Satellite-based background concentration maps of different particle classes in the atmosphere

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Air Pollution 2004, Rhodes, 30. 6. – 2. 7. 2004

The concept

- Key satellite observable: aerosol optical thickness (AOT)

- What do we need in addition to AOT?

- Supplementary input: vertical structure, aerosol type

- Secondary satellite result: choice of aerosol type

- Assumption / external information on vertical profile

- Conversion of AOT to PM

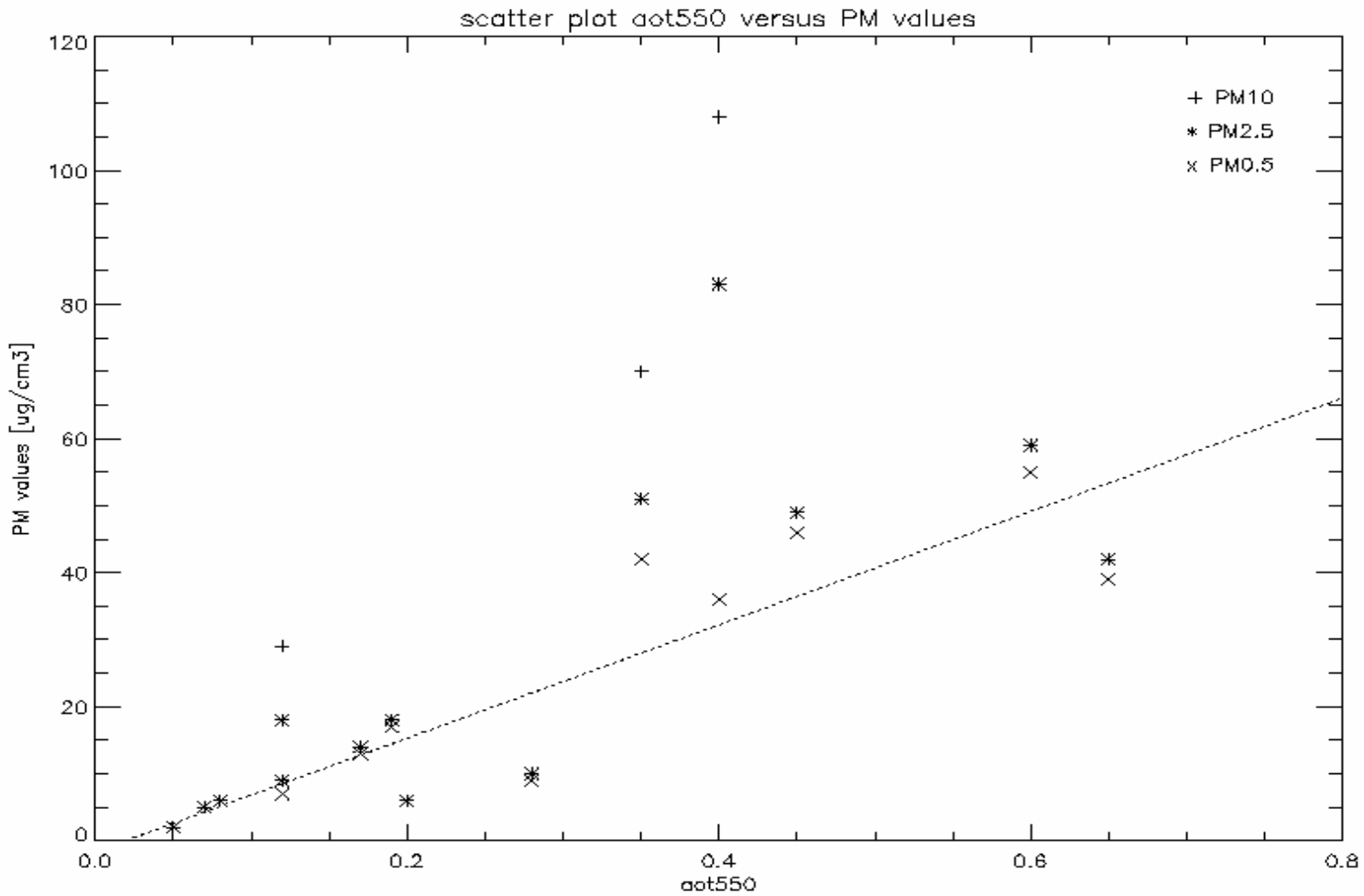
PM10 values for 20 mixtures

			Particle mass concentrations PM10 [µg/m^3]					
No.	**Name**	**Total**	**WASO**	**INSO**	**SSAM**	**SSCM**	**SOOT**	**MITR**
1	Pure Watersoluble	148	148					
2	Continental I	206	140	66				
3	Continental II	265	132	133				
4	Continental III	325	126	199				
5	Maritime I	296	44		252			
6	Maritime II	323	44		234	45		
7	Maritime III	328	22		306			
8	Maritime IV	381	22		270	91		
9	Polluted Watersoluble I	137	132				5	
10	Polluted Watersoluble II	128	118				10	
11	Polluted Continental I	256	118	133			5	
12	Polluted Continental II	247	104	133			10	
13	Polluted Maritime I	272	60		162	45	5	
14	Polluted Maritime II	289	44		144	91	10	
15	Desert Outbreak I	109	109					318
16	Desert Outbreak II	72	72					636
17	Desert Outbreak III	38	38					954
18	Biom. Burn. / High Poll. I	133	126				7	
19	Biom. Burn. / High Poll. II	118	103				15	
20	Biom. Burn. / High Poll. III	103	80				23	

Exponential vertical profile assumed

AOT – PM correlations

Linear relation for PM0.5



Climatology - basic dataset

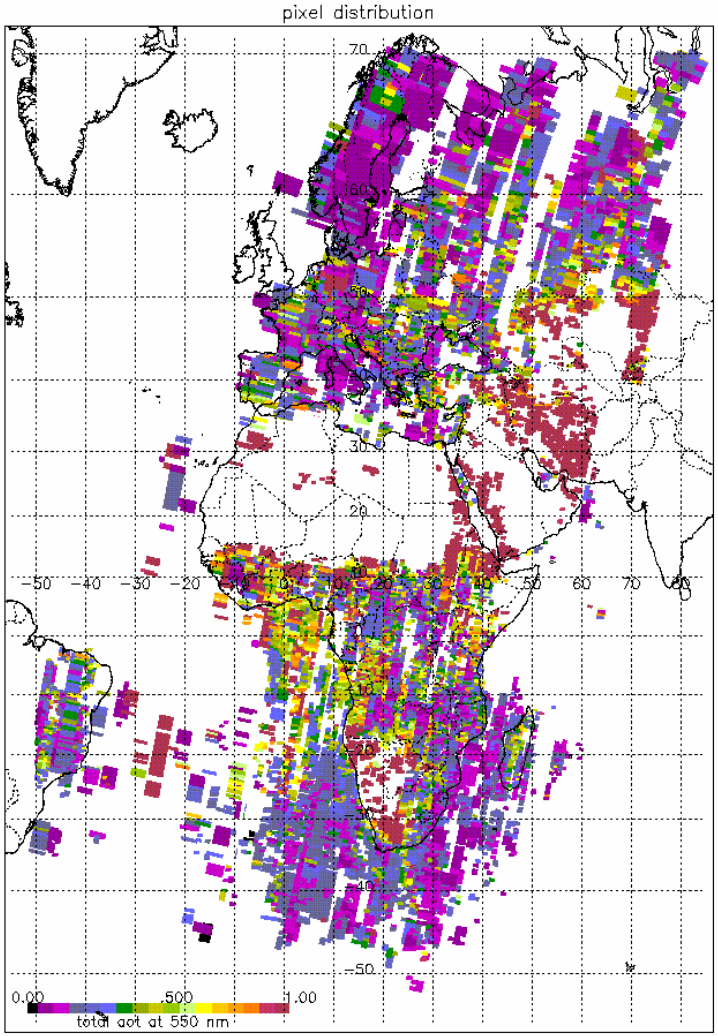
Based on SYNAER evaluation of **GOME / ATSR-2** data
July 1997 – August 1998 (3 days per month)
5 x 5 degree grid

Limitation:
3 days per month only
Cloudiness
Bright surface albedo

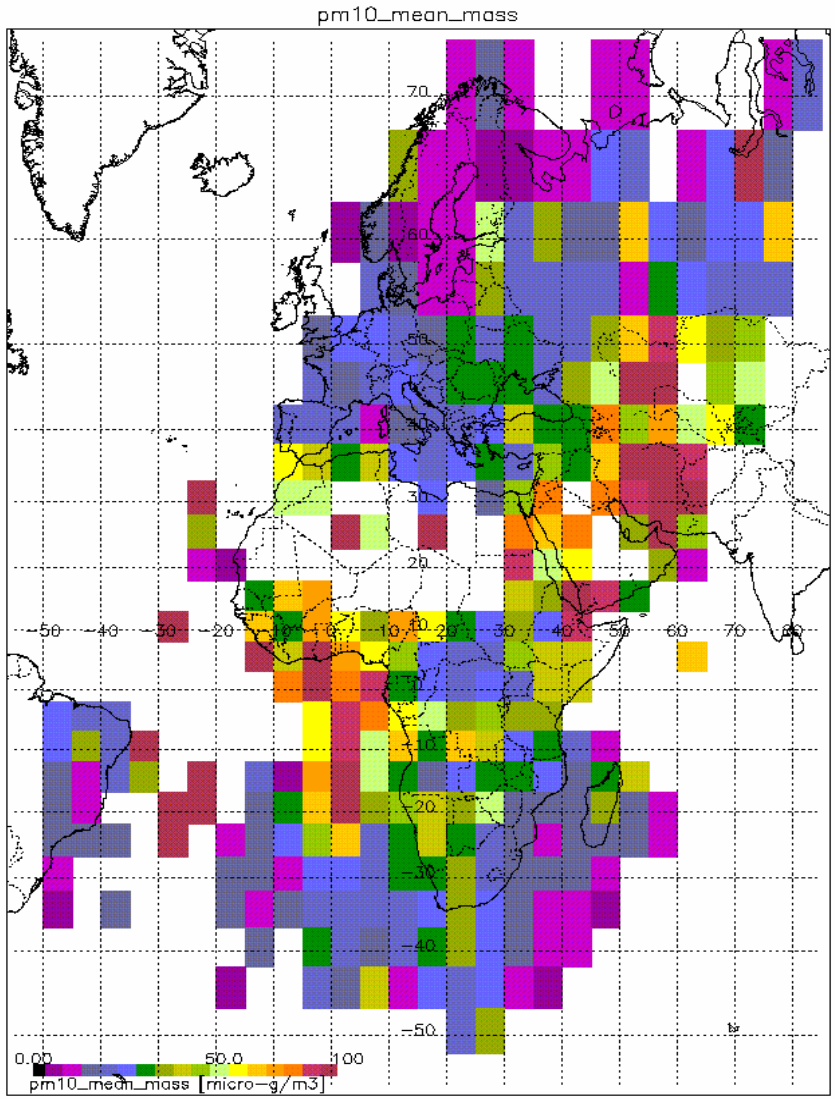
Quality check / ambiguity test:
Surface albedo 670 nm less than 0.08 (0.015) over land (ocean)
Cloud fraction in GOME pixel less than 35%
Fit error GOME spectrum less than 0.005 (1% error is 0.002)
Number of contributing orbits per box 2 or more (mean: 4)
Number of contributing GOME pixels per box 5 or more (mean: 19)
Component analysis only for AOT > 0.1

14 month AOT at 550 nm

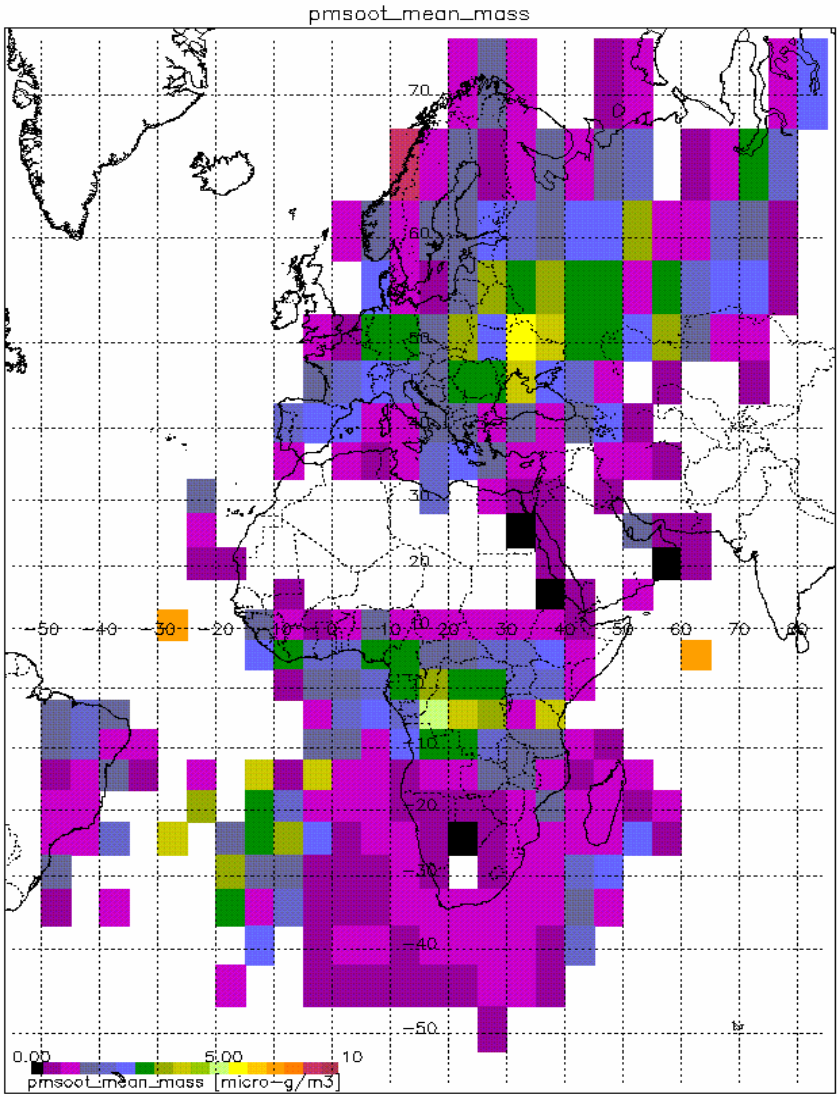
Pixelwise AOT550
0…1



14 month PM 10 (μg /m³)

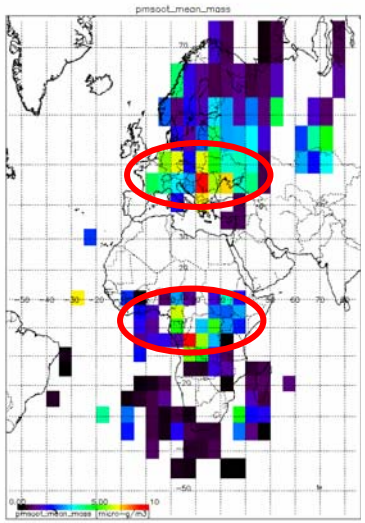


14 month PM soot (μg /m³)

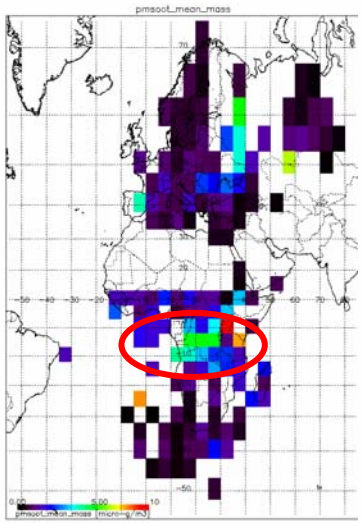


Seasonal PM soot (μg /m³)

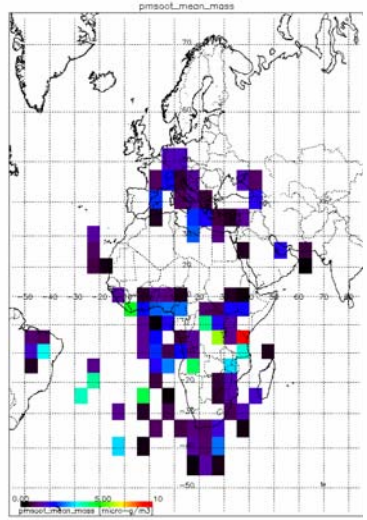
JulAug97



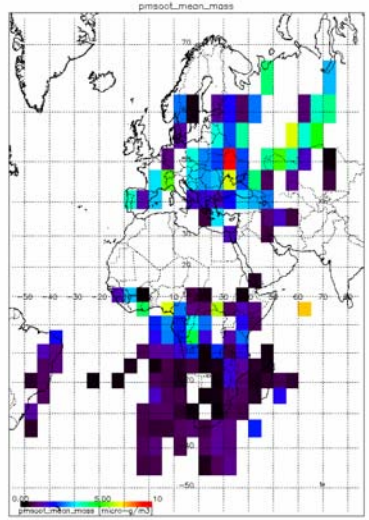
SepOctNov97



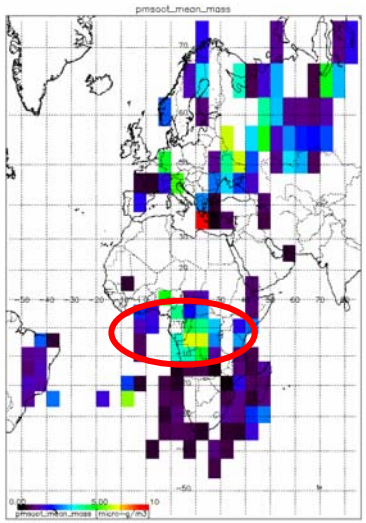
DecJanFeb9798



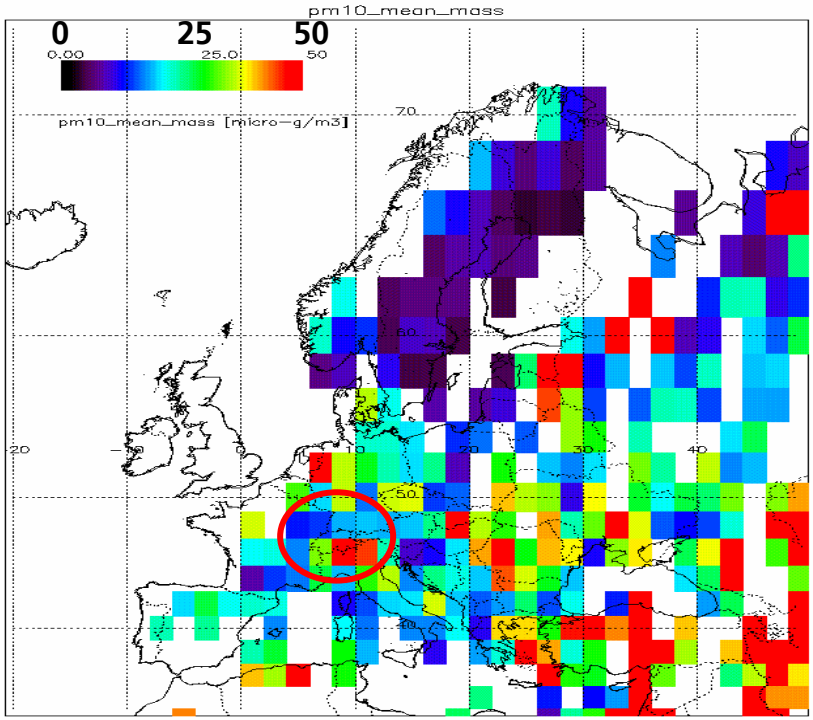
MarAprMay98



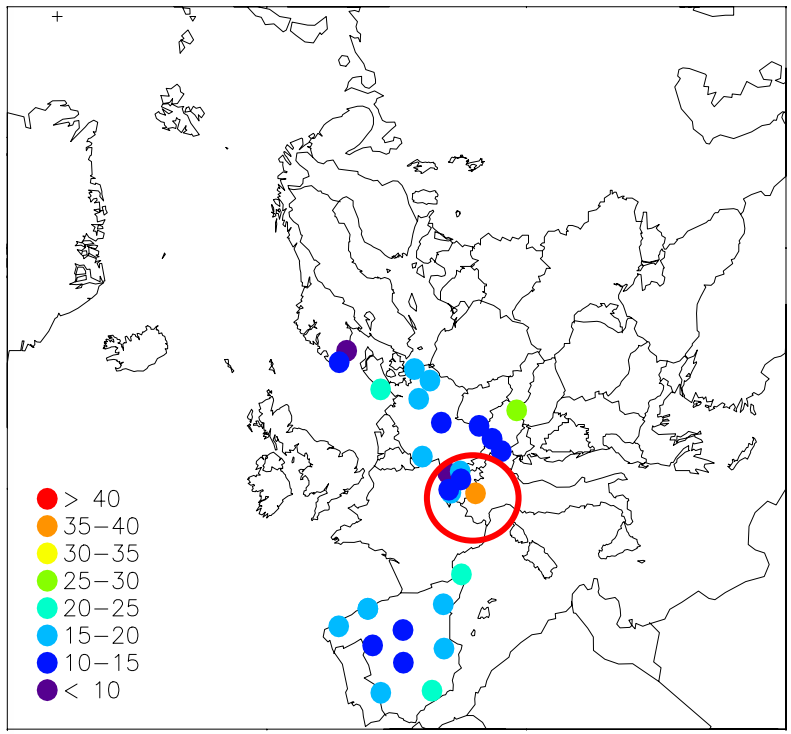
JunJulAug98



PM10 intercomparison (2 degree)



SYNAER Jul97 – Aug98 mean PM10



From EMEP/CCC report 9/2003
annual mean 2001 PM10