MISR aerosol product status

MISR

Multi-angle Imaging SpectroRadiometer

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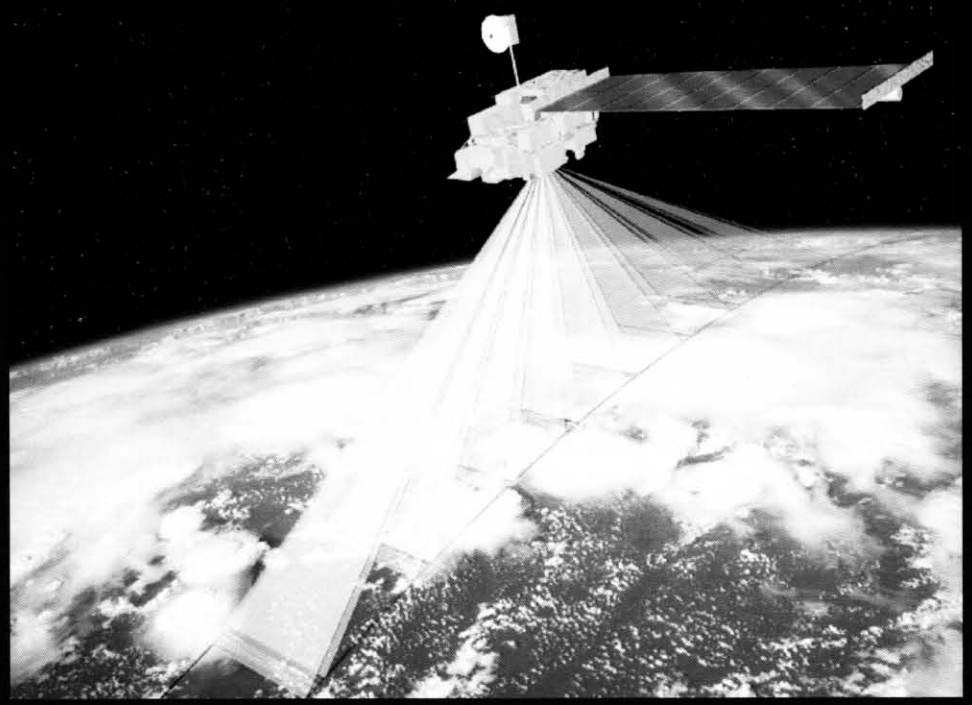
First AEROCOM model/satellite intercomparison meeting
Paris, France
June 2-3 2003

MISR observing concept



9 pushbroom cameras

9 view angles at Earth surface:
70.5º forward to 70.5º aftward

Multiple spectral bands at each angle:
446, 558, 672, 866 nm

14-bit digitization

On-board calibration system

Continuous pole-to-pole coverage
on orbit dayside

400-km swath

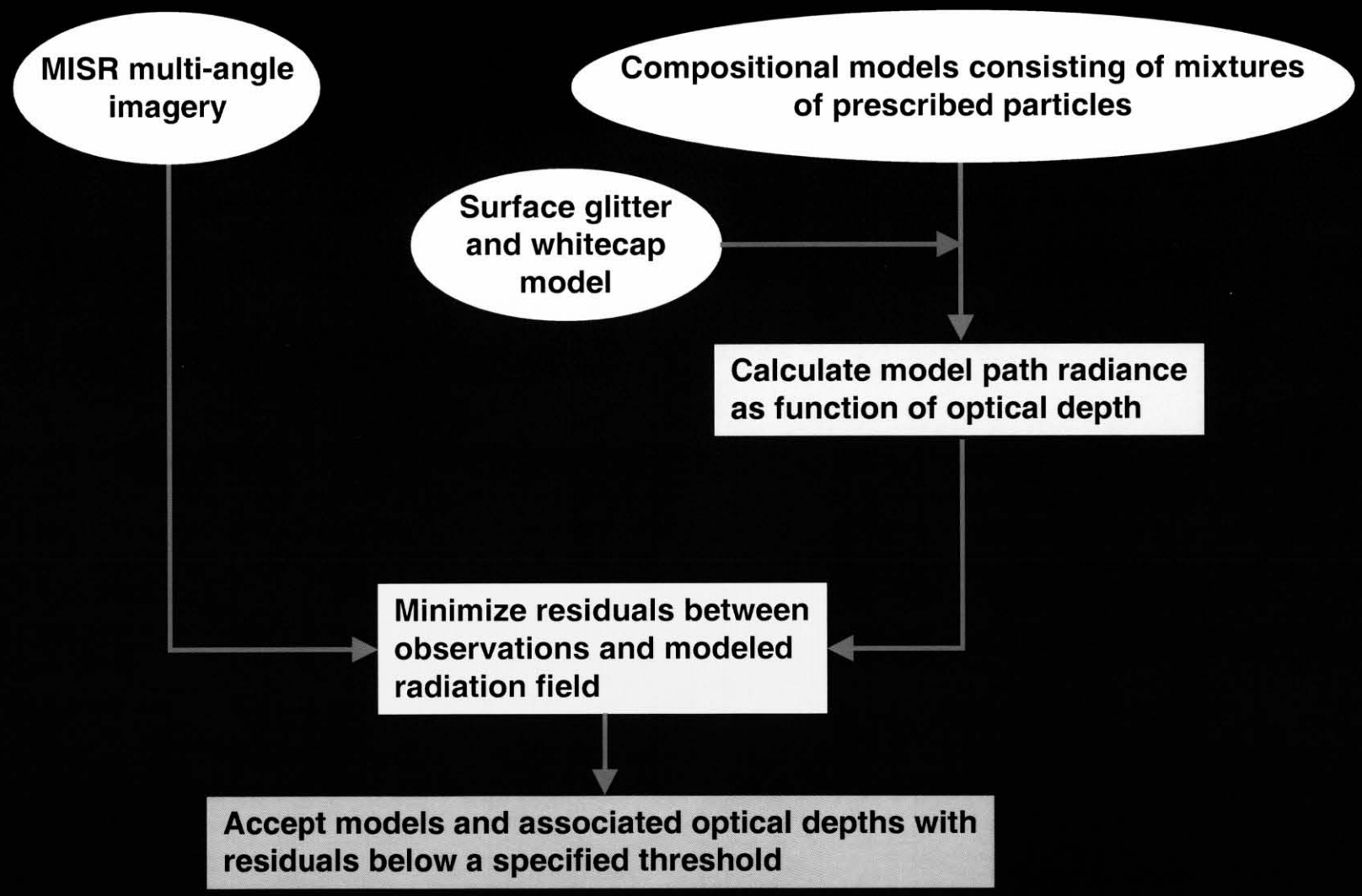
Contiguous zonal coverage:
9 days at equator
2 days at poles

275 m - 1.1 km sampling

7 minutes to observe each scene
at all 9 angles

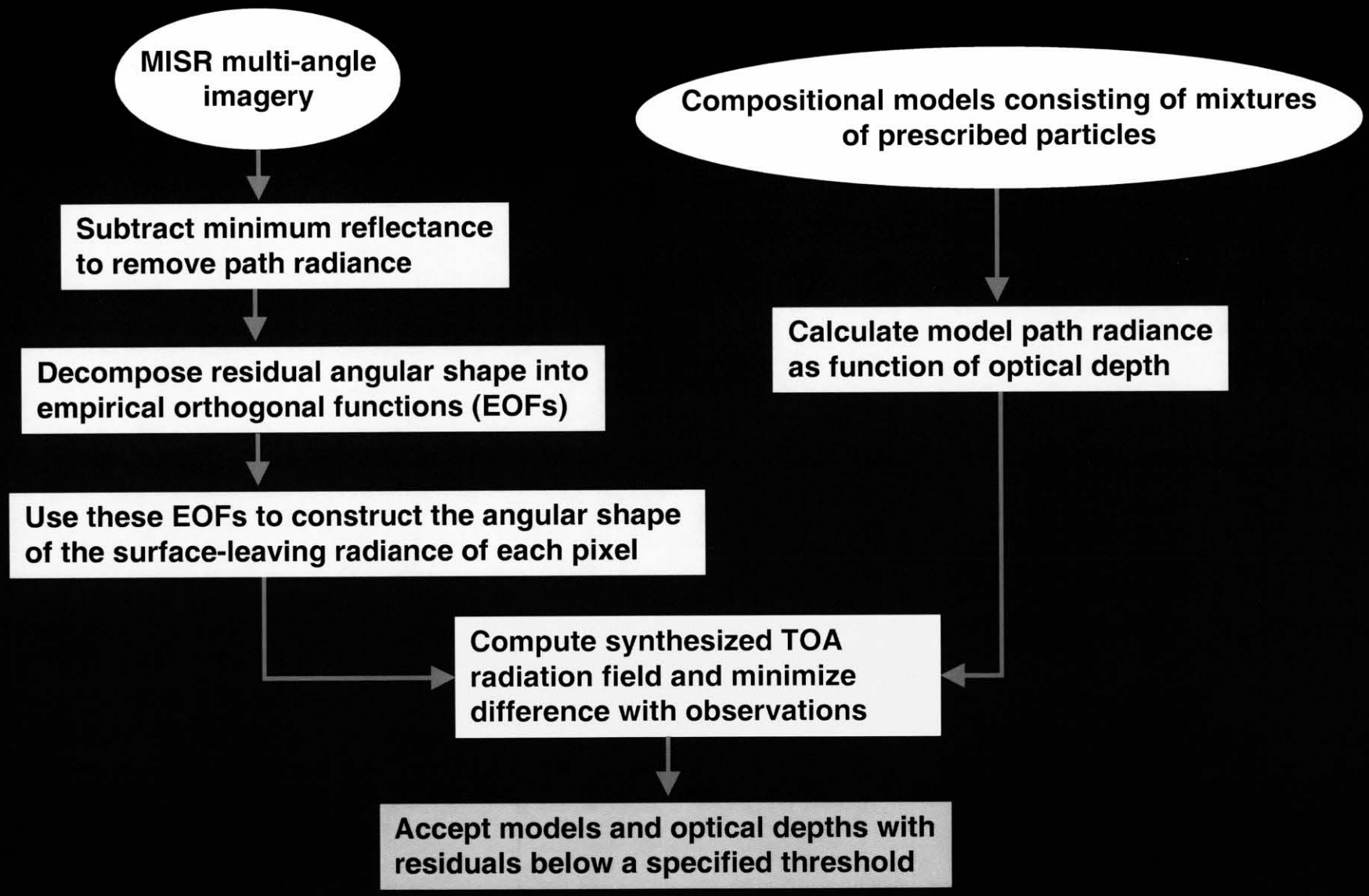
Aerosol retrieval methodology over water

Applied to each 17.6-km area



Aerosol retrieval methodology over land

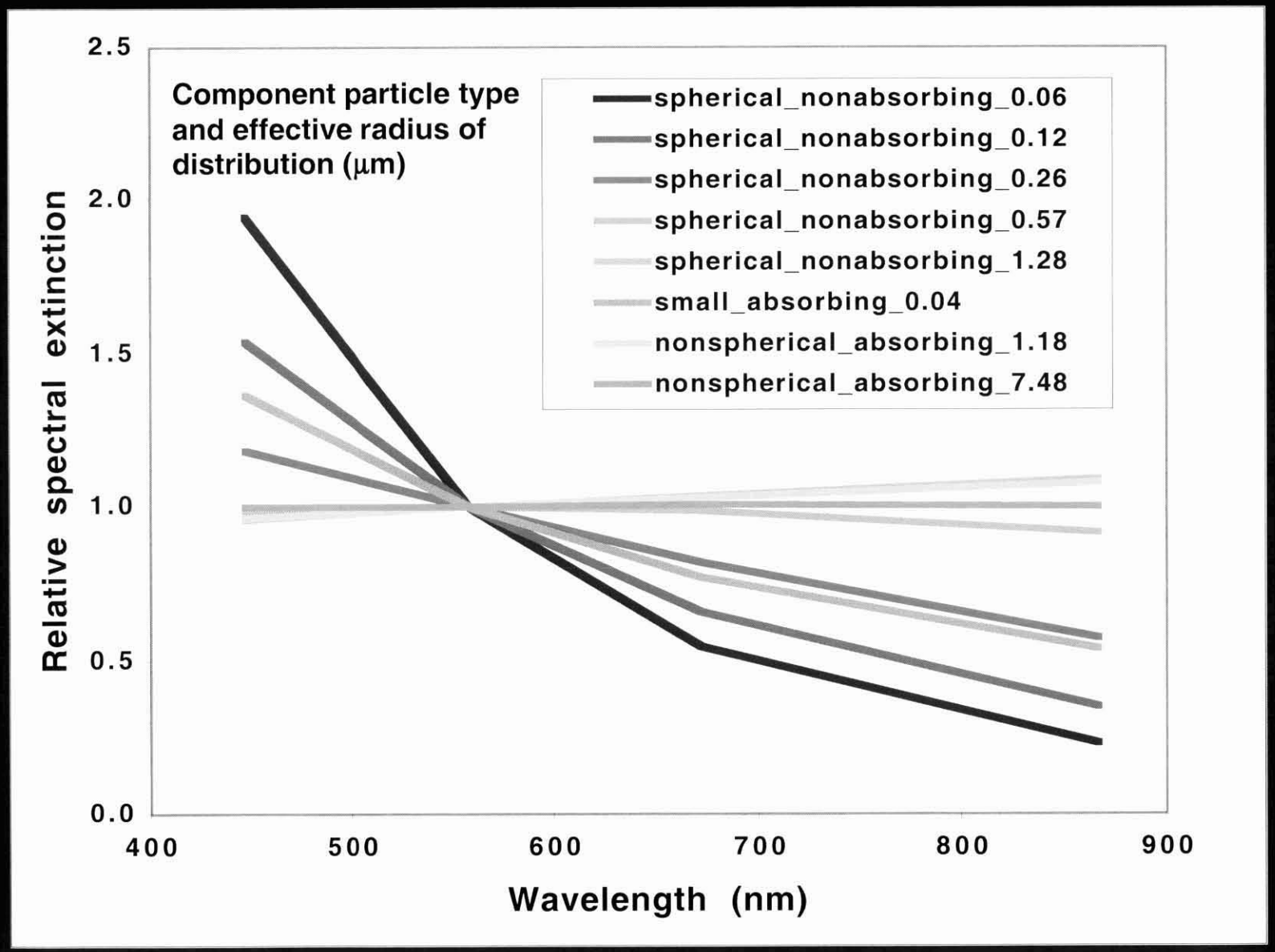
Applied to each 17.6-km area



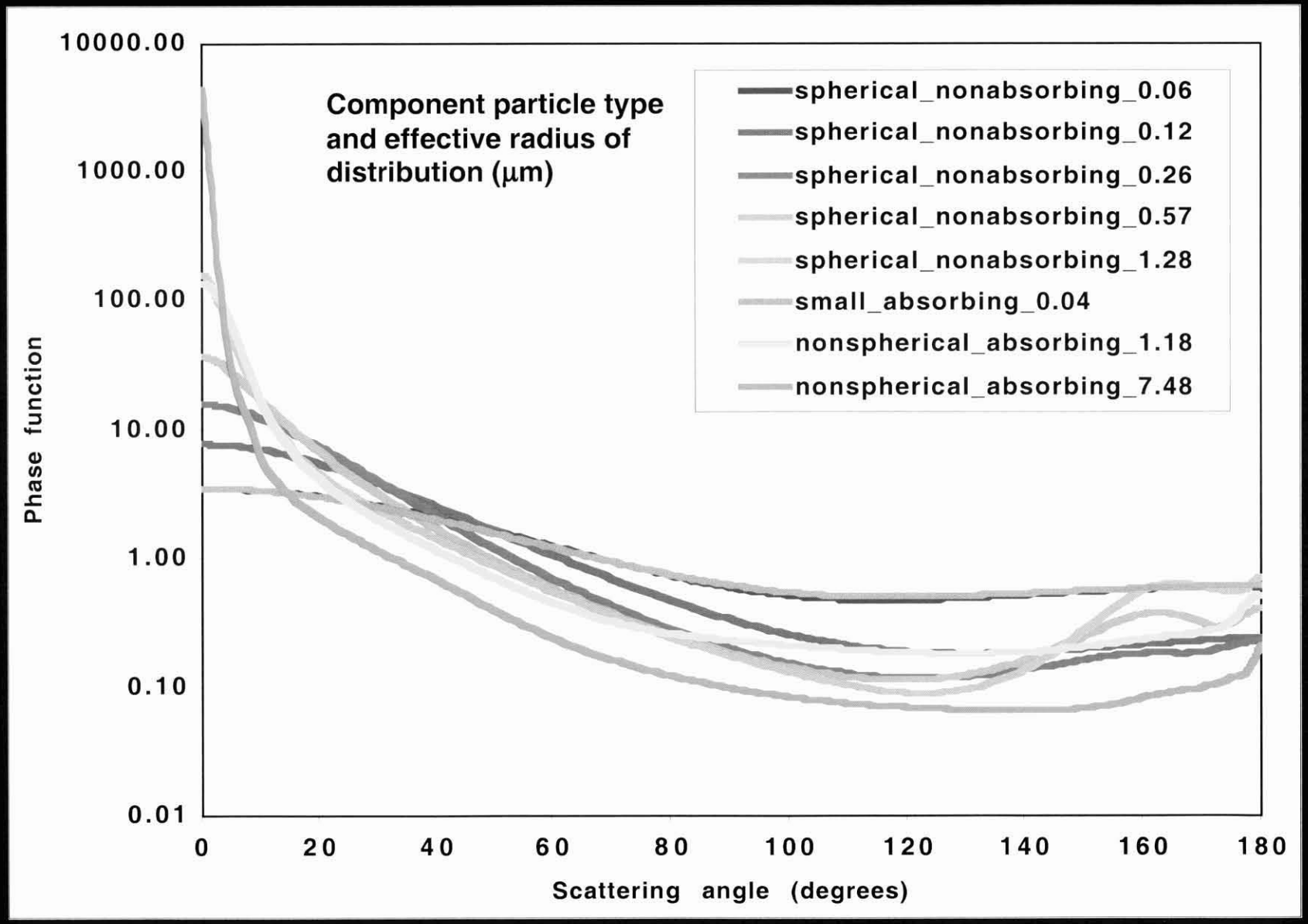
24 mixtures used in retrievals

		r_{eff} (components)	α	ϖ_0
1	Spherical Small Clean	0.06	3.22	1.00
2	Spherical Small Clean	0.06, 0.12	2.71	1.00
3	Spherical Small Clean	0.12	2.24	1.00
4	Spherical Small Clean	0.12, 0.26	1.63	1.00
5	Spherical Medium Clean	0.26	1.09	1.00
6	Spherical Medium Clean	0.26, 0.57	0.56	1.00
7	Spherical Medium Clean	0.57	0.10	1.00
8	Spherical Medium Clean	0.57, 1.28	-0.05	1.00
9	Spherical Bimodal Clean	0.12, 1.28	0.82	1.00
10	Spherical Bimodal Clean	0.06, 1.28	1.19	1.00
11	Spherical Small Absorbing	0.06. 0.04	2.87	0.88
12	Spherical Small Absorbing	0.06, 0.12, 0.04	2.50	0.88
13	Spherical Small Absorbing	0.12, 0.04	2.09	0.88
14	Spherical Small Absorbing	0.12, 0.26, 0.04	1.62	0.88
15	Spherical Medium Absorbing	0.26, 0.04	1.13	0.88
16	Spherical Medium Absorbing	0.26, 0.57, 0.04	0.71	0.88
17	Spherical Medium Absorbing	0.57, 0.04	0.29	0.88
18	Dusty Low	0.26, 1.18	1.46	0.97
19	Dusty Low	0.26, 1.18	0.85	0.94
20	Dusty Low	0.26, 1.18	0.33	0.91
21	Dusty Low	1.18	-0.11	0.88
22	Dusty Low	1.18, 7.48	-0.08	0.83
23	Dusty Low	1.18, 7.48	-0.06	0.79
24	Dusty High	1.18	-0.11	0.88

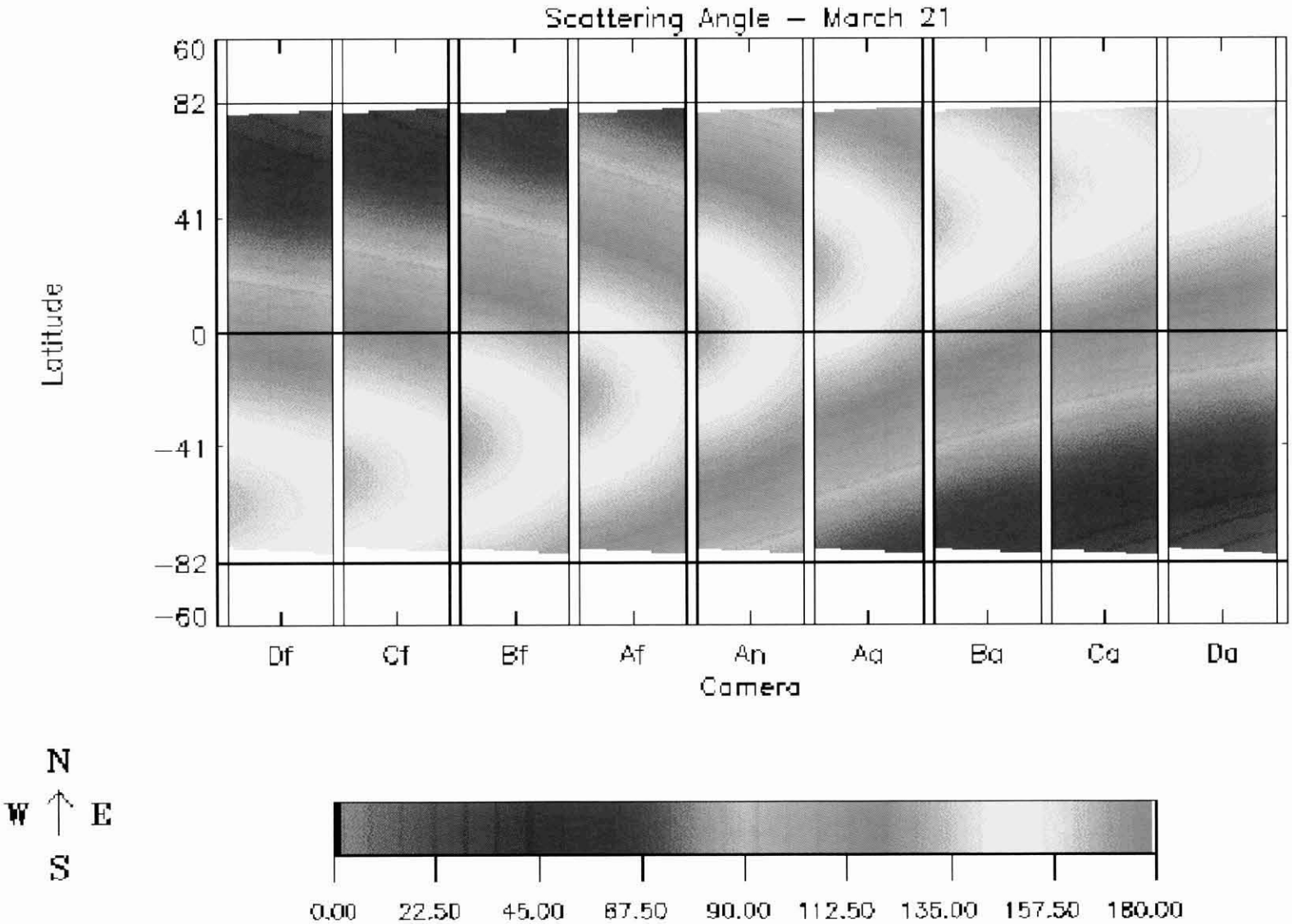
Spectral extinction of component aerosols relative to 558 nm



Scattering phase functions of component aerosols



Example MISR scattering angle coverage (March 21)

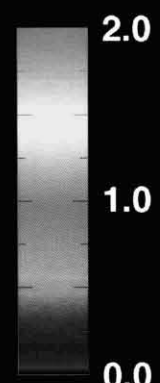


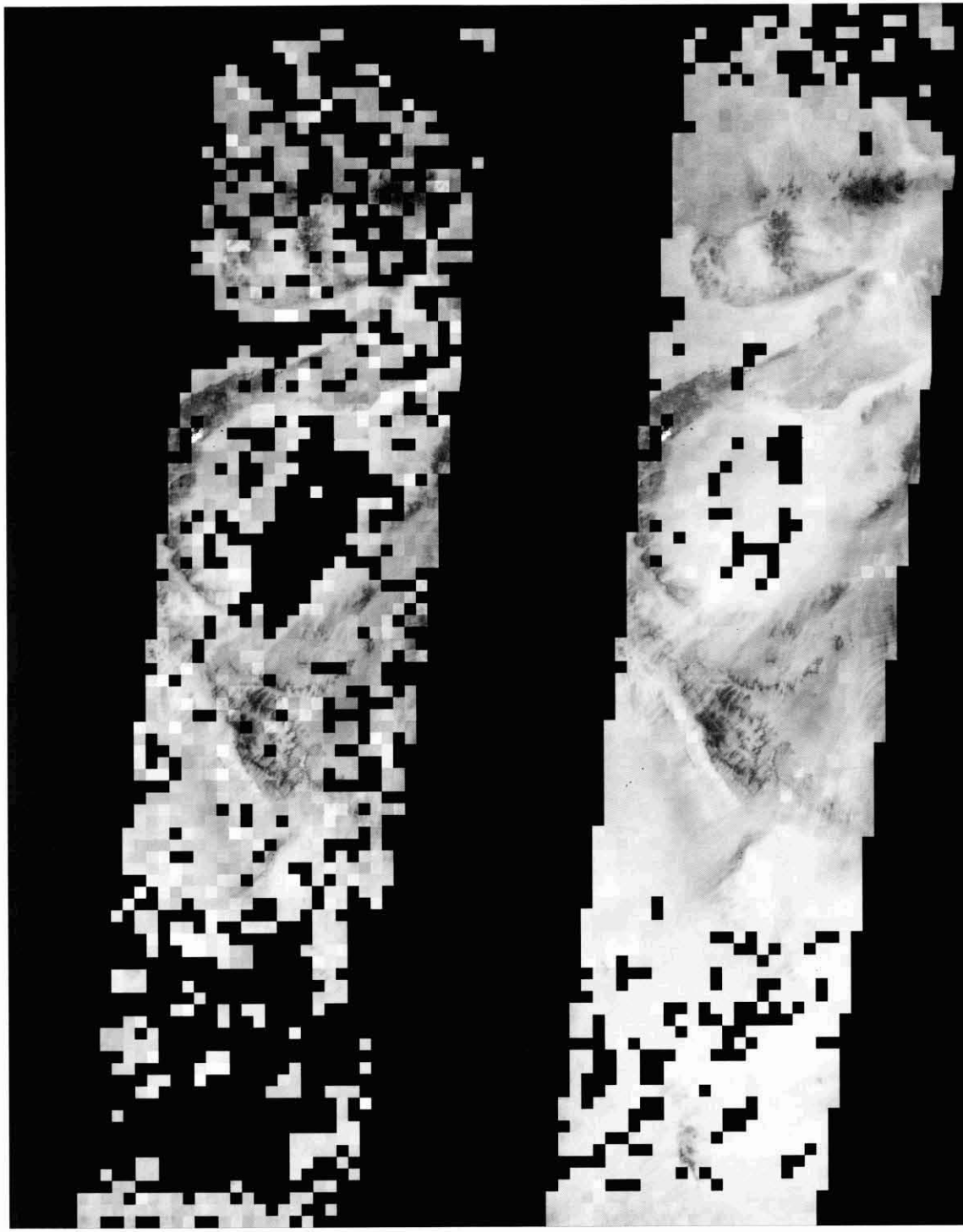
Recent algorithm enhancement

Northern Africa

P187, O13602, 9 July 2002

Left: 70º-forward browse image
Middle: HDRF pre-filter off
Right: HDRF pre-filter on





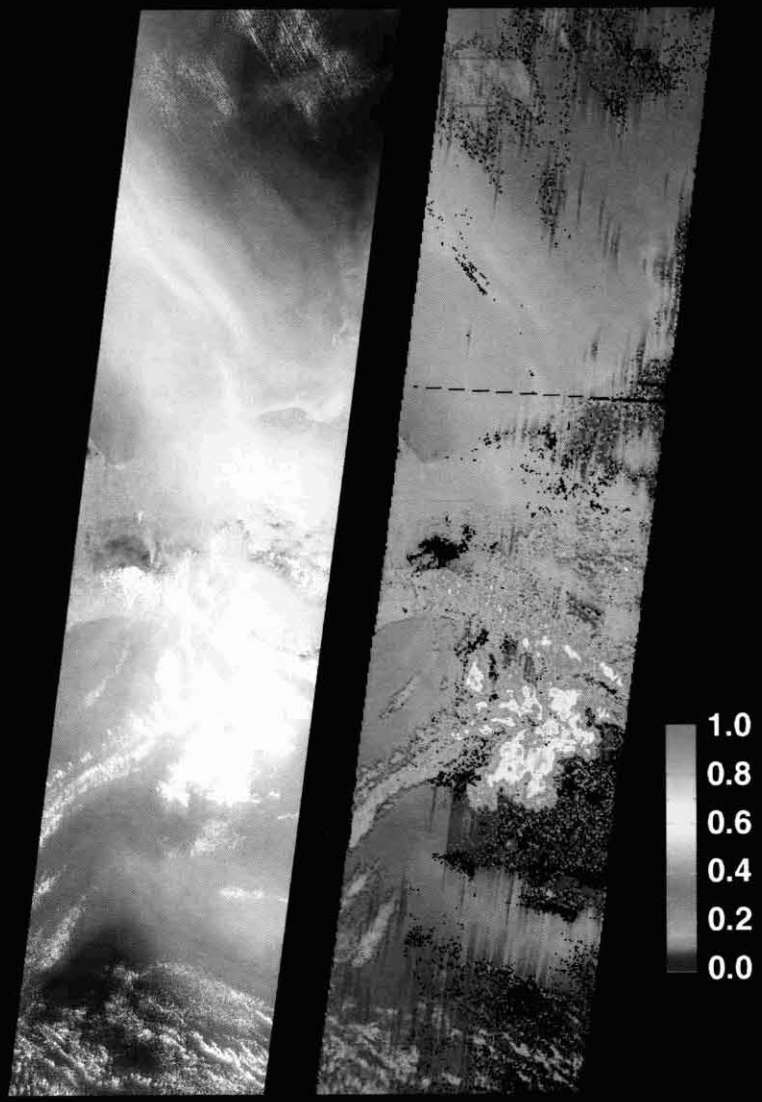
Northern Africa

P187, O13602, 9 July 2002
Blocks 66-78

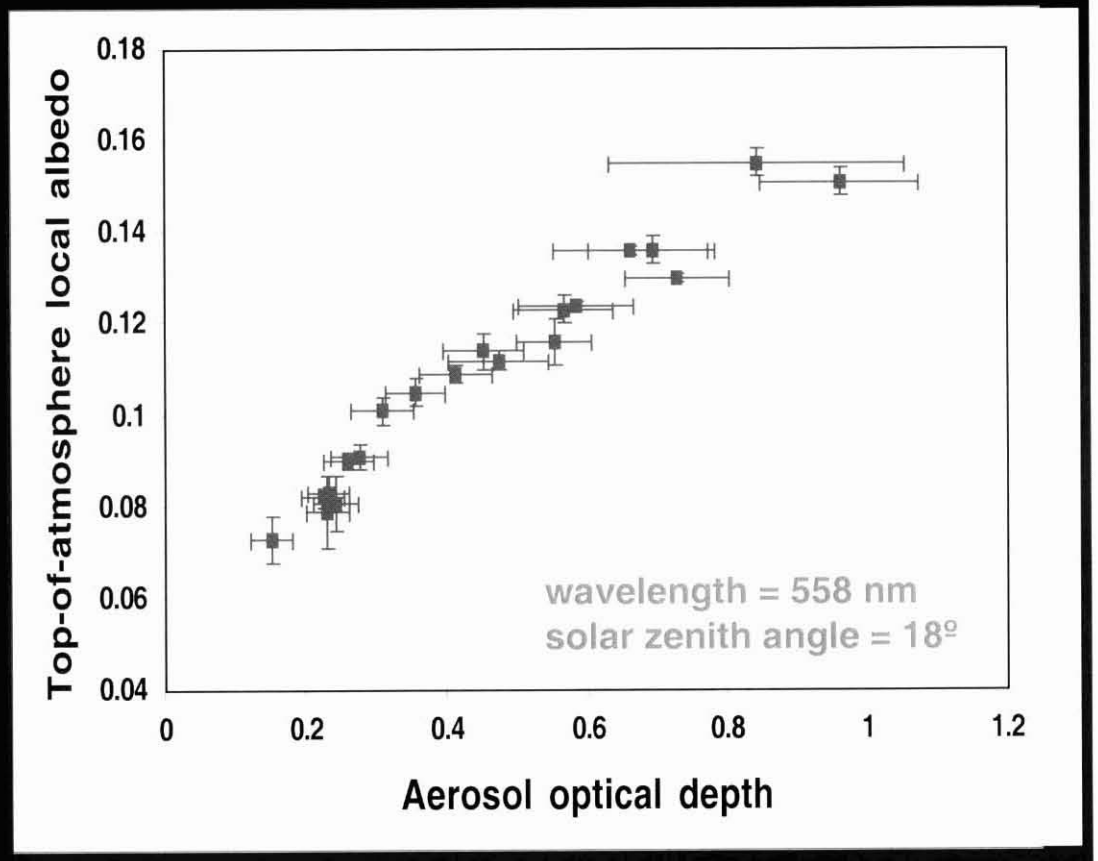
70º-forward HDRF

Left: HDRF pre-filter off
Right: HDRF pre-filter on

Radiative effects



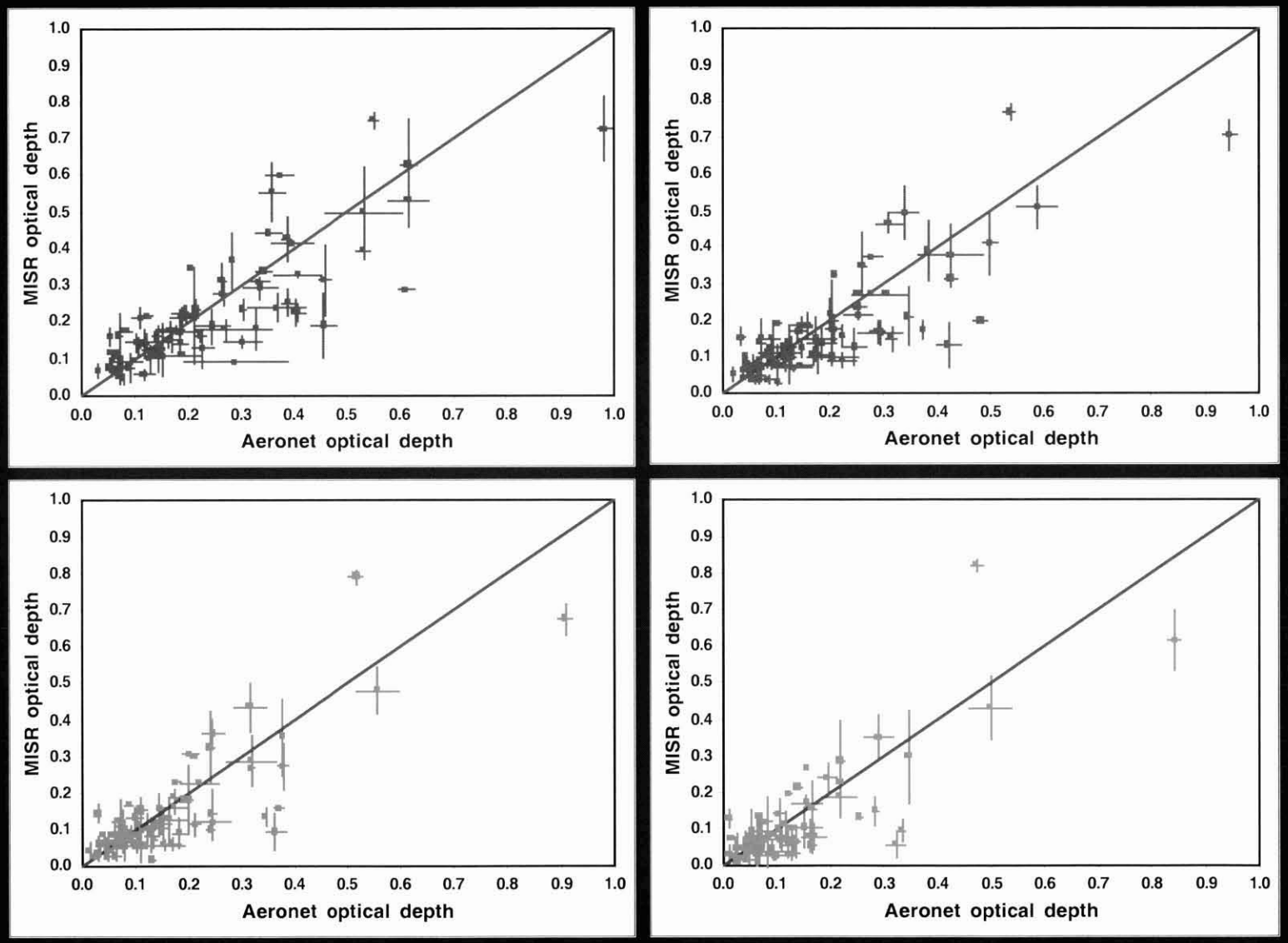
70º backward TOA local albedo



Southern Mexico
2 May 2002

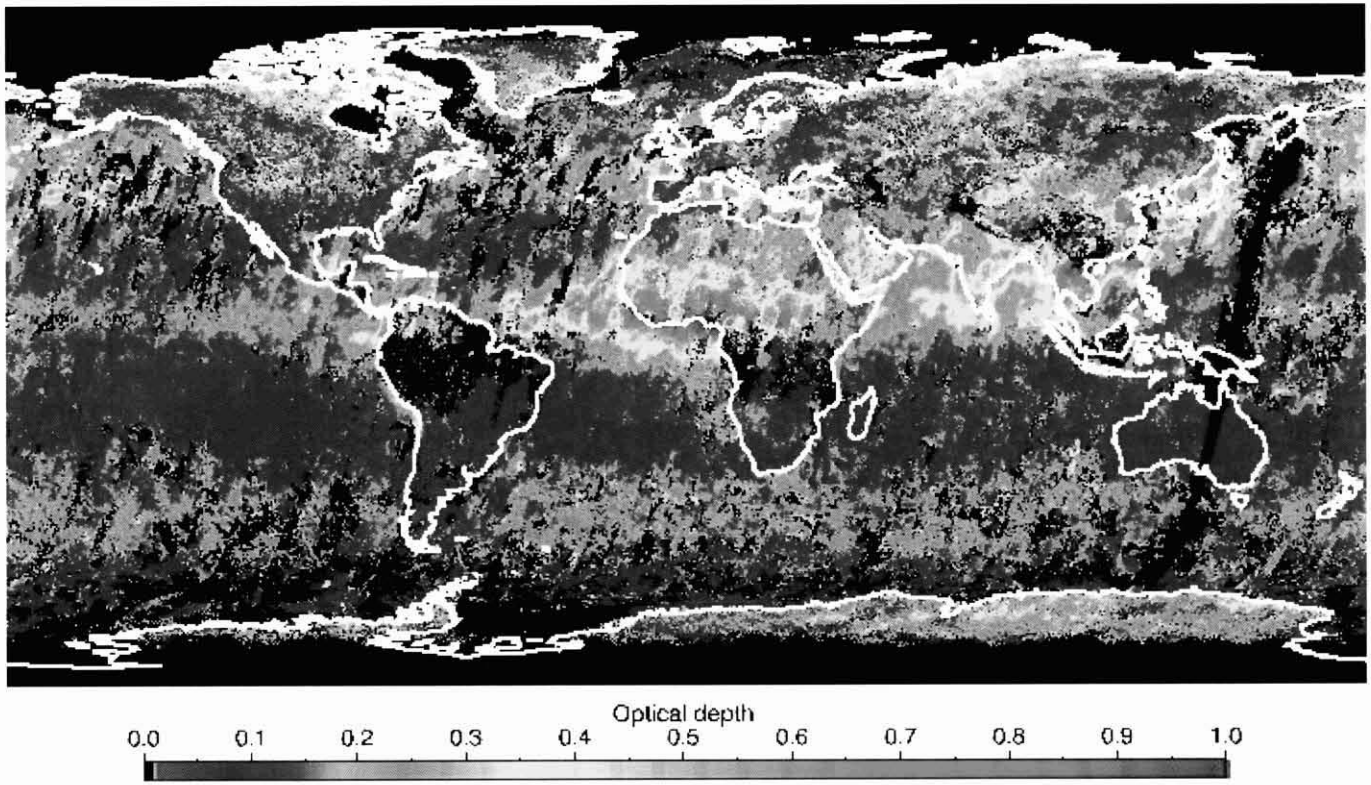
MISR vs. AERONET optical depths

51 globally distributed sites, March 2002



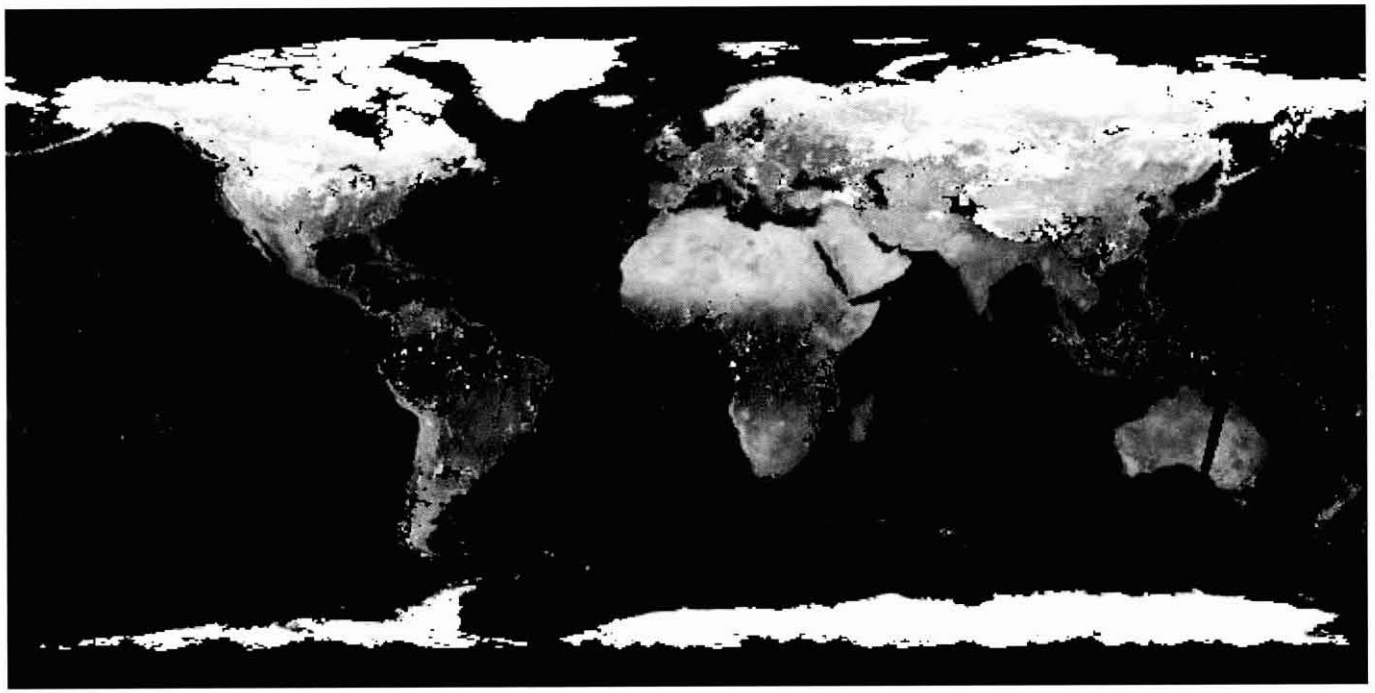
Data plotted are matchups where MISR and AERONET had coincident retrievals

MISR global aerosol optical depth March 2002



MISR directional hemispherical reflectance March 2002

DHR March 2002 F01_0005 (Natural color, Histogram equalized)



Conclusions

Multi-angle remote sensing provides unique ways of retrieving aerosol properties over many surface types, including bright deserts which are major source regions

MISR data products and tools are publicly available through the NASA Langley Atmospheric Sciences Data Center
http://eosweb.larc.nasa.gov

For more information about MISR:
http://www-misr.jpl.nasa.gov