

**WRAP RMC
Phase II Wind Blown Dust Project**

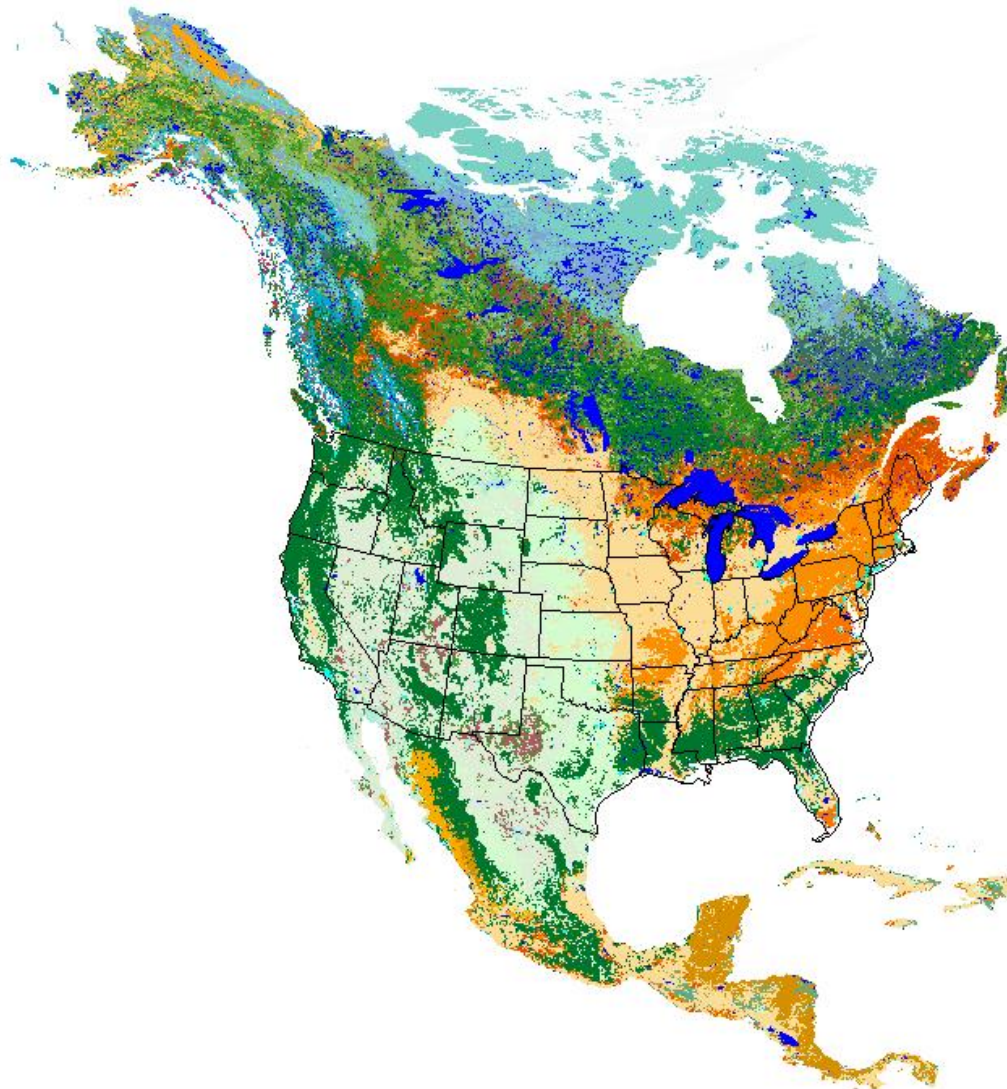
**ENVIRON International Corporation
and
University of California, Riverside**

20 September 2005

Recent Revisions for Base02a Inventory

- Updated LULC database
- Dust Transport Fractions
- Dust Fine Fraction (PM10/PM2.5)

Updated LULC Database (2000)



LULC Categories

- 1 - Tropical or Sub-tropical Broadleaved Evergreen Forest - Closed Canopy
- 2 - Tropical or Sub-tropical Broadleaved Deciduous Forest - Closed Canopy
- 3 - Temperate or Sub-polar Broadleaved Deciduous Forest - Closed Canopy
- 4 - Temperate or Sub-polar Needleleaved Evergreen Forest - Closed Canopy
- 5 - Temperate or Sub-polar Needleleaved Evergreen Forest - Open Canopy
- 6 - Temperate or Sub-polar Needleleaved Mixed Forest - Closed Canopy
- 7 - Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Closed Canopy
- 8 - Temperate or Sub-polar Mixed Broadleaved or Needleleaved Forest - Open Canopy
- 9 - Temperate or Subpolar Broadleaved Evergreen Shrubland - Closed Canopy
- 10 - Temperate or Subpolar Broadleaved Deciduous Shrubland - Open Canopy
- 11 - Temperate or Subpolar Needleleaved Evergreen Shrubland - Open Canopy
- 12 - Temperate or Sub-polar Mixed Broadleaved and Needleleaved Dwarf-Shrubland
- 13 - Temperate or Subpolar Grassland
- 14 - Temperate or Subpolar Grassland with a Sparse Tree Layer
- 15 - Temperate or Subpolar Grassland with a Sparse Shrub Layer
- 16 - Polar Grassland with a Sparse Shrub Layer
- 17 - Polar Grassland with a Dwarf-Sparse Shrub Layer
- 18 - Cropland
- 19 - Cropland and Shrubland/woodland
- 20 - Subpolar Needleleaved Evergreen Forest Open Canopy - lichen understory
- 21 - Unconsolidated Material Sparse Vegetation (old burnt or other disturbance)
- 22 - Urban and Built-up
- 23 - Consolidated Rock Sparse Vegetation
- 24 - Water bodies
- 25 - Burnt area (resent burnt area)
- 26 - Snow and Ice
- 27 - Wetlands
- 28 - Herbaceous Wetlands
- 29 - Tropical or Sub-tropical Broadleaved Evergreen Forest - Open Canopy

LULC Summary/Comparison

US LULC Summary		
Landuse Category	% 1992	% 2000
Water/Wetlands/Other	9.09%	7.70%
Forest/Urban	30.15%	40.67%
Agricultural	25.62%	14.60%
Grasslands	15.29%	14.33%
Shrublands	17.97%	20.28%
Barren	1.88%	2.41%
Total	100.00%	100.00%

Fine Fraction of Dust

- Original methodology used 0.78/0.22 (PMC/PMF)
- Revised methodology uses 0.90/0.10

Latest Transport Fractions (Tom Pace, EPA, 6/2005)

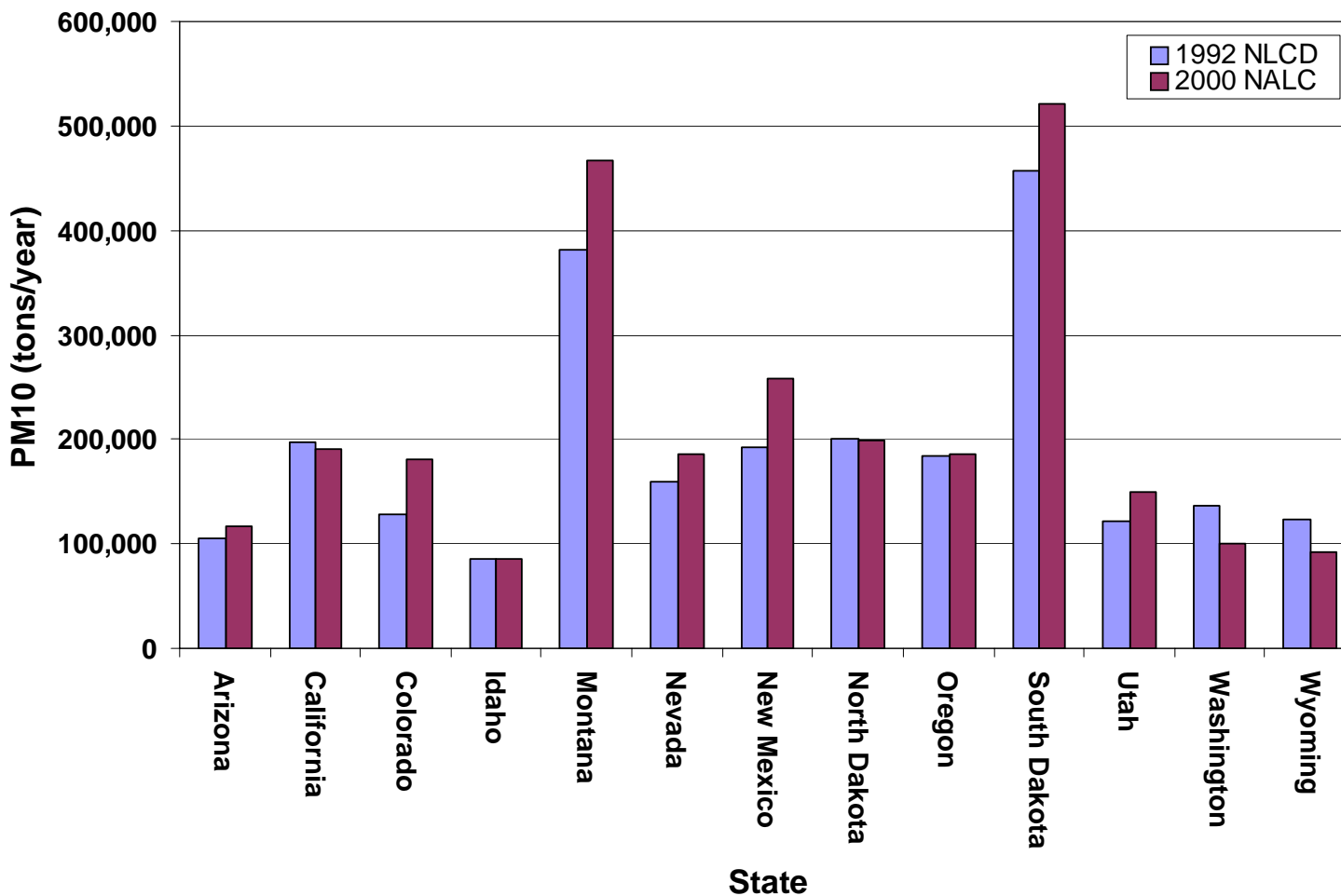
- Effects of near-source dust removal & deposition
- Varies by LULC; Applied at grid-cell level (12-km)

LULC Category	Pre02b	Base02a
Urban	0.30	0.00
Agricultural	0.85	0.75
Grasslands	0.70	0.75
Shrublands	0.60	0.75
Forest	0.30	0.50
Barren/Water	0.97	1.00

Model Results

WRAP 12-km Modeling Domain

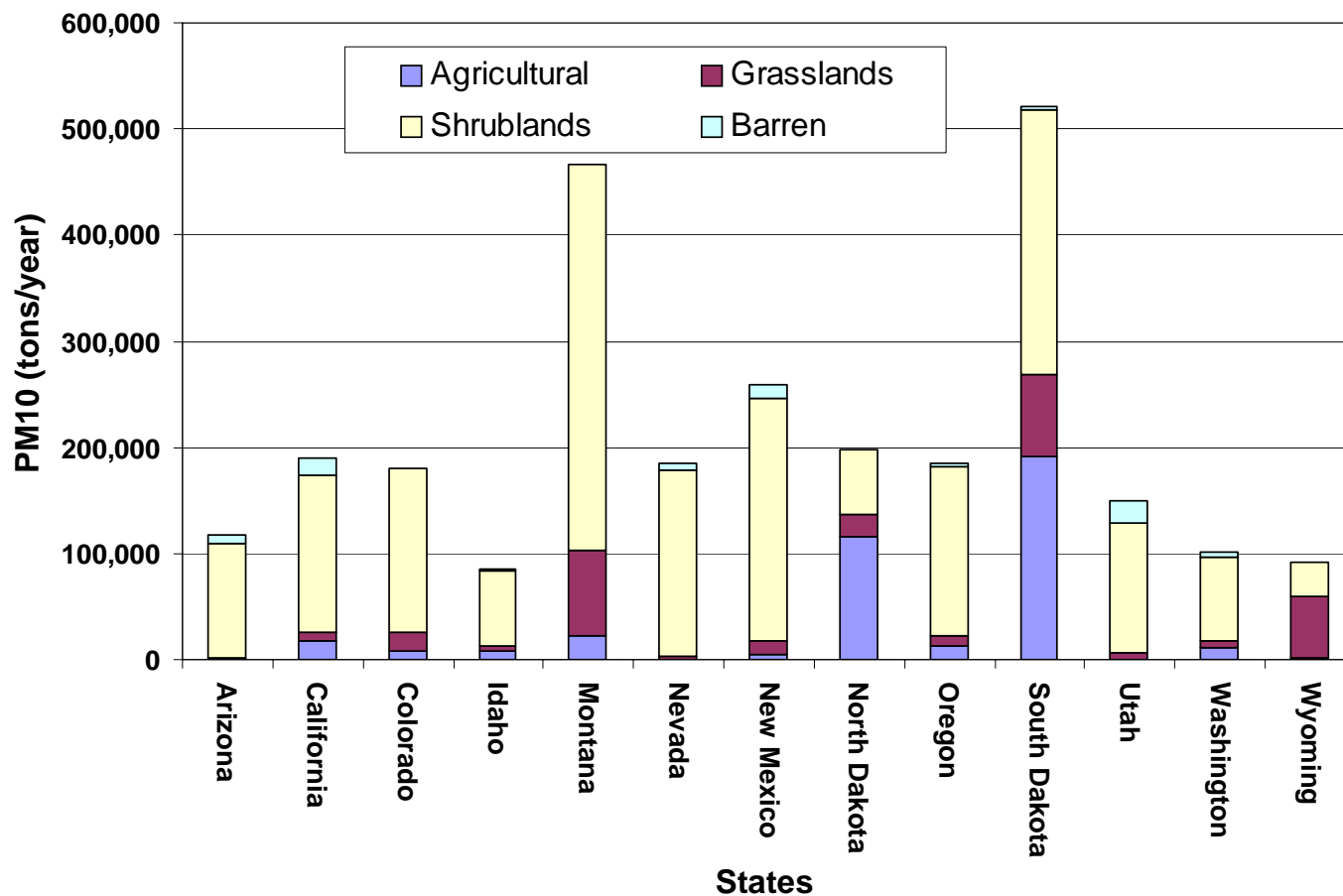
Comparison of WB Dust PM10 Emissions
WRAP 12-km Domain



Model Results

WRAP 12-km Modeling Domain

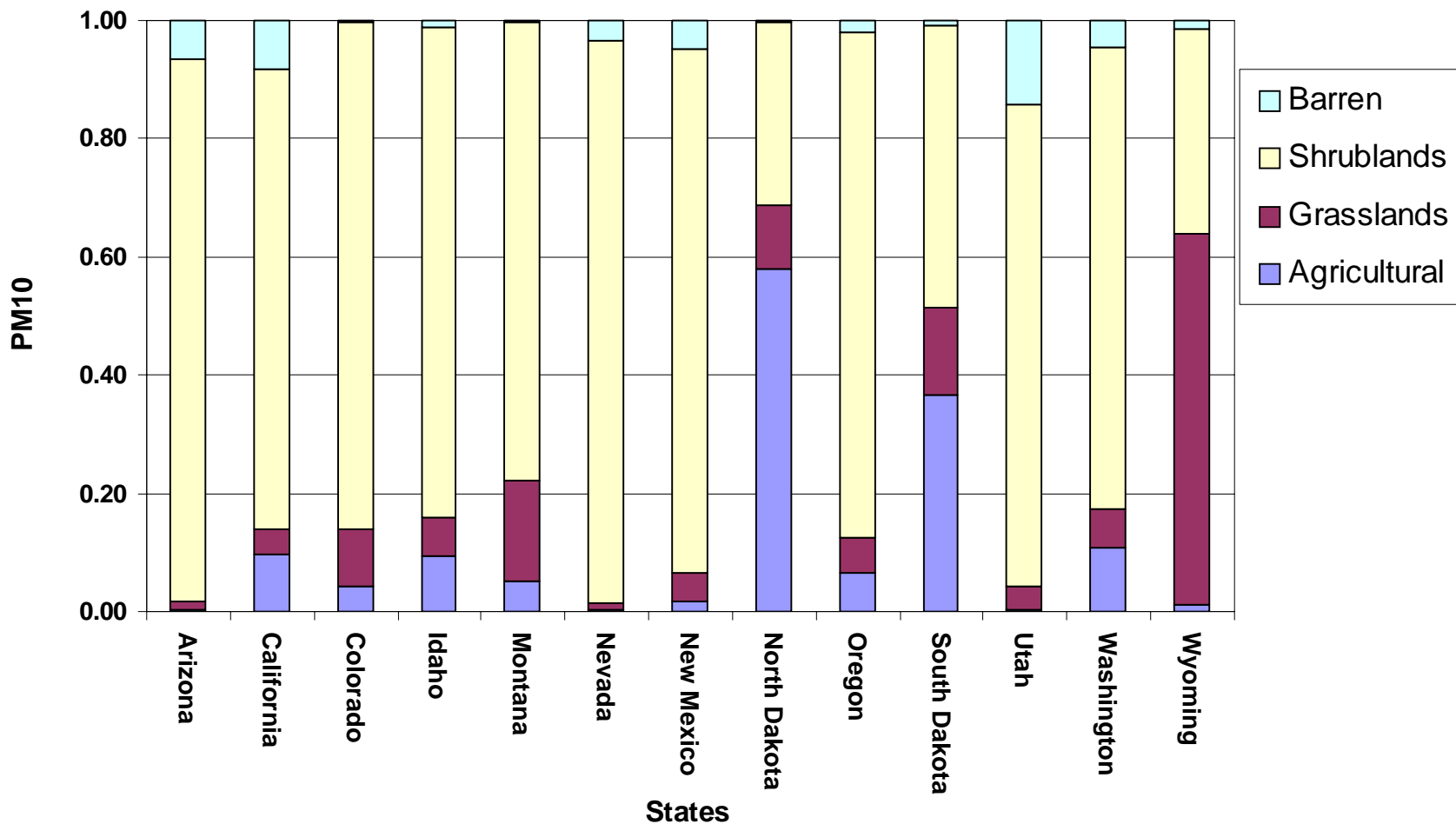
2002 Annual WRAP 12-km WB Dust
2000 LULC (TFs Applied)



Model Results

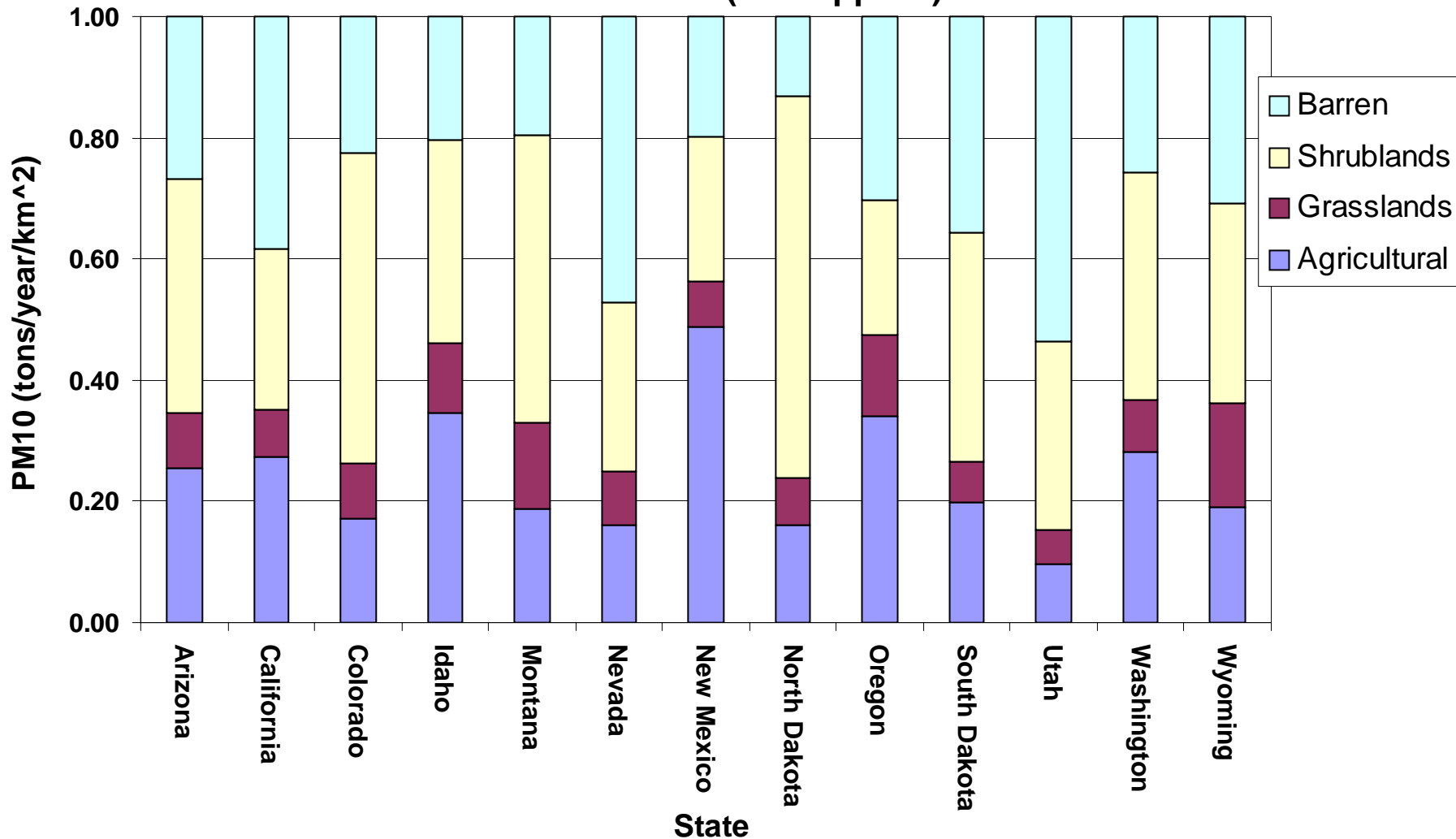
WRAP 12-km Modeling Domain

2002 Annual WRAP 12-km WB Dust
2000 LULC (TFs Applied)



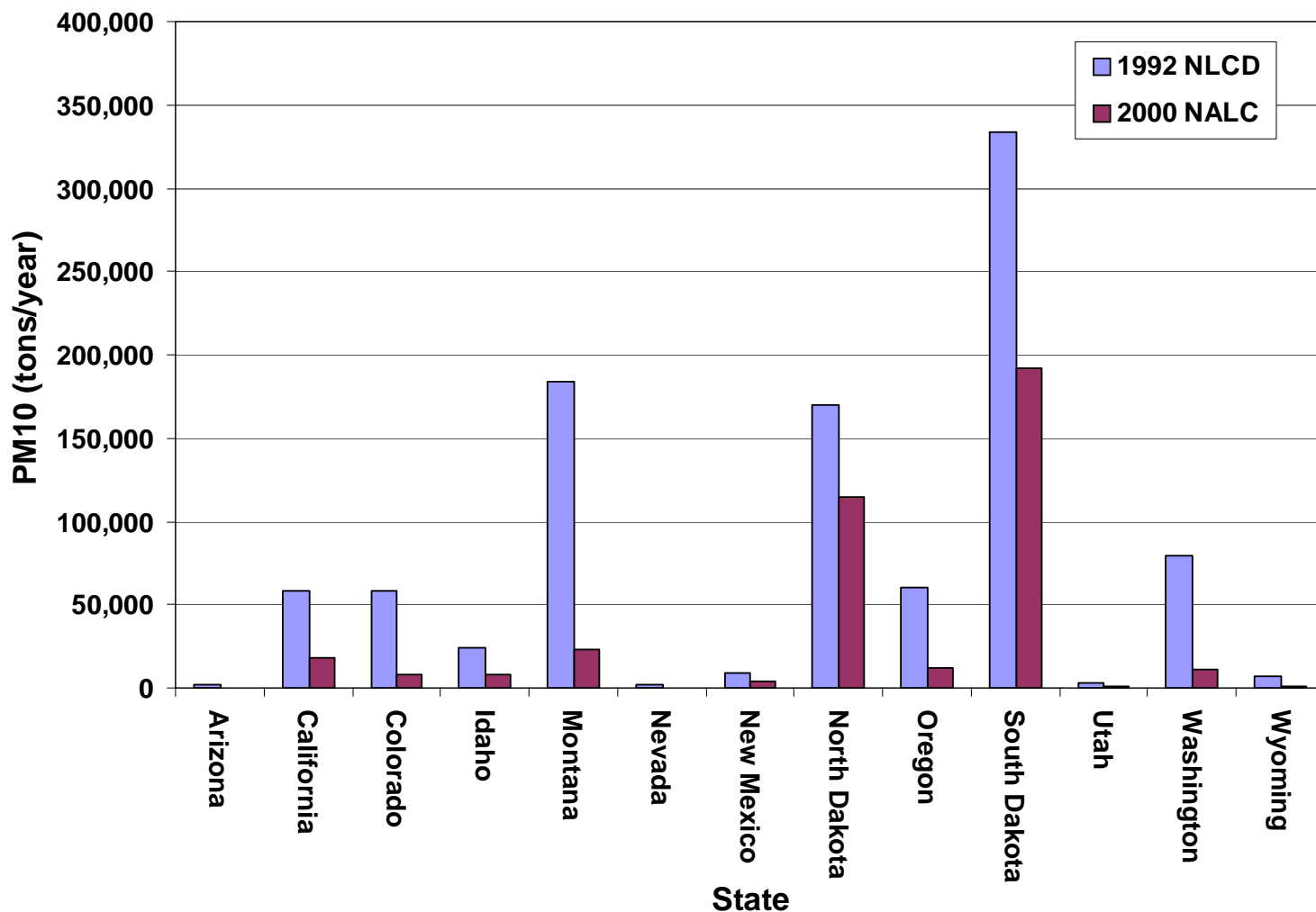
WRAP 12-km Modeling Results

2002 Annual WRAP 12-km WB Dust
2000 LULC (TFs Applied)



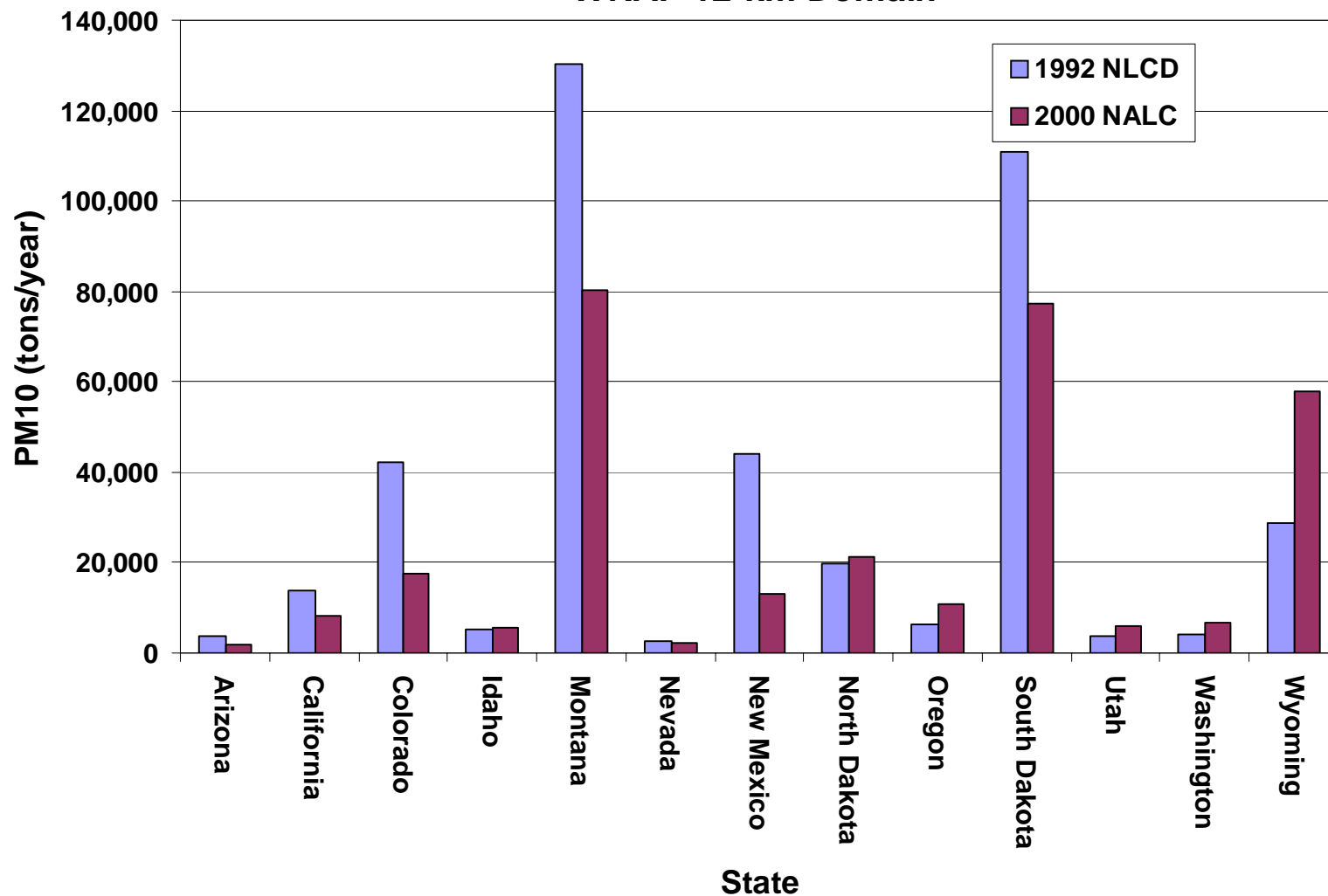
WRAP 12-km Modeling Results

Comparison of Agricultural Dust Emissions
WRAP 12-km Domain



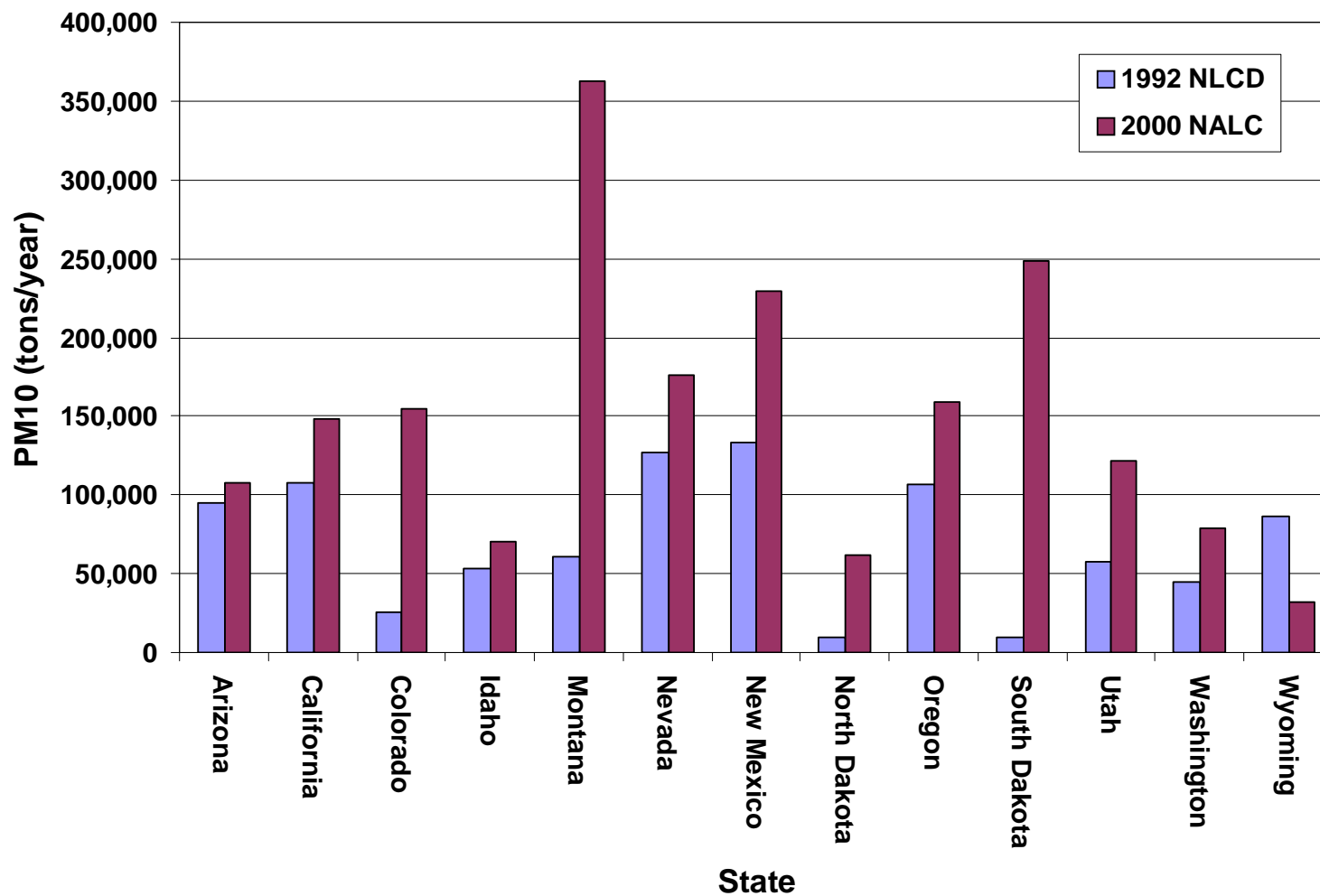
WRAP 12-km Modeling Results

Comparison of Grassland Dust Emissions
WRAP 12-km Domain



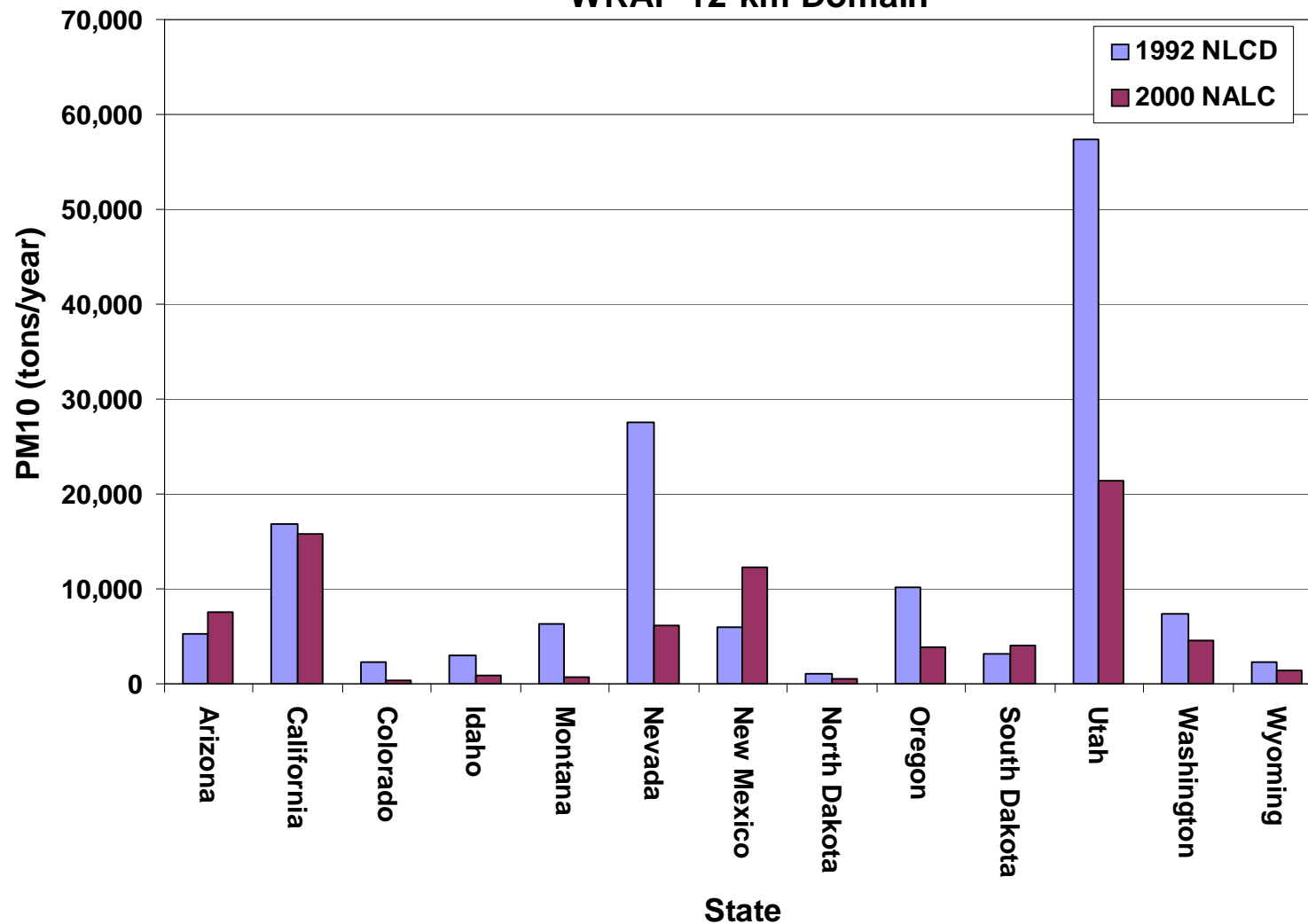
WRAP 12-km Modeling Results

Comparison of Shrubland Dust Emissions
WRAP 12-km Domain



WRAP 12-km Modeling Results

Comparison of Barren Land Dust Emissions
WRAP 12-km Domain

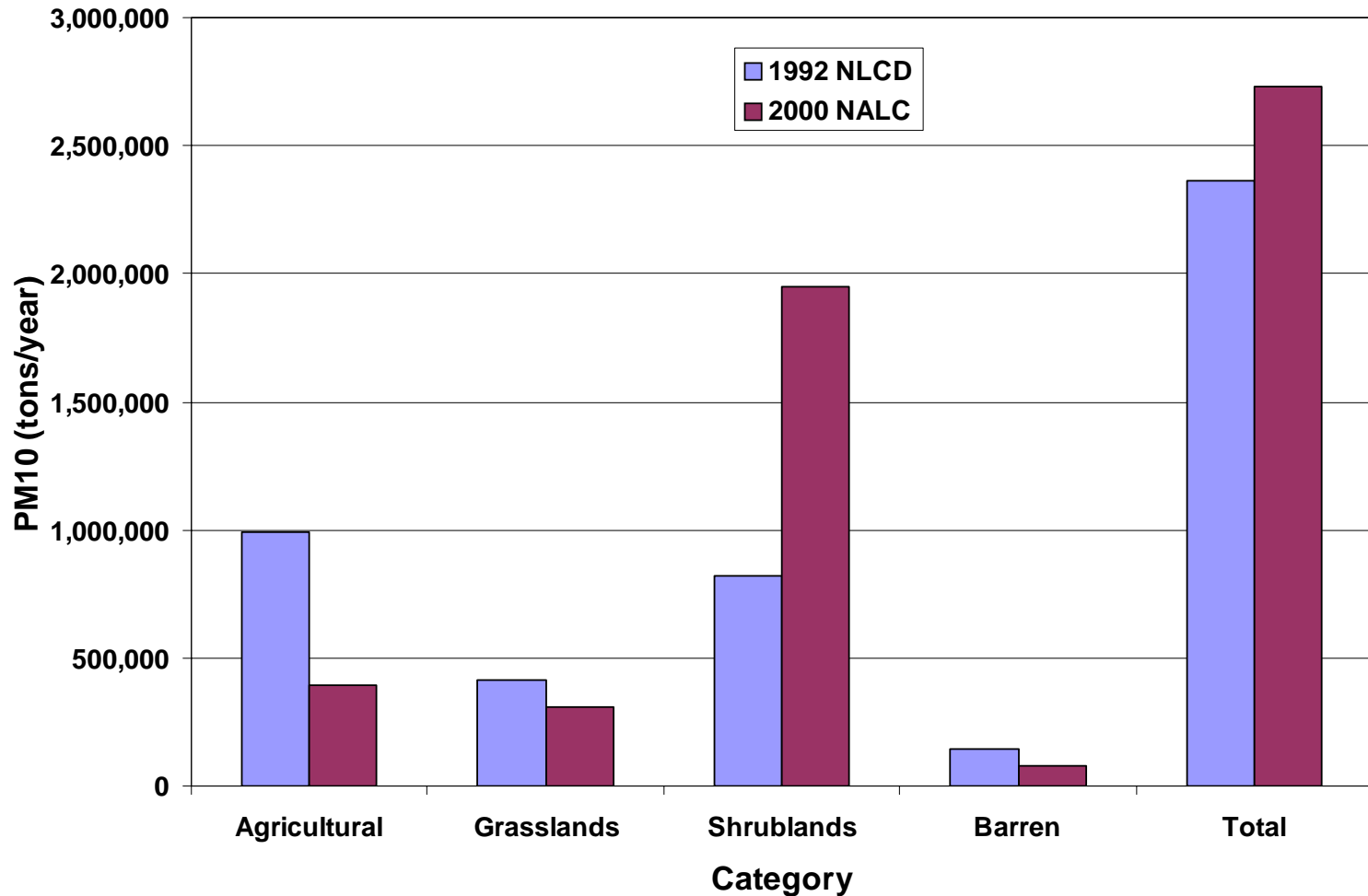


WRAP Dust Comparison

2002 Annual WBD PM10 Emissions (WRAP States)		
Landuse Category	Base02a (2000 LULC)	Pre02b (1992 LULC)
Agricultural	393,306	988,264
Grasslands	308,099	411,595
Shrublands	1,950,862	820,937
Barren	79,435	143,292
Total	2,731,702	2,364,089

WRAP Dust Comparison

2002 Annual WB Dust PM10 Emissions
WRAP 12-km Domain

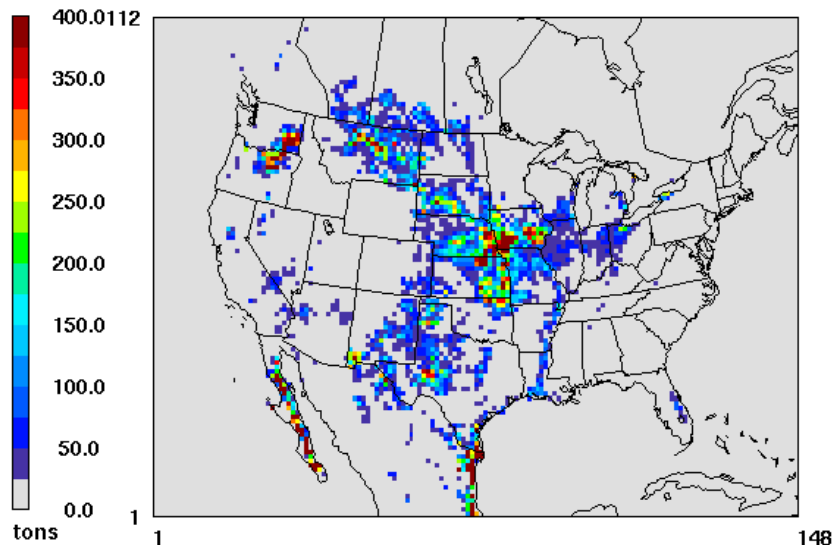


Model Results

36-km - January

PMC

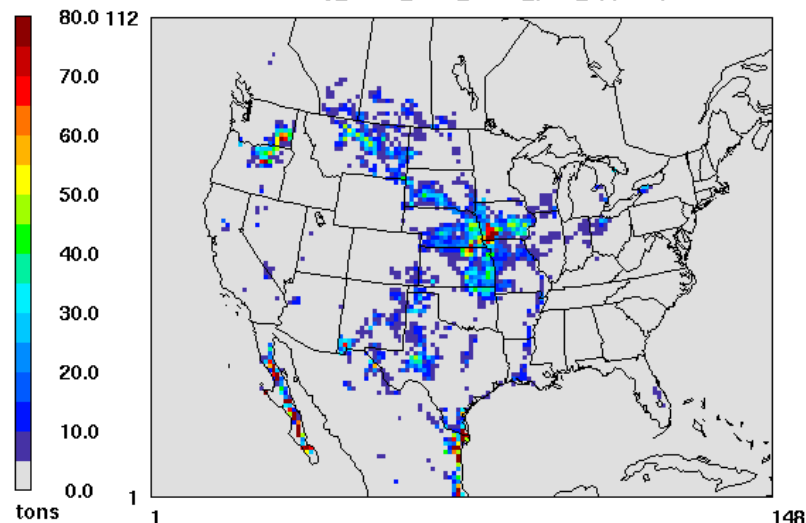
Wind Blown Dust Emissions 36-km
Monthly_Total_2001_LULC_(TFs_applied)



January 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 1646.5 at (33,23)

PMFINE

Wind Blown Dust Emissions 36-km
Monthly_Total_2001_LULC_(TFs_applied)



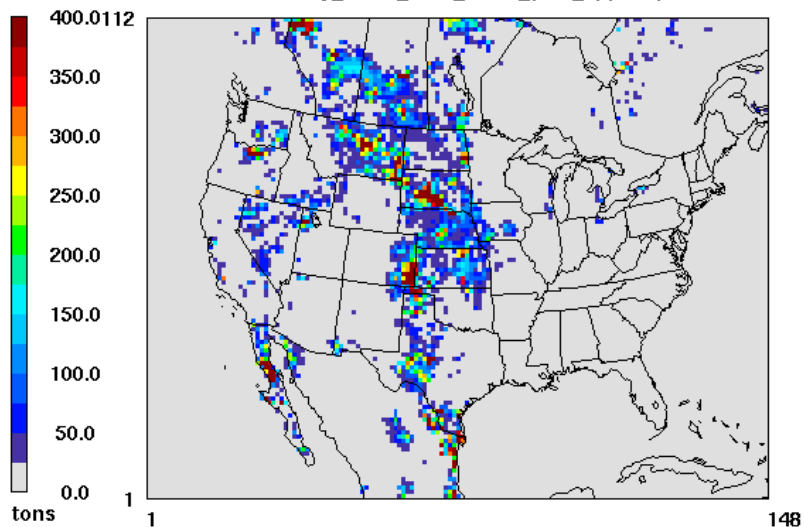
January 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 182.9 at (33,23)

Model Results

36-km - July

PMC

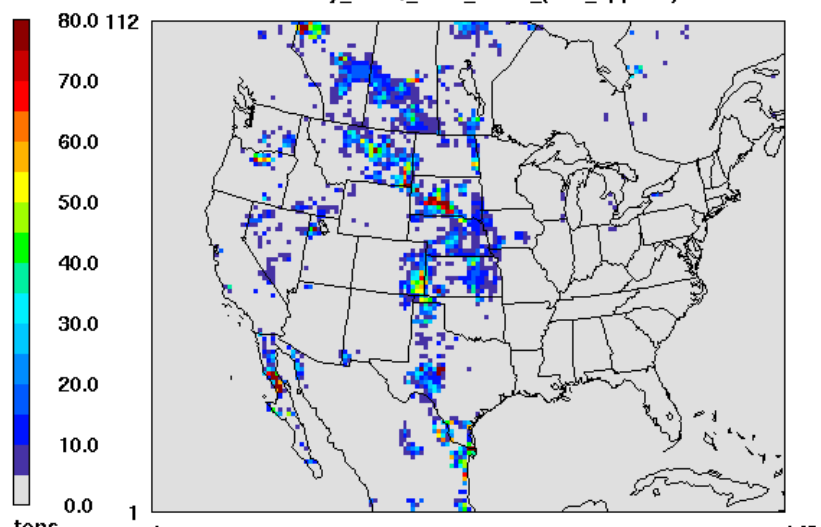
Wind Blown Dust Emissions_36-km
Monthly_Total_2001_LULC_(TFs_applied)



July 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 3018.5 at (30,31)

PMFINE

Wind Blown Dust Emissions_36-km
Monthly_Total_2001_LULC_(TFs_applied)



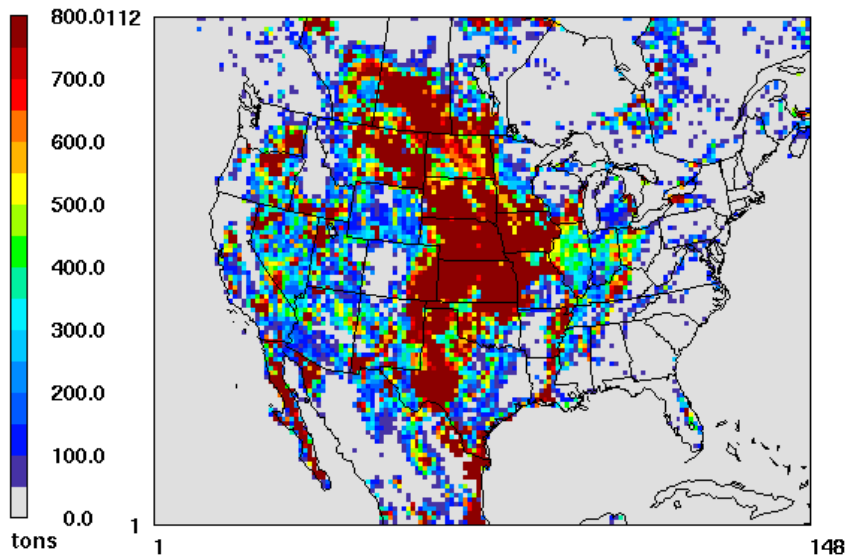
July 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 335.4 at (30,31)

Model Results

36-km - Annual

PMC

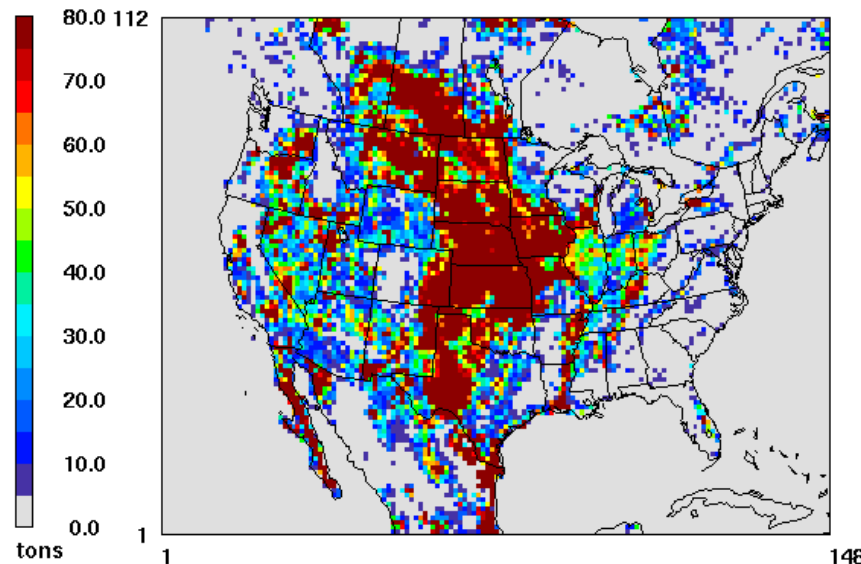
Wind Blown Dust Emissions 36-km
2002_Annual_2001_LULC_(TFs_applied)



December 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 20202.8 at (30,31)

PMFINE

Wind Blown Dust Emissions 36-km
2002_Annual_2001_LULC_(TFs_applied)



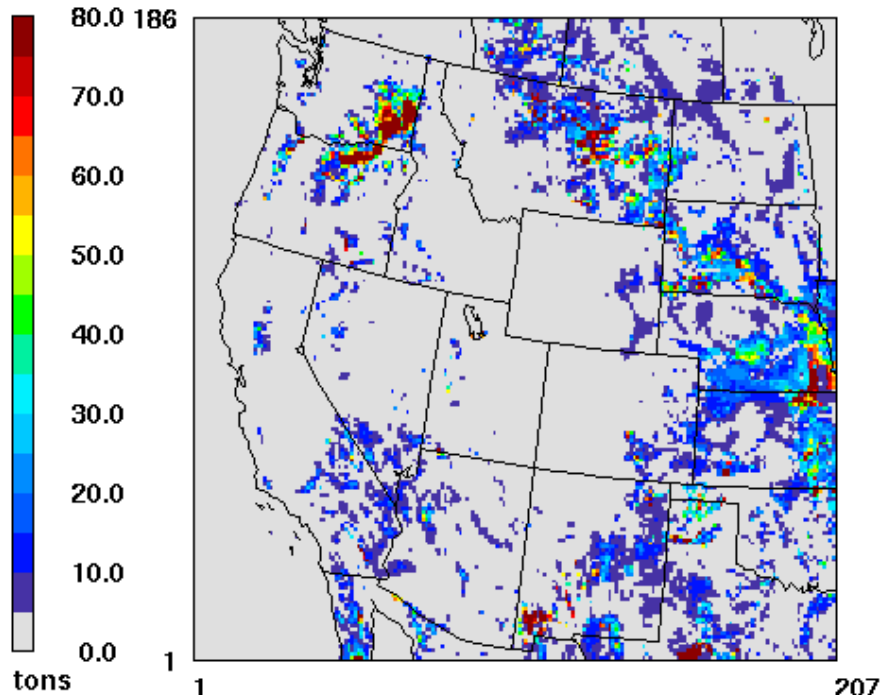
December 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 2244.8 at (30,31)

Model Results

12-km - January

PMC

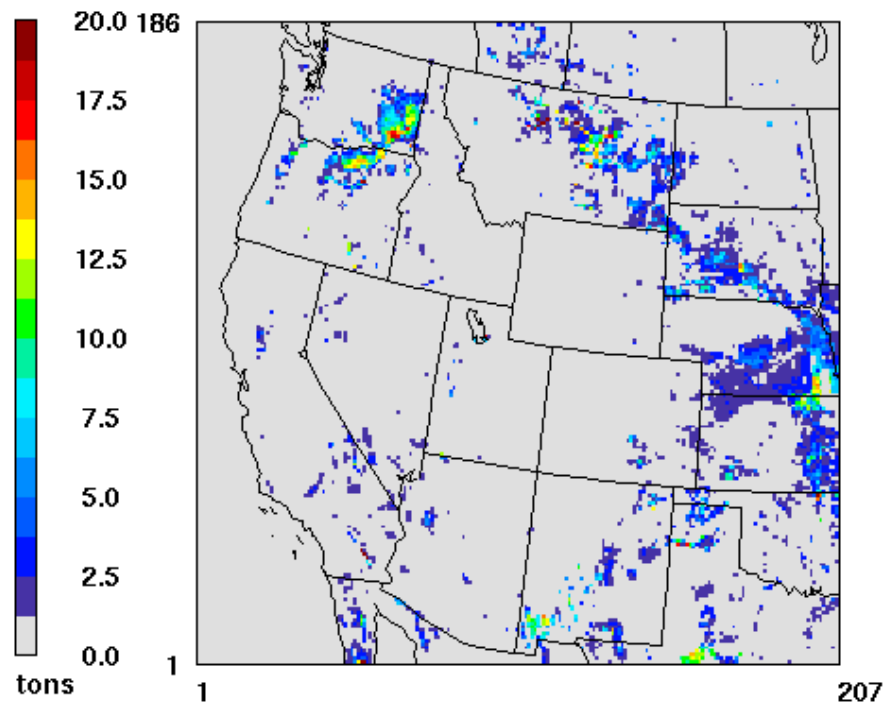
Wind Blown Dust Emissions, 12-km
Monthly_Total, 2001_LULC_(TFs_applied)



January 31, 2002 0:00:00
Min= 0.0 at (1,1), Max= 250.8 at (54,33)

PMFINE

Wind Blown Dust Emissions, 12-km
Monthly_Total, 2001_LULC_(TFs_applied)

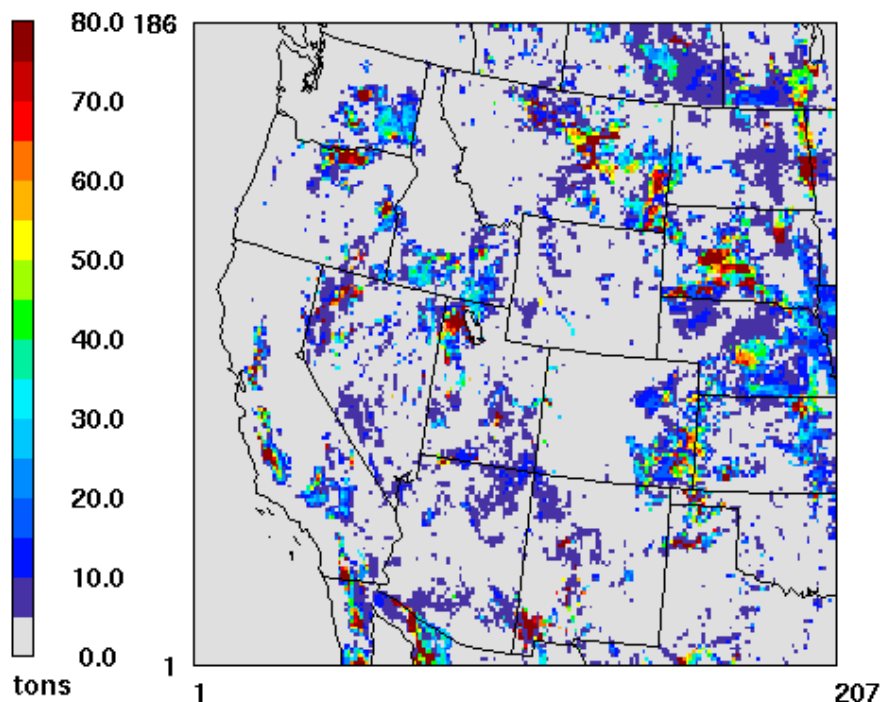


January 31, 2002 0:00:00
Min= 0.0 at (1,1), Max= 27.9 at (54,33)

Model Results 12-km – July

PMC

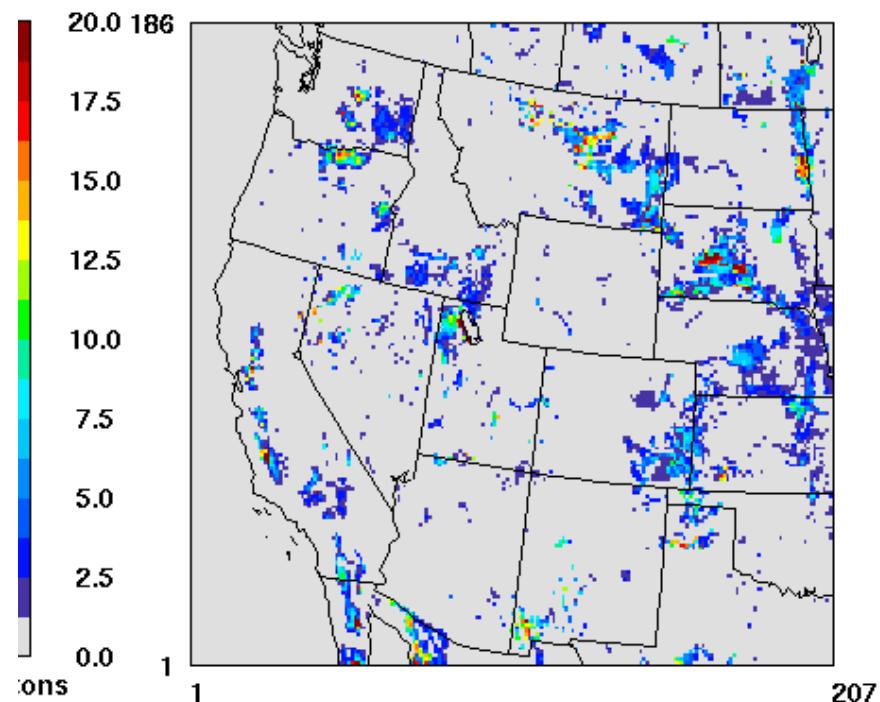
Wind Blown Dust Emissions, 12-km
Monthly_Total, 2001_LULC_(TFs_applied)



July 31, 2002 0:00:00
Min= 0.0 at (1,1), Max= 821.4 at (26,60)

PMFINE

Wind Blown Dust Emissions, 12-km
Monthly_Total, 2001_LULC_(TFs_applied)



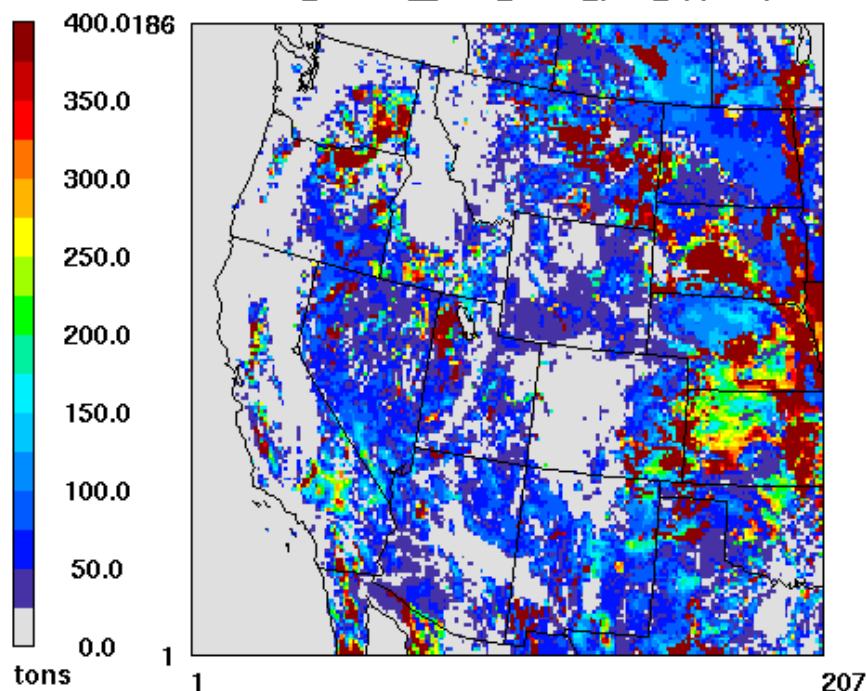
July 31, 2002 0:00:00
Min= 0.0 at (1,1), Max= 91.3 at (26,60)

Model Results

12-km – Annual

PMC

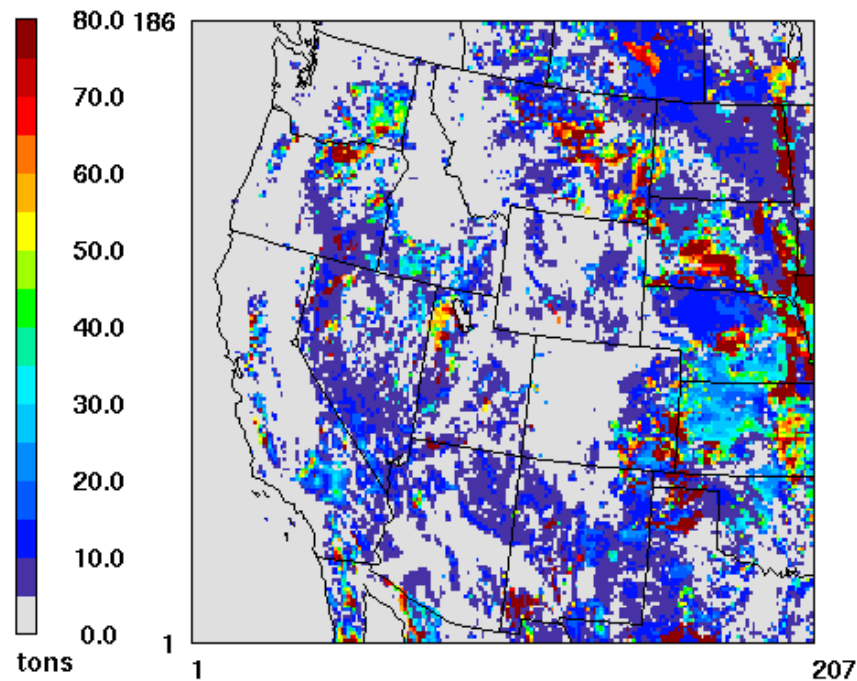
Wind Blown Dust Emissions_12-km
2002_Annual_2001_LULC_(TFs_applied)



December 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 3371.4 at (55,1)

PMFINE

Wind Blown Dust Emissions_12-km
2002_Annual_2001_LULC_(TFs_applied)



December 31,2002 0:00:00
Min= 0.0 at (1,1), Max= 374.6 at (55,1)

Next Steps

- Update Model performance Evaluation
 - Scatter plots of IMPROVE data vs. WBD Emissions
 - Evaluate CMAQ model performance with & without WBD Emissions
- Update Project Final Report