Electronic Supplement for:

"Regional Pollution Potentials of Megacities and other Major Population Centers"

by

M. G. Lawrence, T. M. Butler, J. Steinkamp, B. R. Gurjar, and J. Lelieveld

For publication in Atmospheric Chemistry and Physics.

This file contains the following:

- p. 2-3: Tables of the results for the $\tau = 1d$ and $\tau = 100d$ tracers (like Table 3 in the text for the $\tau = 10d$ tracers)
- p. 4: Global total figures for the full set of $\tau = 1d$ and $\tau = 100d$ tracers (like Figure 1 in the text for the $\tau = 10d$ tracers)
- p. 5-49: Global annual mean figures for each individual $\tau = 10d$ tracer, including the additional tracers which were not selected for inclusion in the main text.
- p. 50-94: Zoomed in seasonal mean figures for each individual $\tau = 10d$ tracer, including the additional tracers which were not selected for inclusion in the main text.

Table 1. Like Table 3 in the main text, but for the $\tau = 1\ d$ tracers: Annual mean regional pollution potentials of the selected MPC source locations for the $\tau = 1\ d$ tracers, with $\pm$ standard deviations of the monthly means for the values, and minimum and maximum monthly values (in parenthesis) for the ranks.

	ELR_{1km}		E_{UT}		A_{10}	
City	%	Rank	%	Rank	$\times 10^6\ km^2$	Rank
Eurasia						
London, England	12.9 ± 3.5	1 (1, 5)	1.4 ± 1.5	35 (18, 36)	1.3 ± 0.2	4 (2, 9)
Paris, France	11.2 ± 4.1	2 (1, 13)	2.2 ± 2.7	33 (22, 33)	1.4 ± 0.2	3 (2, 9)
Moscow, Russia	9.4 ± 5.0	4 (1, 30)	3.0 ± 9.6	30 (10, 36)	1.7 ± 0.7	1 (1, 24)
Po Valley, Italy	3.4 ± 2.9	22 (9, 33)	7.5 ± 14.4	19 (6, 26)	1.0 ± 0.4	12 (4, 35)
Istanbul, Turkey	7.9 ± 2.7	7 (3, 18)	3.5 ± 3.3	29 (15, 29)	1.2 ± 0.3	7 (4, 19)
Teheran, Iran	2.8 ± 1.6	26 (22, 32)	2.5 ± 5.4	32 (10, 32)	1.0 ± 0.4	13 (7, 35)
Africa						
Cairo, Egypt	7.2 ± 1.9	10 (6, 14)	0.4 ± 0.5	36 (28, 36)	1.0 ± 0.2	11 (6, 18)
Lagos, Nigeria	0.3 ± 0.2	35 (26, 36)	32.4 ± 8.1	6 (3, 8)	0.4 ± 0.1	35 (20, 35)
Johannesburg, South Africa	0.7 ± 0.8	31 (18, 34)	27.0 ± 16.0	8 (4, 33)	0.5 ± 0.2	34 (10, 34)
Southern Asia						
Karachi, Pakistan	3.6 ± 1.3	20 (14, 25)	2.9 ± 4.3	31 (20, 32)	0.9 ± 0.3	16 (14, 27)
Mumbai, India	3.2 ± 1.4	24 (9, 30)	4.8 ± 7.1	26 (11, 34)	0.7 ± 0.2	24 (18, 30)
Delhi, India	3.0 ± 1.6	25 (21, 35)	4.9 ± 11.5	25 (10, 35)	0.8 ± 0.2	19 (10, 28)
Kolkata, India	3.4 ± 2.0	23 (18, 32)	12.6 ± 19.9	13 (2, 34)	0.7 ± 0.2	25 (16, 34)
Dhaka, Bangladesh	4.7 ± 3.3	17 (7, 29)	12.8 ± 18.8	12 (3, 31)	0.8 ± 0.3	21 (7, 32)
Eastern Asia						
Szechuan Basin, China	0.3 ± 0.1	34 (32, 35)	12.9 ± 13.7	11 (6, 17)	0.6 ± 0.1	31 (19, 32)
Beijing, China	6.1 ± 3.1	12 (4, 28)	4.5 ± 9.5	27 (15, 34)	0.9 ± 0.3	17 (11, 33)
Tianjin, China	5.0 ± 2.6	16 (6, 30)	5.4 ± 11.8	24 (12, 35)	1.0 ± 0.3	15 (10, 31)
Shanghai, China	7.6 ± 3.2	8 (7, 18)	7.3 ± 15.7	20 (2, 34)	1.2 ± 0.2	5 (1, 14)
Seoul, Korea	7.3 ± 2.8	9 (2, 21)	4.2 ± 7.5	28 (19, 35)	0.9 ± 0.2	18 (3, 24)
Tokyo, Japan	6.1 ± 2.6	13 (11, 20)	11.6 ± 12.7	15 (6, 21)	0.8 ± 0.1	23 (11, 28)
Osaka, Japan	7.2 ± 2.8	11 (5, 15)	6.2 ± 5.1	21 (15, 25)	0.8 ± 0.2	20 (5, 22)
Hong Kong / PRD, China	8.7 ± 5.7	5 (4, 32)	11.0 ± 17.8	16 (3, 29)	1.0 ± 0.3	10 (7, 24)
Southeast Asia						
Manila, Philippines	4.2 ± 2.6	18 (7, 24)	34.4 ± 12.9	4 (3, 12)	0.7 ± 0.1	27 (13, 31)
Bangkok, Thailand	2.3 ± 1.5	27 (23, 34)	30.7 ± 24.0	7 (1, 13)	0.6 ± 0.2	30 (25, 35)
Jakarta, Indonesia	0.6 ± 0.3	32 (24, 36)	45.7 ± 7.7	1 (1, 15)	0.5 ± 0.1	33 (22, 35)
Australia						
Sydney, Australia	3.4 ± 2.6	21 (2, 27)	19.0 ± 7.4	10 (8, 30)	0.8 ± 0.1	22 (5, 24)
North America						
Chicago, USA	10.0 ± 5.0	3 (2, 22)	5.8 ± 13.6	22 (9, 34)	1.7 ± 0.6	2 (1, 18)
New York, USA	8.6 ± 2.2	6 (5, 10)	5.5 ± 6.6	23 (16, 31)	1.2 ± 0.2	8 (2, 17)
Los Angeles, USA	3.9 ± 2.6	19 (5, 24)	1.7 ± 1.9	34 (16, 35)	1.0 ± 0.2	14 (5, 19)
Atlanta, USA	5.0 ± 2.9	15 (8, 31)	12.1 ± 18.8	14 (2, 19)	1.2 ± 0.4	6 (3, 27)
Mexico City, Mexico	0.5 ± 0.2	33 (30, 35)	25.9 ± 4.5	9 (5, 16)	0.5 ± 0.1	32 (29, 35)
South America						
Bogota, Colombia	0.1 ± 0.1	36 (30, 36)	33.3 ± 9.0	5 (5, 18)	0.2 ± 0.0	36 (36, 36)
Lima, Peru	1.2 ± 1.1	30 (9, 32)	7.9 ± 9.2	18 (6, 36)	0.6 ± 0.1	29 (17, 33)
Rio de Janeiro, Brazil	1.6 ± 1.6	28 (6, 31)	36.1 ± 19.3	2 (1, 31)	0.7 ± 0.2	26 (8, 30)
Sao Paulo, Brazil	1.3 ± 1.1	29 (11, 32)	35.6 ± 16.5	3 (1, 24)	0.7 ± 0.2	28 (8, 32)
Buenos Aires, Argentina	5.7 ± 2.8	14 (1, 24)	8.8 ± 4.4	17 (9, 34)	1.1 ± 0.4	9 (1, 21)

Table 2. Like Table 3 in the main text, but for the $\tau = 100\ d$ tracers: Annual mean regional pollution potentials of the selected MPC source locations for the $\tau = 100\ d$ tracers, with ± standard deviations of the monthly means for the values, and minimum and maximum monthly values (in parenthesis) for the ranks.

	ELR_{1km}		E_{UT}		A_{10}	
City	%	Rank	%	Rank	$\times 10^6\ km^2$	Rank
Eurasia						
London, England	17.9 ± 1.6	2 (1, 4)	35.2 ± 2.9	35 (33, 36)	40.1 ± 11.9	2 (1, 3)
Paris, France	17.6 ± 2.1	3 (2, 9)	35.7 ± 3.4	34 (30, 35)	33.5 ± 13.9	3 (2, 6)
Moscow, Russia	20.5 ± 4.4	1 (1, 12)	34.0 ± 5.4	36 (25, 36)	52.0 ± 25.7	1 (1, 20)
Po Valley, Italy	16.1 ± 3.0	4 (2, 18)	37.5 ± 5.1	33 (19, 33)	21.1 ± 13.5	4 (4, 22)
Istanbul, Turkey	15.4 ± 2.5	5 (5, 17)	39.6 ± 4.7	32 (21, 33)	16.3 ± 7.5	5 (5, 13)
Teheran, Iran	14.2 ± 3.0	11 (6, 23)	41.0 ± 5.0	28 (15, 31)	12.5 ± 8.5	11 (5, 19)
Africa						
Cairo, Egypt	13.4 ± 1.8	15 (10, 22)	43.5 ± 2.8	22 (18, 27)	11.5 ± 3.6	15 (7, 23)
Lagos, Nigeria	9.9 ± 0.5	32 (23, 32)	50.6 ± 2.2	8 (5, 15)	1.9 ± 2.0	35 (21, 36)
Johannesburg, South Africa	11.8 ± 1.8	22 (4, 32)	45.8 ± 4.4	18 (6, 34)	2.6 ± 3.3	32 (10, 35)
Southern Asia						
Karachi, Pakistan	11.9 ± 2.0	21 (17, 31)	47.5 ± 4.4	17 (9, 19)	15.1 ± 6.9	7 (5, 25)
Mumbai, India	10.9 ± 1.5	24 (23, 32)	49.8 ± 4.5	10 (4, 14)	11.7 ± 4.1	13 (9, 23)
Delhi, India	12.3 ± 2.7	19 (14, 33)	48.2 ± 6.0	15 (4, 19)	14.7 ± 7.8	8 (7, 32)
Kolkata, India	10.7 ± 2.0	28 (22, 35)	51.7 ± 5.8	6 (3, 14)	10.0 ± 5.7	18 (13, 32)
Dhaka, Bangladesh	10.6 ± 1.9	30 (23, 36)	52.2 ± 5.6	5 (2, 11)	9.5 ± 5.1	19 (18, 31)
Eastern Asia						
Szechuan Basin, China	10.8 ± 1.6	27 (20, 32)	48.3 ± 5.9	14 (7, 20)	2.0 ± 0.6	34 (27, 36)
Beijing, China	14.6 ± 1.5	9 (8, 15)	42.3 ± 2.7	24 (20, 28)	13.7 ± 4.9	9 (6, 21)
Tianjin, China	14.1 ± 1.5	12 (11, 19)	43.2 ± 3.4	23 (16, 26)	13.2 ± 5.1	10 (8, 26)
Shanghai, China	12.2 ± 1.1	20 (17, 22)	48.0 ± 3.3	16 (10, 19)	11.0 ± 3.7	17 (14, 24)
Seoul, Korea	14.4 ± 1.1	10 (2, 15)	41.9 ± 2.2	26 (22, 33)	11.7 ± 6.5	12 (1, 20)
Tokyo, Japan	12.8 ± 1.5	17 (8, 21)	44.9 ± 4.0	20 (16, 28)	5.7 ± 3.5	26 (7, 28)
Osaka, Japan	13.0 ± 1.2	16 (7, 20)	44.6 ± 3.3	21 (16, 30)	8.3 ± 3.9	22 (3, 25)
Hong Kong / PRD, China	10.6 ± 1.4	29 (22, 30)	51.6 ± 5.2	7 (5, 15)	7.6 ± 3.7	24 (20, 33)
Southeast Asia						
Manila, Philippines	8.7 ± 0.9	35 (28, 36)	57.7 ± 3.6	2 (1, 7)	3.7 ± 2.1	28 (21, 33)
Bangkok, Thailand	9.1 ± 1.2	34 (28, 36)	55.8 ± 5.3	3 (1, 9)	4.1 ± 2.6	27 (22, 36)
Jakarta, Indonesia	8.4 ± 0.6	36 (22, 36)	57.7 ± 2.6	1 (1, 14)	2.1 ± 1.2	33 (26, 35)
Australia						
Sydney, Australia	13.9 ± 1.4	14 (2, 23)	41.9 ± 2.5	25 (12, 35)	6.5 ± 2.9	25 (6, 29)
North America						
Chicago, USA	15.3 ± 2.2	6 (5, 17)	39.7 ± 4.5	31 (17, 31)	15.6 ± 5.7	6 (5, 23)
New York, USA	14.9 ± 1.2	8 (5, 11)	39.9 ± 3.0	29 (27, 32)	11.7 ± 5.3	14 (2, 20)
Los Angeles, USA	14.0 ± 2.0	13 (8, 20)	41.8 ± 2.5	27 (20, 28)	11.1 ± 5.0	16 (6, 27)
Atlanta, USA	12.6 ± 2.0	18 (12, 25)	45.5 ± 5.4	19 (10, 26)	8.8 ± 3.3	21 (16, 29)
Mexico City, Mexico	10.1 ± 0.9	31 (25, 33)	50.2 ± 2.9	9 (8, 15)	3.2 ± 1.4	30 (25, 35)
South America						
Bogota, Colombia	9.4 ± 0.5	33 (27, 34)	53.4 ± 1.7	4 (3, 12)	0.6 ± 3.2	36 (23, 36)
Lima, Peru	10.9 ± 1.3	25 (11, 35)	49.4 ± 2.5	12 (4, 23)	9.2 ± 3.2	20 (5, 30)
Rio de Janeiro, Brazil	11.0 ± 1.8	23 (6, 34)	49.1 ± 5.1	13 (2, 32)	3.2 ± 1.9	31 (12, 36)
Sao Paulo, Brazil	10.8 ± 1.7	26 (8, 35)	49.7 ± 5.2	11 (2, 31)	3.4 ± 1.7	29 (17, 36)
Buenos Aires, Argentina	15.1 ± 1.3	7 (1, 18)	39.8 ± 2.5	30 (19, 36)	8.3 ± 2.9	23 (5, 24)

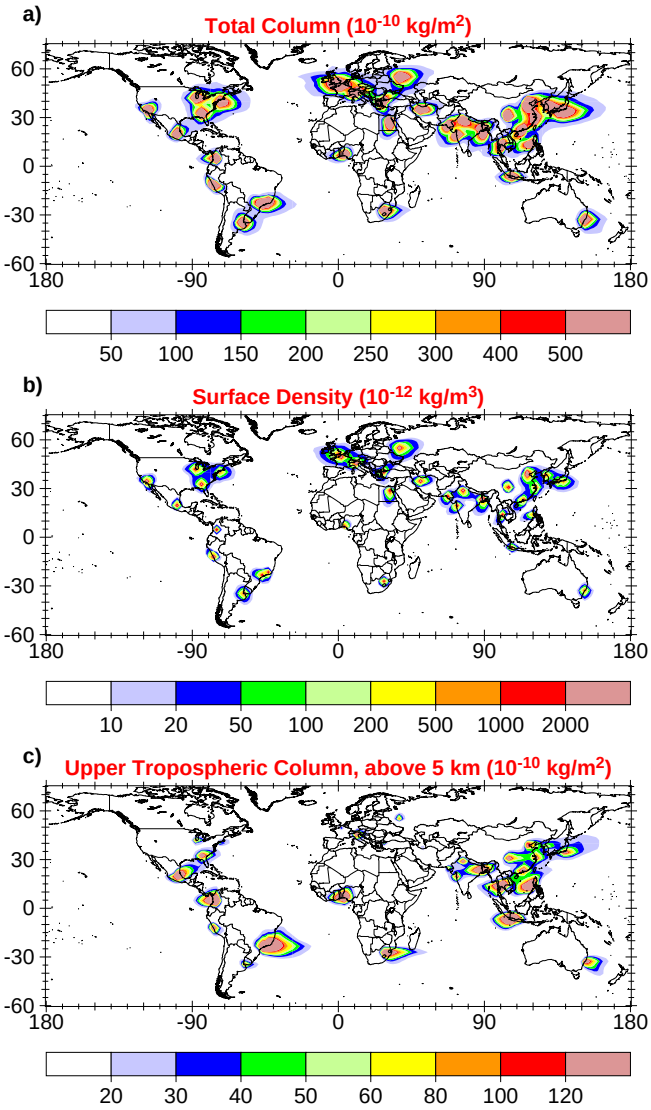


Fig. 1. Like Figure 1 in the main text, but for the $\tau = 1\ d$ tracers (note the difference in scales for the column densities): Annual mean plots of the sum of all of the $\tau = 1\ d$ MPC tracers for a) the total column mass density ($10^{-10} kg/m^2$), b) the model surface layer density ($10^{-12} kg/m^3$), and c) the column above $5\ km$ ($10^{-10} kg/m^2$).

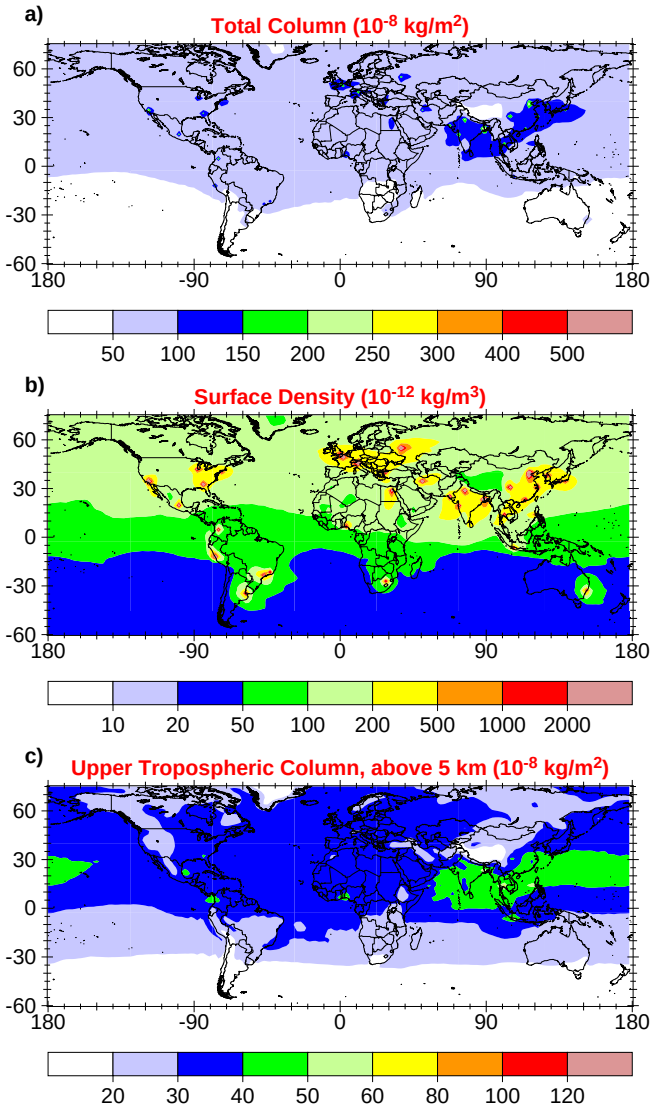
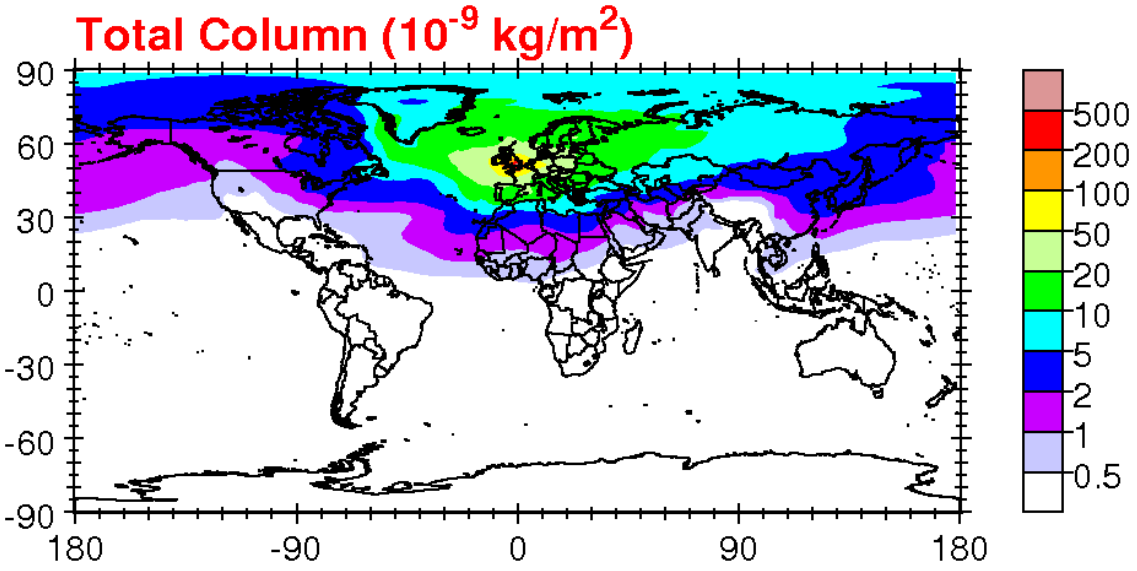
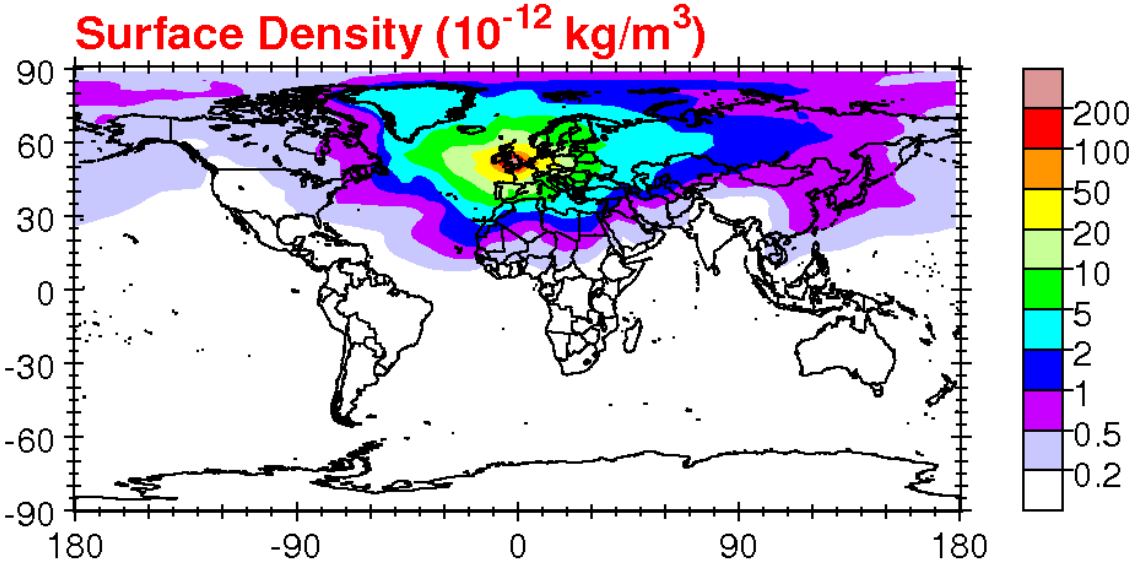


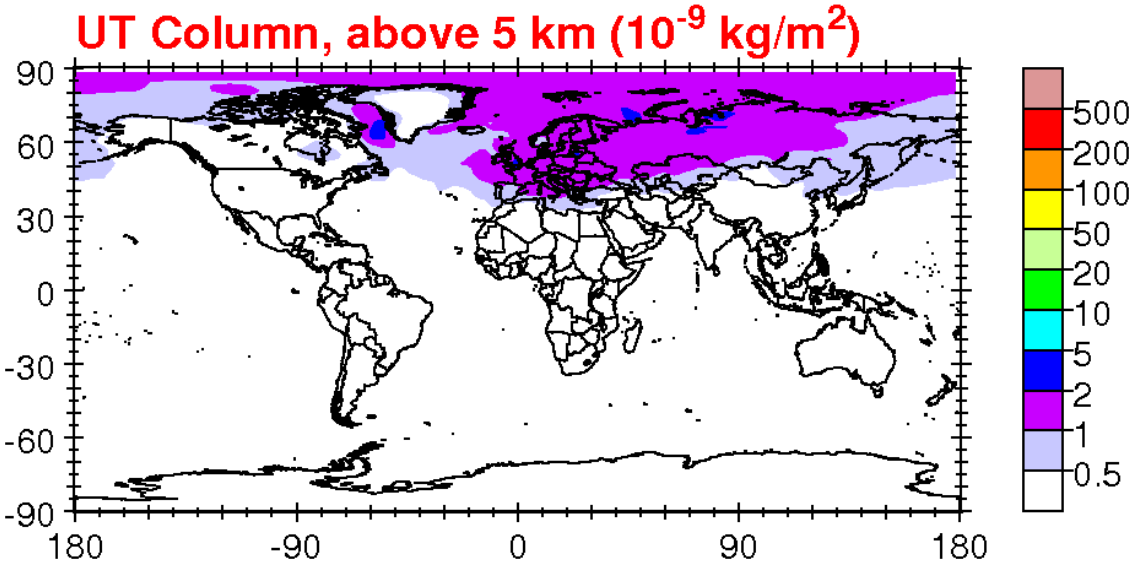
Fig. 2. Like Figure 1 in the main text, but for the $\tau = 100\ d$ tracers (note the difference in scales for the column densities): Annual mean plots of the sum of all of the $\tau = 100\ d$ MPC tracers for a) the total column mass density ($10^{-8} kg/m^2$), b) the model surface layer density ($10^{-12} kg/m^3$), and c) the column above $5\ km$ ($10^{-8} kg/m^2$).

London, England

Tau = 10 d, Annual Mean 1995



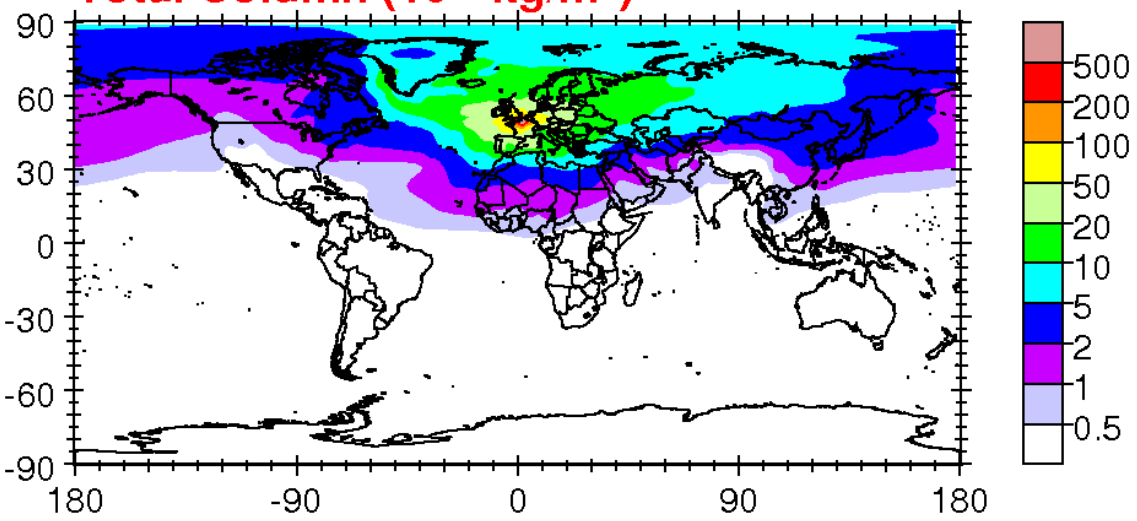




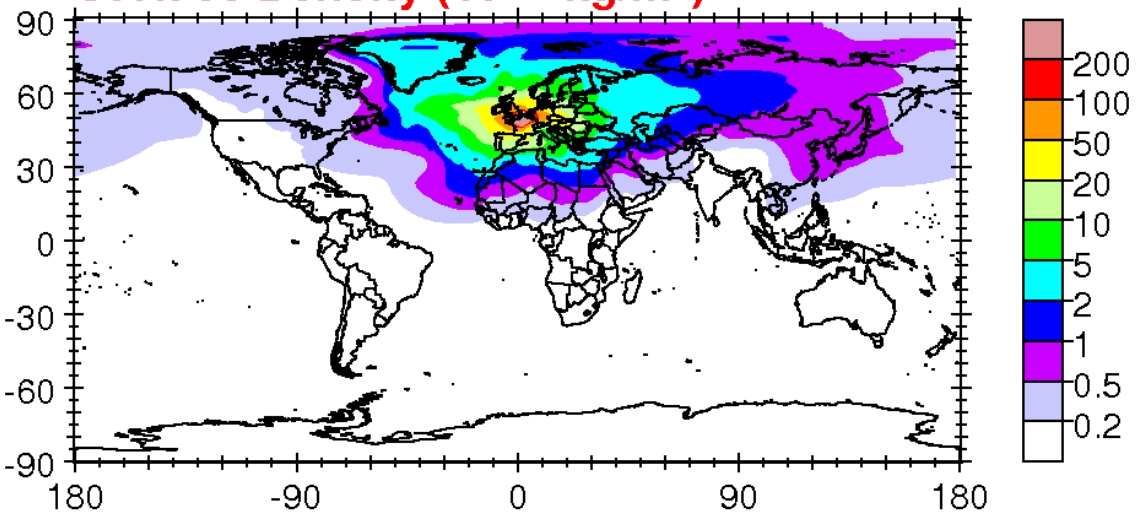
Paris, France

Tau = 10 d, Annual Mean 1995

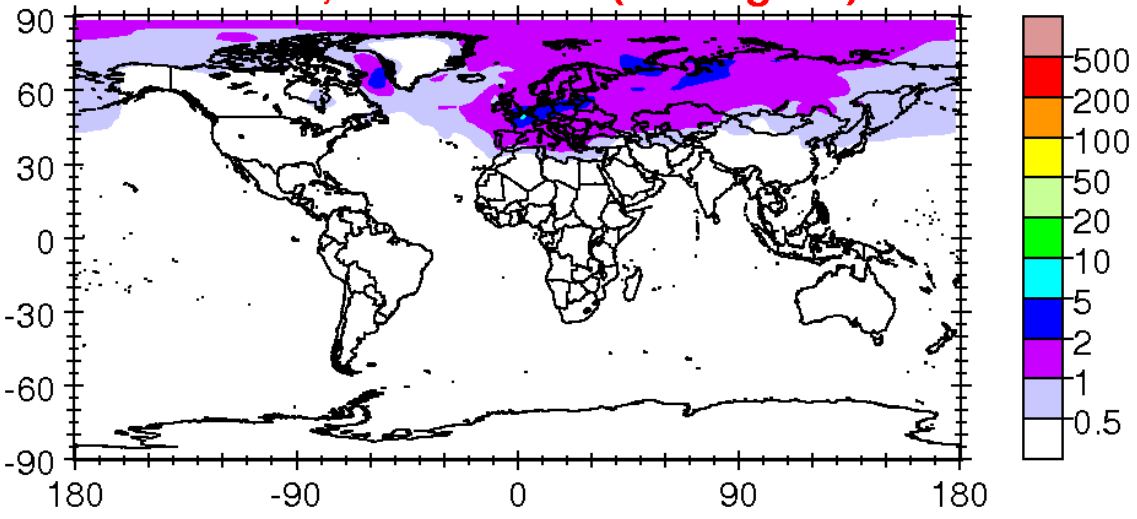
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

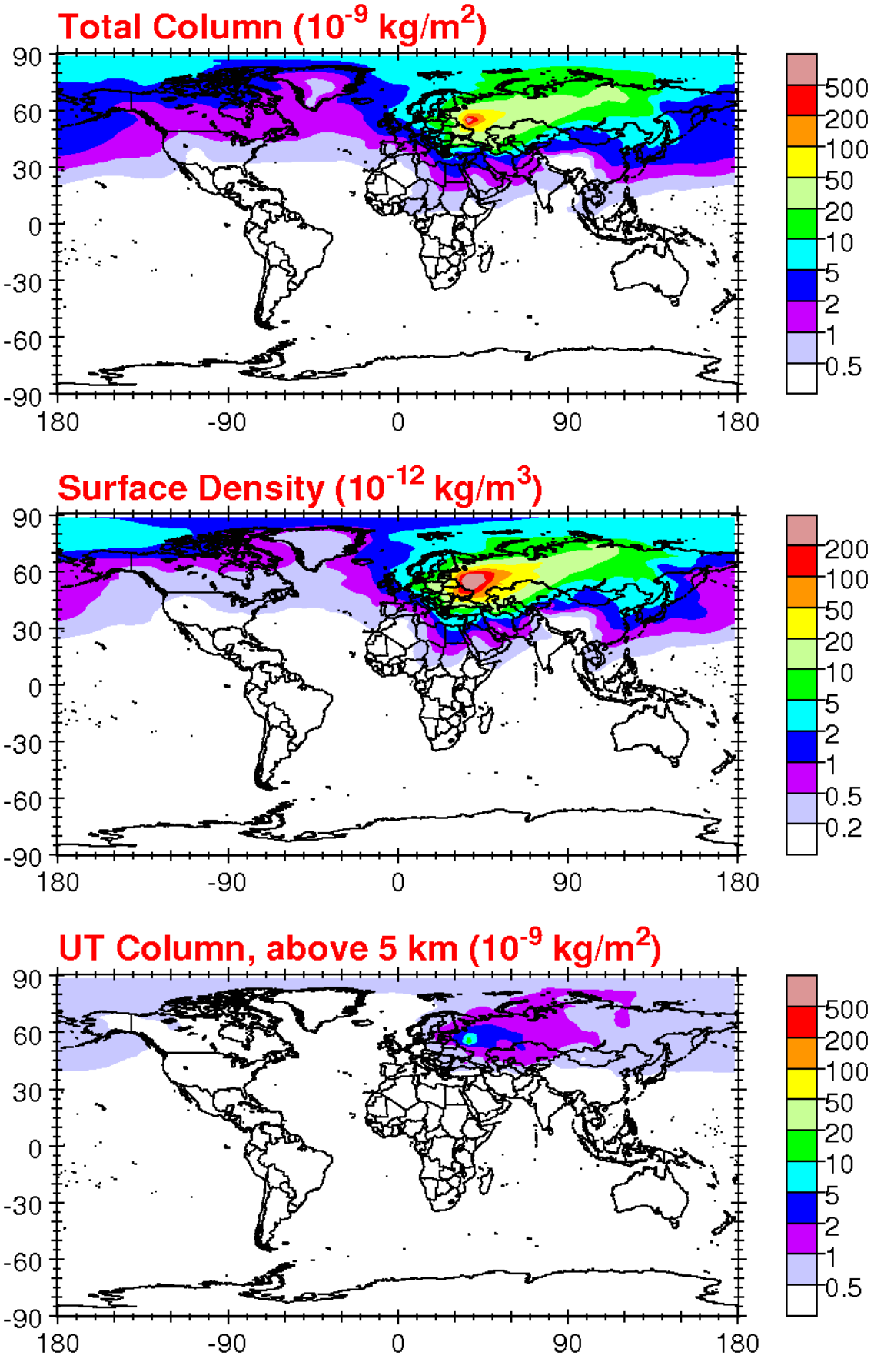


UT Column, above 5 km (10^{-9} kg/m^2)



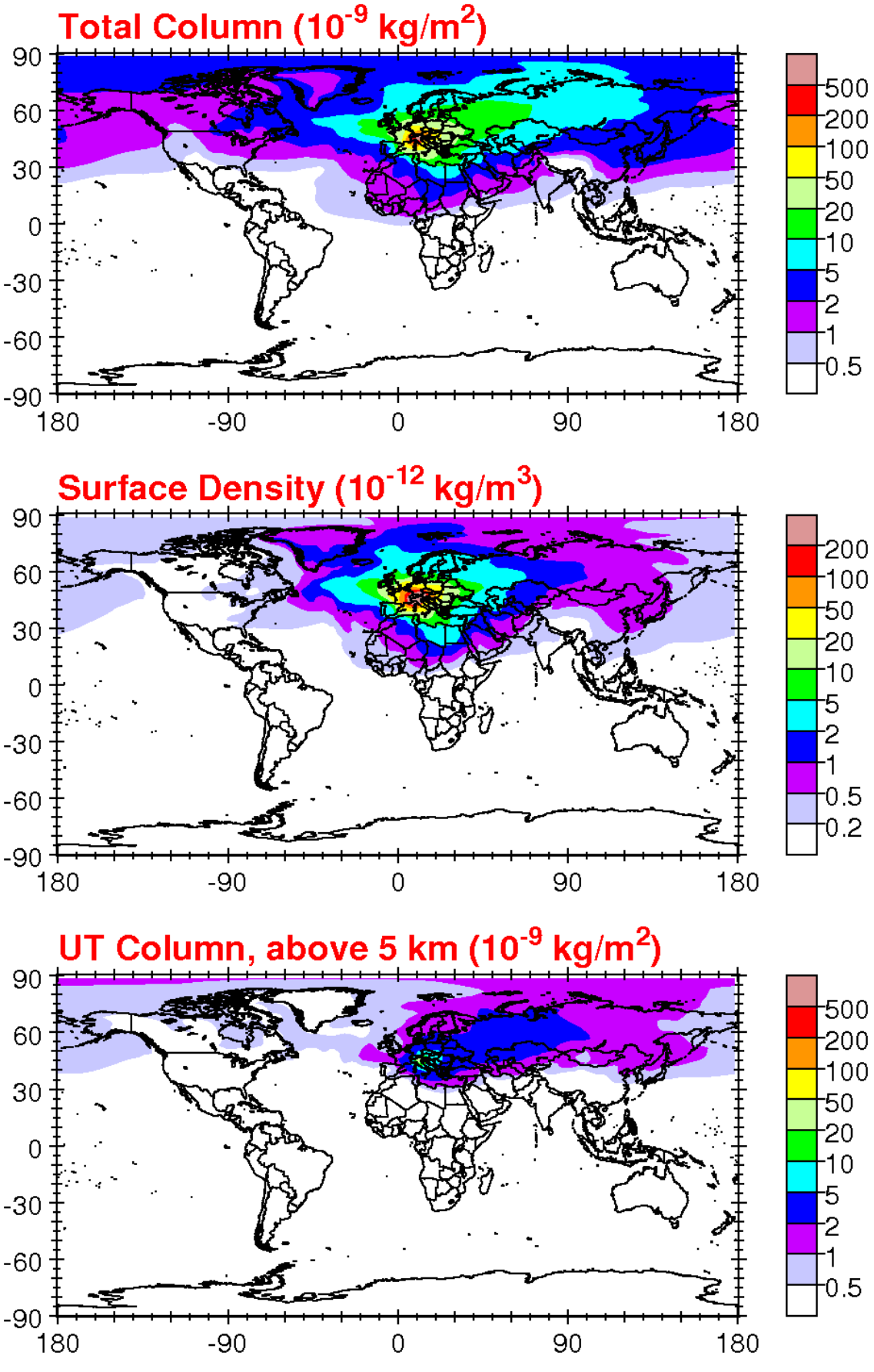
Moscow, Russia

Tau = 10 d, Annual Mean 1995



Po Valley, Italy

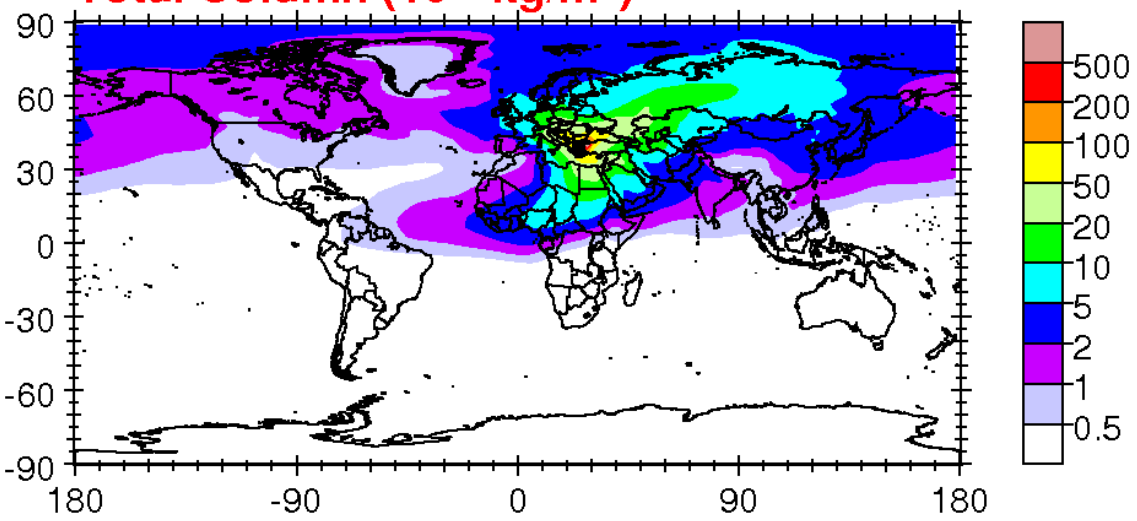
Tau = 10 d, Annual Mean 1995



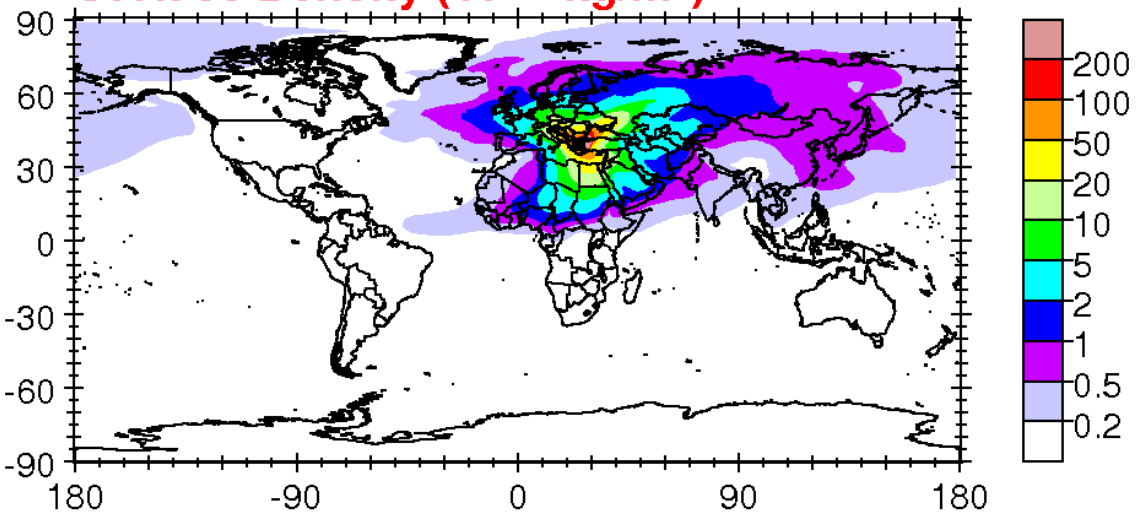
Istanbul, Turkey

Tau = 10 d, Annual Mean 1995

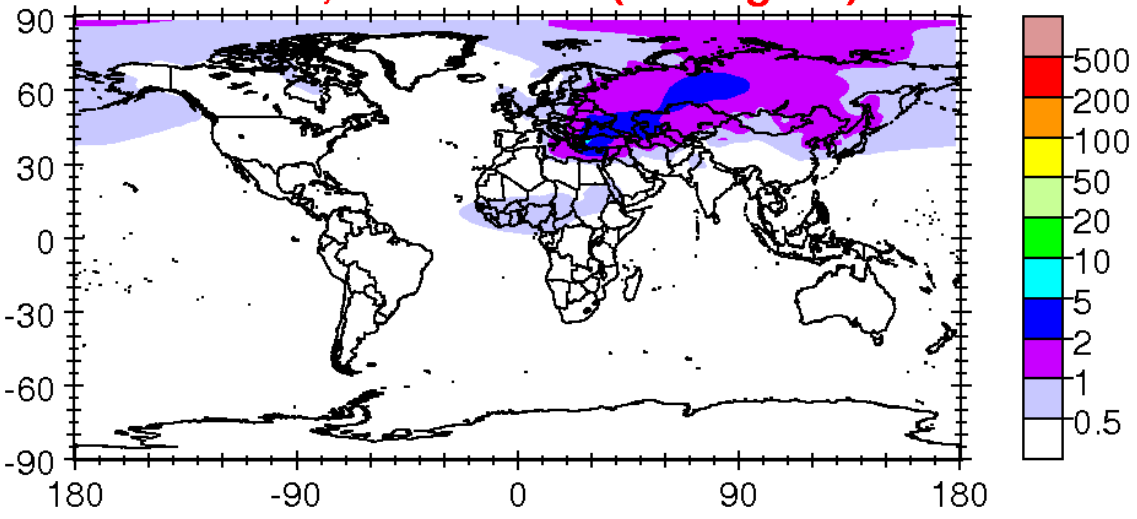
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



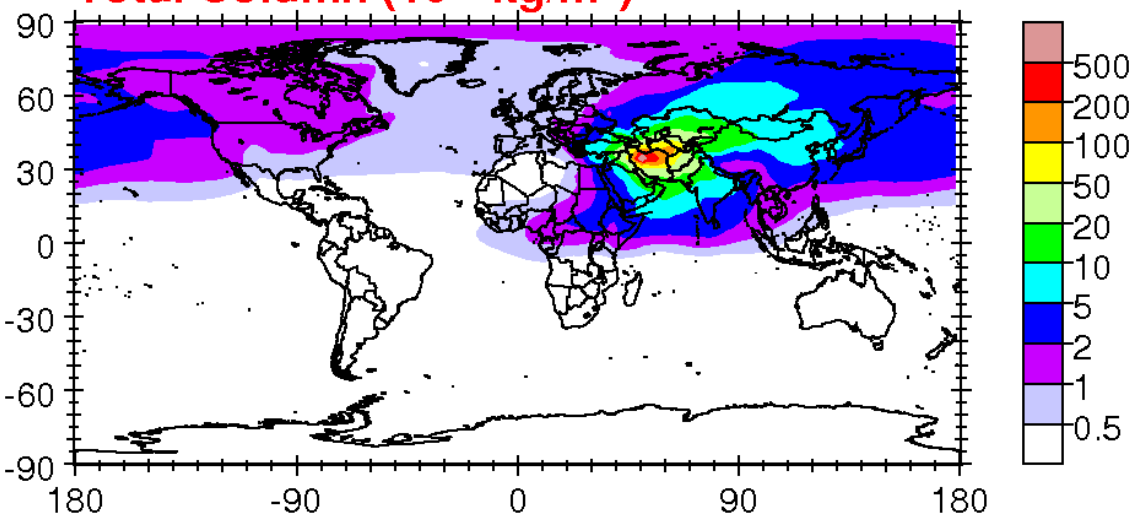
UT Column, above 5 km (10^{-9} kg/m^2)



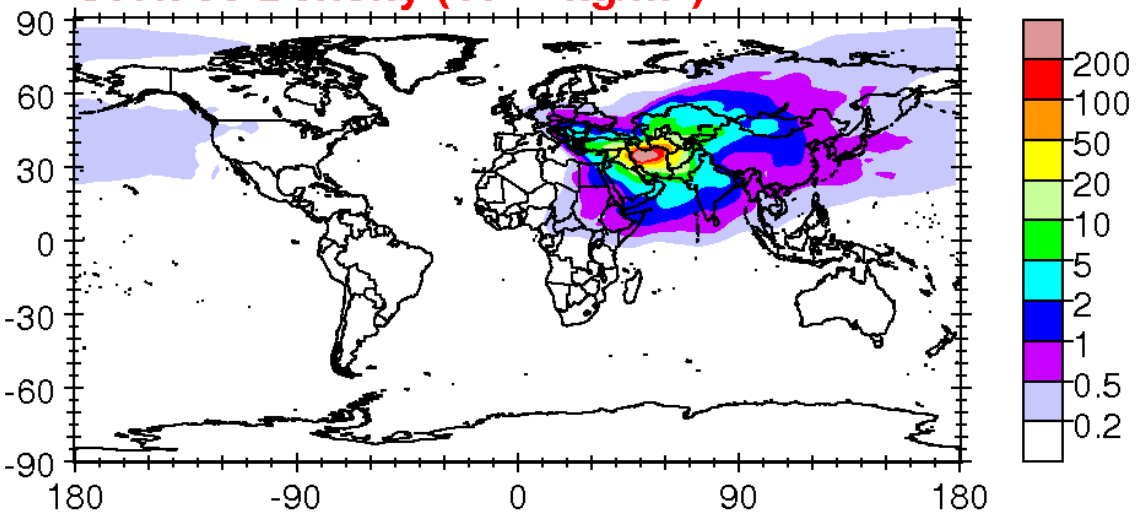
Teheran, Iran

Tau = 10 d, Annual Mean 1995

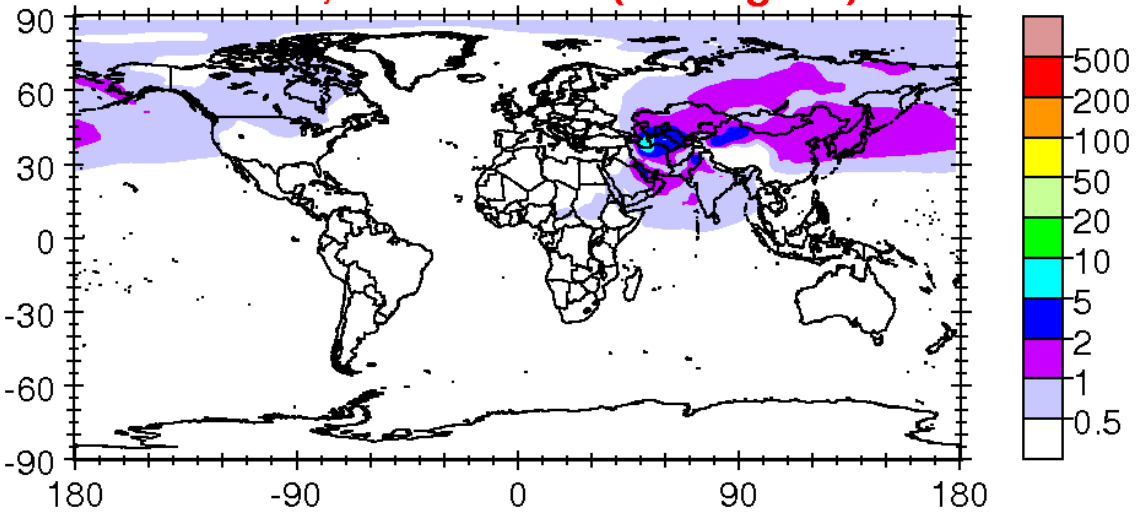
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

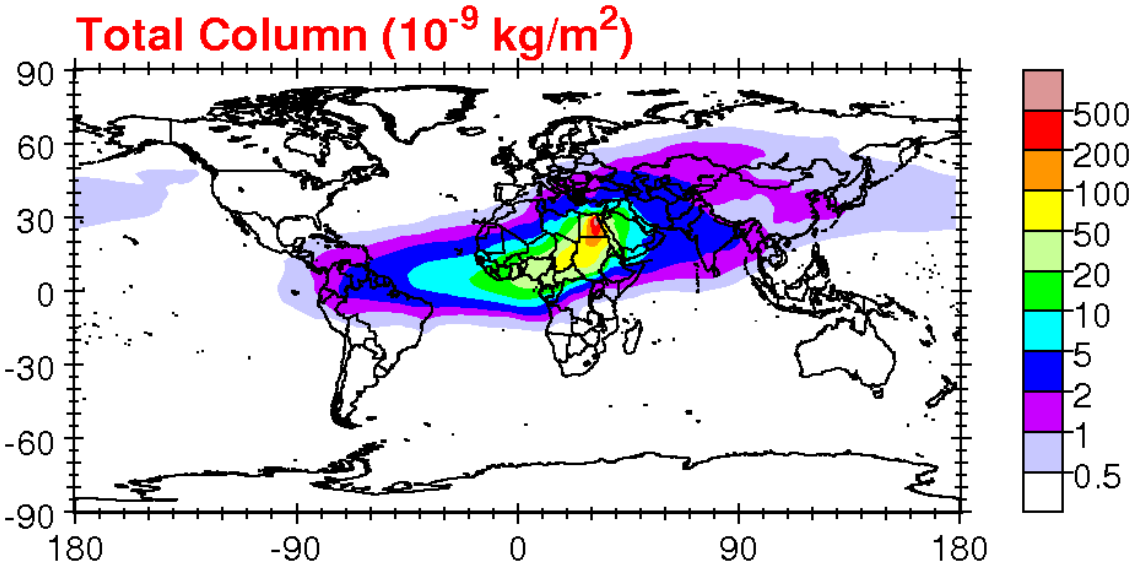


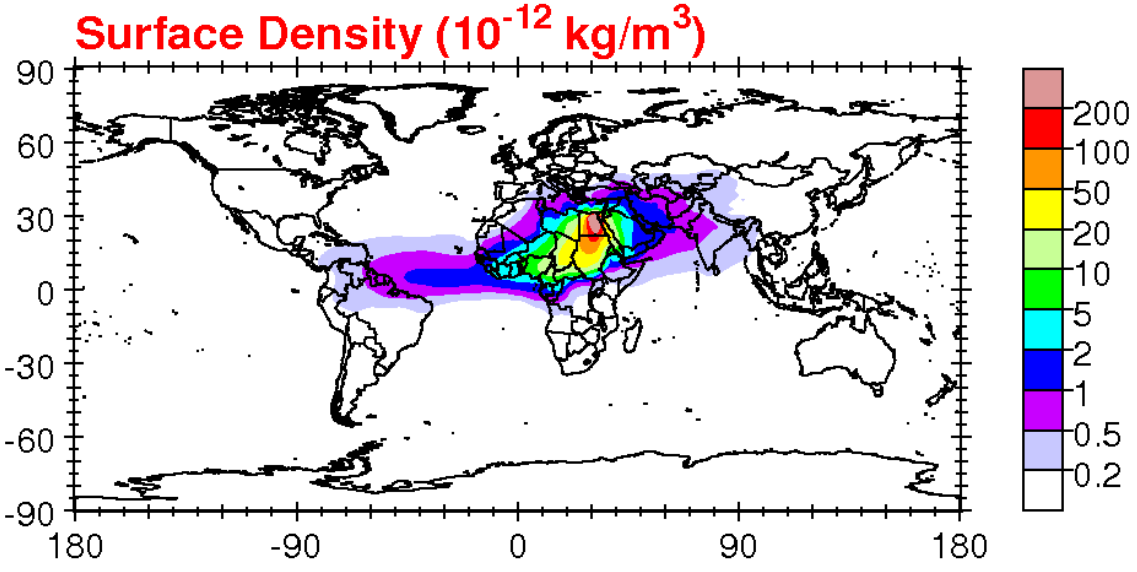
UT Column, above 5 km (10^{-9} kg/m^2)

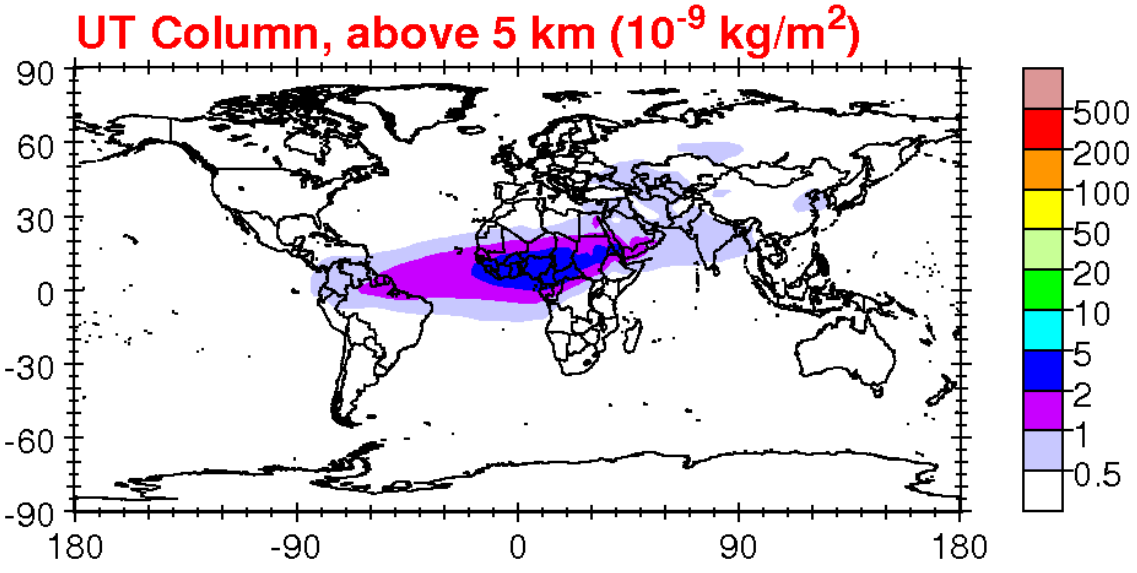


Cairo, Egypt

Tau = 10 d, Annual Mean 1995

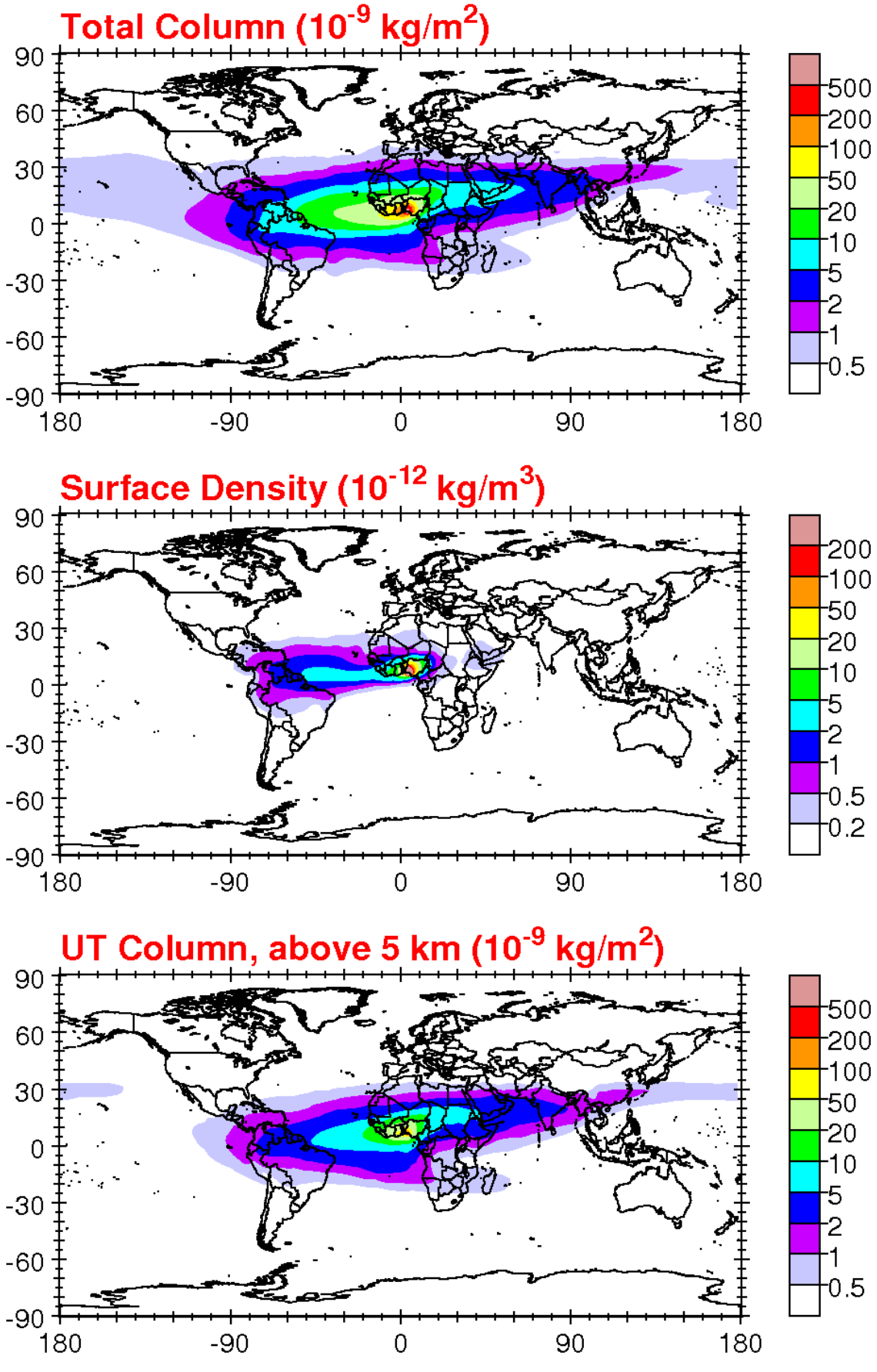






Lagos, Nigeria

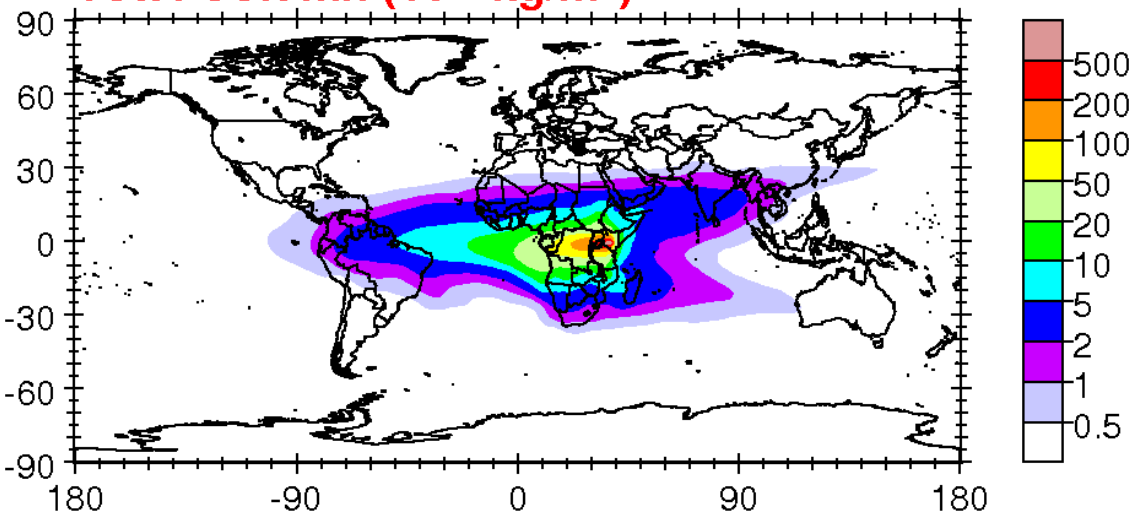
Tau = 10 d, Annual Mean 1995



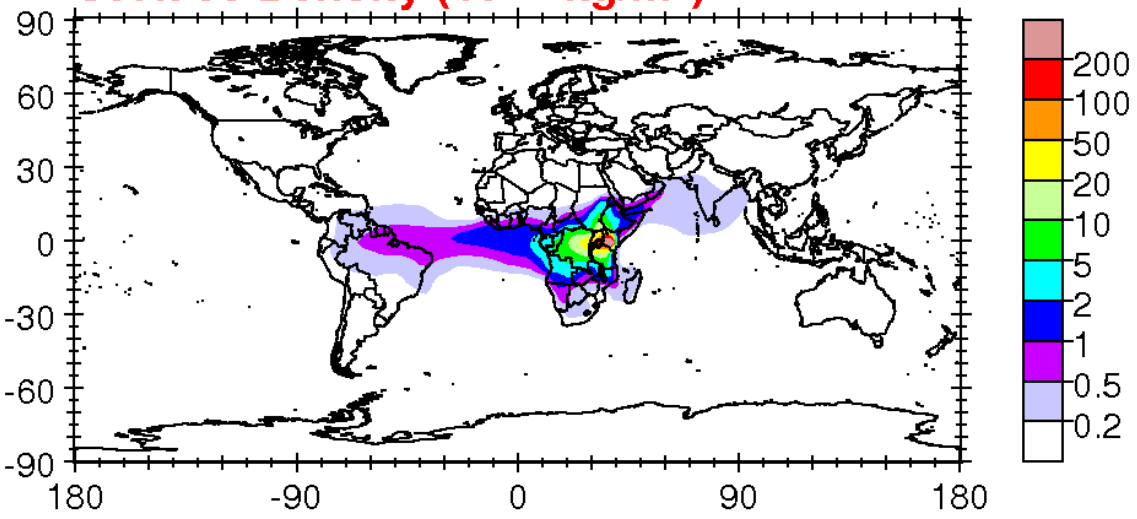
Nairobi, Kenya

Tau = 10 d, Annual Mean 1995

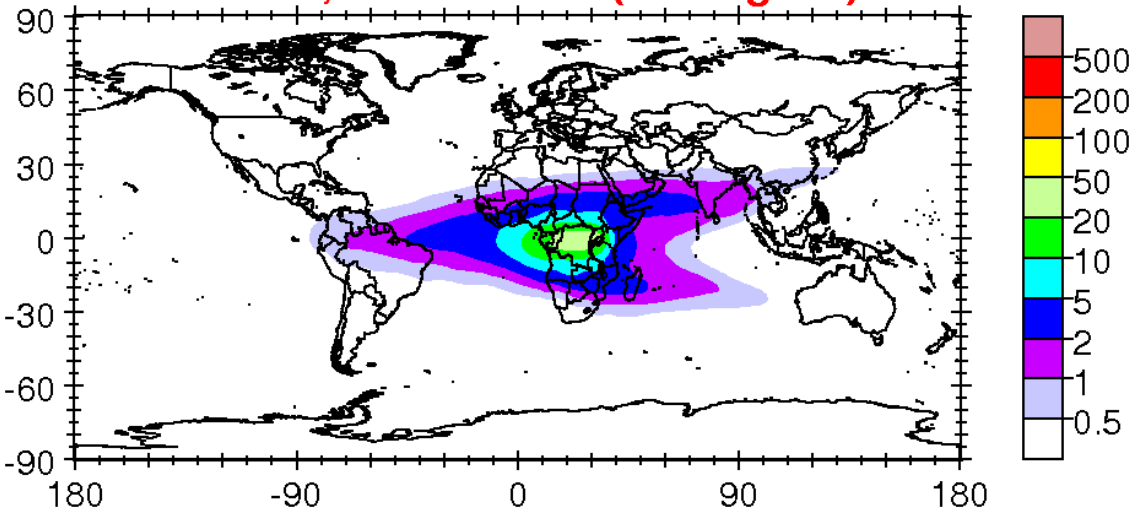
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



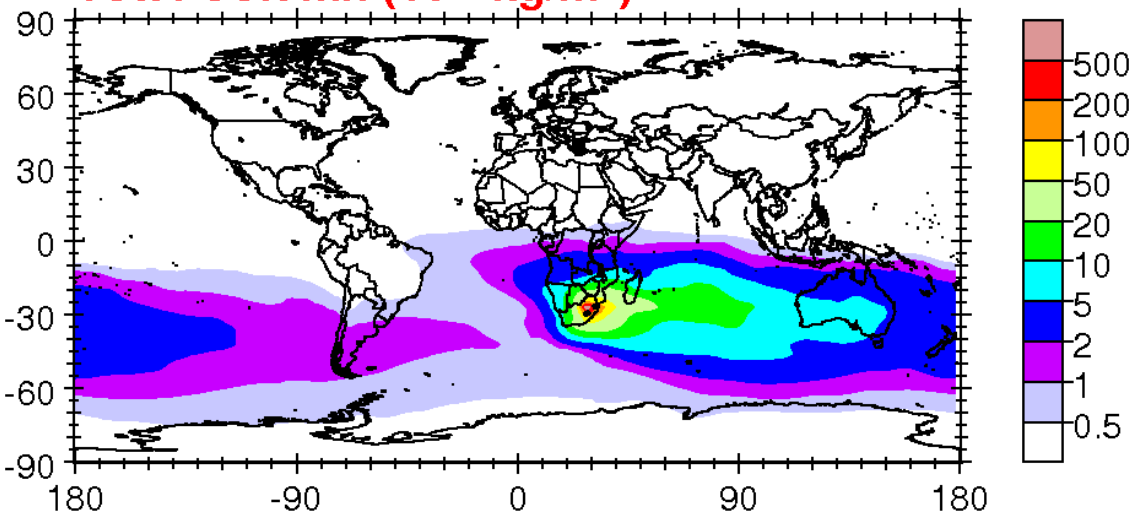
UT Column, above 5 km (10^{-9} kg/m^2)



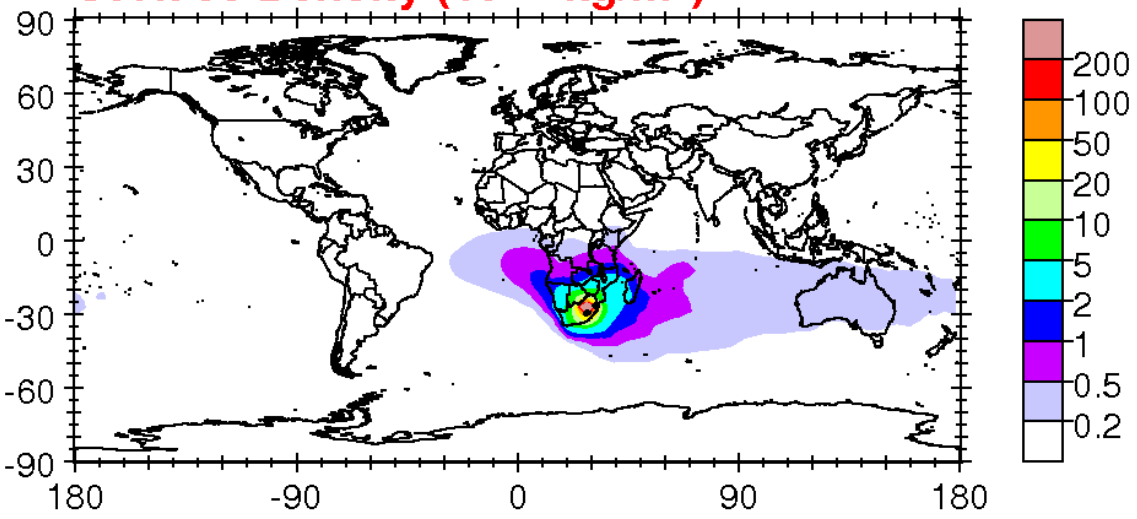
Johannesburg, South Africa

Tau = 10 d, Annual Mean 1995

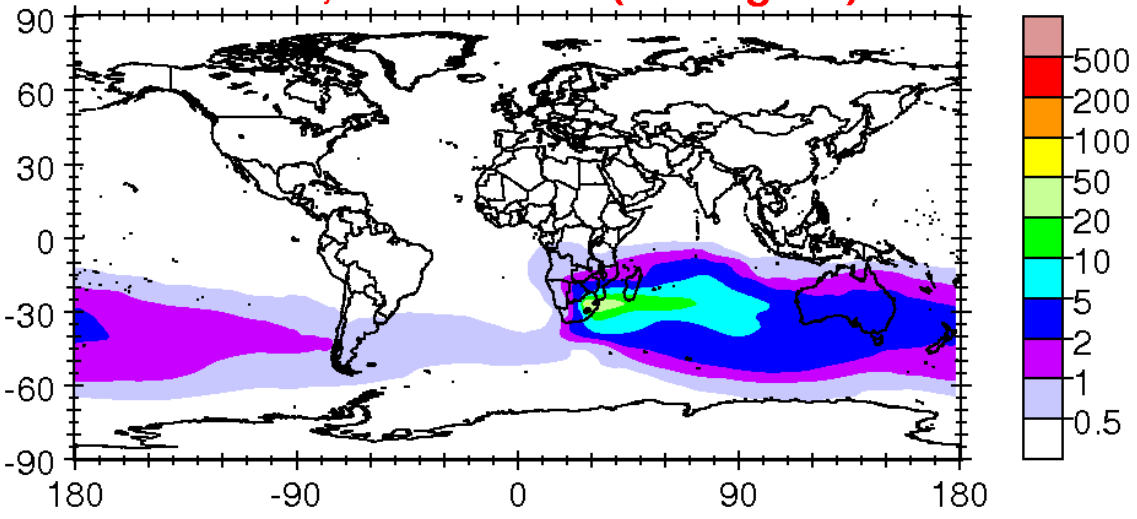
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

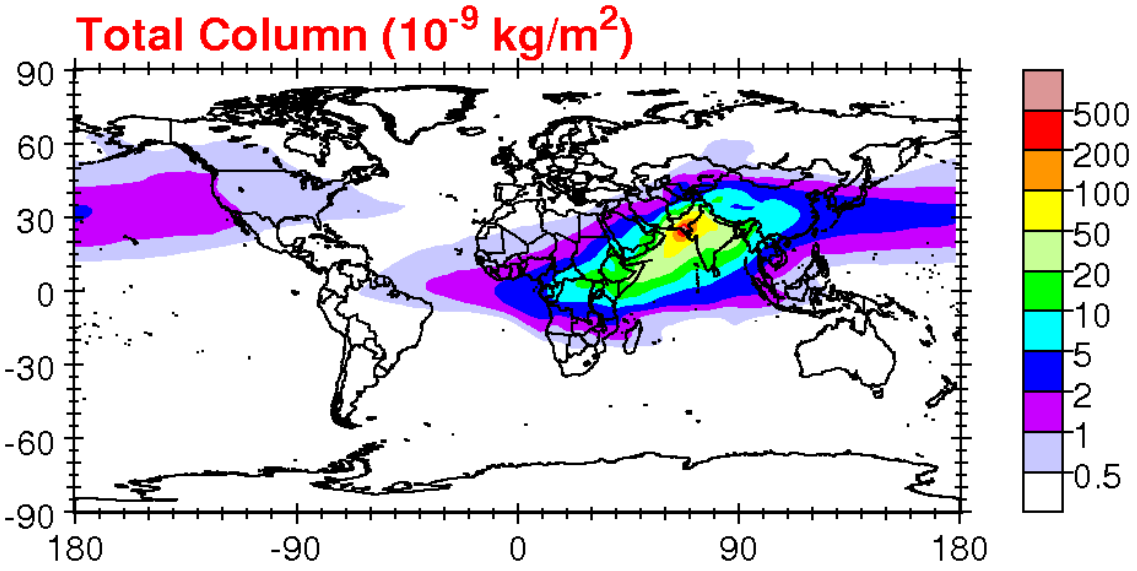


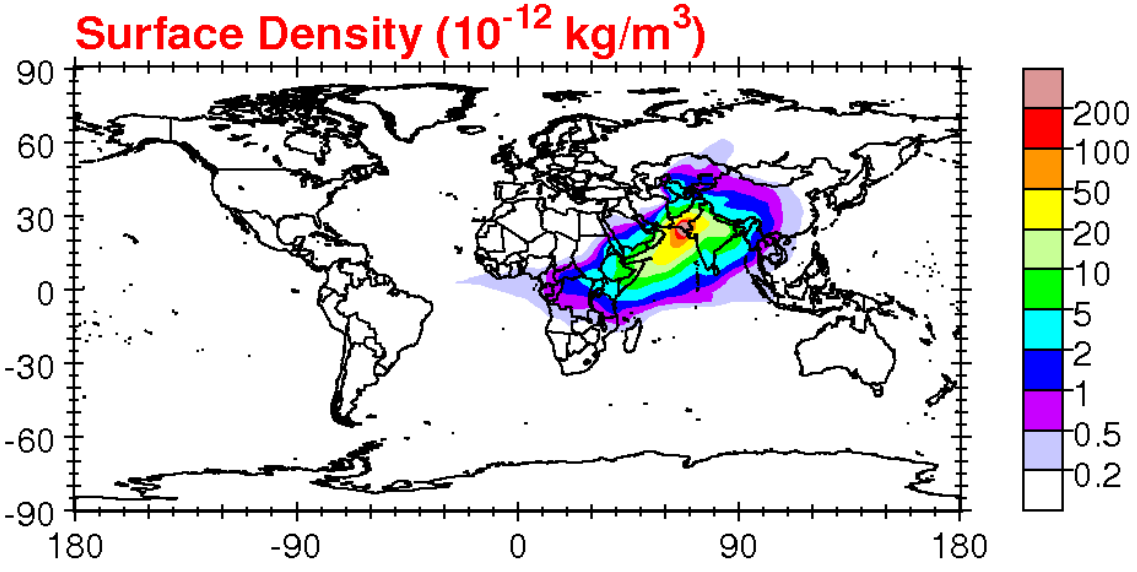
UT Column, above 5 km (10^{-9} kg/m^2)

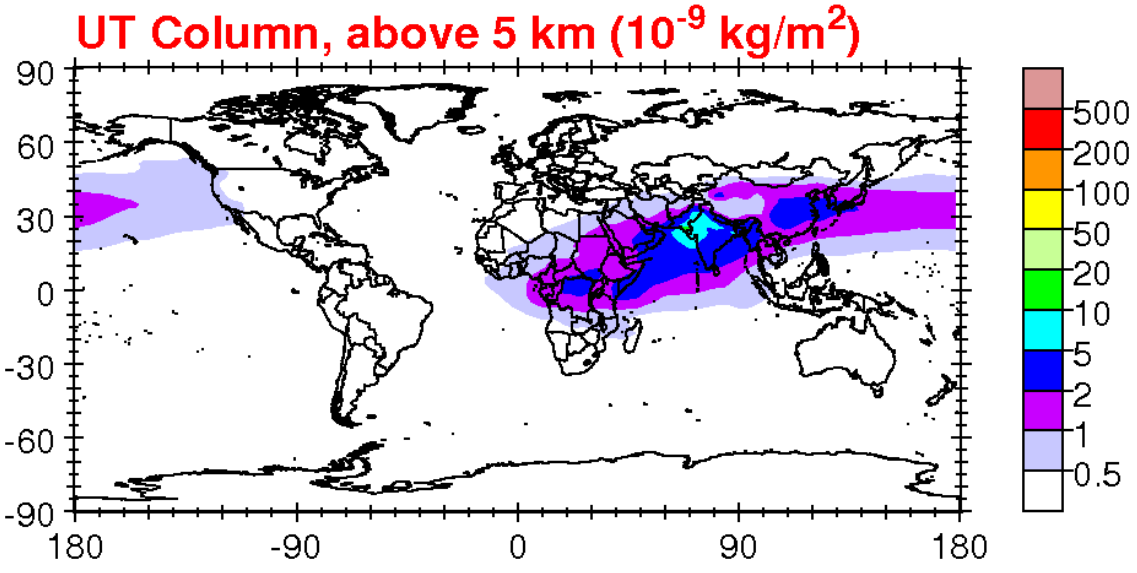


Karachi, Pakistan

Tau = 10 d, Annual Mean 1995

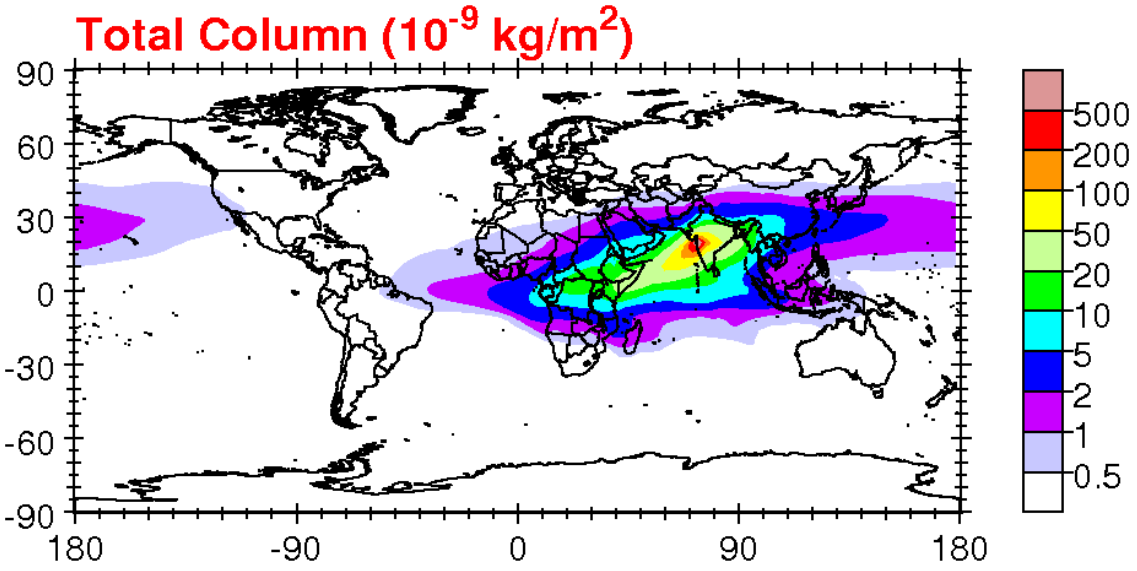


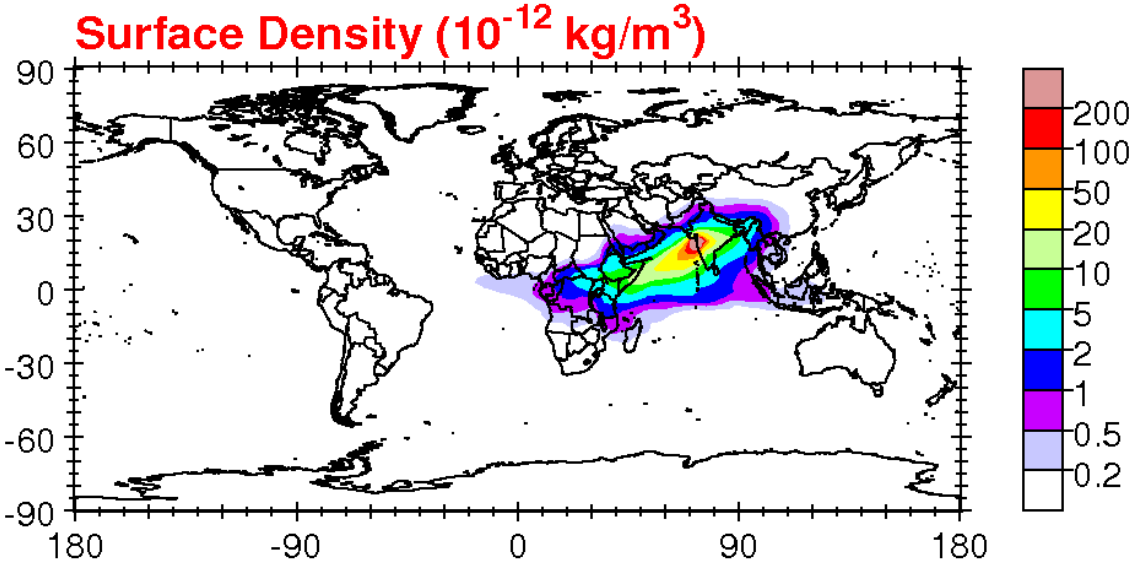


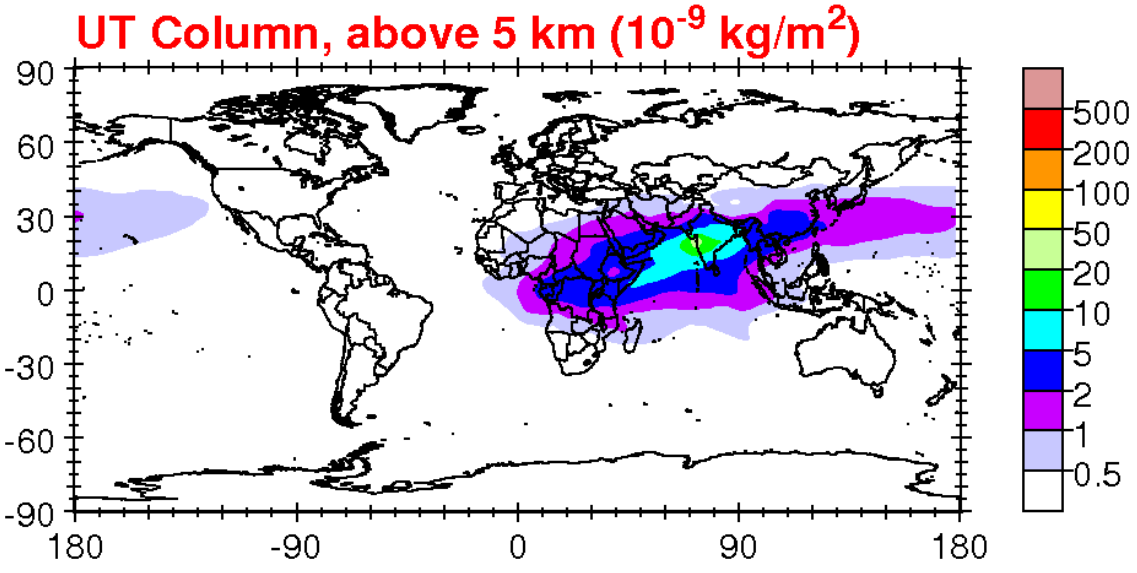


Mumbai (Bombay), India

Tau = 10 d, Annual Mean 1995



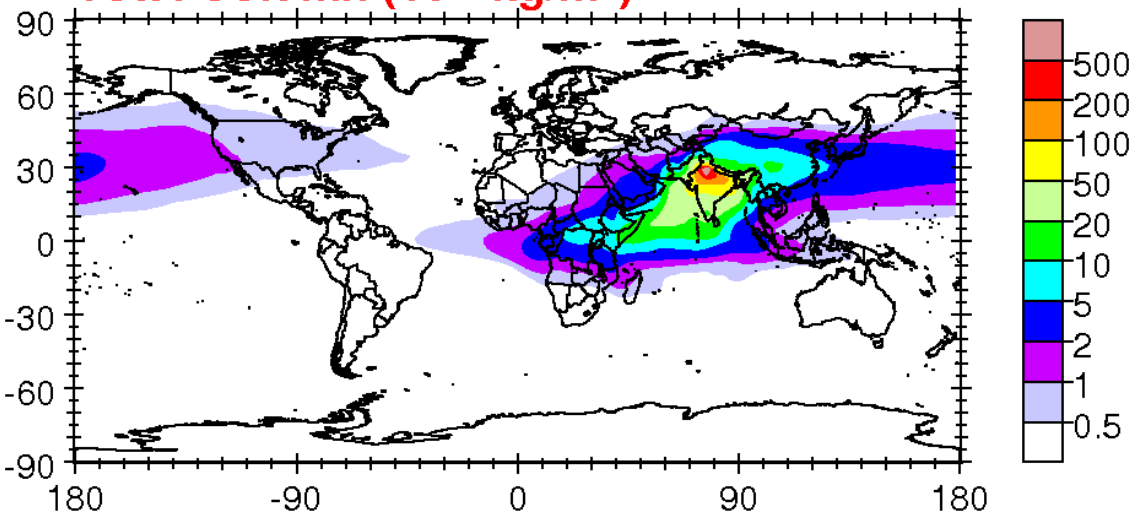




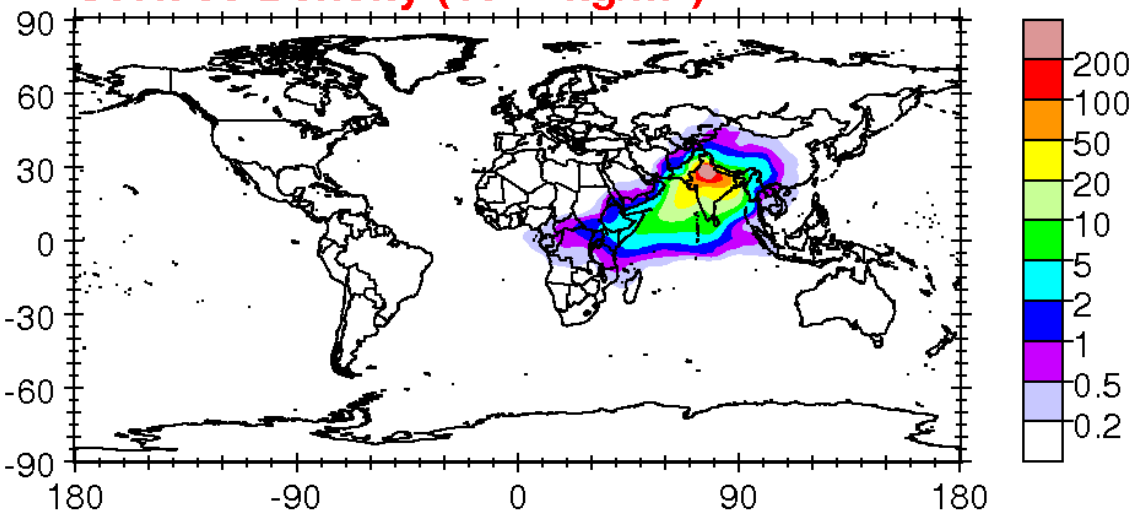
Delhi, India

Tau = 10 d, Annual Mean 1995

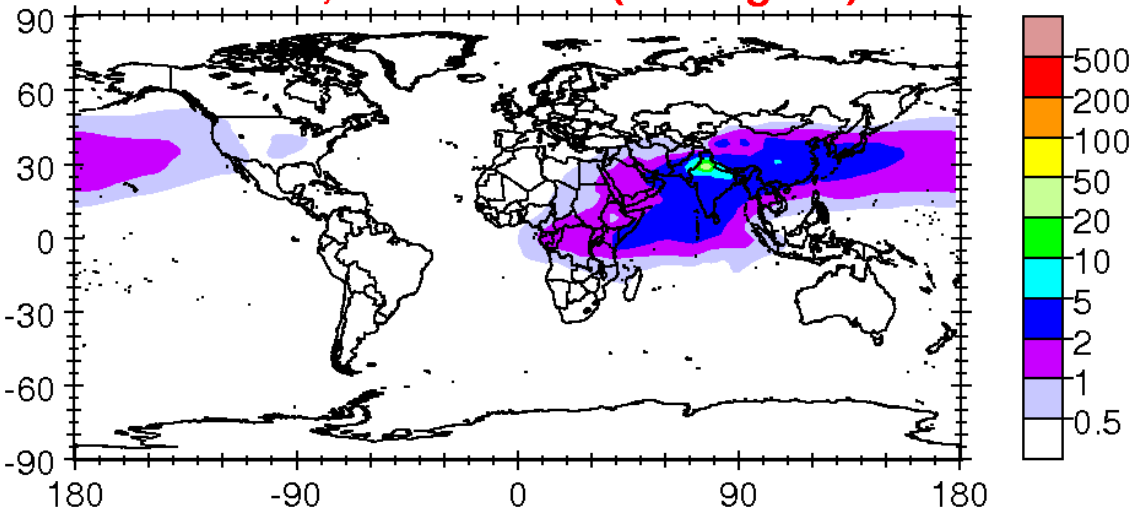
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

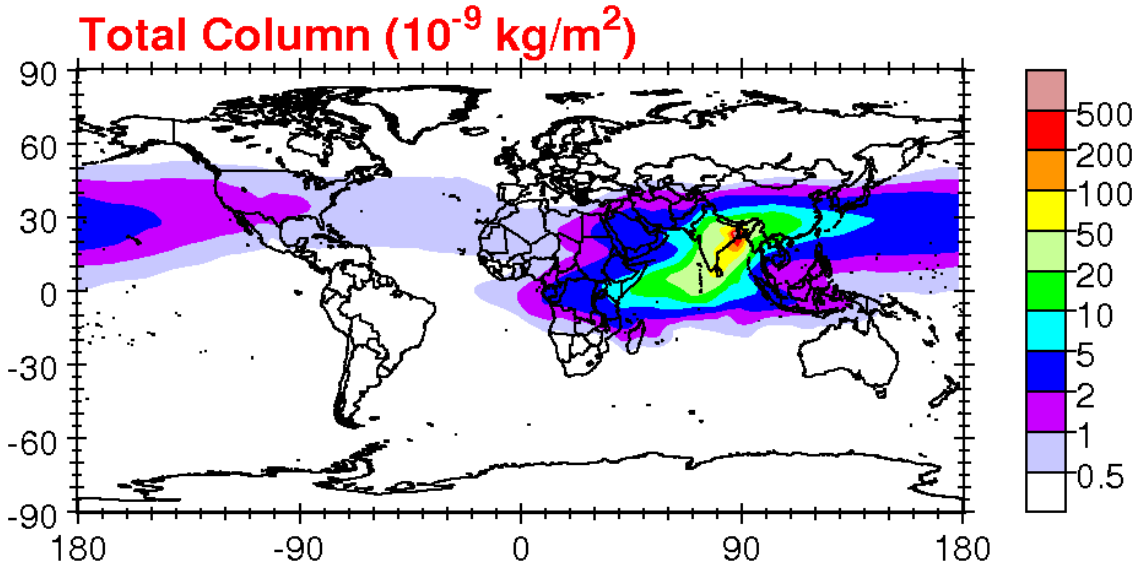


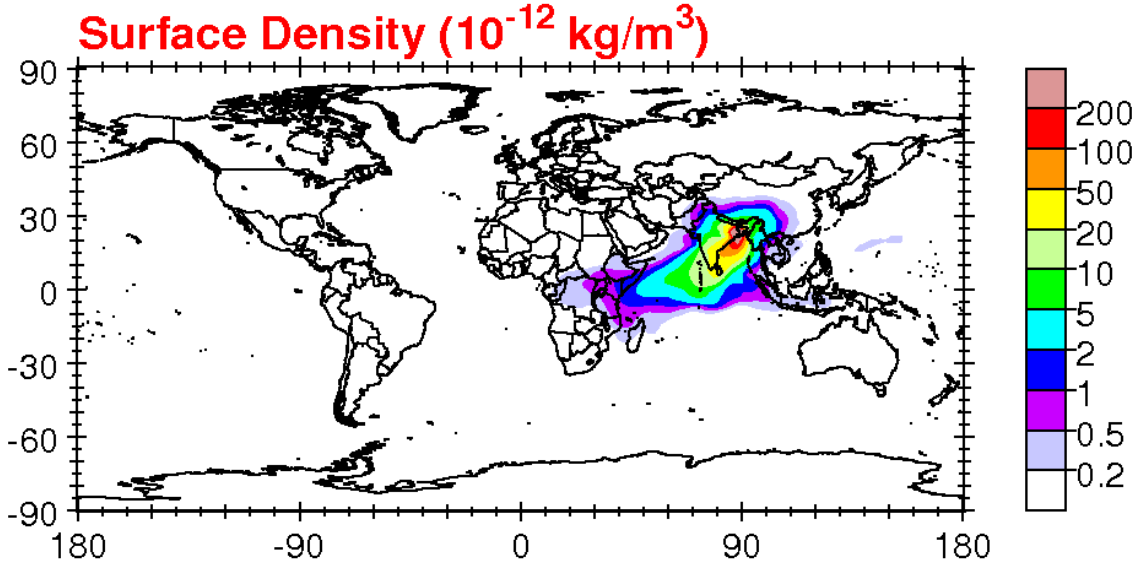
UT Column, above 5 km (10^{-9} kg/m^2)

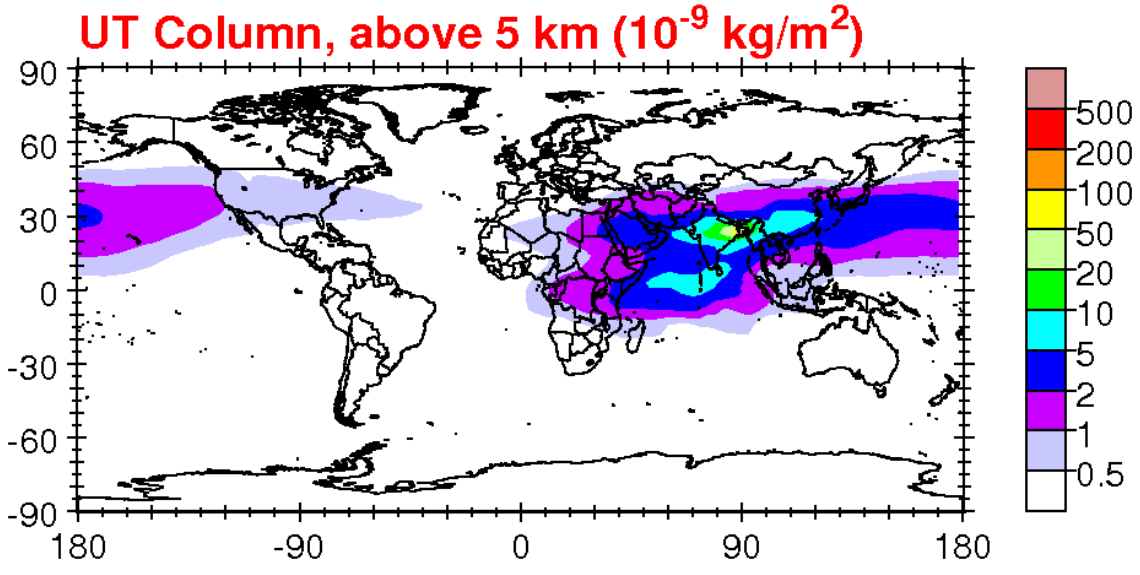


Kolkata (Calcutta), India

Tau = 10 d, Annual Mean 1995



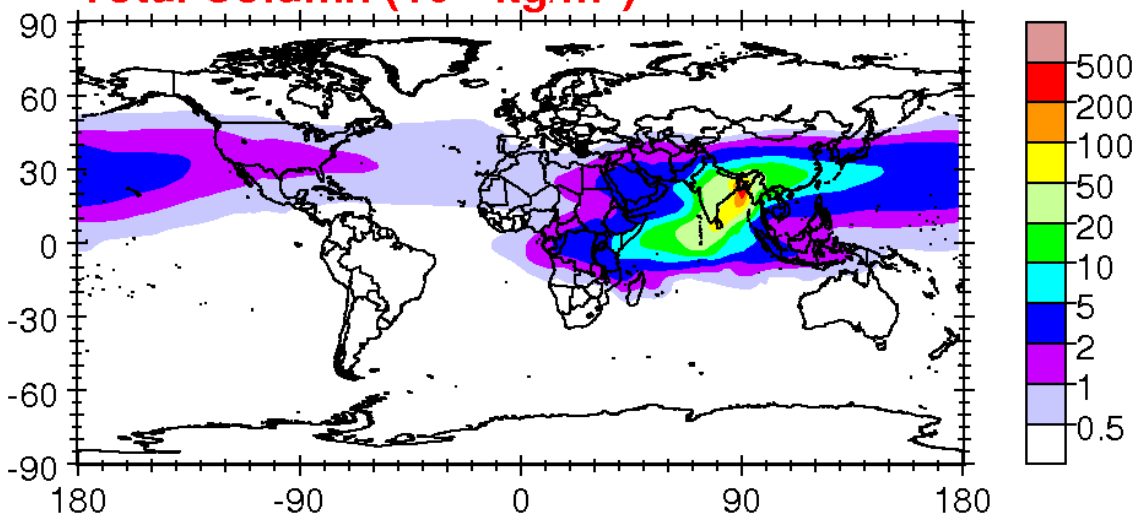




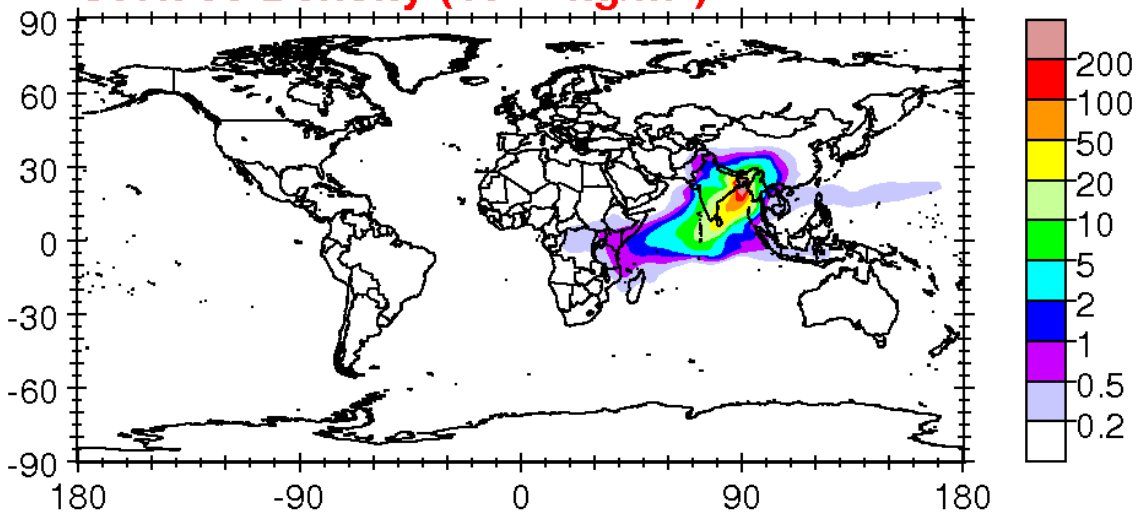
Dhaka, Bangladesh

Tau = 10 d, Annual Mean 1995

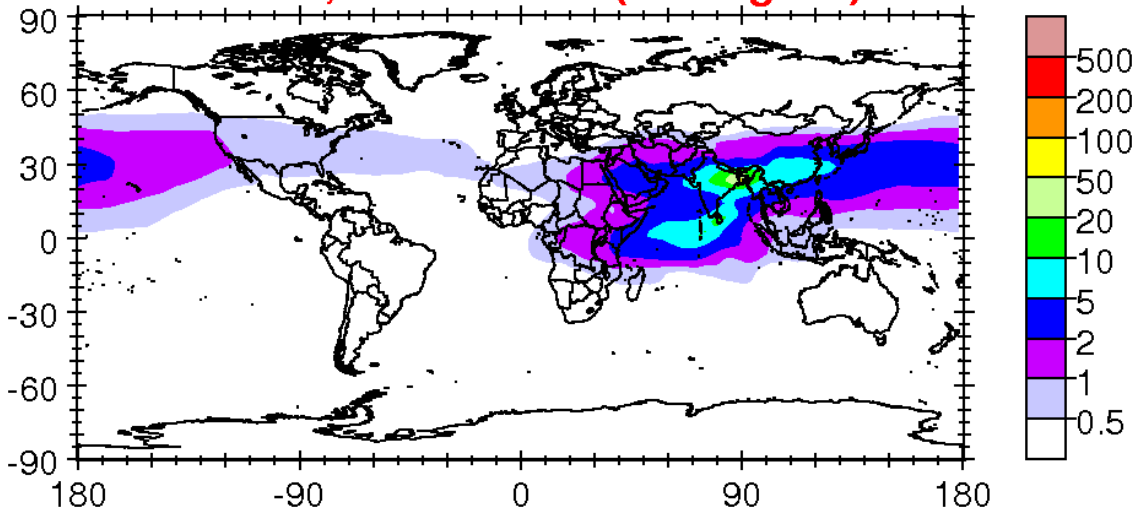
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

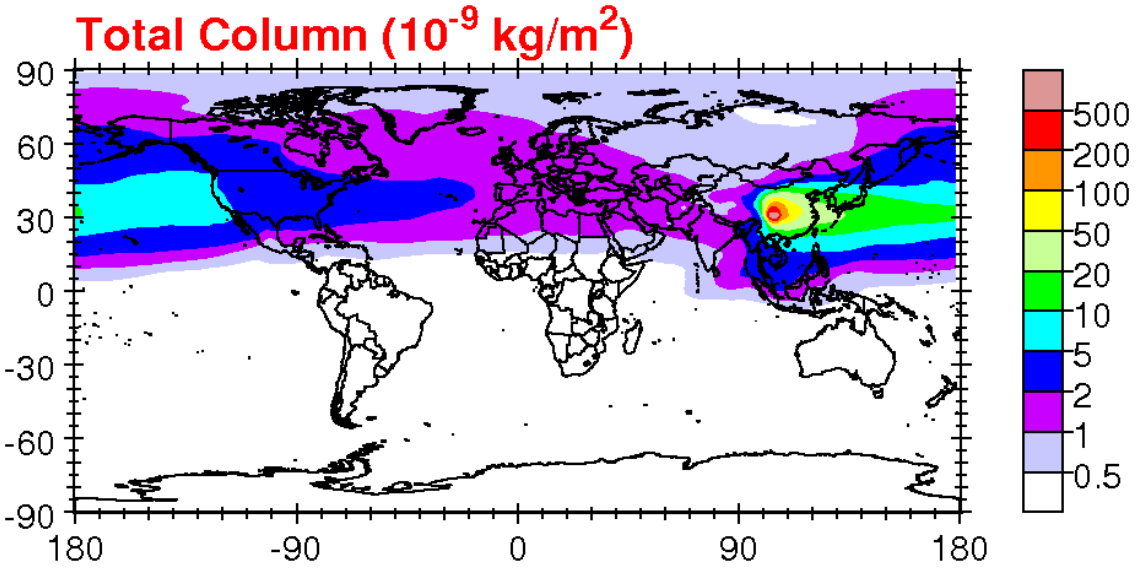


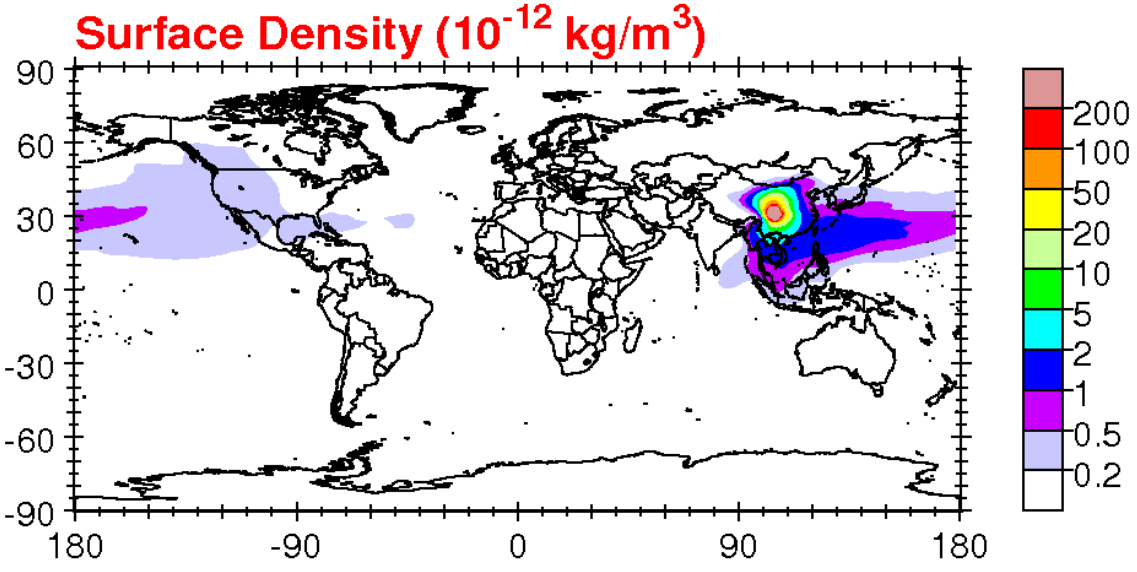
UT Column, above 5 km (10^{-9} kg/m^2)

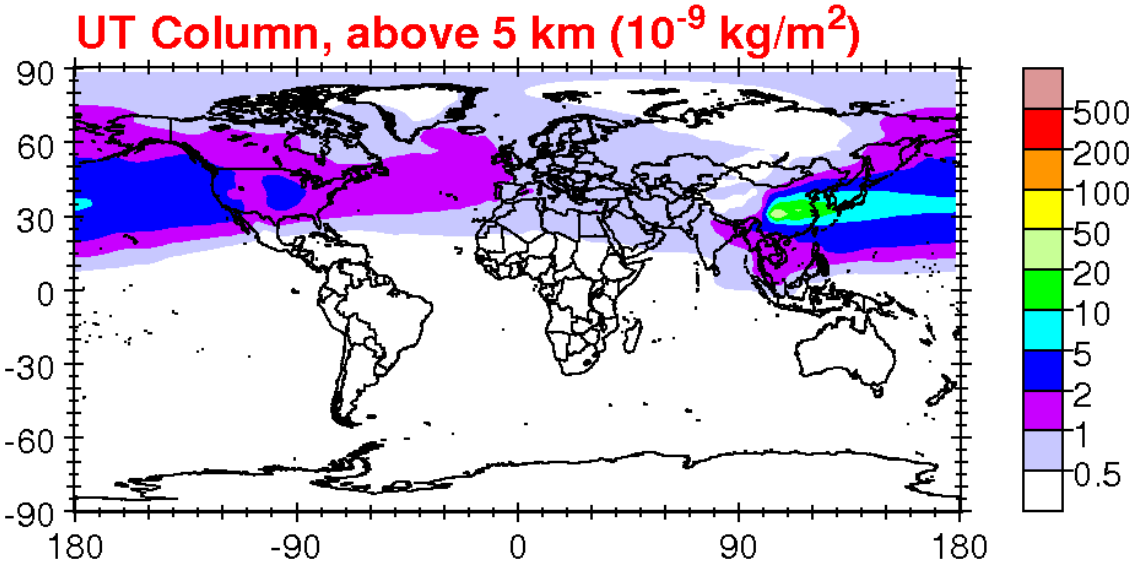


Szechuan Basin, China

Tau = 10 d, Annual Mean 1995



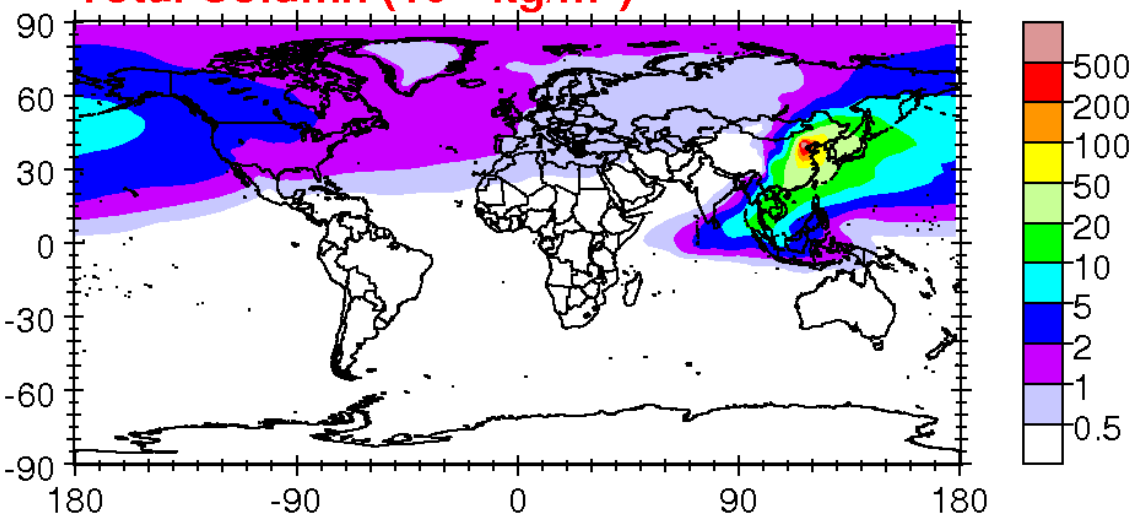




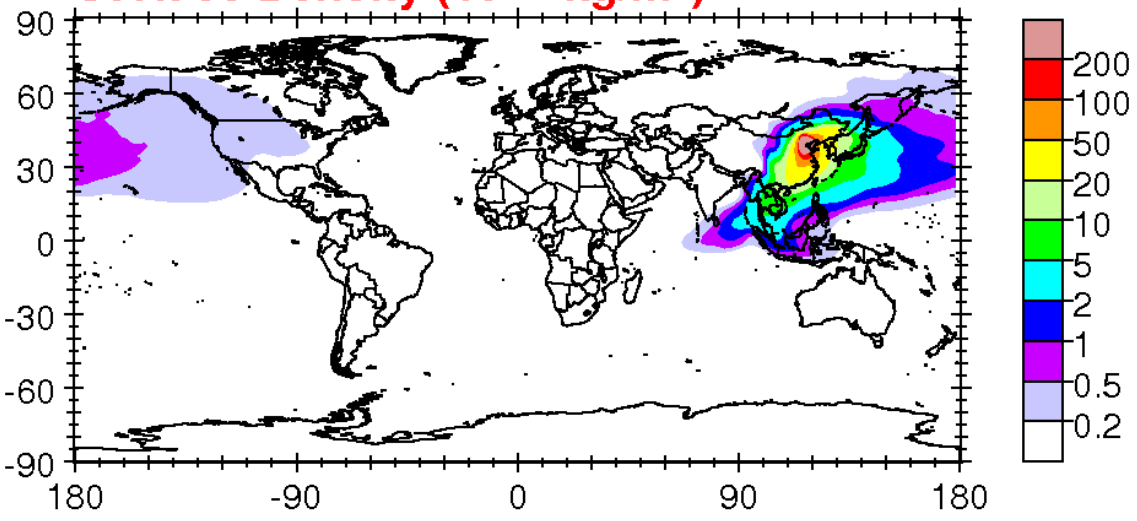
Beijing, China

Tau = 10 d, Annual Mean 1995

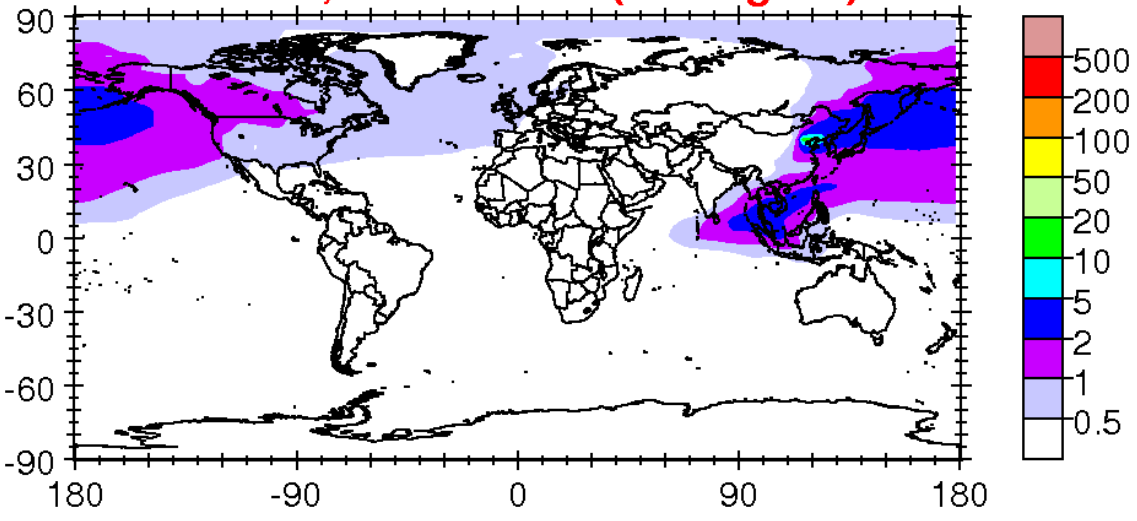
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



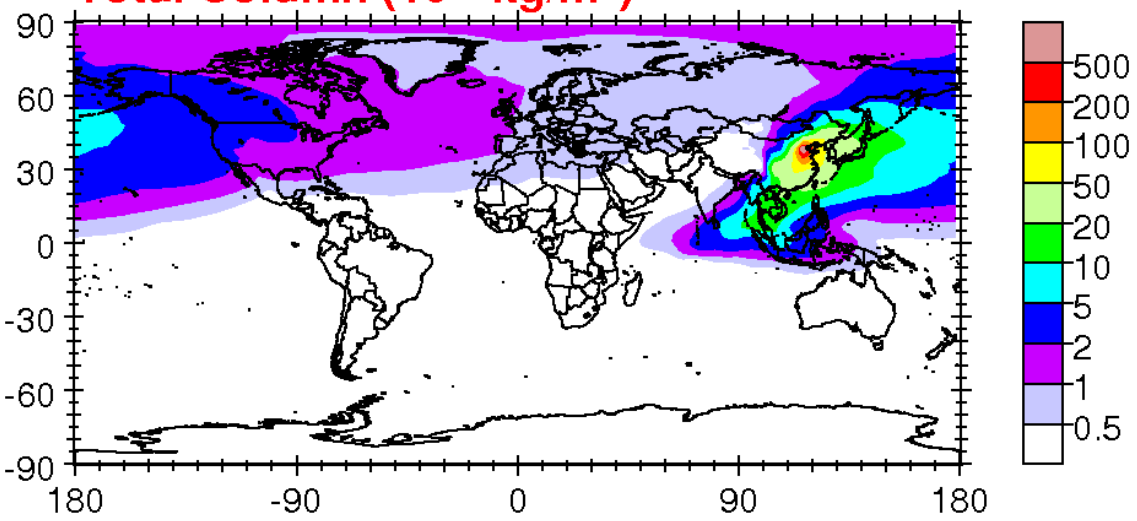
UT Column, above 5 km (10^{-9} kg/m^2)



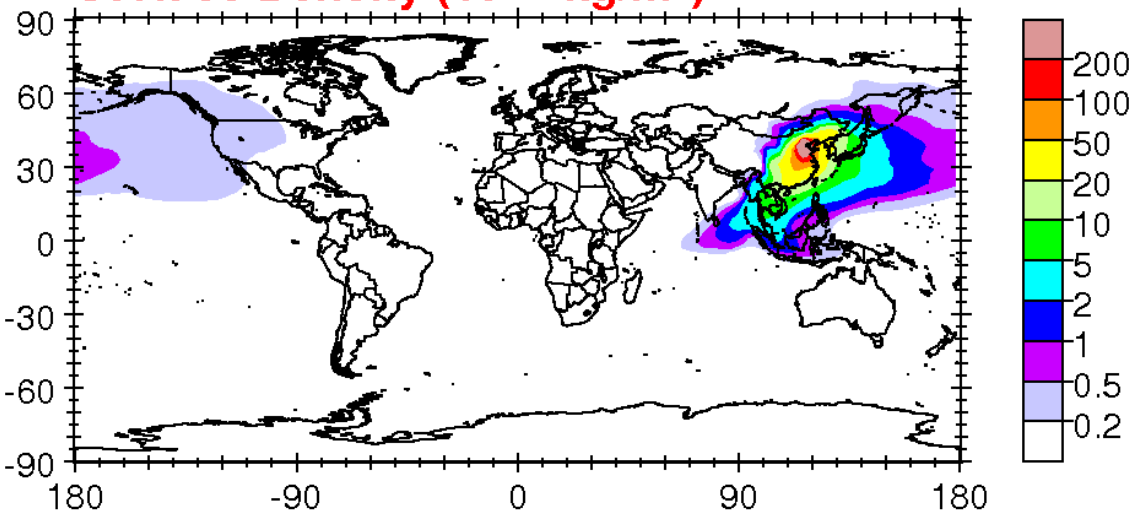
Tianjin, China

Tau = 10 d, Annual Mean 1995

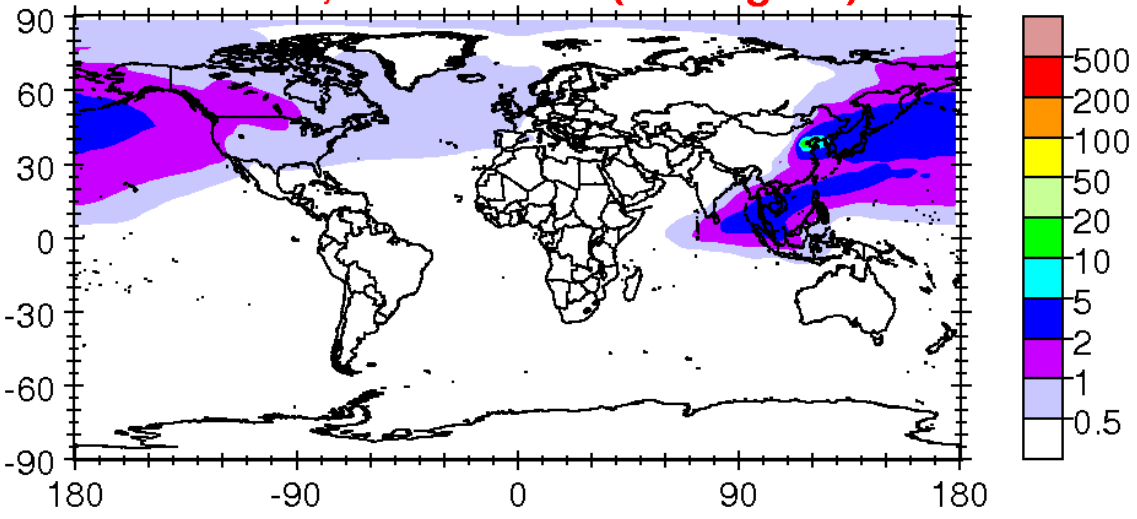
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

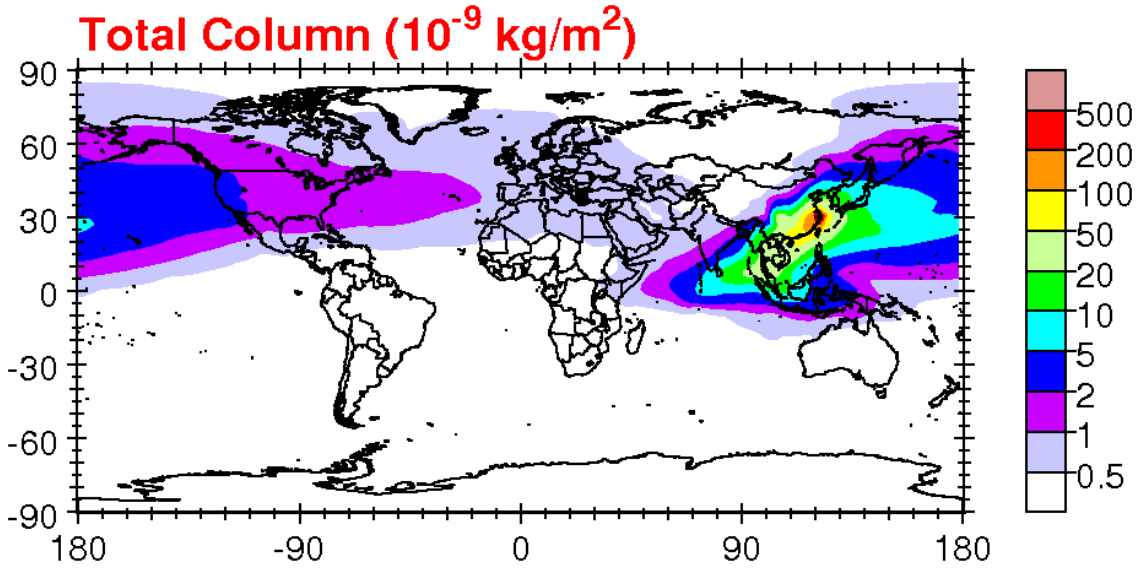


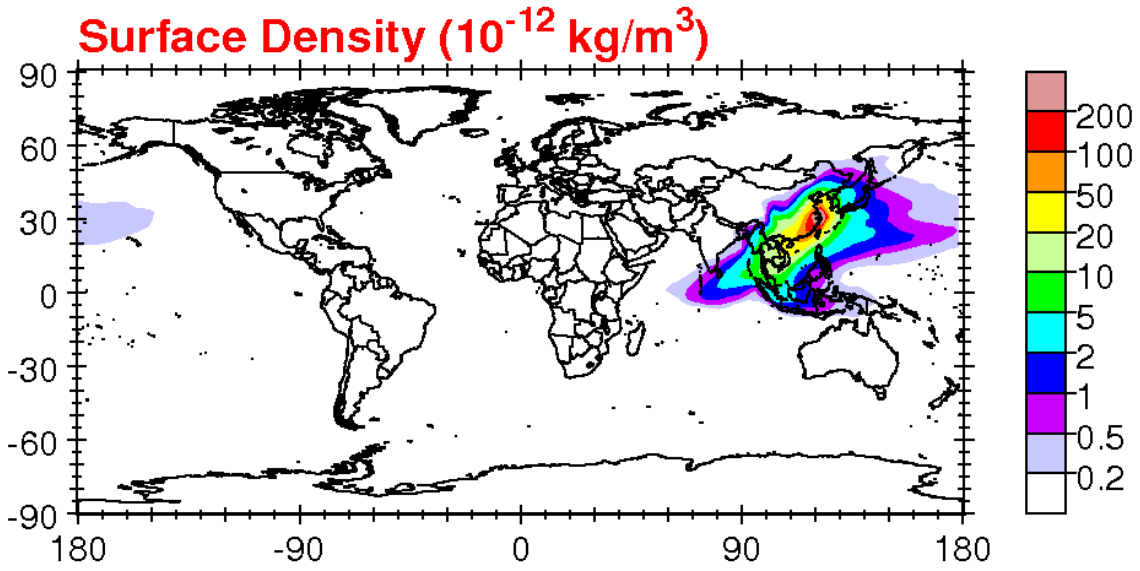
UT Column, above 5 km (10^{-9} kg/m^2)

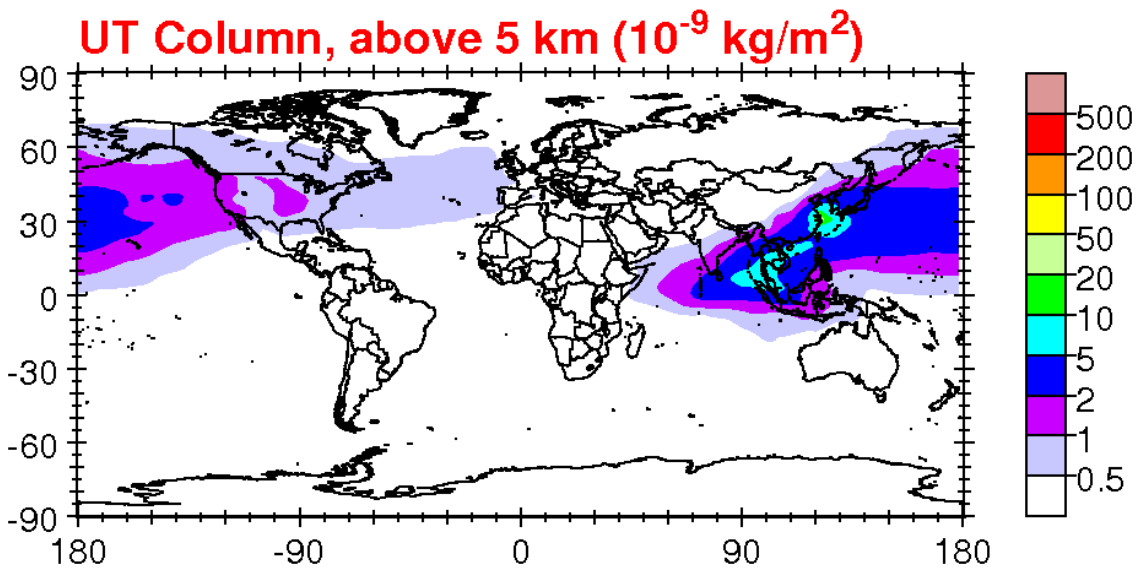


Shanghai, China

Tau = 10 d, Annual Mean 1995

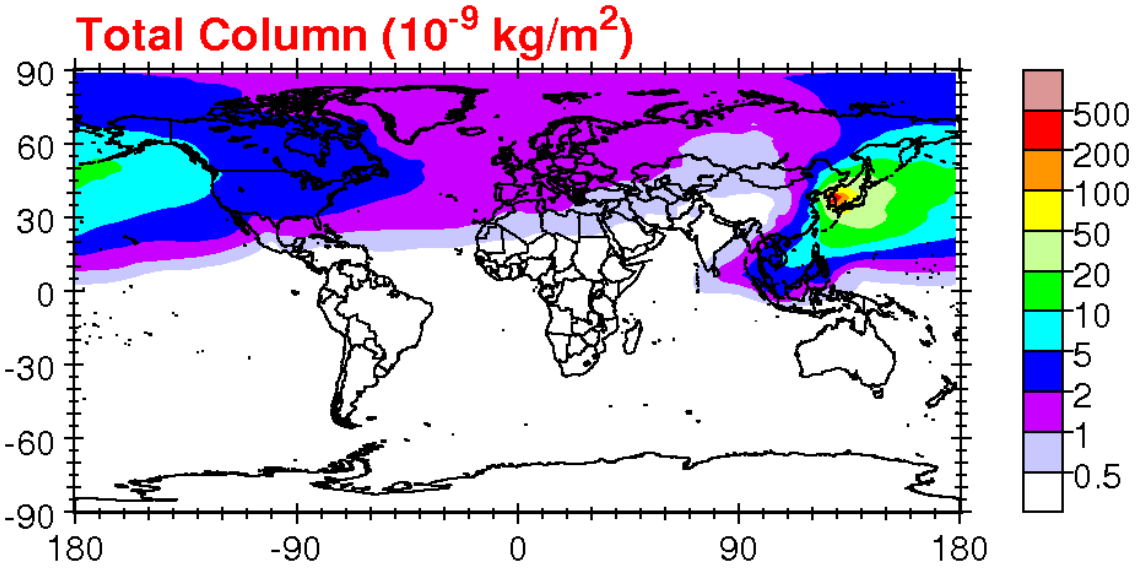


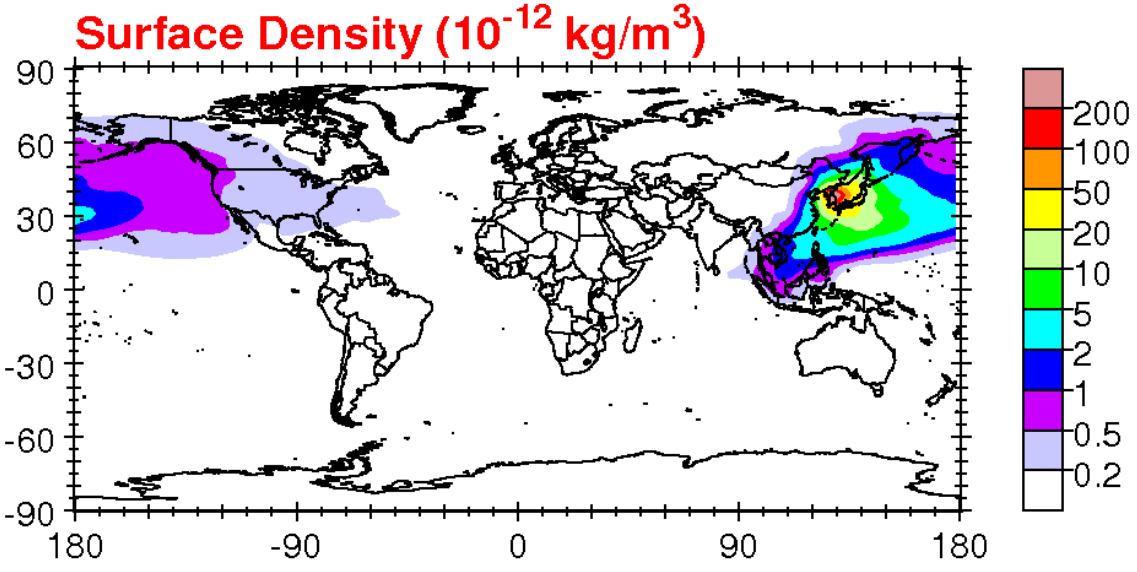


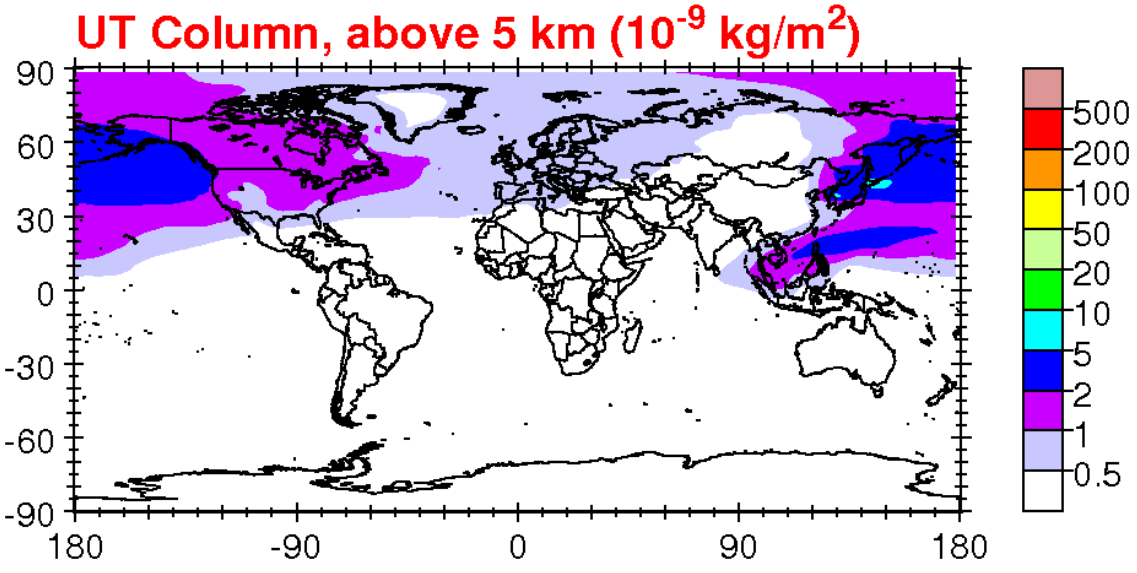


Seoul, Korea

Tau = 10 d, Annual Mean 1995



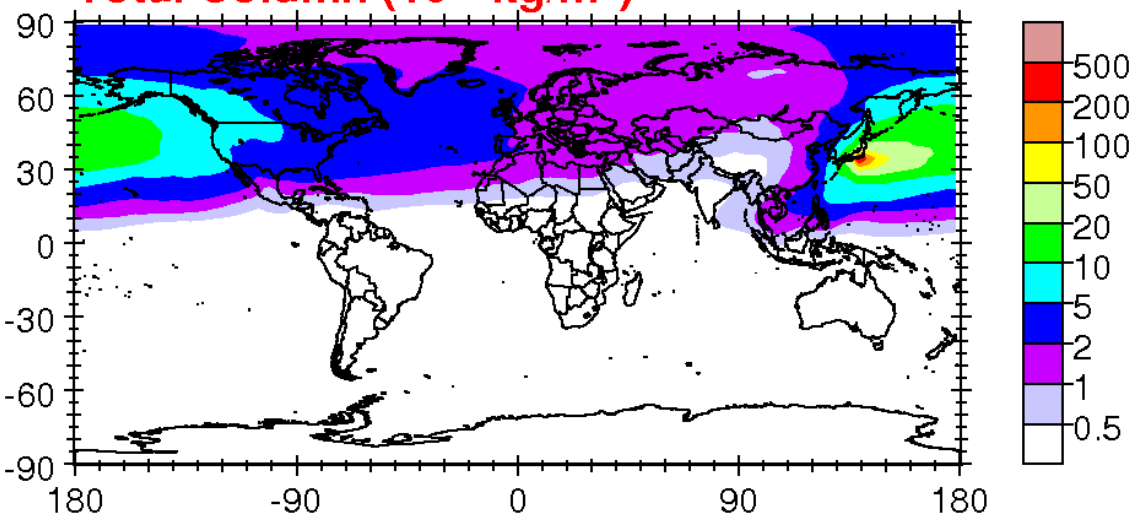




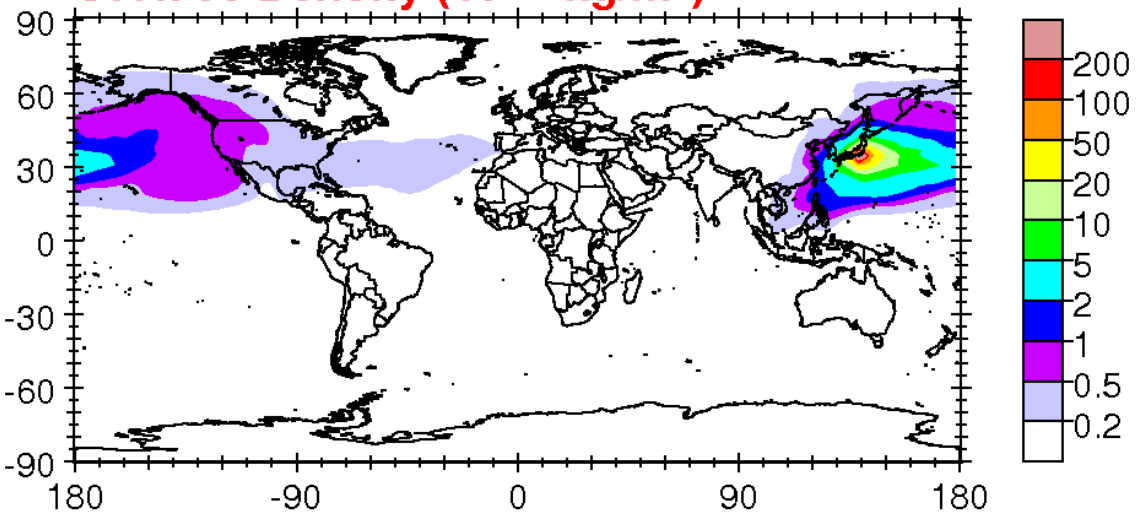
Tokyo, Japan

Tau = 10 d, Annual Mean 1995

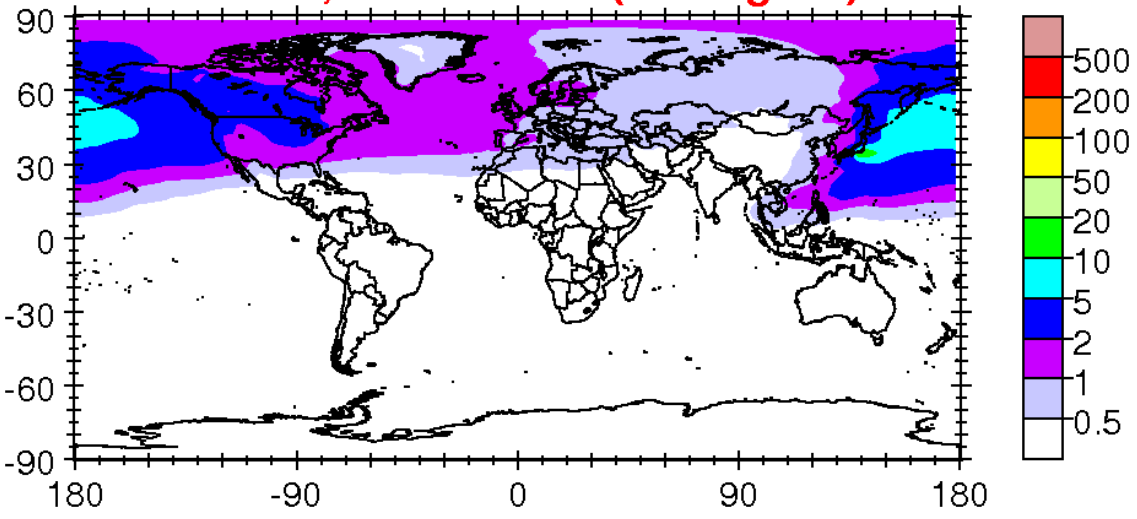
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



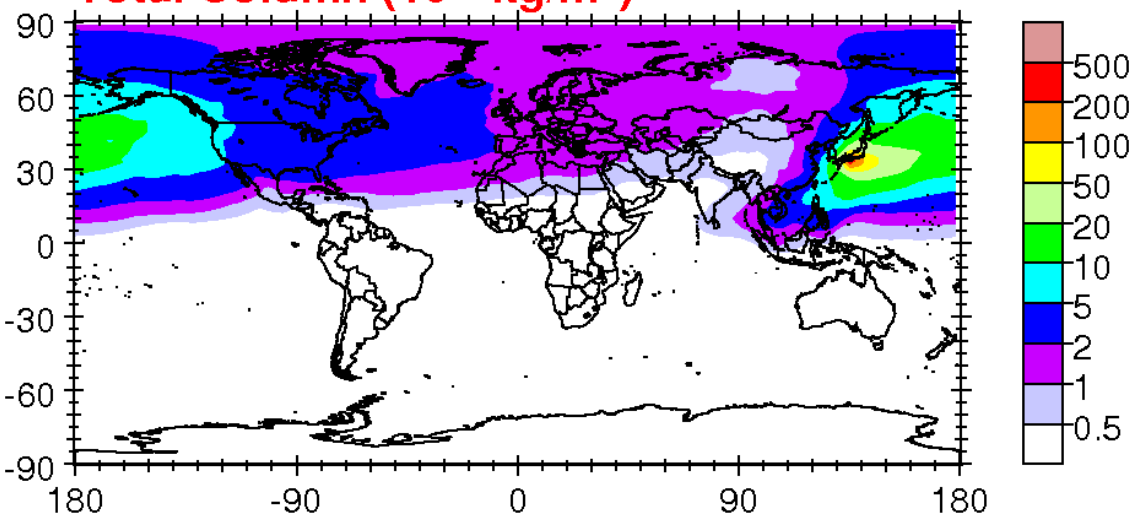
UT Column, above 5 km (10^{-9} kg/m^2)



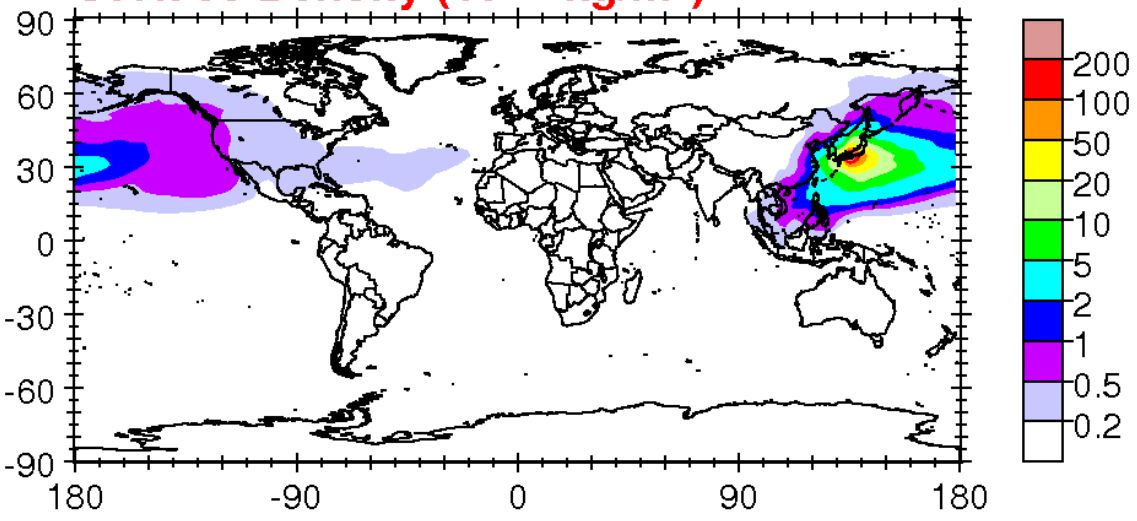
Osaka, Japan

Tau = 10 d, Annual Mean 1995

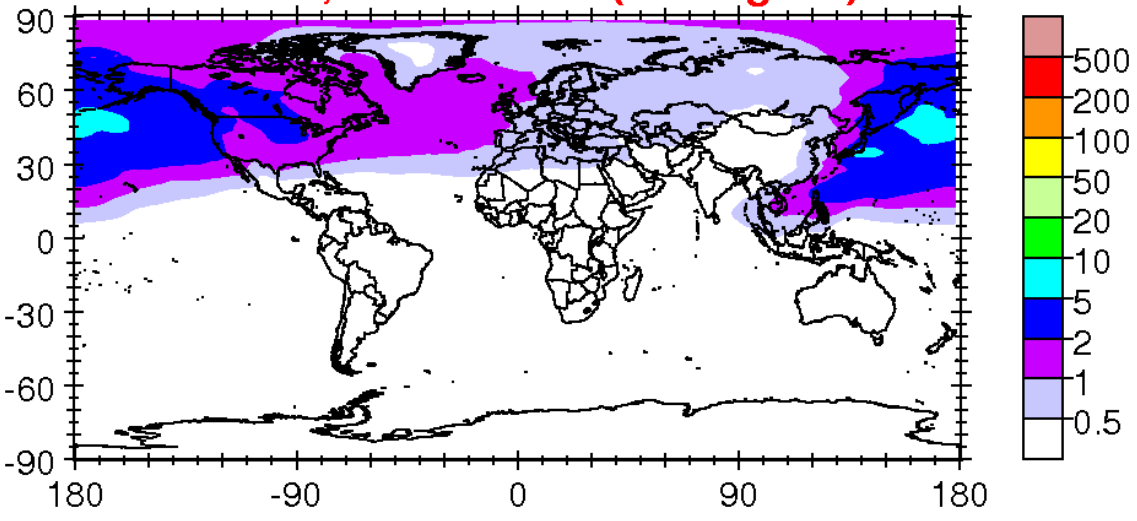
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



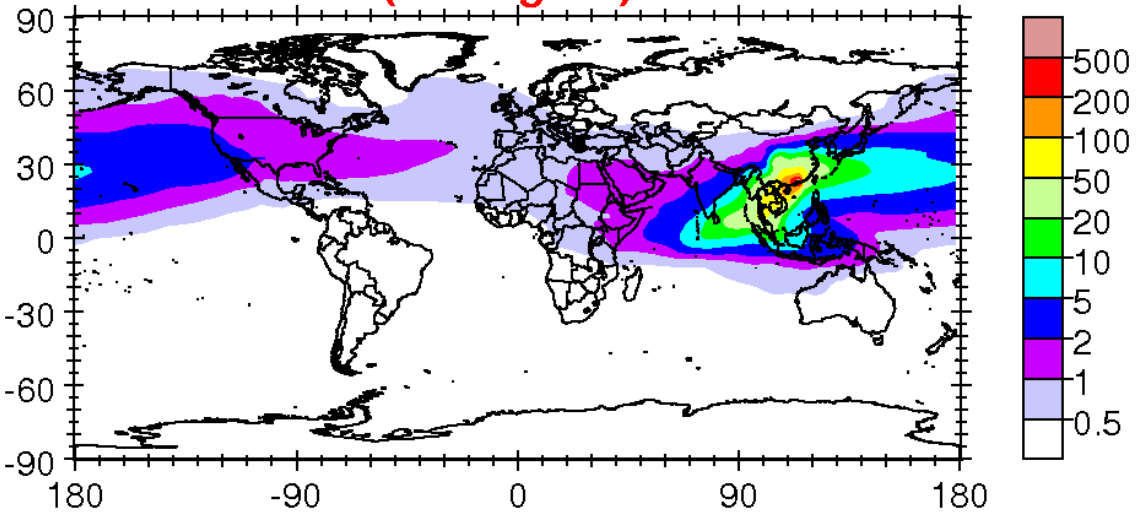
UT Column, above 5 km (10^{-9} kg/m^2)



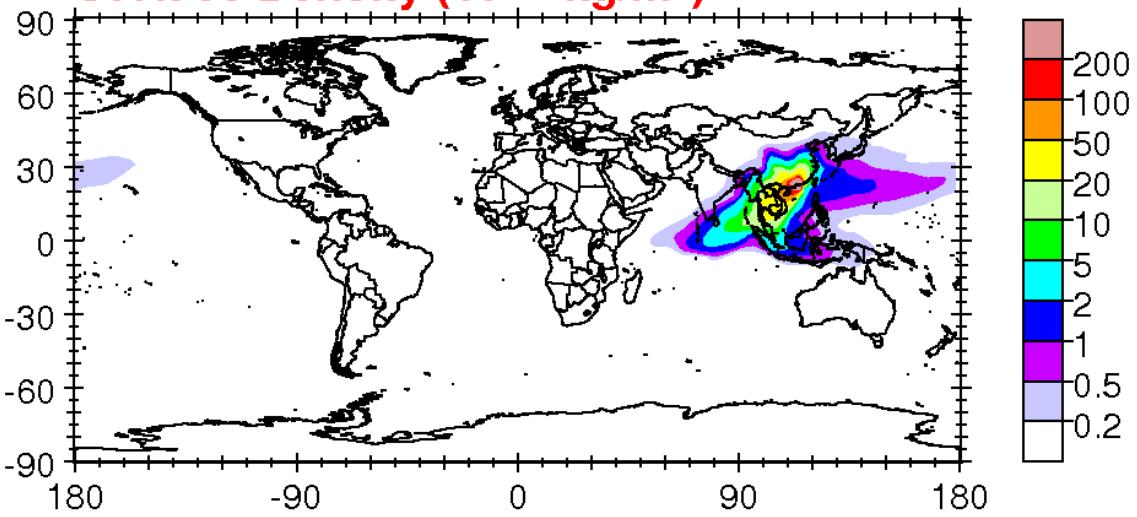
Hong Kong

Tau = 10 d, Annual Mean 1995

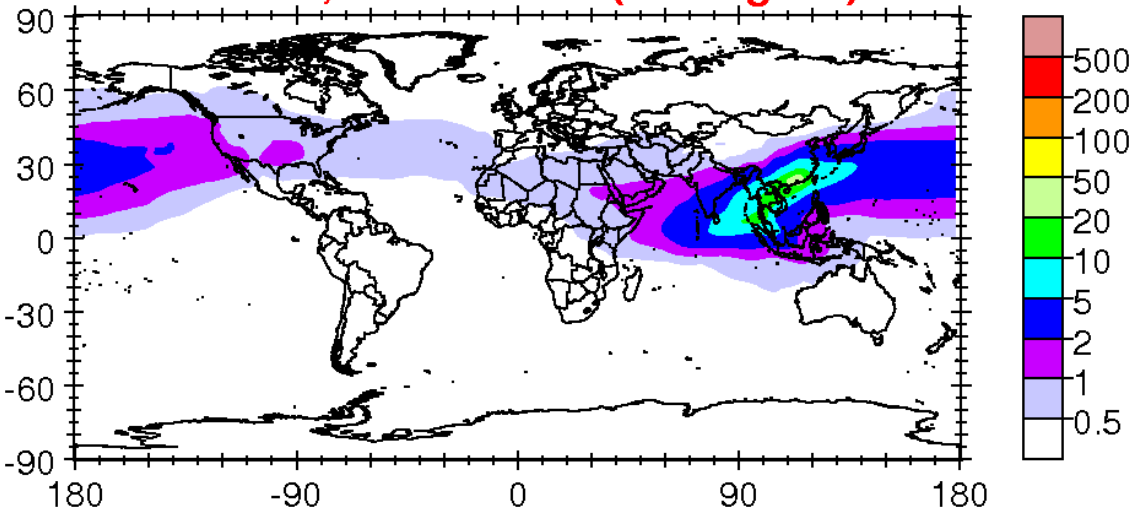
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

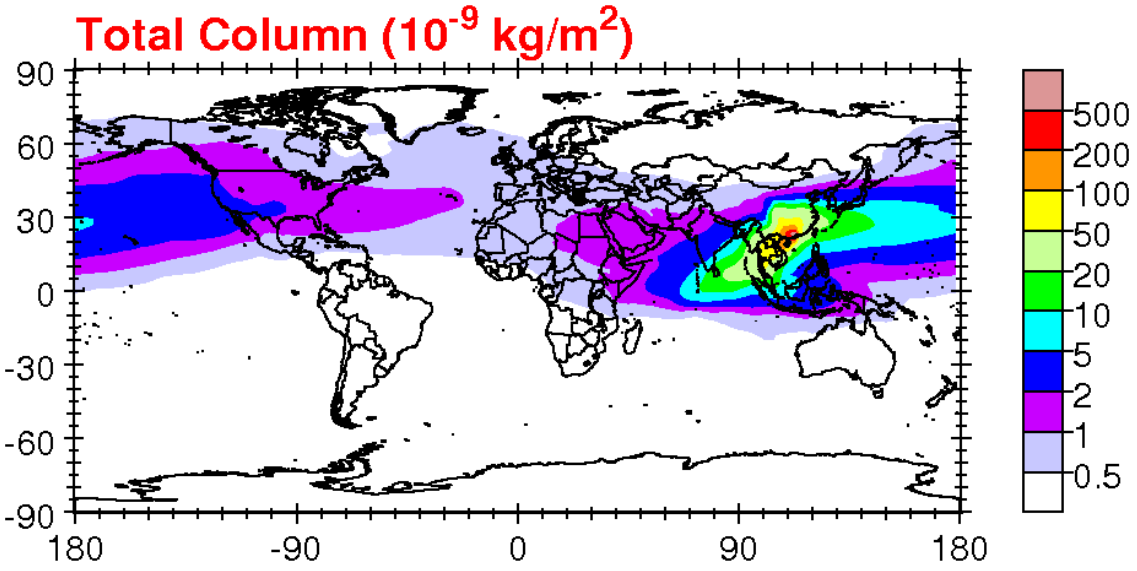


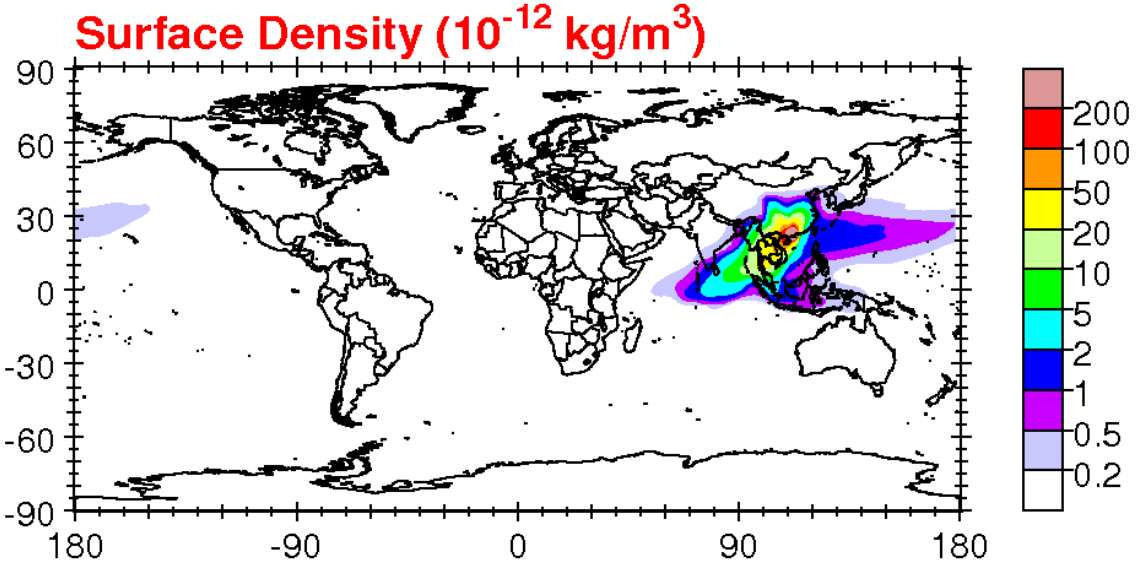
UT Column, above 5 km (10^{-9} kg/m^2)

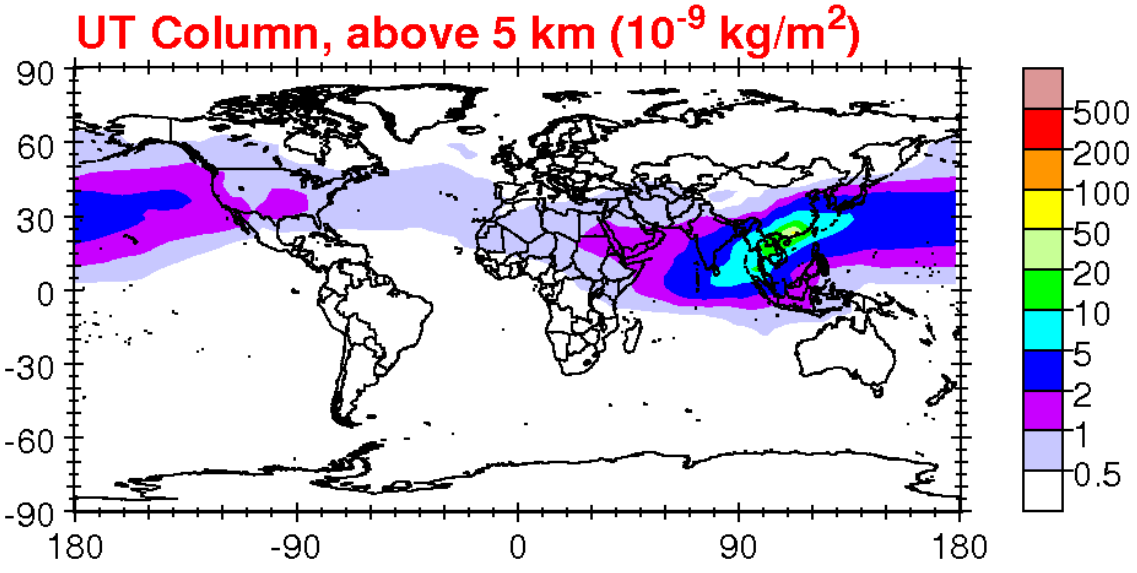


Pearl River Delta, China

Tau = 10 d, Annual Mean 1995



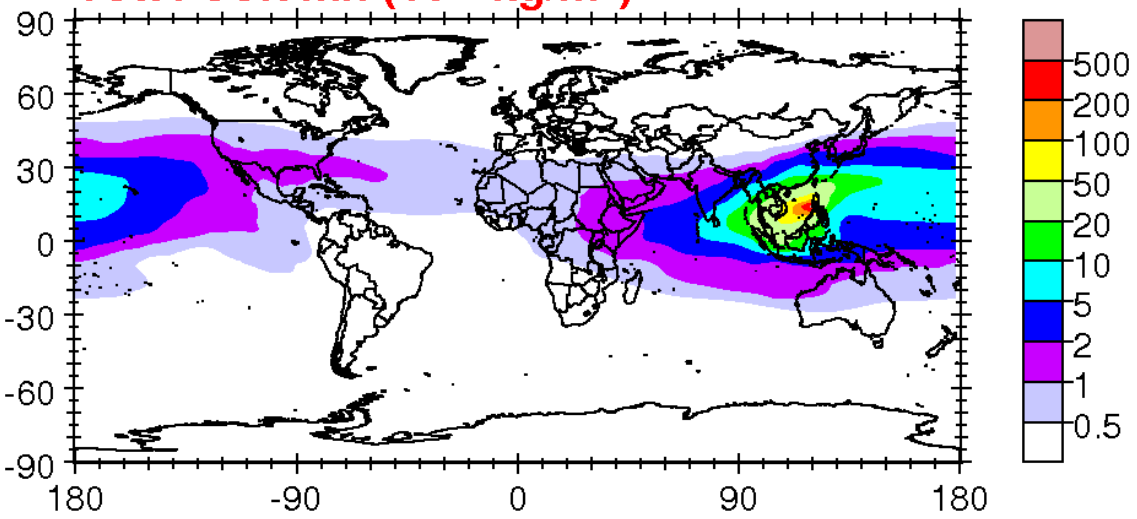




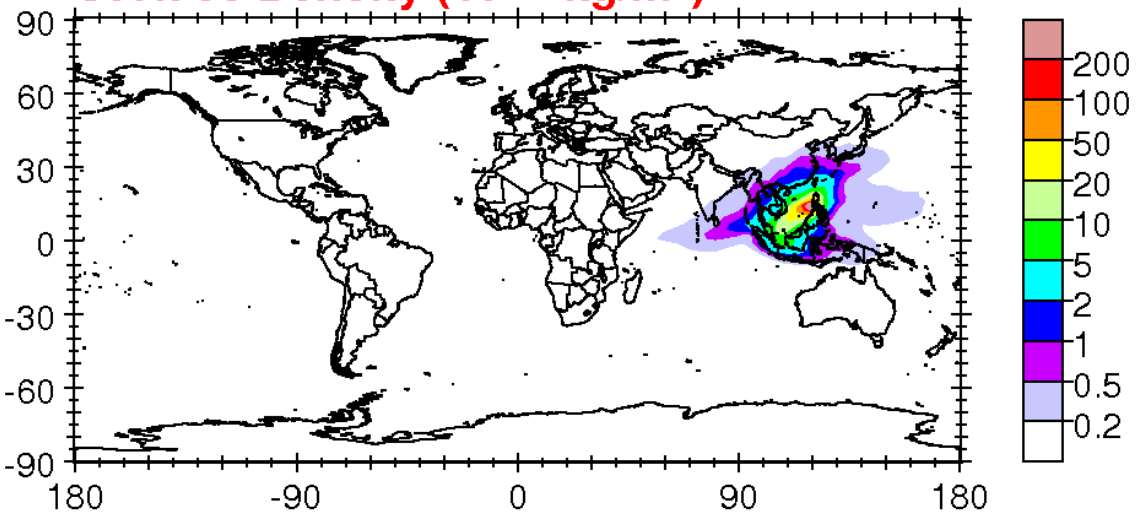
Manila, Philippines

Tau = 10 d, Annual Mean 1995

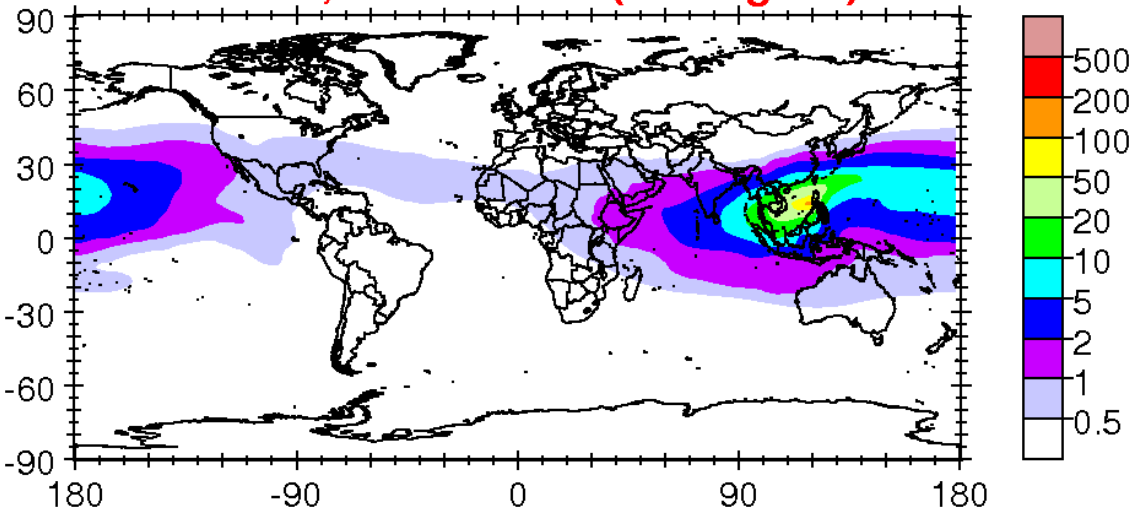
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



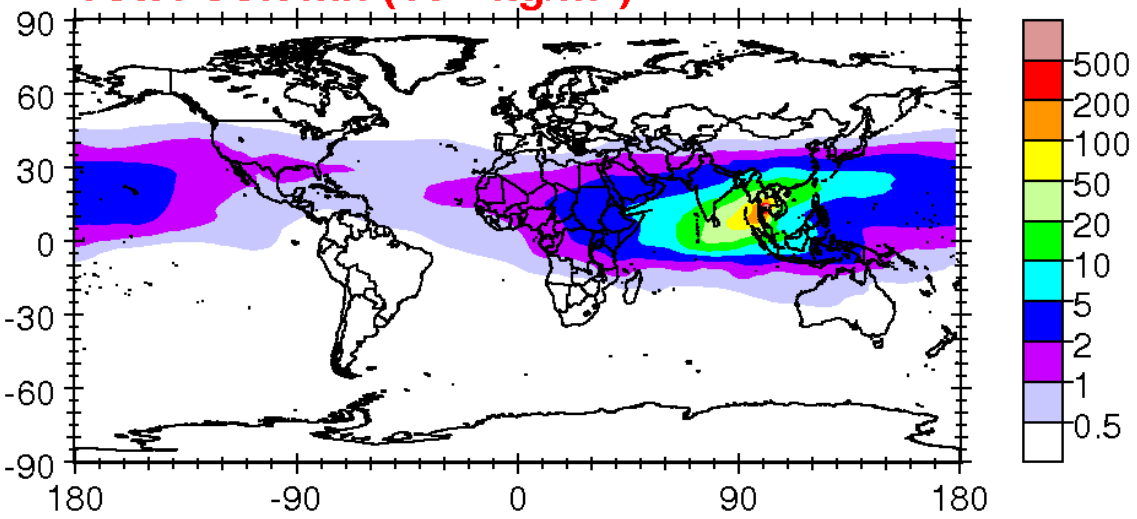
UT Column, above 5 km (10^{-9} kg/m^2)



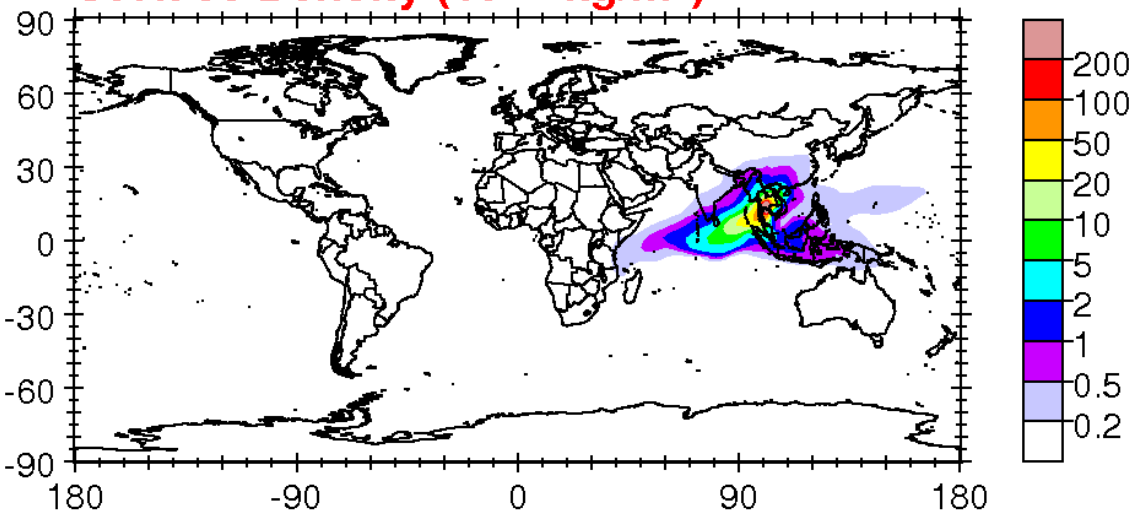
Bangkok, Thailand

Tau = 10 d, Annual Mean 1995

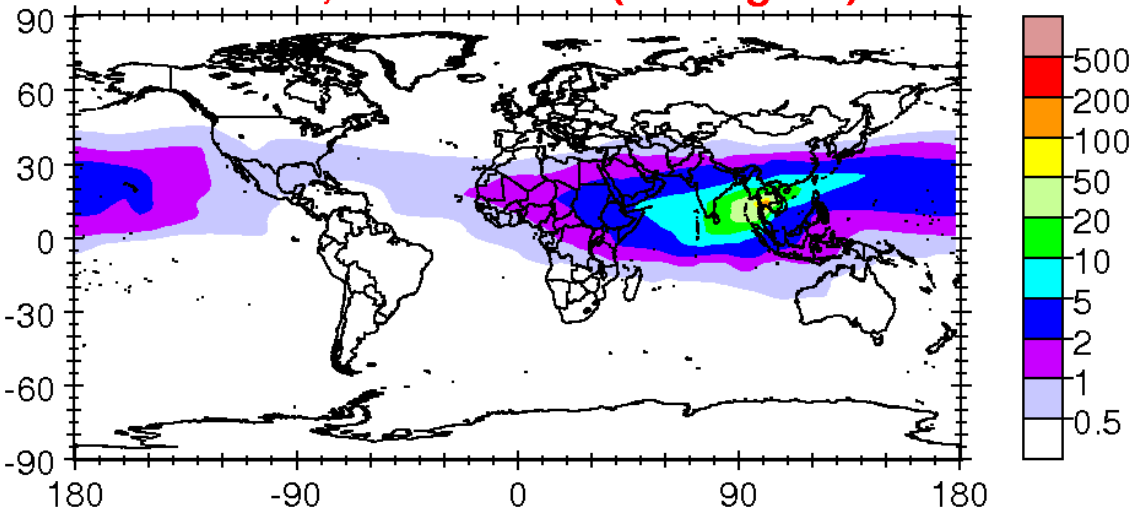
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



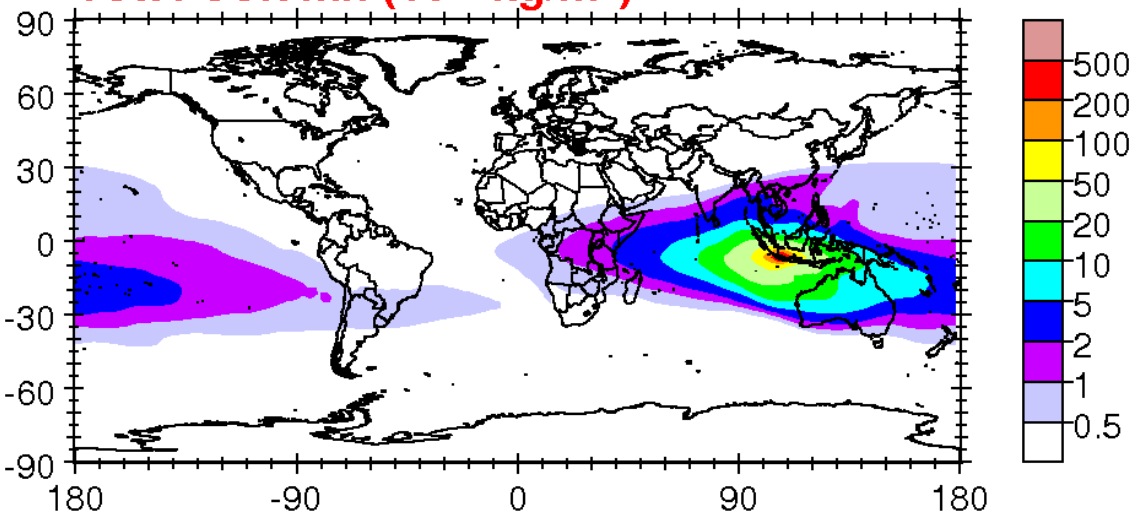
UT Column, above 5 km (10^{-9} kg/m^2)



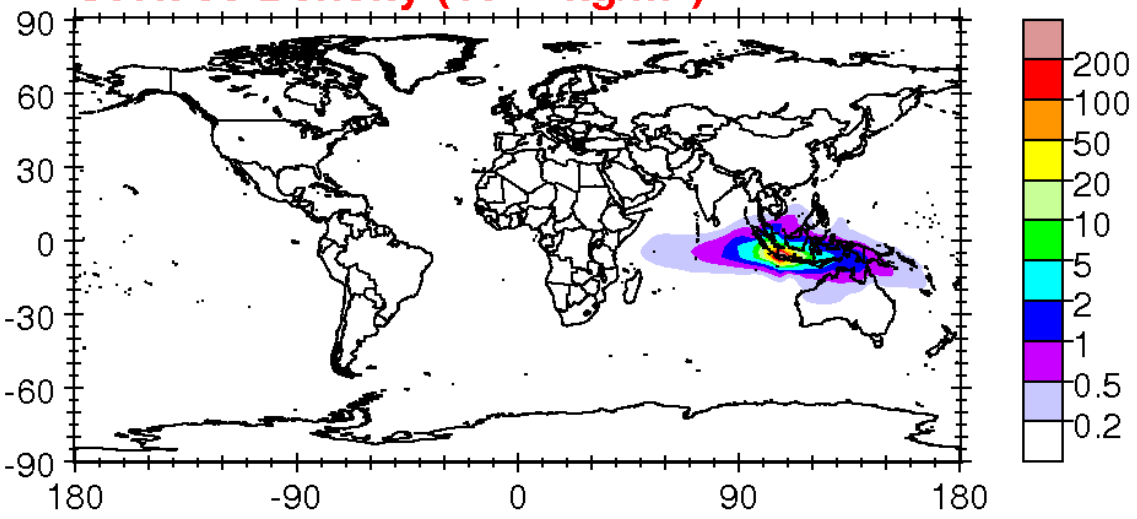
Jakarta, Indonesia

Tau = 10 d, Annual Mean 1995

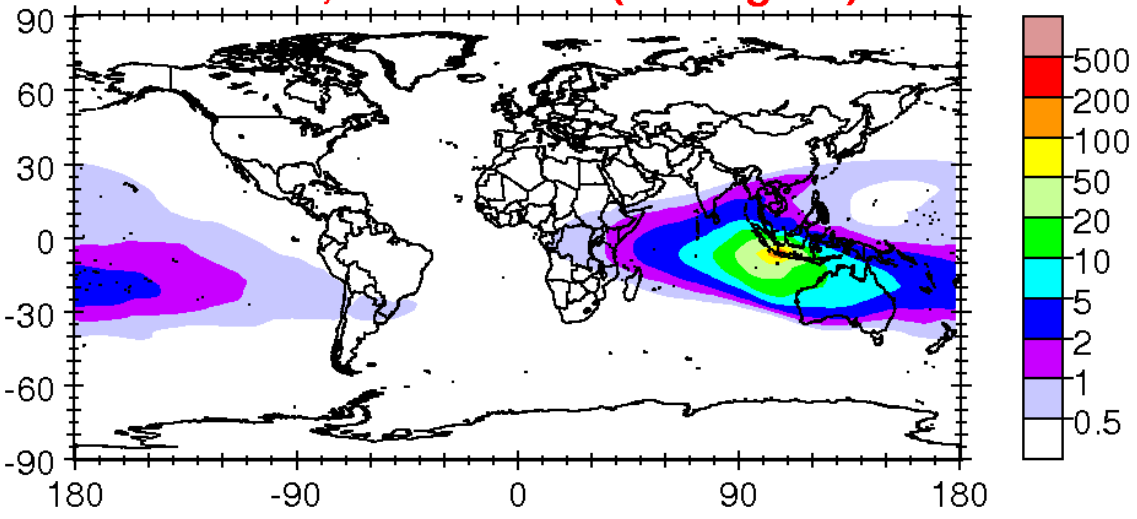
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



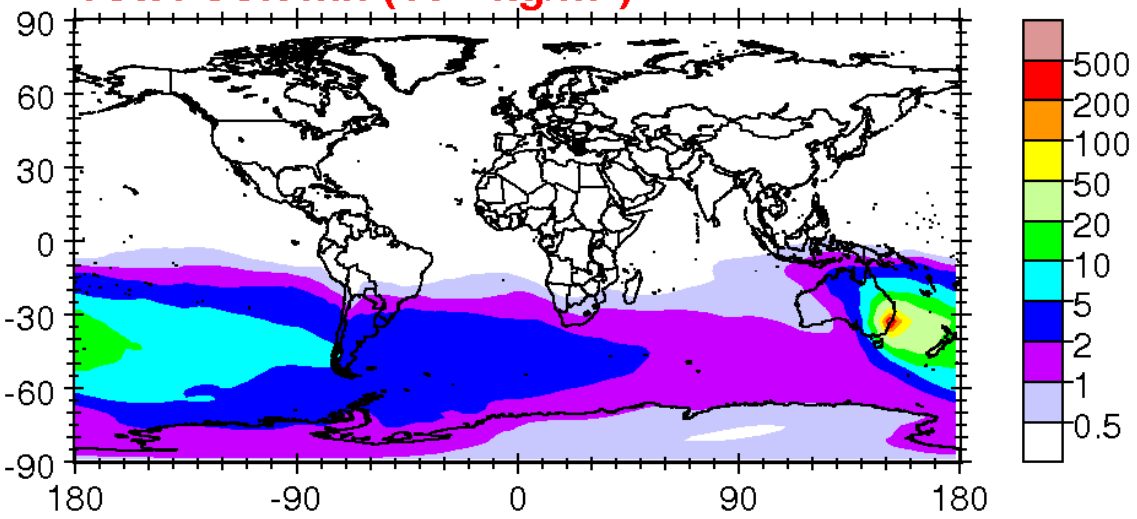
UT Column, above 5 km (10^{-9} kg/m^2)



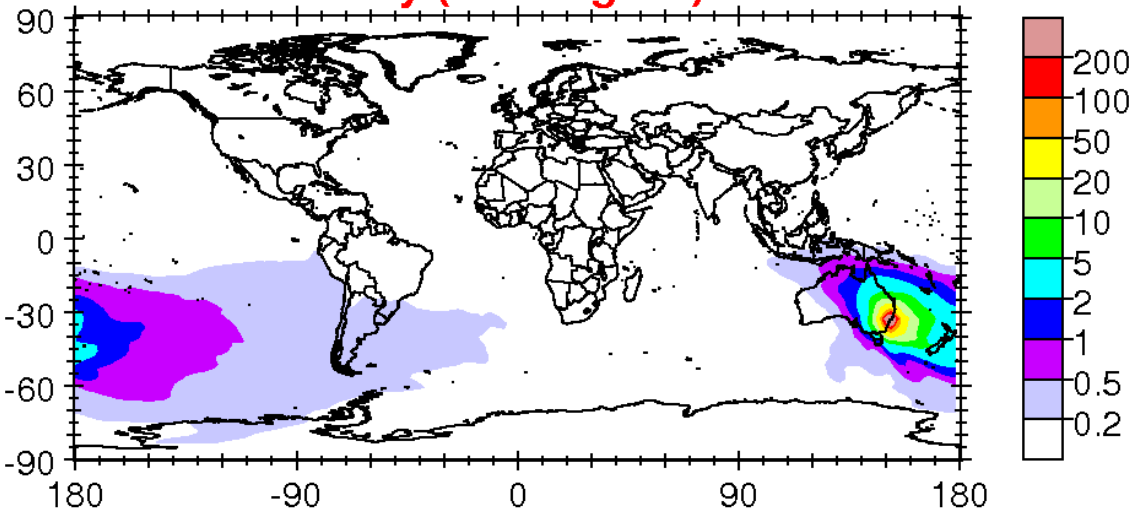
Sydney, Australia

Tau = 10 d, Annual Mean 1995

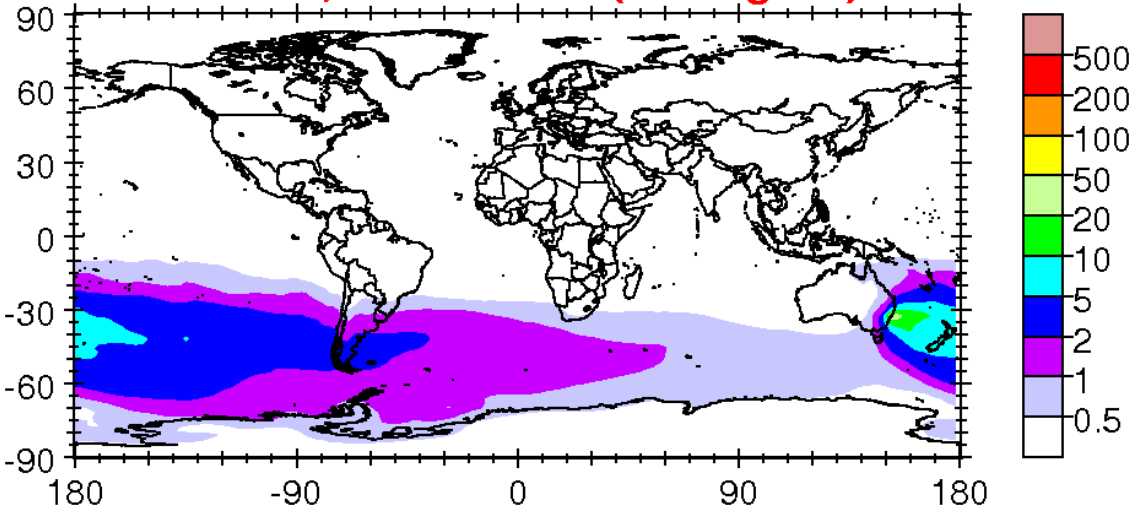
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



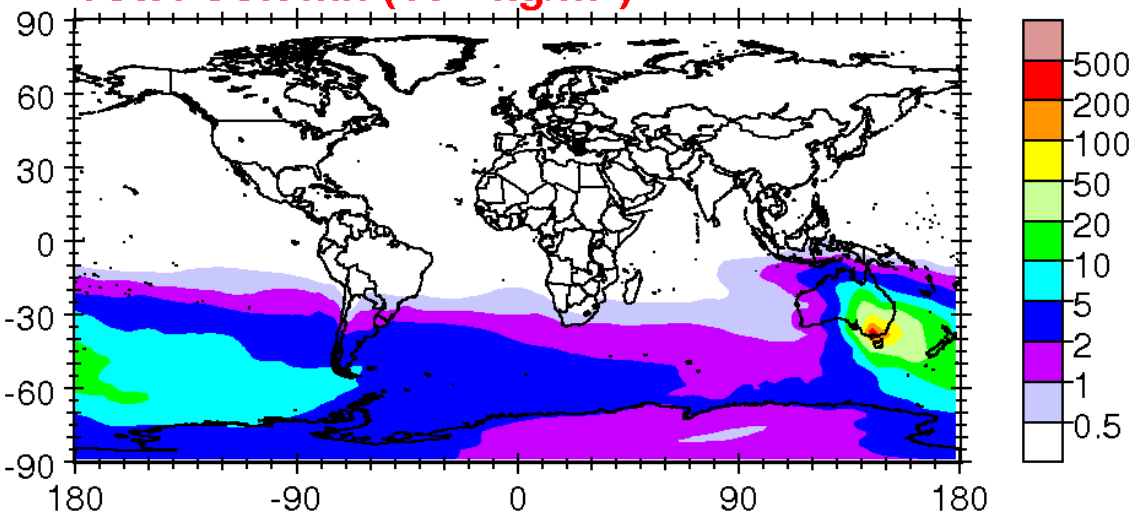
UT Column, above 5 km (10^{-9} kg/m^2)



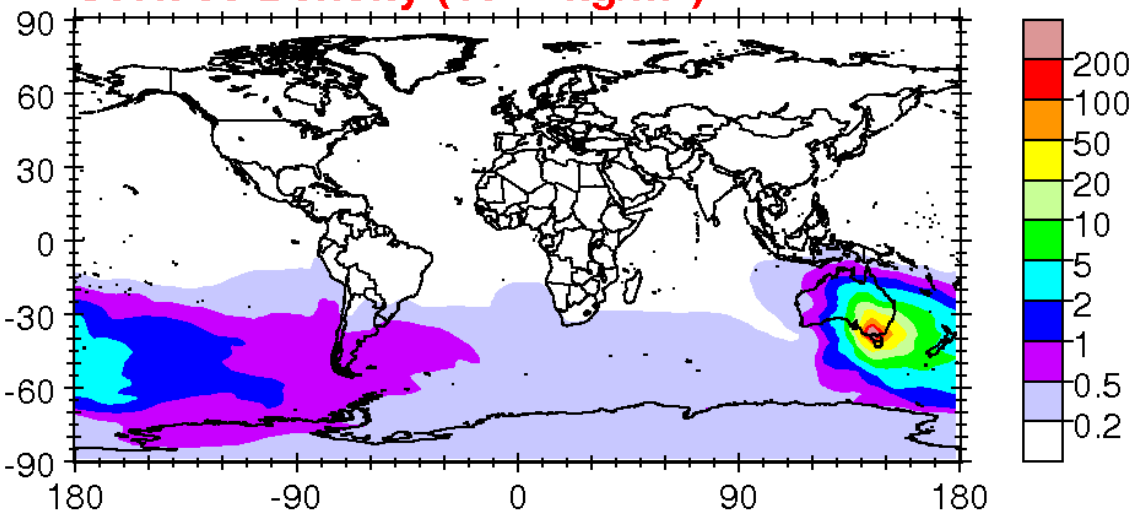
Melbourne, Australia

Tau = 10 d, Annual Mean 1995

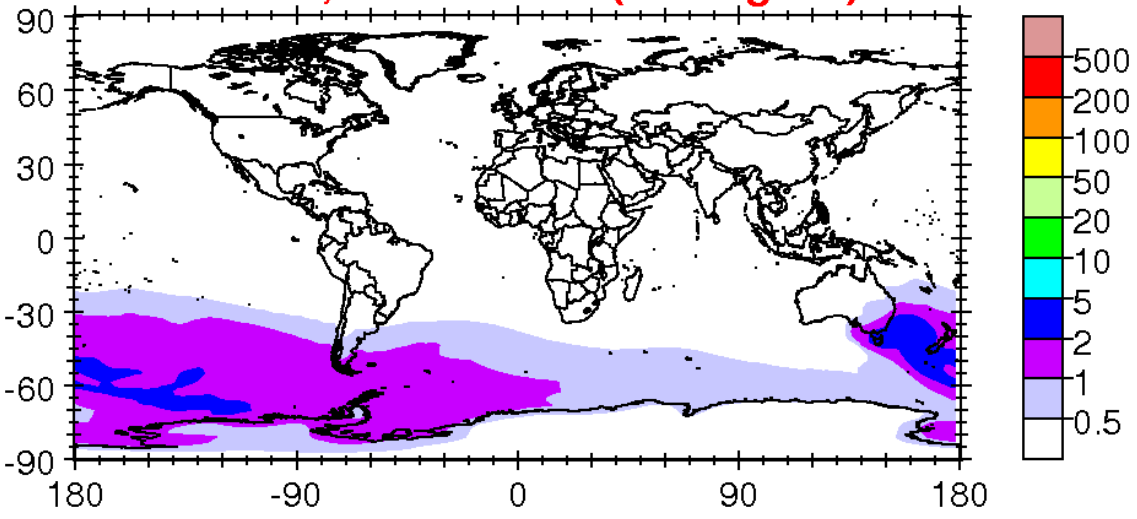
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



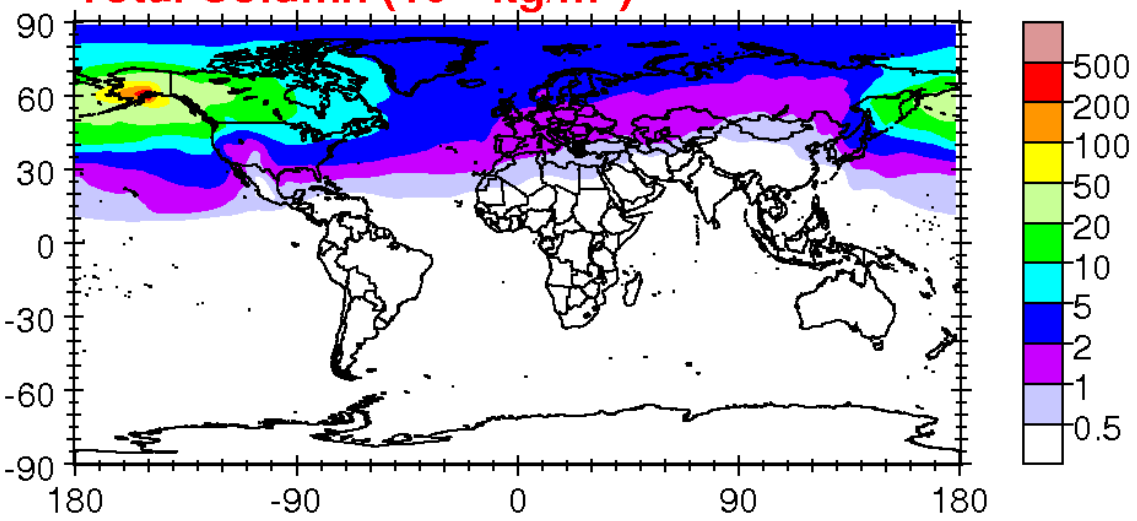
UT Column, above 5 km (10^{-9} kg/m^2)



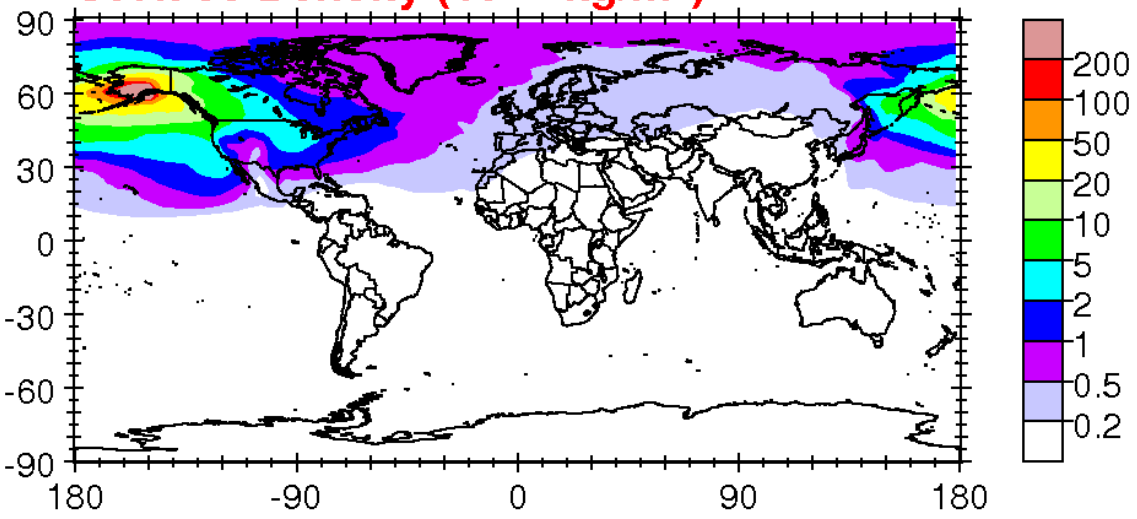
Anchorage, USA

Tau = 10 d, Annual Mean 1995

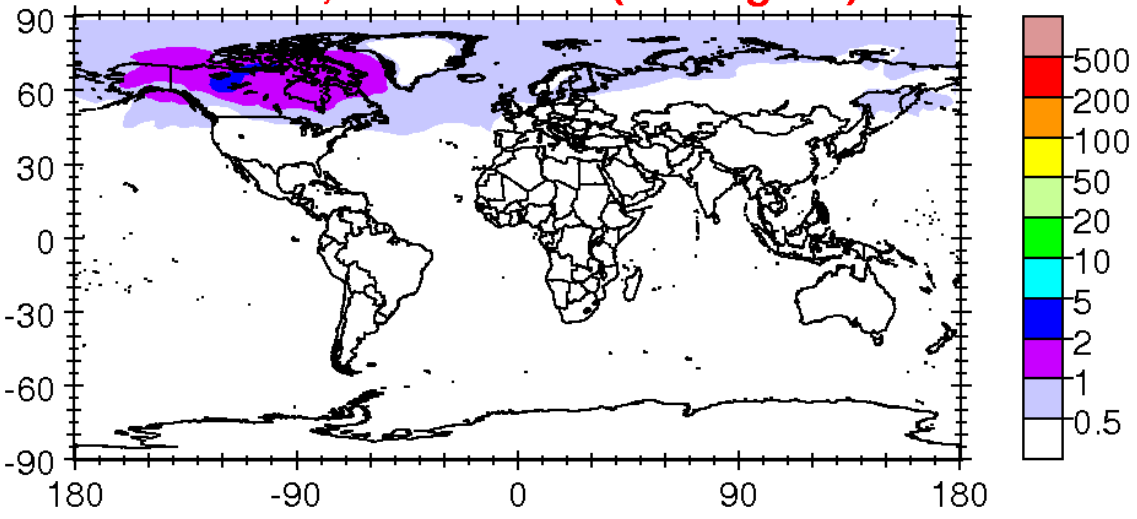
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



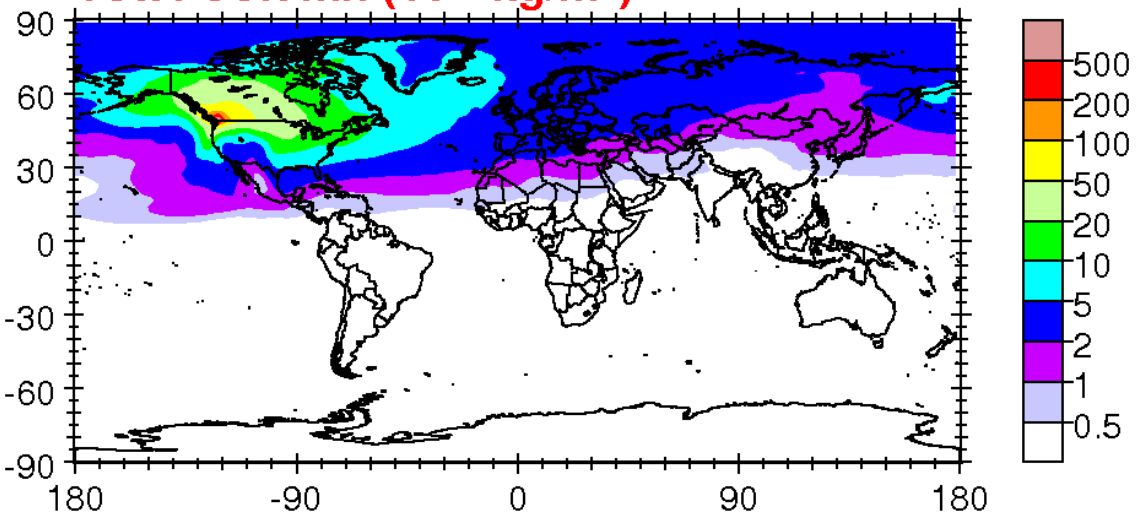
UT Column, above 5 km (10^{-9} kg/m^2)



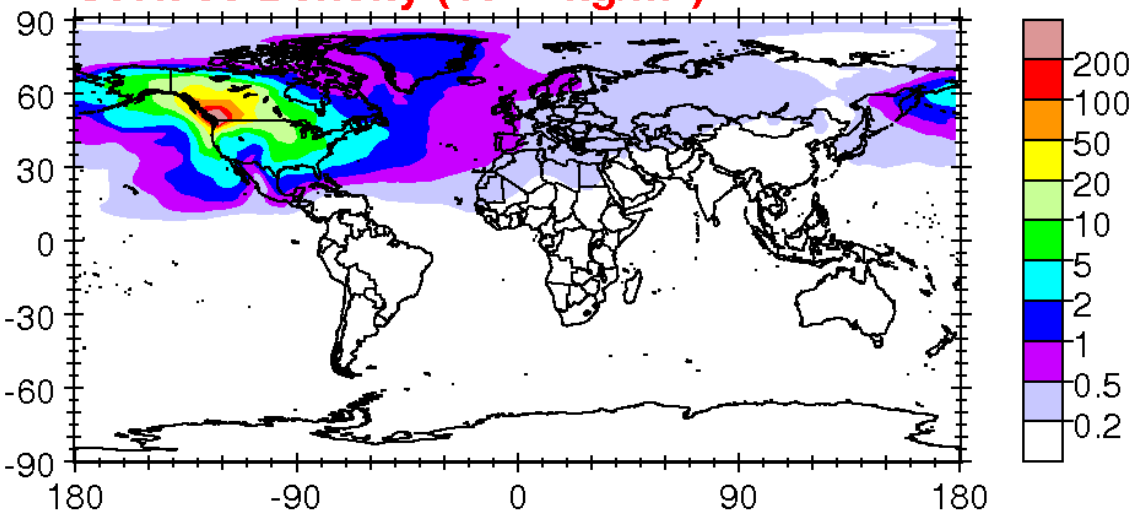
Seattle, USA + Vancouver, CA

Tau = 10 d, Annual Mean 1995

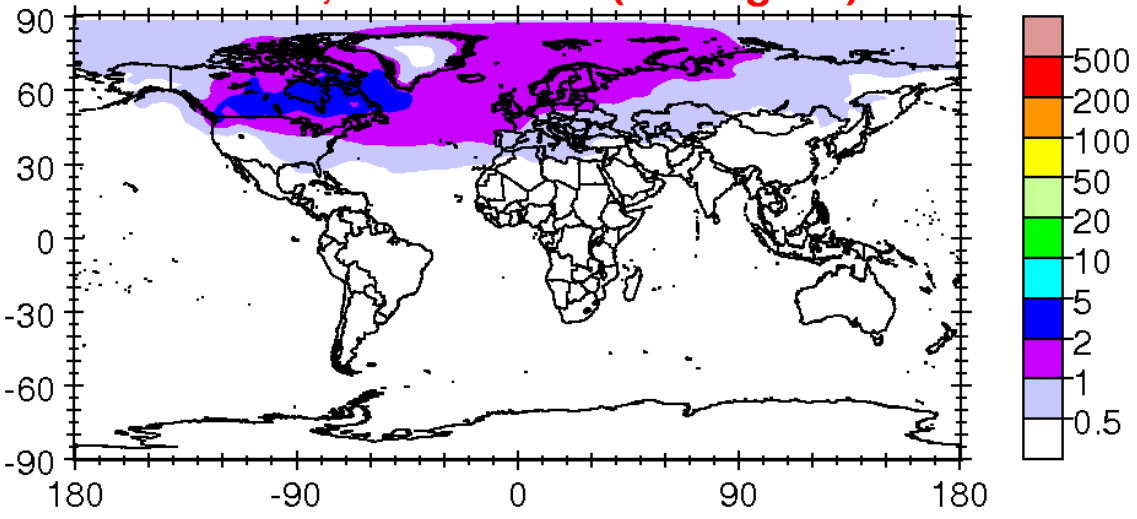
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

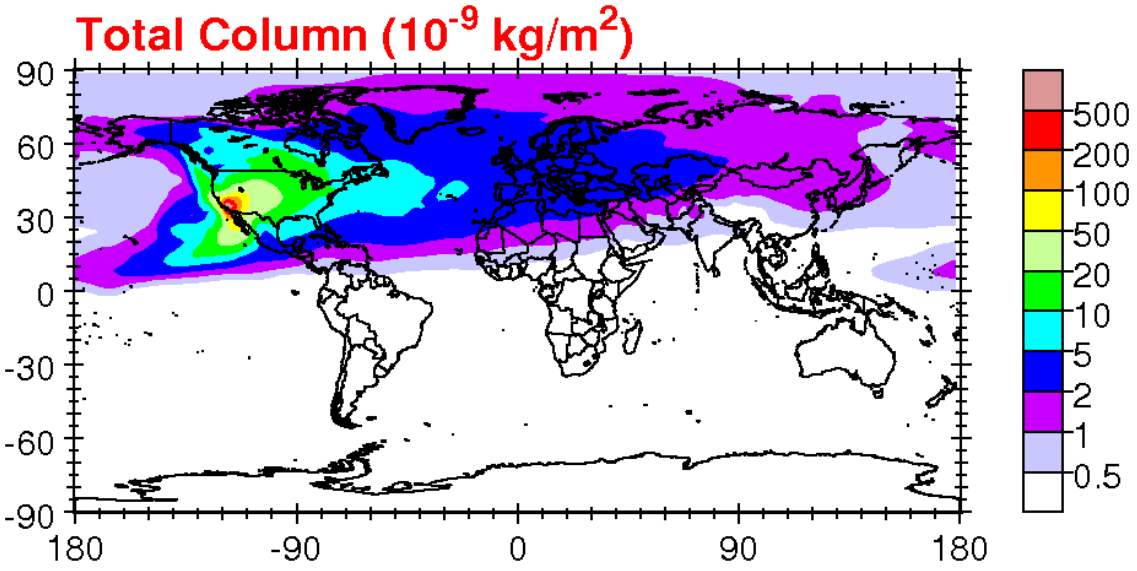


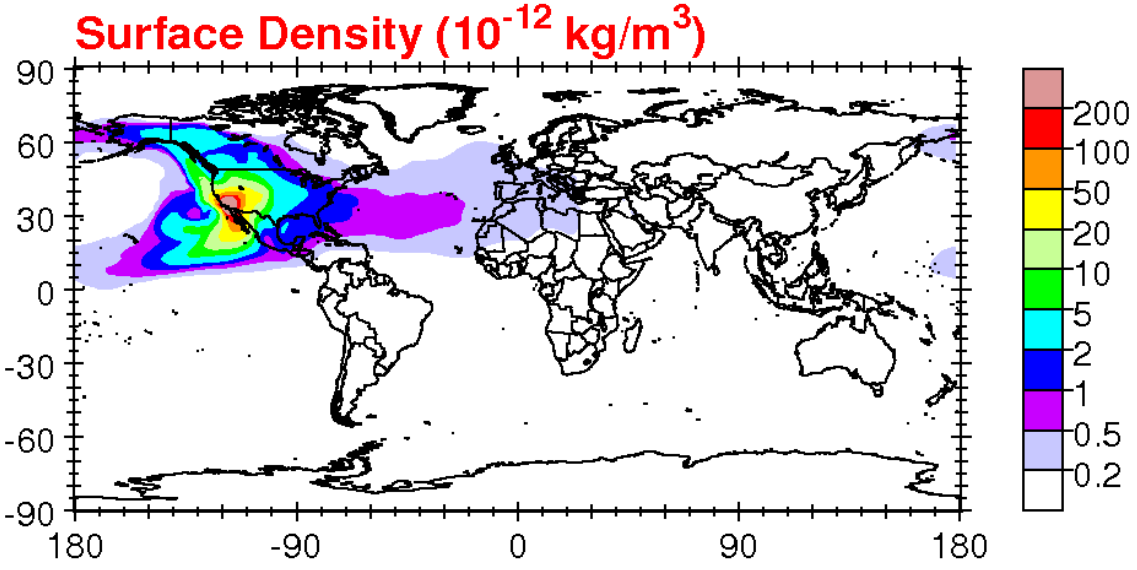
UT Column, above 5 km (10^{-9} kg/m^2)

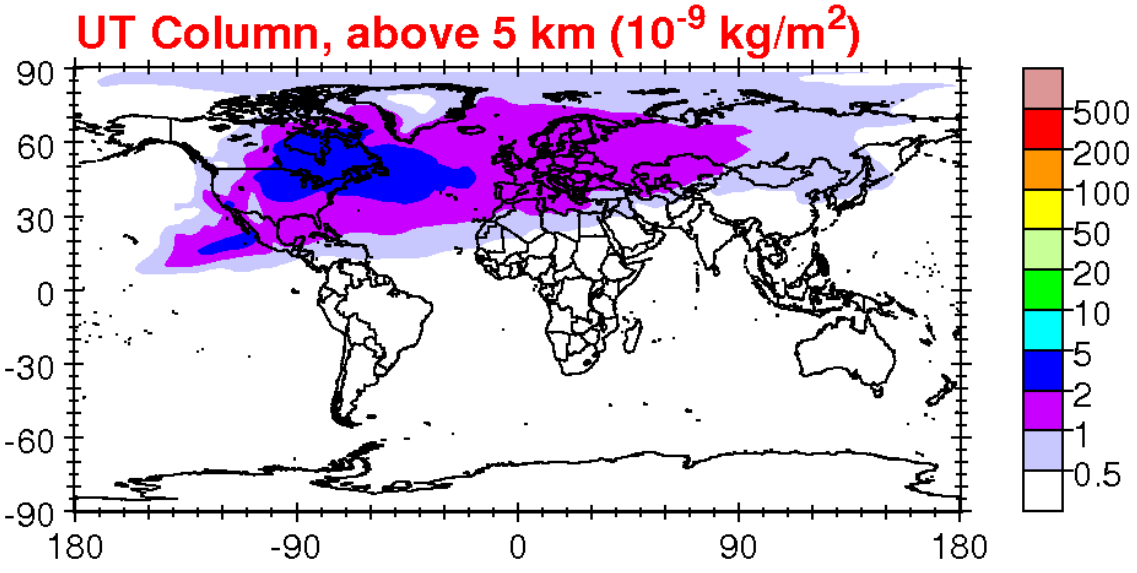


Los Angeles, USA

Tau = 10 d, Annual Mean 1995

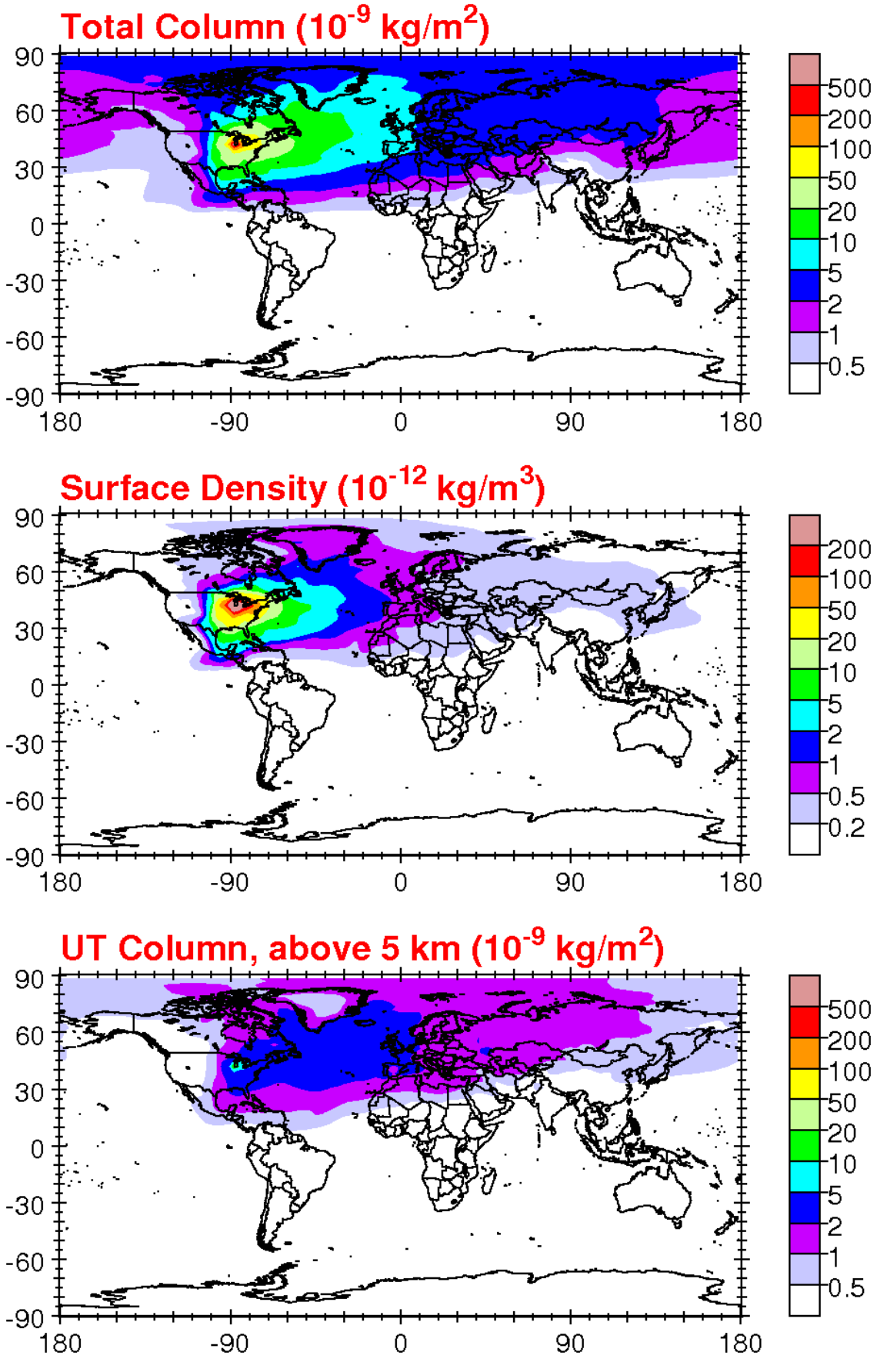






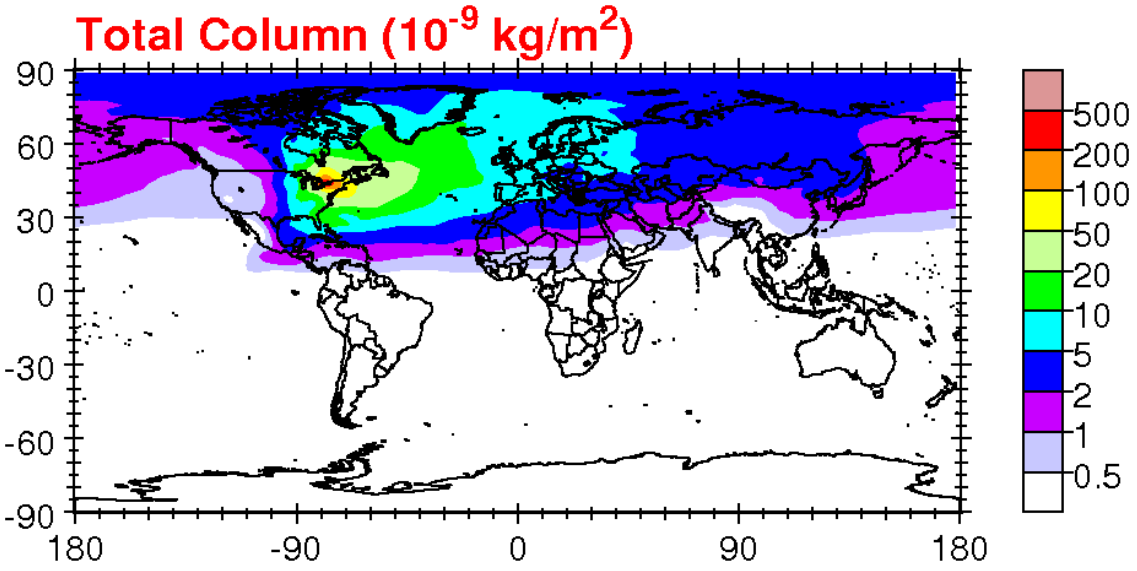
Chicago, USA

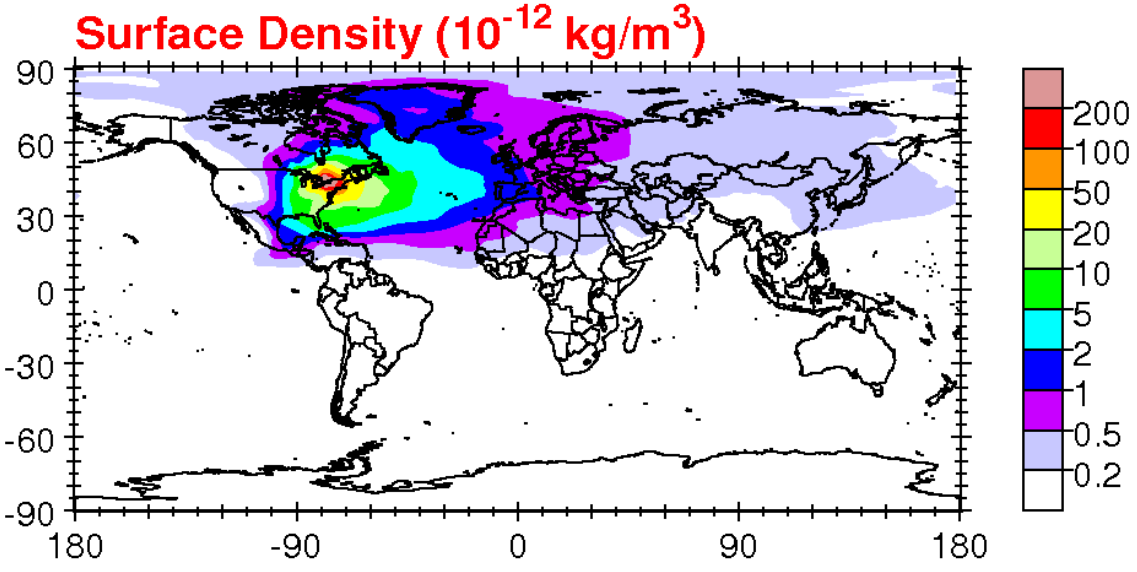
Tau = 10 d, Annual Mean 1995

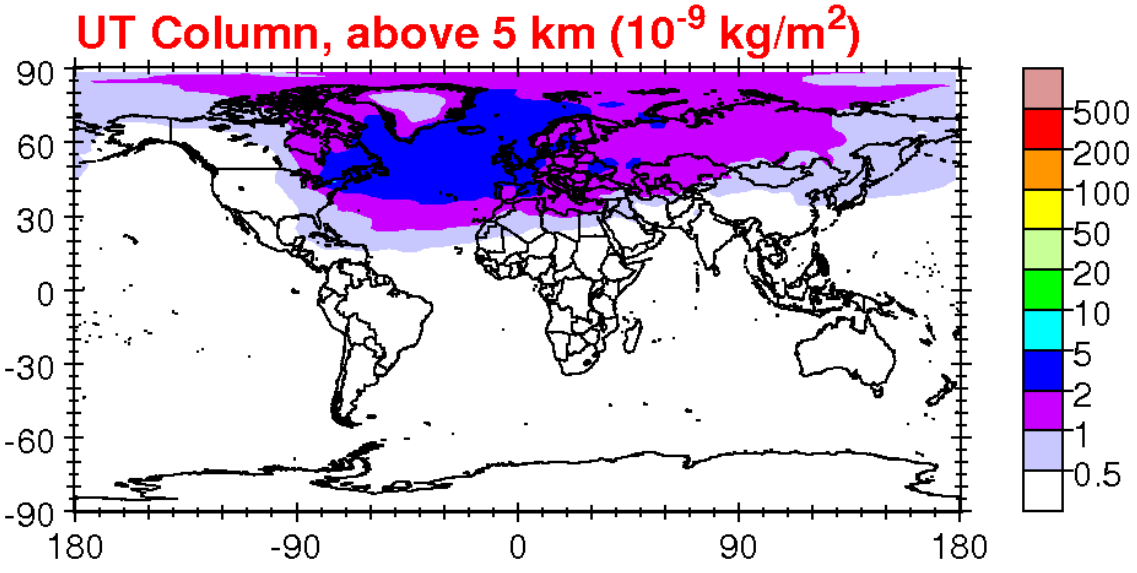


Toronto, Canada

Tau = 10 d, Annual Mean 1995

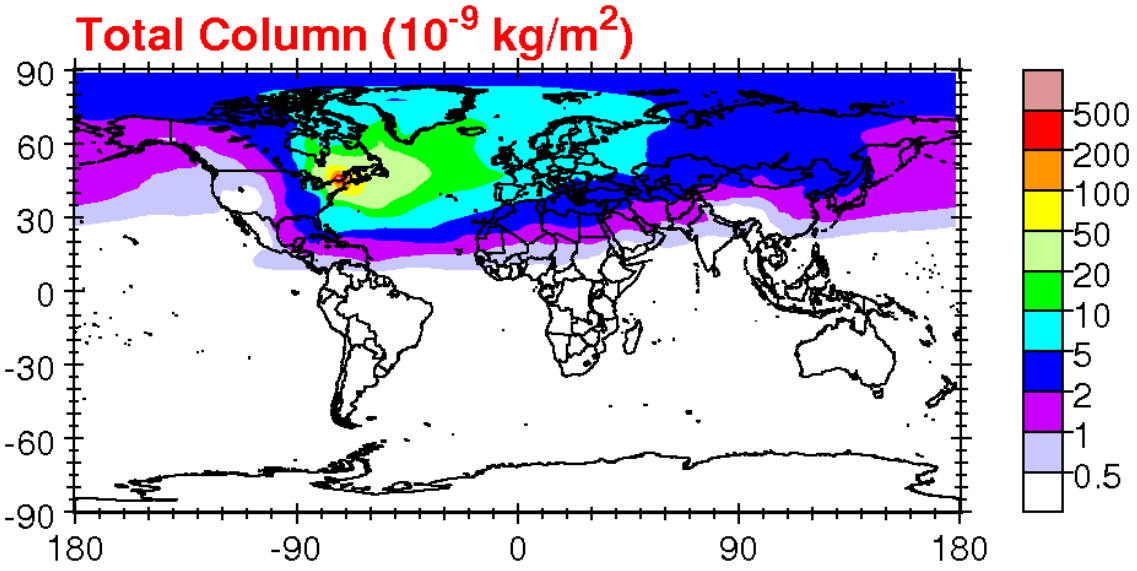


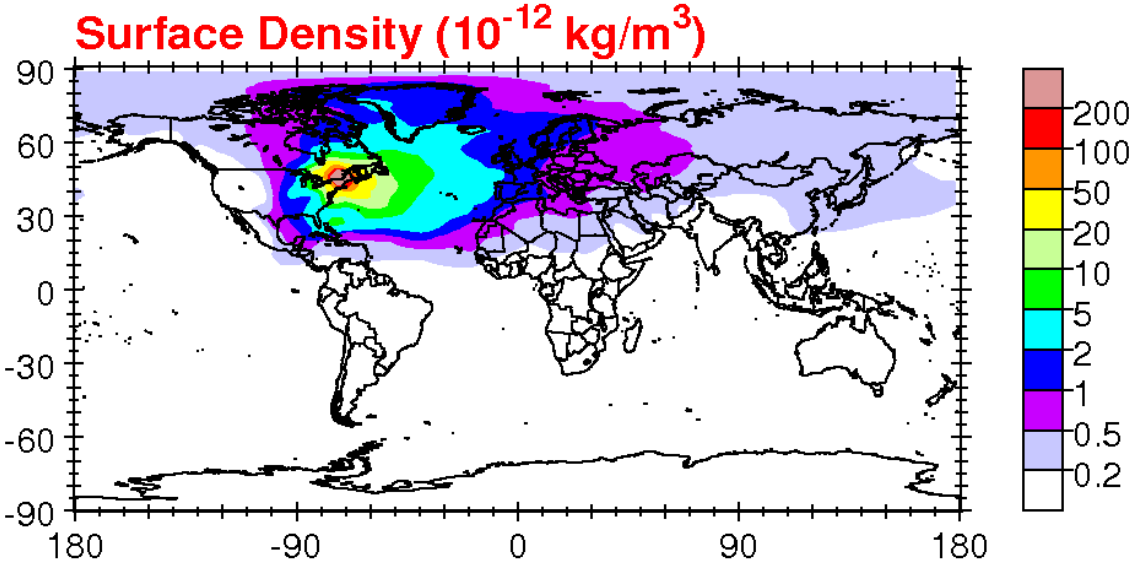


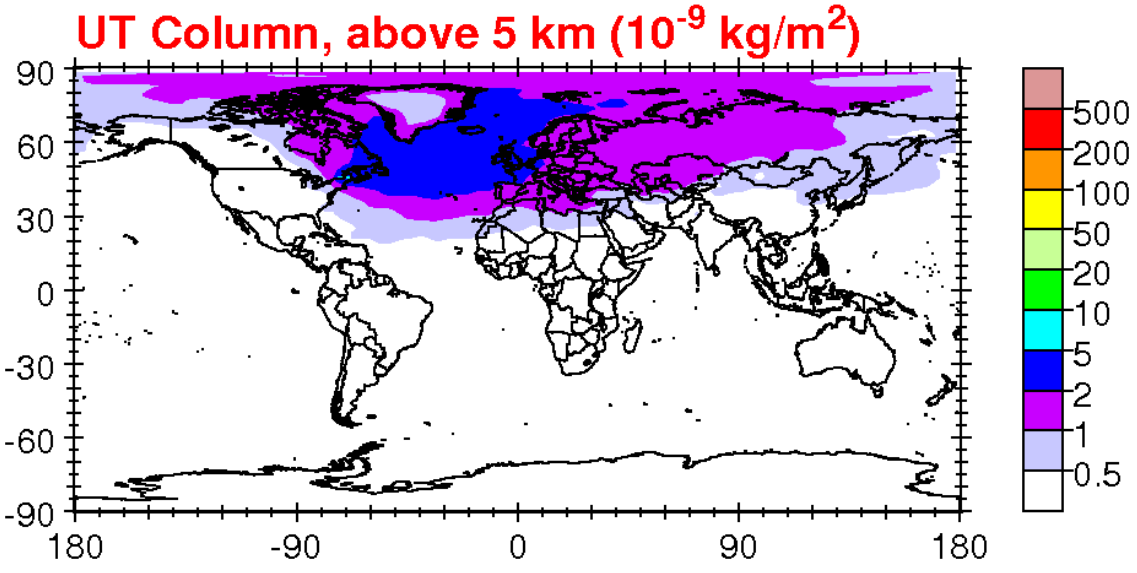


Montreal, Canada

Tau = 10 d, Annual Mean 1995



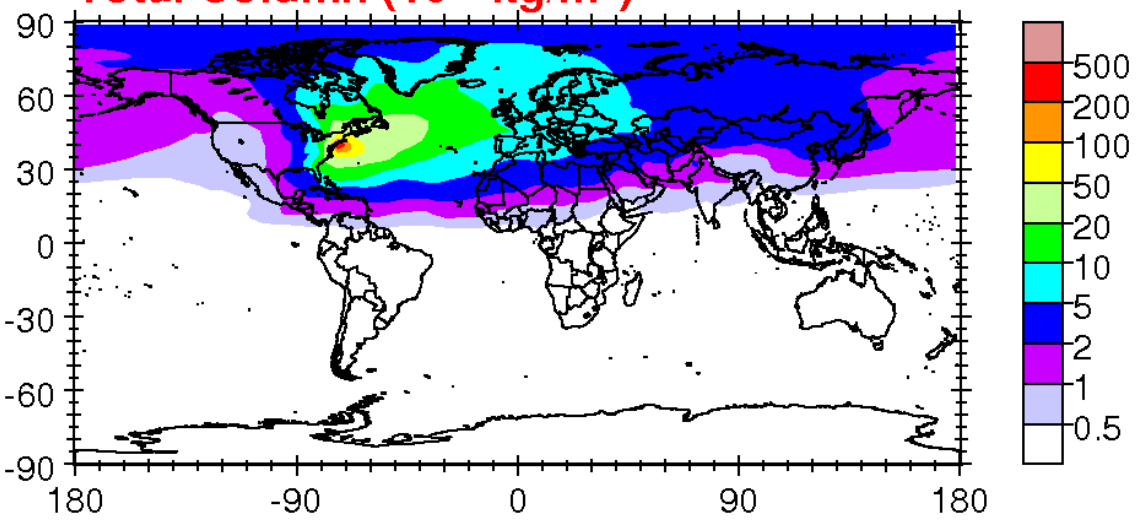




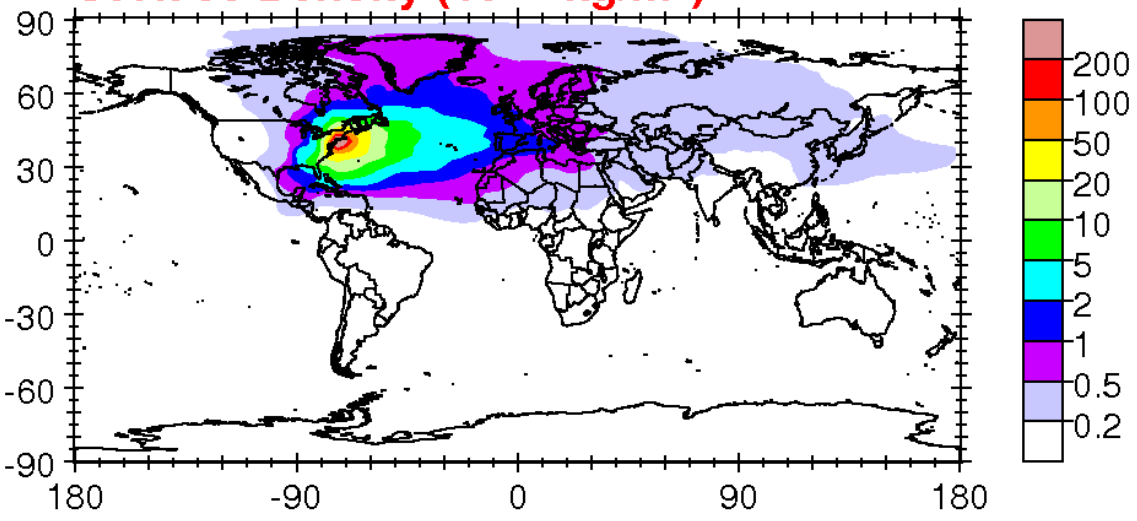
New York, USA

Tau = 10 d, Annual Mean 1995

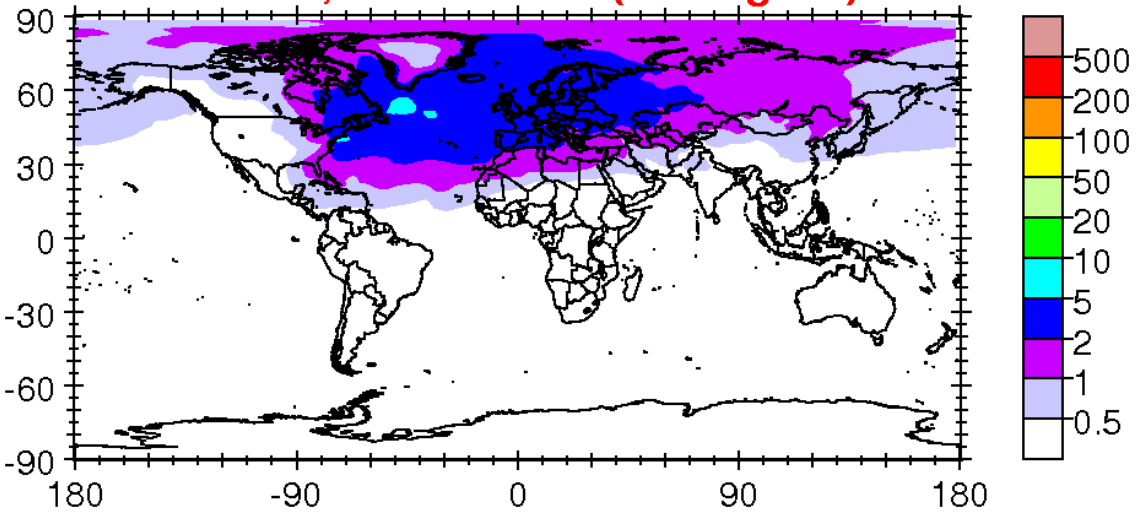
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



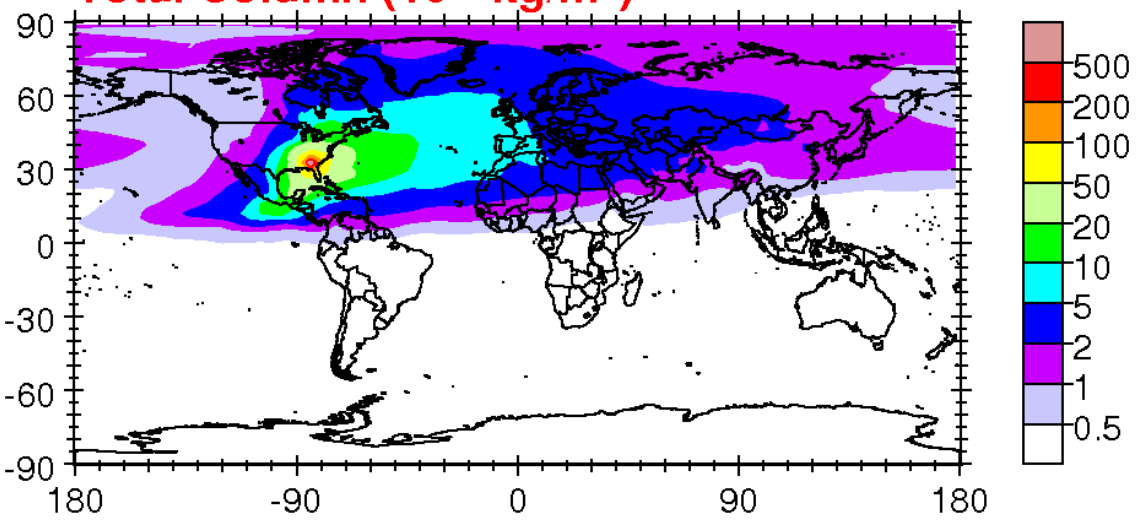
UT Column, above 5 km (10^{-9} kg/m^2)



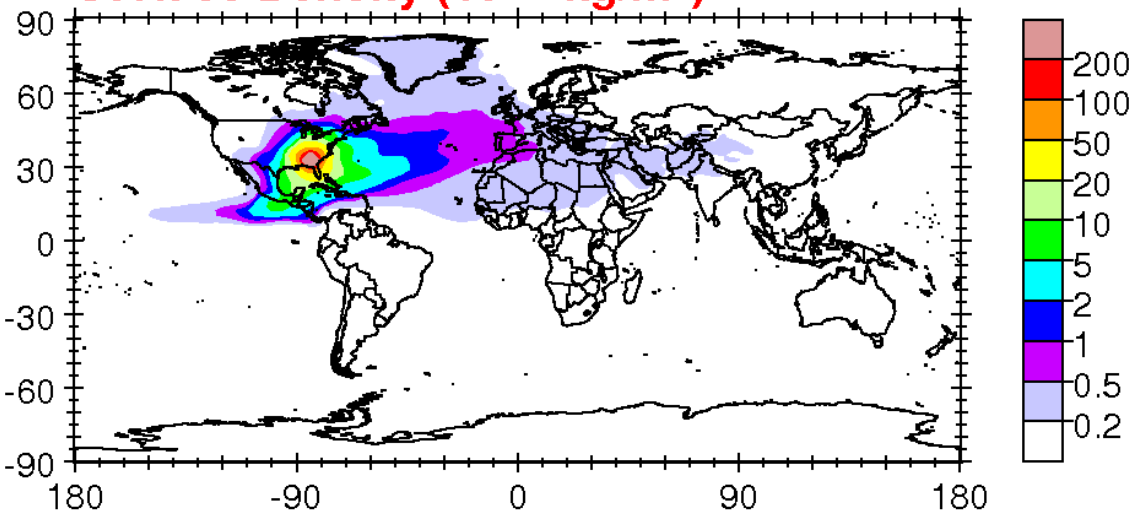
Atlanta, USA

Tau = 10 d, Annual Mean 1995

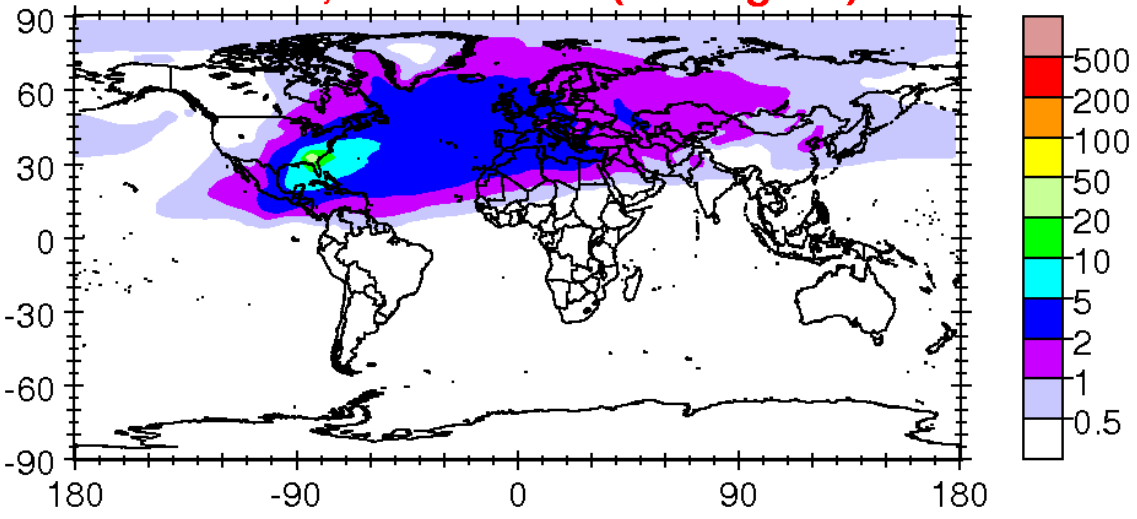
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



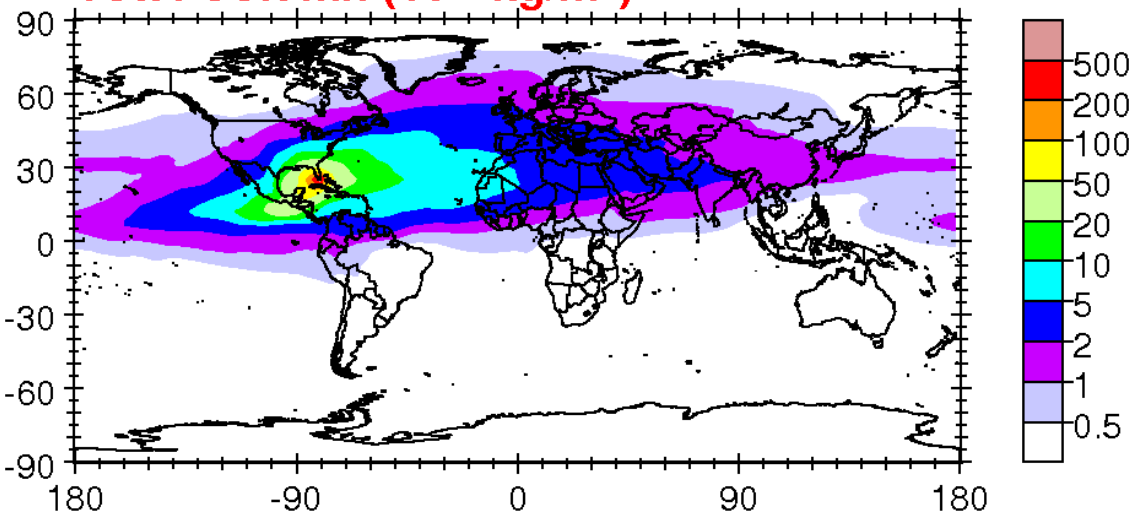
UT Column, above 5 km (10^{-9} kg/m^2)



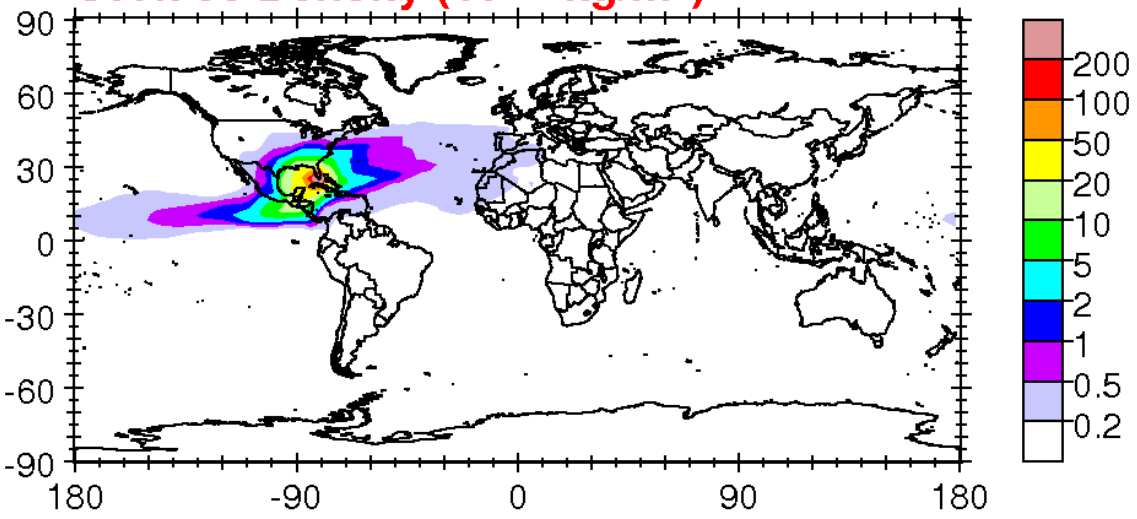
Miami, USA

Tau = 10 d, Annual Mean 1995

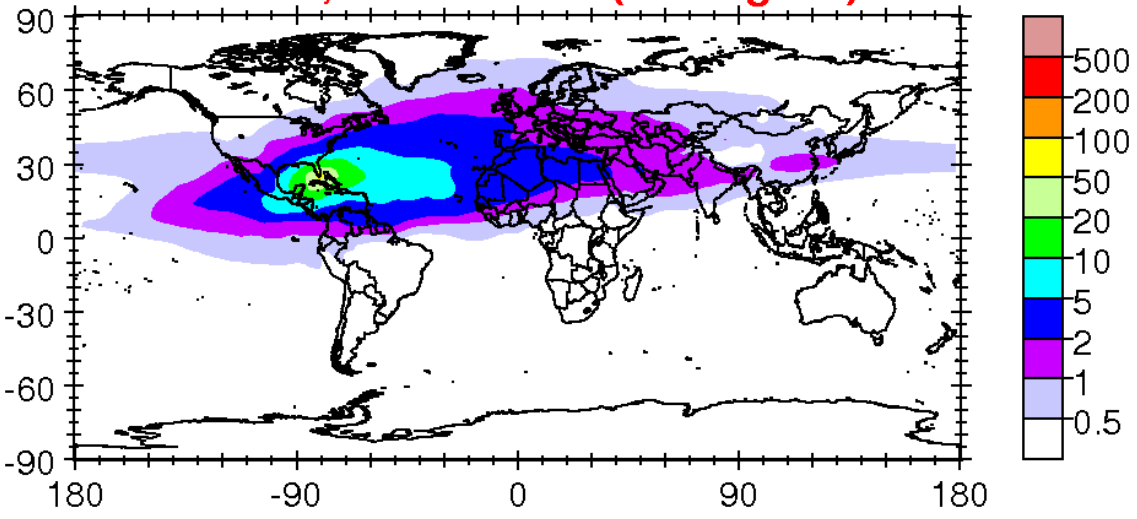
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



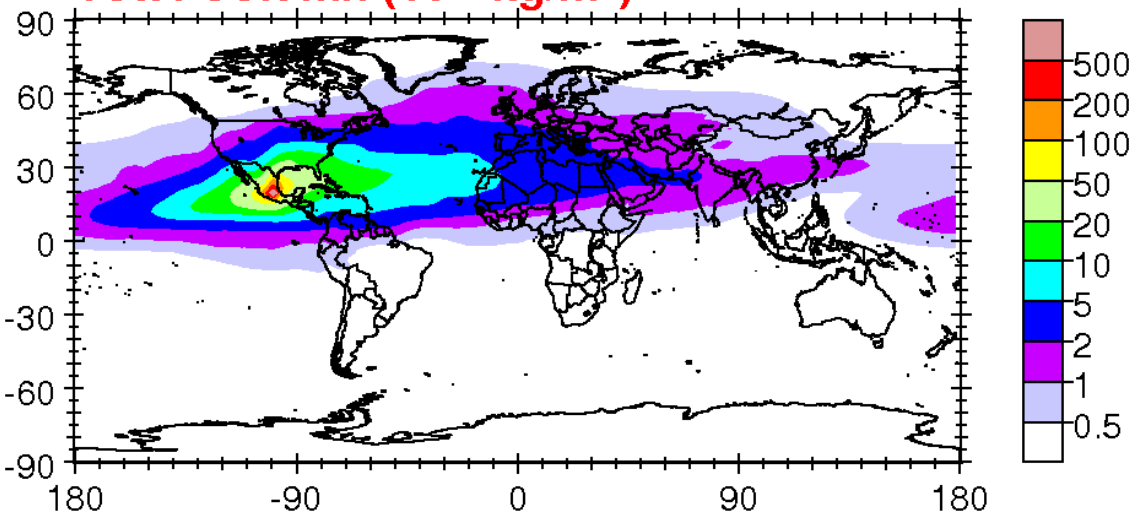
UT Column, above 5 km (10^{-9} kg/m^2)



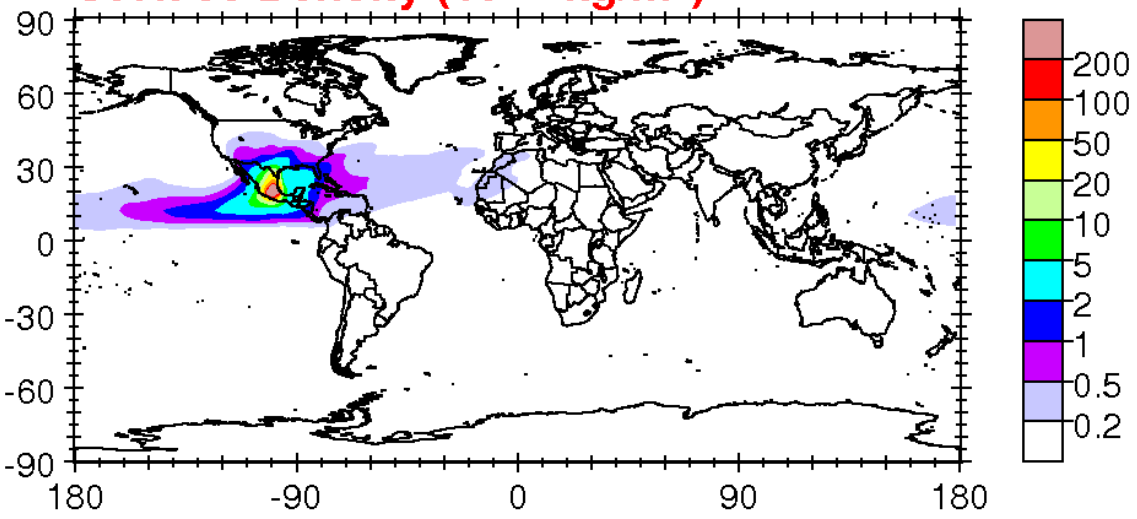
Mexico City, Mexico

Tau = 10 d, Annual Mean 1995

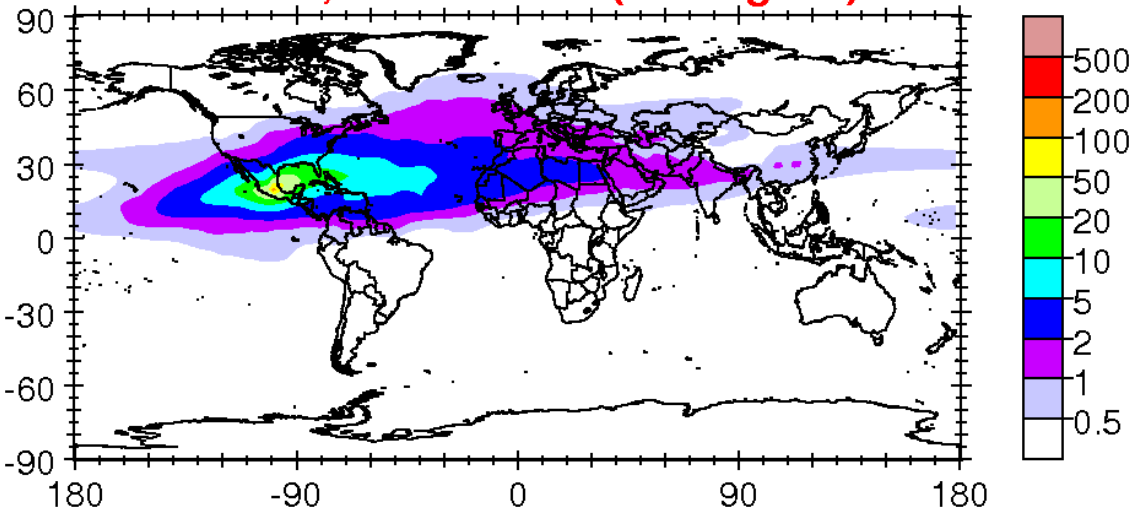
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

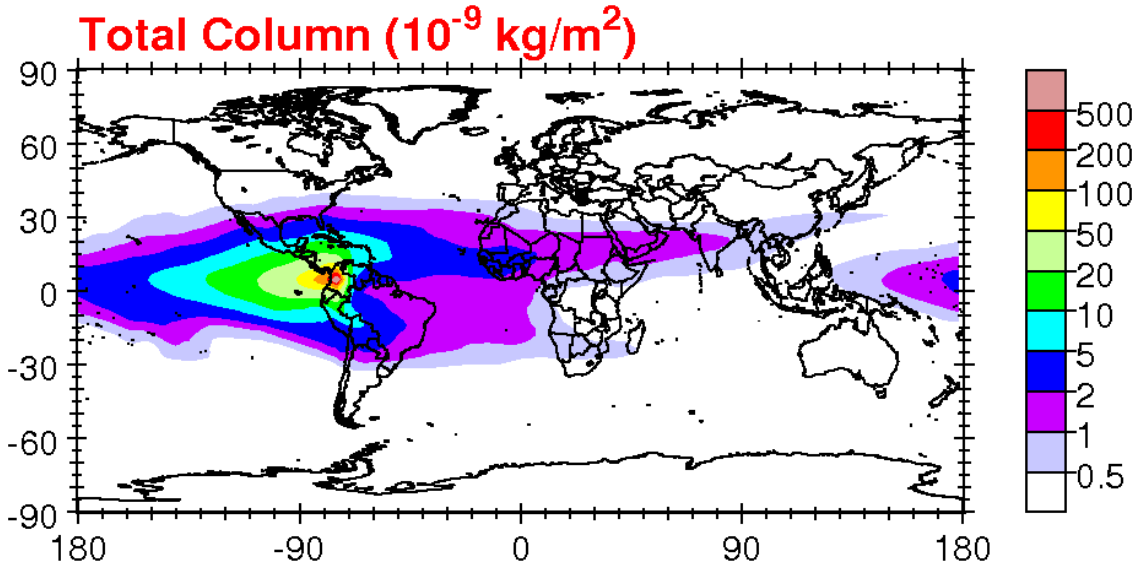


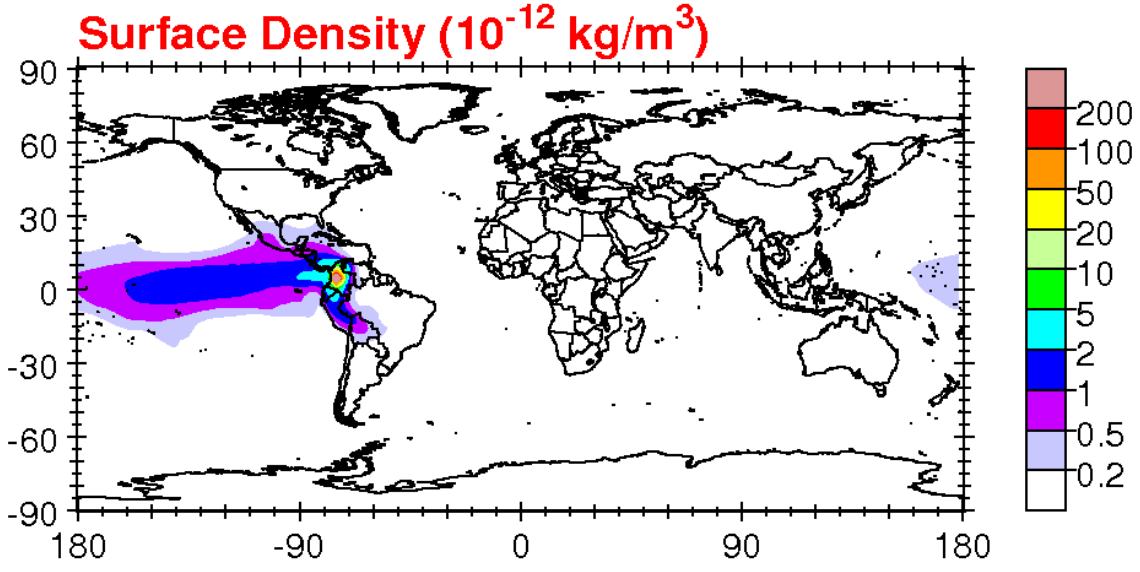
UT Column, above 5 km (10^{-9} kg/m^2)

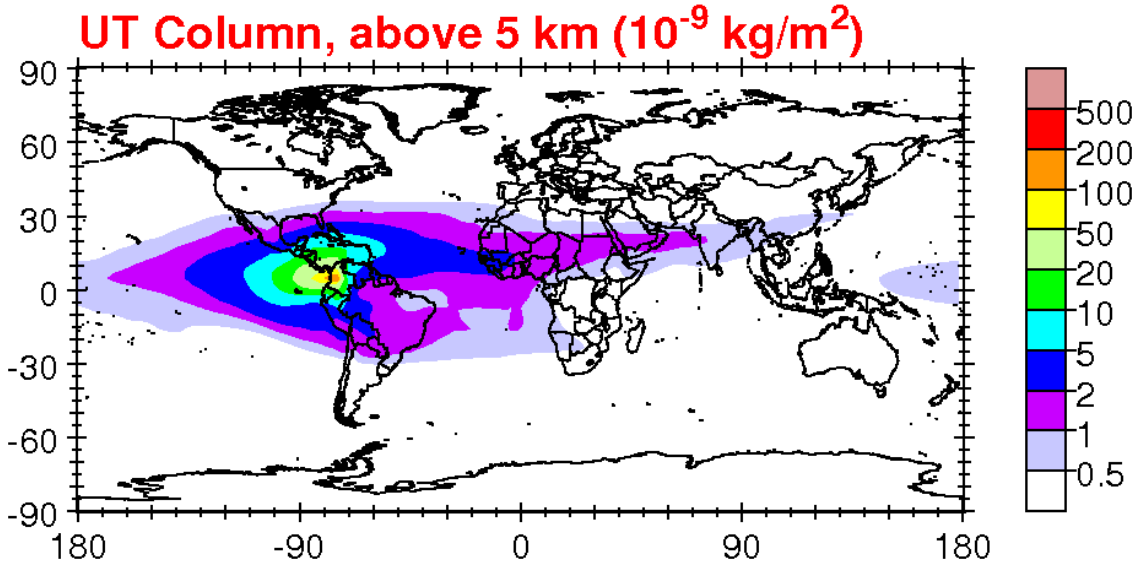


Bogota, Colombia

Tau = 10 d, Annual Mean 1995



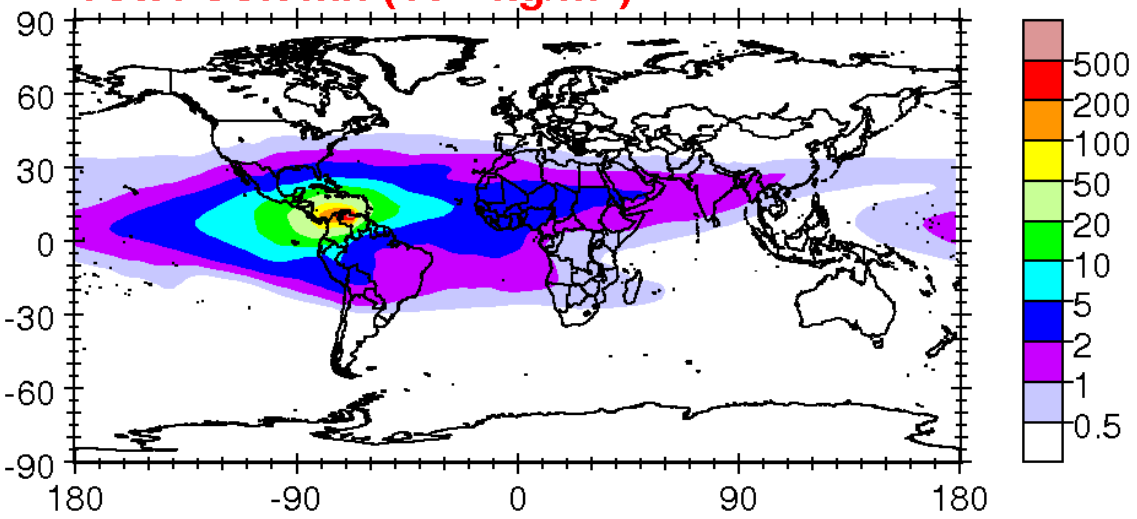




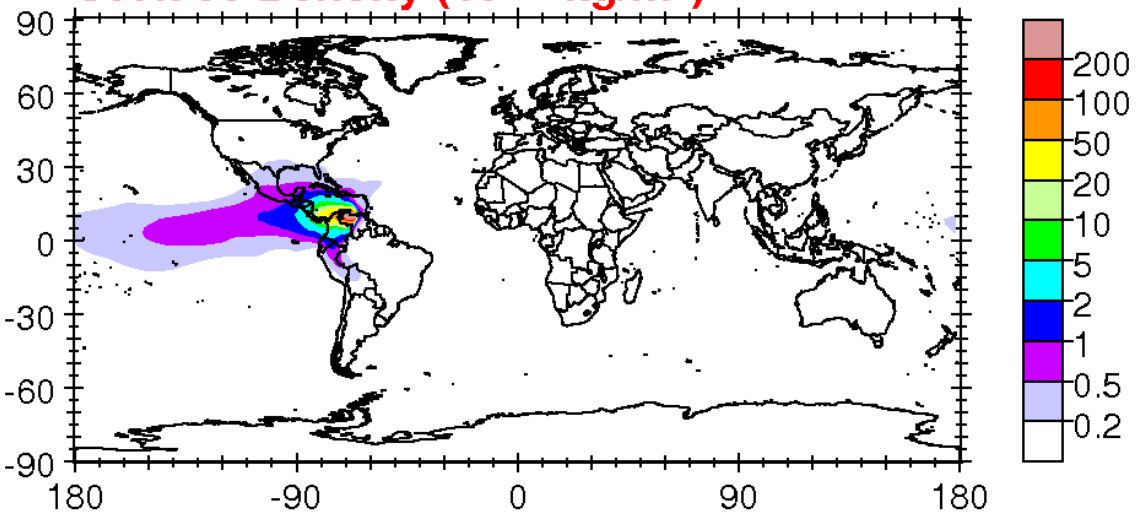
Caracas, Venezuala

Tau = 10 d, Annual Mean 1995

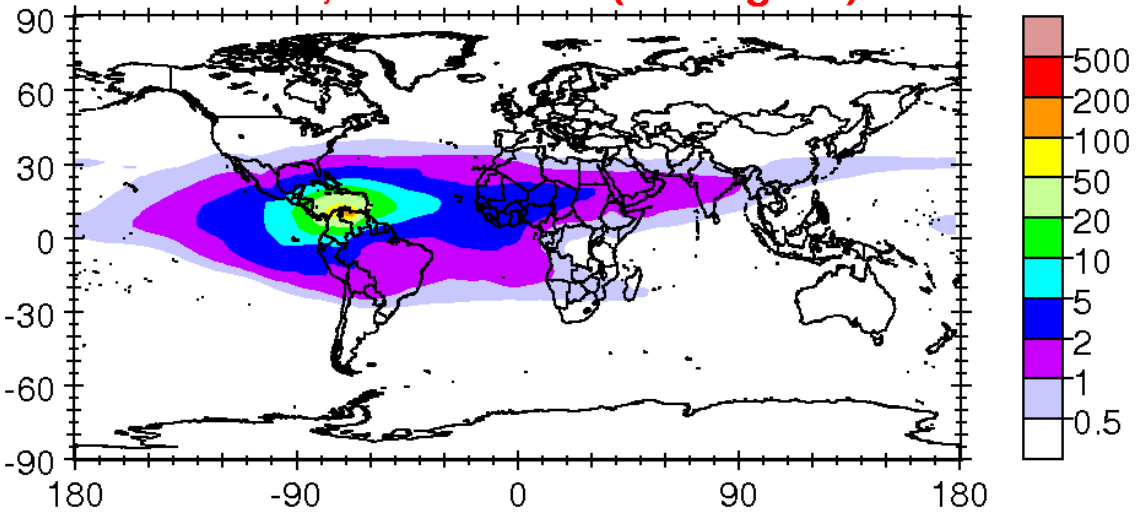
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



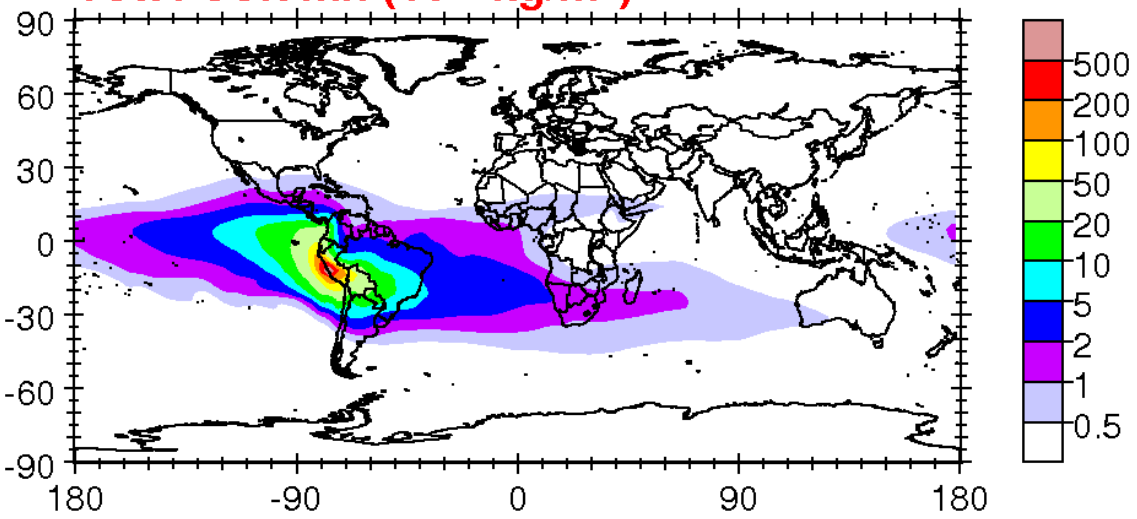
UT Column, above 5 km (10^{-9} kg/m^2)



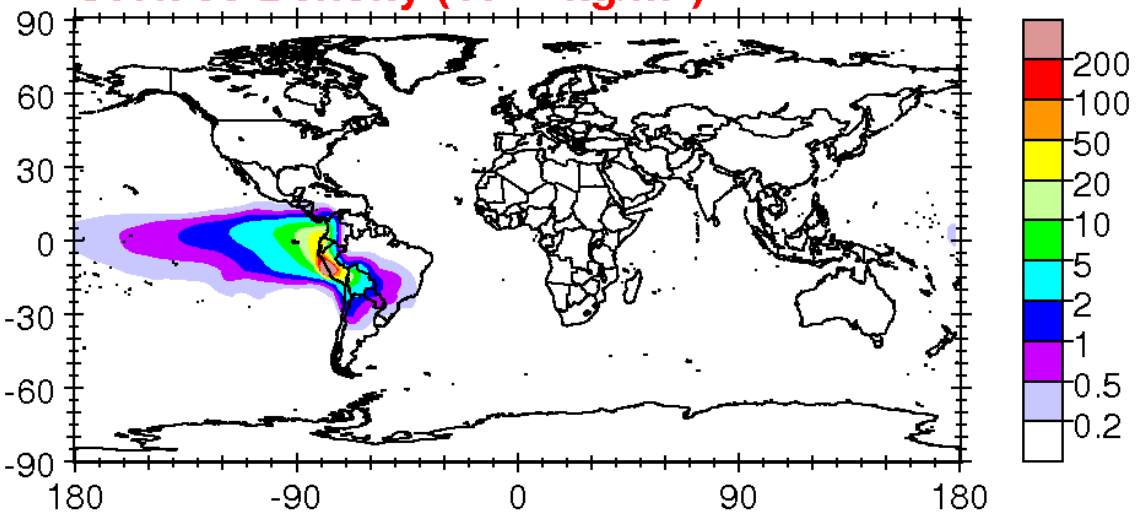
Lima, Peru

Tau = 10 d, Annual Mean 1995

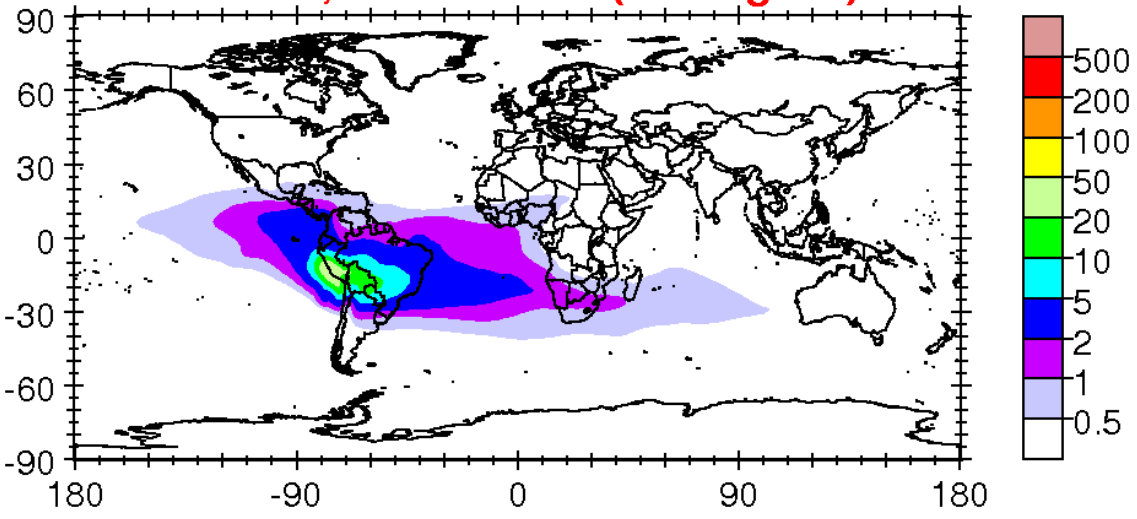
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



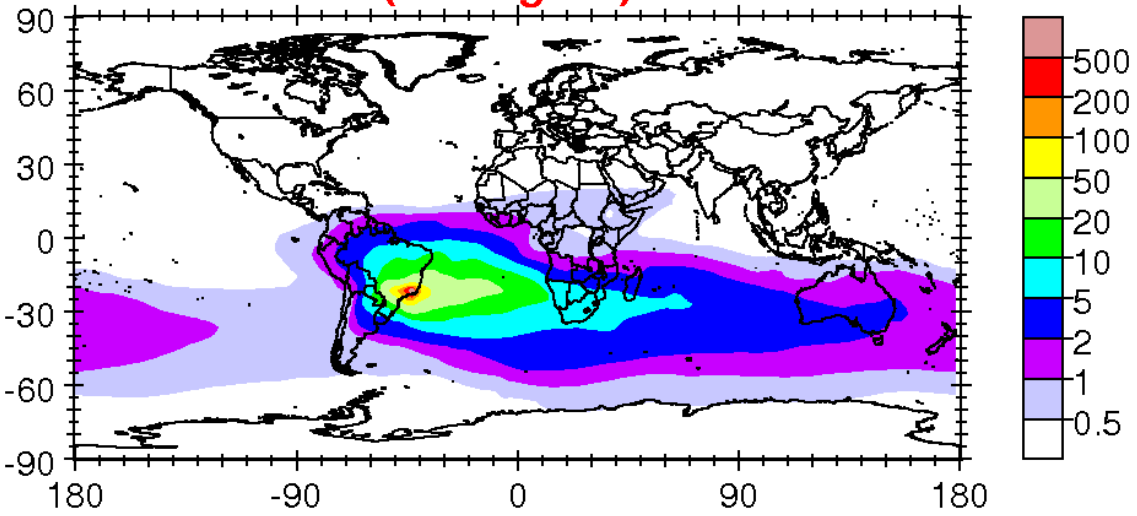
UT Column, above 5 km (10^{-9} kg/m^2)



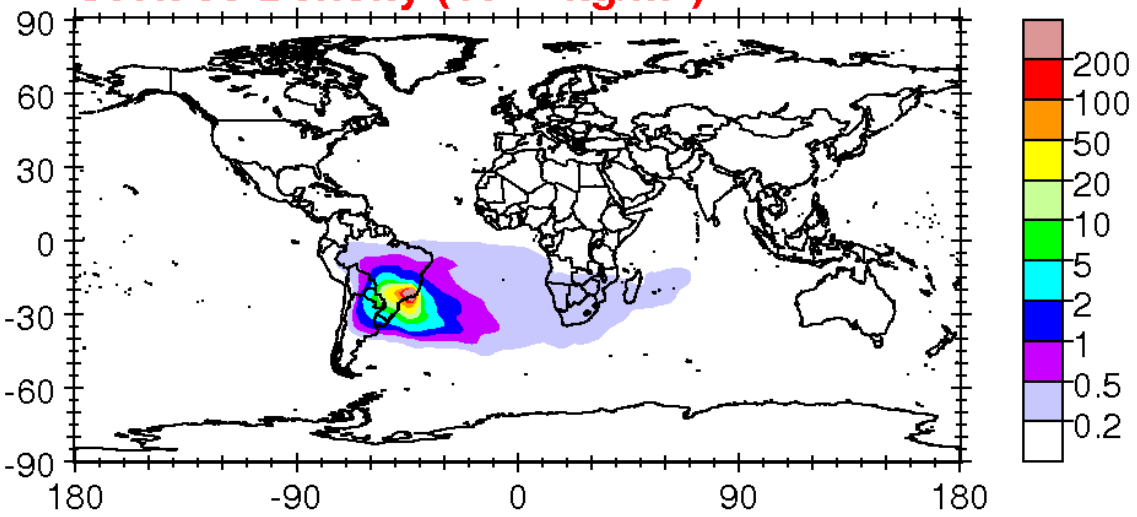
Rio de Janeiro, Brazil

Tau = 10 d, Annual Mean 1995

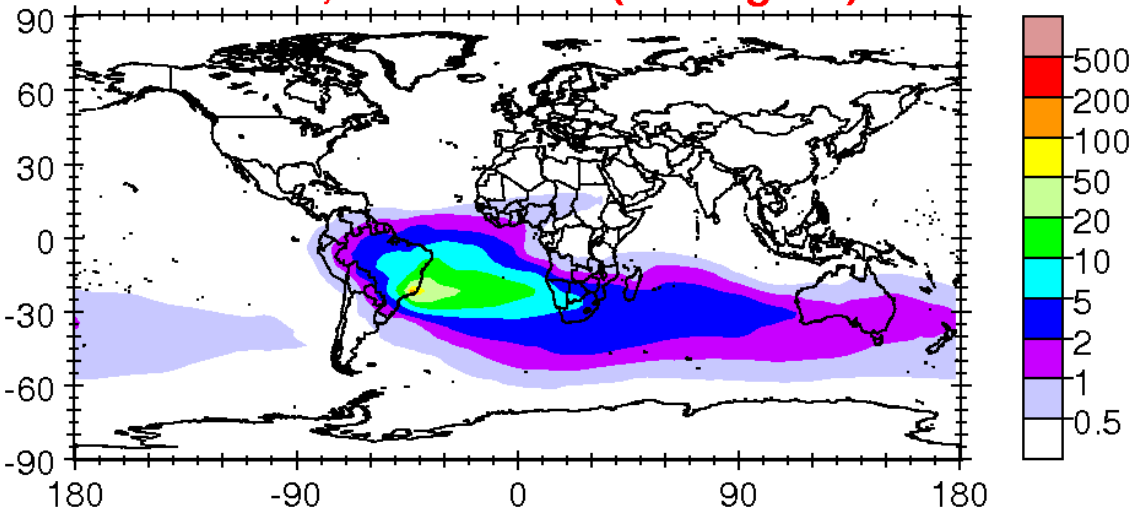
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



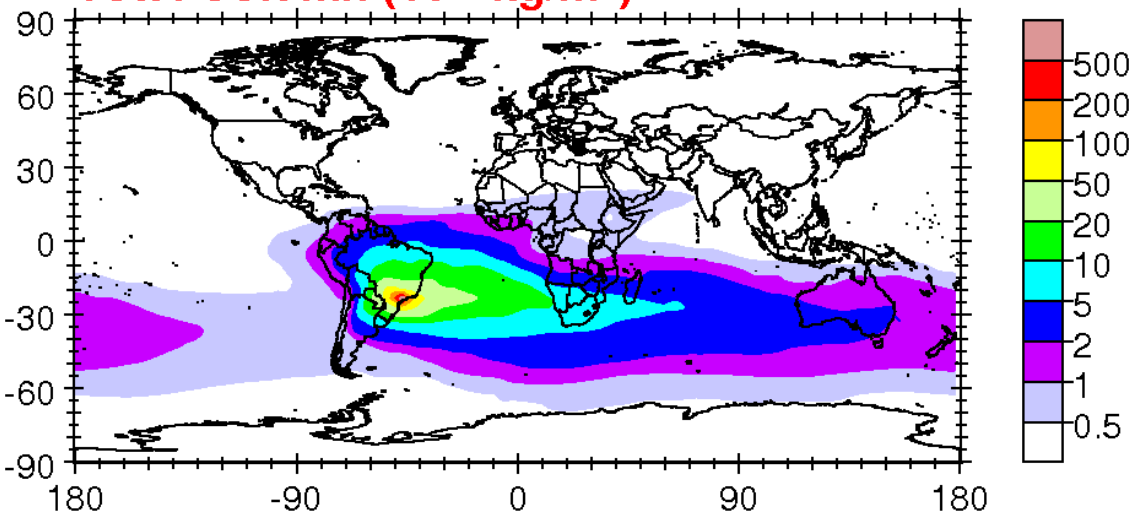
UT Column, above 5 km (10^{-9} kg/m^2)



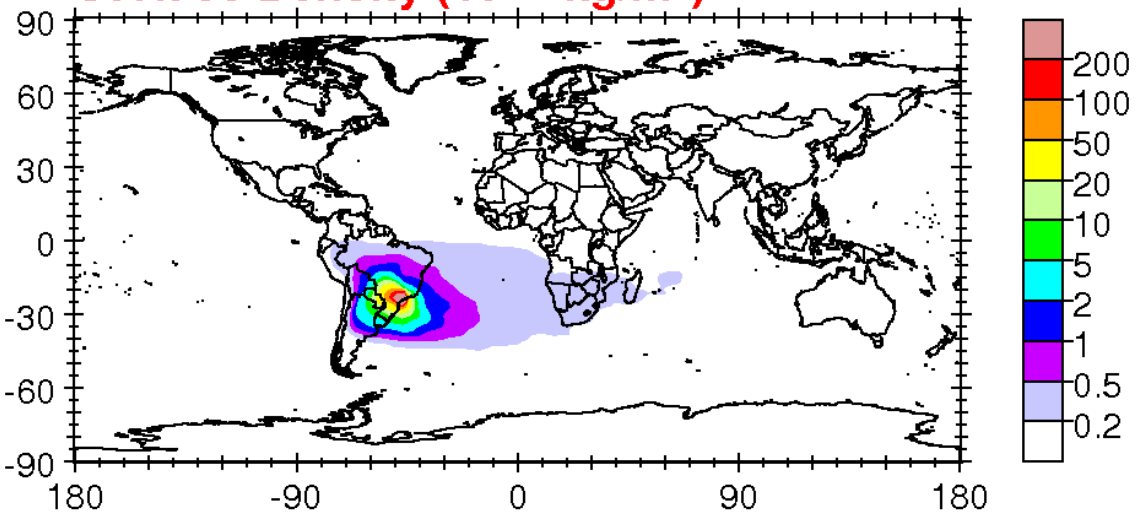
Sao Paulo, Brazil

Tau = 10 d, Annual Mean 1995

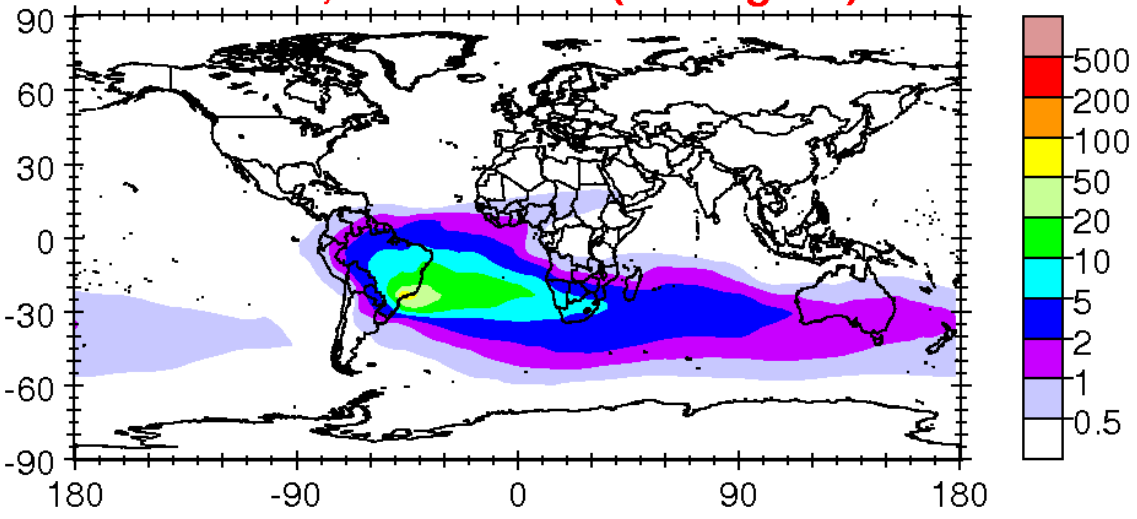
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)



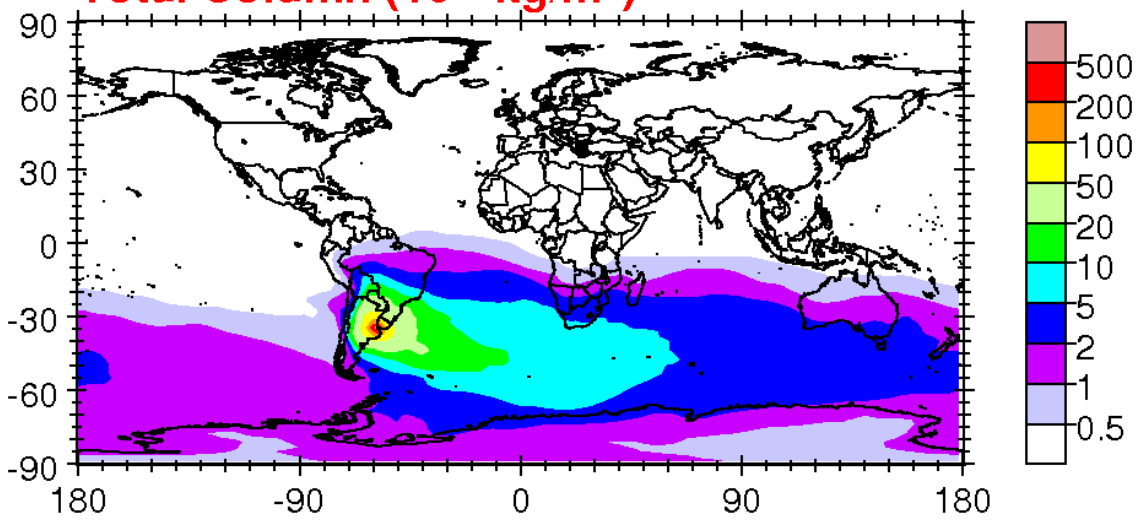
UT Column, above 5 km (10^{-9} kg/m^2)



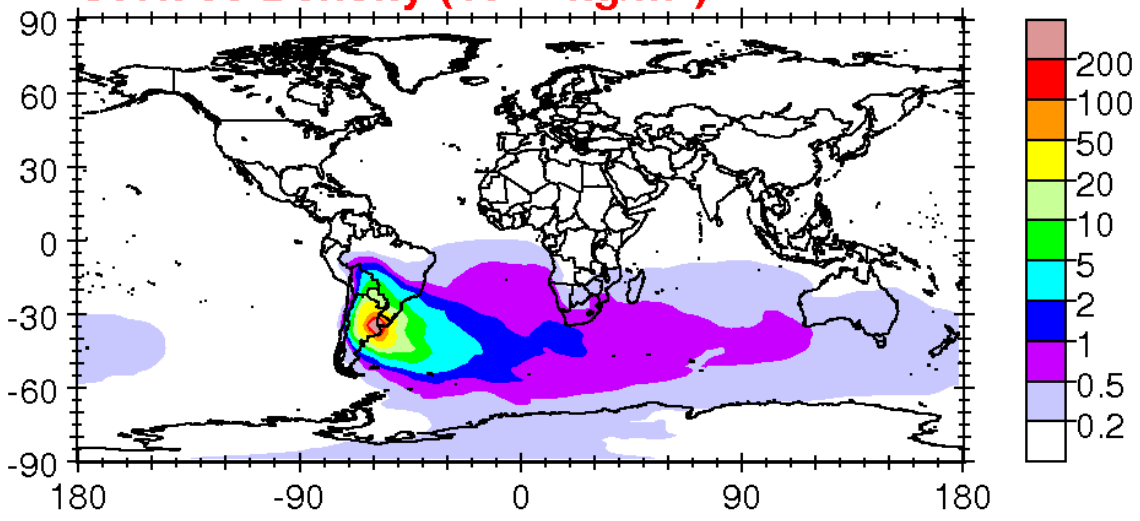
Buenos Aires, Argentina

Tau = 10 d, Annual Mean 1995

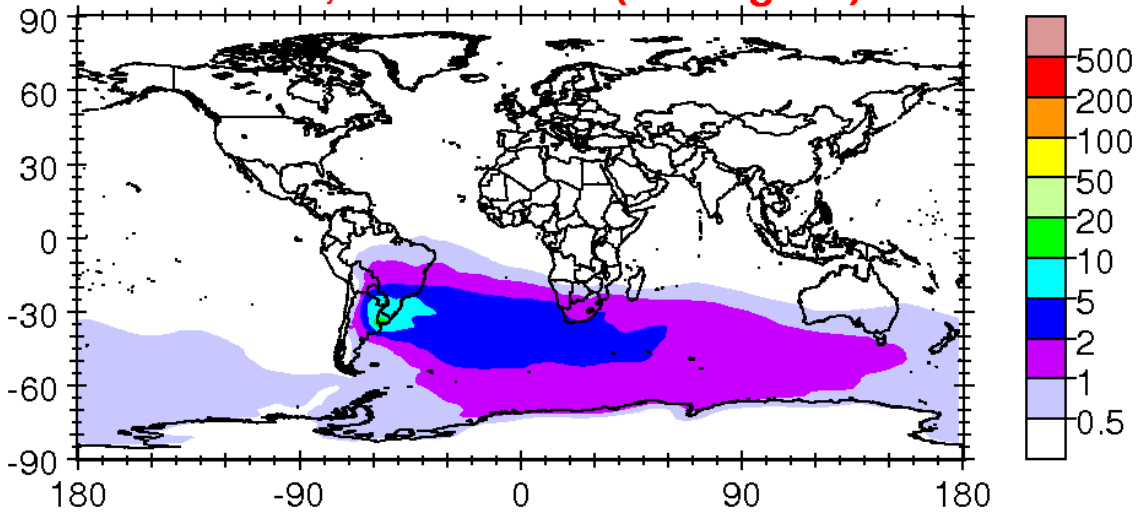
Total Column (10^{-9} kg/m^2)



Surface Density (10^{-12} kg/m^3)

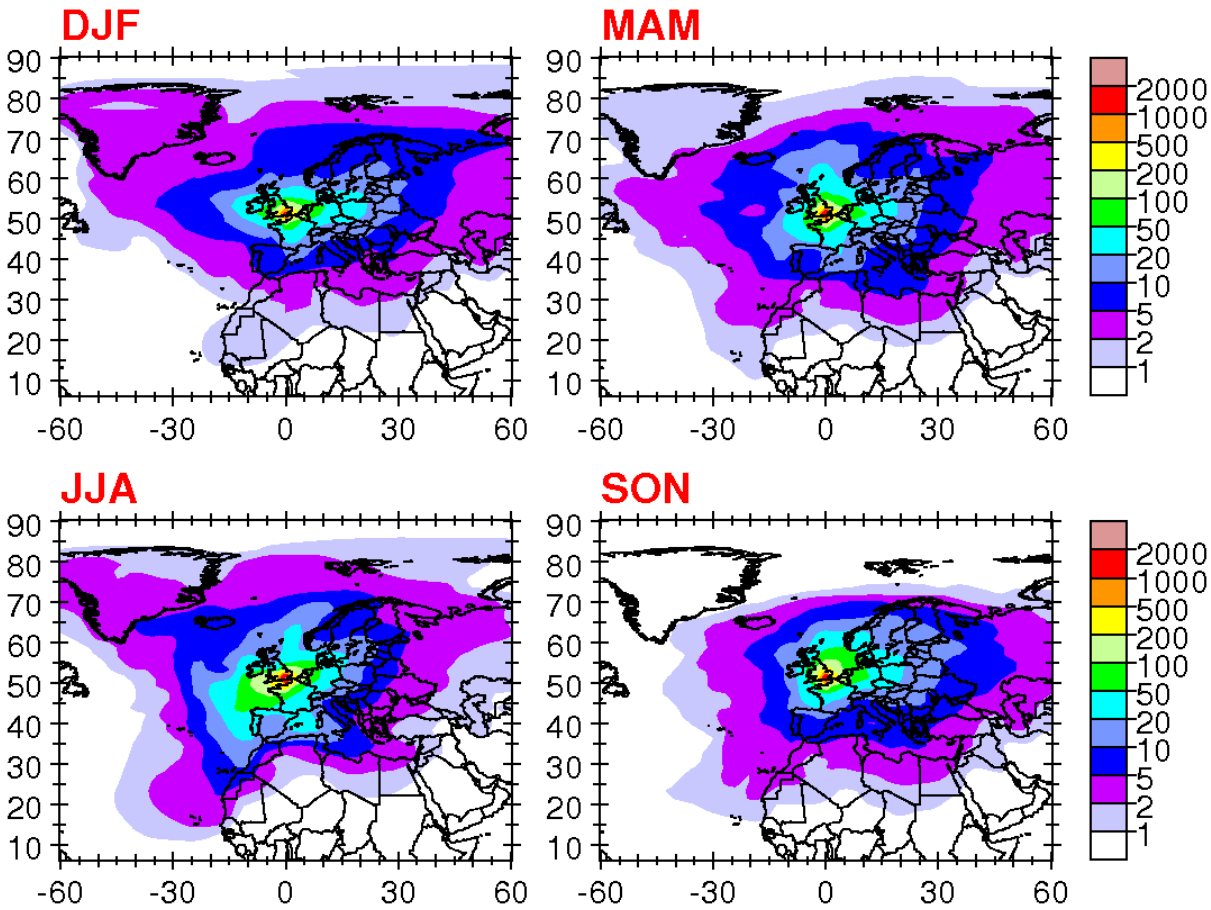


UT Column, above 5 km (10^{-9} kg/m^2)



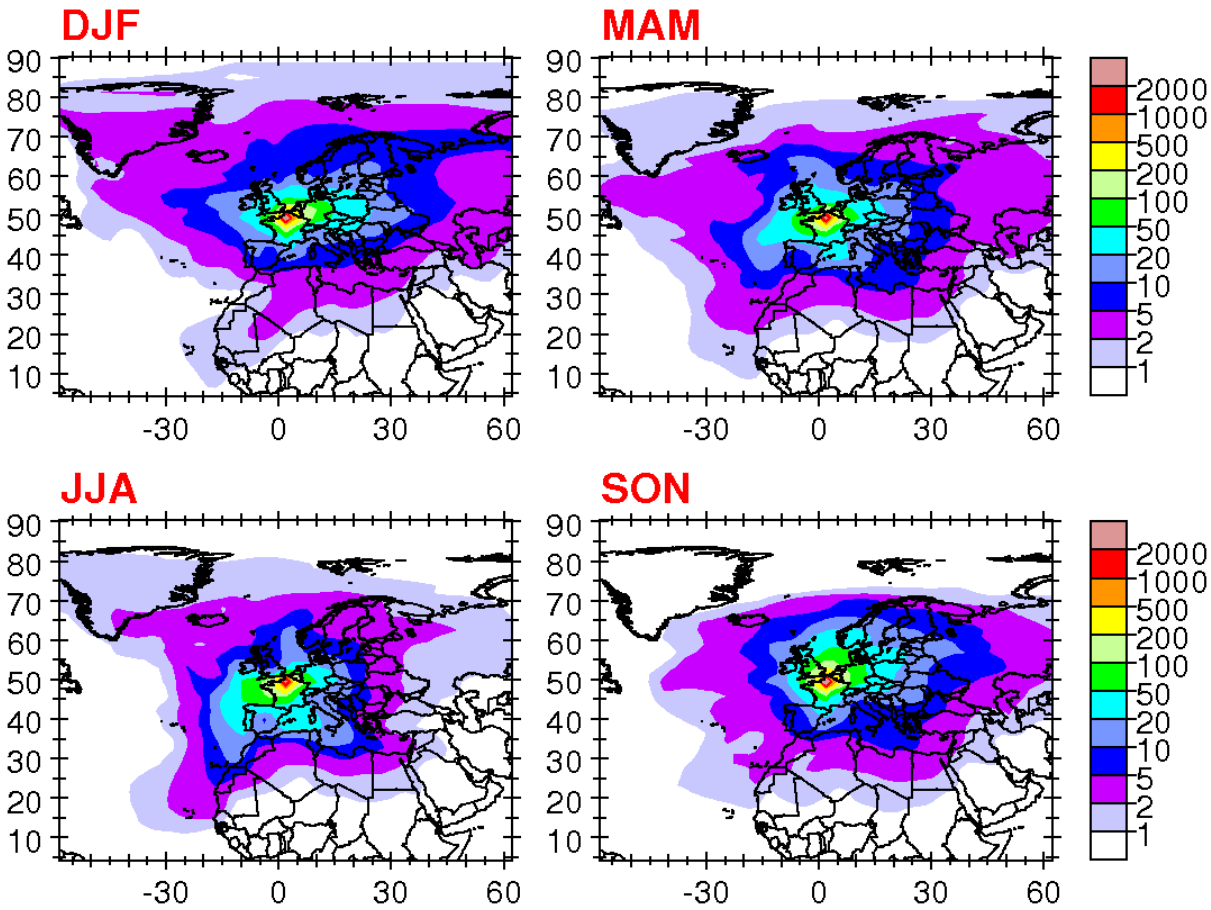
London, England

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



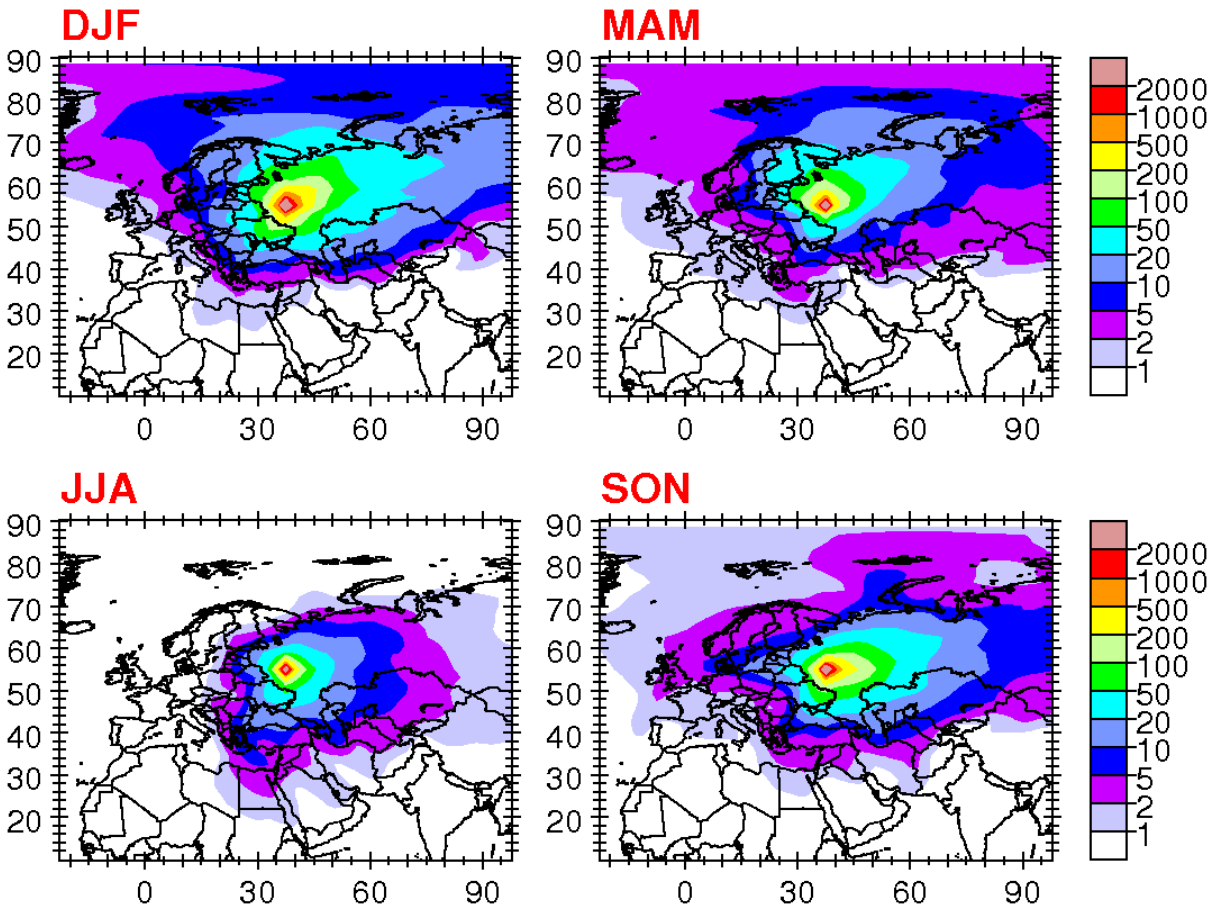
Paris, France

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



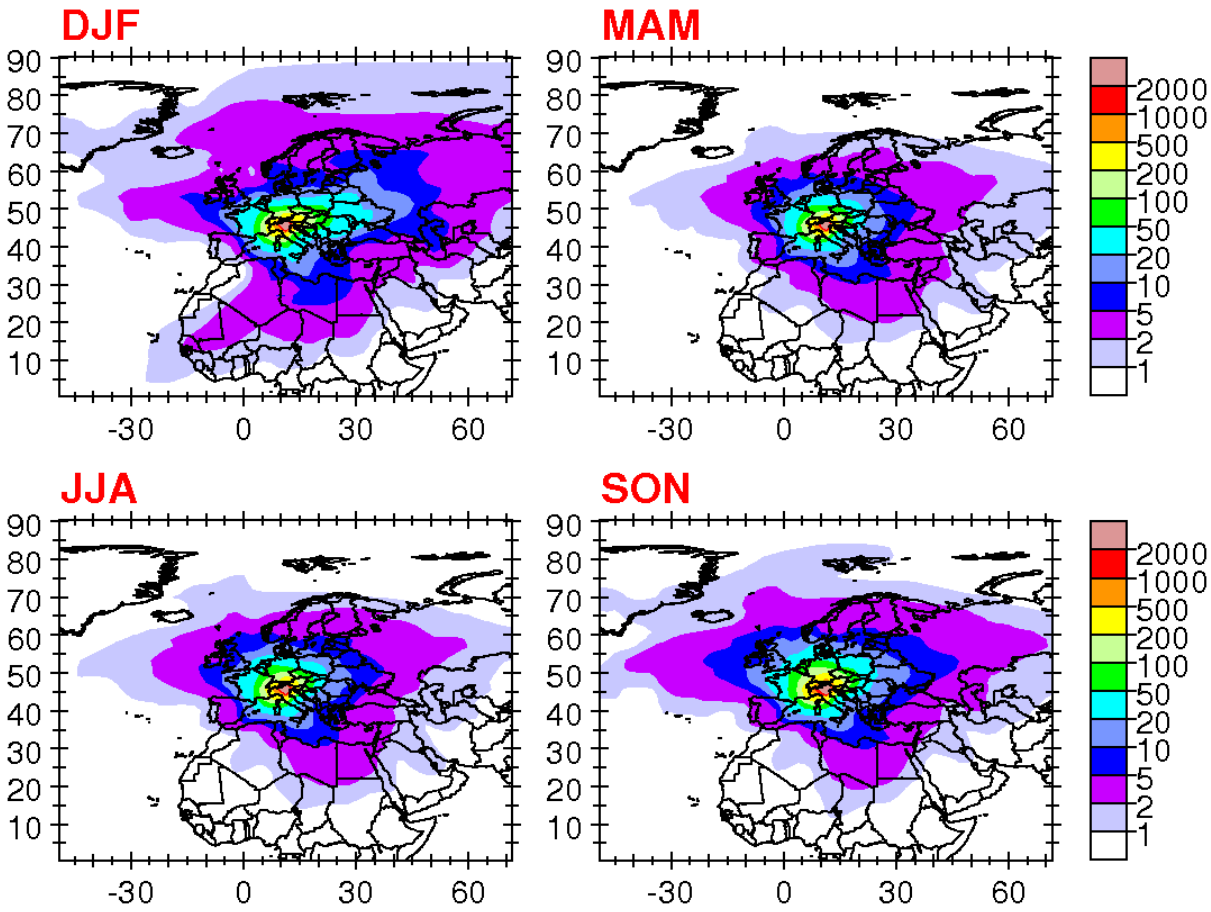
Moscow, Russia

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



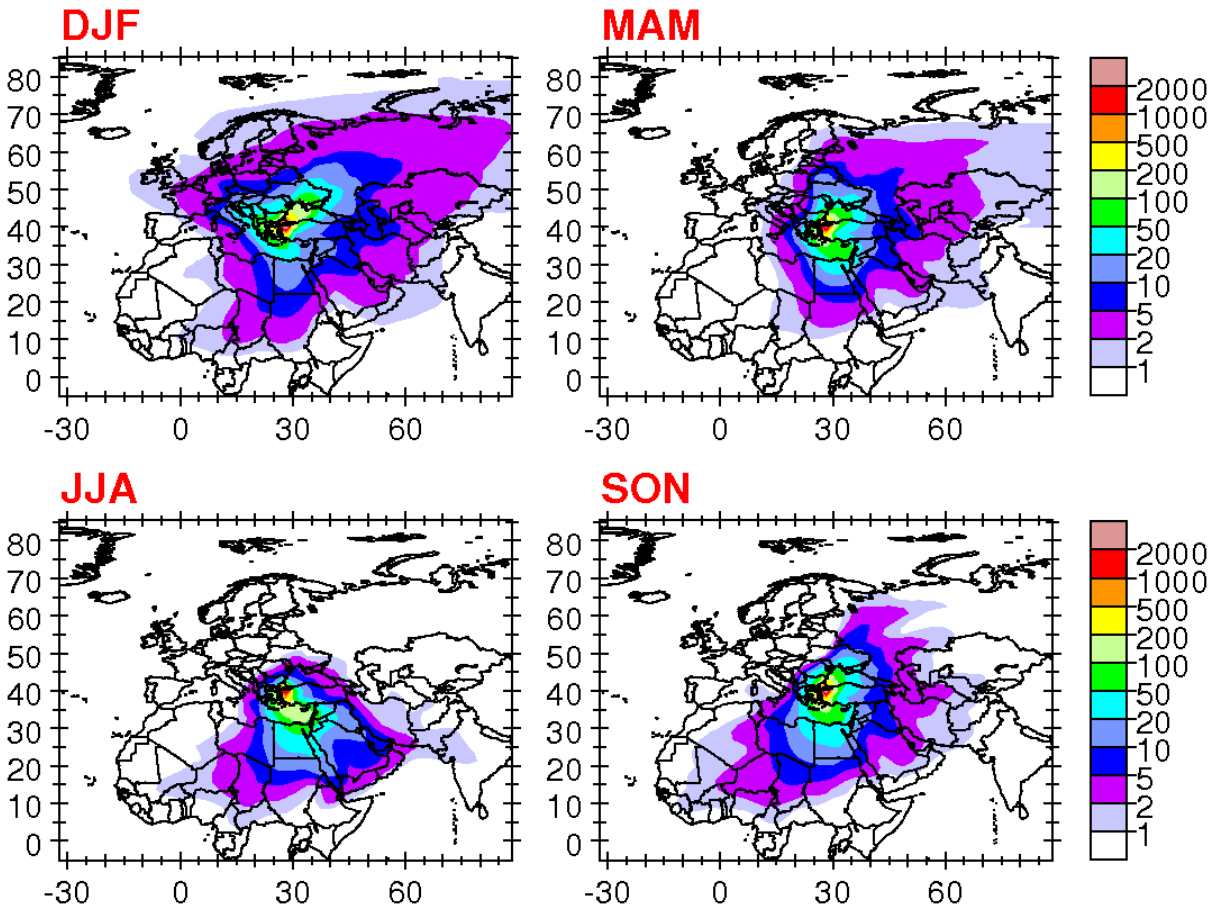
Po Valley, Italy

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



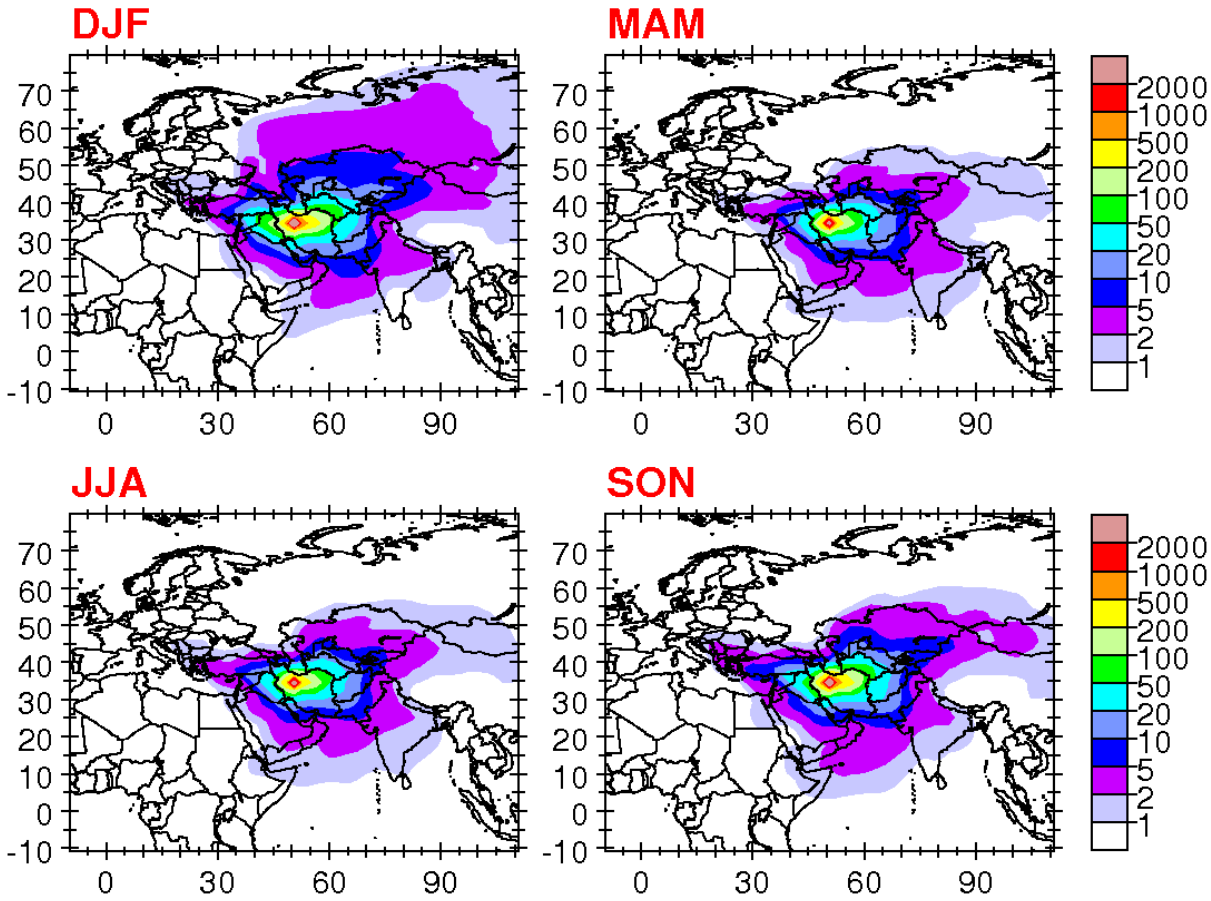
Istanbul, Turkey

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



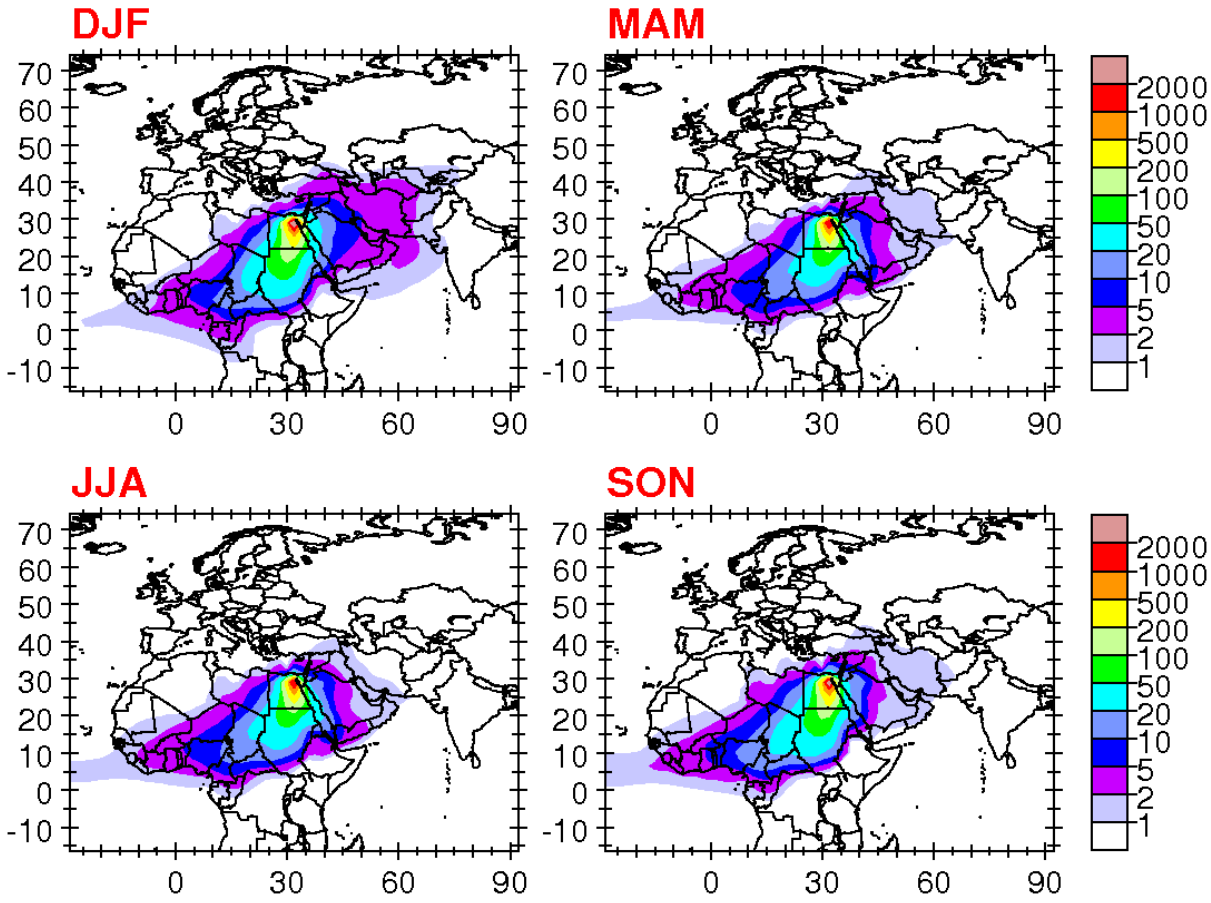
Teheran, Iran

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



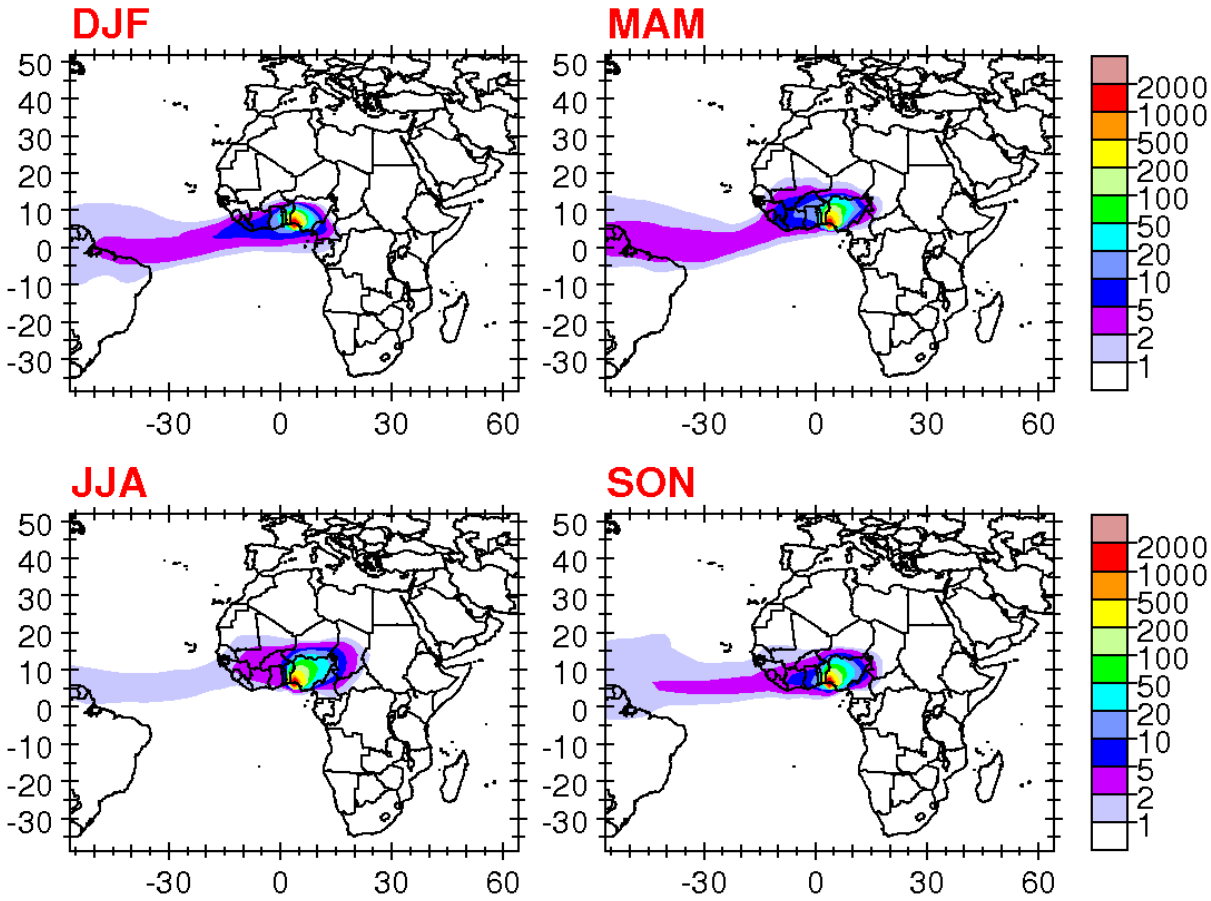
Cairo, Egypt

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



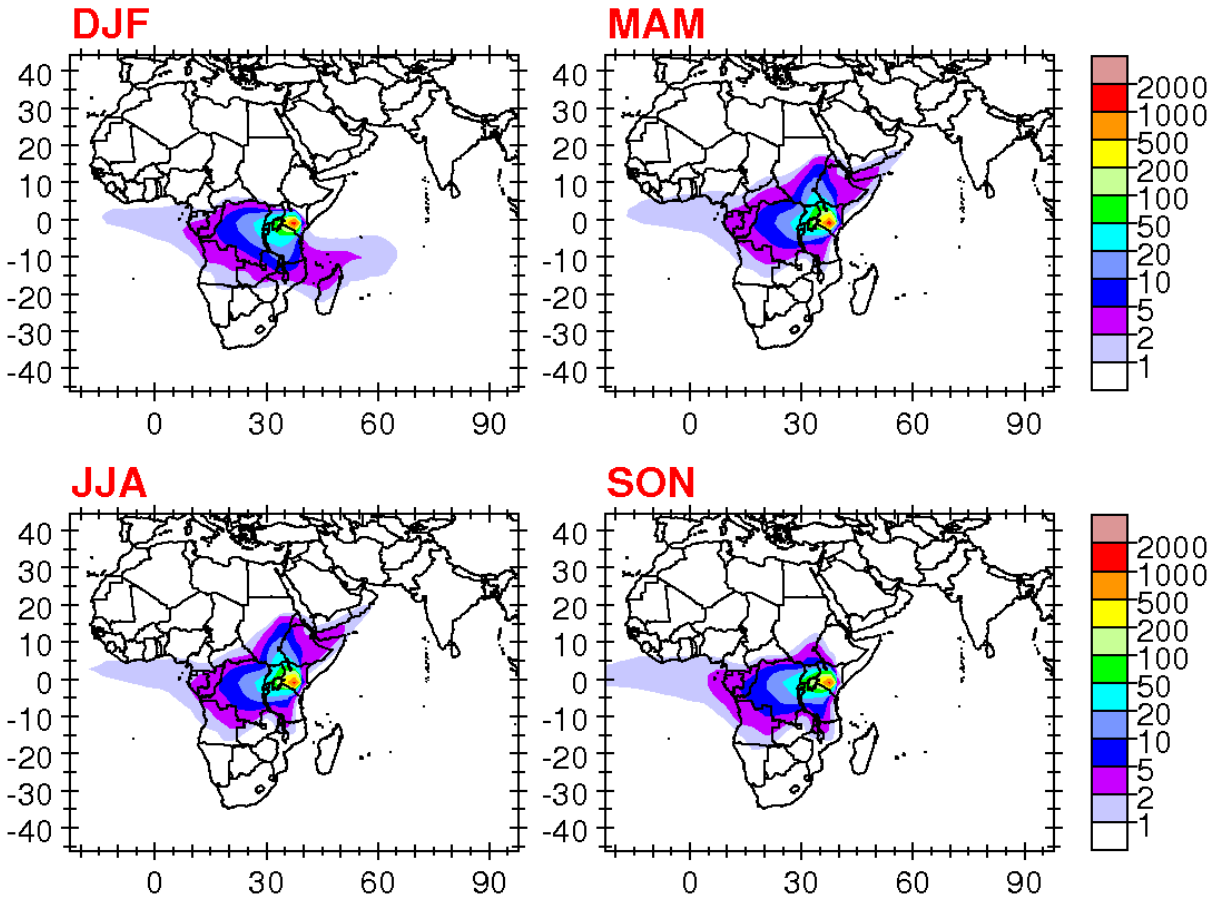
Lagos, Nigeria

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



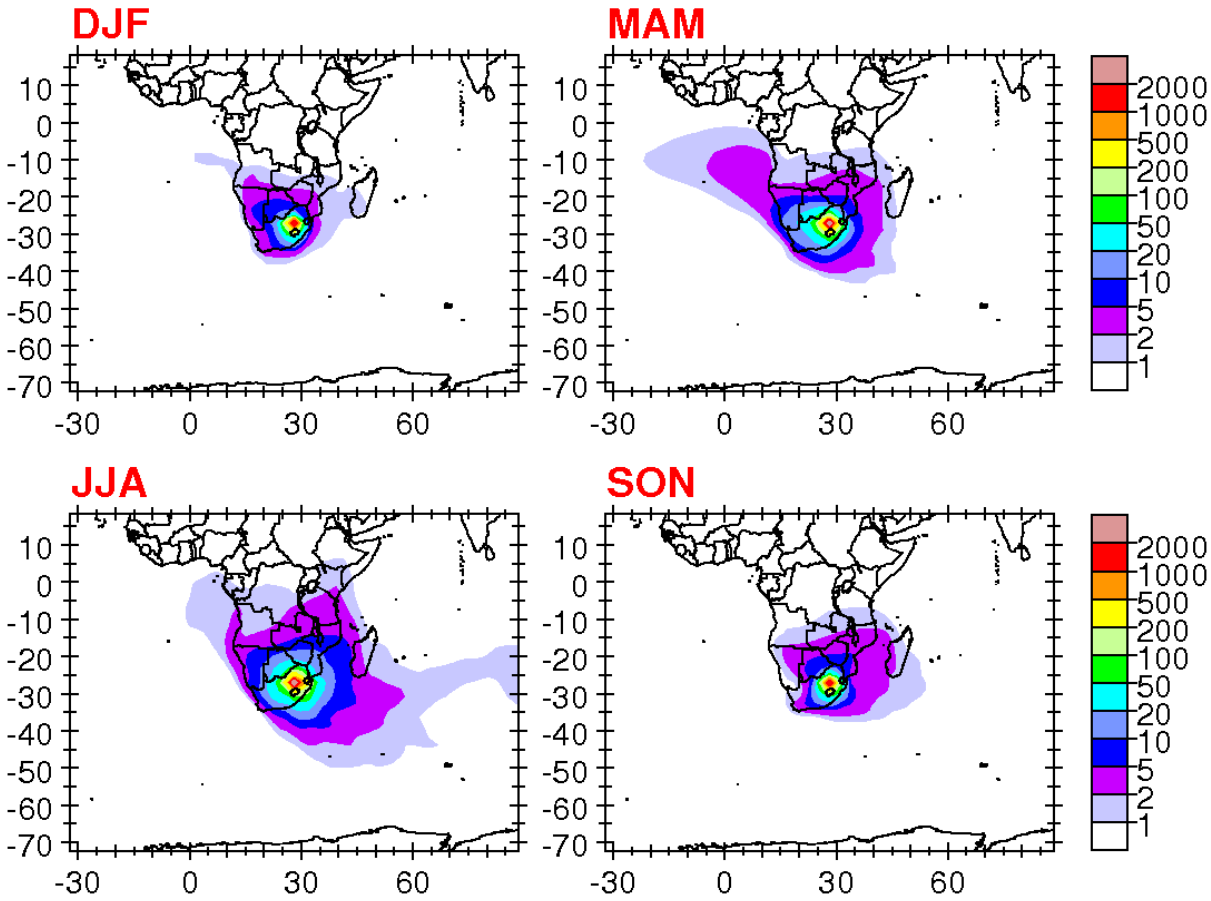
Nairobi, Kenya

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



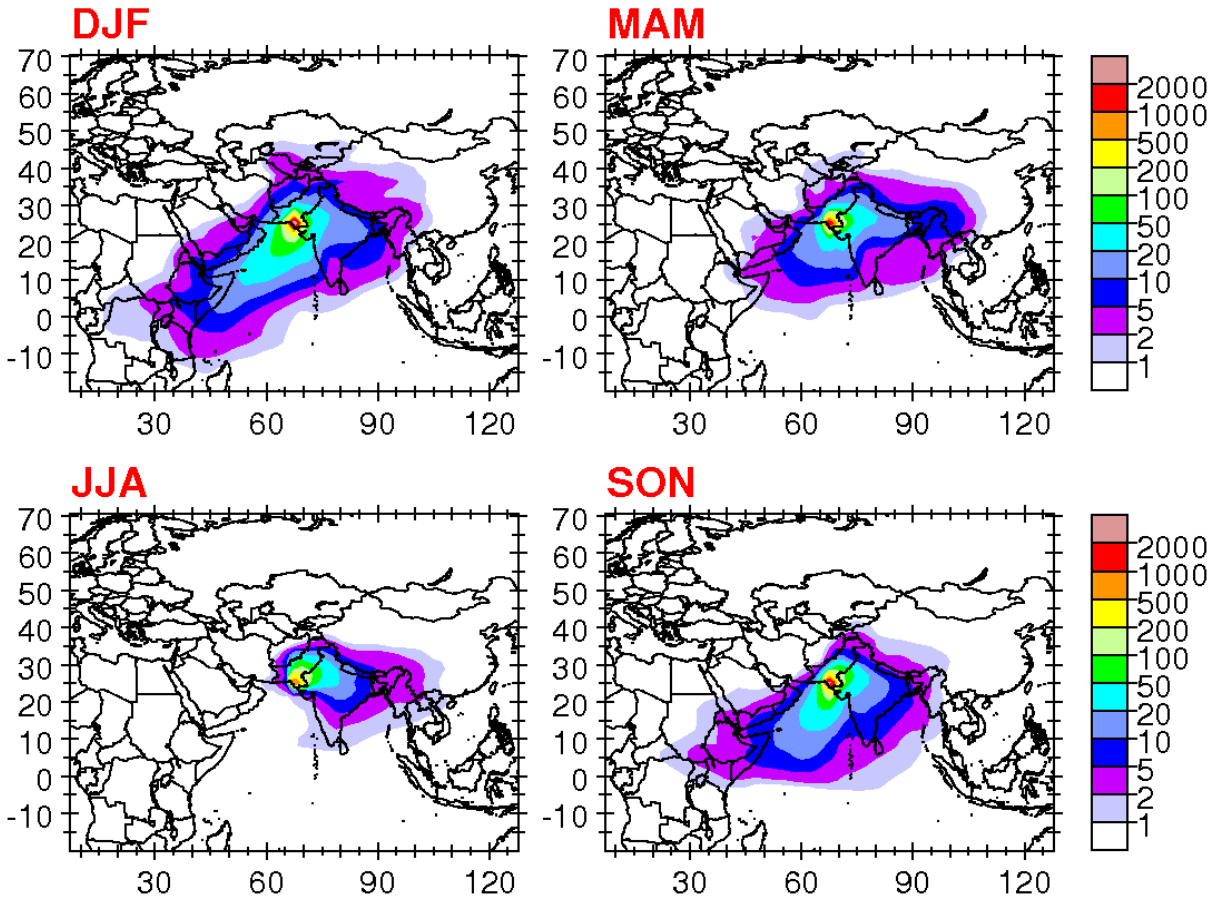
Johannesburg, South Africa

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



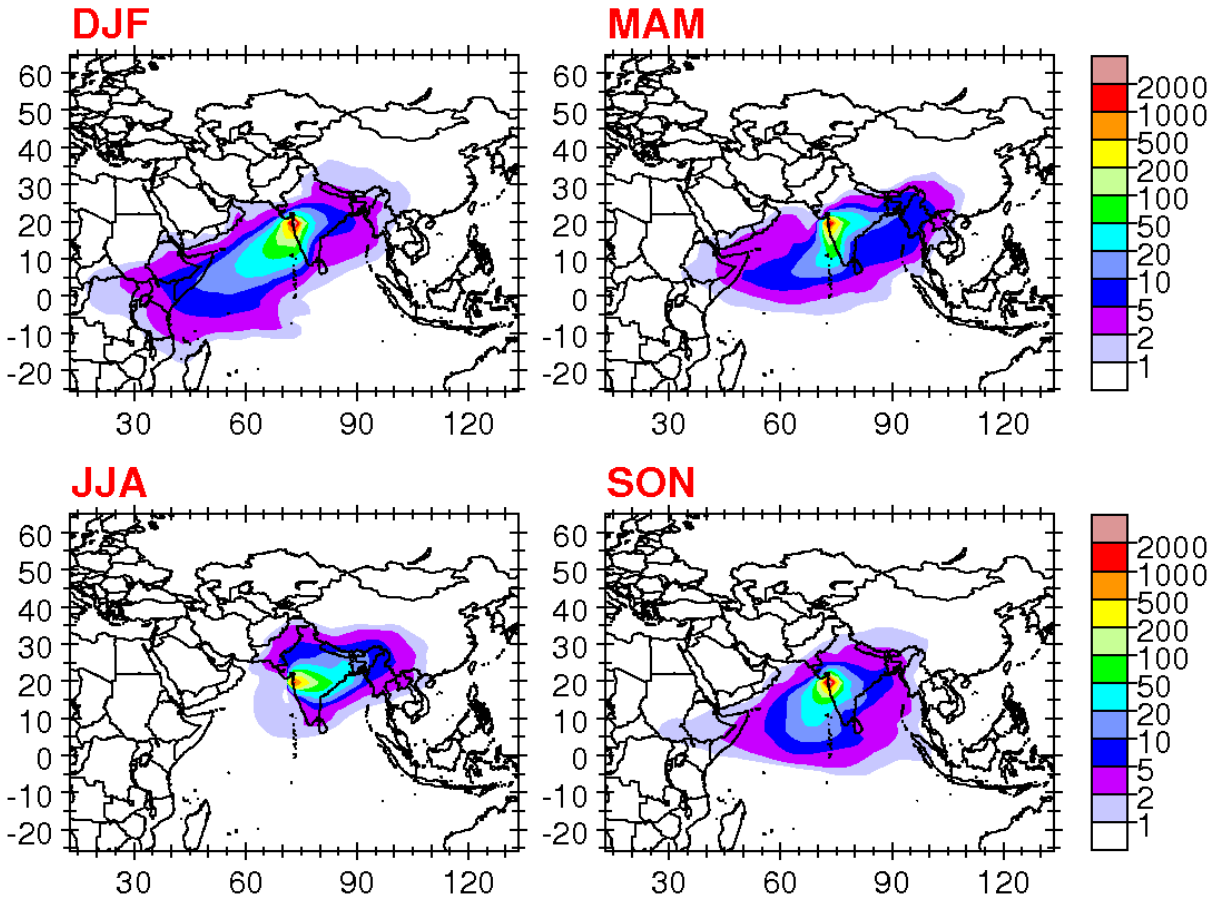
Karachi, Pakistan

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



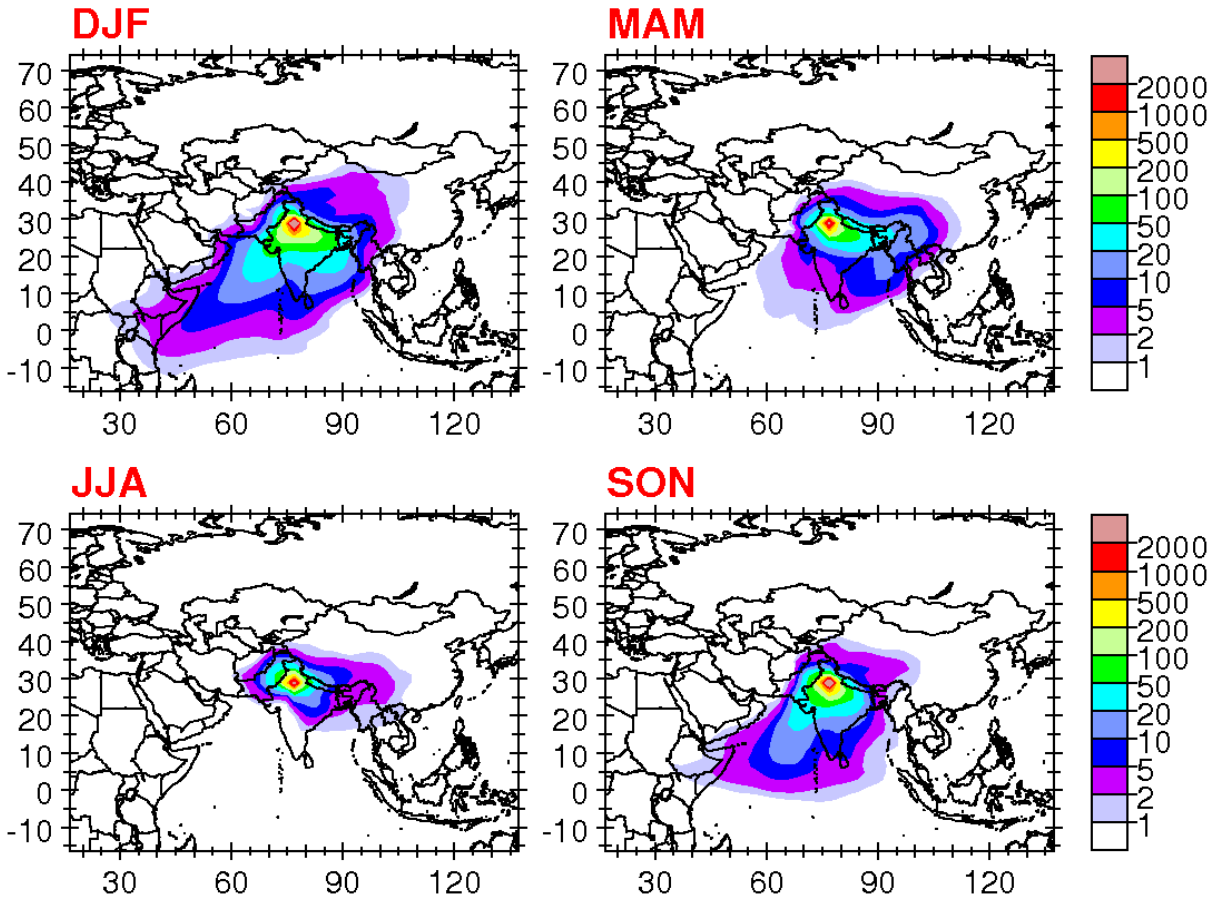
Mumbai (Bombay), India

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



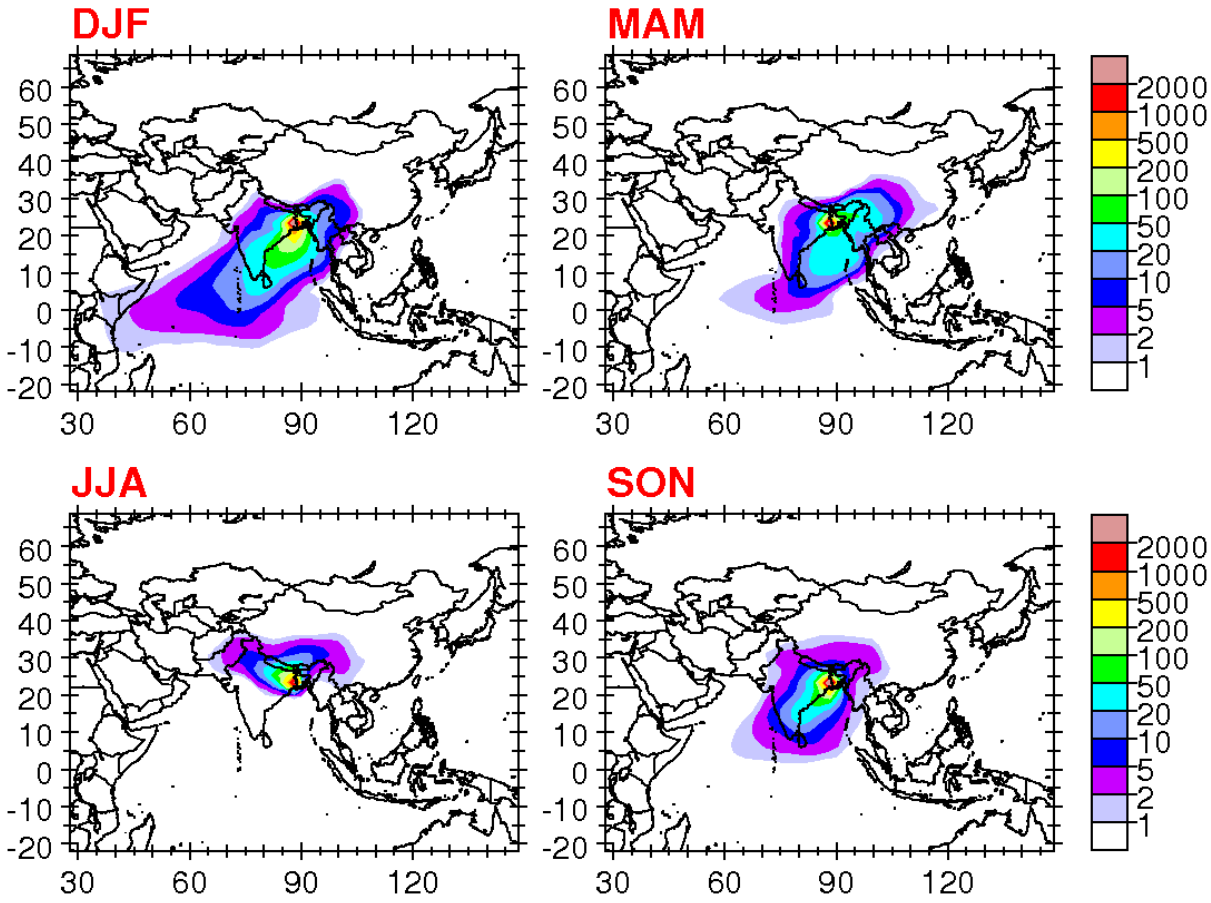
Delhi, India

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



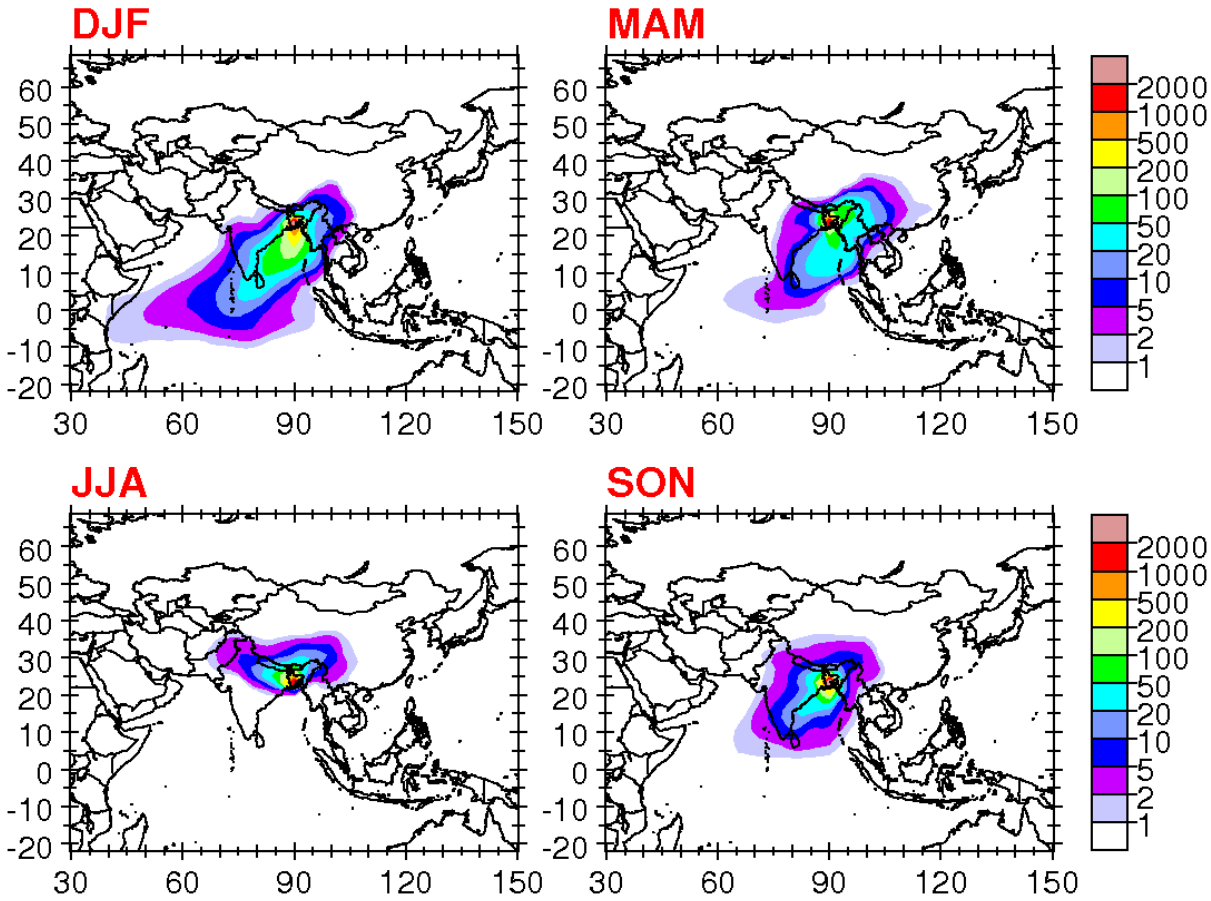
Kolkata (Calcutta), India

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



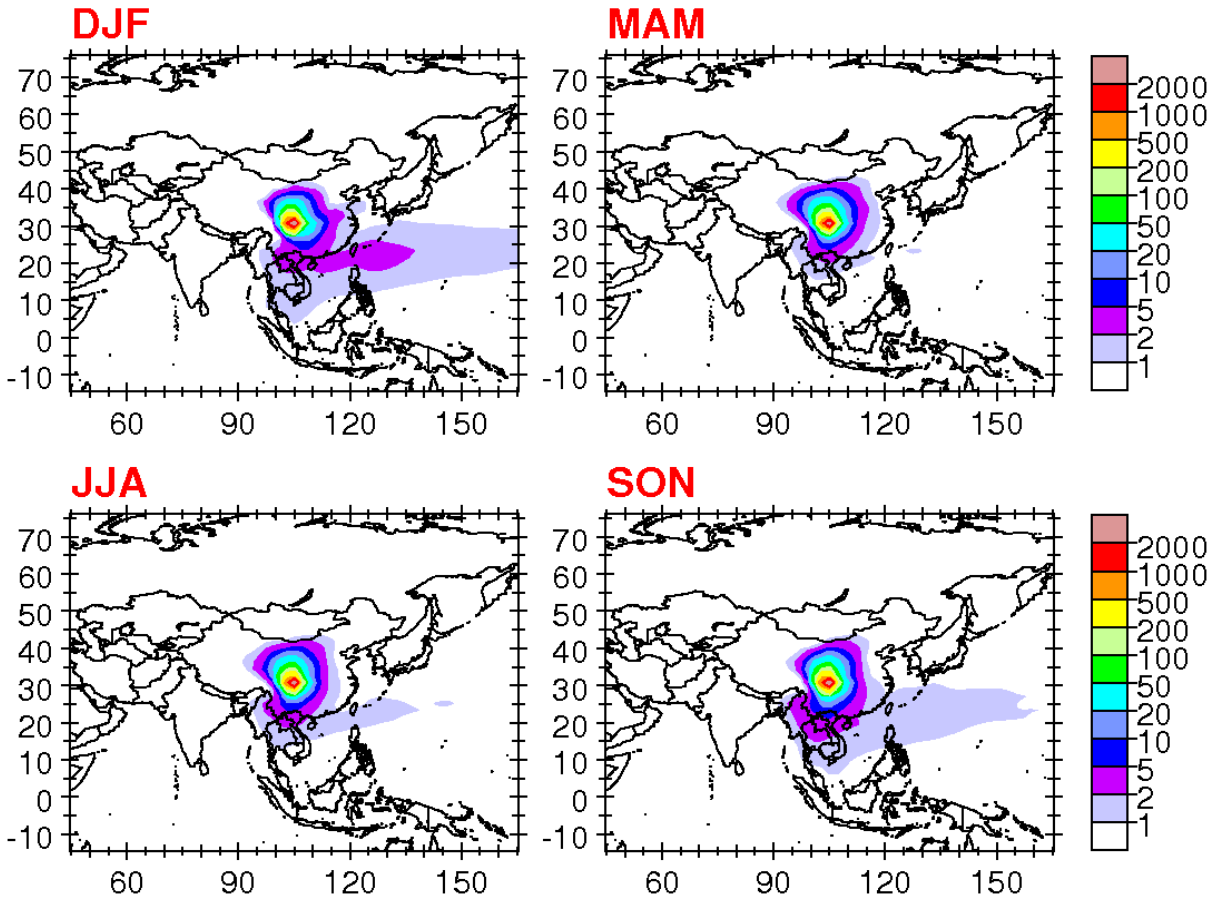
Dhaka, Bangladesh

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



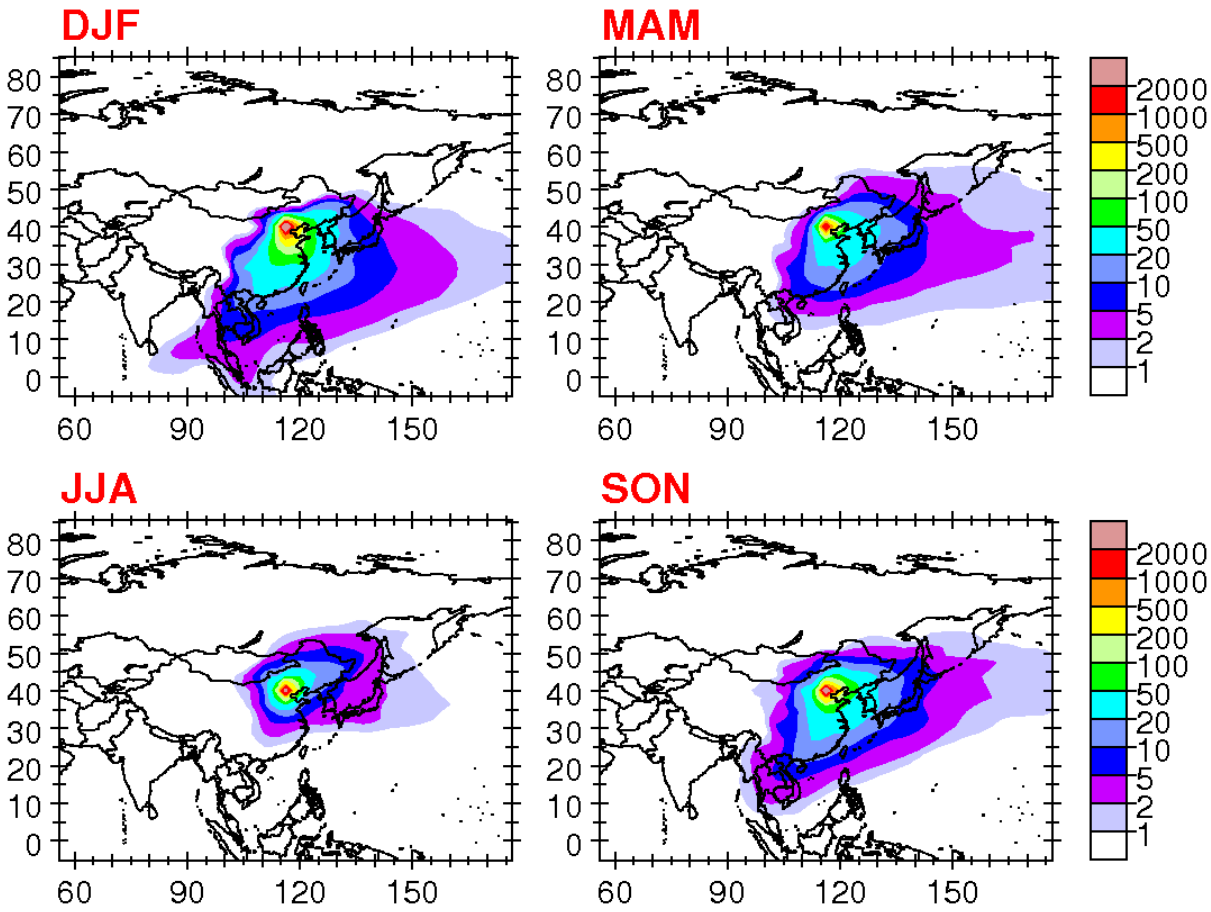
Szechuan Basin, China

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



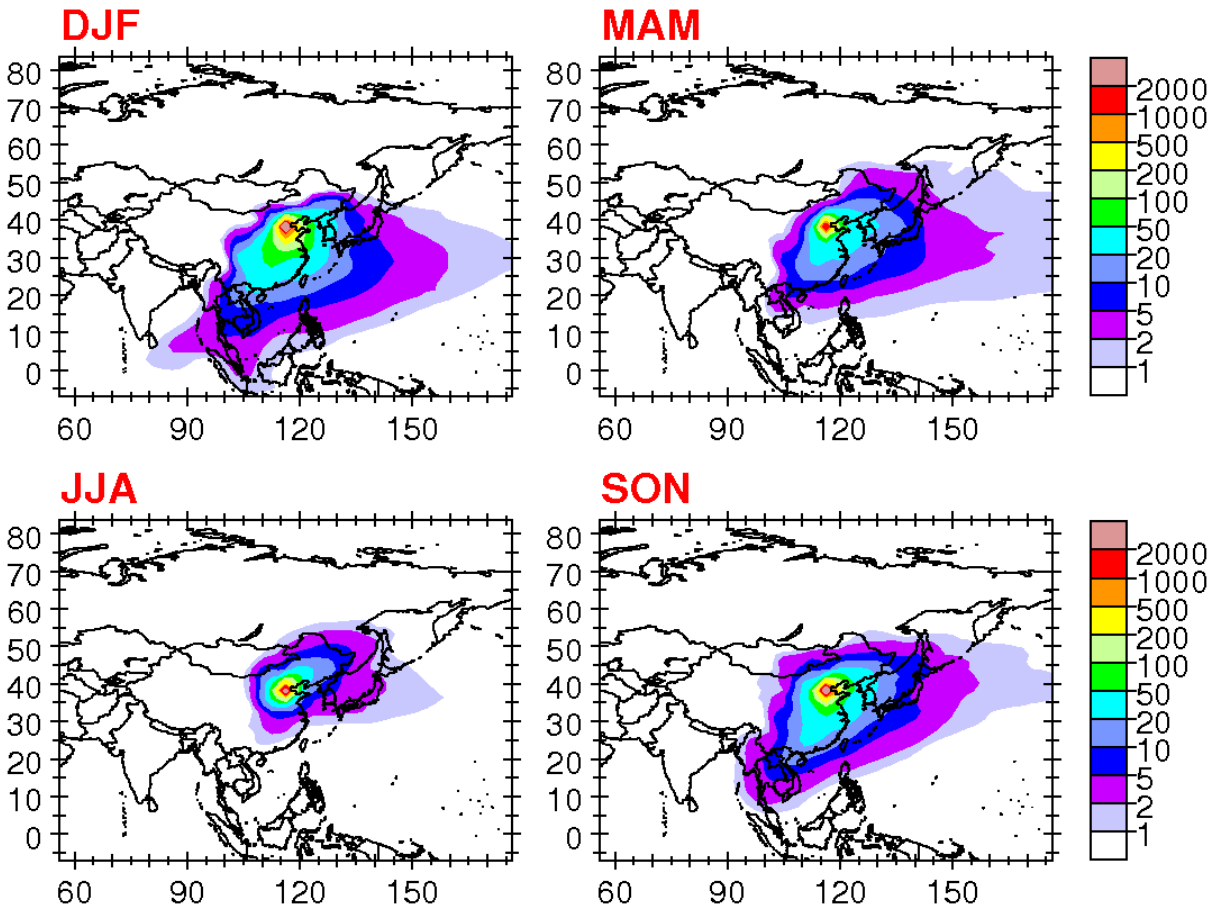
Beijing, China

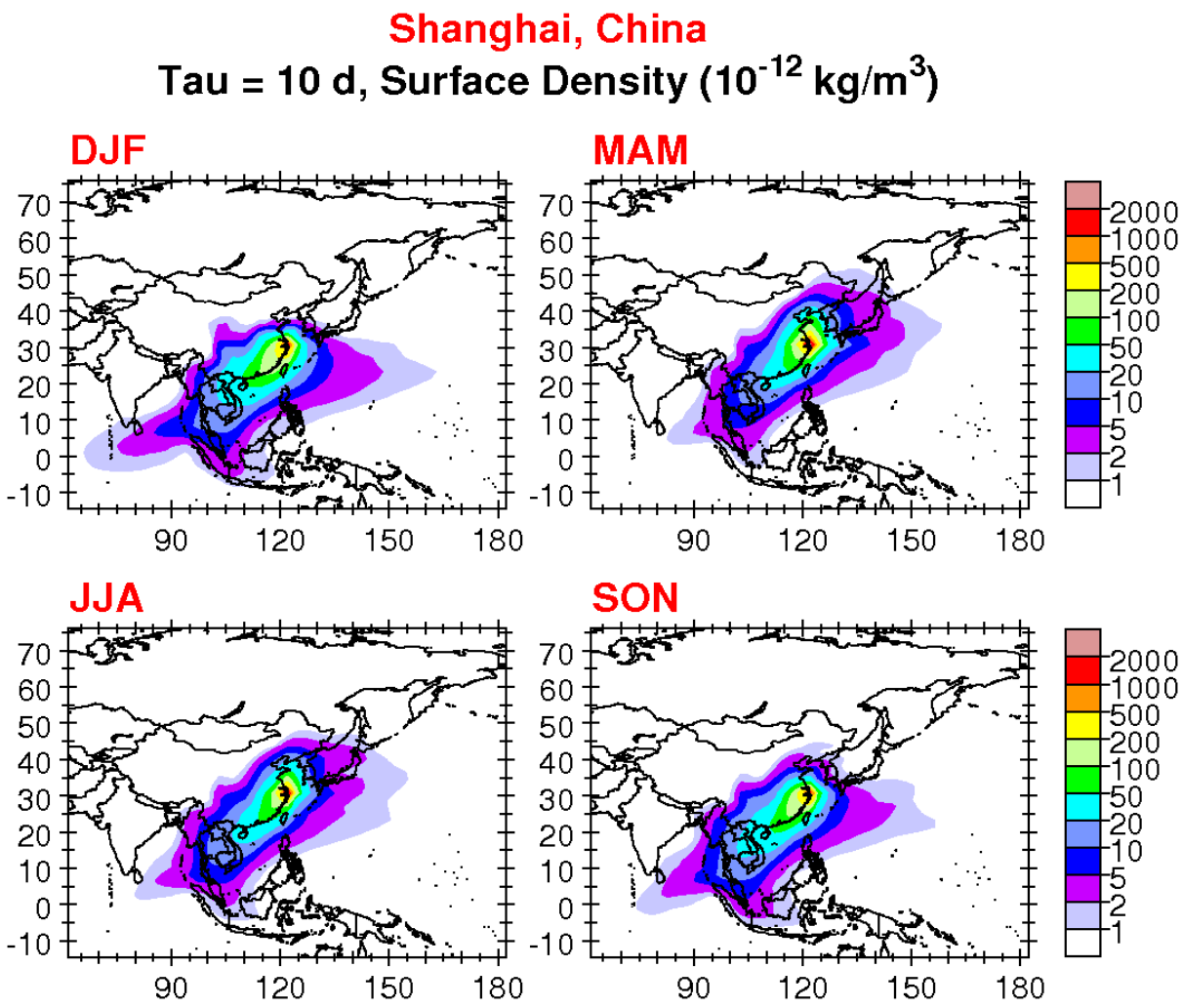
Tau = 10 d, Surface Density (10^{-12} kg/m^3)

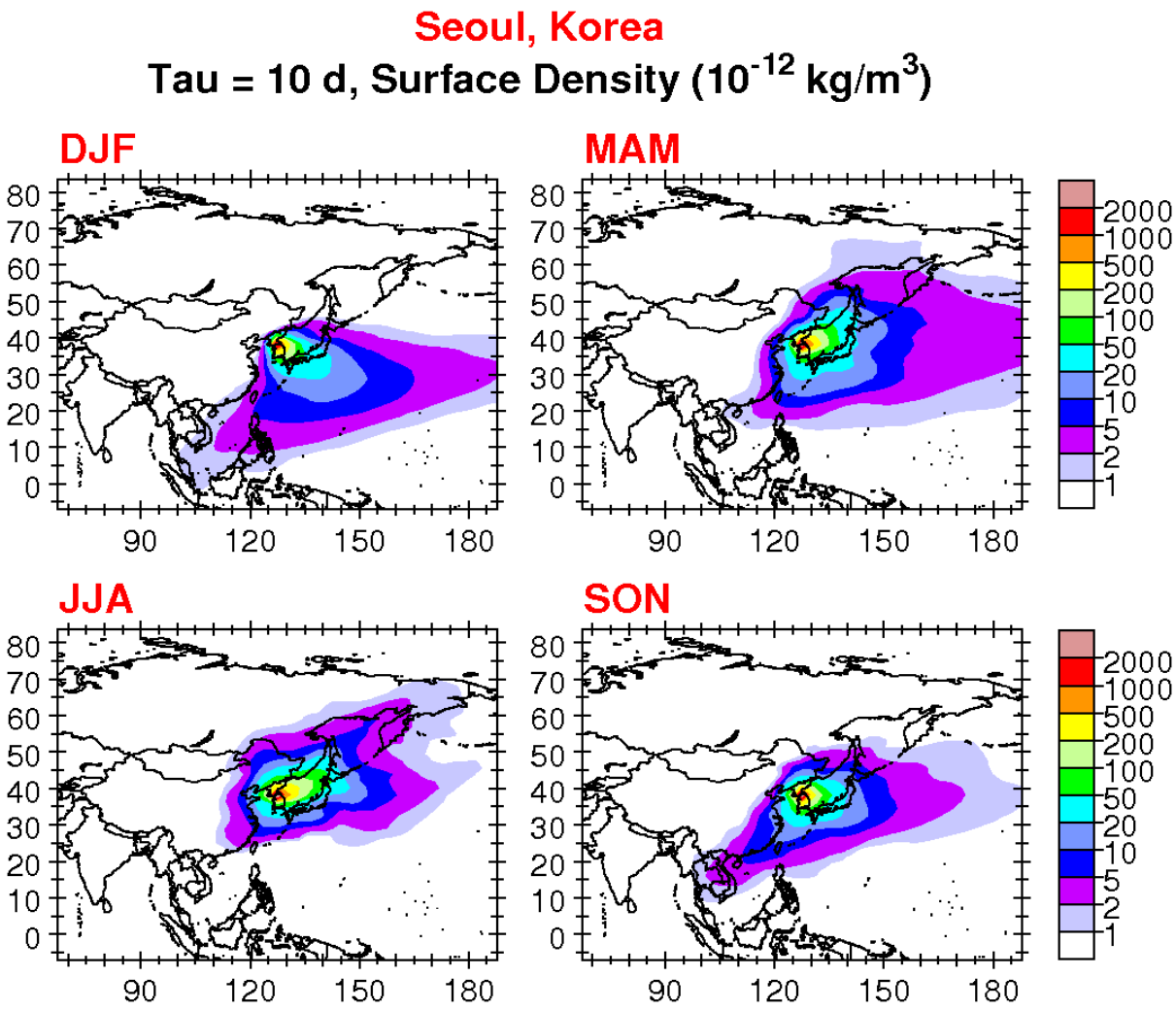


Tianjin, China

Tau = 10 d, Surface Density (10^{-12} kg/m^3)

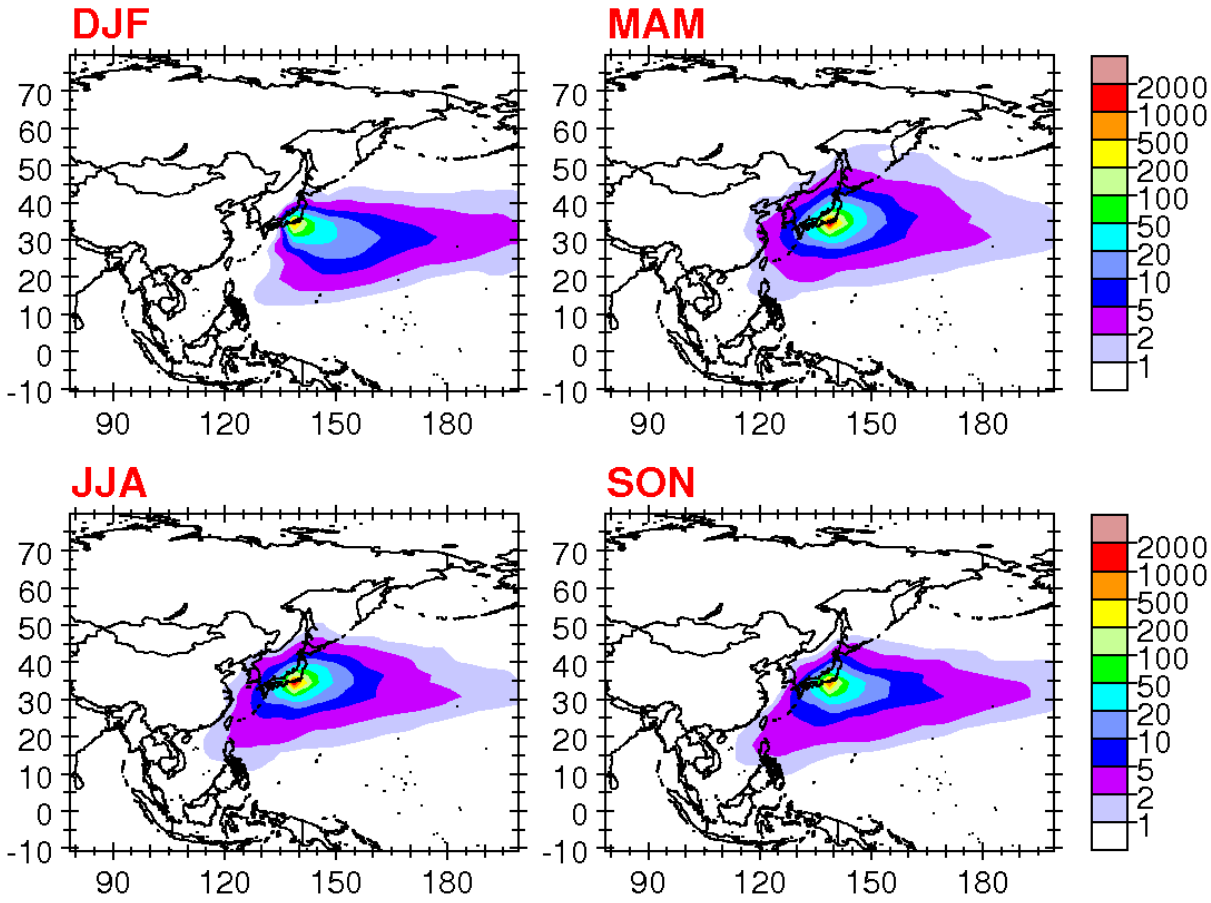



Shanghai, China
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
70
60
50
40
30
20
10
0
-10
90
120
150
180
2000
1000
500
200
100
50
20
10
5
2
1


Seoul, Korea
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
80
70
60
50
40
30
20
10
0
90
120
150
180
2000
1000
500
200
100
50
20
10
5
2
1

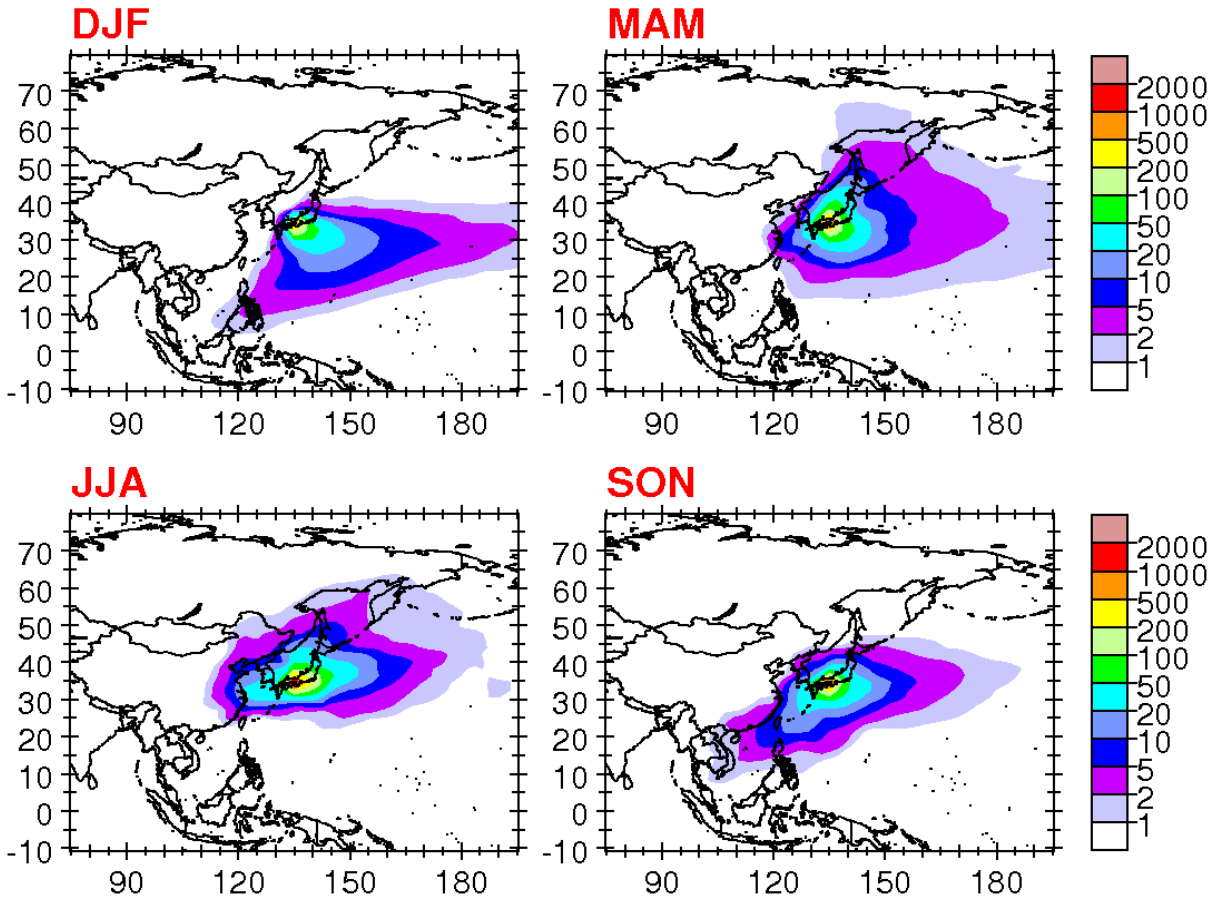
Tokyo, Japan

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



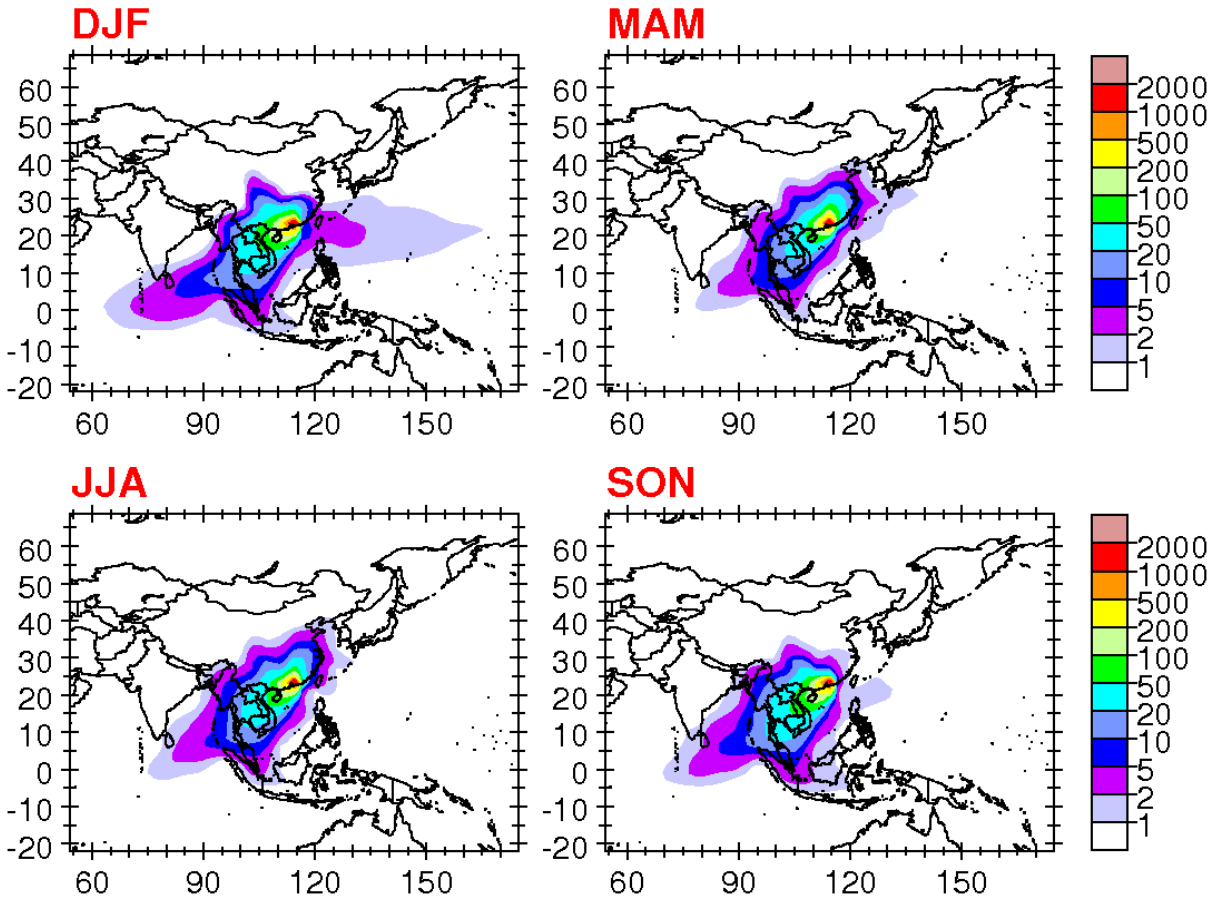
Osaka, Japan

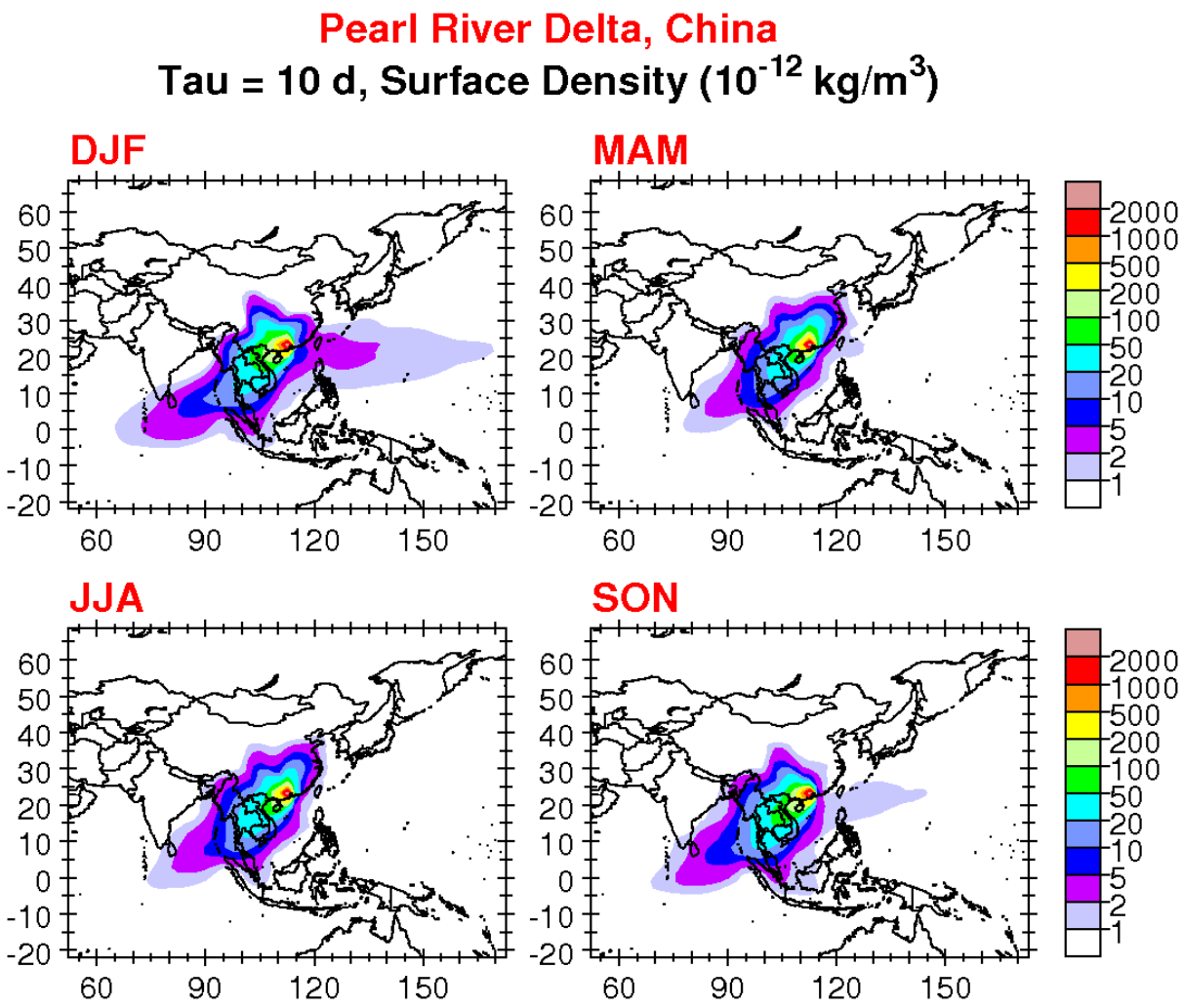
Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Hong Kong

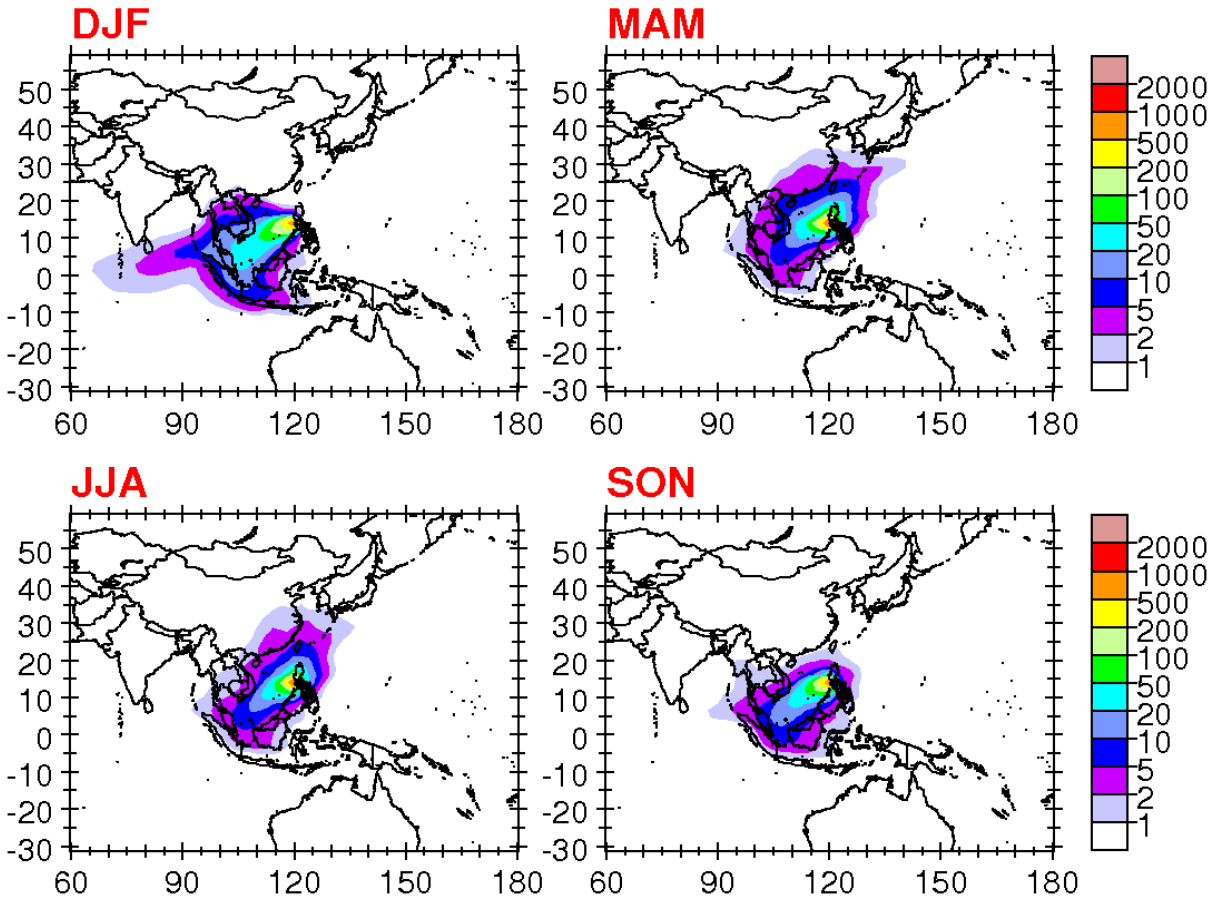
Tau = 10 d, Surface Density (10^{-12} kg/m^3)




Pearl River Delta, China
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
60
50
40
30
20
10
0
-10
-20
60
90
120
150
2000
1000
500
200
100
50
20
10
5
2
1

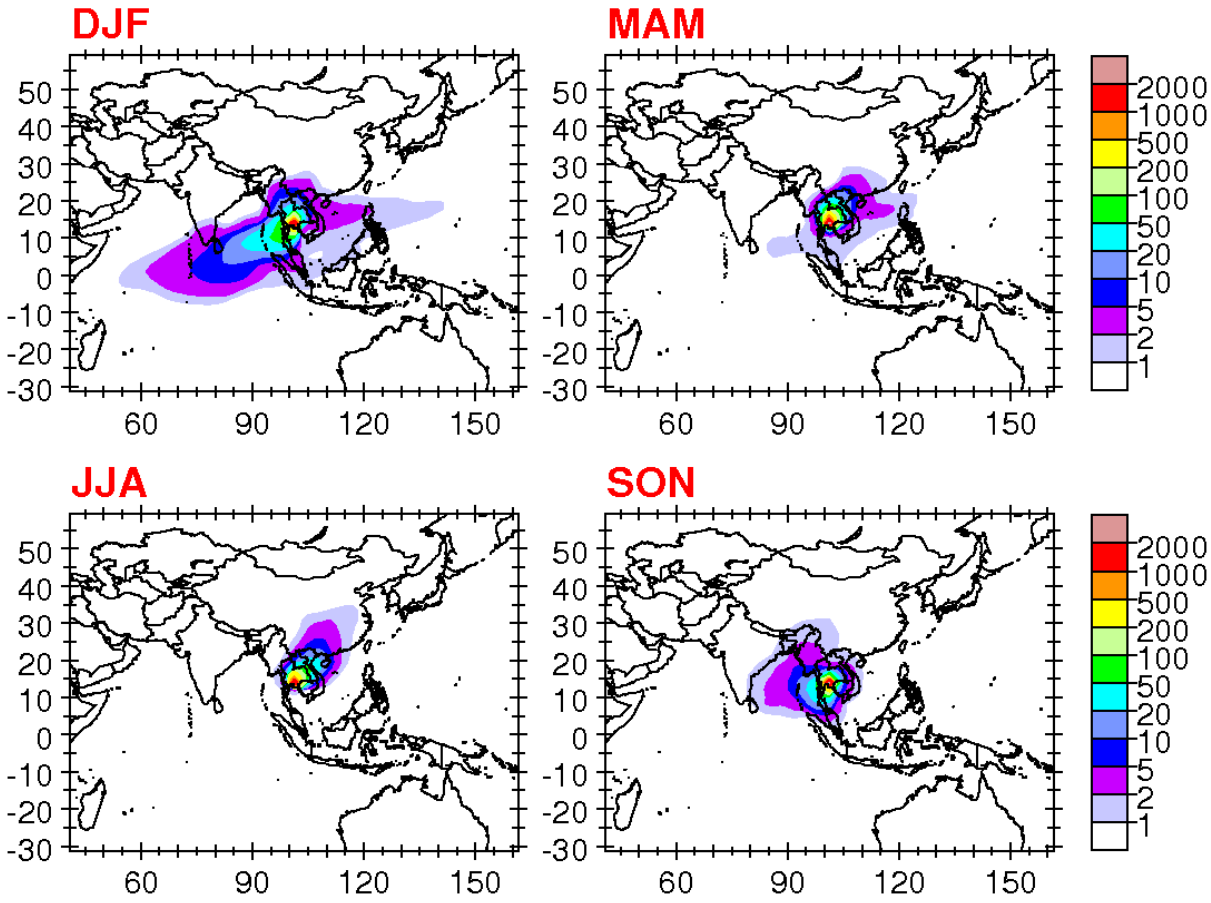
Manila, Philippines

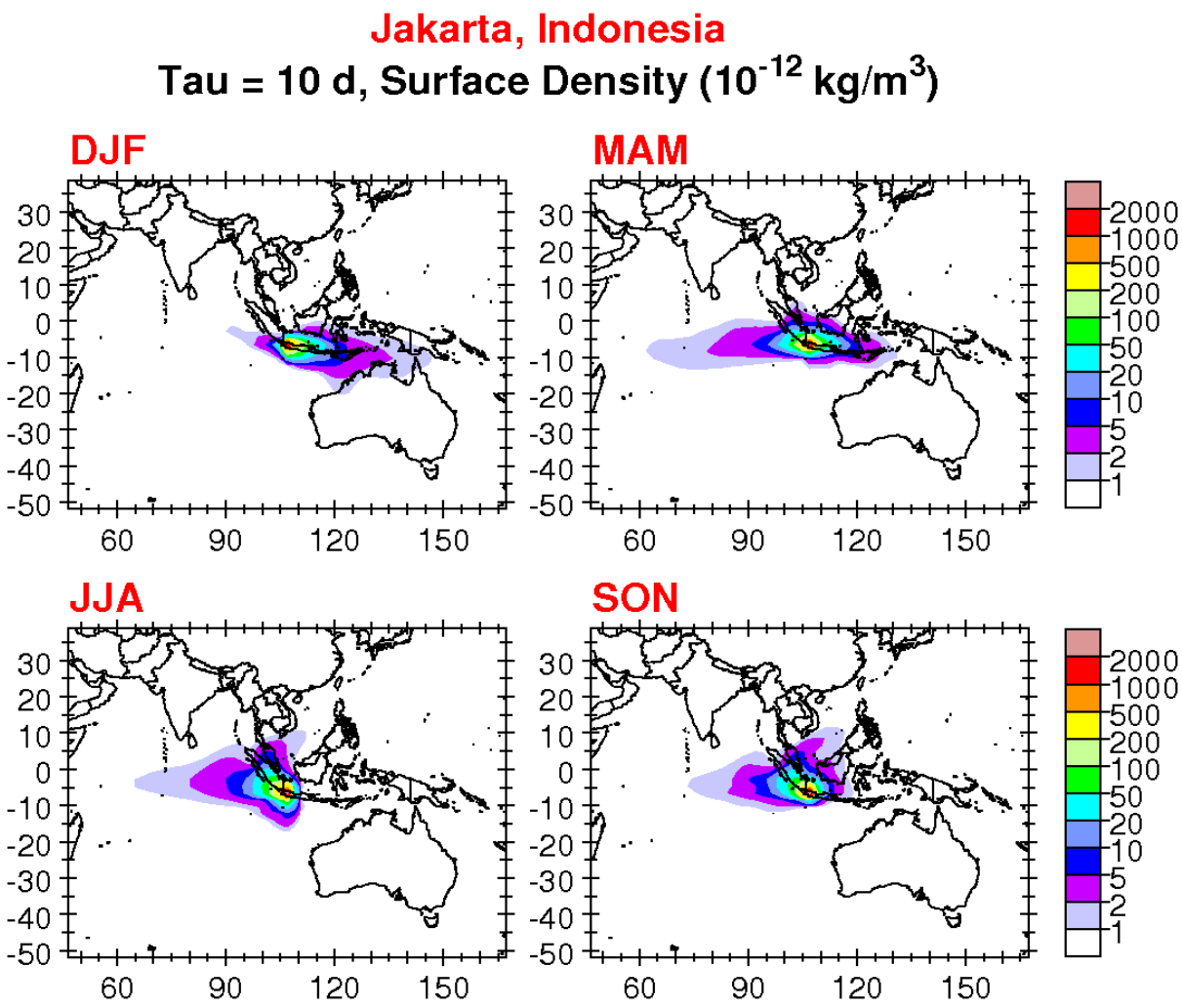
Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Bangkok, Thailand

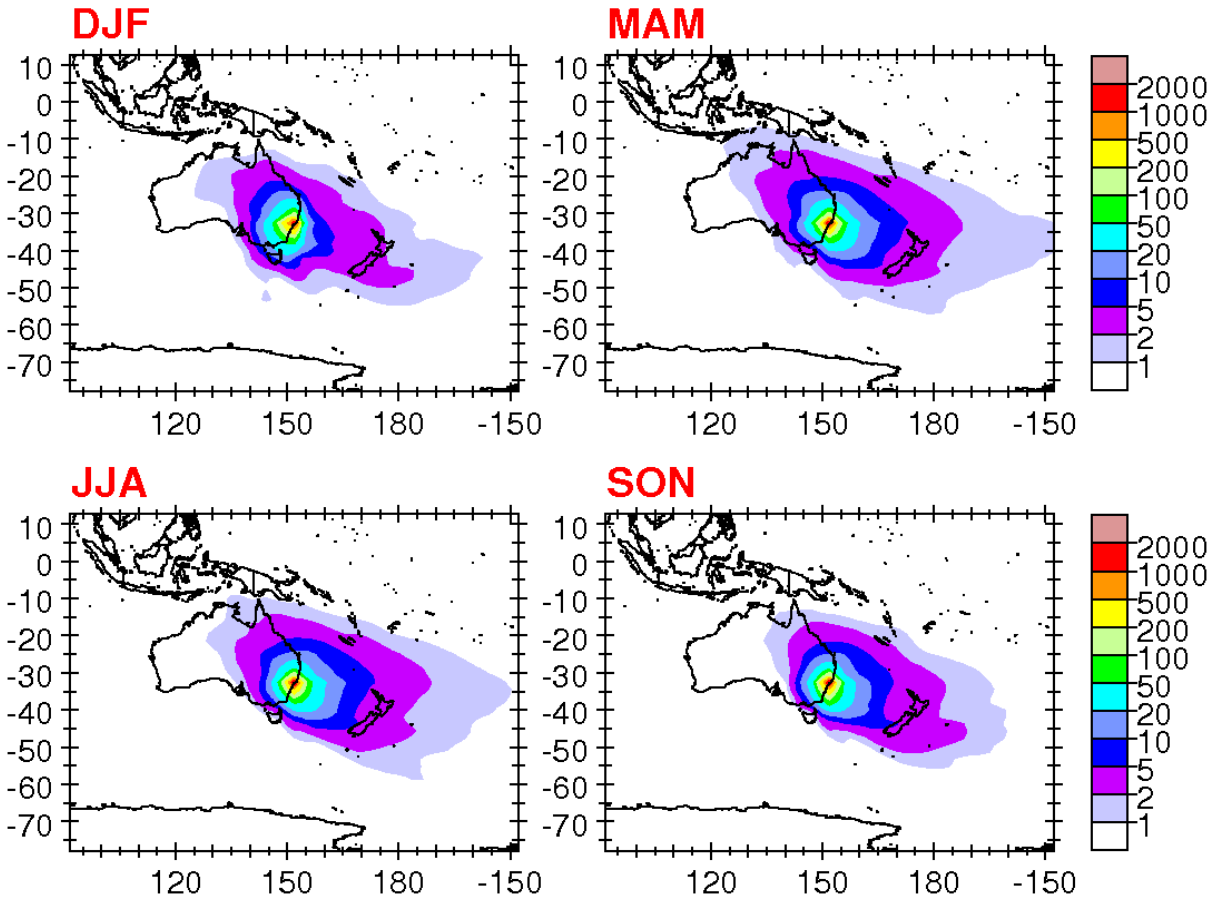
Tau = 10 d, Surface Density (10^{-12} kg/m^3)




Jakarta, Indonesia
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
30
20
10
0
-10
-20
-30
-40
-50
60
90
120
150
2000
1000
500
200
100
50
20
10
5
2
1

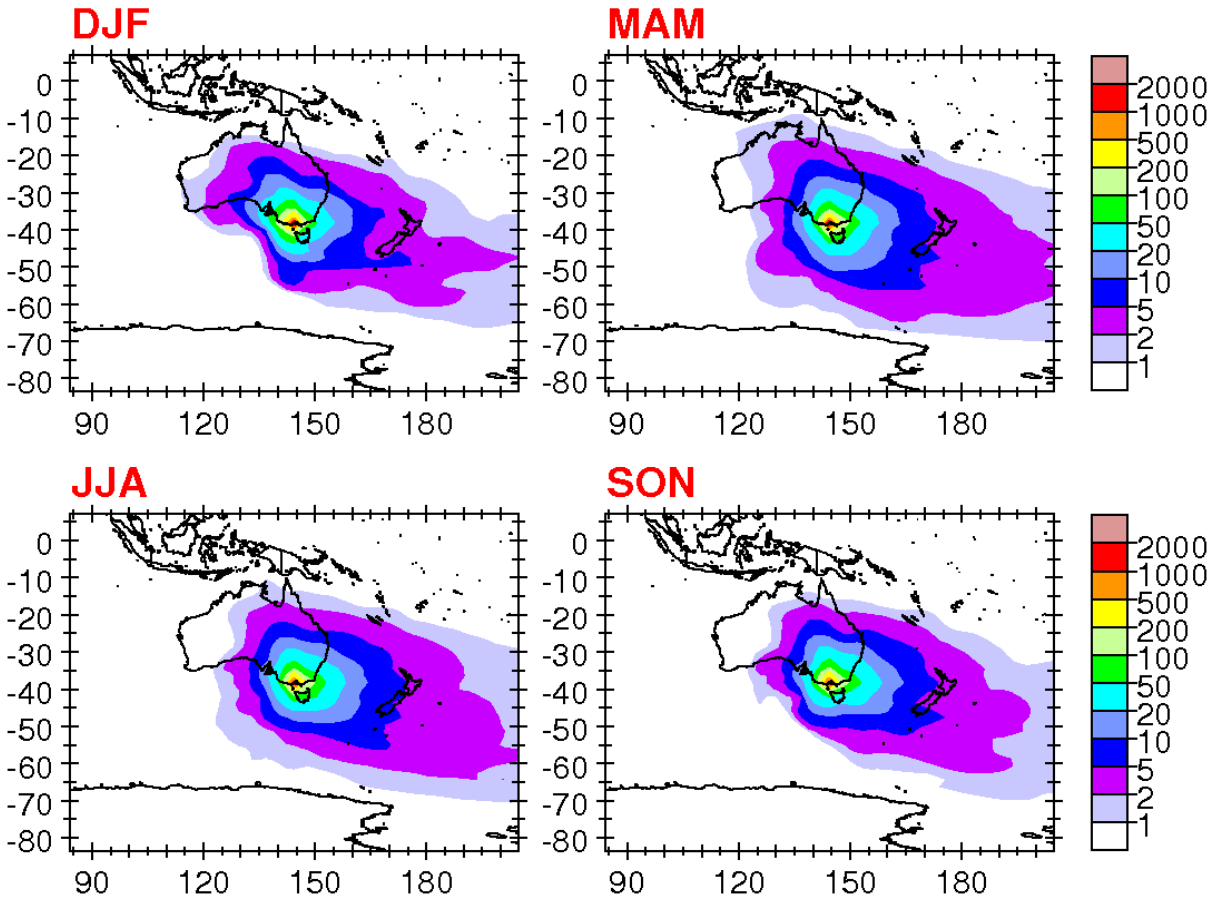
Sydney, Australia

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



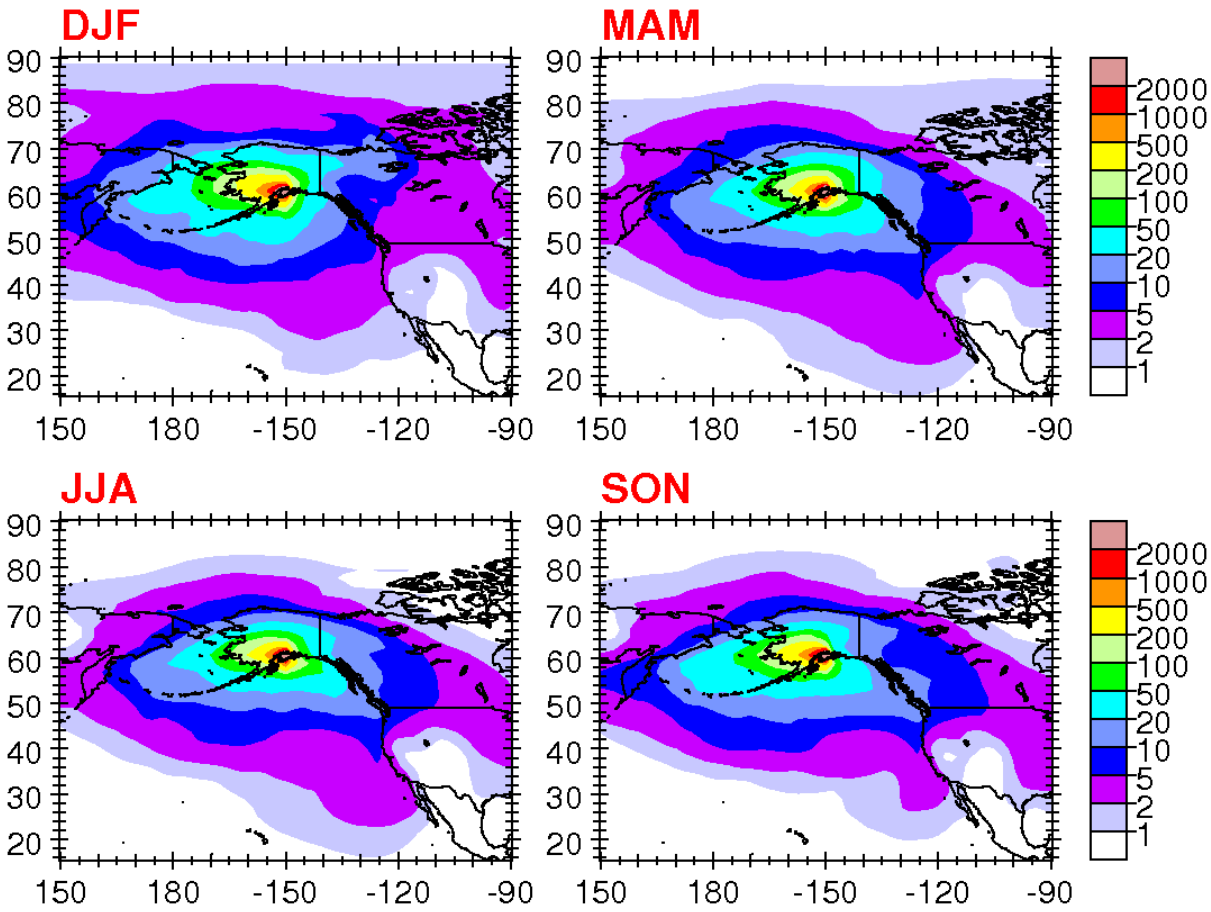
Melbourne, Australia

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



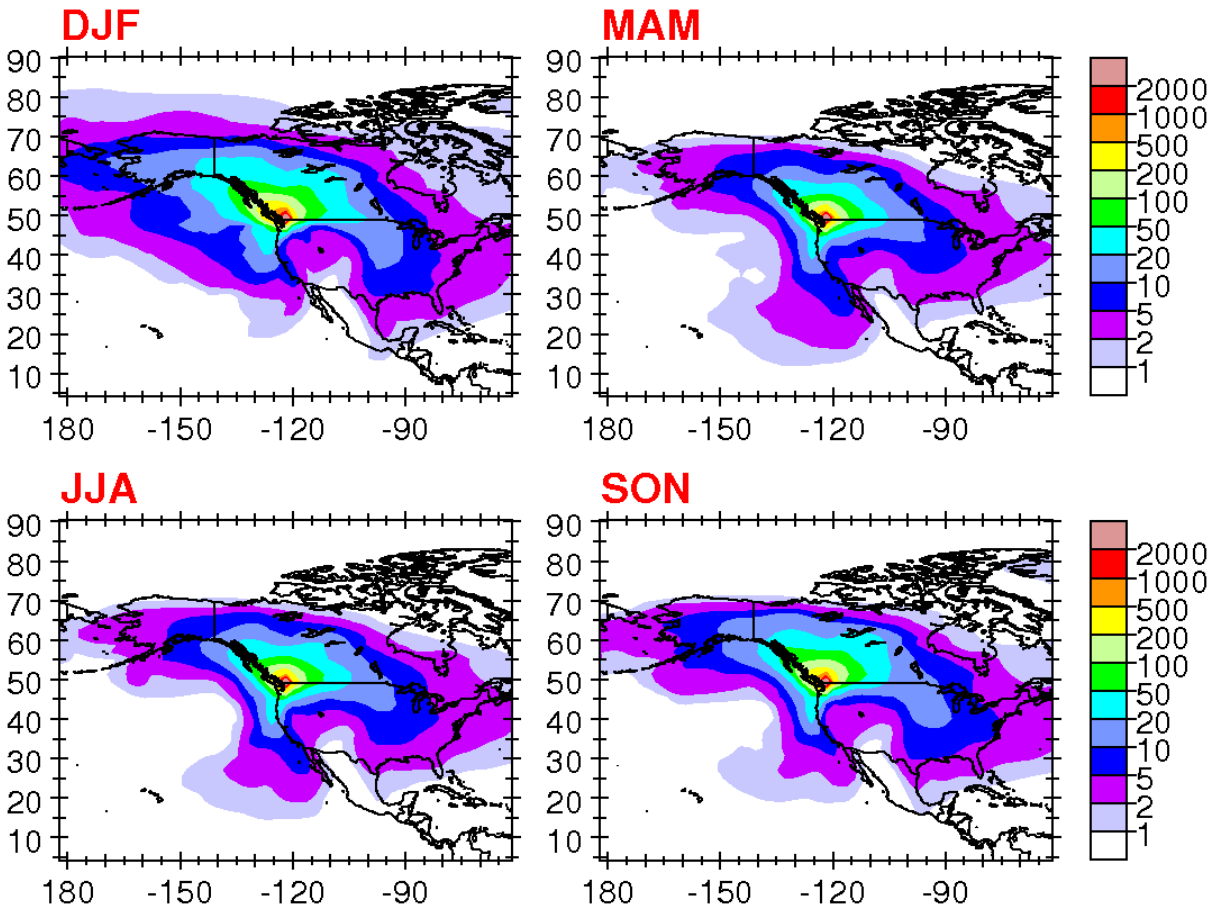
Anchorage, USA

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



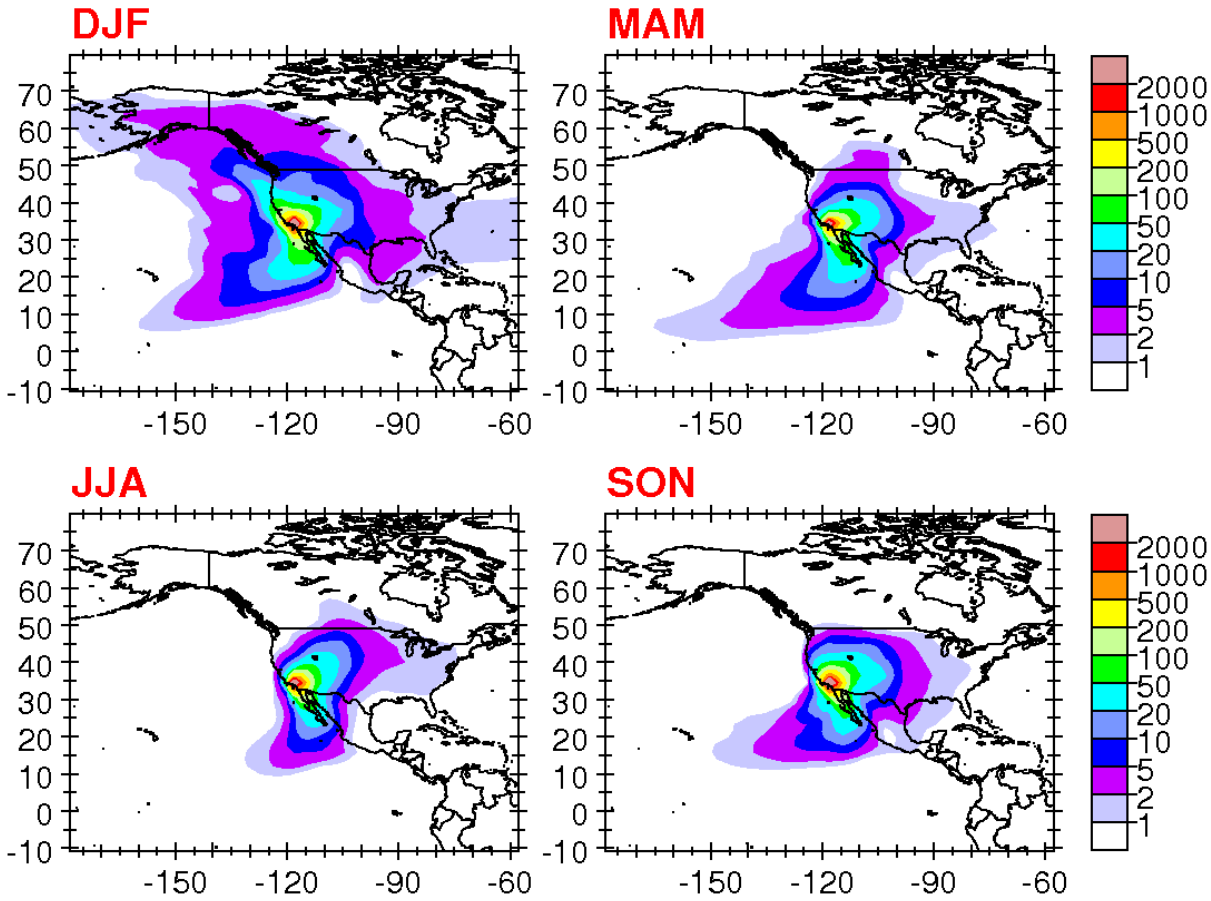
Seattle, USA + Vancouver, CA

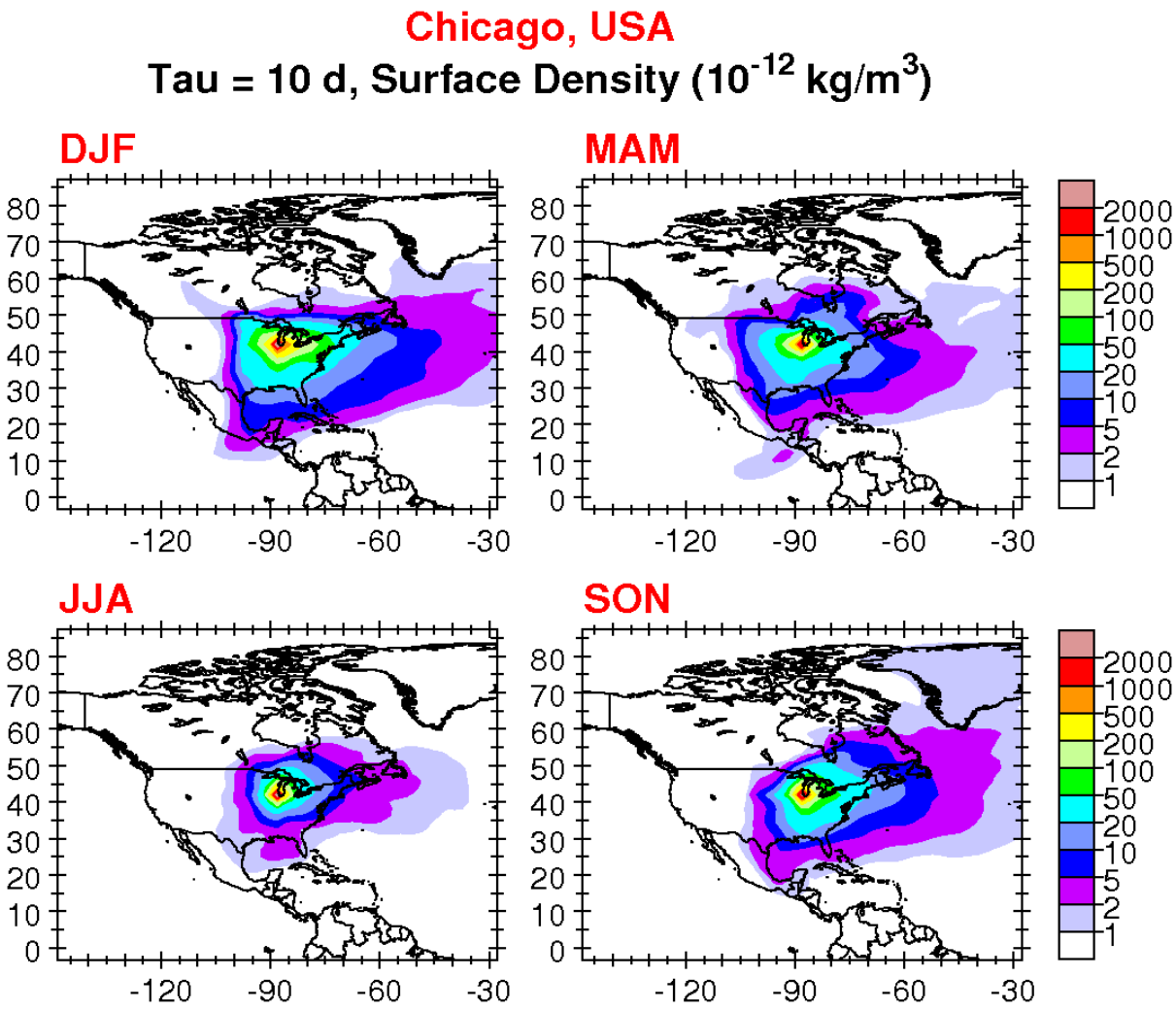
Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Los Angeles, USA

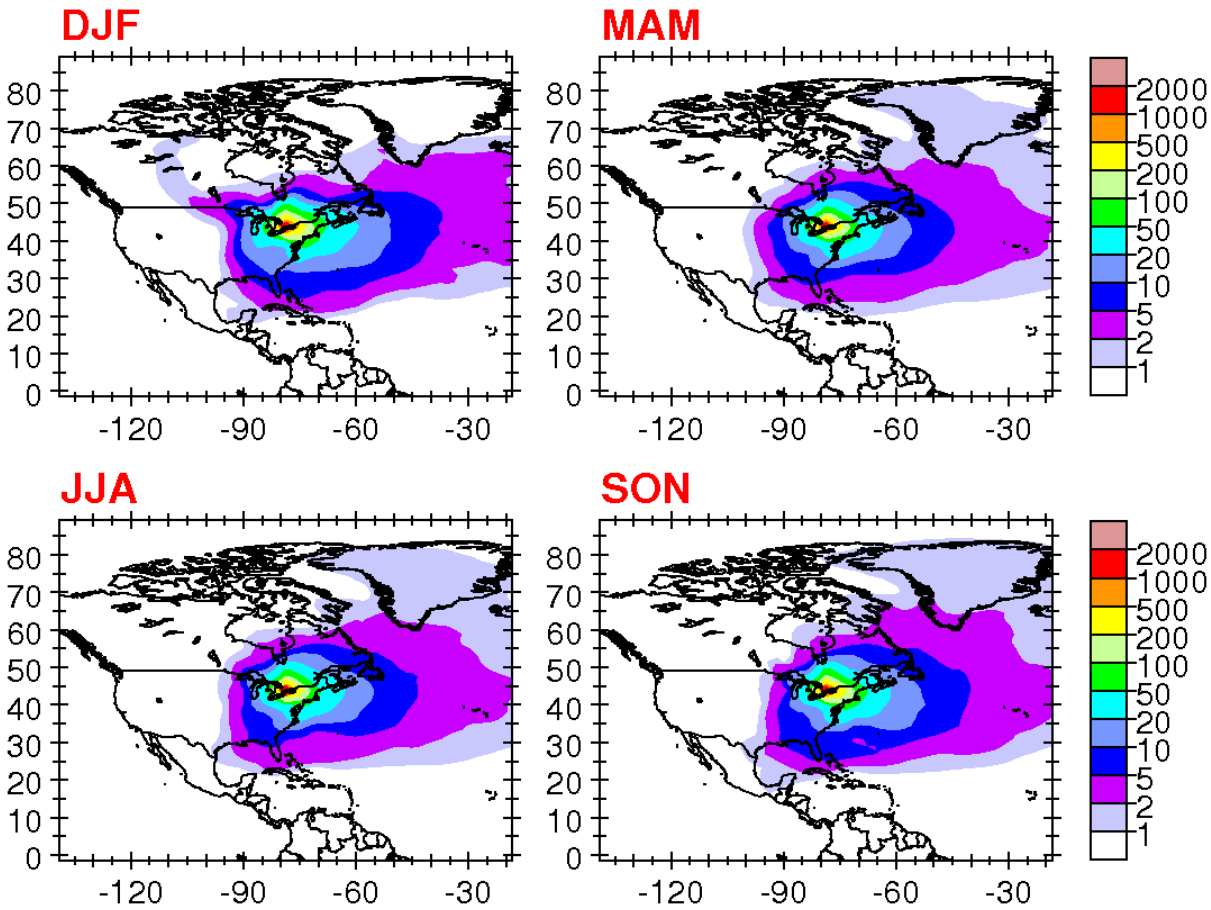
Tau = 10 d, Surface Density (10^{-12} kg/m^3)




Chicago, USA
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
80
70
60
50
40
30
20
10
0
-120
-90
-60
-30
2000
1000
500
200
100
50
20
10
5
2
1

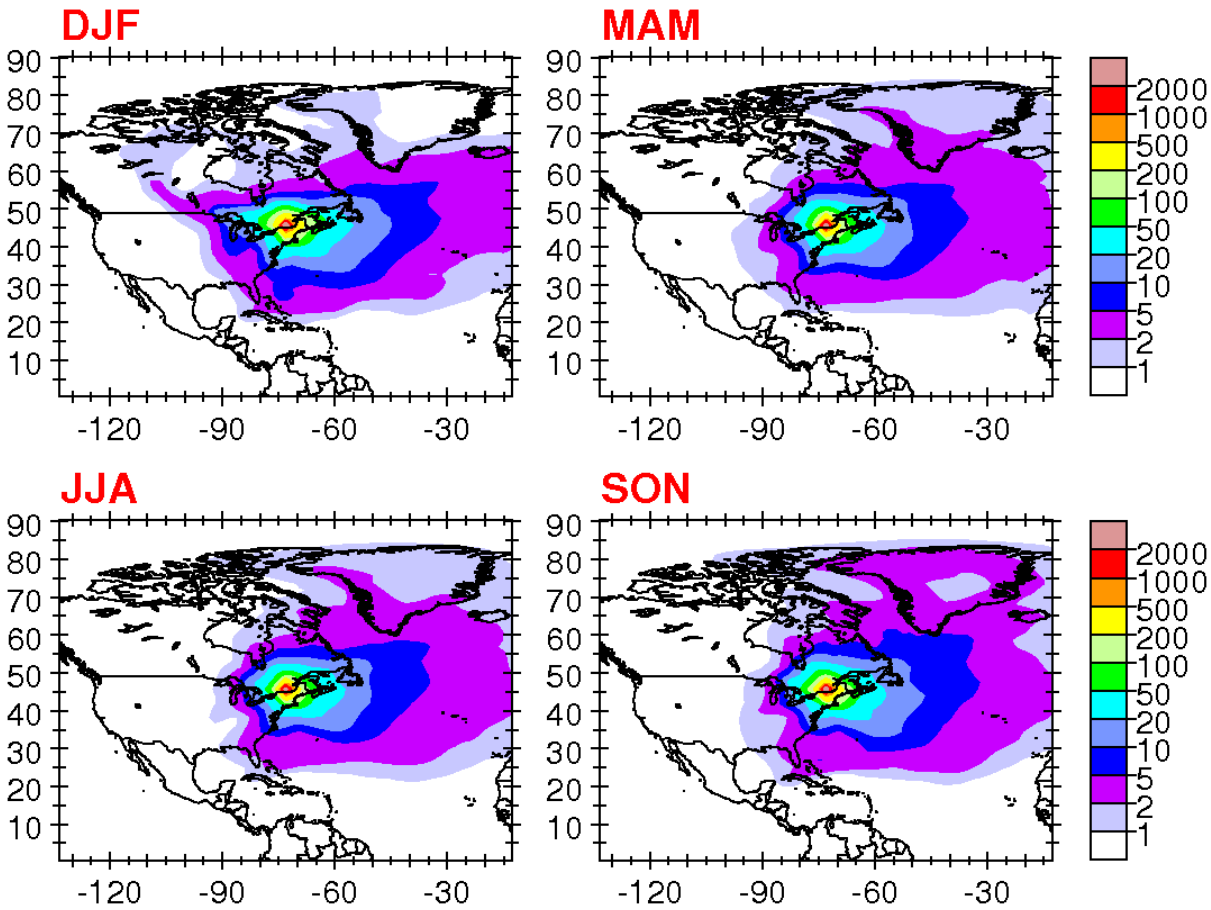
Toronto, Canada

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



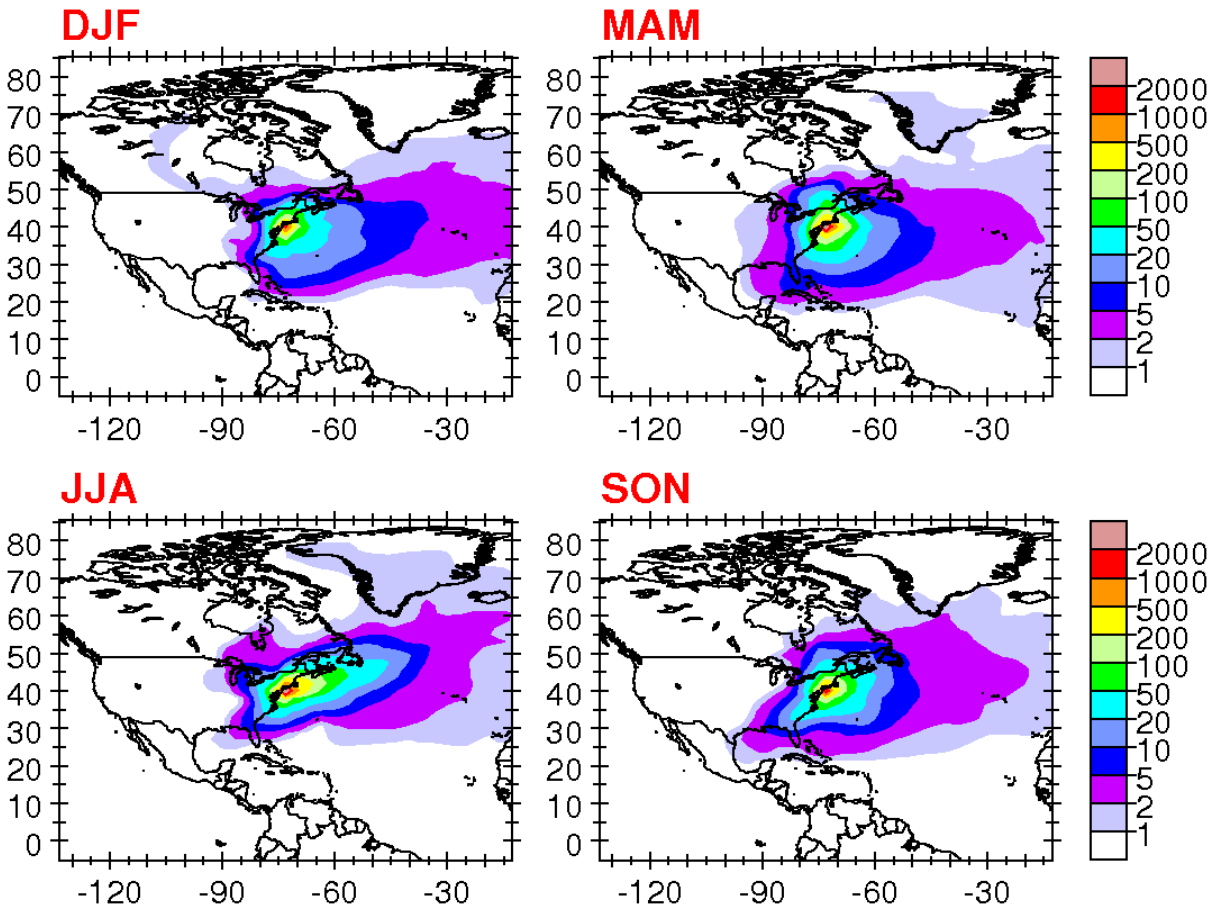
Montreal, Canada

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



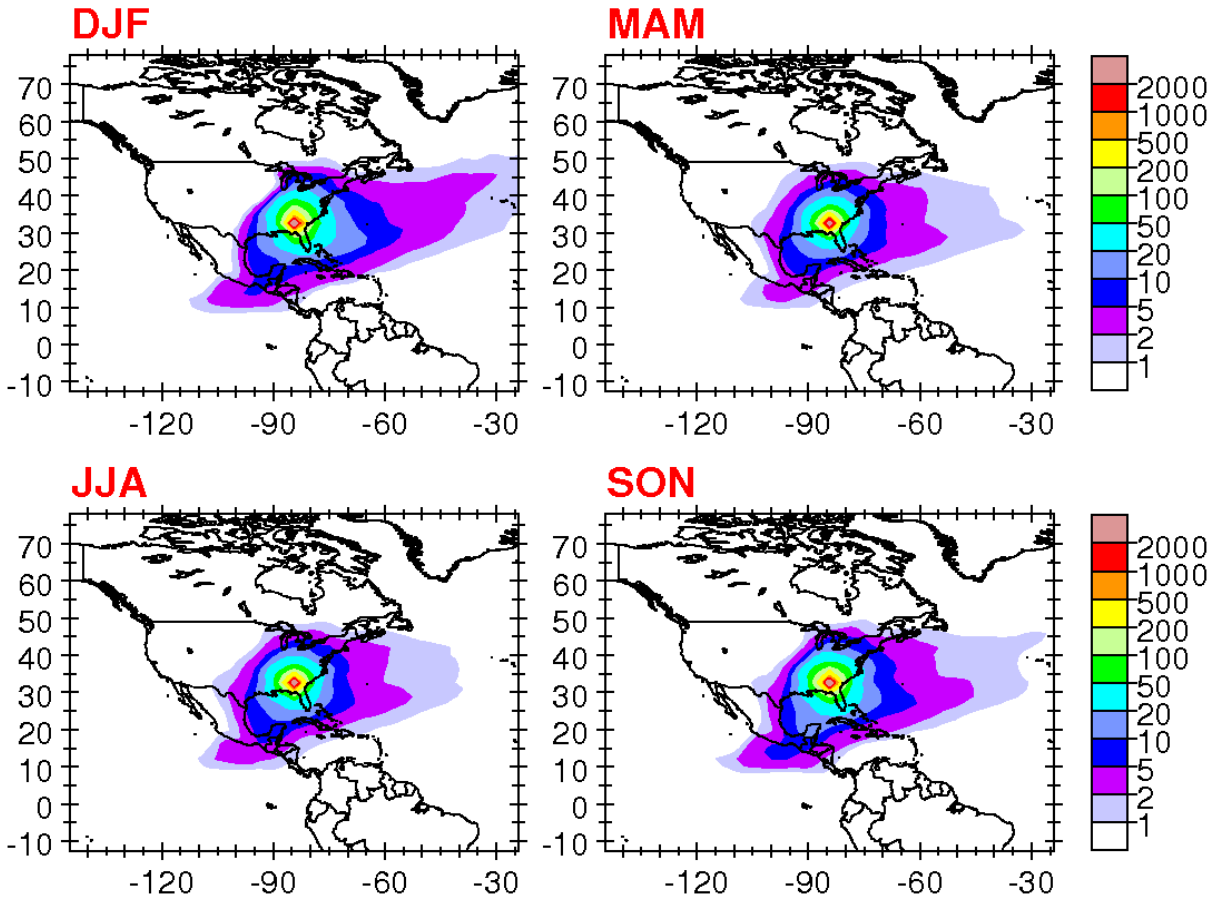
New York, USA

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



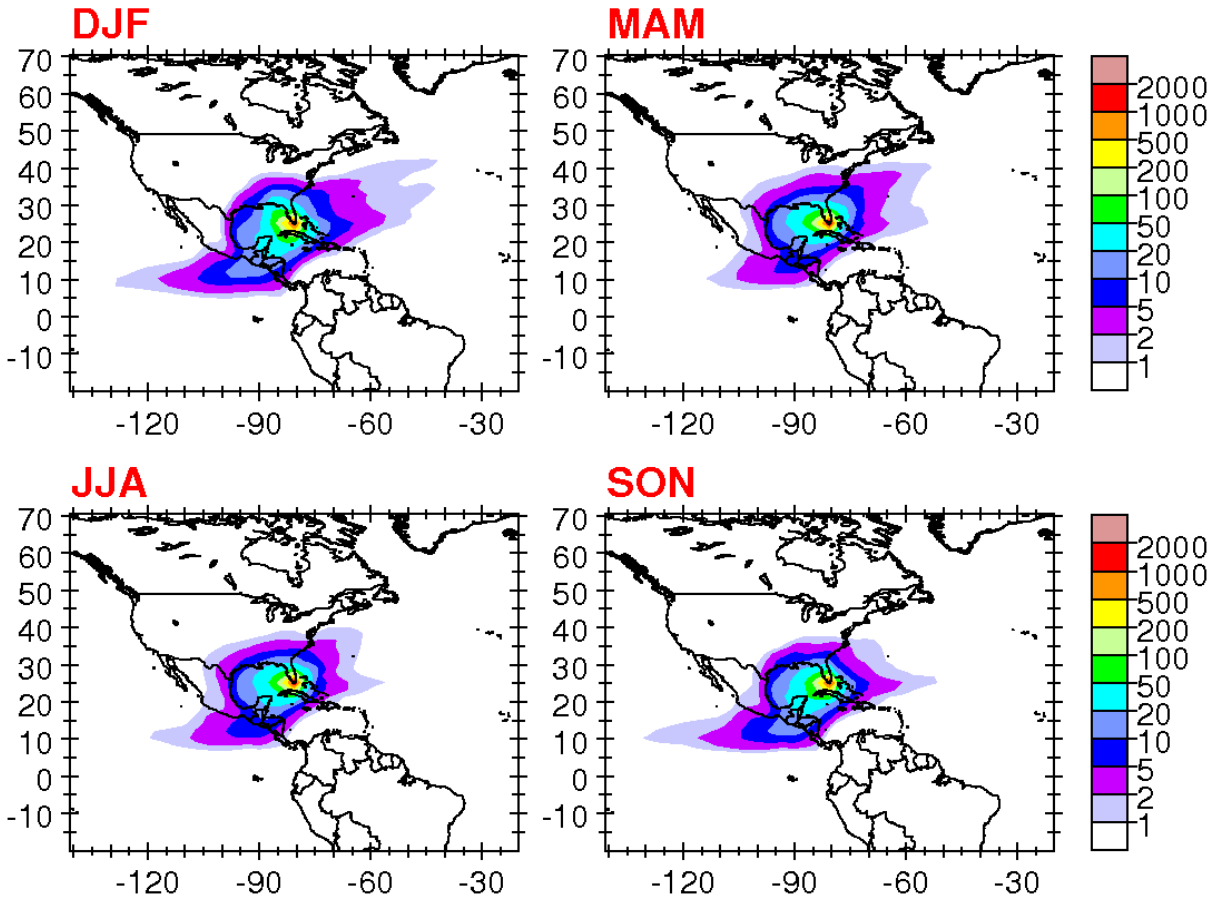
Atlanta, USA

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



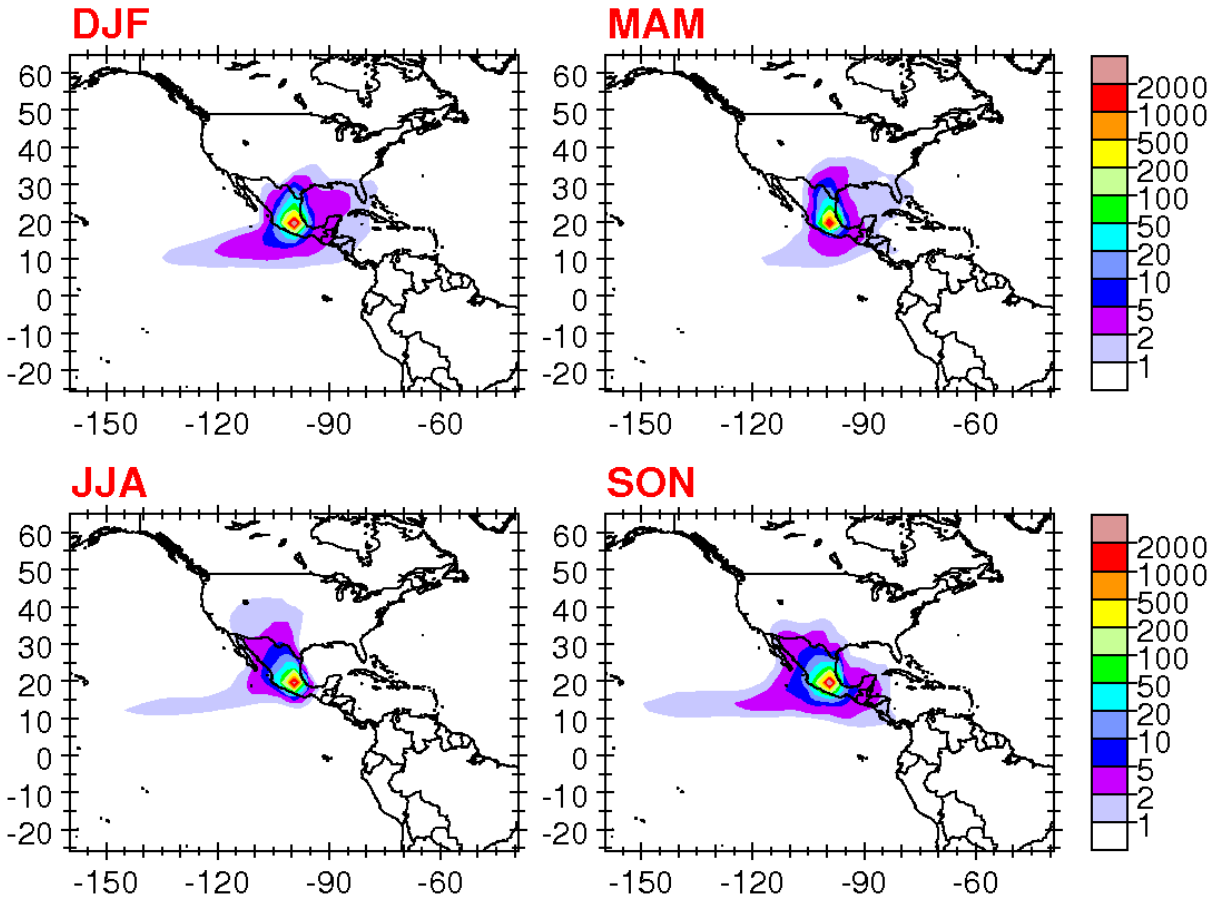
Miami, USA

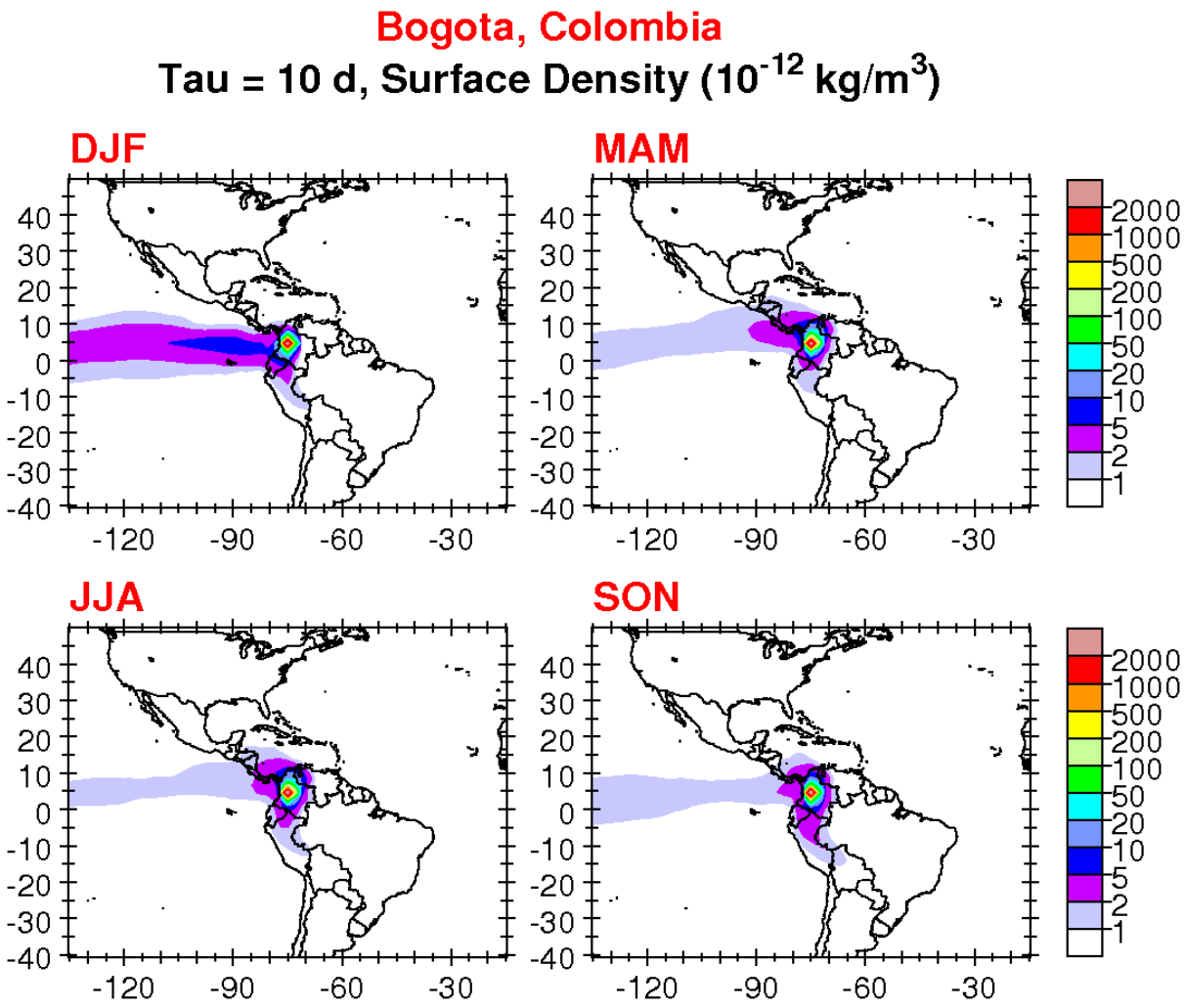
Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Mexico City, Mexico

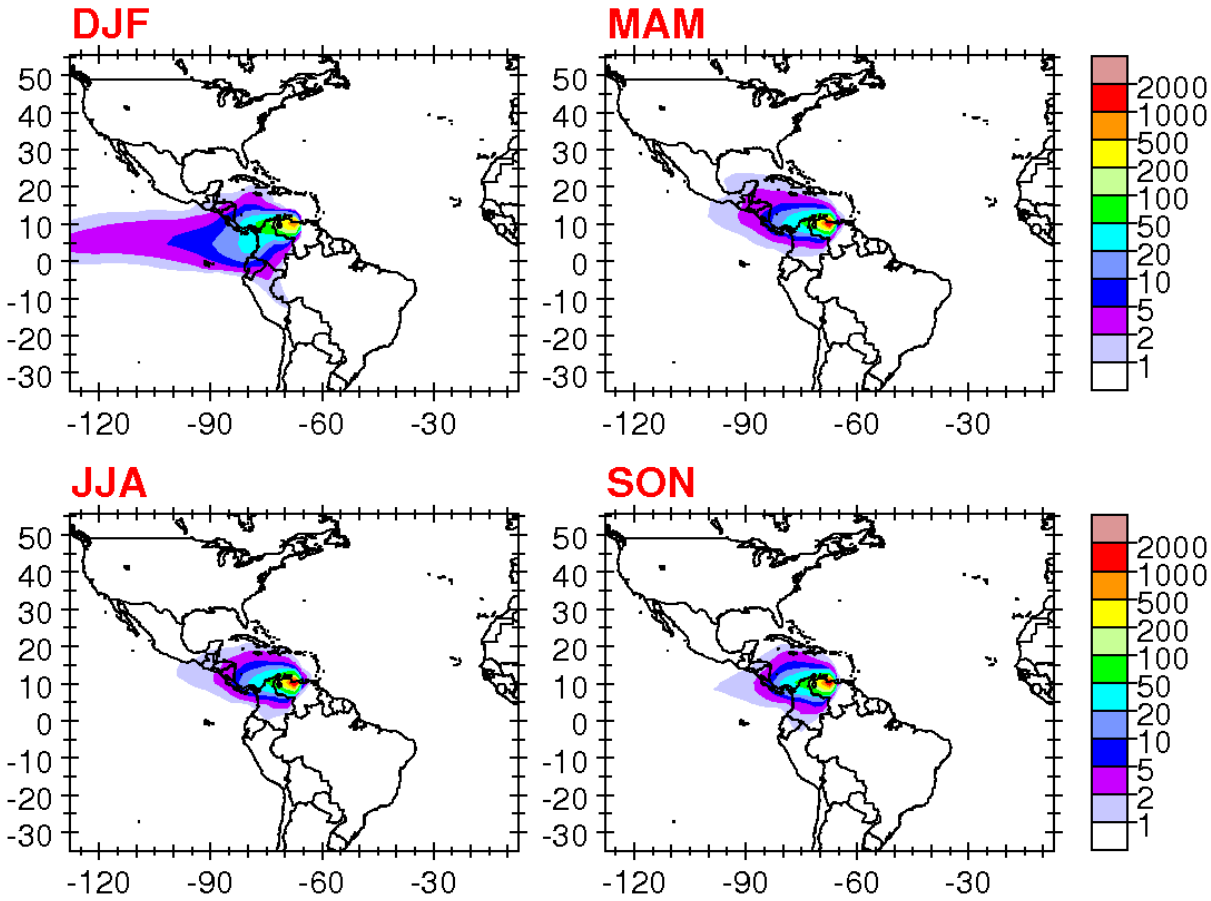
Tau = 10 d, Surface Density (10^{-12} kg/m^3)




Bogota, Colombia
Tau = 10 d, Surface Density (10^{-12} kg/m^3)
DJF
MAM
JJA
SON
40
30
20
10
0
-10
-20
-30
-40
-120
-90
-60
-30
2000
1000
500
200
100
50
20
10
5
2
1

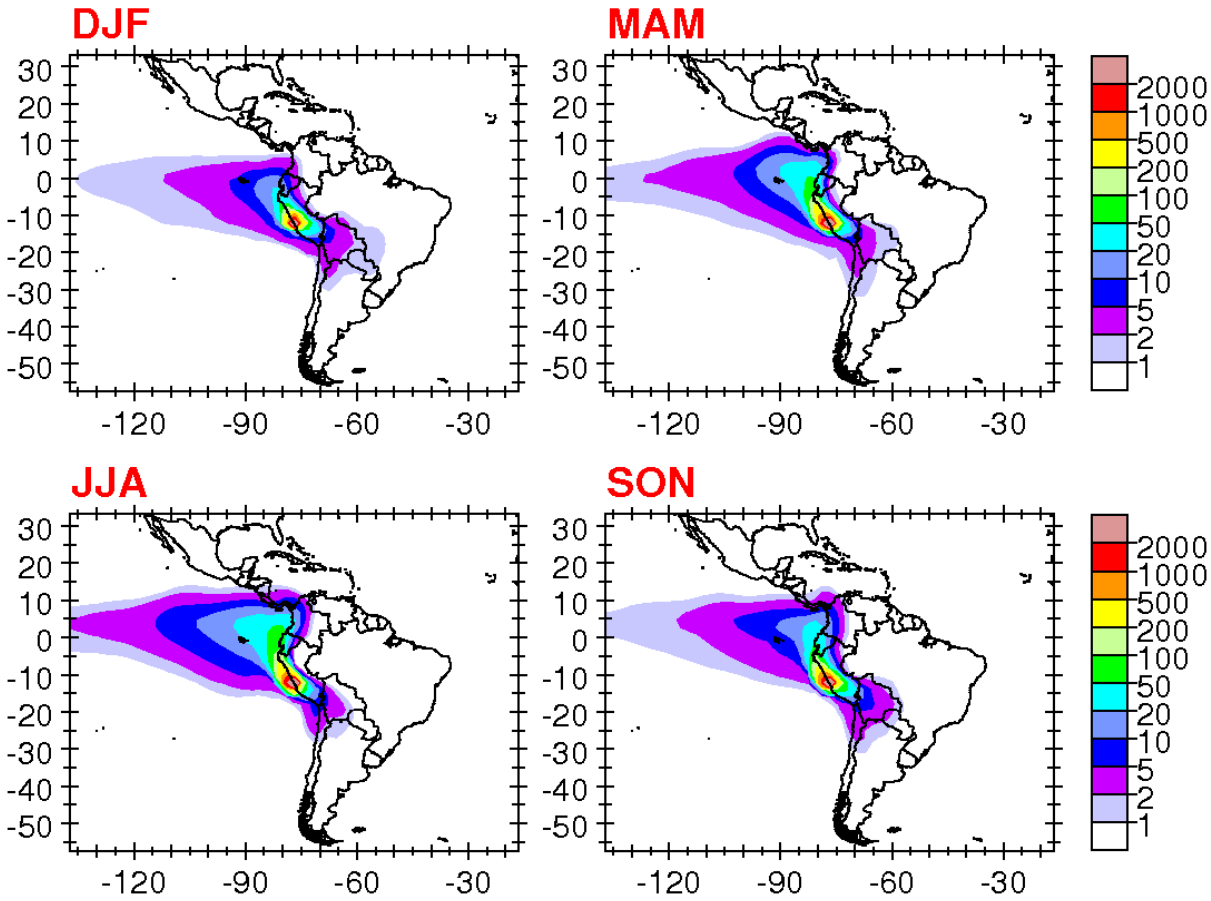
Caracas, Venezuala

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



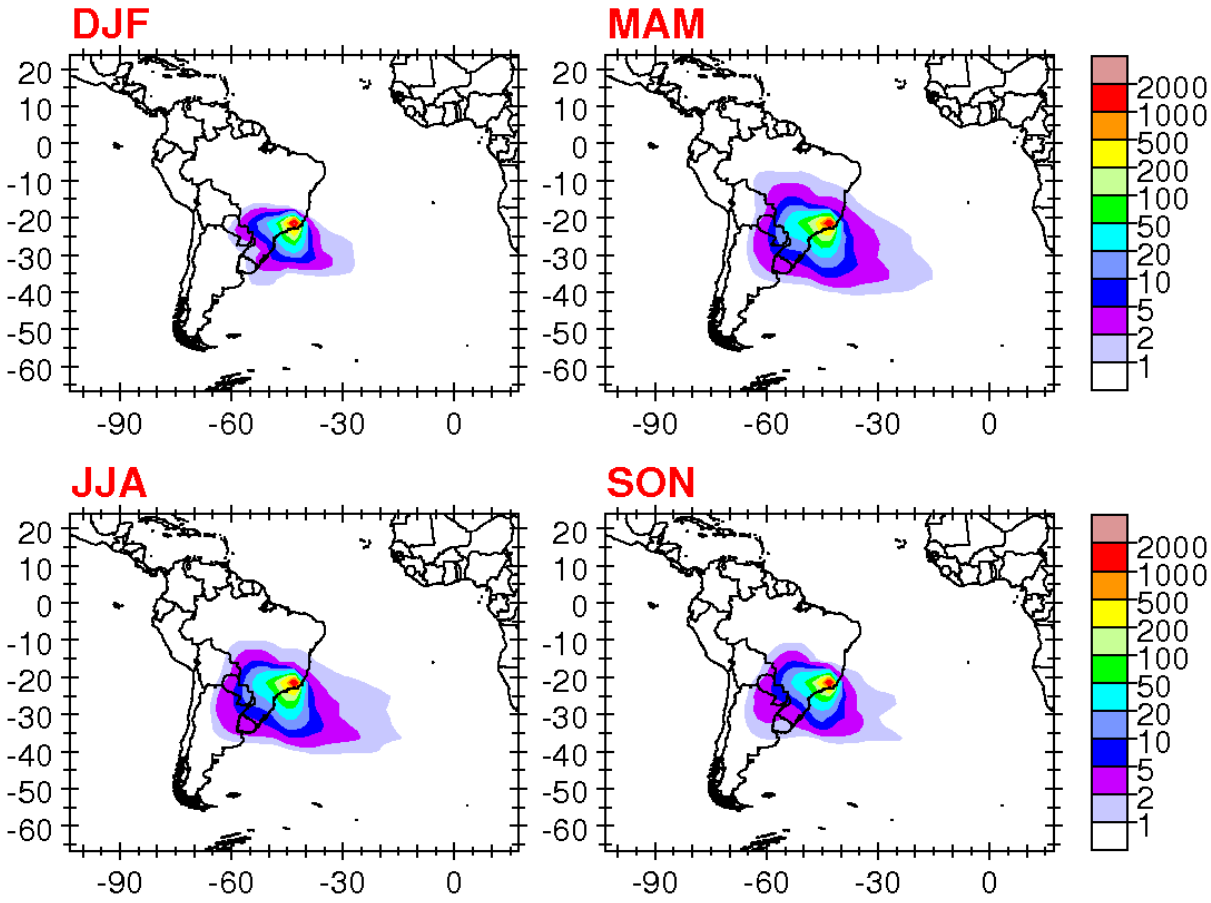
Lima, Peru

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



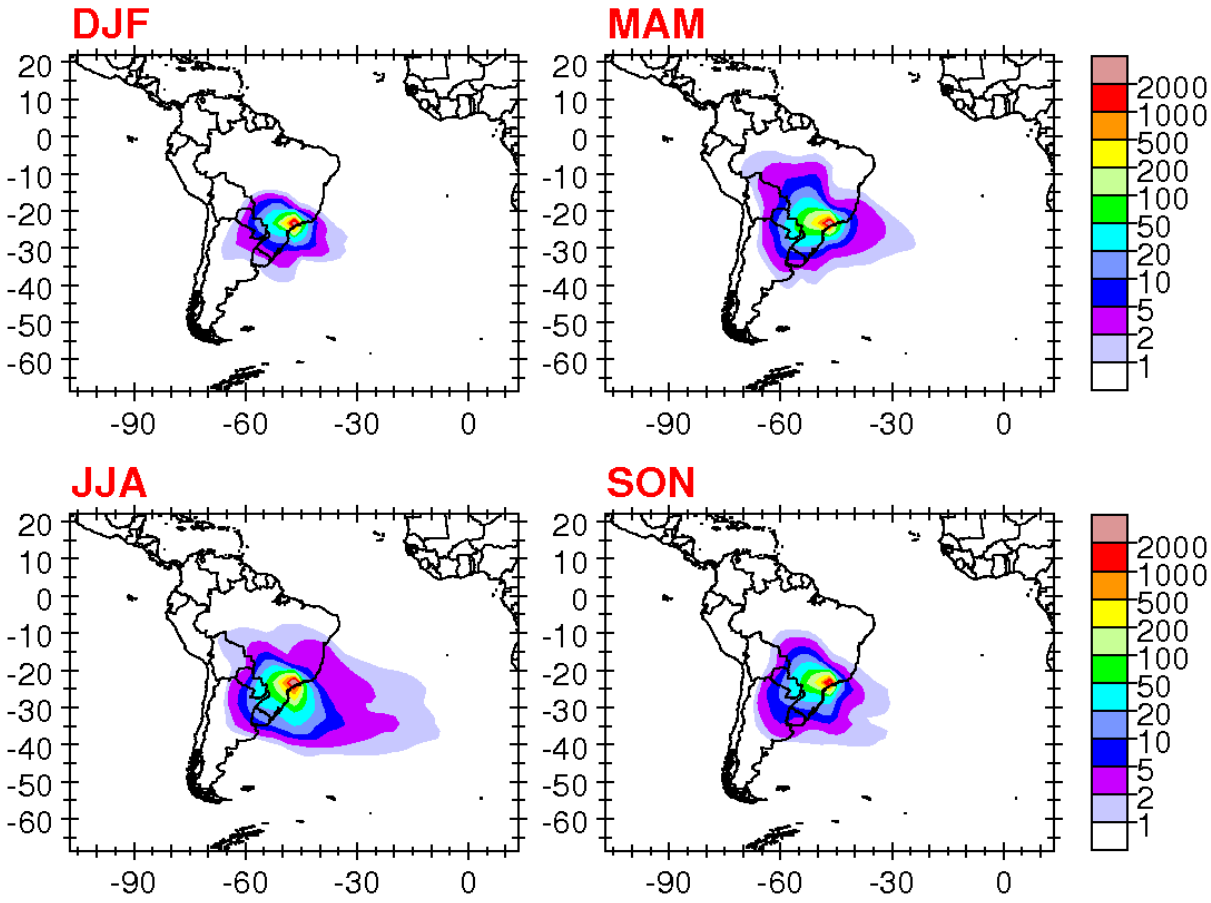
Rio de Janeiro, Brazil

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Sao Paulo, Brazil

Tau = 10 d, Surface Density (10^{-12} kg/m^3)



Buenos Aires, Argentina

Tau = 10 d, Surface Density (10^{-12} kg/m^3)