
CHAP
ChinaHighAirPollutants
中国高分辨率高质量近地表空气污染物数据集

CHAP

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ChinaHighAirPollutants (CHAP)

New update: Daily seamless 1 km PM_x and composition data released!

- **Brief Introduction**

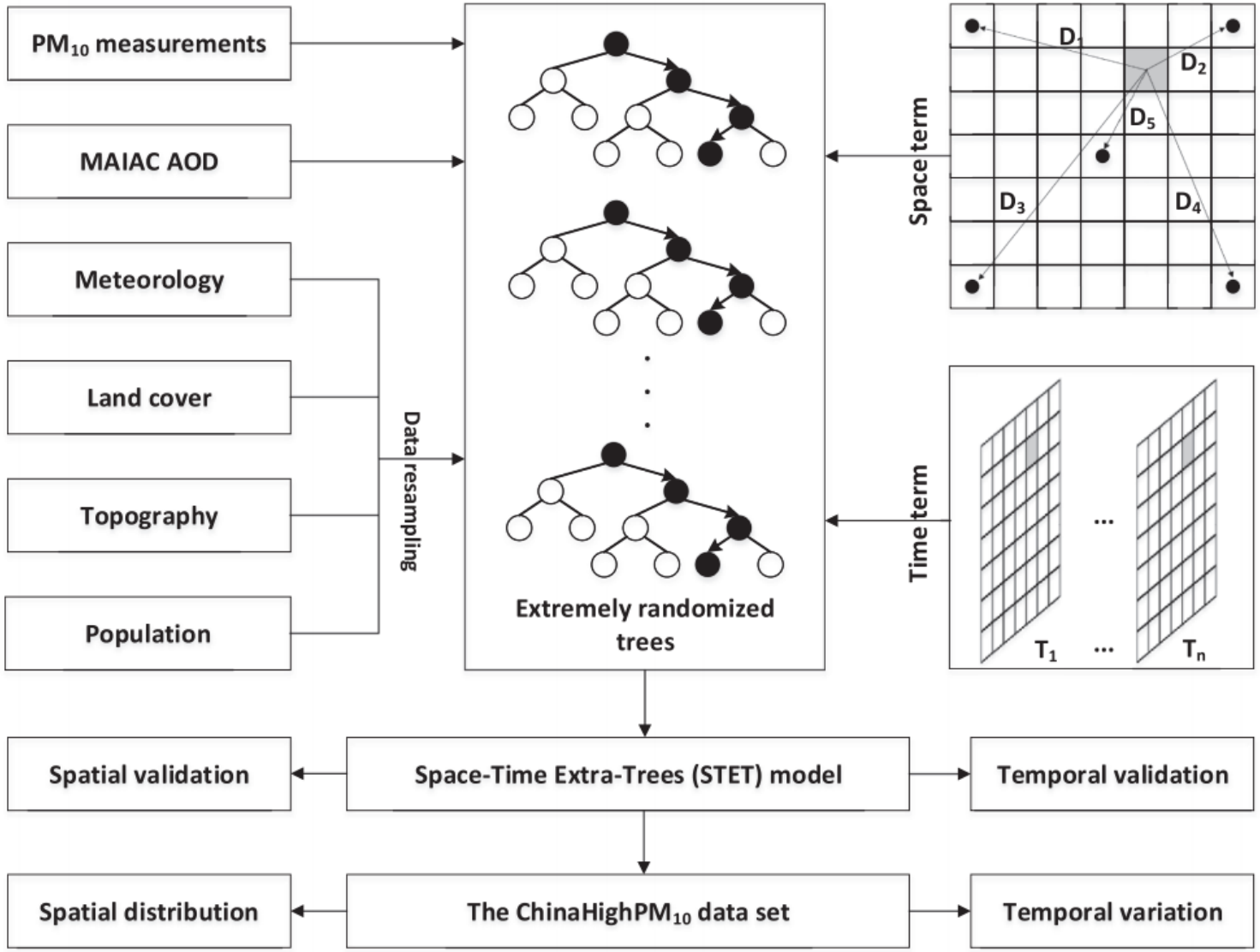
  The ChinaHighAirPollutants (CHAP) dataset refers to the **long-term**, **full-coverage**, **high-resolution**, and **high-quality** datasets of ground-level air pollutants for China. It is generated from the big data (e.g., ground-based measurements, satellite remote sensing products, atmospheric reanalysis, and model simulations) using artificial intelligence by considering the spatiotemporal heterogeneity of air pollution. The CHAP dataset contains **7** major air pollutants (i.e., **PM_1**, **$PM_{2.5}$**, **PM_{10}**, **O_3**, **NO_2**, **SO_2**, and **CO**), and **$PM_{2.5}$ compositions (e.g., SO_4^{2-}, NO_3^-, NH_4^+, Cl^-, and BC, et al)**. This CHAP dataset is **public** and **freely** open to all users!

- **Dataset summary**

ChinaHighAirPollutants (CHAP)								
Air Pollutant	Main predictor	Spatial resolution	Missing values	Temporal resolution				Available period (yyyy/mm)
				Hourly	Daily	Monthly	Yearly	
PM_1	Big data	1 km	No		√	√	√	2000/01 – 2021/12
$PM_{2.5}$	Big data	1 km	No		√	√	√	2000/01 – 2021/12
	Himawari-8	5 km	Yes	√	√	√	√	2018/01 – 2018/12
PM_{10}	Big data	1 km	No		√	√	√	2000/01 – 2021/12

Website: https://weijing-rs.github.io/product.html

ChinaHighPM$_{10}$ (Method & Updates)



Flowchart of STET model (Wei et al., EI, 2021)

Method

Space-Time Extra-Trees (STET) model

Main updates (Version 4)

1) AOD gap filling:

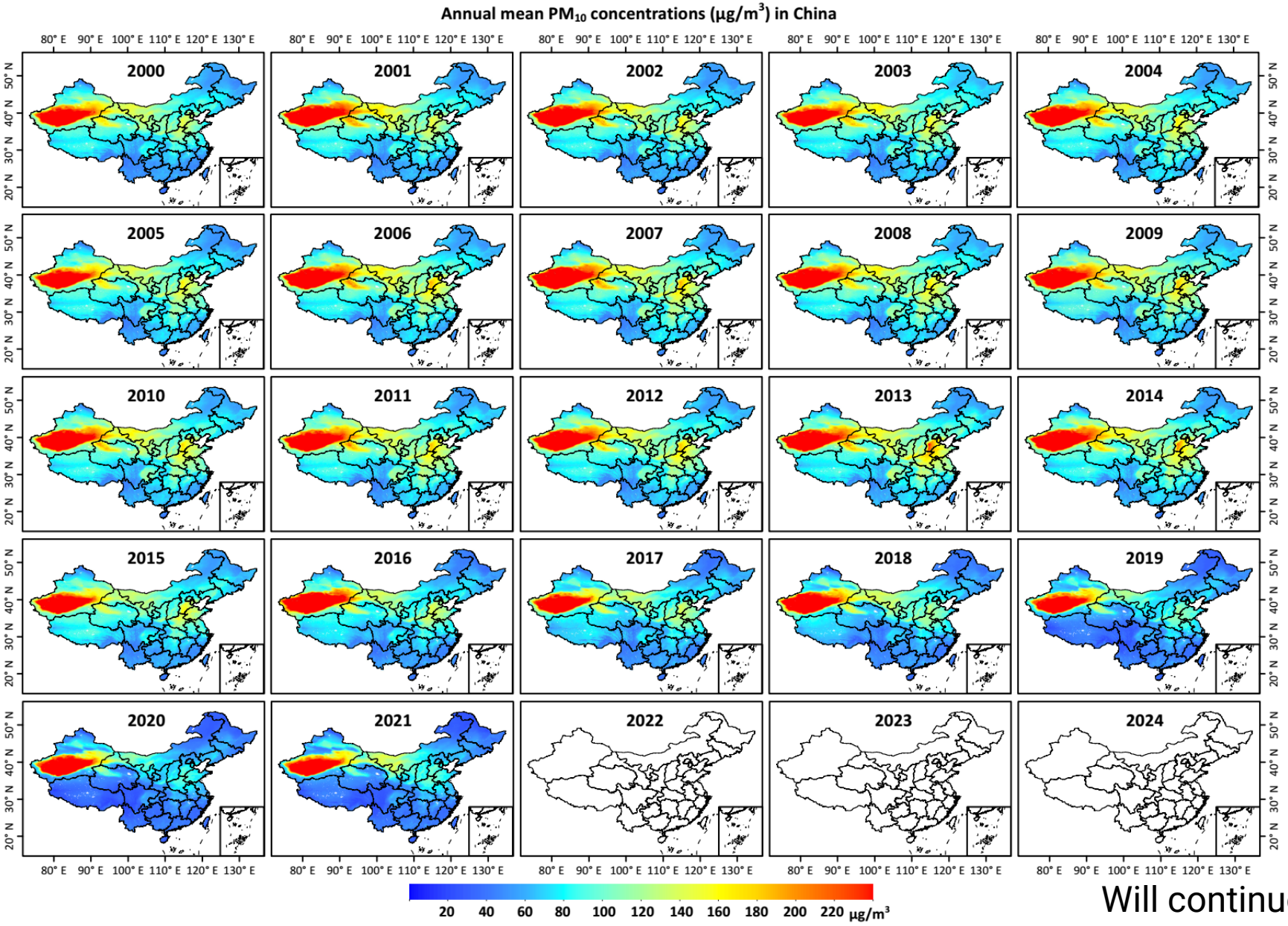
Fill the AOD gaps from big data using machine learning

2) Update data sources

e.g., MERRA2 PM compositions

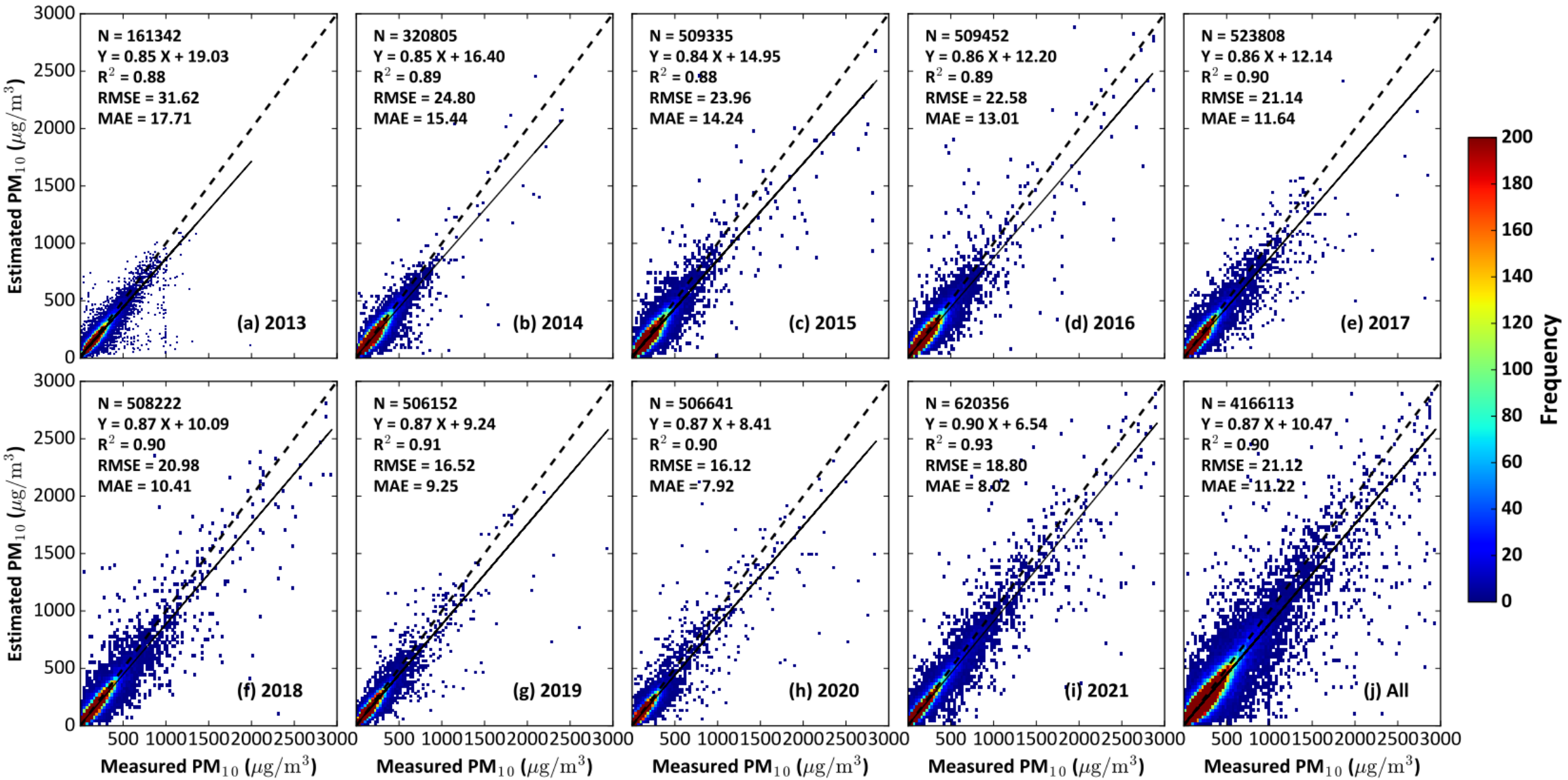
CAMS emission inventory

ChinaHighPM$_{10}$ (1 km, 2000-2021, Version 4)



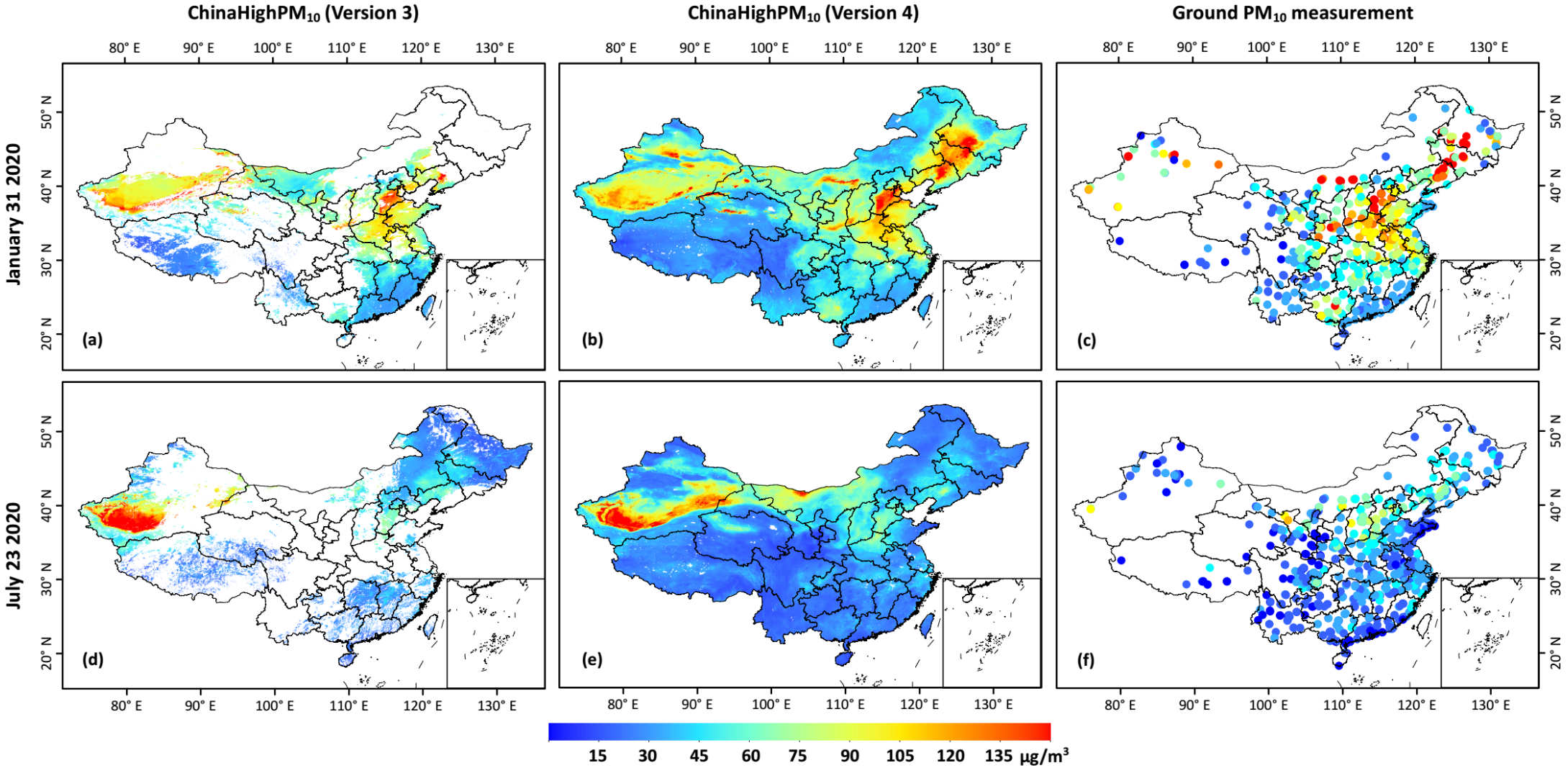
Will continuously update!

10-fold Cross Validation



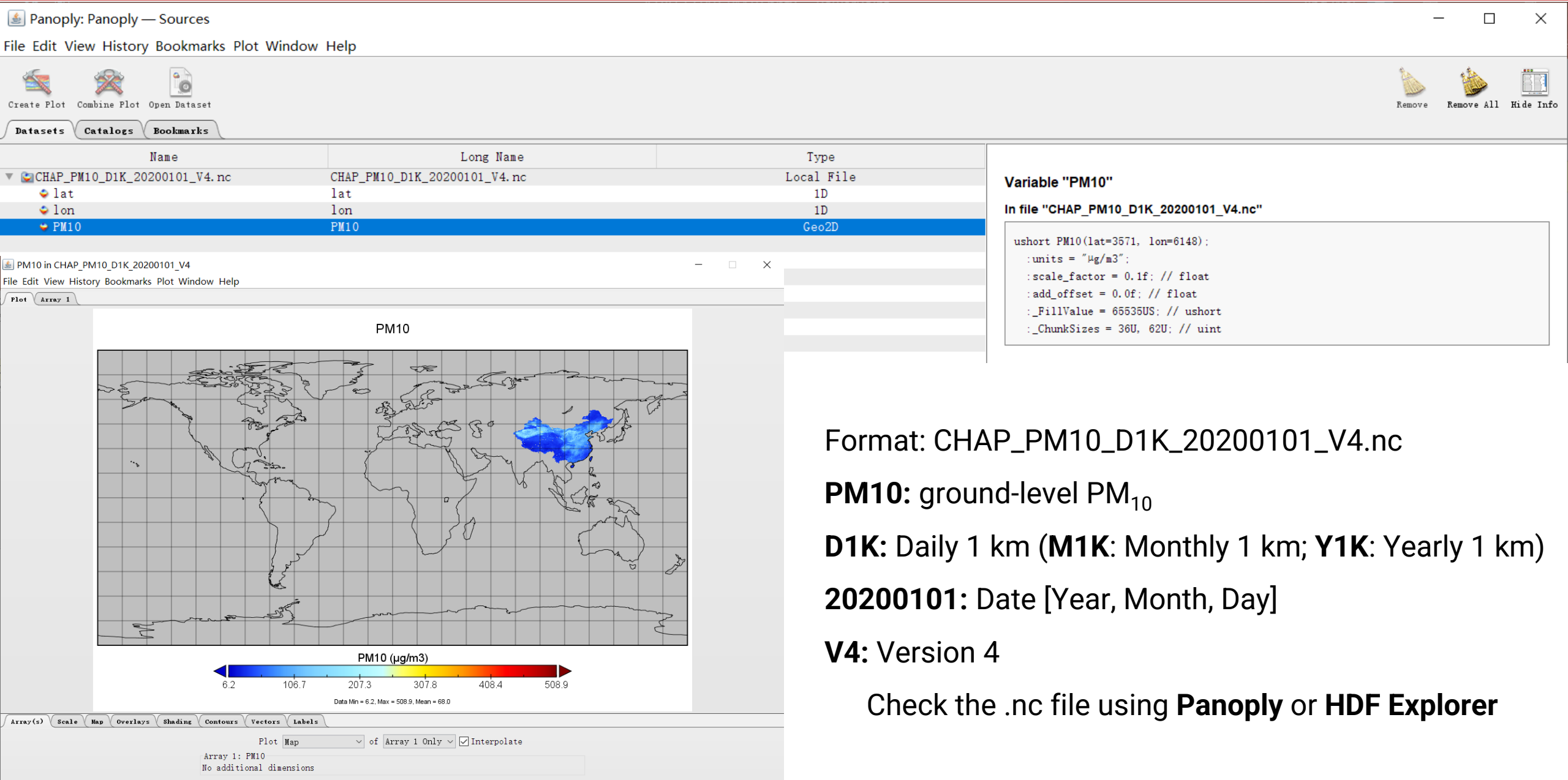
Overall accuracy: CV-R^2 = **0.90**, RMSE = **21.12** μg/m^3

Version Comparison (4 & 3)



The V4 data filled the missing values of satellite AOD products and provided **seamless** daily PM_{10} concentrations across China, significantly improving the data availability by **60%** compared to the V3 dataset.

ChinaHighPM$_{10}$ product (format)



Format: CHAP_PM10_D1K_20200101_V4.nc

PM10: ground-level PM$_{10}$

D1K: Daily 1 km (**M1K**: Monthly 1 km; **Y1K**: Yearly 1 km)

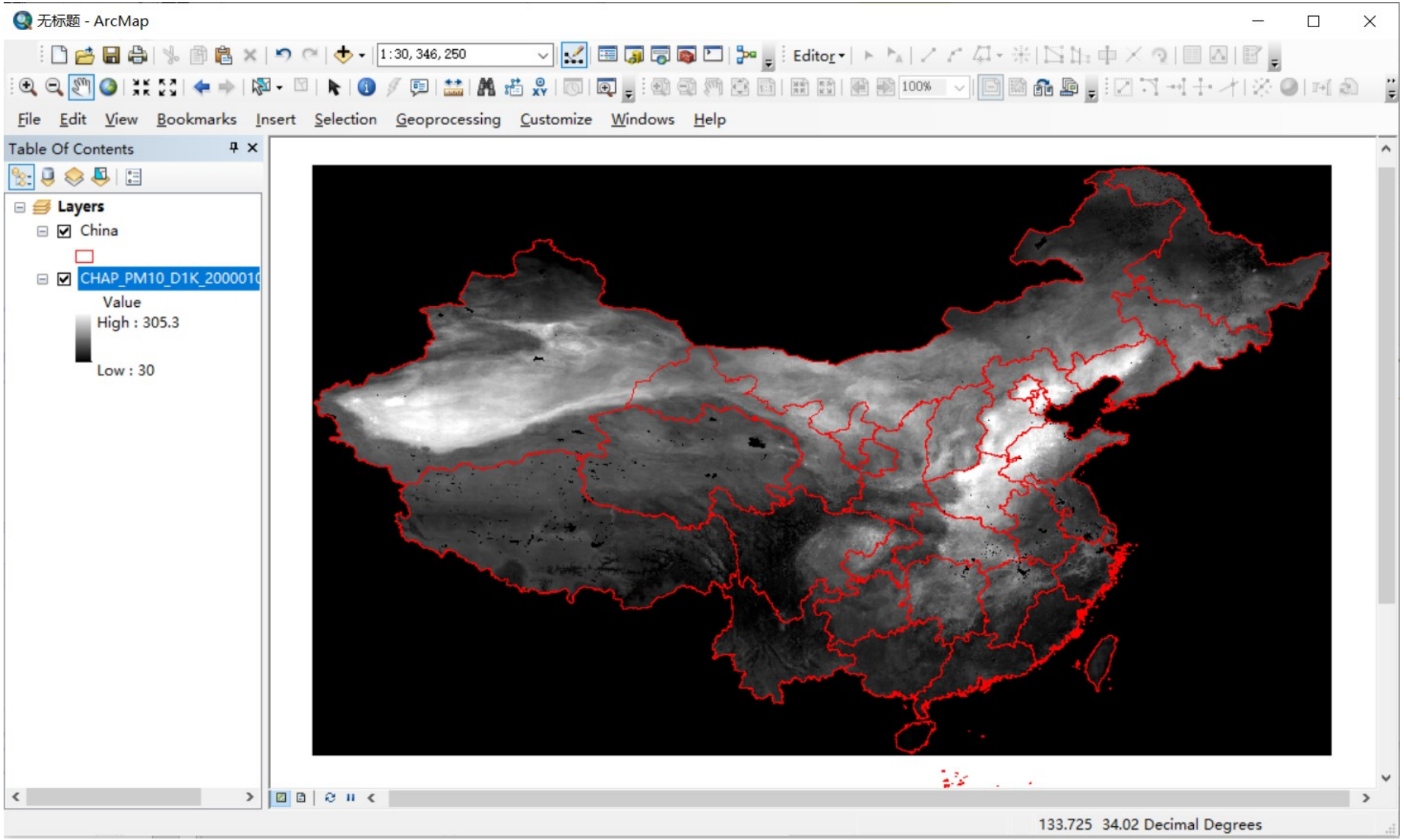
20200101: Date [Year, Month, Day]

V4: Version 4

Check the .nc file using **Panoply** or **HDF Explorer**

How to read?

Use Python, Matlab, and IDL codes (nc2geotiff codes.rar) to batch convert NetCDF (.nc) to GeoTIFF (.tif).



Reference

[1] Wei, J., Li, Z., Xue, W., Sun, L., Fan, T., Liu, L., Su, T., and Cribb, M. The ChinaHighPM$_{10}$ dataset: generation, validation, and spatiotemporal variations from 2013 to 2019 across China. *Environment International*, 2021, 146, 106290. https://doi.org/10.1016/j.envint.2020.106290

Contact

If you use the ChinaHighPM$_{10}$ dataset for related study, please cite the corresponding reference (Wei et al., EI, 2021). **Note that this dataset is continuously updated, and if you need more data or have any questions, please contact me (weijing_rs@163.com; weijing.rs@gmail.com).**