SAGE III/ISS: Aerosol extinction
CALIPSO: TAB, VFM, tropopause height

From 36 km to the stratospheric bottom: \( S_{p,S} = S'_{p,S} \), (Initial \( S'_{p,S} = 50 \text{ sr} \))

Aerosol extinction retrieval based on CALIPSO TAB (Young and Vaughan, 2009)

Calculation of the AOD of CALIPSO and SAGE III/ISS at corresponding heights in the stratosphere (\( \tau_{CAL,S} \) and \( \tau_{SAGE,S} \))

\[
\varepsilon = \frac{\tau_{SAGE,S} - \tau_{CAL,S}}{\tau_{SAGE,S}}
\]

\(|\varepsilon| < 0.01\)

Yes

\( S'_{p,S} = \frac{S_{p,S}}{1 - \varepsilon} \)

No

End of retrieval, stratospheric lidar ratio (\( S_{p,S} \)) is determined

Are tropospheric observations available for SAGE III/ISS?

Yes

From the top of troposphere to near surface: \( S_{p,T} = S'_{p,T} \), (Initial \( S'_{p,T} = 28.75 \text{ sr} \))

Aerosol extinction retrieval based on CALIPSO TAB (Young and Vaughan, 2009)

Calculation of the AOD of CALIPSO and SAGE III/ISS at corresponding heights in the troposphere (\( \tau_{CAL,T} \) and \( \tau_{SAGE,T} \))

\[
\varepsilon = \frac{\tau_{SAGE,T} - \tau_{CAL,T}}{\tau_{SAGE,T}}
\]

\(|\varepsilon| < 0.01\)

Yes

End of retrieval, stratospheric and tropospheric lidar ratios (\( S_{p,S} \) and \( S_{p,T} \)) are determined

No

Yes

No

\( S'_{p,T} = \frac{S_{p,T}}{1 - \varepsilon} \)