Comparison of CERES/SSF-MODIS and CERES/SSF-VIRS Aerosol Products

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NOAA/NESDIS/ORA

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- Objective
  - **Assess aerosol data continuity in the transition from CERES/SSF-VIRS to CERES/SSF-MODIS data sets.**

- Approach
  - **Comparison of results from self-consistency checks.**
  - **Comparison of global daily and monthly mean values.**

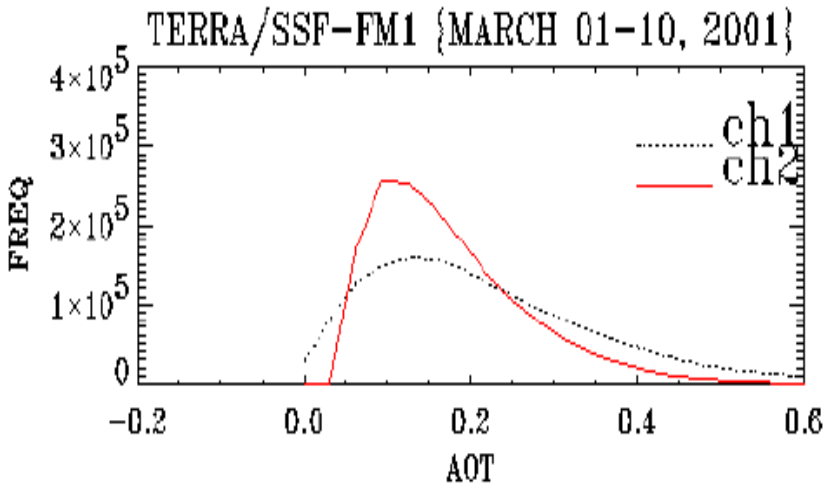
Data Sets

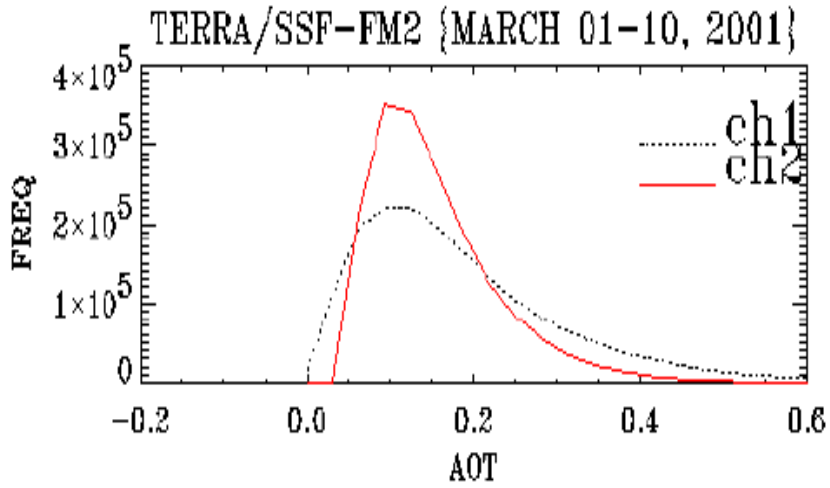
- **SSF-VIRS only data for March 2001**
- **SSF-MODIS (Terra) Beta1 (FM1,FM2) data for March 2001 (VIRS-like)**

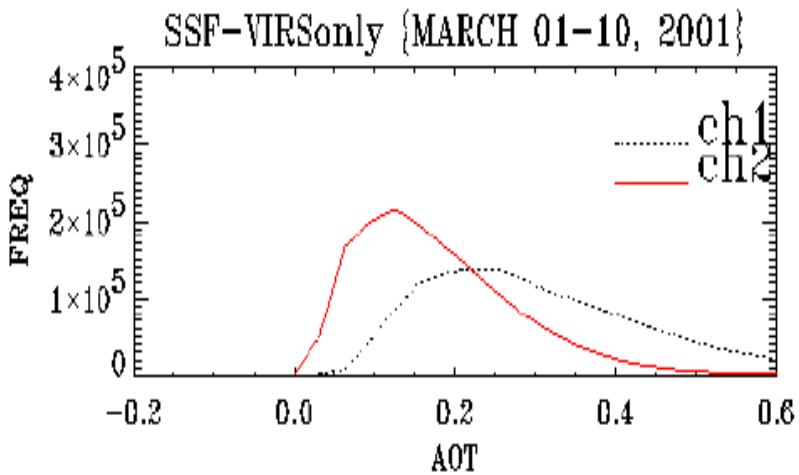
Retrieval Algorithm

- **Input Radiance (different):**
  - VIRS (0.63μm, 1.61μm); MODIS (0.67μm, 1.64μm)
- **Cloud Screening (same):** Minnis et al. (2001)
- **Sampling (same):** $\gamma > 40^{o}$ & anti-solar side of orbit
- **Aerosol Retrieval (same):** Ignatov & Stowe (2002)
  - dependent two-channel retrieval; Fresnel (v=1m/s) + small Diff. Ref.
  - bi-modal log-normal aerosol distribution
  - LUTs using 6S Code (Vermote et al., 1997)

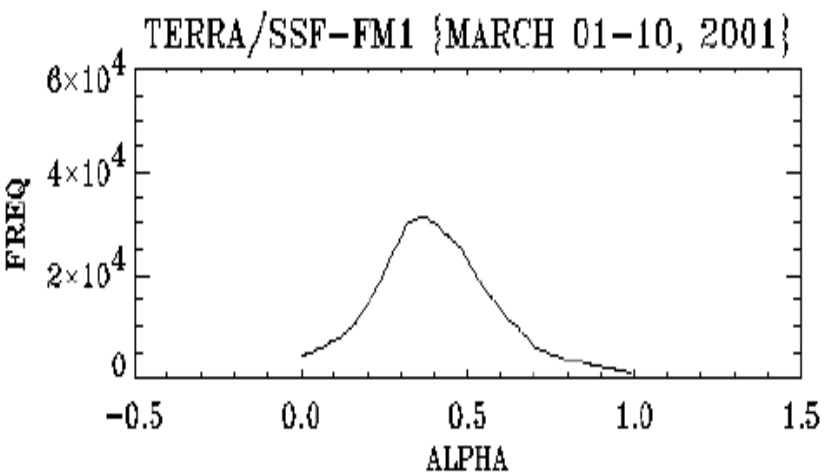
Probability Distribution of τ

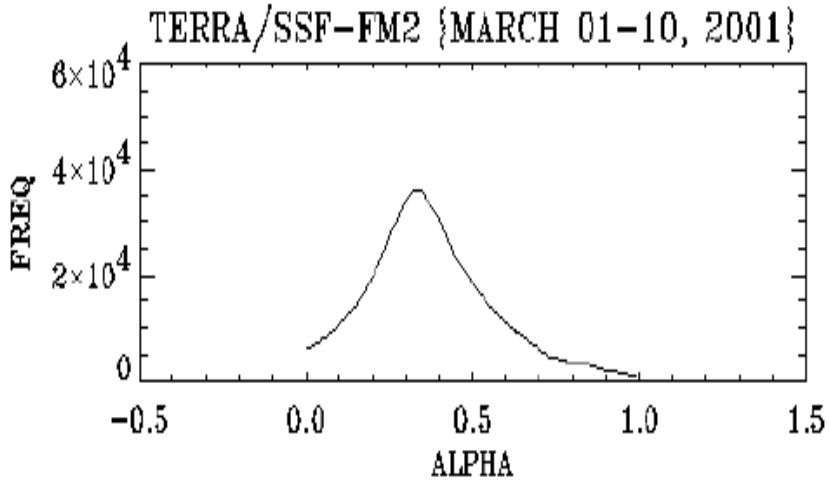


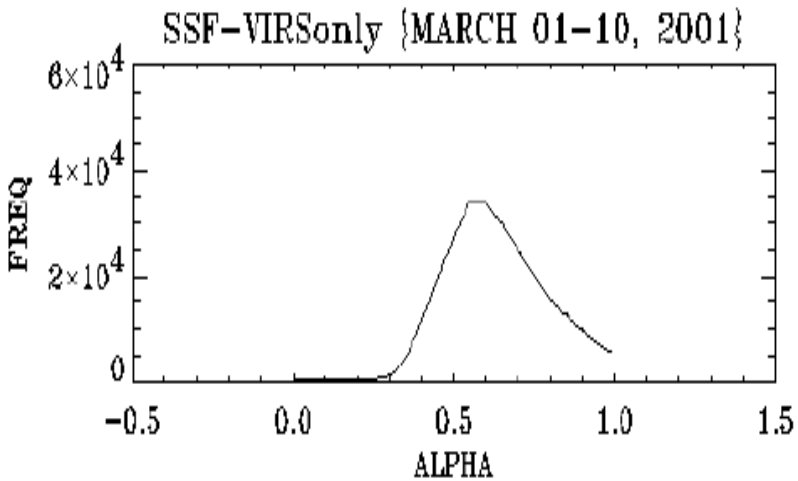




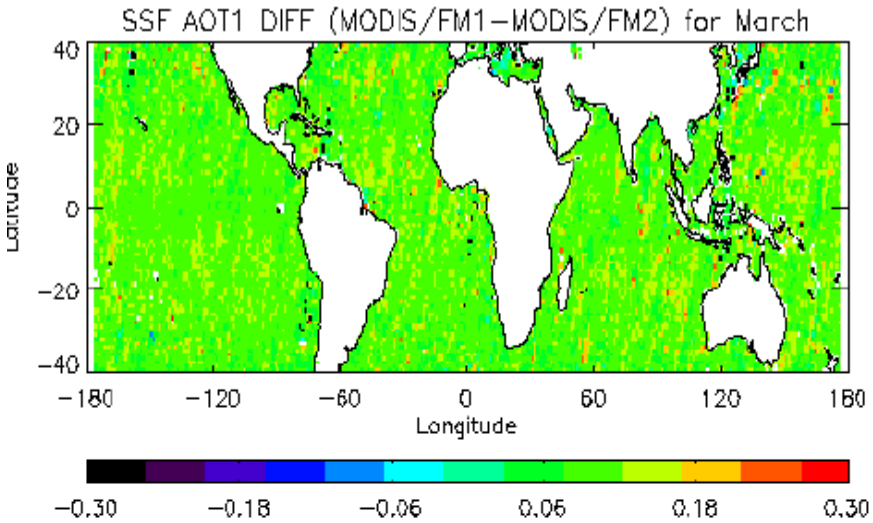
Probability Distribution of α

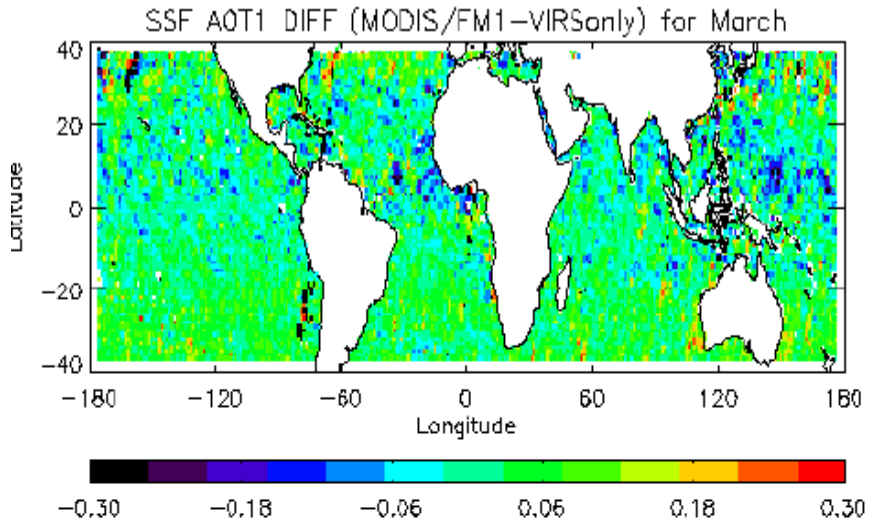


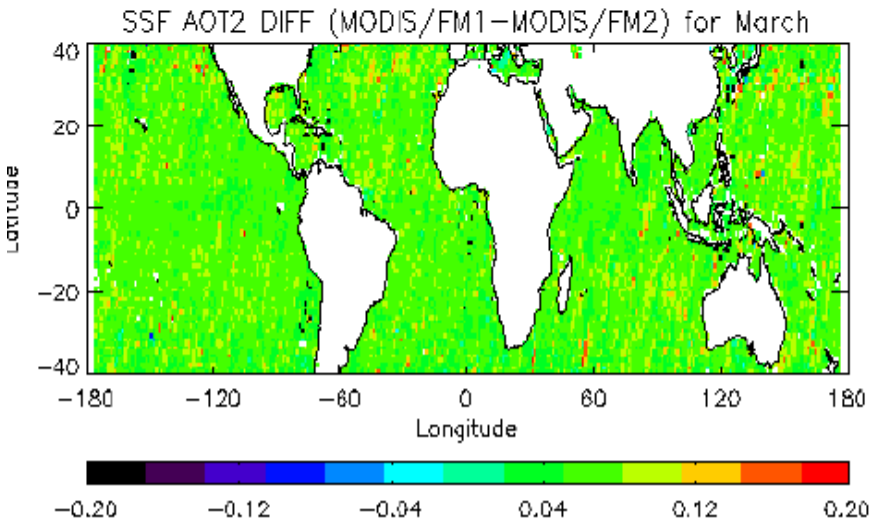


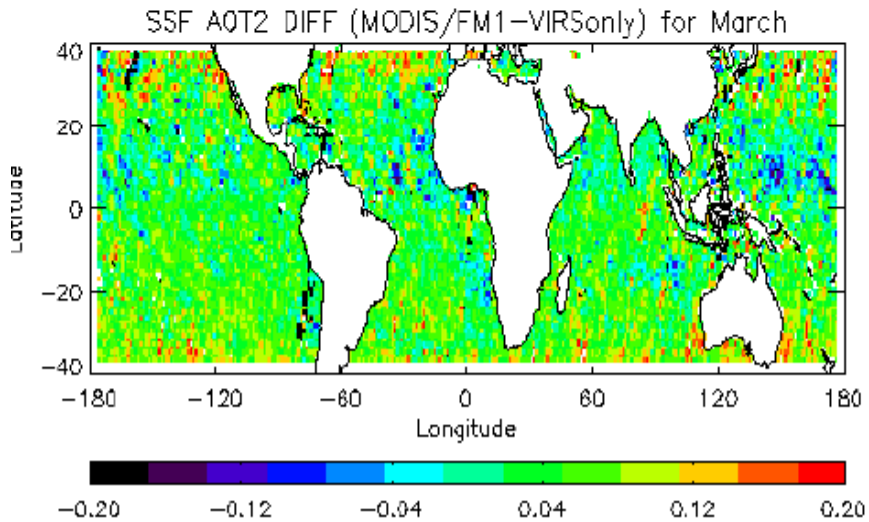


Global Map of $\Delta\tau$

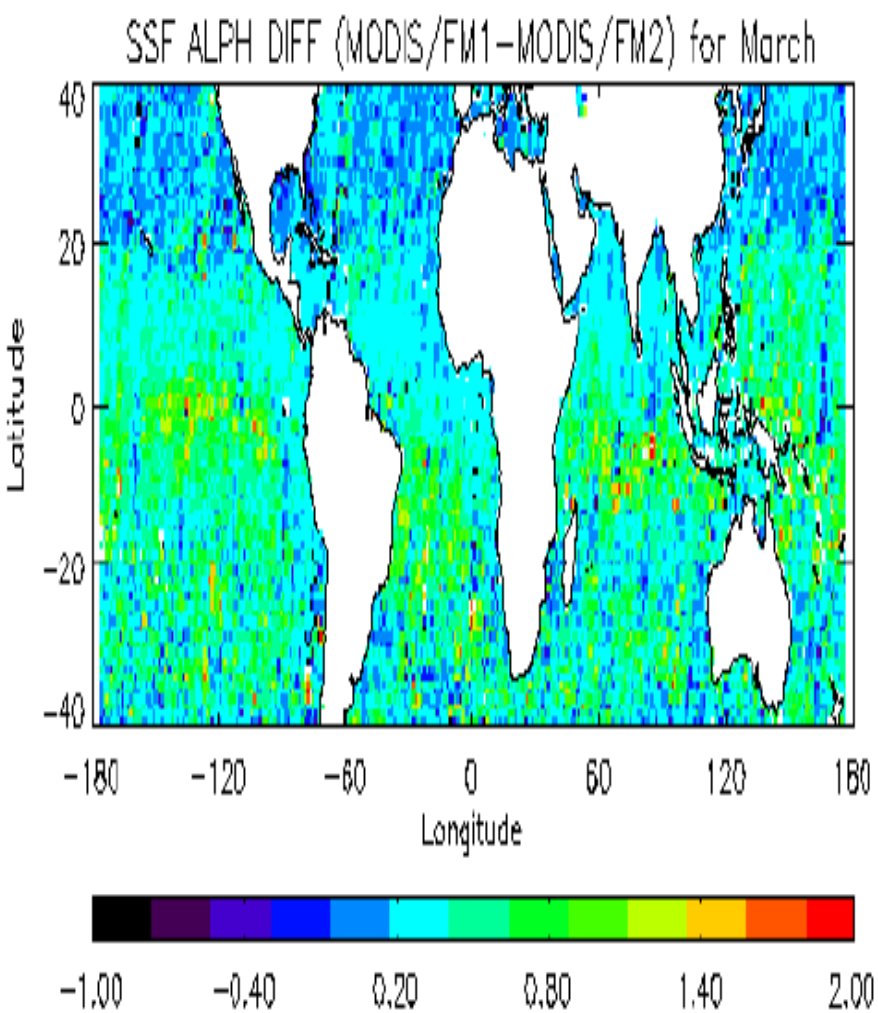


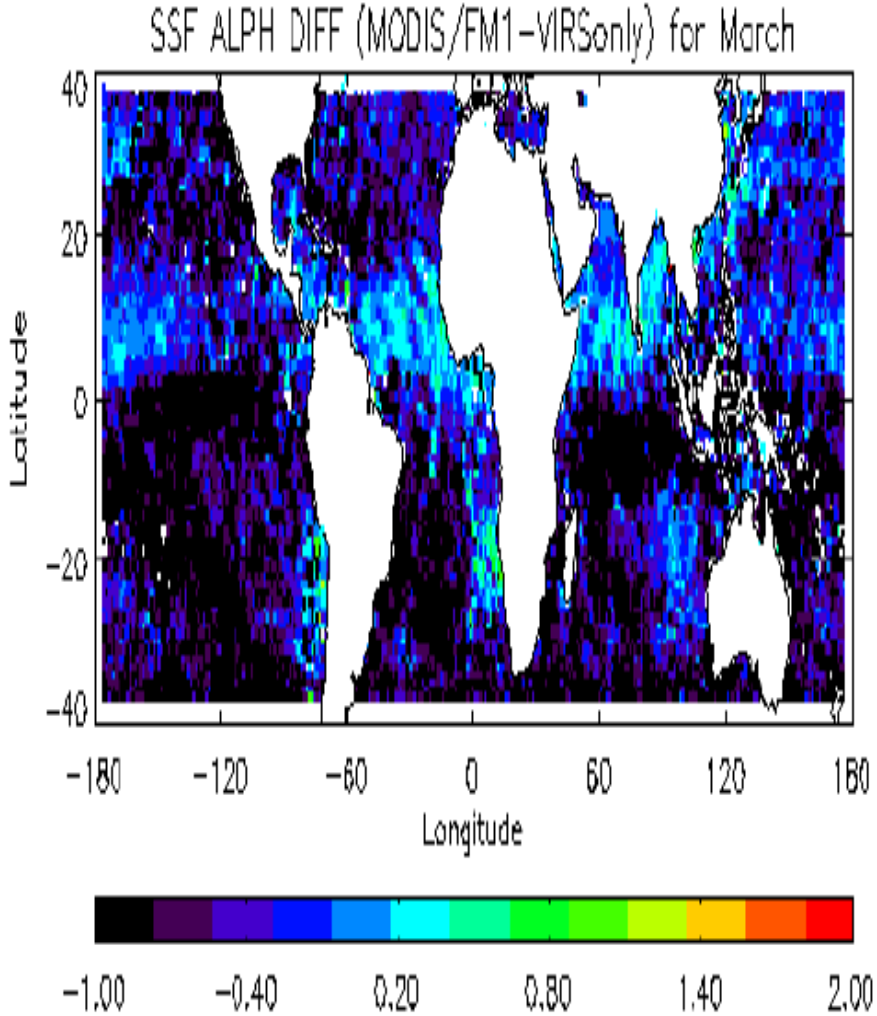






Global Map of $\Delta\alpha$





Comparison of Globally Averaged τ_1, τ_2, and α for MODIS/SSF and VIRS/SSF in March 2001

	SSF Data	Day1	Day15	Day31	Day 1-10	Day1-31
τ_1	M-FM1	0.118	0.101	0.100	0.110	0.105
	M-FM2	0.097	0.082	0.092	0.098	0.085
	V-Only	0.199	0.135	0.134	0.178	0.139
	V-ED2A	0.176	0.147	0.214	0.138	0.158
τ_2	M-FM1	0.085	0.076	0.070	0.082	0.080
	M-FM2	0.070	0.064	0.064	0.068	0.066
	V-Only	0.088	0.071	0.065	0.085	0.070
	V-ED2A	0.125	0.096	0.115	0.089	0.099
α	M-FM1	0.234	0.151	0.212	0.182	0.152
	M-FM2	0.186	0.039	0.153	0.087	0.062
	V-Only	1.003	0.895	1.032	0.949	0.936
	V-ED2A	0.310	0.442	0.669	0.503	0.509

Note: The time for the VIRS-ED2A data is March 1998.

Summary

- AOT and α from FM1 and FM2 of SSF/MODIS are comparable with FM1 values slightly larger.
- AOT1 and α of SSF/VIRS are systematically larger than that of SSF/MODIS, especially in the NH for AOT1 (> 30%) and in the SH for α (several factors).
- SSF/VIRS AOT2 is comparable to SSF/MODIS AOT2 with slightly larger values of SSF/VIRS in the tropics and slightly smaller values in the subtropics.

Future Works

- Apply the same analyses to new version of SSF aerosol products (e.g., TERRA/SSF-ED1)
- Explore the possibility of inter-calibration between VIRS and MODIS sensors to find a better solution for the calibration of VIRS channel 2 (1.61μm).

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