Projet Clean Air Monitoring and Solutions Network (CAMS-Net)

Symposium and project meeting

Air quality in Togo: Monitoring status and CAMS-Net

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KEY POINTS OF PRESENTATION

Introduction

- **Brief presentation of Togo**
- **State of knowledge of air quality in Togo;**
- **CAMS-NET opportunities; and**
- **Methodological approach envisaged.**

Conclusion

INTRODUCTION

Human exposure to air pollution is a major short-term and long-term problem. In 2016, ambient air pollution caused more than 4.2 million deaths, including 300,000 deaths of children under five and most are due to particulate matter pollution.

Therefore, air pollution has become a health emergency. Exposure to PM 2.5 leads to a high risk of mortality from lung and heart disease thereby requiring hospitalizations.

PM 2.5 has a greater impact on human health compared to other PM due to its size, which facilitates its penetration into the human body.

For exemple, each year in the UK there are around 29,000 premature deaths from exposure to PM2.5. Several sources are at the origin of the presence of PM2.5 in the air, these are:

- **Combustion of biomass;**
- **Road traffic;**
- **Agricultural source,**
- **Industrial source and**
- **Domestic source.**

In Togo, the inventory of air pollution is not really known, but on an urban scale, pollution is attributable to the industrial zone, to road traffic and open burning of household waste.

This presention of the low level of knowledge of the state of pollution in Togo is in order to seize the CAMS-Net opportunity to boost research on air quality in the near future.

❑ PRESENTATION OF TOGO

❖ Geographical position

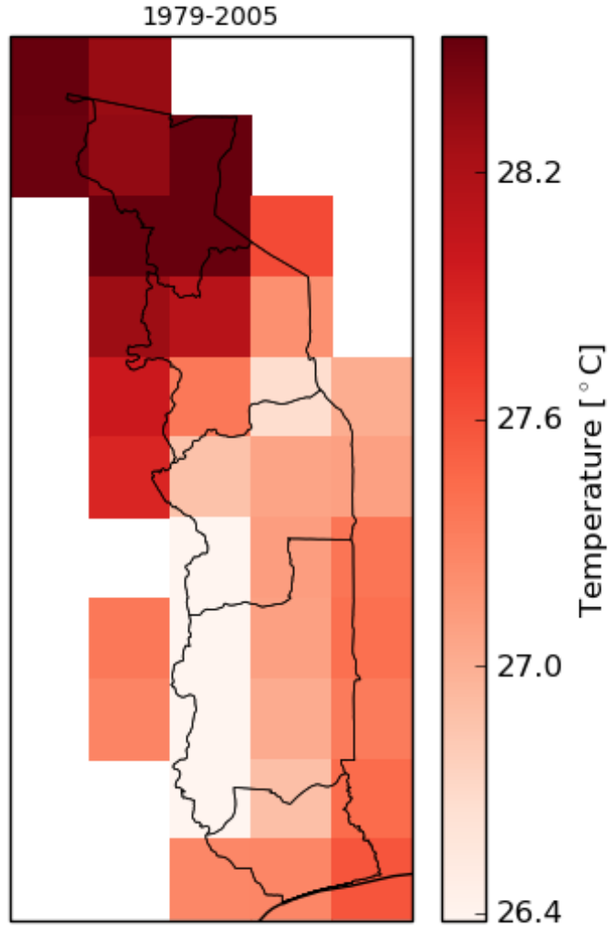
Covering an area of 56,600 km², Togo is one of West Africa bordered to the North by Burkina-Faso, to the South by the Atlantic Ocean, to the East by Benin and to the West by Ghana.

It has 05 economic regions, 39 prefectures and 117 communes with population estimated at 7,886,000 inhabitants in 2021. Its GDP rose from 4% in 2017 to 4.3% in 2018 and 5.4% in 2020.

❖ Climate

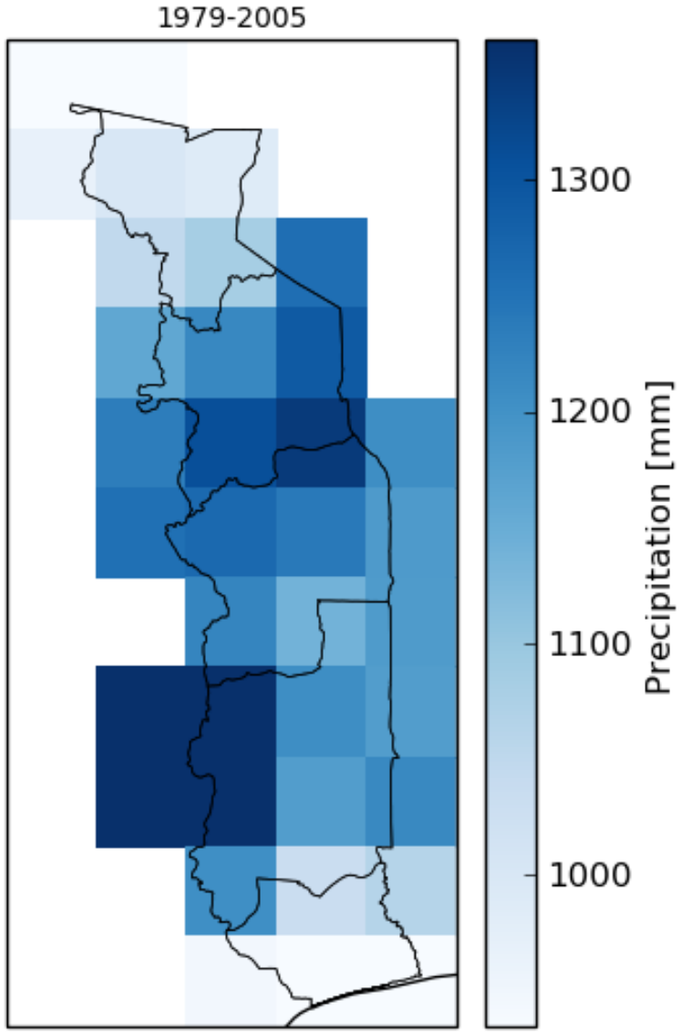
Togo enjoys a tropical climate with two variants. A Guinean type climate with 04 seasons is observed in the southern part while a Sudanian tropical type climate with 02 seasons prevails in the northern part.

Thermally, the average annual temperature is 27.1°C but it varies according to altitude, latitude and land use.



In the South, the climatic regime is characterized by a :

- **Long rainy season (March/April to July), Short rainy season (September to November)**
- **Short dry season centered on the month of August and**
- **Long dry season centered on the months of November to February**



❑ KNOWLEDGE STATUS OF AIR QUALITY IN TOGO

❖ Anthropogenic sources of air pollution in Togo

Pollution sources are mainly related to energy consumption; road transport, industrial activities and waste management:

- **<u>Road traffic</u> : The vehicle fleet in Togo is dilapidated with a mosaic of machines, the majority of which are more than 10 years old. It is almost dependent on petroleum products, and therefore a source of PM emissions. In Togo, it is Lome, the capital, which has the highest density of road traffic and is therefore more exposed to impacts.**
- **<u>Industrial units</u> : The industrial sector in Togo is full of extractive units (phosphates, clinker and other minerals) and agrifood as well as factories specializing in wood, textiles, building materials and chemicals.**

In 2018, there were 29,710 industrial units mainly concentrated in the industrial port area in Lomé. Dust and fumes escape there in the 7/7 day zone.

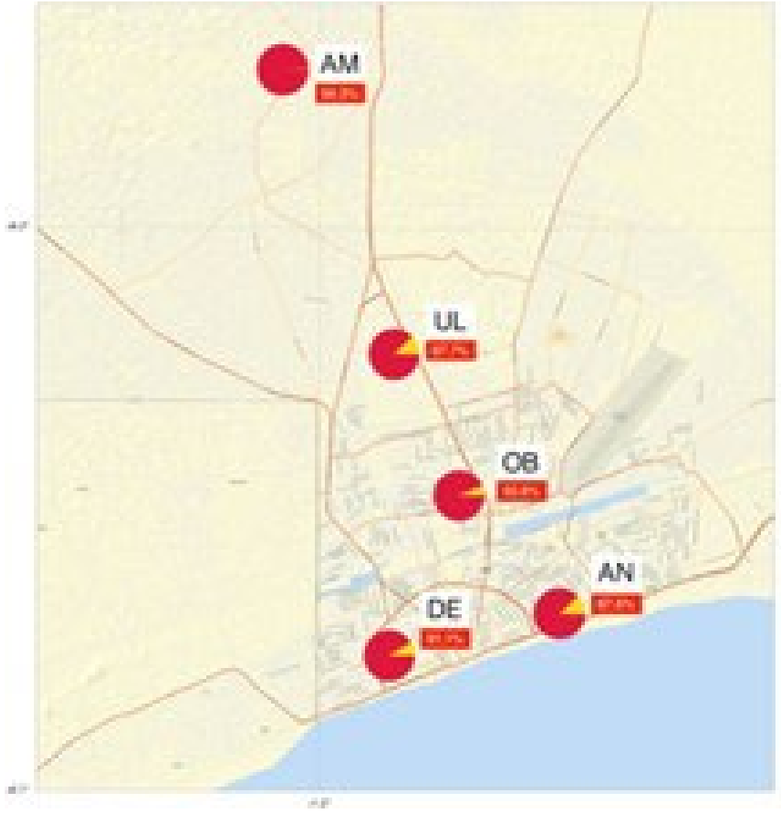
- **<u>Waste management</u> : In Lomé, 65.8% of households have recourse to pre-collectors compared to only 13.1% in all of the towns in the interior where the main management methods adopted are discharge into wild dumps (34.8%) and discharge into nature (31.2%). Waste from wild dumps and nature is mostly burnt in the open air, resulting in the release of pollutants and in particular PM.**
- **<u>Biomass combustion</u> : In rural areas, slash and burn agriculture is still practiced and agricultural residues burned, which cause significant air pollution.**

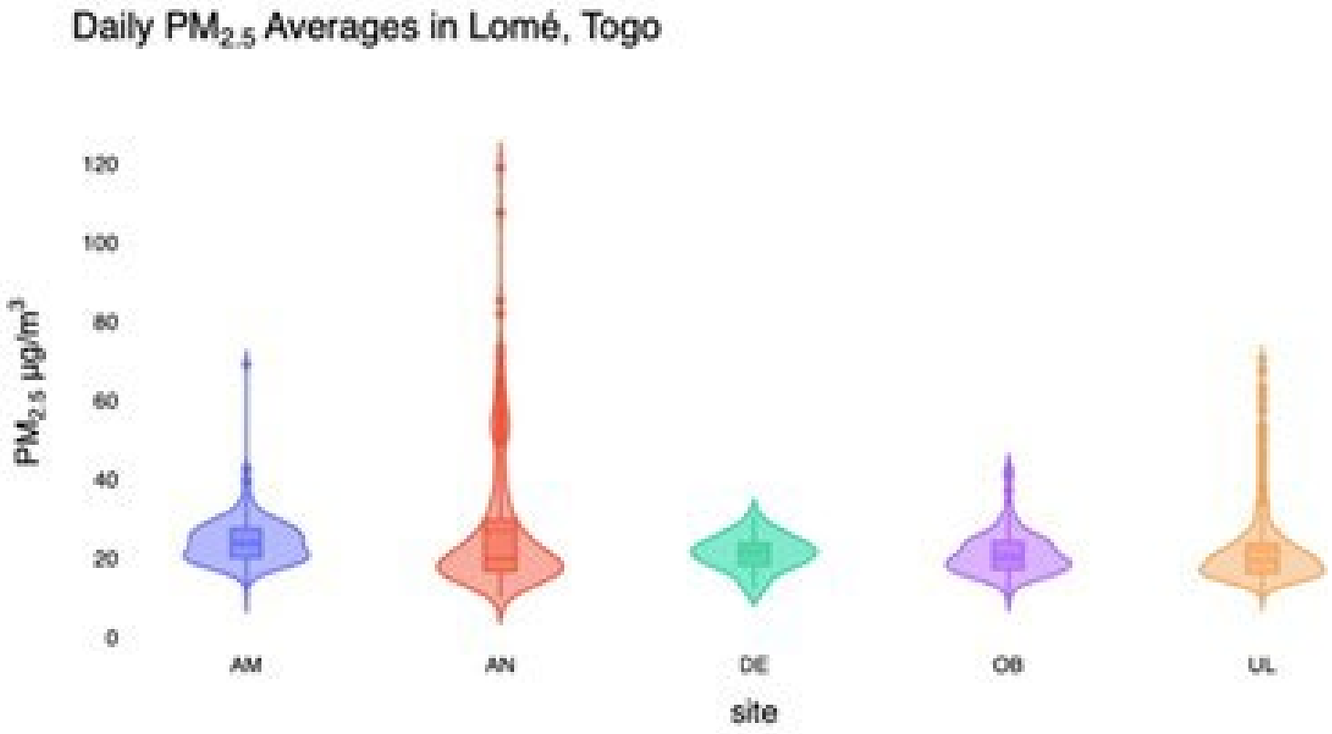
❖ Air quality monitoring in Togo

The Atmospheric Chemistry Laboratory cruelly lacks adequate equipment to carry out research and systematic observation on air pollution and the ozone layer and consequently, the work was limited to methodological applications and the use of available pollutant and GHG emission inventory models.

Also, Togo does not have an air quality monitoring network but takes ad hoc measurements for the purposes of environmental impact studies if necessary.

Thanks to CAMS-Net, the laboratory has been able to fix 05 low-cost sensors in Lomé for 02 years which have allowed us to have data on PM even if the spatial coverage is not yet satisfactory.





https://doi.org/10.1021/acsearthspacechem.1c00391

❑ CAMS-Net OPPORTUNITIES

CAMS-Net remains a hope for the LCA laboratory to obtain useful and usable data from low-cost sensors, especially since two young doctoral students are currently enrolled in thesis with the topics entitled:

- **Atmospheric PM2.5 measurements using low-cost sensors calibrated in the ambient air of the city of Lome in Togo;**
- **Air quality modeling and characterization and distribution of pollutant emission sources in West Africa.**

It urges the LCA to obtain the assistance of CAMS-Net in equipment, technical capacity building to develop new methods and best practices for the collection and analysis of real data on the air quality in the city from Lomé and starting on all the extent of Togo.

❑ METHODOLOGICAL APPROACH ENVISAGED

(1) Sensor choice: The choice of PurpleAir sensors is due to the fact that they are low cost and of good resolution and are coupled to real-time P, H and T detection sensors.

(2) Sampling points : It is foresees in the long term to cover the 117 communes of Togo with a minimum of 05 sensors, i.e. approximately a deployment of 585 sensors.

(3) Calibration and Correction : It is provides for 2 calibration stations to cover Togo : one in Lome and one in Dapaong.

(4) Modelization: This point is fundamental in our methodological approach because LCA is in its initiation phase to the PurpleAir sensors use. The two doctoral students on the theme are awaiting capacity buildings.

CONCLUSION

Air pollution having become a health emergency and so the Laboratory of Atmospheric Chemistry of the University of Lomé wants to rely on the CAMS-Net to find solution approaches.

Togo likely experiences high levels of air pollution but the exact quantities of atmospheric pollution are not well known.

To deal with this challenge, LCA has joined forces with the CAMS-Net to find solutions and has already deployed 05 sensors fixed for 02 years.

LCA will continue with CAMS-Net's assistance to obtain equipment and technical capacity building to develop new methods and best practices for the collection and analysis of real data on air quality.

This is also the reason for our presence at this ASIC conference, an opportunity to exchange knowledge to boost research on air quality. Togo requests the assistance of all goodwill

ACKNOWLEDGMENTS

Thanks for ASIC who has bring together stakeholders from academia, government, communities, and commercial interests to promote and advance air pollution sensors, improve the data quality from these sensors, expand the pollutants measured, and foster community involvement in monitoring air quality.
Thanks for Professor Dan Westervelt and Dr Garima Raheja especially

Thanks you all