

ARM2 updates

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ARM2 Overview

- Focus is on NO₂ and NO_x data from EPA AQS sites from 2001-2010
- 98th percentile calculated from 20 ppb-bins
- 3-order polynomial derived
- Max ratio of 0.9
- Min ratio of 0.2
- 3 test databases with NO₂ ISRs of 0.1-0.2
- Several additional sensitivity tests

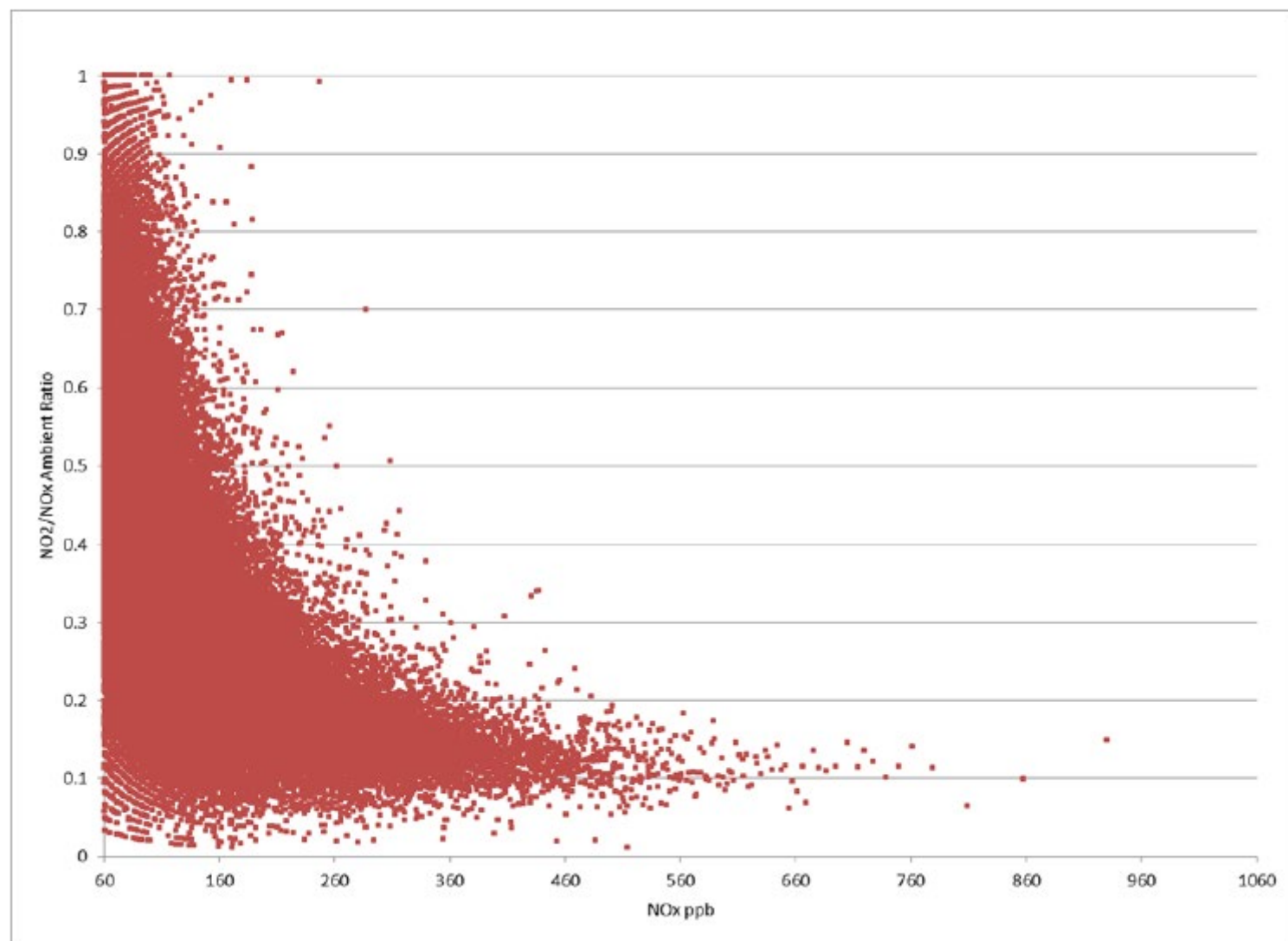
EPA Overview

- Analyzed 5 years of AQS data of concurrent $\text{NO}_2/\text{NO}_x/\text{O}_3$ measurements
- Analysis of theoretical NO_2/NO_x ratios with respect to O_3 chemistry
 - Psuedo-steady state (PSS)
 - Simple titration (complete reaction with NO and O_3)

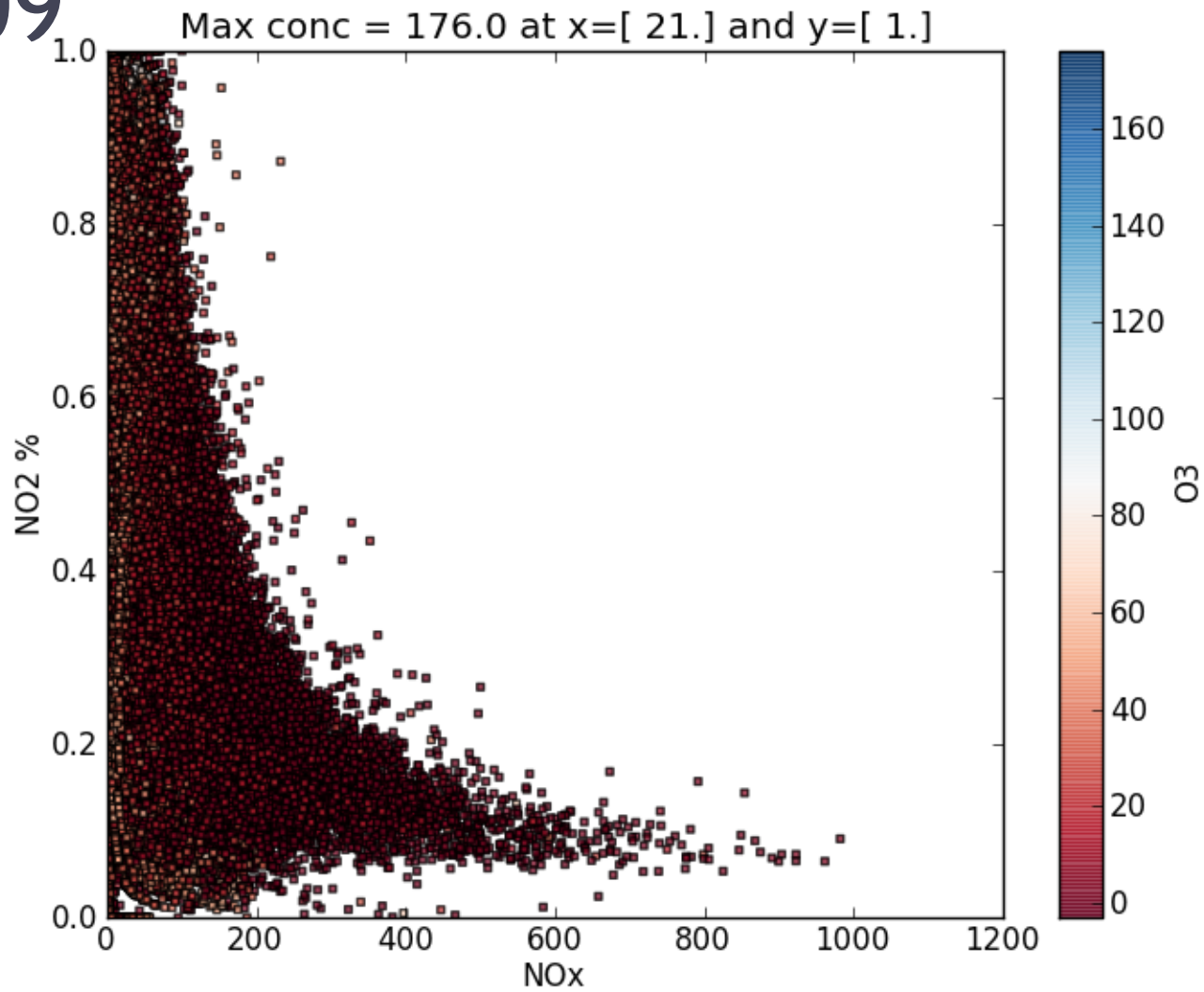
EPA Overview

- $\text{O}_3 + \text{NO} \rightarrow \text{NO}_2 + \text{O}_2$ (k_1)
- $\text{O}_2 + \text{NO}_2 + h\nu \rightarrow \text{NO} + \text{O}_3$ (k_2)
- $K_1[\text{O}_3][\text{NO}] = k_2[\text{NO}_2]$
 - $K_1 = (15.33/T)\exp(-1450/T) \text{ ppb}^{-1} \text{ sec}^{-1}$
 - $k_2 = 0.0167\exp(-0.575/\cos(\theta)) \text{ sec}^{-1}$
 - θ = zenith angle of sun, function of location latitude and time of day
- $(k_1[\text{O}_3])/(k_2 + k_1[\text{O}_3]) = [\text{NO}_2]/[\text{NO}_x]$

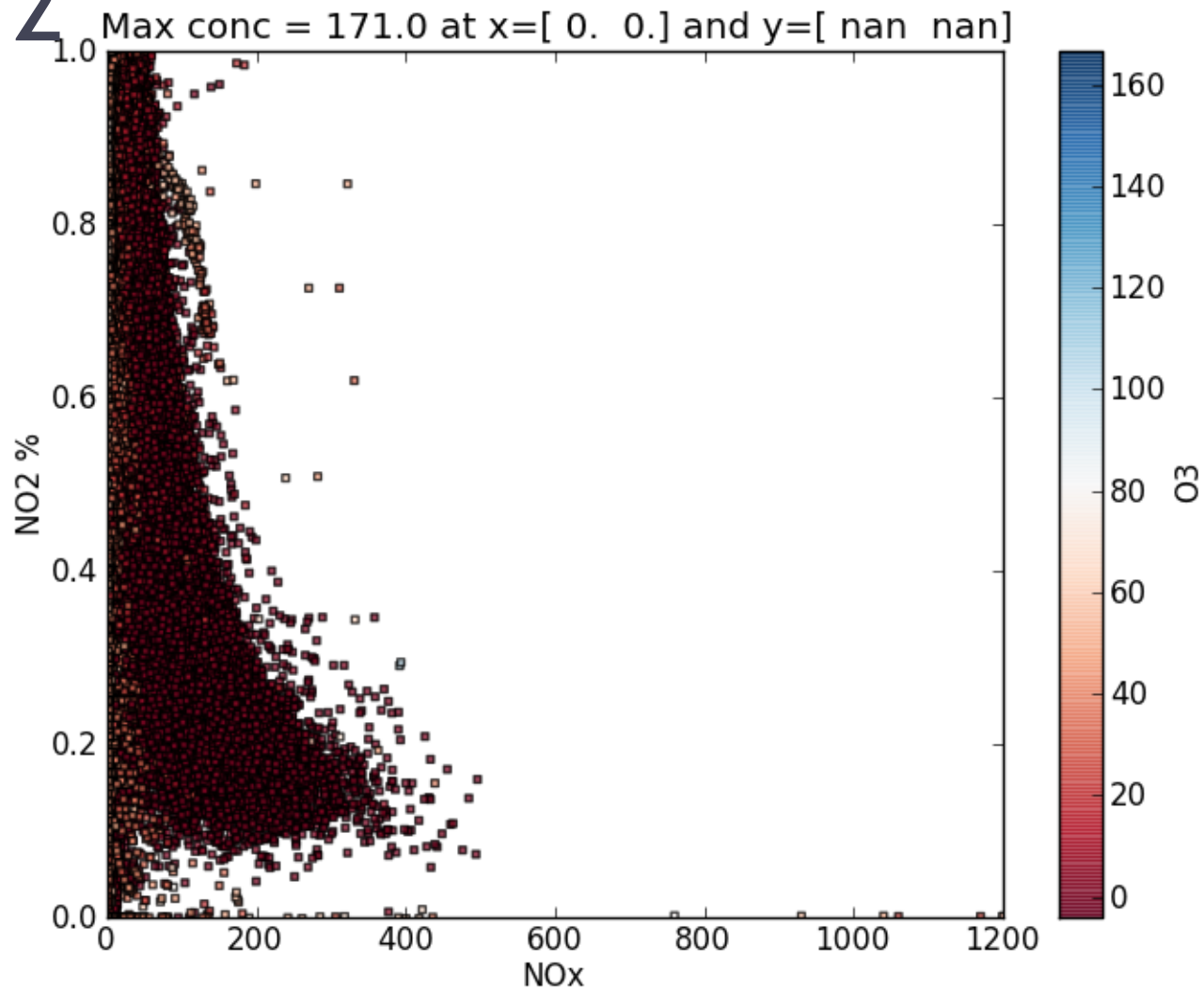
Figure 1– NO₂/NO_x Ratios for All AQS Monitoring Sites for 2001-2010



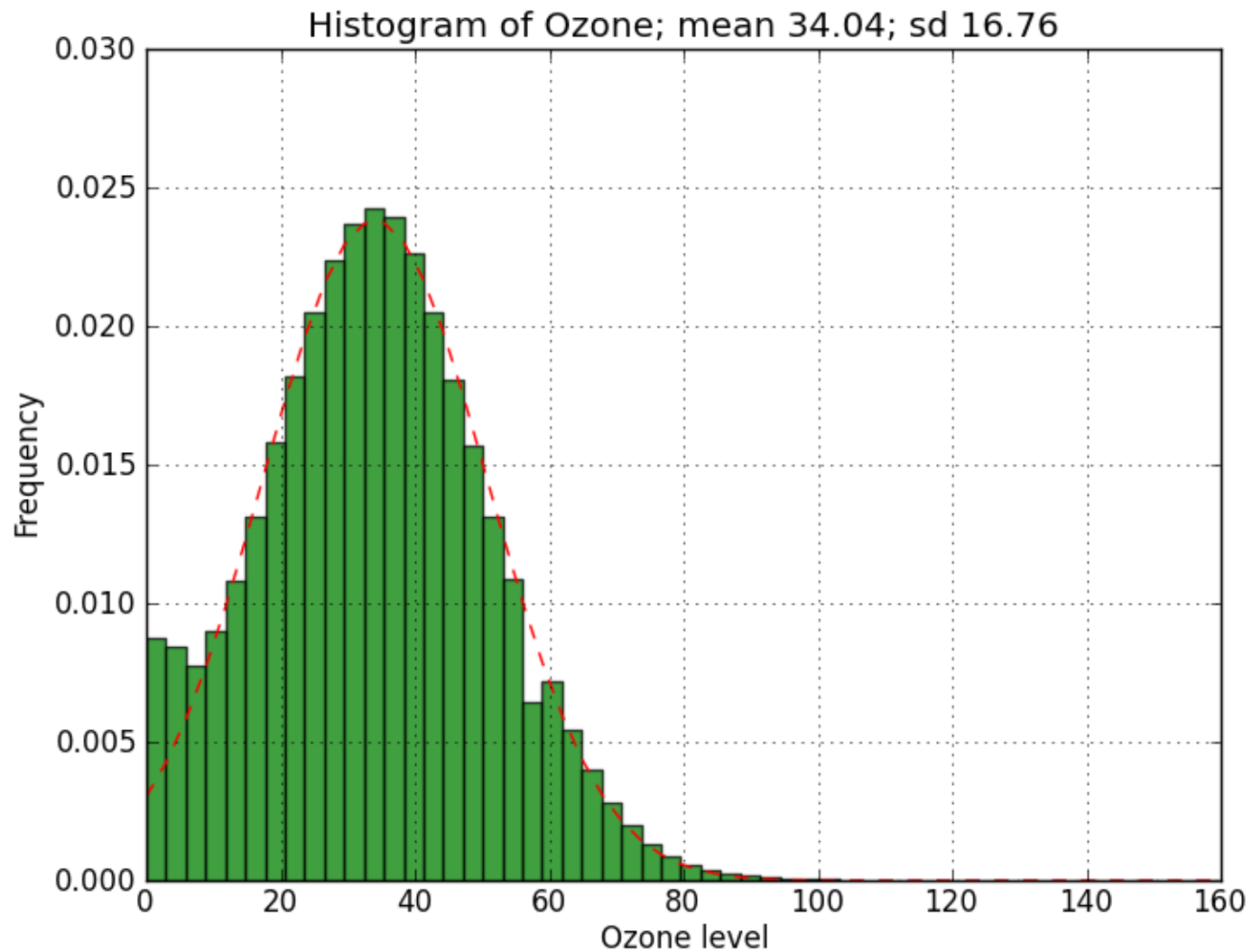
2009



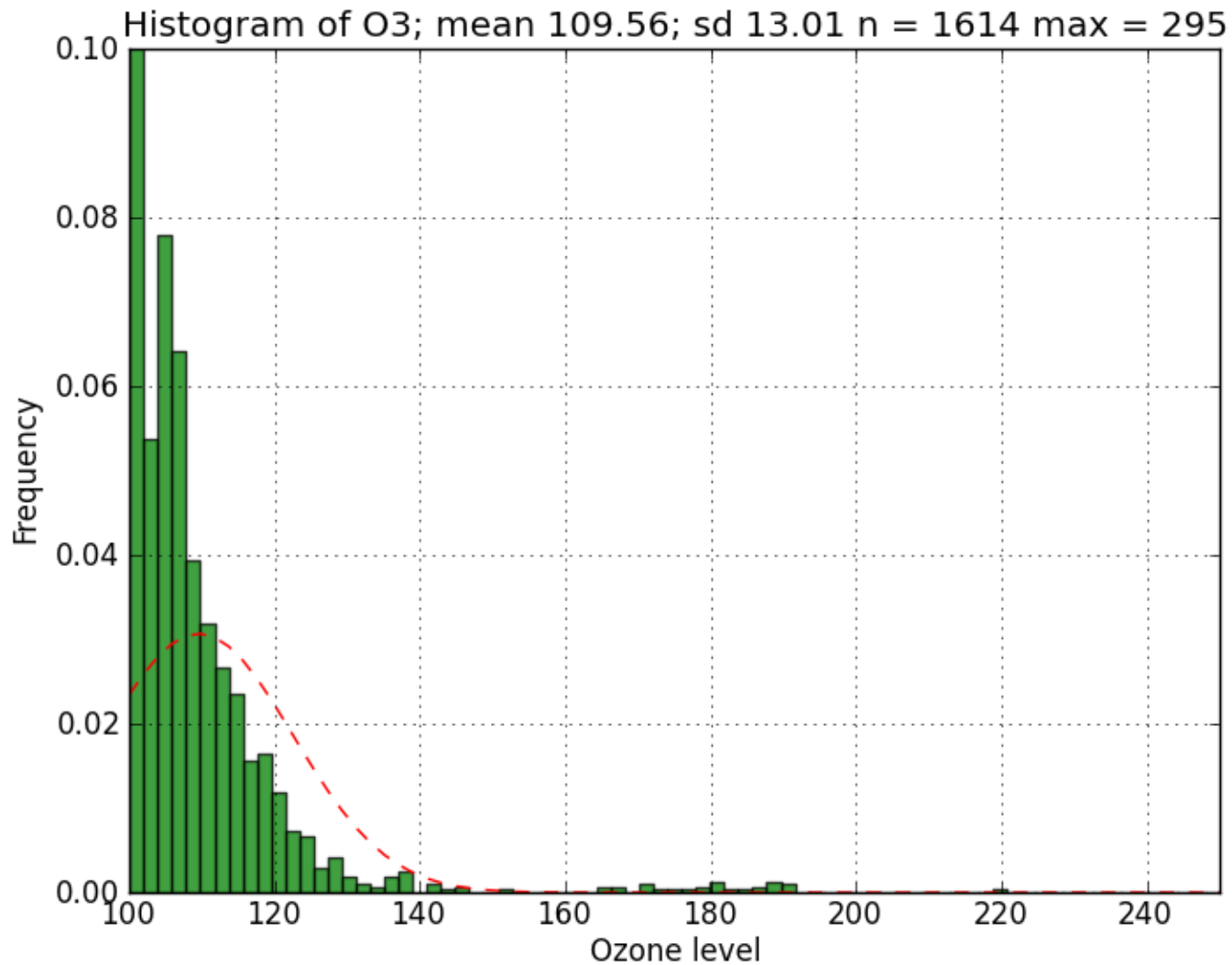
2012



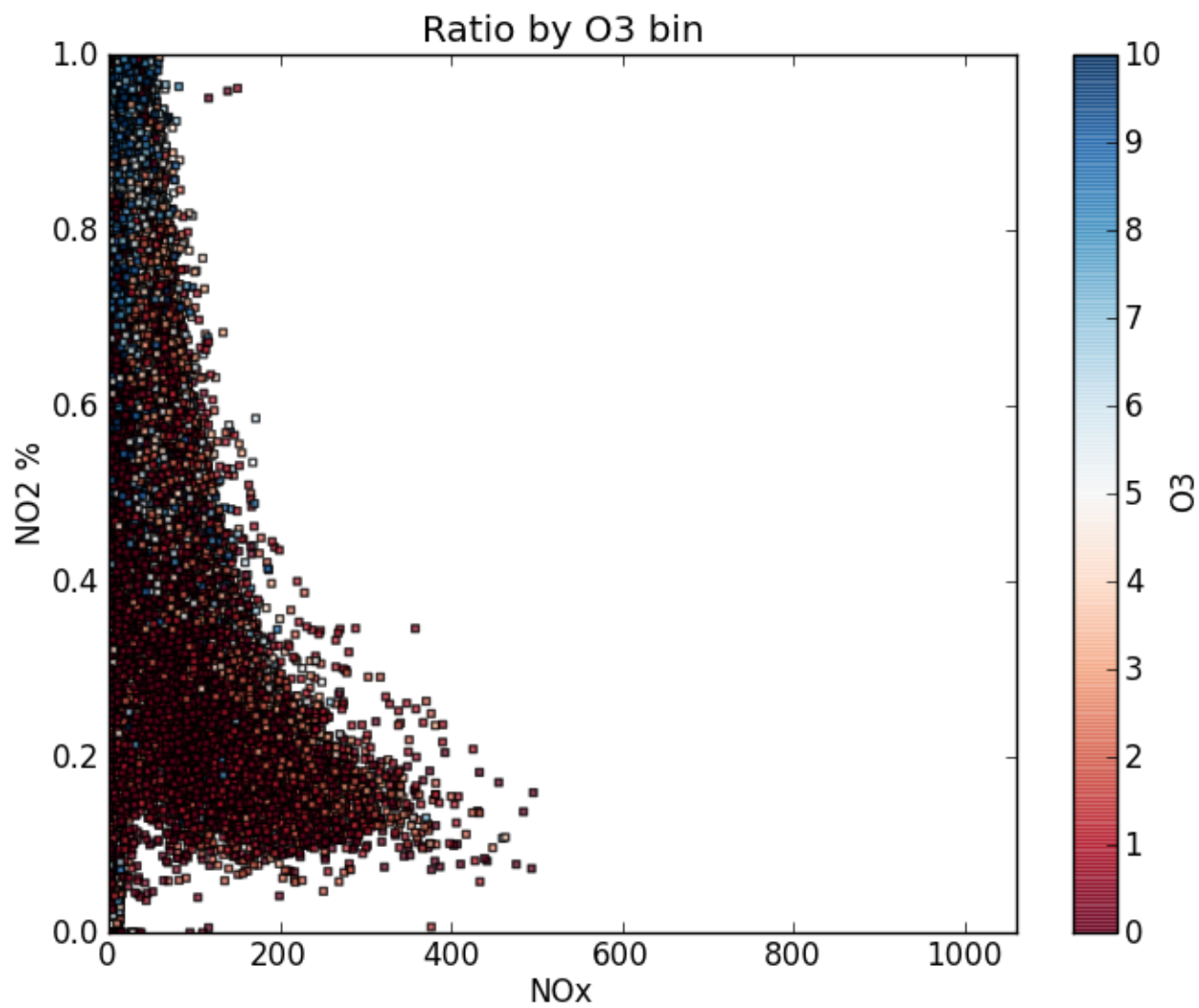
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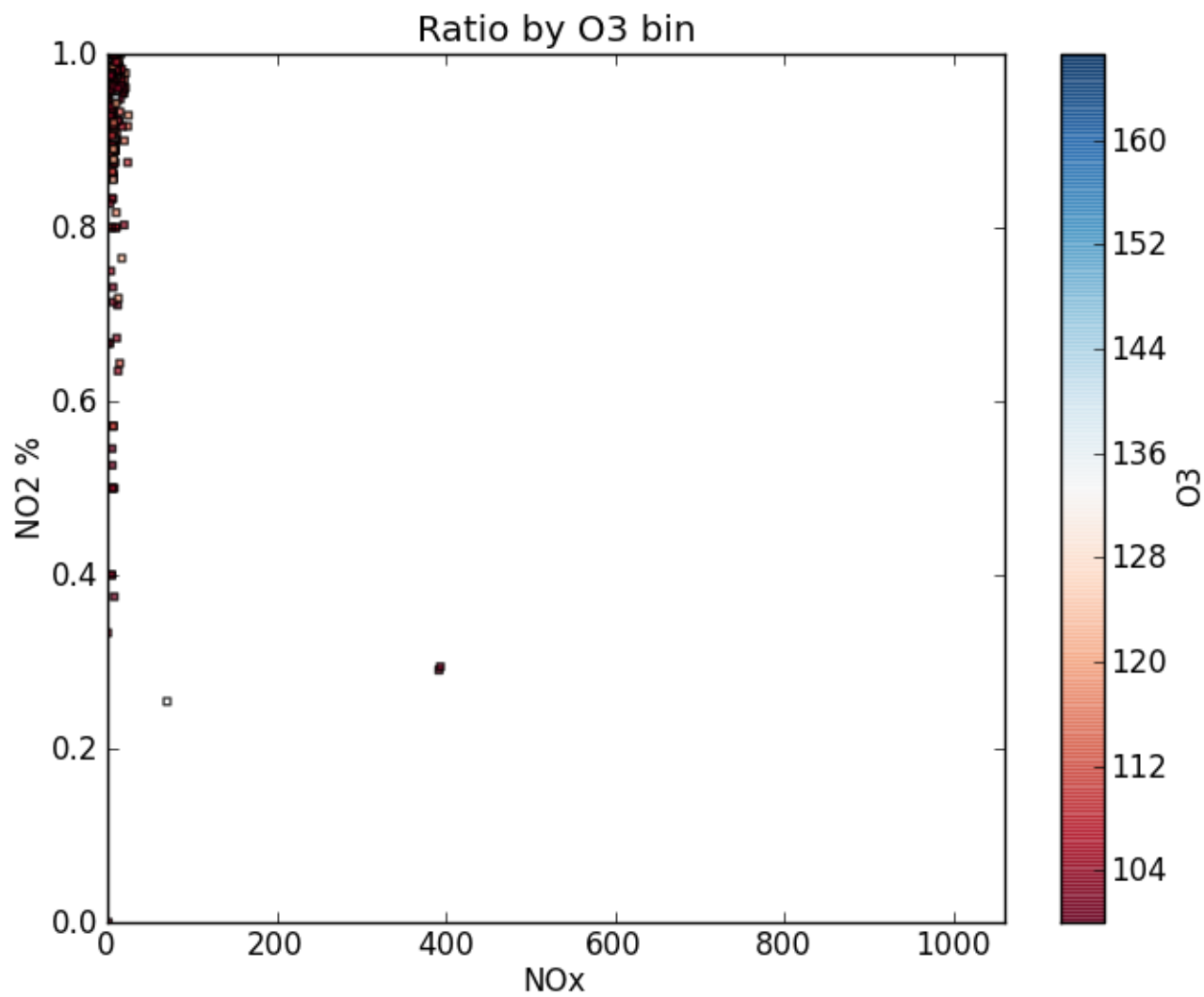
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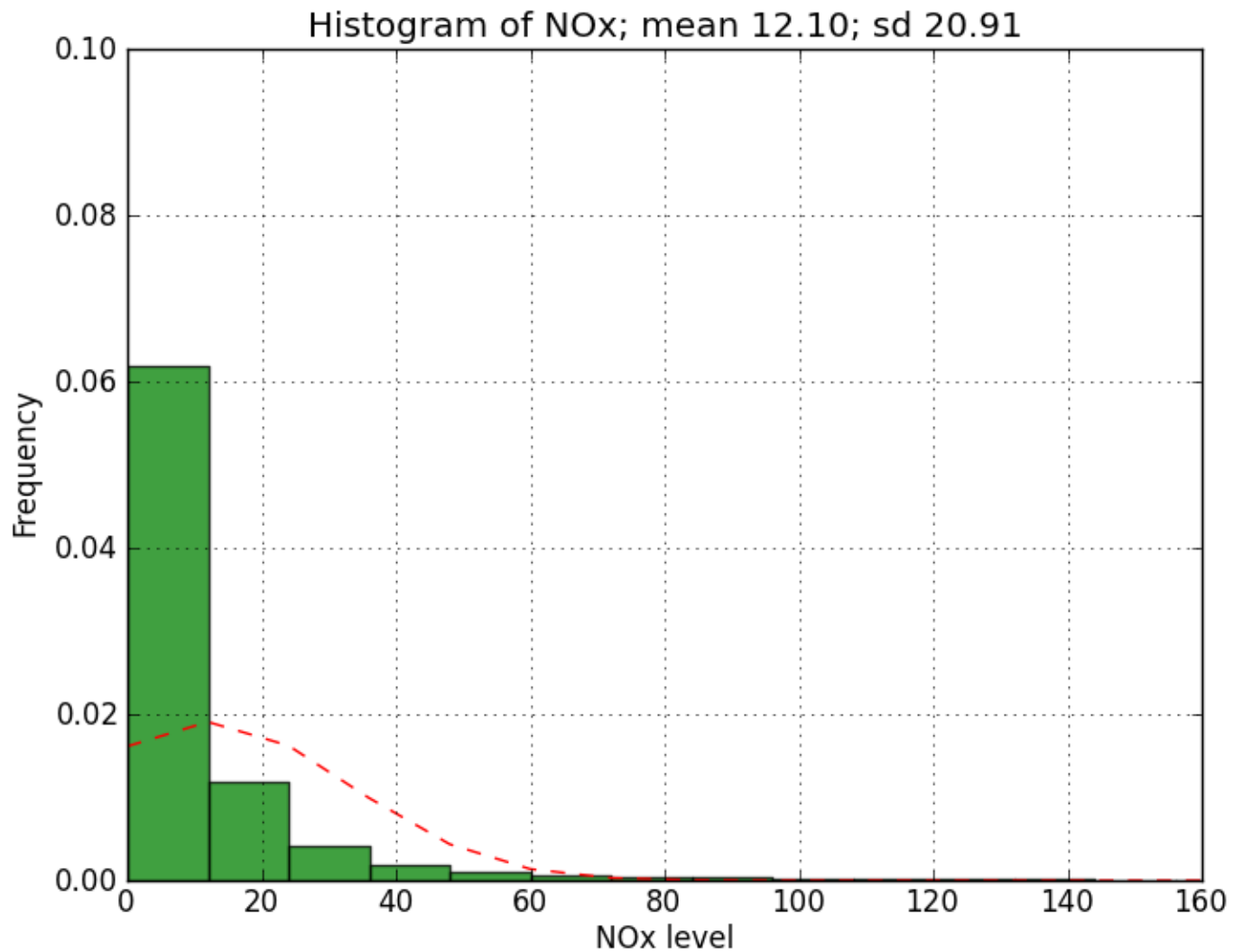
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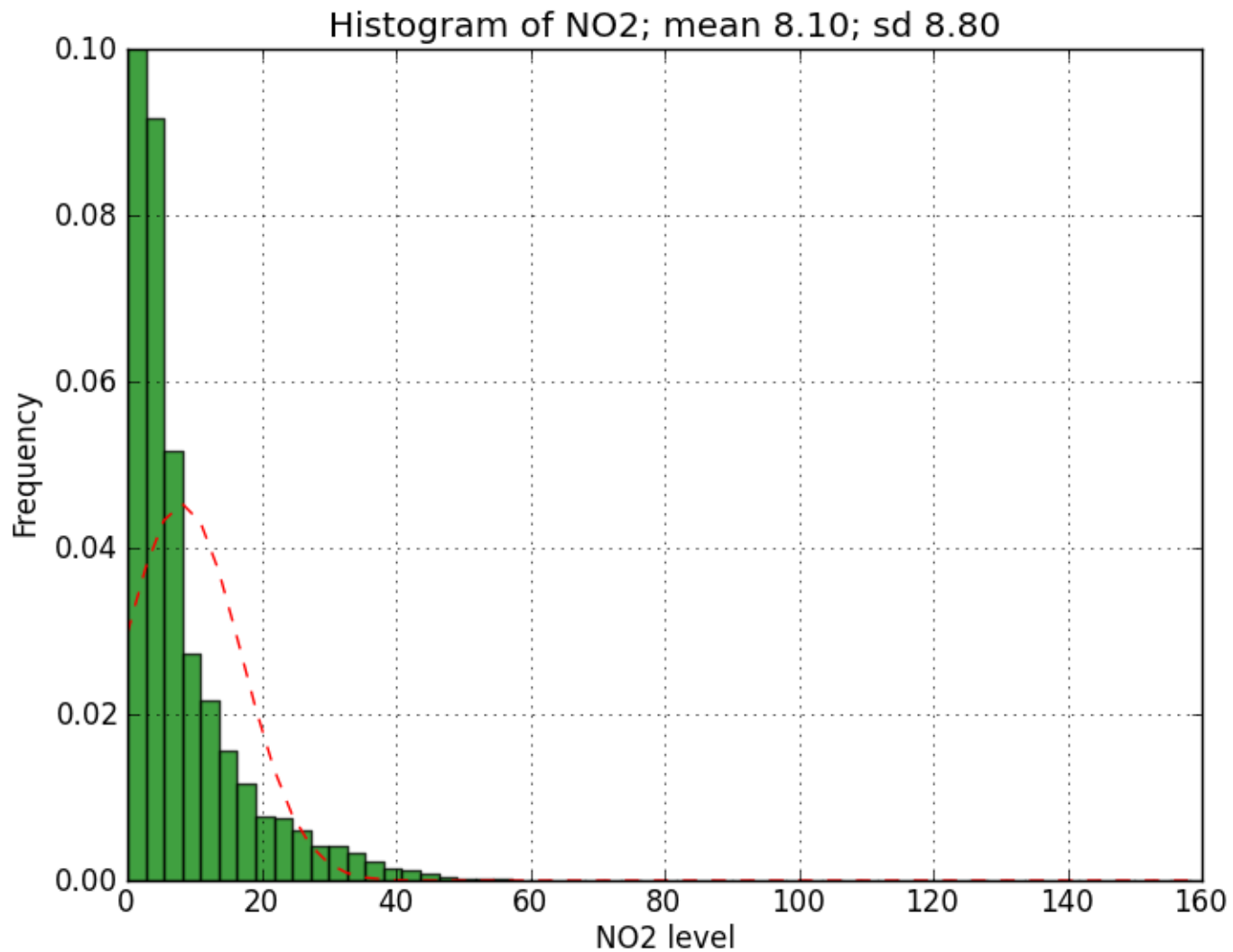
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NO conversion times based on ozone concentration

