New Mexico Environment Department

179B Demonstration

Armando Paz
Environmental Analyst
Air Quality Bureau

79th JAC Meeting
February 11, 2021

Overview

- Clean Air Act 179B Demonstration Requirements
  - 5 years of data analysis
- Conceptual Model
  - Description of air quality dynamics causing high concentration of pollutants at monitoring site
- Back Trajectory / Wind Rose Analysis
  - NOAA HYSPLiTS
- Emissions Inventory Analysis
- Source Apportionment Model

179B Demonstration

- Clean Air Act 179B(b) Demonstration:
  - International Emissions Influence on Sunland Park Ozone (O_3) Nonattainment Area (SLP O_3 NAA)
    - Weight of Evidence Approach
  - Retrospective Demonstration
    - "But for" Demonstration
  - 2015 8-Hour O_3 National Ambient Air Quality Standard (NAAQS).
    - 2018 Sunland Park Nonattainment Area Designation
  - Provide regulatory relief from "Bump Up" in nonattainment status from "marginal" to "moderate"
    - Does not allow designation from nonattainment to attainment
    - Cannot be used to avoid initial nonattainment designation

Paso del Norte Airshed

Paso del Norte Airshed

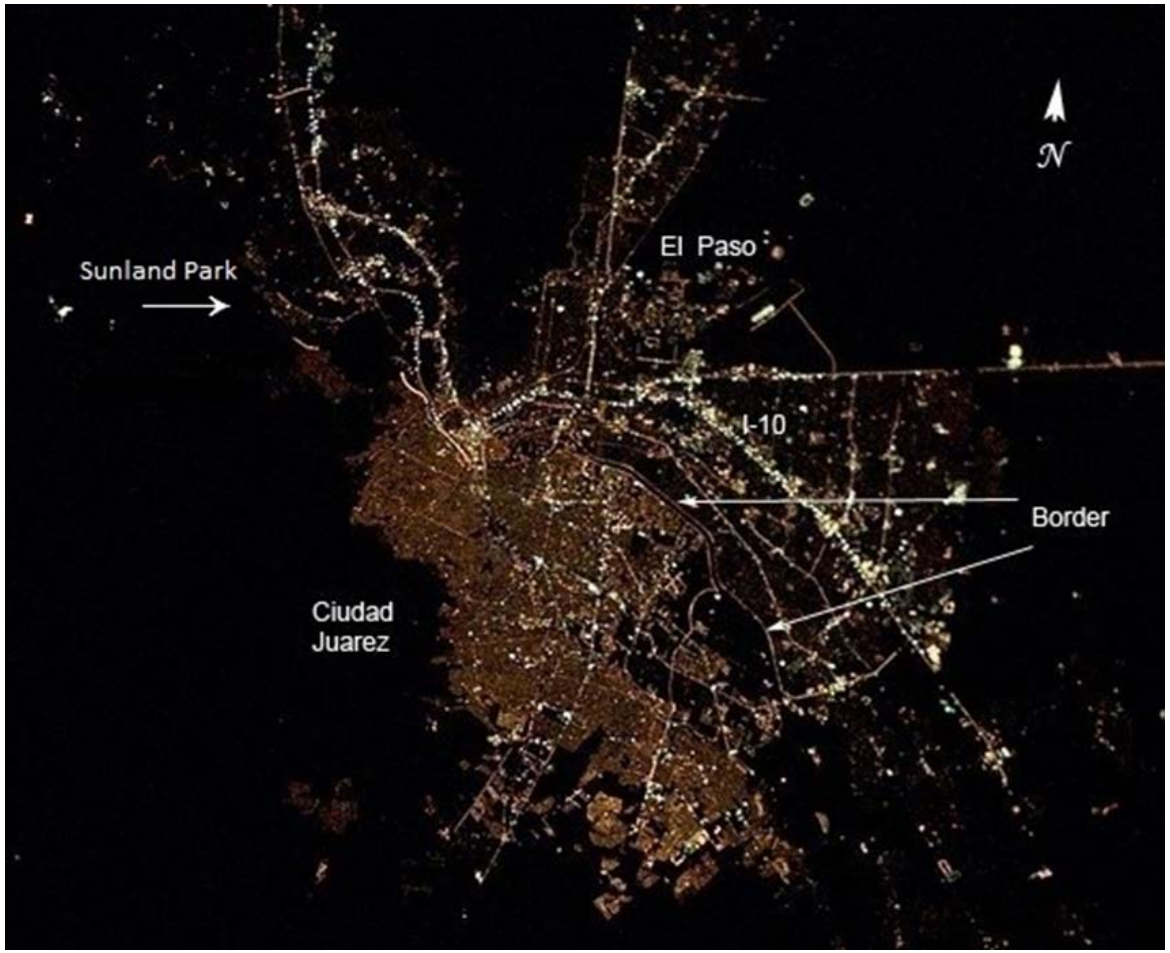


Image courtesy of the Earth and Science and Remote Sensing Unit, NASA Johnson Space Center; ISS006-E-44123; https://eol.jsc.nasa.gov/.

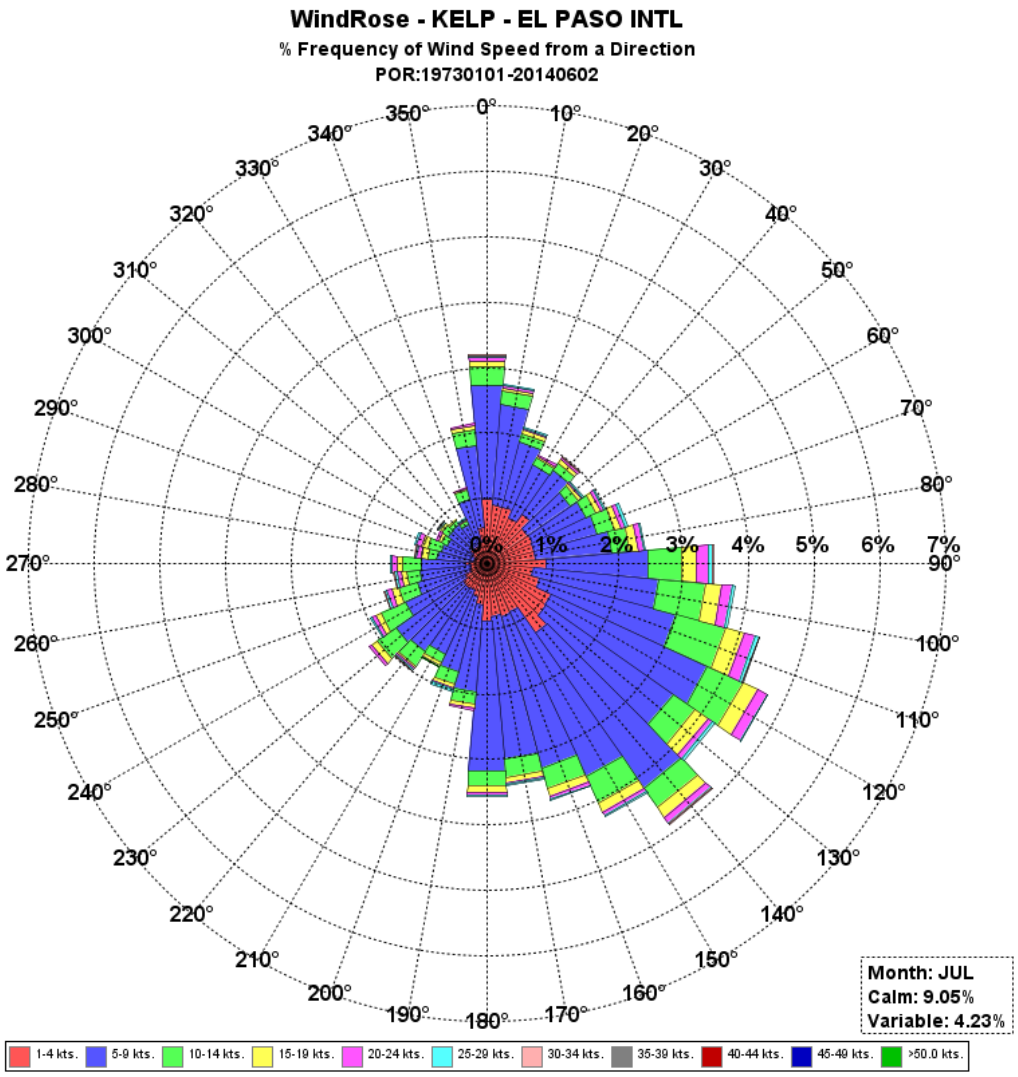
El Paso Meteorological Analysis

- NWS Annual Rainfall 2016 – 2020 data analysis
  - 47% of precipitation May-August
- 32.3% Average Annual Relative Humidity (RH)
  - 29.3% Average RH May – August

	Jan.	Feb.	March	April	May	June	July	August	Sep.	October	Nov.	Dec.
Avg. Temperature (°C)	6.5	9.1	12.5	17.6	22.1	26.8	27.9	26.9	23.6	18	11.1	7.3
Min. Temperature (°C)	-1.3	0.7	3.8	8.7	13	17.8	20.2	19.4	15.9	9.5	2.6	-0.7
Max. Temperature (°C)	14.4	17.6	21.2	26.6	31.3	35.8	35.7	34.5	31.4	26.5	19.6	15.3
Avg. Temperature (°F)	43.7	48.4	54.5	63.7	71.8	80.2	82.2	80.4	74.5	64.4	52.0	45.1
Min. Temperature (°F)	29.7	33.3	38.8	47.7	55.4	64.0	68.4	66.9	60.6	49.1	36.7	30.7
Max. Temperature (°F)	57.9	63.7	70.2	79.9	88.3	96.4	96.3	94.1	88.5	79.7	67.3	59.5
Precipitation / Rainfall (mm)	10	11	8	5	6	16	41	41	34	20	10	15

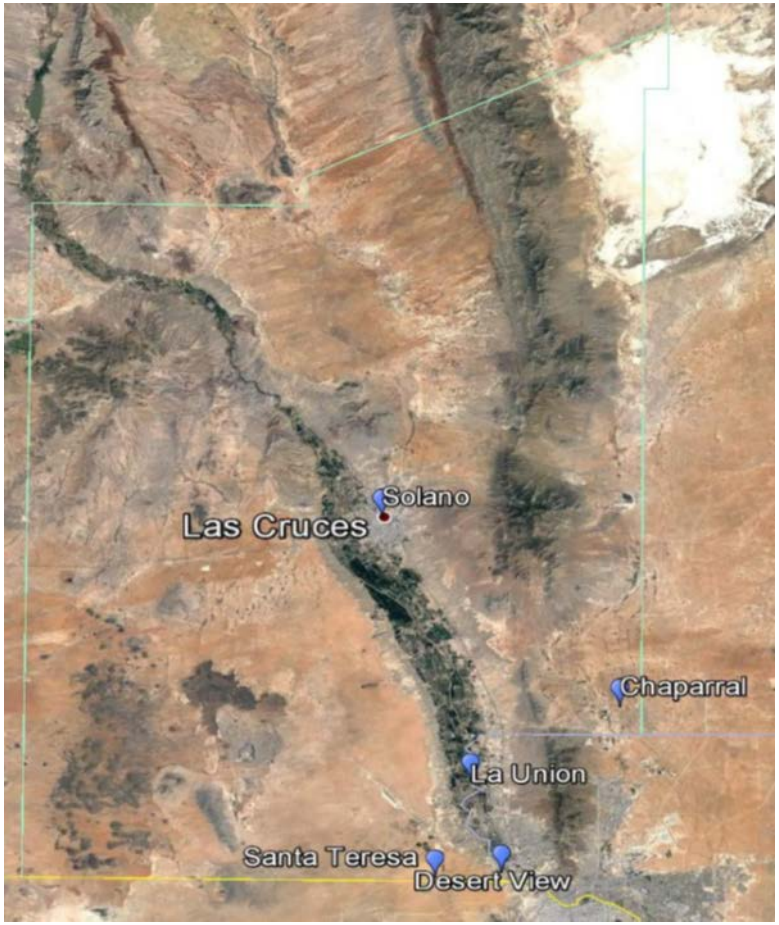
Taken from https://en.climate-data.org/north-america/united-states-of-america/texas/el-paso-943/

Wind Speeds and Direction

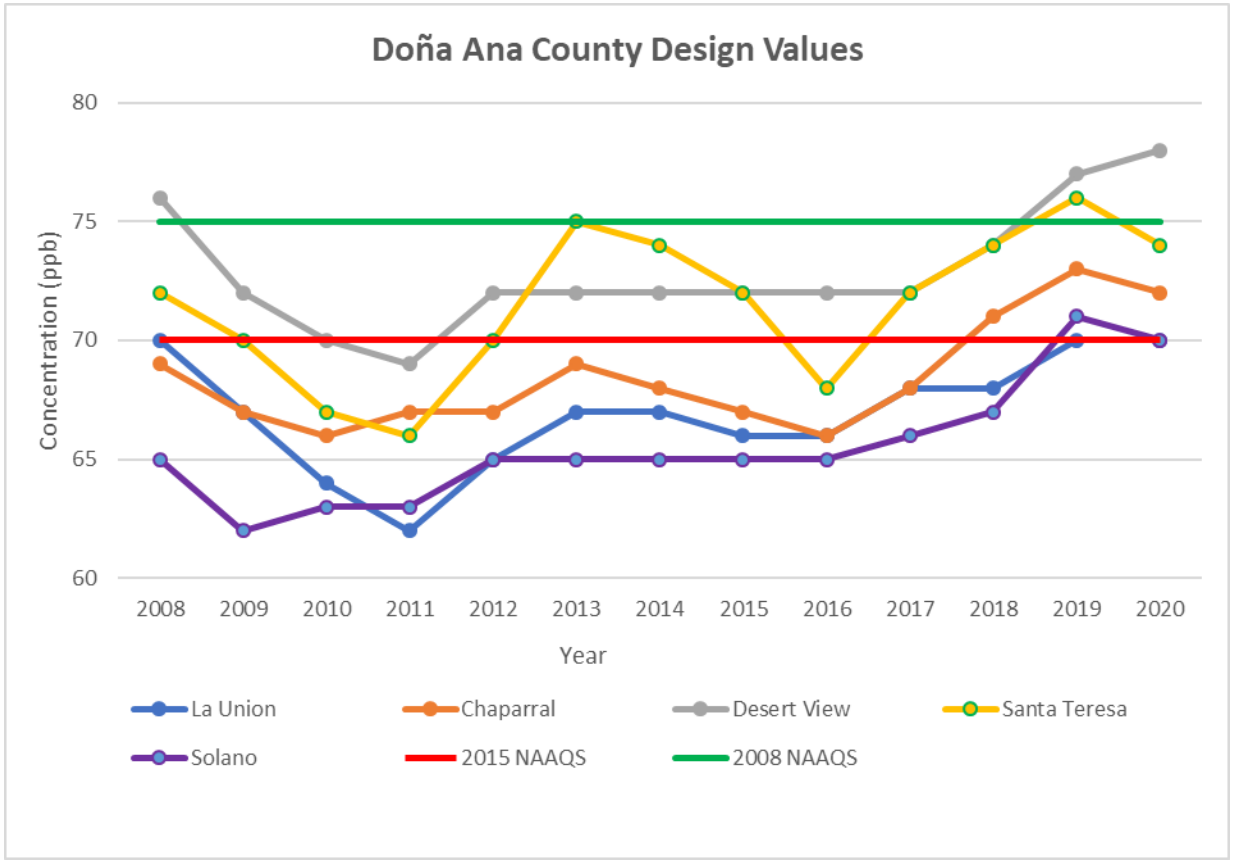


Taken from https://www.weather.gov/epz/elpwindrosedata

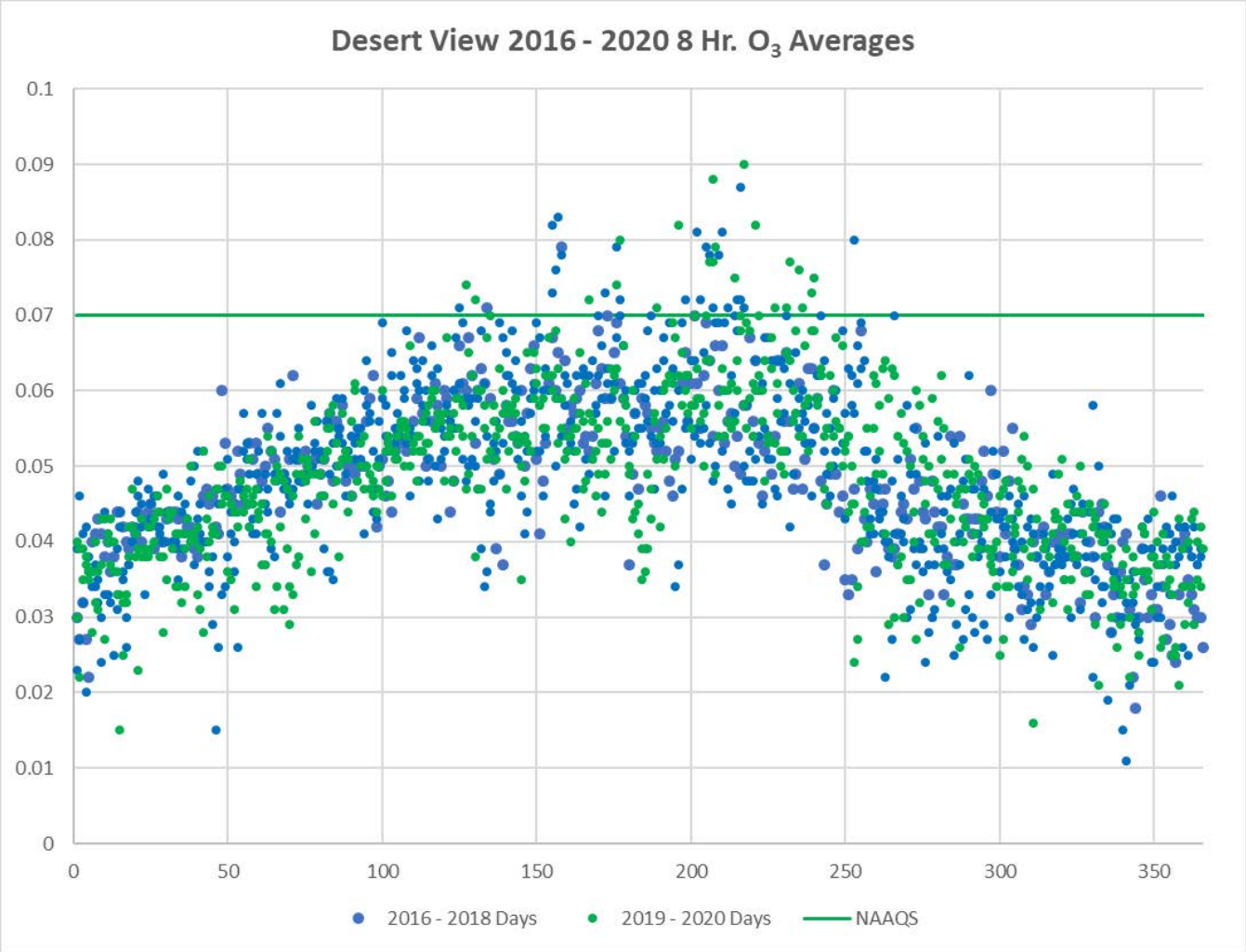
NMED Dona Ana County O_3 Monitors



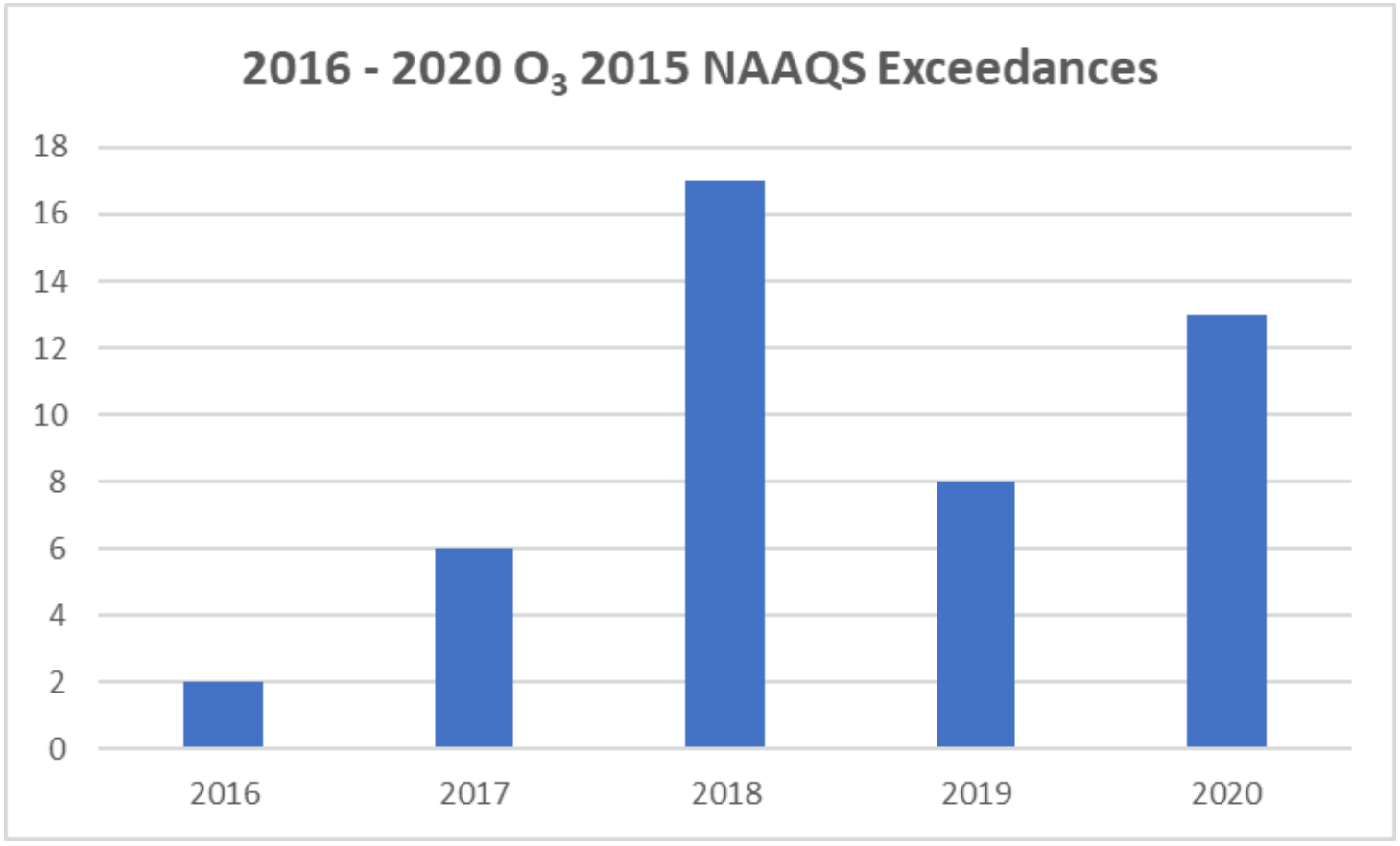
Doña Ana County O_3 Design Values



Desert View Monitoring Site



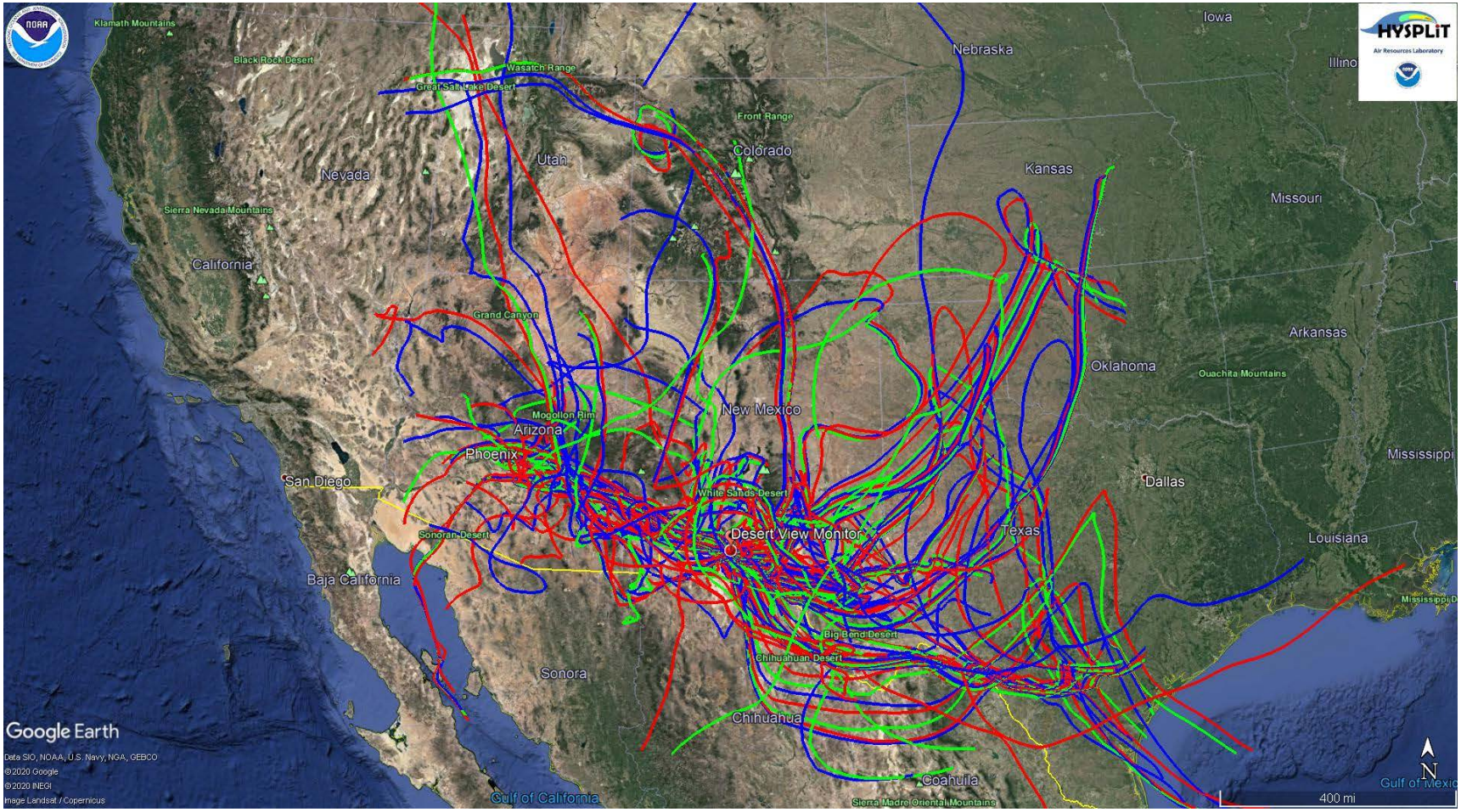
2016 -2020 Desert View Exceedances



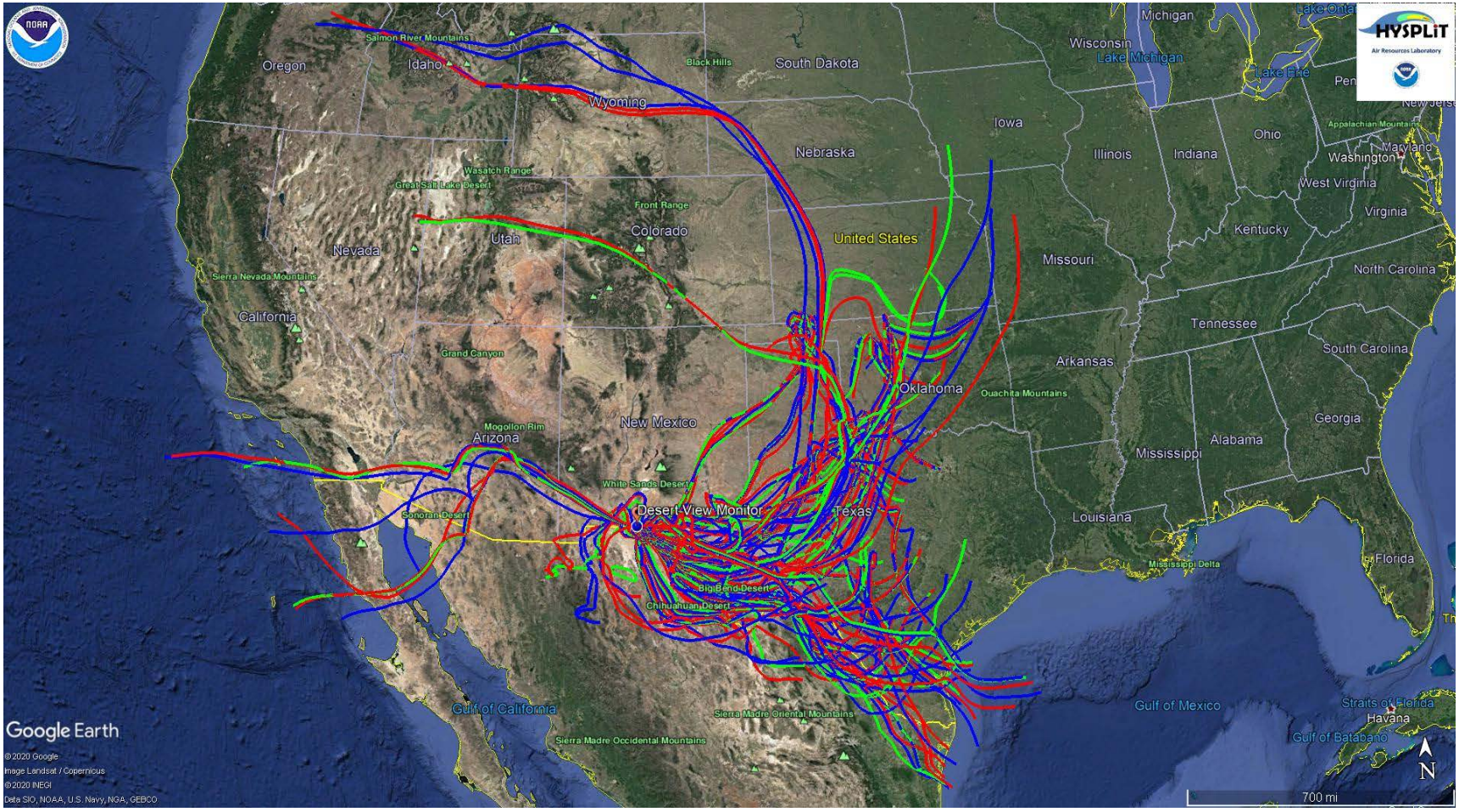
Back-Trajectory Analysis

- Exceedance Days vs. Non-Exceedance Days
  - Same number of Days for each year as comparisons
- National Oceanic and Atmospheric Administration (NOAA) HYSPLiT Back-Trajectories
- North American Mesoscale (NAM) Meteorology
- 72-Hour Run Time
- 8 Maximum Trajectories
  - Starting every 1 hour
- Starting Heights of 100, 500, & 1000 m agl

Non-Exceedance Days 2019-2020



Exceedance Days 2019 - 2020



Comprehensive Emissions Analysis

- 2016 & 2013 Mexico National Emissions Inventories
  - Municipal Ciudad Juarez Emissions
- 2017 & 2014 National Emissions Inventories
  - El Paso County and Dona Ana County
- 2017 & 2014 Sunland Park Emissions Inventories
  - Sunland Park O_3 Nonattainment SIP Revision/Southern New Mexico Ozone Study (SNMOS)
- Assumptions
  - 1 Year difference in emissions inventories with US and Mexico
  - Refining emissions estimation methods for more conservative estimates
  - Anthropogenic Emissions (Biogenics Removed)

Ciudad Juárez Municipality

- 2016 Mexico National Emissions Inventory
  - NO_X: 31,103 tons/yr.
  - VOC: 28,817 tons/yr.
- 2013 Mexico National Emissions Inventory
  - NO_X: 31,804 tons/yr.
  - VOC: 28,726 tons/yr.
- 2013→2016 Trend Analysis
  - NO_X: ↑ 701 tons (2% increase)
  - VOC: ↑ 197 tons (0.7% increase)

El Paso County

- 2017 National Emissions Inventory
  - NO_X : 15,900 tons/yr.
  - VOC: 20,552 tons/yr.
- 2014 National Emissions Inventory
  - NO_X : 19,332 tons/yr.
  - VOC: 14,016 tons/yr.
- 2014→2017 Trend Analysis
  - NO_X : ↓ 3,432 tons/yr. (18% reduction)
  - VOC: ↑ 6,536 tons/yr. (47% increase)

Doña Ana County

- 2017 National Emissions Inventory
  - NO_X : 8,671 tons/yr.
  - VOC: 6,312 tons/yr.
- 2014 National Emissions Inventory
  - NO_X : 10,166 tons./yr.
  - VOC: 6,349 tons/yr.
- 2014→2017 Trends Analysis
  - NO_X : ↓ 1,495 tons/yr. (15% reduction)
  - VOC: ↓ 37 tons/yr. (<1% reduction)

Sunland Park O_3 Nonattainment Area

- 2017 Emissions Inventory NAA SIP Revision
  - NO_X : 280 tons/yr.
  - VOC: 999 tons/yr.
- 2014 SNMOS Emissions Inventory
  - NO_X : 2,701 tons/yr.
  - VOC: 1,857 tons/yr.
- 2014→2017 Trend Analysis
  - NO_X : ↓ 2,421 tons/yr. (90% difference)
  - VOC: ↓ 858 tons/yr. (46% difference)
- Smaller 2017 Nonattainment Area size
- Overall miniscule contributions to PdN airshed

Paso Del Norte Airshed Emissions

Jurisdiction	NOx	Percent	VOC	Percent
Ciudad Juárez	49,208	66.7%	28,923	51.8%
El Paso County	15,900	21.5%	20,552	36.8%
Doña Ana County	*8,391	11.4%	*5,313	9.5%
Sunland Park NAA	280	0.4%	999	1.8%
Total	73,779	100%	55,787	100%

* To prevent double counting adjusted amounts reflect SLP NAA as subset of Doña Ana County

Photochemical Modeling

- 2016 SNMOS Modeling
- EPA Mexico/Canada Emissions Contribution Cross-State Air Pollution Rule (CSAPR) Modeling Data
- 2021 New Mexico Ozone Attainment Initiative Modeling Results

Design Value Contributions

- 2016 Southern NM Ozone Study Modeling

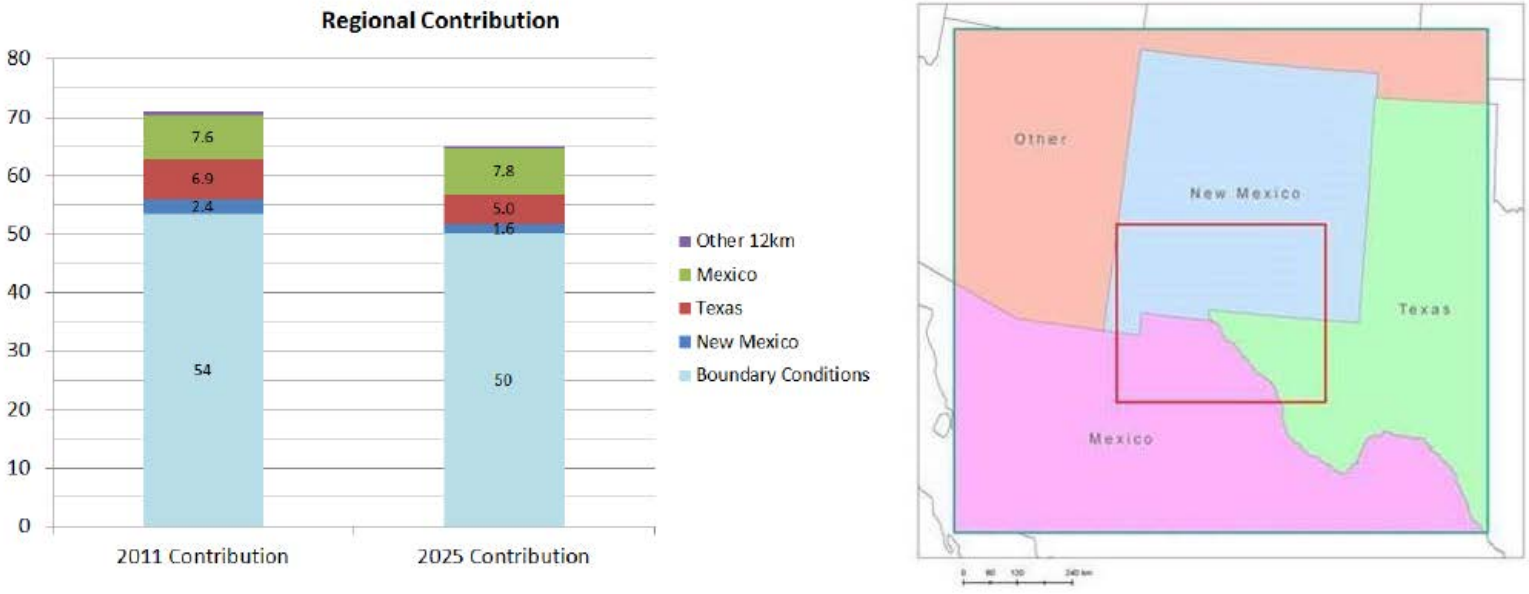
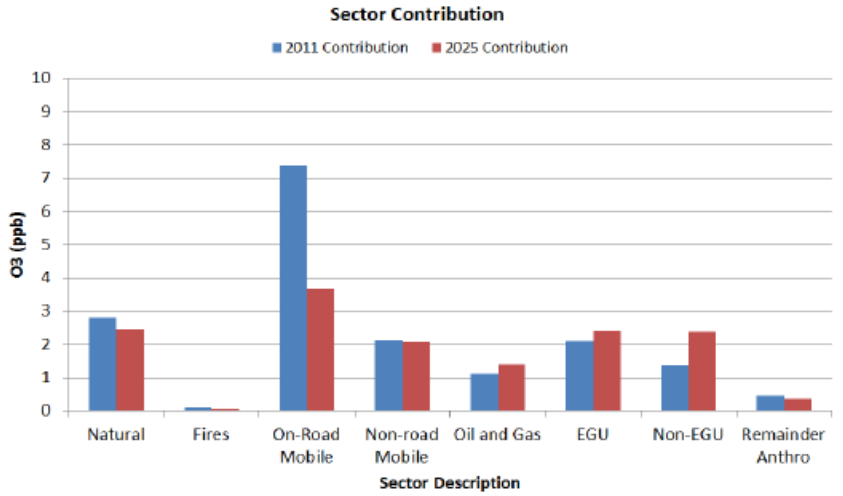
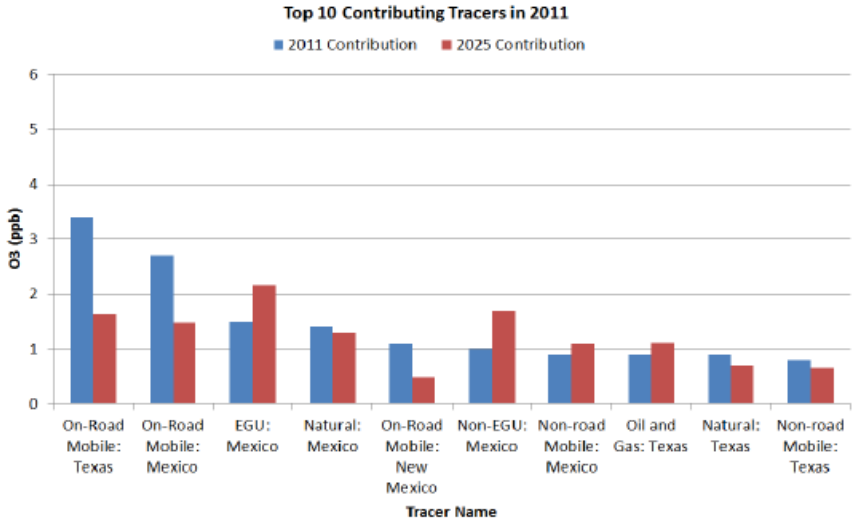


Figure 1-4. Contributions of geographic regions (including Boundary Conditions) to the 2011 and 2025 ozone Design Values at Desert View monitoring site in Dona Ana County in Southwestern New Mexico.

Taken from Ozone Attainment Initiative Draft Modeling Protocol

Design Value Contributions





Design Value Contributions

- EPA CSAPR Mexico/Canada Modeling Emissions Contribution to Desert View monitor (ppb)
  - 2016 Centered Average Design Value = 72.7 ppb
  - 2016 Centered Maximum Design Value = 74 ppb

Year	Mexico Contributions	Average Design Value	Maximum Design Value
2021	16.65	70.4	71.7
2023	16.44	69.5	70.8
2028	15.46	68.2	69.4

Additional Resources

- NMED-Ozone Attainment Initiative Photochemical Modeling Results
- EPA-Intended Area Designation for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document
  - El Paso, TX and Doña Ana County, NM
  - Supports Juarez, Mexico contributes to more than 50% of NO_X and VOC in area
  - EL Paso County has higher emissions than Doña Ana County

Conclusion

- Topography, meteorology, and ozone precursors prime for efficient formation during peak season
- 2016 – 2020 Data Analysis supportive of “But For” Analysis
- “Weight of Evidence” Ciudad Juárez emissions influence high ozone levels and design values
- Bump up in nonattainment designation from “marginal” to “moderate” not appropriate
  - SLP NAA would have met the NAAQS “but for” emissions from MX
  - Increased SIP requirements in NM would not result in improved air quality

Questions and Contact Information

Armando Paz
NMED Air Quality Bureau
2301 Entrada del Sol
Las Cruces, NM 88001
(575) 449-2983
armando.paz@state.nm.us