RAINFALL ANALYSIS

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1. Which district received the highest average rainfall over the given period

- **Warangal Rural** and **Warangal Urban** received the **highest average rainfall** at **6.7 mm** each.
- Other districts like **Mulugu, Kumuram Bheem, and Nirmal** had moderate rainfall (~4.3–4.5 mm).
- **Nizamabad** recorded the **lowest average** among the shown districts (4 mm).

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2. Monthly rainfall distribution across different mandals

- **Atmakur** and **Chandur** show:
    - **January & February:** Minimal rainfall (~0K–5K mm range).
    - **March & April:** Slight increase, with Atmakur recording slightly higher rainfall than Chandur in March.

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3. Trend in rainfall over the years for each district

- From **2021 to 2024**, rainfall patterns fluctuate slightly but remain **mostly stable**.
- Minor peaks are visible in **2022** across some districts, while **2024** shows a flatter trend indicating **reduced or steady rainfall**.

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4. Seasonal variation in rainfall in different districts

- **Quarter 2 (April-June)** shows **higher rainfall** in most districts compared to Q1 and Q3.
- **Quarter 3 (July-September)** has a visible peak in some districts, indicating monsoon influence.
- **Quarter 4 (Oct-Dec)** has moderate rainfall, relatively stable across districts.

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5. Percentage of annual rainfall in different districts

- **Warangal Rural** and **Warangal Urban** contribute **~17% each** to the annual rainfall, highest among districts.

- Other districts have **10–11.5% share**, with Nizamabad having the **lowest percentage (~10.56%)**.

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6. Periods of high rainfall intensity in each district

- **2021 recorded the highest rainfall intensity (4 mm)**.
- There is a **gradual decrease** each year: 2022 (3.8 mm), 2023 (2.9 mm), and **sharp decline in 2024 (0.1 mm)** indicating **significant reduction** in rainfall intensity recently.

TEMPERATURE ANALYSIS

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1. Average minimum and maximum temperatures for each district

- **Nagole** recorded the **highest average maximum and minimum temperatures**.
- **Nizamabad, Mancherial, and Sanga Reddy** follow with slightly lower values.
- **Jagitial** has the **lowest average temperatures** among all districts displayed.

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2. Seasonal variation of temperature in different mandals

- Across all **quarters (Q1 to Q4)**, the **maximum temperature remains fairly stable (~30-35°C)**.
- **Minimum temperatures** also remain stable, with **slight dips in Q4**, suggesting cooler conditions towards the year-end.

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3. Temperature comparison between two selected districts

- **Khammam:**
    - **Average Max Temp:** 35.3°C
    - **Average Min Temp:** 23.0°C
- **Peddapalli:**
    - **Average Max Temp:** 34.9°C
    - **Average Min Temp:** 22.7°C
- **Insight:** Khammam is slightly warmer than Peddapalli in both minimum and maximum temperatures.

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4. Correlation between minimum and maximum temperature

- There is a **positive correlation**; districts with **higher maximum temperatures** tend to also have **higher minimum temperatures**.
- Data points are clustered around **max temperatures of 33-35°C** and **min temperatures of 21-24°C**, indicating a **consistently warm climate**.

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5. Trend in minimum and maximum temperatures over the years

- From **2021 to 2023**, both **minimum and maximum temperatures show an increasing trend**, peaking in 2023.
- **In 2024**, both temperatures **drop significantly**, indicating a **recent cooling trend**.

HUMIDITY ANALYSIS

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1. Compare the average min and max humidity levels across districts

- **Warangal Urban** has the **highest average max humidity (52%)** and a relatively high min humidity (50%).
- **Mulugu** and **Kumuram Bheem** show **lower min humidity (46-48%)** and moderate max humidity (49-48%).
- **Nirmal** has high max humidity (89%) but lower min humidity (46%), indicating a **large daily variation**.

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2. Compare the humidity patterns between two selected districts

- **Nizamabad (51.81%)** has slightly **higher total humidity share** compared to **Nalgonda (48.19%)**.
- Both districts contribute almost **equally to total humidity distribution** in the dataset.

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3. What is the daily humidity range in each district

- **Day 1** shows the **highest range (~65K)** in Adilabad, while subsequent days show a **more stable daily humidity range (~25K–30K)**.
- **Insight:** Significant variation on Day 1 could indicate a **sudden weather change or outlier event**.

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4. Distribution of humidity levels in different districts throughout the year

- **Max humidity levels remain consistently higher** than min humidity levels in all years (2021–2024).
- The **distribution pattern is stable** across districts, indicating **no major annual shifts** in humidity.

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5. How do humidity levels change with seasons in different mandals

- **Quarter 2** has the **highest humidity levels** in all mandals, both in **max and average min humidity**.

- **Quarter 3** also shows elevated humidity, while **Quarter 4 shows a decline**, indicating **monsoon impact peaking in Q2–Q3** and receding towards Q4.

WINDSPEED ANALYSIS

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1. Average minimum and maximum wind speeds for each district

- Districts like **Adilabad** and **Hanumakonda** show **higher average max wind speeds (~10–12 kmph)**.
- **Minimum wind speeds** across districts remain **low (<0.5 kmph)**, indicating **calm conditions with occasional strong gusts**.

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2. Variation of wind speed throughout the year in different mandals

- **Across 2021–2024**, **max wind speeds remain consistent** with **minor yearly variation**.
- **Minimum wind speeds remain negligible** in all years, suggesting wind activity is dominated by **peak gusts rather than constant breezes**.

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3. Trend in min and max wind speed over the years

- **2022 shows the highest average max wind speed (~13.5 kmph)**.
- There is a **peak in 2022**, followed by a decline in **2023 and 2024**, indicating **reduction in annual wind activity recently**.

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4. Distribution of wind speeds in different districts throughout the year

- Distribution is **consistent across 2021–2024**, with **Adilabad, Bhadrachalam, and Hanumakonda showing relatively higher max wind speeds** compared to others.
- **Minimum wind speeds remain nearly constant** across districts and years.

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5. Comparison of wind speed patterns between two selected districts

- **Nalgonda (52.87%)** shows **slightly higher total wind speed share** than **Rangareddy (47.13%)**.
- Both districts contribute almost equally to total wind activity.

OVERALL ANALYSIS

Overall KPIs (left side)

- **Overall average rainfall: 4.46 mm**, indicating low rainfall levels in the selected period.
- **Overall average maximum temperature: 35.55°C**, showing **high heat levels**.
- **Overall average maximum humidity: 90.68%**, suggesting **very humid conditions**.

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1. Yearly average rainfall

- **Rainfall decreased from 2022 to 2023**, indicating a **declining trend** in precipitation.

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2. Correlation between min and max temperature (Bhadradri Kothagudem)

- Positive correlation: as **max temperature increases, min temperature also increases**, but limited data points shown.

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3. Average of min and max temperature for each district

- **Bhadradri Kothagudem** shows a **high sum of max temperature (~15K) and min temperature (~10K)** compared to other districts, indicating consistent high temperature levels.

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4. Daily humidity range for each district (Bhadradri Kothagudem)

- **Day 1 shows the highest humidity range (~500 units)**.
- Daily range remains **consistently high across days**, suggesting **persistently humid conditions**.

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5. Trend between min and max wind

- **2022 shows higher average max wind speeds (~5 kmph)** compared to **2023 (~2 kmph)**, indicating **wind speeds are declining over time**.

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6. Percentage of annual rainfall

- **Bhadradri Kothagudem contributes 100%** of rainfall in the dataset shown, indicating data is **filtered for this district only** in this visual.

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7. Temperature anomalies by year

- **2022 shows a negative anomaly (~-500)** suggesting **temperatures were below average** that year.
- **2023 shows a small negative anomaly**, indicating **slightly cooler than average temperatures**.
