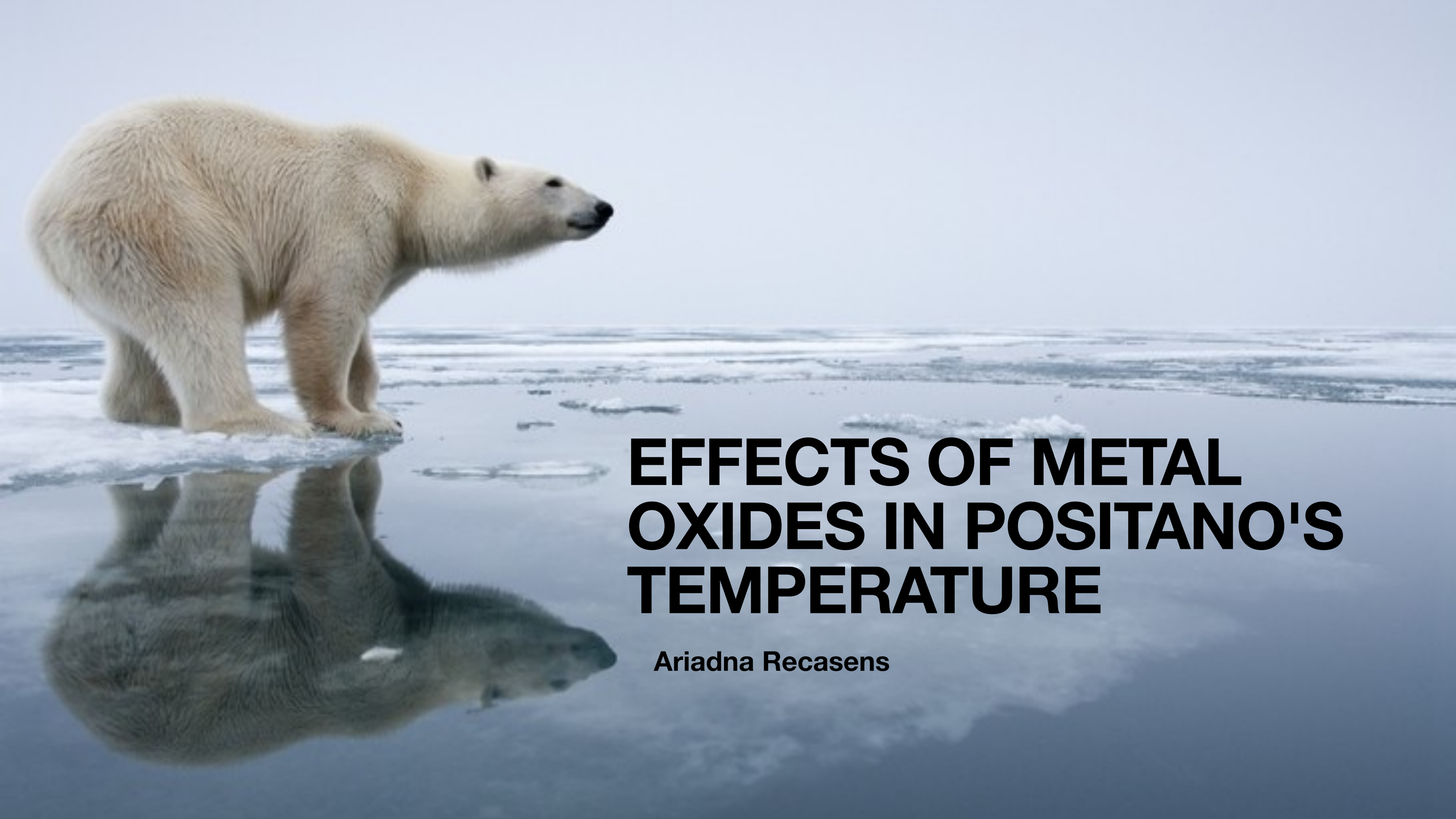


EFFECTS OF METAL OXIDES IN POSITANO'S TEMPERATURE

Ariadna Recasens

OVERVIEW

This project explores the effect of metal oxides on the temperature of Positano to help the new mayor implement novel regulations.

OUTLINE

- Business problem
- Data
- Methods
- Results
- Conclusions

BUSINESS PROBLEM

- The new mayor of Positano wants to understand whether metal oxides that are released from the city's industries impact the city's warming climate.

- In this project, we will create a linear regression model to understand the effect of ten metal oxides on Positano's temperature to help the new mayor introduce new regulations to reduce climate change.

BUSINESS PROBLEM

Air Quality Data Set

The dataset contains 9358 instances of hourly averaged responses from an array of 5 metal oxide chemical sensors embedded in an Air Quality Chemical Multisensor Device.

Data were recorded from March 2004 to February 2005.

Metal oxides studied include:

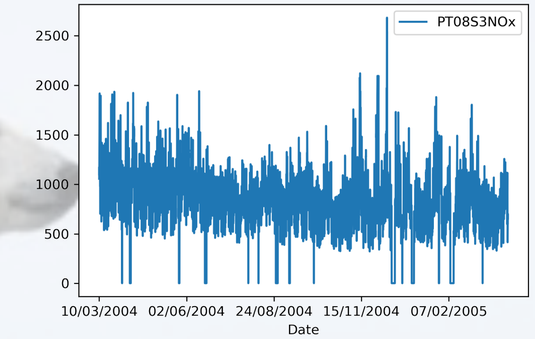
- CO
- Tin oxide
- Non Metanic HydroCarbons
- Benzene
- Titania
- NOx
- Tungsten oxide (nominally NO2 & NOx targeted)
- NO2
- Indium oxide

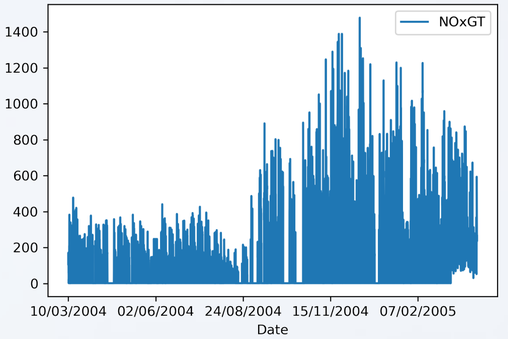
METHODS

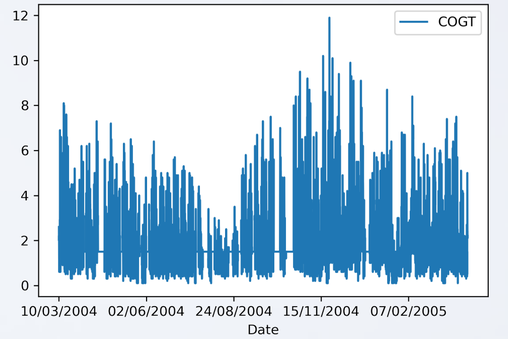
1. Data exploration:
    - How do variables change over time?
    - How did the average of each variable change between 2014 and 2015?
2. Linear regression model:
    - Iteration process to improve the model by studying multicollinearity and interactions.
    - Model validation using train and testing subset.

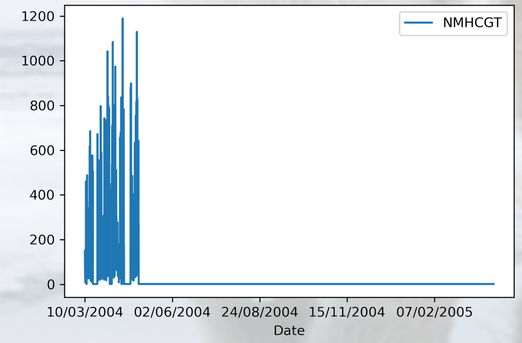
RESULTS

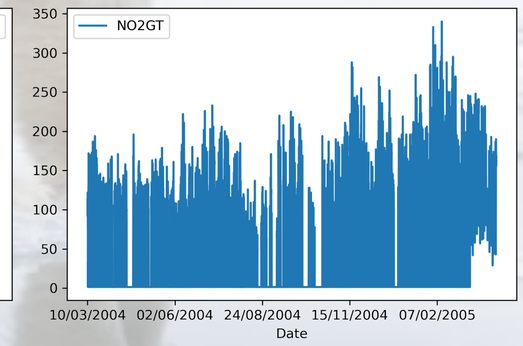
Change of variables over time

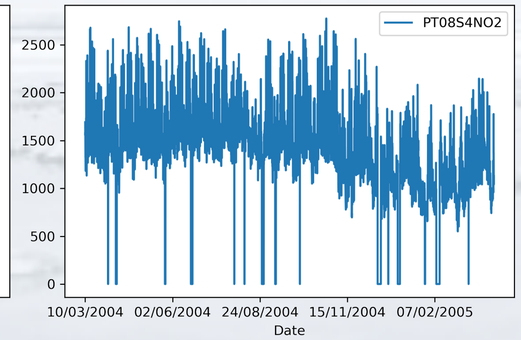


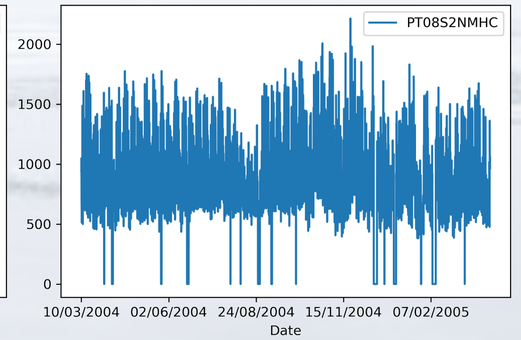


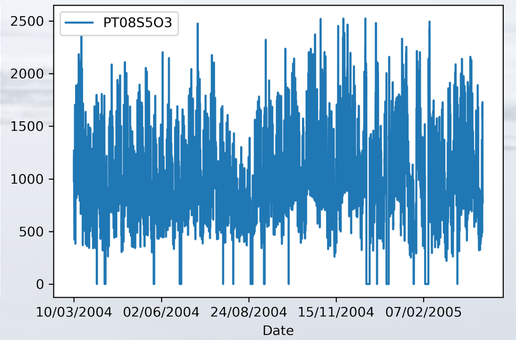


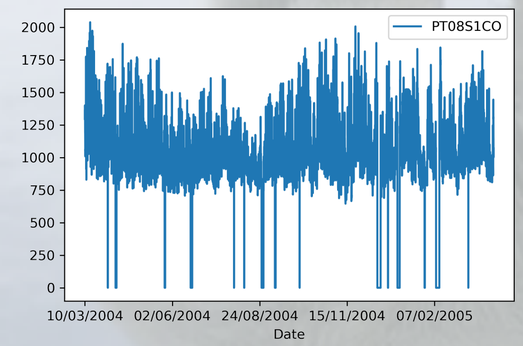


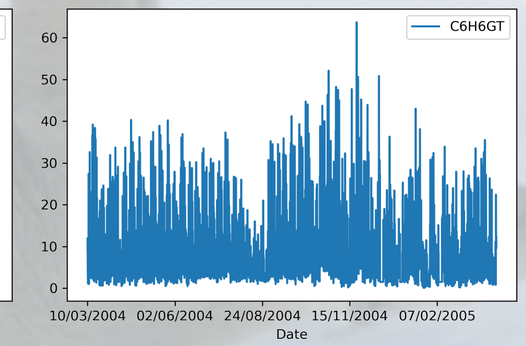


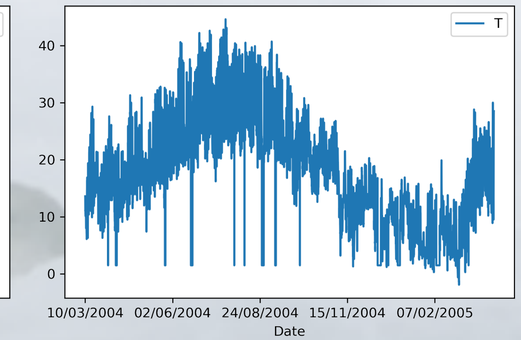


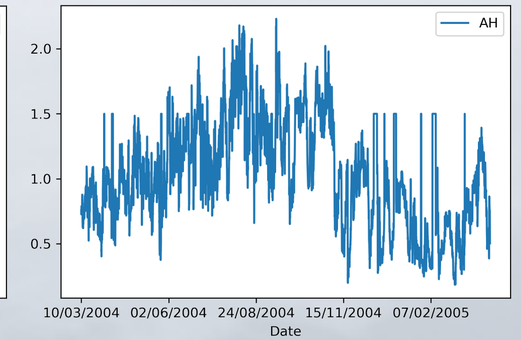


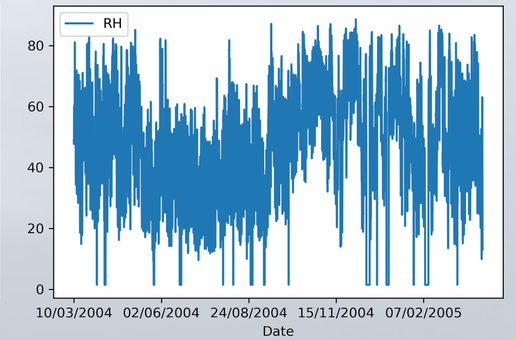












RESULTS

Average differences between 2014 and 2015

Variable	Average 2014	Average 2015
CO(GT)	2.036723	2.030975
Tin oxide - PT08.S1(CO)	1061.597046	1041.919893
Non Metanic HydroCarbons - NMHC(GT)	29.435724	1.500000
Benzene - C6H6(GT)	10.338383	7.877303
Titania - PT08.S2(NMHC)	930.068214	815.172230
NOx - NOx(GT)	170.898312	308.375834
tungsten oxide - PT08.S3(NOx)	828.916174	720.461949
NO2 - NO2(GT)	79.611744	137.482198
Tungsten oxide - PT08.S4(NO2)	1502.120956	1074.207388
indium oxide - PT08.S5(O3)	980.447117	990.885180
Temperature - (T)	20.240605	9.494393
Relative humidty (RH) - PT08S5O3	46.753657	49.308055
Absolute humidty (AH)	1.151260	0.704977

RESULTS

Linear Regression Model

Final R-squared = 0.668
(Initial R-squared = 0.653)

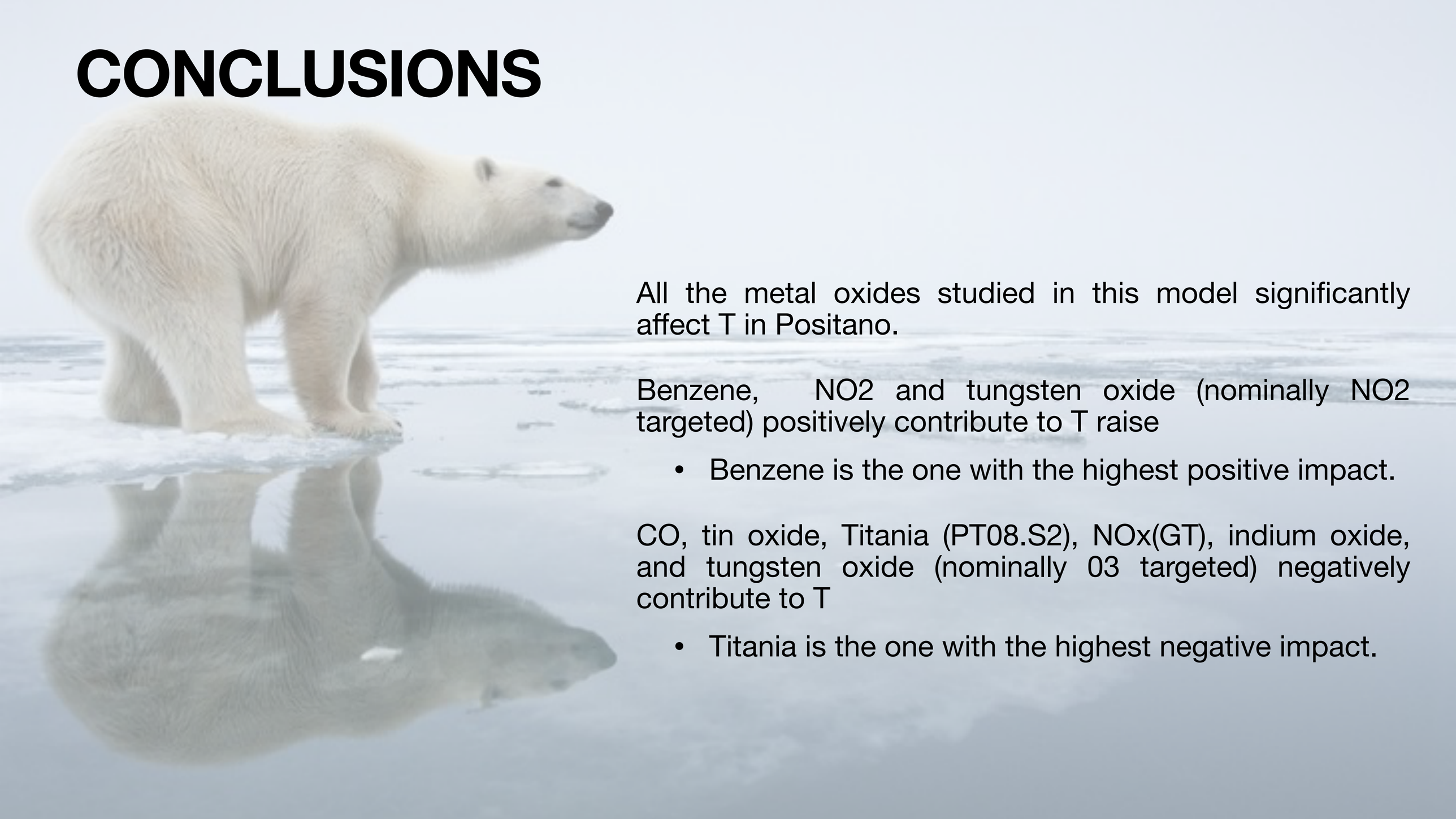
Variables that positively impact Temperature

Variable	Coefficient
C6H6(GT)	11.09684
NO2(GT)	1.925704
PT08.S4(NO2)	6.673217

Variables that negatively impact Temperature

Variable	Coefficient
CO(GT)	-0.561600
PT08.S1(CO)	-4.501010
PT08.S2(NMHC))	-5.678621
NOx(GT)	-2.7477100
PT08.S3(NOx)	-3.156382
PT08.S5(O3)	-5.449668

CONCLUSIONS



All the metal oxides studied in this model significantly affect T in Positano.

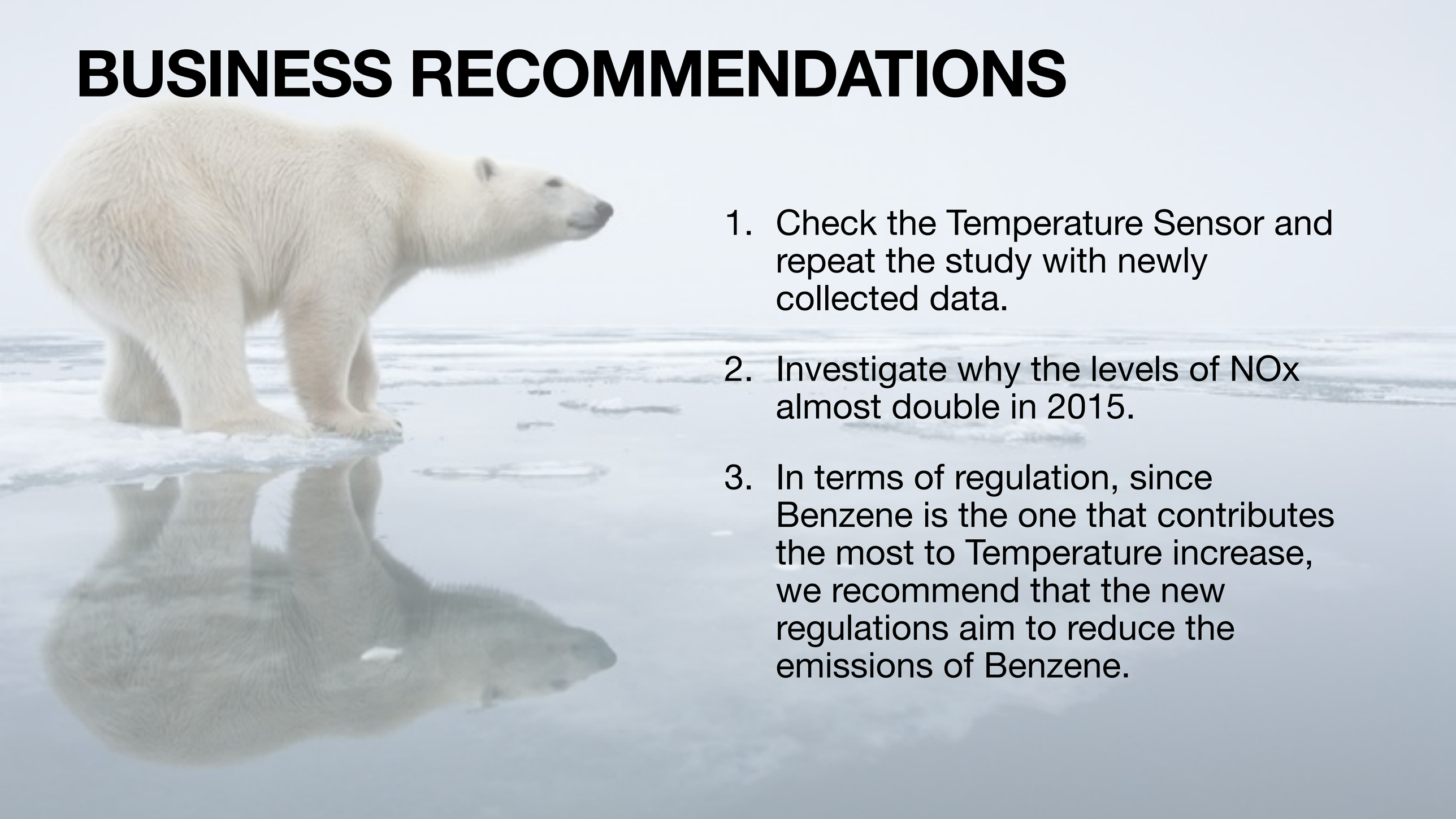
Benzene, NO2 and tungsten oxide (nominally NO2 targeted) positively contribute to T raise

- Benzene is the one with the highest positive impact.

CO, tin oxide, Titania (PT08.S2), NOx(GT), indium oxide, and tungsten oxide (nominally 03 targeted) negatively contribute to T

- Titania is the one with the highest negative impact.

BUSINESS RECOMMENDATIONS



1. Check the Temperature Sensor and repeat the study with newly collected data.

2. Investigate why the levels of NOx almost double in 2015.

3. In terms of regulation, since Benzene is the one that contributes the most to Temperature increase, we recommend that the new regulations aim to reduce the emissions of Benzene.


THERE IS NO PLANET B