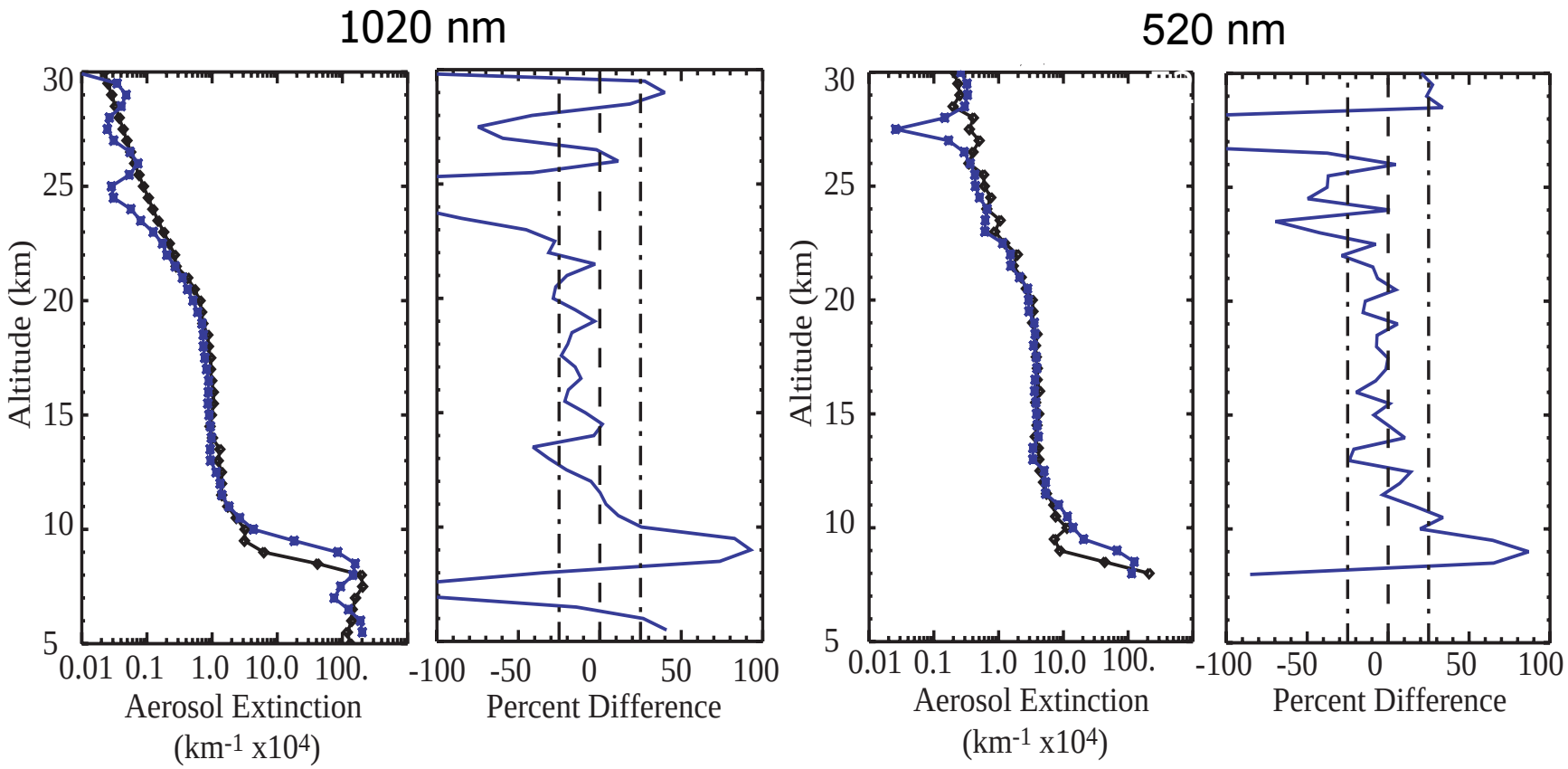
Long-Term Aerosol Variability and SAGE III Aerosol Extinction Validation

Larry Thomason
NASA Langley Research Center
Lynn Harvey
SAIC

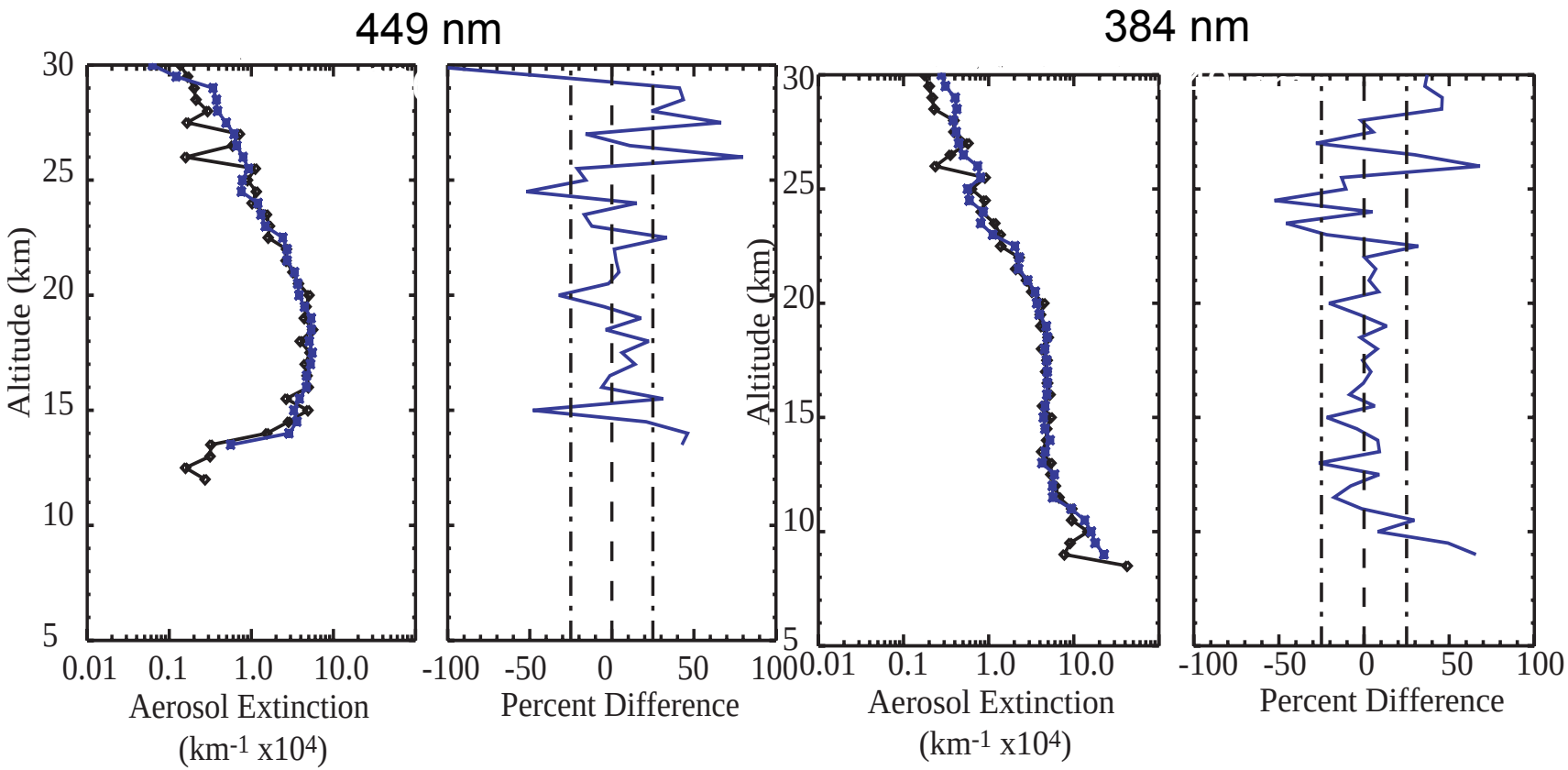
Overview

- Overview of the status of SAGE III aerosol extinction measurements
- Coming soon to a GRL near you:
  - *SAGE III Aerosol Extinction Measurements: Initial Results* by Thomason and Taha
- Science team activities

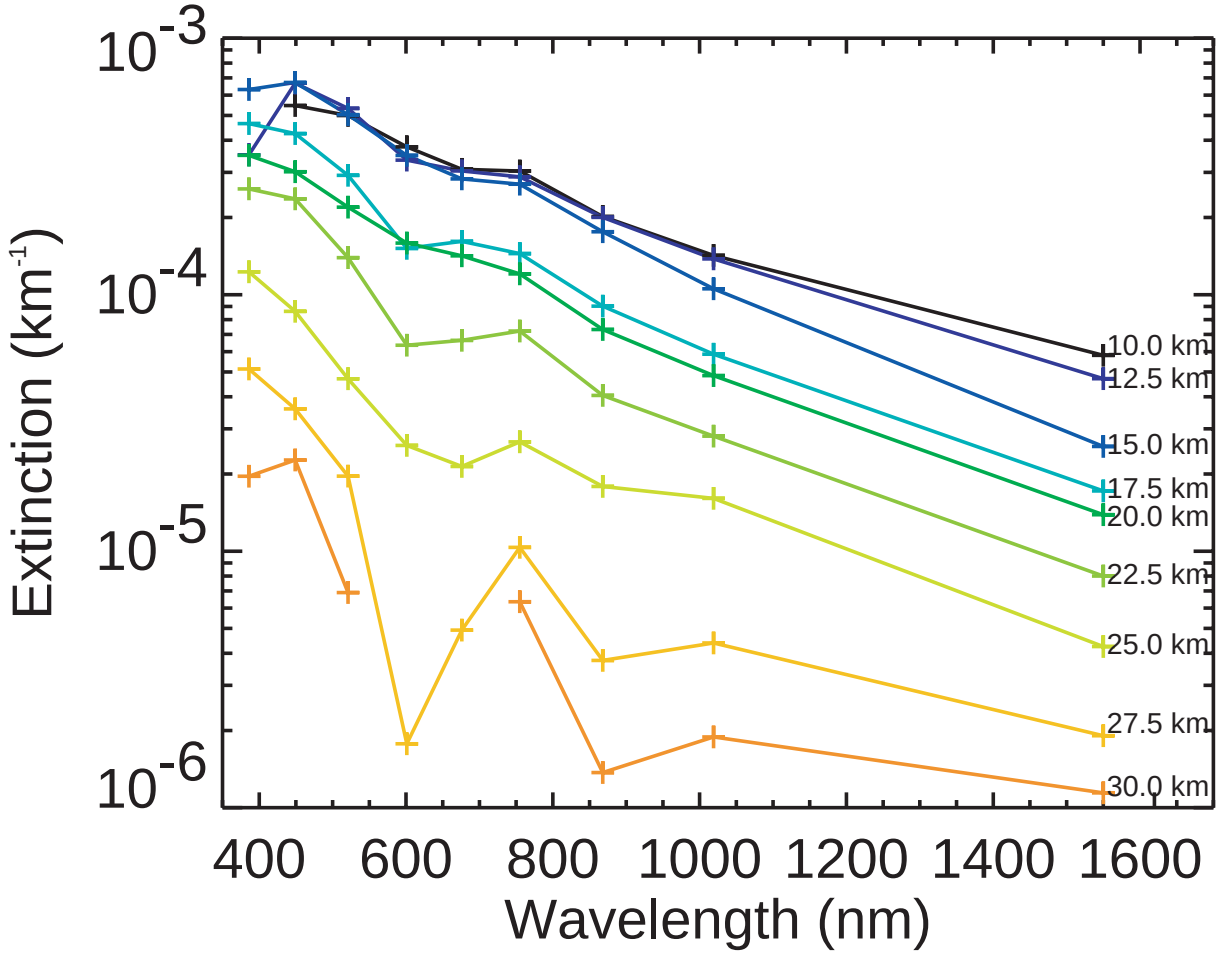
Comparisons with SAGE II



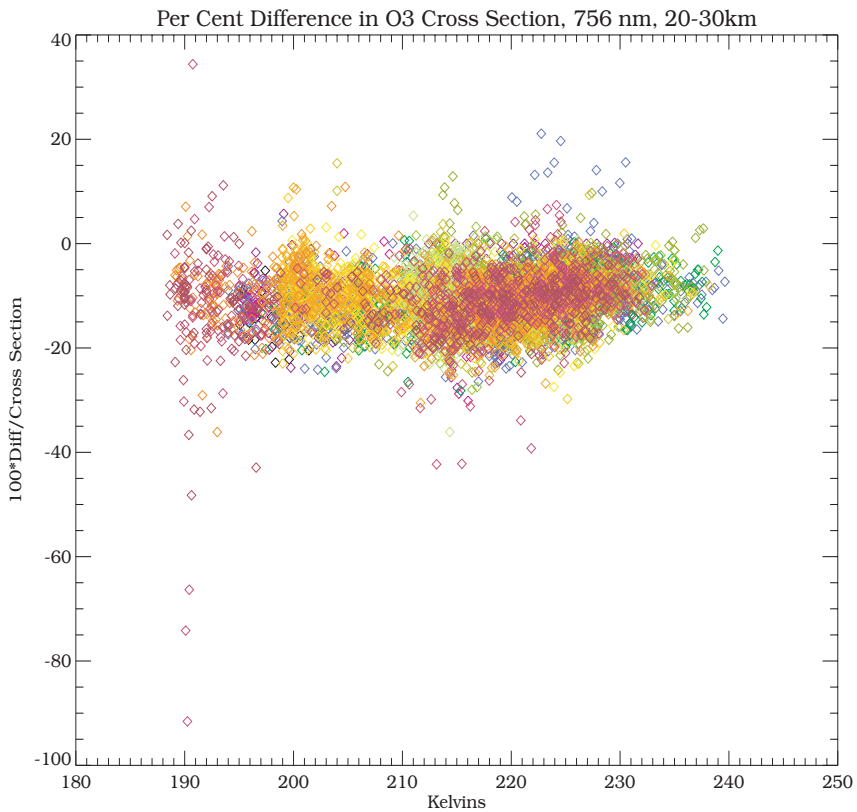
Comparison to SAGE II (cont.)

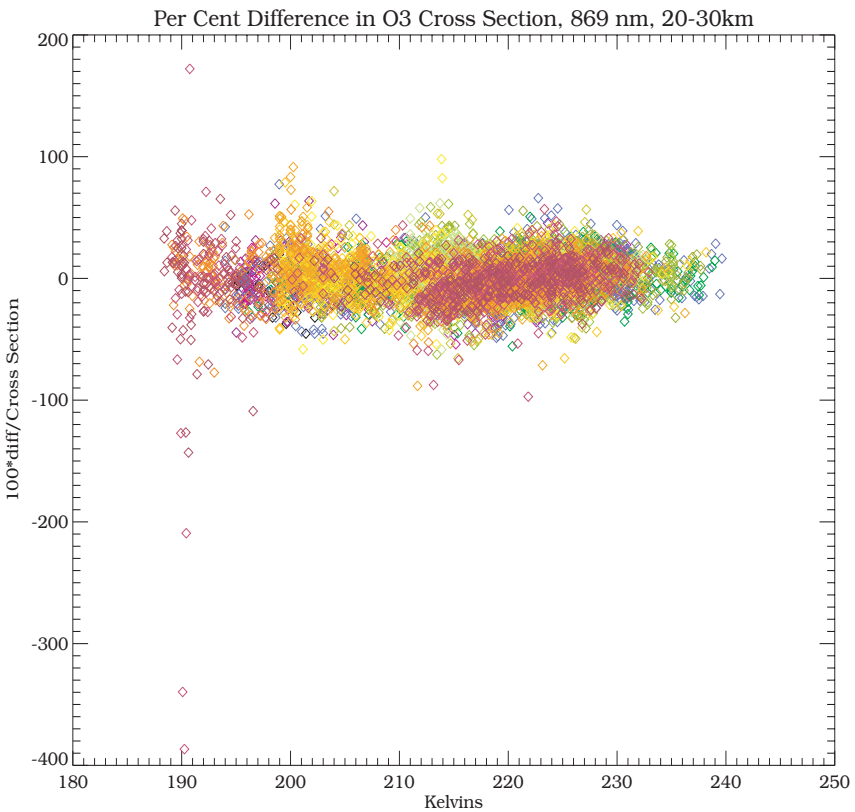


Aerosol Extinction Spectra



"Ozone Cross Section Error" Based on Aerosol Anomaly





Aerosol Channel Assessment

- Most channels seem to be performing reasonably well
- Short wavelength channels agree well with SAGE II
- 601-nm channel is noisy (data quality assessment)
- 755-nm channel (possibly 869 nm) have ozone cross section problems

Science Goals

- **Establish long-term self-consistent aerosol extinction data set**
  - **SAM II re-analysis**
  - **Establish SAGE I-SAGE II-SAGE III consistency using trajectory matching**
  - **Analysis of stratospheric aerosols in clean periods (1979, 1989, >1999)**
- **SAGE III aerosol extinction validation**
  - **Multi-satellite, multi-wavelength instrument comparisons**
  - **Tropospheric aerosol validation using data from airborne sun-photometer data**

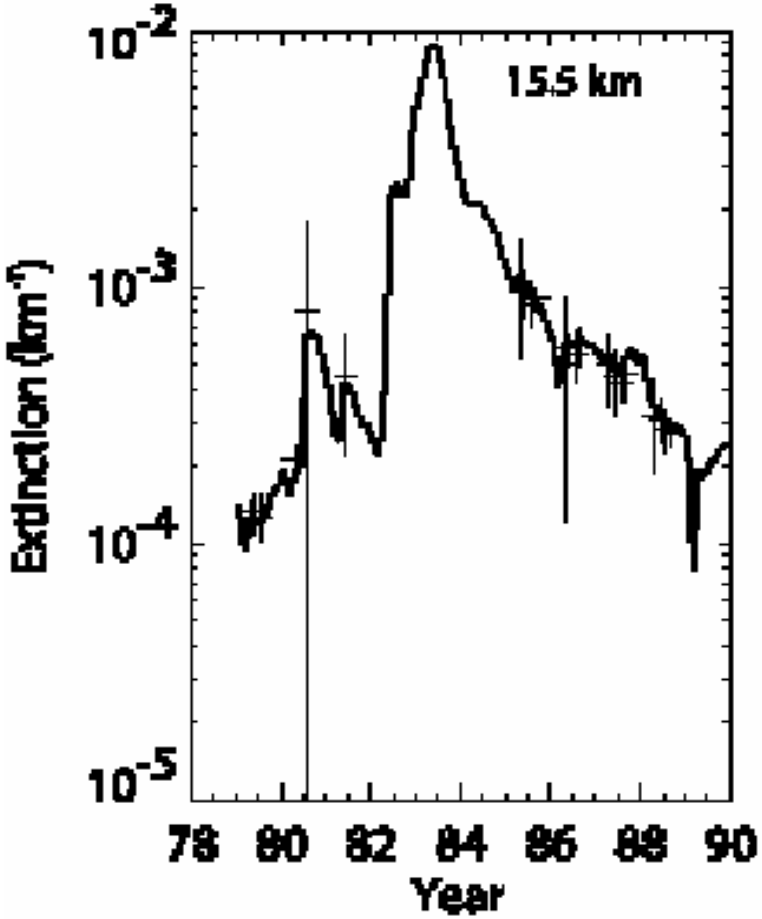
SAM II Reanalysis

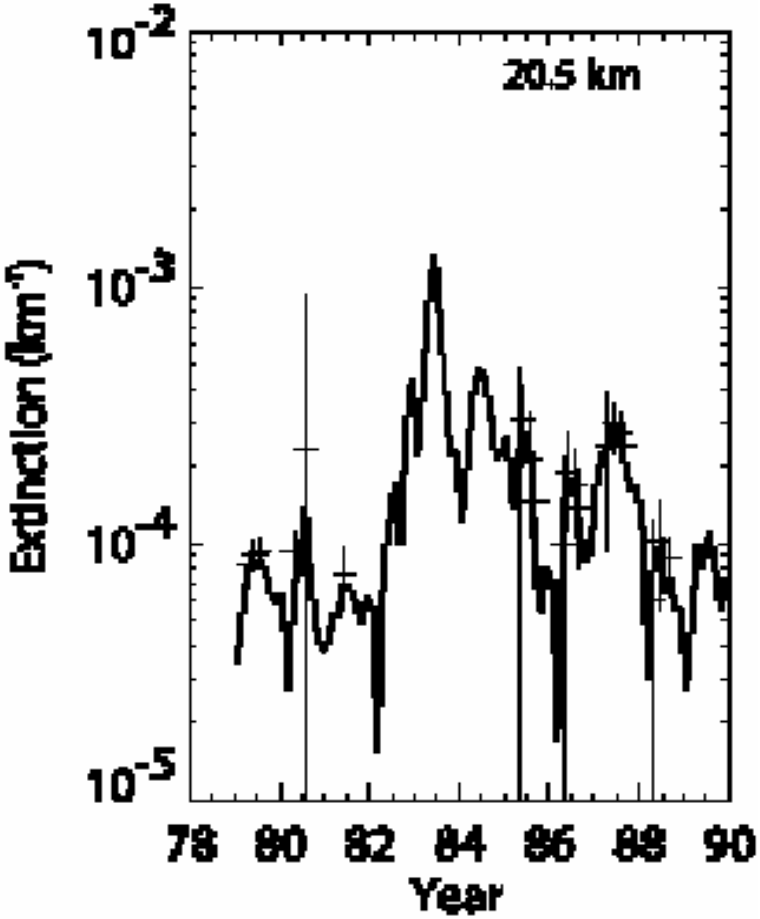
- SAGE I and SAGE II have equivalent transmission products (“Version 6”)
- Current SAM II version dates to mid-1980’s
- Bring SAM II data processing into compliance with SAGE II v6.0 standard (shift & stretch, mirror scan rate fix, etc.)
- Update auxiliary meteorological data (NCEP reanalysis)

SAM II/SAGE/SAGE II Comparison

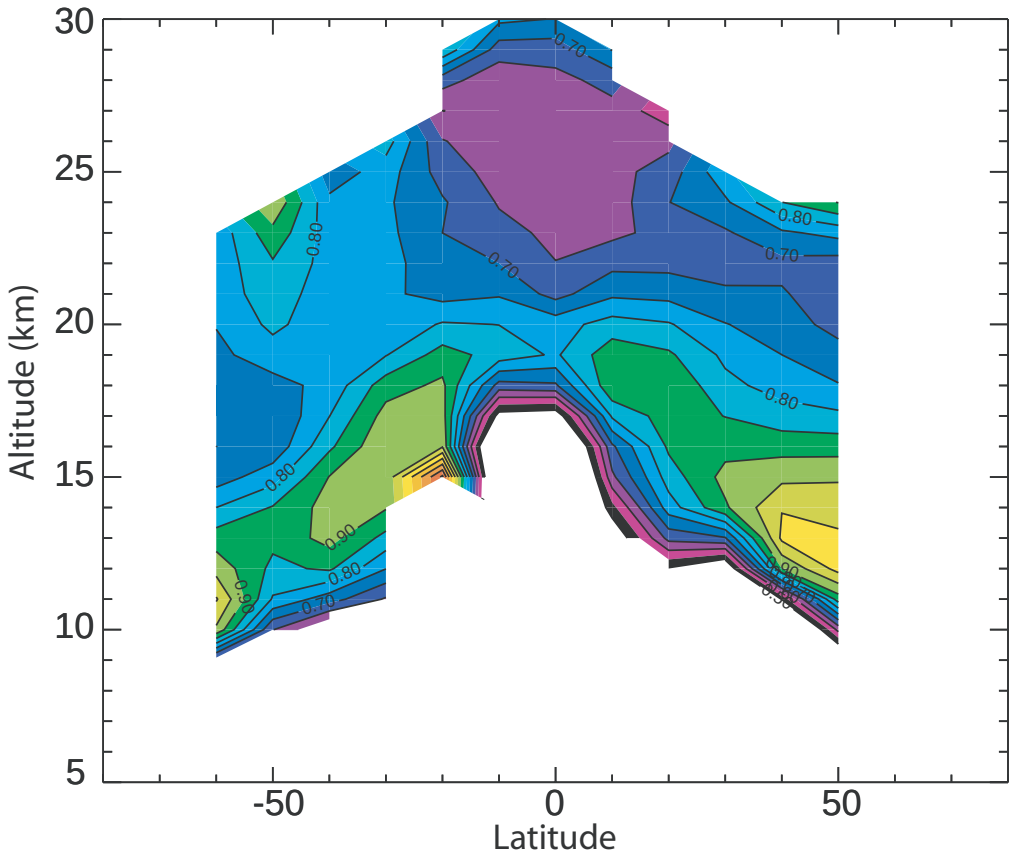
- Use trajectory matching to establish continuous, long-term, consistent aerosol extinction record (1979-Present)
- Look for evidence of drift between SAM II and SAGE II (1984-1989)
- Determine relative difference in aerosol extinction between ‘clean’ periods in 1979, 1989, 1999 and on

SAM II, SAGE, SAGE II Comparison (pre v6.0)





Relative Changes between 1979 and 1999 (pre-v6.0)



Aerosol Validation Activities

- Using the trajectory matching methodology, perform comparisons between SAGE III and other instruments (SAGE II, ILAS II, HALOE, POAM III, etc.)