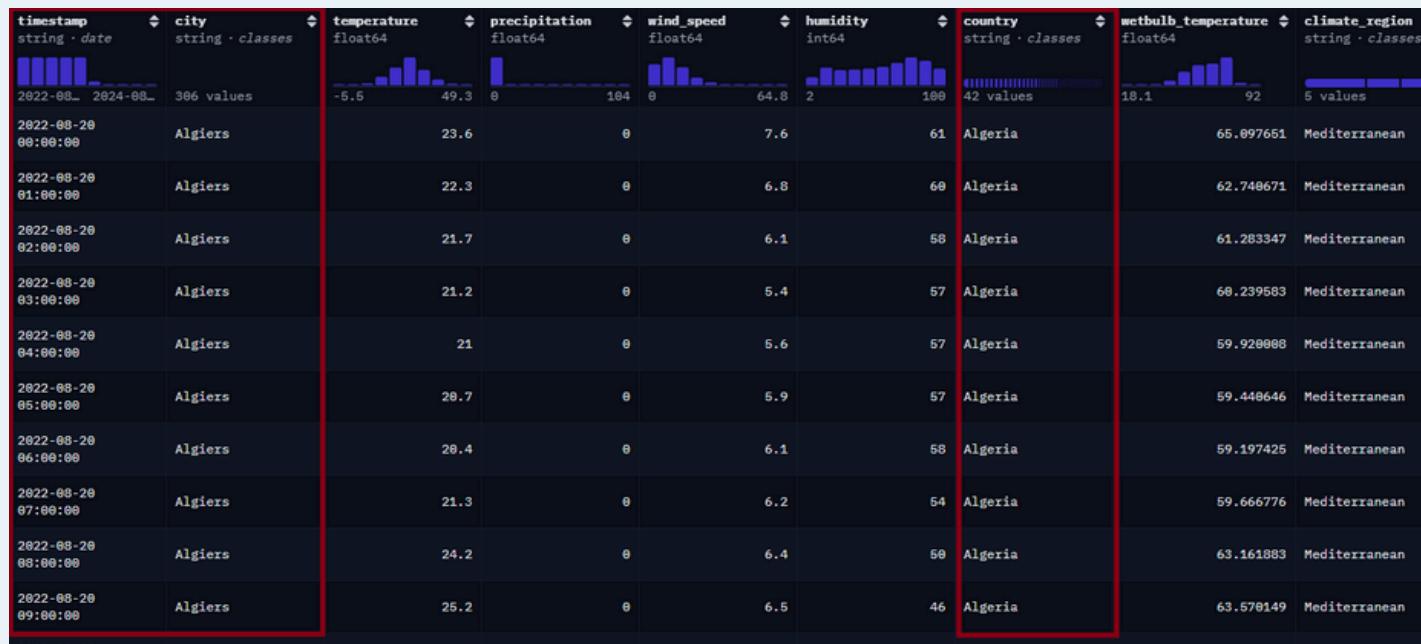


WATER USAGE EFFICIENCY (WUE) IN AFRICAN DATA CENTERS

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ANALYSIS-READY DATASET

Before aggregation



- Very large dataset: $\approx 3M$ observations (hourly data \times many cities \times multiple countries)
- High spatial granularity (city-level) not aligned with our research question
- Highly disaggregated energy source data

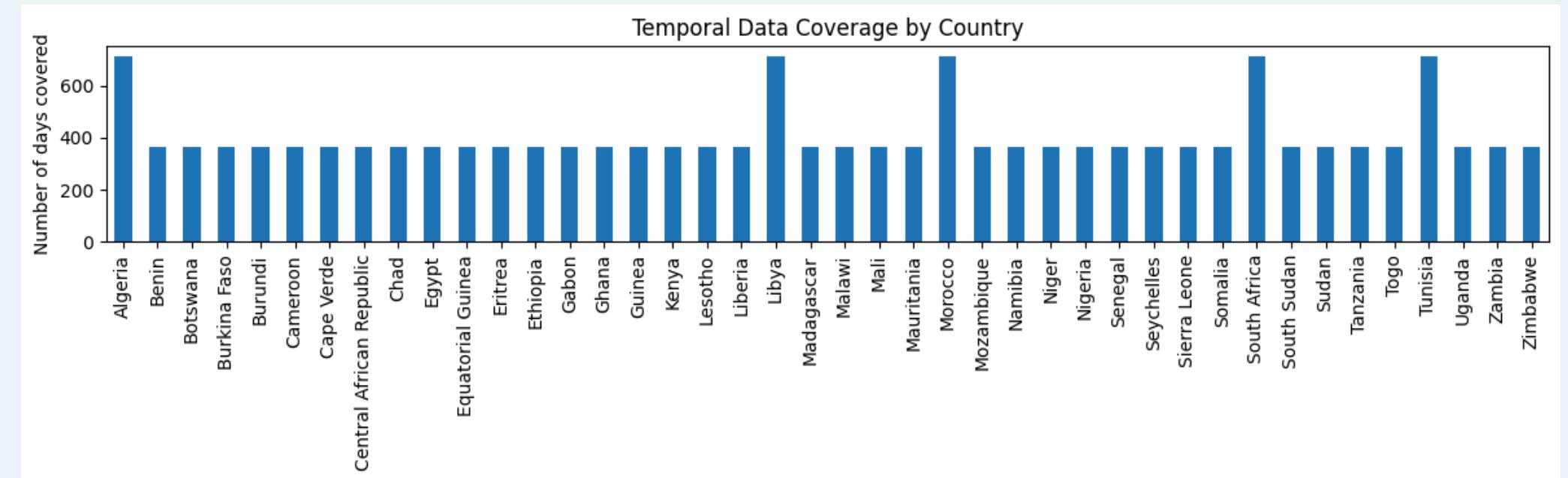
After aggregation

- Country-level, hourly dataset
- Cities aggregated \rightarrow countries
- Focused variables: climate (temperature, humidity, wet-bulb), WUE, energy context
- Dataset size significantly reduced while preserving focused variables

country	climate_region	date	houz	avg_temperature	avg_humidity	avg_wetbulb_temperature	avg_wind_speed	avg_precipitation	avg_wue_fixed	avg_wue_indirect	avg_total_renewables_twh
Algeria	Mediterranean	2022-08-20	0	22.02	64.3	63.175698	6.04	0	1.641379	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	1	21.42	64.7	62.305006	5.32	0	1.635311	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	2	20.84	65	61.438778	4.58	0	1.628322	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	3	20.29	65.4	60.639498	3.86	0	1.621868	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	4	19.92	66	60.170544	4.11	0	1.617717	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	5	19.75	66.8	60.07275	4.4	0	1.616492	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	6	19.22	67.7	59.397945	4.67	0	1.610999	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	7	20.2	61.4	59.593583	5.24	0	1.612671	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	8	22.84	55.1	62.298711	5.81	0	1.634286	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	9	24.95	48.9	63.987856	6.38	0	1.645884	1.413949	5,957.884724
Algeria	Mediterranean	2022-08-20	10	27.21	44.2	65.939271	8.54	0	1.659209	1.413949	5,957.884724

FIRST CHECKS IMPLEMENTED

- **Dataset size (rows × columns):** 382.968 observations × 14 variables
- **Data types validation:** all variables correctly parsed
- **Missing values:** no missing values across variables
- **Geographic coverage:** 42 African countries
- **Temporal coverage:** 4 countries have nearly 2 years of observations, while the remaining countries have approximately 1 year (important for later averaging and comparisons)



WHAT'S NEXT...

- **Variable-level understanding:**

- Means and ranges of:
 - WUE main metric
 - Climate and energy variables
- Outlier checks

- **Temporal sanity checks**

- Examine hourly averages of WUE and key climate variables
- Identify expected diurnal patterns in cooling demand
- Check for anomalies, discontinuities, or data artifacts

TODAY

- Compute means and ranges of the main WUE metric
- Examine climate and energy variable distributions
- Identify outliers and implausible values
- Start temporal sanity checks