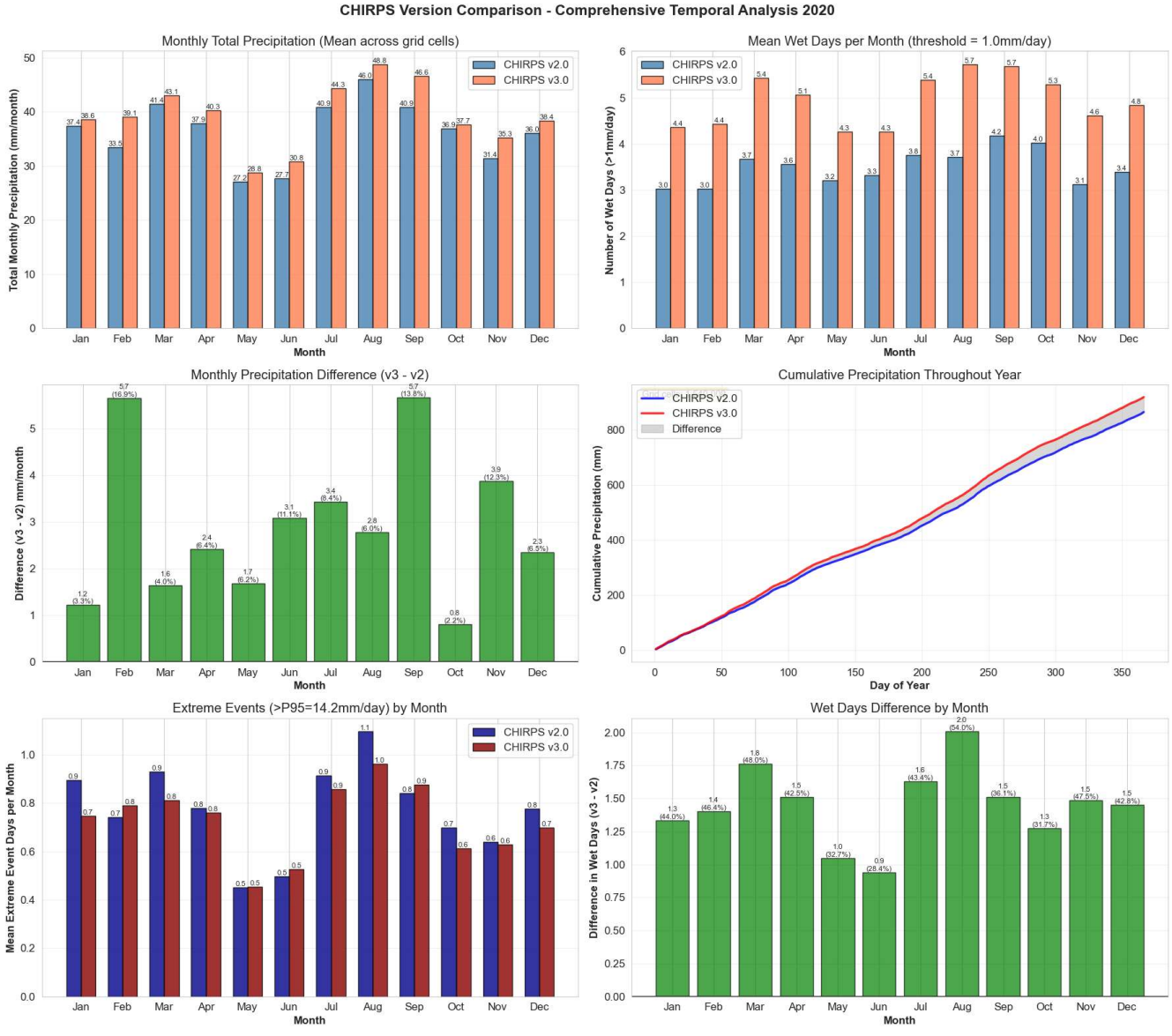
CHIRPS Version Comparison Report: v2.0 to v3.0

Analysis Period: Full Year 2020 (January - December)
Geographic Coverage: -35°S to 20°N, -20°W to 50°E

1. Grid Cell Coverage and Resolution

- **Total Grid Cells Analyzed:** 1,540,000 cells
- **Grid Dimensions:** 1,100 latitude points × 1,400 longitude points
- **Spatial Resolution:** 0.05° (~5.5 km at the equator)
- **Geographic Extent:**
  - Latitude: 35°S to 20°N (spanning 55 degrees)
  - Longitude: 20°W to 50°E (spanning 70 degrees)
- **Data Completeness:** 100% valid data coverage (no missing cells)



2. Annual Overview: The Big Picture

Overall Precipitation Totals

Metric	CHIRPS v2.0	CHIRPS v3.0	Difference	% Change
Annual Mean	437.2 mm	471.8 mm	+34.6 mm	+7.9%
Regional Total	863.7 mm	918.0 mm	+54.3 mm	+6.3%
Median	14.0 mm	34.8 mm	+20.8 mm	+149%
Maximum	4,602.9 mm	5,659.7 mm	+1,056.8 mm	+23.0%

3. Monthly Breakdown: Where the Differences Matter Most

Detailed Monthly Comparison

Here's a month-by-month breakdown showing precipitation totals, differences, and wet days for both versions:

Month	v2 Total (mm)	v3 Total (mm)	Difference	% Change	v2 Wet Days	v3 Wet Days	Extra Wet Days
January	37.4	38.6	+1.2	+3.3%	3.0	4.4	+1.4
February	33.5	39.1	+5.6	**+16.9%**	3.0	4.4	+1.4
March	41.4	43.1	+1.7	+4.0%	3.7	5.4	+1.7
April	37.9	40.3	+2.4	+6.4%	3.6	5.1	+1.5
May	27.2	28.8	+1.6	+6.2%	3.2	4.3	+1.1
June	27.7	30.8	+3.1	+11.1%	3.3	4.3	+1.0
July	40.9	44.3	+3.4	+8.4%	3.8	5.4	+1.6
August	46.0	48.8	+2.8	+6.0%	3.7	5.7	+2.0
September	40.9	46.6	**+5.7**	**+13.8%**	4.2	5.7	+1.5
October	36.9	37.7	+0.8	+2.2%	4.0	5.3	+1.3
November	31.4	35.3	+3.9	+12.3%	3.1	4.6	+1.5
December	36.0	38.4	+2.4	+6.5%	3.4	4.8	+1.4

Key Monthly Insights

Highest Differences:

1. **September** showed the largest absolute difference (+5.7 mm) and one of the highest percentage changes (+13.8%)
2. **February** had the highest percentage change (+16.9%) despite a moderate absolute difference
3. **November** and **June** also showed notable increases (12.3% and 11.1% respectively)

Lowest Differences:

- **October** had the smallest change (+0.8 mm, +2.2%)
- **January** and **March** showed relatively modest changes (3-4%)

Wet Days Pattern:

- Version 3.0 consistently identifies **1-2 more wet days per month** than v2
- **August** showed the largest wet day difference (+2.0 days)
- **June** had the smallest wet day difference (+0.9 days)
- A "wet day" is defined as any day receiving ≥1.0 mm of precipitation

4. Seasonal Patterns: Understanding Climate Zones

Four-Season Comparison

Here's how the two versions compare across the traditional meteorological seasons:

December-January-February - Northern Dry / Southern Wet

- **v2 Total:** 106.9 mm
- **v3 Total:** 116.1 mm
- **Difference:** +9.2 mm (+8.6%)
- **Wet Days:** v2 averaged 9.5 days, v3 averaged 13.6 days (+4.2 days)
- **Impact:** Moderate change; affects southern Africa's main growing season

March-April-May - Transition Season

- **v2 Total:** 106.5 mm
- **v3 Total:** 112.2 mm
- **Difference:** +5.8 mm (+5.4%)
- **Wet Days:** v2 averaged 10.4 days, v3 averaged 14.8 days (+4.3 days)
- **Impact:** Lower relative change; most stable transition period

June-July-August - Northern Wet / Southern Dry

- **v2 Total:** 114.6 mm
- **v3 Total:** 123.9 mm
- **Difference:** +9.3 mm (+8.1%)
- **Wet Days:** v2 averaged 10.8 days, v3 averaged 15.4 days (+4.6 days)
- **Impact:** Significant for Sahel and West African monsoon applications

September-October-November - Transition to Wet

- **v2 Total:** 109.2 mm
- **v3 Total:** 119.5 mm
- **Difference:** +10.4 mm (+9.5%)
- **Wet Days:** v2 averaged 11.3 days, v3 averaged 15.6 days (+4.3 days)
- **Impact: Highest seasonal difference**; critical for East African short rains

Seasonal Summary

Version 3.0 shows increases across all seasons, with the September-October-November experiencing the largest absolute increase.

5. Extreme Events and Precipitation Thresholds

Understanding Extreme Rainfall

We analyzed extreme precipitation events using statistical thresholds to understand how the two versions differ in capturing heavy rainfall:

Threshold	Definition	v2 Threshold Value	v3 Threshold Value	Cells Affected
P90	Top 10% of daily rainfall	1,395.8 mm/year	1,484.2 mm/year	154,000 cells (10%)
P95	Top 5% of daily rainfall	1,631.7 mm/year	1,732.2 mm/year	77,000 cells (5%)
P99	Top 1% of daily rainfall	2,195.4 mm/year	2,416.4 mm/year	15,400 cells (1%)

Daily Extreme Threshold: Both versions use 14.17 mm/day as the 95th percentile for extreme daily events.

What Changed in Extreme Events?

- Version 3.0 shows **higher thresholds** for extreme events across all percentiles
- The P99 threshold increased by **221 mm/year** (+10.1%)
- This suggests v3 captures more intense precipitation events in high-rainfall areas
- Applications focused on flood risk or reservoir management should note these differences

Dry vs. Wet Conditions Analysis

The analysis revealed interesting patterns in how the versions handle very dry and very wet regions:

Dry Regions (≤0 mm/year):

- v2: 0.0 mm average
- v3: 342.1 mm average
- **Impact:** v3 identified precipitation in areas v2 classified as completely dry

Wet Regions (≥836 mm/year):

- v2: 1,368.7 mm average
- v3: 719.1 mm average
- **Difference:** -649.6 mm (-47.5%)
- **Impact:** v3 shows **lower** precipitation in the wettest regions, suggesting improved bias correction

Key Takeaways:

- Version 3.0 shows consistently higher precipitation values across most months
- About **68% of grid cells** show differences greater than 10% between versions
- Annual precipitation increased by **54.3 mm** (6.3%) in v3 compared to v2
- Wet days per month increased by **1-2 days** on average in v3
- September showed the largest monthly difference (5.7 mm, 13.8%)