

Under the framework of Research Project named: “An Interdisciplinary Study toward Clean Air, Public Health and Sustainable Agriculture: The Case of Crop Residue Burning in North India” (hereafter “Aakash”) promoted by Research Institute for Humanity and Nature, air pollutant observation campaign was held over northwestern India including Delhi NCR, from September to November 2022, 2024 and 2024. This dataset consists of PM_{2.5}, Carbon monoxide (CO), temperature & relative humidity obtained during the campaign.

Terms of Use: These data are made freely available to the public and the scientific community in the belief that their wide dissemination will lead to greater understanding and new scientific insights. Appropriate referencing and acknowledgment to the data sources must be made. Users are strongly encouraged to contact Aakash Project Leader - Prabir Patra (prabir@chikyu.ac.jp) and CUPI-G Team Leaders – Yutaka Matsumi (matsumi@nagoya-u.jp) and Tomoki Nakayama (t-nakayama@nagasaki-u.ac.jp). In cases where the data are central to a publication, coauthorship for data providers may be appropriate.

Every effort is made to produce the most accurate and precise measurements possible. However, we reserve the right to make corrections to the data based on recalibration of standard gases or for other reasons deemed scientifically justified. We are not responsible for results and conclusions based on use of these data without regard to this warning.

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Instrument and Data Citations:

Nakayama, T., Matsumi, Y., Kawahito, K. & Watabe, Y. Development and evaluation of a palm-sized optical PM_{2.5} sensor. *Aerosol Science and Technology* 52, 2–12 (2018).

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Data Processing

1 Time correction

Observation time is referenced to the Real Time Clock of the Raspberry Pi. If the RTC time is not accurate, the observation time is corrected by using the GPS time, if available. Neither RTC of Raspberry Pi nor GPS time is available, the sensor data is not used.

2 Screening of PM2.5 sensor data

If the measurement is suspended for more than 4 minutes (mainly due to power shortage), data from the first 5 minutes after resumption is not used.

3 Screening of gaseous sensors data

3.1 Erroneous data with AD values of <100 or 4095 were removed

3.2 When measurement was stopped for >4 min due to power shortage and so on, the 180 min data after restarting measurement were removed, because it takes time for stabilizing

4 10 minutes average

4.1 Observation value is recorded in the interval indicated in the data file. After the time correction and screening the data, daily average is calculated.

4.2 "date" indicates the end-of-period in IST. Data of 2022/09/01 0:00 indicates average over 2022/08/31 23:50:01 - 2022/09/01 0:00:00

4.3 10 Minutes average is calculated if more than 50% of data is valid.

4.4 The number "-99999" indicates that the data is missing.

5 Improvements in Ver 1.1

5.1 Erroneous values detected in Ver 1.0 (PM2.5) data are removed.

5.2 Conversion factors for CO are improved.

5.3 The differences from the baseline value are calculated for Ver 1.0 CO concentrations and redefined as Δ CO.

Caution

PM_{2.5} mass concentrations are potentially overestimated due to hygroscopic growth when RH in the box were >70% (Nakayama et al. 2018, <https://doi.org/10.1080/02786826.2017.1375078>).

Final values of CO are subject to change in the future.

The "temperature" and "humidity" in the CUPI-G data are the temperature and humidity inside the equipment, not the outside air.

Contact: Prabir Patra (prabir@chikyu.ac.jp)

Aakash project leader, Research Institute for Humanity and Nature

Data format of 10 minutes averaged data :

Date	Date	interval	temperature	temperature	temperature	humidity	humidity	Humidity	pm2.5	pm2.5	pm2.5	ΔCO	ΔCO	ΔCO
	UTC	sec	mean	Std	N	mean	Std	N	mean	std	N	mean	std	N

- date: Local time (IST)
- date UTC: UTC time
- interval sec: observation time intervals (seconds)
- temperature mean: mean value of temperature(°C)
- temperature std: standard deviation of temperature
- temperature N: number of data used for average
- humidity mean: mean value of humidity(%)
- humidity std: standard deviation of humidity
- humidity N: number of data used for average
- pm2.5 mean: mean value of PM2.5($\mu\text{g}/\text{m}^3$)
- pm2.5 std: standard deviation of PM2.5
- pm2.5 N: number of data used for average
- ΔCO mean: mean value of ΔCO(ppb)
- ΔCO std: standard deviation of ΔCO
- ΔCO N: number of data used for averaging

■ Filename convention:

“CUPIG_NS-01.csv”

Mission name, always “CUPIG”

ID, “NS-”nn ; n indicates 2 character id number.

* The file “CUPIG_LOCATIONS.xlsx” is a list of site locations with instrument numbers. A plot of site locations for 2022, 2023 and 2024 campaigns is shown in the next page.

CUPI-G Datasets are available at <https://aakash-rihn.org/en/data-set>

About Aakash project: <https://aakash-rihn.org/en/>

RIHN homepage: <https://www.chikyu.ac.jp/en>

