

# ASSESSMENT OF AIR POLLUTION FROM GROUND TRANSPORT BY INTEGRATING REMOTE SENSING AND SOCIO-ECONOMIC MODELING

Aya Fujikawa<sup>1</sup> and Wataru Takeuchi<sup>2</sup>

<sup>1</sup>Master's course student, Department of Civil Engineering, The University of Tokyo,  
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan; Tel: + 81-3-5452-6410;

E-mail: ayafuji@iis.u-tokyo.ac.jp

<sup>2</sup>Associate professor, Institute of Industrial Science, The University of Tokyo,  
4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, Japan; Tel: + 81-3-5452-6407;

E-mail: wataru@iis.u-tokyo.ac.jp

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## ABSTRACT:

Today, it isn't so clear that whether there is the characteristic of city or the regionality in terms of the state of the atmosphere. The objective of this research is to find the characteristic of each cities or the regionality by using the data from MOPITT. I focus on Angstrom exponent (ANG) and optical tickness of aerosols (AOD) to draw a comparison with cities. I research 14 cities about ANG and AOD. This research shows the deviation value of ANG in European cities(6 cities) is higher than that of other cities. In the future, this research would be useful to distinguish artificial aerosol from natural aerosol by satellite data and to analyze the effect of artificial aerosol in the field of transportation.

## INTRODUCTION

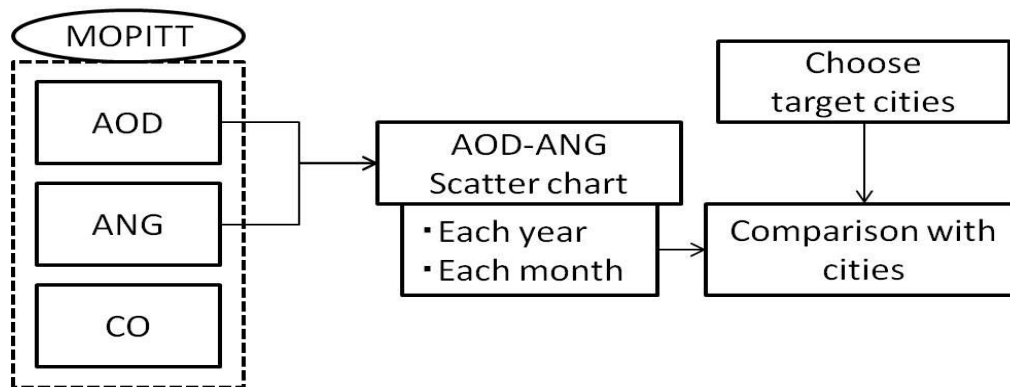
### Background

Today, it is considerably revealed that what is the aerocol itself. However, it isn't so clear that how much range natural or artificial aerosol affects and that how different it affects by each seasons. Especially, it isn't so clear how much degree aerosol in the field of transportation affects atmosphere. So, I focus on Angstrom exponent (ANG) and optical tickness of aerosols (AOD) to analyze the state of the atmosphere.

### Objective

The objective of this research is to find the characteristic of each cities or the regionality by researching Angstrom exponent (ANG) and optical tickness of aerosols (AOD) and comparing the data of each year or monthly average.

**METHODOLOGY**



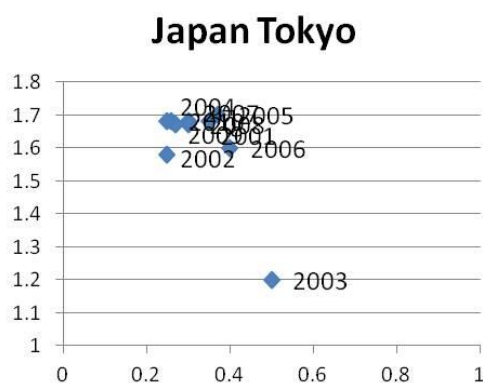
**Figure 1:** Flow chart

I make AOD-ANG scatter chart by using the values of AOD and ANG from MOPITT. I use the 10 years' data from 2001 to 2010.

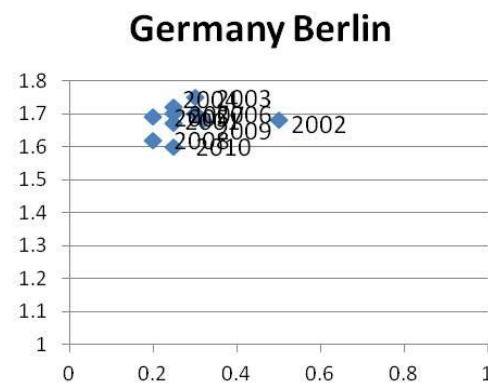
The target cities of this research are Washington D.C.(America), Beijing(China), Tokyo(Japan), Berlin(Germany), Rome(Italy), Moscow(Russia), Paris(France), London(England), Sao Paulo(Brazil), Mexico City(Mexico), Warsaw(Poland), Prague(Czech), Jakarta(Indonesia), Algiers(Algeria), Buenos Aires(Argentina). The 10 cities in the front (Washington D.C. to Mexico city) are the capital cities of the best 10 countries that have cars in 2010 and the 5 cities in the back (Warsaw to Buenos Aires) are the capital cities of the 5 countries that were the highest in a growth rate of the car ownership in 2006-2010. These data were published by Ministry of Land, Infrastructure, Transport and Tourism in Japan.

After choosing the target cities, I choose the maximum value of AOD and ANG in 2001-2010 to make scatter chart. In addition, I make the AOD-ANG scatter chart of the monthly average each cities.

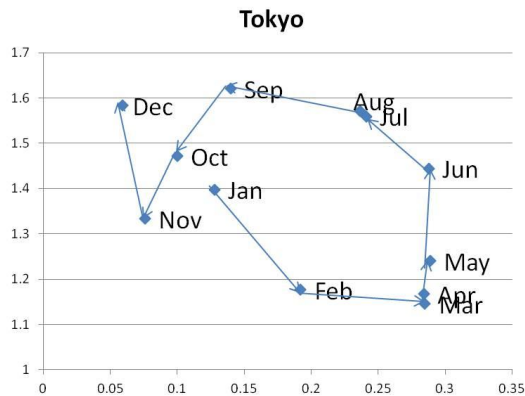
**RESULTS**



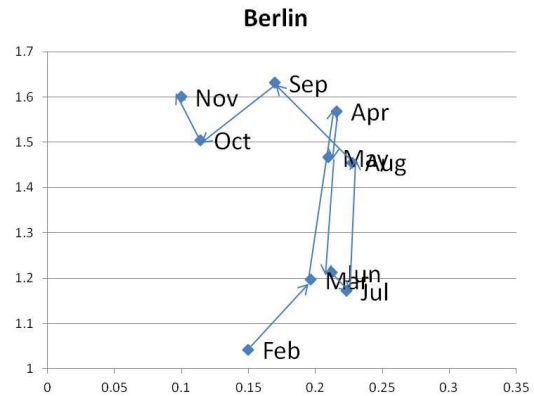
**Figure 2:** Each year (2001-2010) of Tokyo



**Figure 3:** Each year (2001-2010) of Berlin



**Figure 4:** Each month (Jan-Dec) of Tokyo



**Figure 5:** Each month (Jan-Dec) of Berlin  
Berlin's January and December are no data(2001-2010)

I show the cases of Tokyo and Berlin as an example. Figure 2,3 are AOD-ANG scatter chart by years and figure 4,5 are by the monthly average in 2001-2010.

From Figure 2 and 3, it seems that the points of Tokyo and Berlin are concentrated. But, the change from a month to a month is different. Figure 4 (of Tokyo) is like a circle, on the other hand, figure 5 (of Berlin) is that the ANG's value is bigger in April and May and is smaller in June and July.

I show figure 6 which is the data of 14 cities (excluding Algiers because of no data). The points of figure 6 are average values of each cities in 2001-2010 and the error bars mean standard deviation.

## CONCLUSIONS & FUTURE WORKS

Seeing from figure 2-5, Tokyo is similar to Berlin in terms of figure 2 and 3, but is different from Berlin in terms of figure 4 and 5. It seems that there is the characteristic of each cities by seasons.

Seeing from figure 6, the deviation value in European countries is higher. I think natural aerosol in European countries affects bigger and suspect that it is involved with westerlies. And in the case of Jakarta and Beijing, the deviation values of AOD and ANG are bigger. I suspect that the situation is involved that Indonesia and China are rising countries.

As future works, I will add target cities and analyze them to research the characteristic of Europe and rising countries and mix AOD-ANG data and the matters on transportation (ex. population density, the number of vehicle, the rate of infrastructure improvement, etc...).

## REFERENCES

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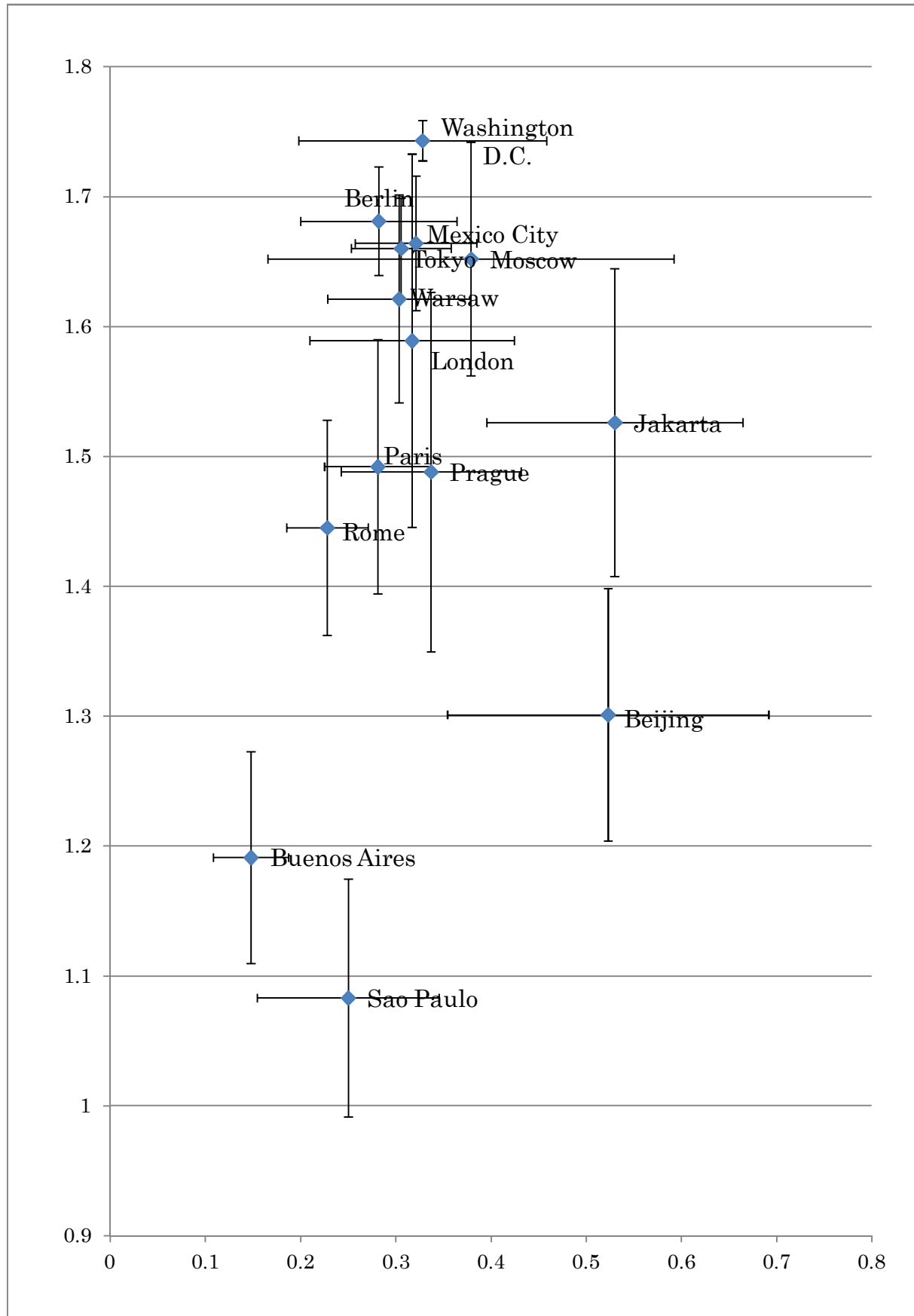


Figure 6: the average value of 14 cities in 2001-2010 (outliers excluded)