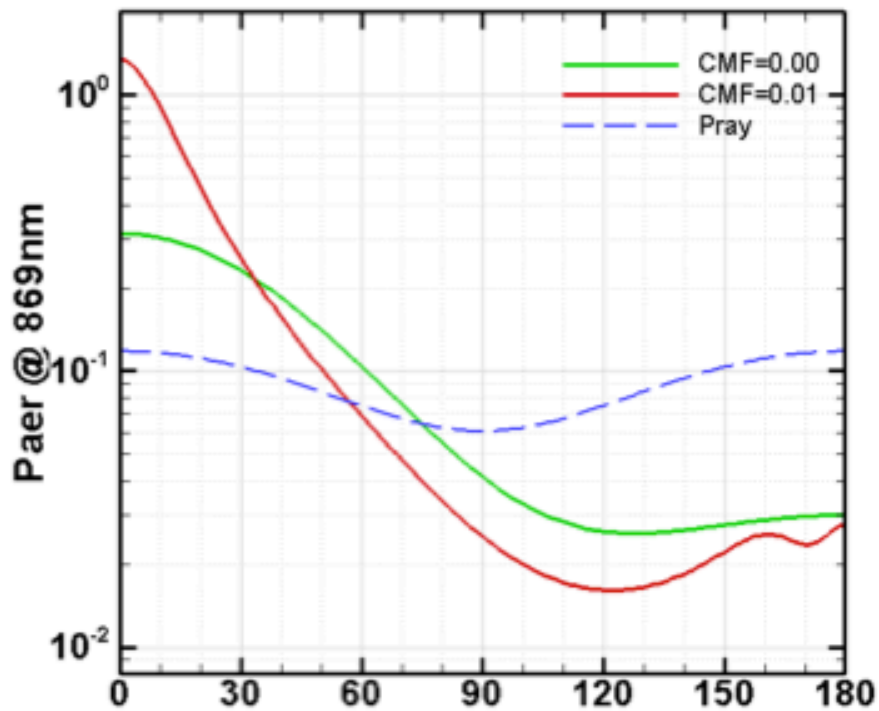
Effect of CMF on aerosol scattering phase function

676 nm



Scatt angle

869 nm

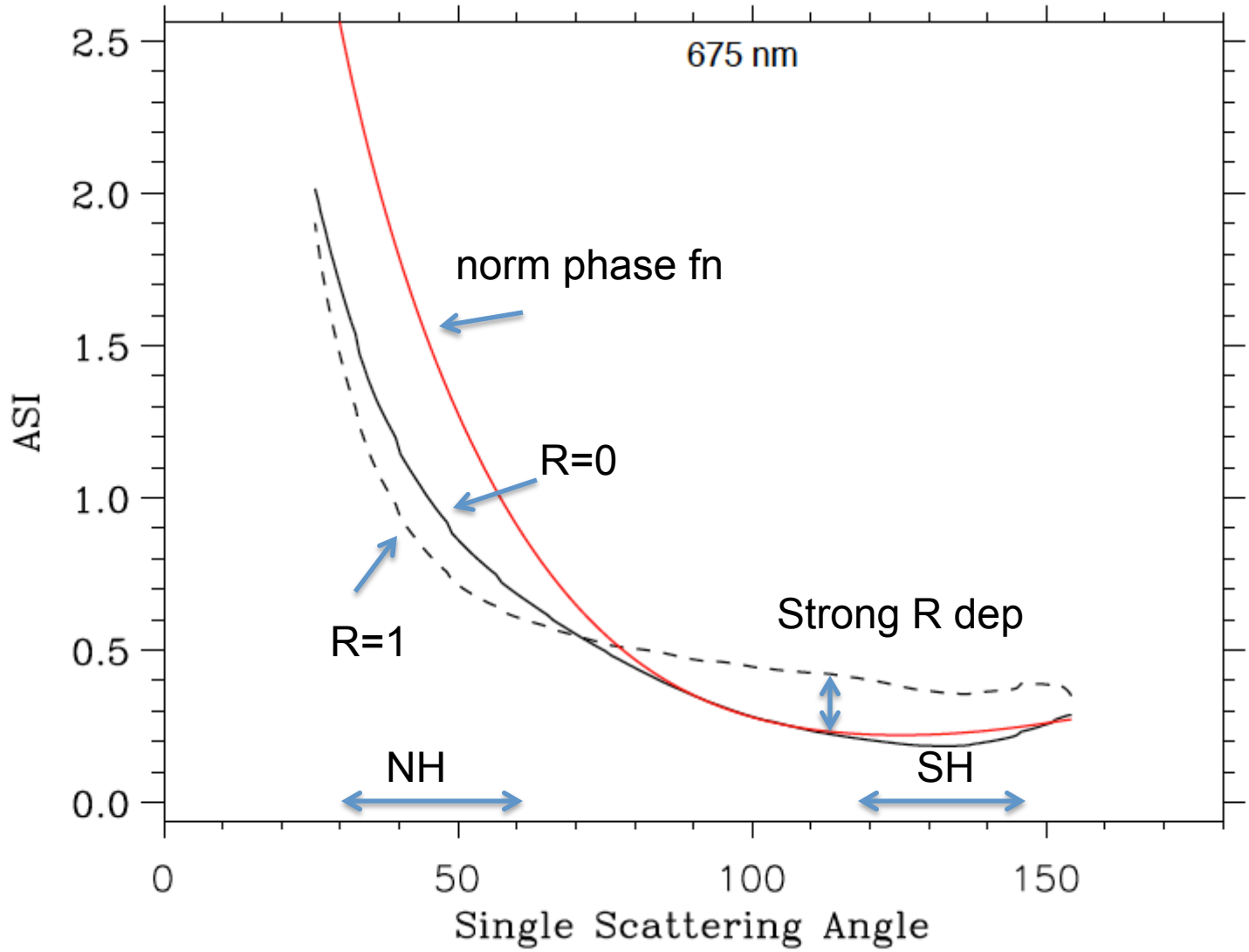


Scatt angle

V1.0 algorithm will use fixed CMF of 0.003. 869 nm may provide some CMF information, but it will be hard to validate it without SAGE III data.

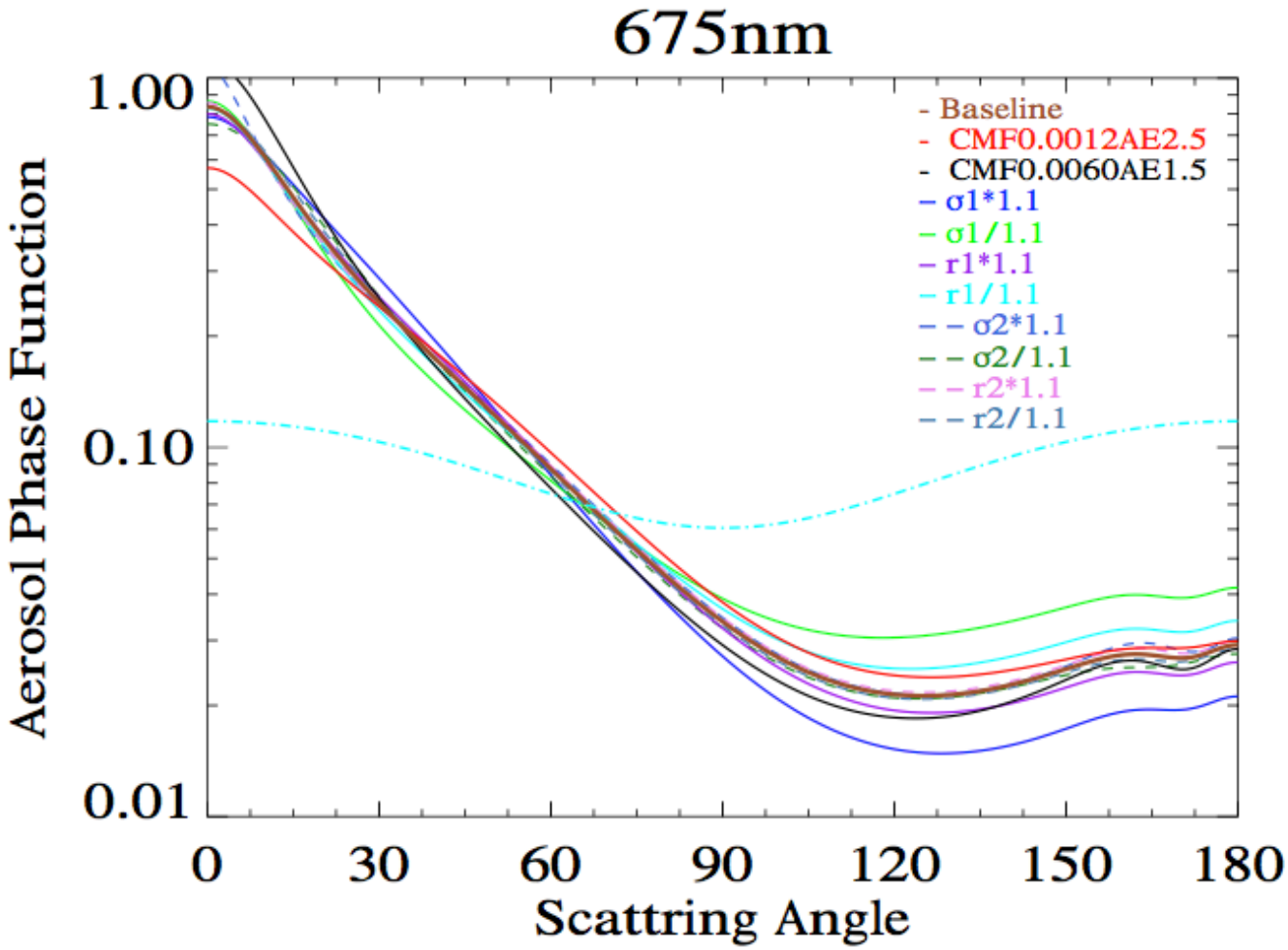
Variation of ASI with SSA & R

(fixed aerosol & P/T profiles, but SZA varies with SSA)



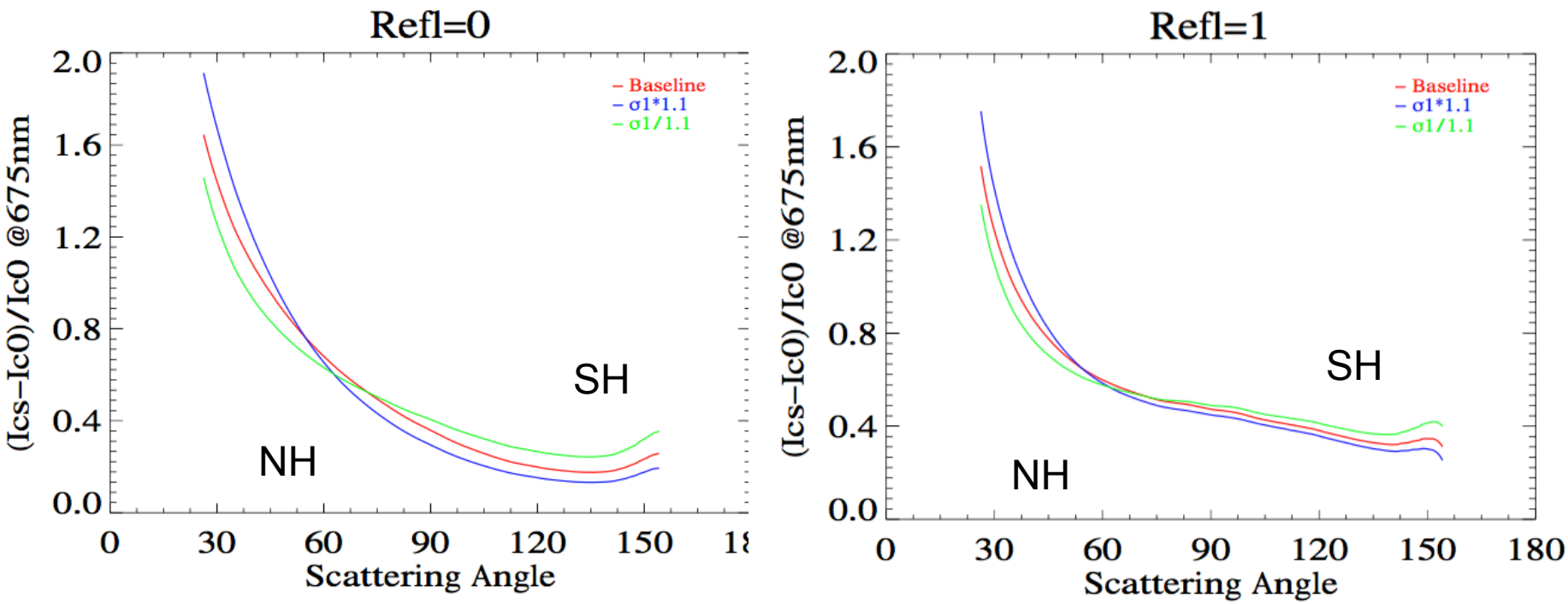
Effect of all size parameters on phase fn

(AE was kept fixed at 2.0 by adjusting CMF)



Effect of size distribution (for fixed AE) is largest in backscattered direction (SH in LP meas geometry)

Effect on ASI of changing fine mode sigma



Effect of size distribution is smaller at R=1. So, if size distribution is reasonable extinction shouldn't vary with R and vice versa.

V1 Aerosol Algorithm Status

- Forward processing will start on June 15, reprocessing to be completed ~ by end of July.
- L2 orbital files will provide radiances, ASI and ASI-residuals at 8 wavelengths (350-1000 nm) plus 675 nm aerosol extinction and ancillary information
  - Cloud contaminated and data with ASI<0.01 will be flagged but not filtered
- L2 daily files will provide data at 675 nm only.
  - Cloud contaminated and data with ASI <0.01 will contain fill values (-999).