



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

A REPORT ON THE OVERVIEW OF THE DATA MONITORED IN UGANDA IN LINE WITH THE ATMOSPHERIC CONCENTRATIONS OF GREENHOUSE GASES AND OZONE DEPLETING SUBSTANCES IN UGANDA FOR CONSIDERATION AT THE 12TH MEETING OF OZONE RESEARCH MANAGERS TO BE HELD FROM 24TH – 26TH APRIL, 2024, IN GENEVA, SWITZERLAND



22ND MARCH, 2024

Preamble:

The key institutions that will undertake monitoring of atmospheric concentrations of the greenhouse gases and the ozone depleting substances are Uganda National Meteorological Authority (UNMA) and the National Environment Management Authority (NEMA).

Following the national reporting guidelines issued to NEMA, a national report for Uganda has been prepared in this regard and it is given below.

1. OBSERVATIONAL ACTIVITIES

1.1 Column measurements of ozone and other gases/variables relevant to ozone loss

(e.g. Dobson, Brewer, DOAS, FT-IR, Satellite; also include any measurements of meteorological parameters that are critical to the interpretation of your ozone and ozone-relevant data)

FIT-IR Spectrometer of the EM27/SUN Series is used to quantify greenhouse gases (CO₂, CH₄ and CO) in the atmosphere over Uganda. Ozone is not measured.

1.2 Profile measurements of ozone and other gases/variables relevant to ozone loss

(e.g., Satellite, OMI, aircraft, ozonesondes, ozone lidar etc; also include any measurements of meteorological parameters that are critical to the interpretation of your ozone and ozone-relevant data)

Due to lack of the appropriate equipment to capture and process ozone – layer related variables transmitted by the satellite space above Uganda, such measurements have never been carried out at national level. Also, we are constrained as a country in terms of technical capacity.

1.3 UV measurements

(e.g., broadband, narrowband, Spectroradiometers, etc)

There is no facility/ provision for direct measurement of UV, hence, there are also no UV forecasts carried out in the country. Measurements of sunshine give an indirect indication of radiation exposures.

1.4 Measurements of substances controlled under the Montreal Protocol

(e.g., flask measurements, high-frequency measurements)

Such measurements have never been carried out at national level due to lack of appropriate equipment and the adequate technical capacity.

1.5 Calibration activities

- Despite the fact that some equipment was acquired, calibrated and test-run during the 2005 period, no further activities have been carried out due to limited financial support to upgrade such activities since 2005.
- Third party calibration services are used for the atmospheric barometers and air thermometers. This is provided by Uganda National Bureau of Standards and private service providers for calibration services.

2. RESULTS FROM OBSERVATIONS AND ANALYSIS

(e.g., trend analyses, UV doses (annual, monthly etc.), UV maps)

- i. According to results from the analysis of solar images captured in Kawanda in March 2023, the concentration of carbon dioxide in the Uganda atmosphere is in the amounts of 421.3 ppm which is within the same value of 421 ppm of Mauna Loa Observatory in Hawaii USA.
- ii. The main sources of CO₂ emissions are land use change and forestry, main sources of NO_x and CH₄-emissions are agriculture and savannah burning. Relative contribution of anthropogenic gases to the greenhouse effect: CO₂: 75%; CH₄ 13%; and NO₂ 12%. Uganda participates in the Global Climate Observing System with 30 observation stations (1990: 18 stations). Due to lack of funds, the stations are not working at optimum level. There are no observation stations to participate in the Global Ozone Observing System.

3. THEORY, MODELLING, AND OTHER OZONE RELATED RESEARCH

(e.g., 3-D CTM modelling, data assimilation, use of satellite data, UV effect studies)

Such activities have not yet been carried out in Uganda due to lack of funds, equipment and technical capacity.

4. DISSEMINATION OF RESULTS

4.1 Data reporting

(e.g., submission of data to the WOUDC and other data centers)

This is not being done currently. It is to be published periodically through the Annual state of the Climate report.

4.2 Information to the public

(e.g., UV forecasts)

Information will be published in the Annual State of the Climate report

4.3 Relevant scientific papers

None at the moment.

5. PROJECTS, COLLABORATION, TWINNING AND CAPACITY BUILDING

(e.g., national projects, international projects, other collaboration (nationally, internationally))

- UNMA has acquired 1 out of the 4 targeted spectrometers for monitoring greenhouse gases across the four regions of Uganda. The National Environment Management Authority has no spectrometer.

Uganda is one of the host countries for the implementation of the Clean Development Mechanism (CDM) Project, under the auspices of the World Bank, geared towards reducing emission of greenhouse gases. Its implementation was initiated in November, 2007, with selection of nine (regional) pilot urban centers – namely: Lira, Soroti, Mbae, Jinja, Kabale, Fort Portal and Mbarara Municipal councils; and two Town councils – Mukono and Kasese. Currently, the main activity being undertaken in each of the urban centers is the construction of structures for the Compositing Plant, and related infrastructure like access roads and water/ electricity supply systems. The collaborating authorities for this project are the local urban authorities (Town Councils and Municipal Councils).

Another related ongoing venture is the West Nile Hydropower Project bordering the Democratic Republic of Congo and the Sudan. This project falls within the broader rural electrification and development plans of the Government's Energy for Rural Transformation programme. The project aims to take advantage of the Dual benefits of the CDM to promote sustainable development in rural Uganda by investing in socio- economic development and poverty alleviation, to reduce carbon dioxide emissions through renewable energy and to generate certified emissions reduction (CER). Hence such a project reduces carbon dioxide emissions by replacing the inefficient diesel generators with hydropower, and by reducing the use of kerosene used for lighting purposes. Emission reductions are estimated at 18 million tonnes over a period of 20 years (UNEP, 2003).

6. FUTURE PLANS

(e.g., new stations, upcoming projects, instrument development)

We would like to acquire more 6 Spectrometers to enable daily monitoring in each region in Uganda.

Recognizing the importance of ozone monitoring and noting that most tropospheric ozone is generated over the tropical atmospheric, Uganda has:

- (a) A deliberate plan to acquire and establish its first upper air ozone monitoring station on either Mount Rwenzori in western part of the country (bordering the Democratic Republic of Congo) or Mount Elgon in the eastern region of the country bordering (Kenya). It is also important to monitor low level ozone generated in urban centres especially in the Kampala City. It is envisaged that Government of Uganda will spearhead these plans with the help of development partners.

- (b) A plan to set up a measurement site for monitoring and forecasting UV radiation; however, the target date has not yet been set, due to uncertainty in the financing and capacity building initiatives.
- (c) Plans to train personnel to enhance professional competence in aspects of monitoring, dataprocessing and research.

7. IMPLEMENTATION OF THE RECOMMENDATIONS OF THE 11TH MEETING OF OZONE RESEARCH MANAGERS

(Progress, difficulties encountered and near term plans)

- Prepared and submitted to the Ozone Secretariat, a country's proposal on activities on research and systematic observations relevant to the Vienna Convention intended to boost technical capacity and provide equipment for monitoring atmospheric concentrations of greenhouse gases and ozone depleting substances. The monitoring data collected will be used for research purposes as well.
- We are constrained in terms of technical capacity and lack of equipment to monitor the atmospheric concentrations of the said gases. We are also constrained by lack of funds to undertake research.
- The near term plans include training of trainers, benchmarking and equipping the institutions (UNMA and NEMA) with the right tools as mentioned above.

8. NEEDS AND RECOMMENDATIONS

- i. Financial assistance for acquisition of ozone and UV monitoring equipment.
- ii. Technical support for installation of the said equipment in (i) above.
- iii. Training for technical staff for maintenance, calibration and operation of the said equipment from UNMA as well as inspectors from NEMA. Where need be, benchmarking from developed countries should be undertaken.
- iv. Support for scientific programmes in ozone and climate change.
- v. UNMA and NEMA staff need training in using the spectrometer to analyze the greenhouse gases, carbon dioxide, methane.
- vi. Government of Uganda needs to acquire six more spectrometers to station in various regions of the country.
- vii. The spectrometers need stand-alone transport facility in form of a van.

References

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