

# Guidance on how to Interpret and use the Seasonal Outlook at National Level

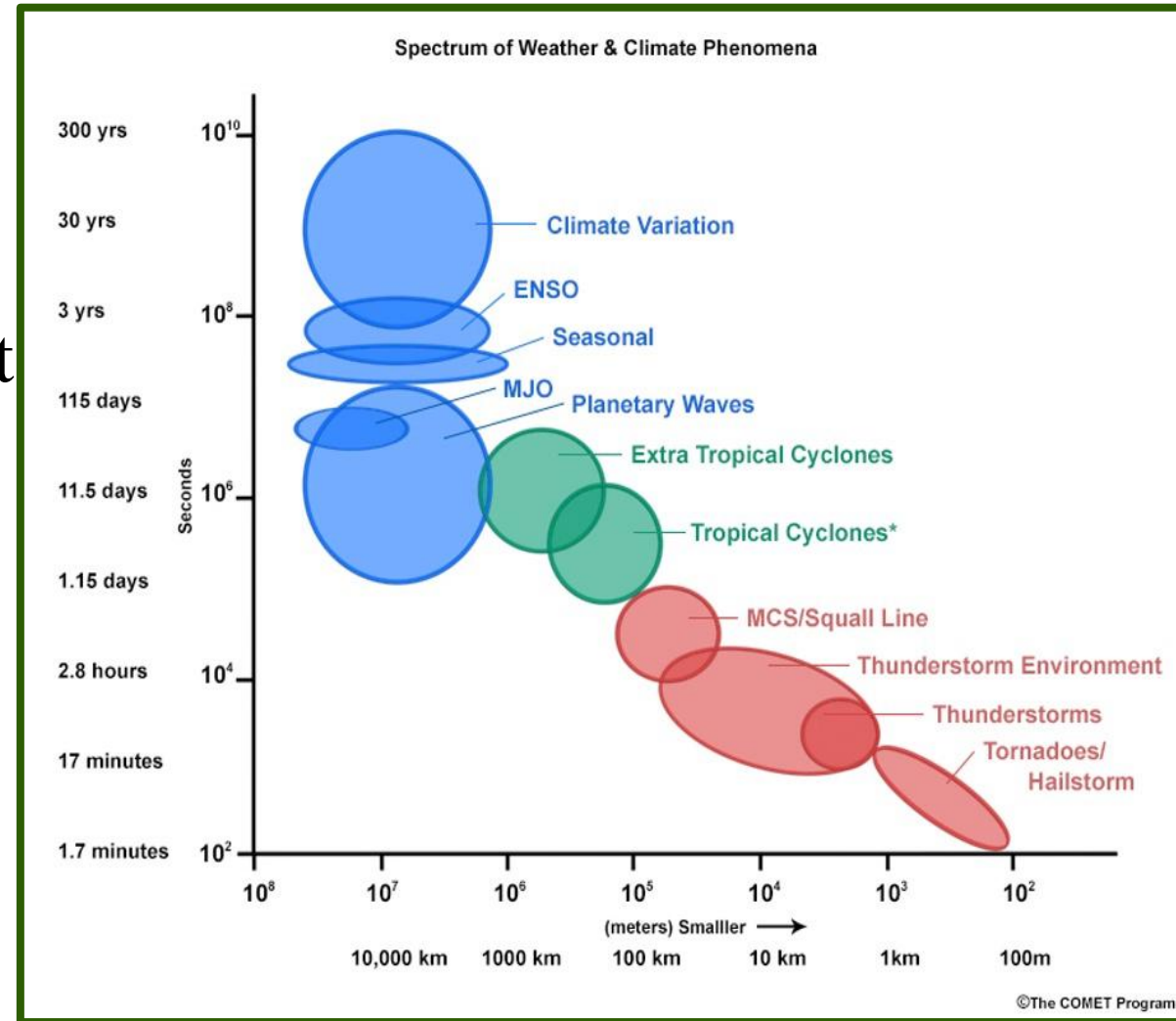
---

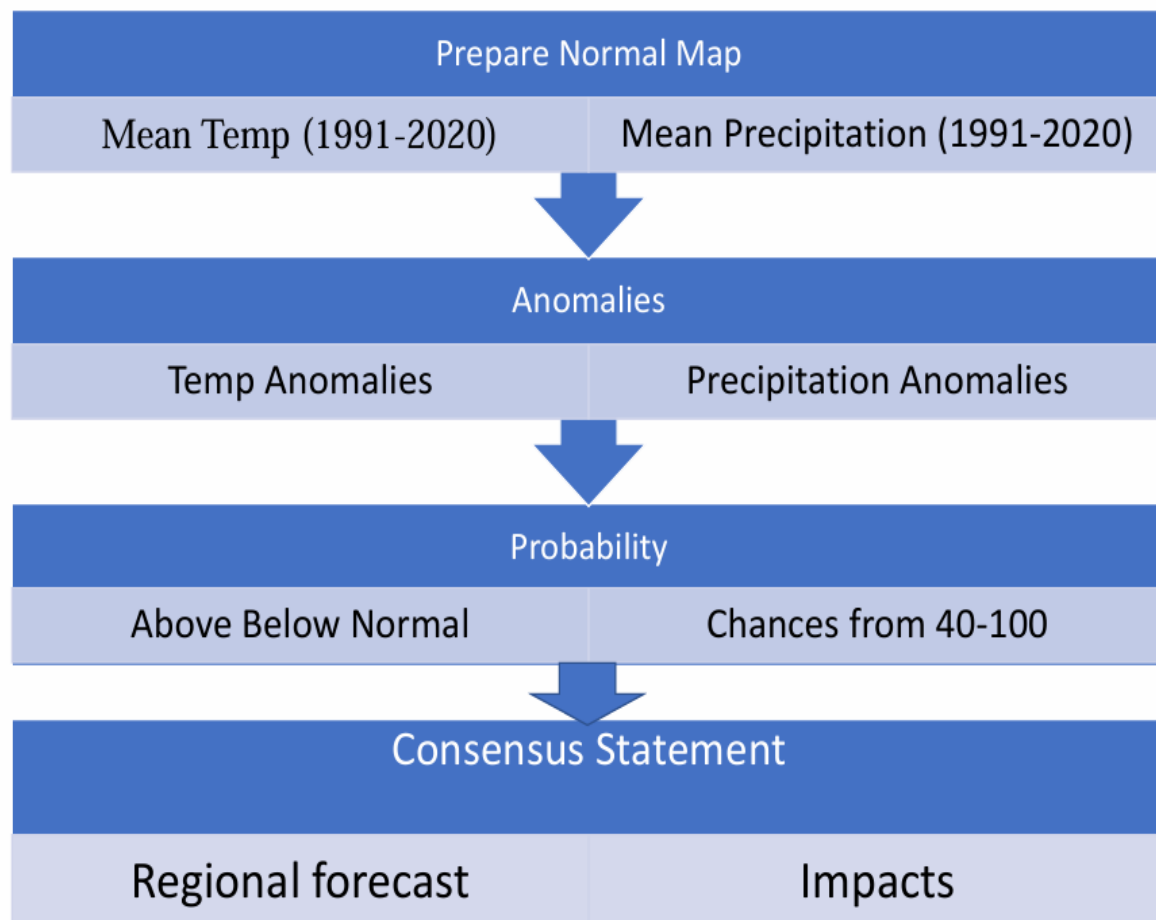
*Dr. Shahzad Sultan*  
*Senior Meteorologist*  
*Pakistan Meteorological Department*

# Introduction

## ➤ What is a Forecast?

- ✓ Weather forecast – Few days
- ✓ Detailed day-to-day changes cannot be calculated beyond two weeks
- ✓ Possible to say something about likely conditions
- ✓ Seasonal Forecast – Few months





Institution/Model	Ensembles	Hindcast Data	Forum
1. APCC-SCOPS	10	1982-2013	
2. BOM-ACCESS-S1	11	1990-2012	
3. CMCC- SPS3.5	50	1992-2017	
4. CWB-TCWB1Tv1.1	30	1982-2019	
5. HMC-SL-AV	20	1985-2010	
6. KMA-GLOSEA5GC2	42	1991-2016	
7. METFR-SYS8	51	1991-2016	
8. NCEP-CFSv2	20	1982-2010	
9. UKMO-GLOSEA5	42	1991-2016	
10. ECCC-CANSIPSv2.1	20	1980-2020	

- *Quantitative Forecast Methodology:*
- Simple Composite Method (SCM)

$$F_t = \frac{1}{N} \sum_{i=1}^N (F_{i,t} - \bar{F}_i)$$

Probabilistic forecast issued by using tercile based probabilistic based upon Gaussian Distribution.

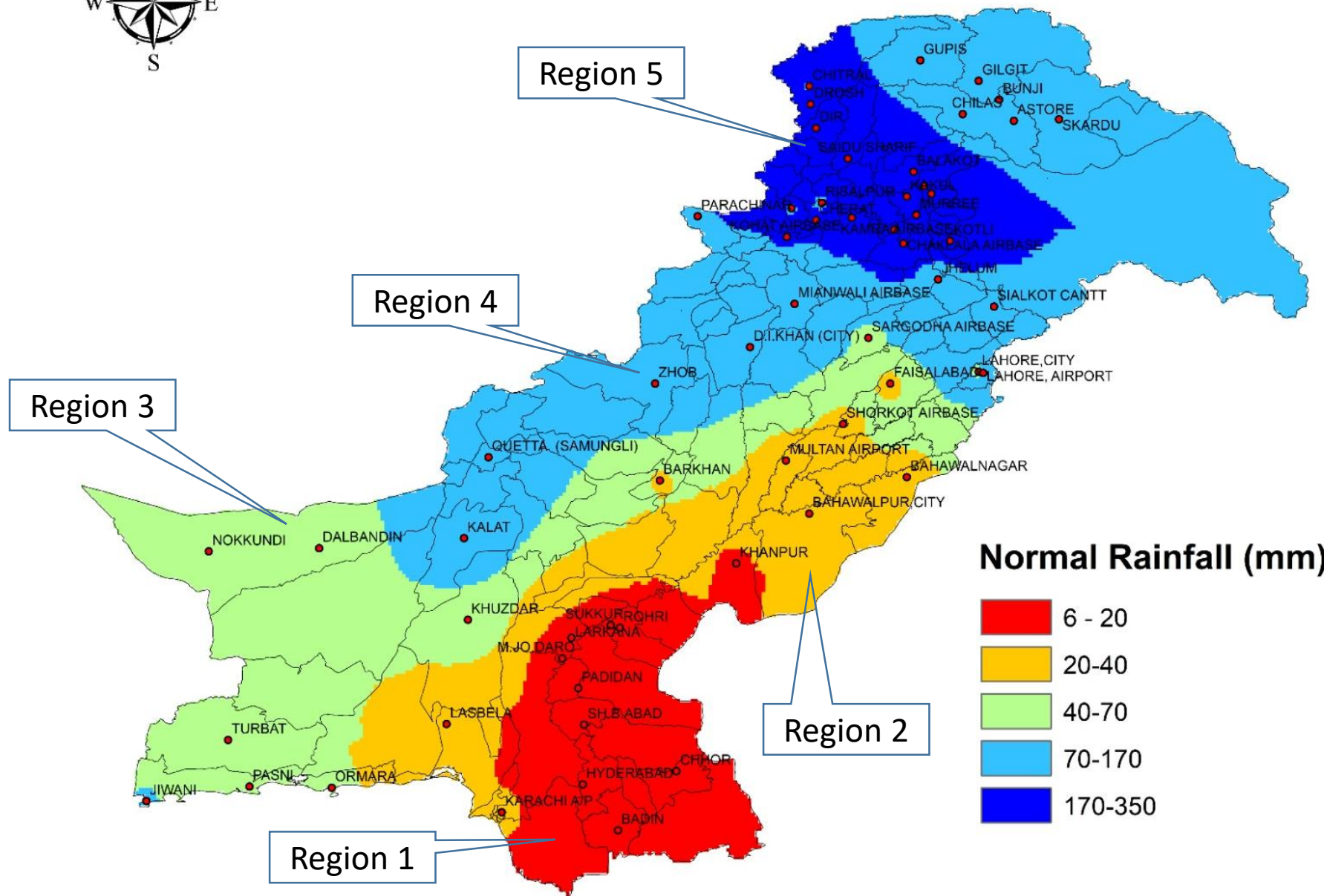
Anomaly calculated after simple composite mean of hind cast data and forecast data. Difference between forecast and hind cast is anomaly for that period.

## Downscaling Regional Guidance

- Compare regional anomalies with national climatology
- Identify sub-national zones most aligned with regional signals
- Consider orographic effects on precipitation patterns



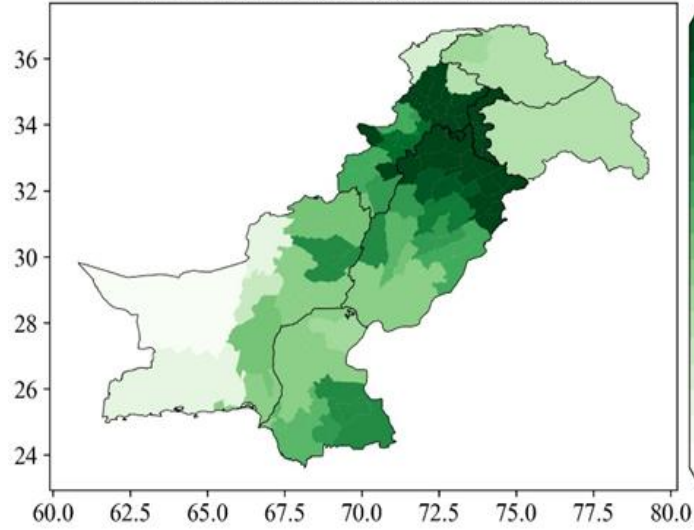
# K-Mean Cluster Classification of DJF Rainfall



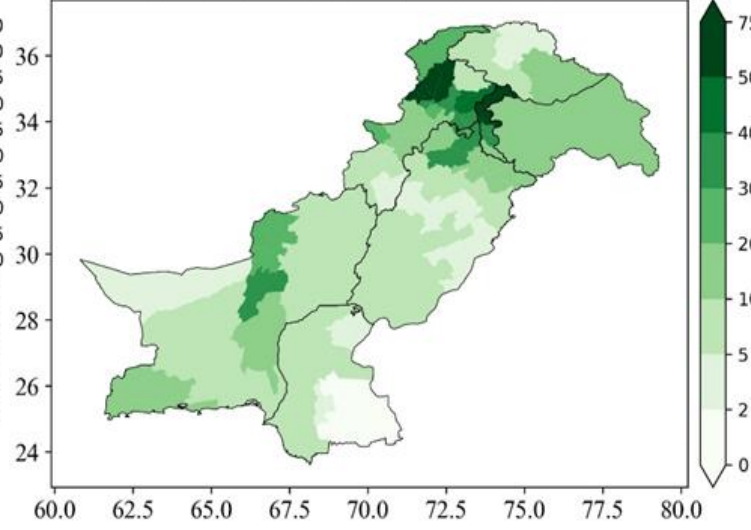


# Probabilistic Forecast

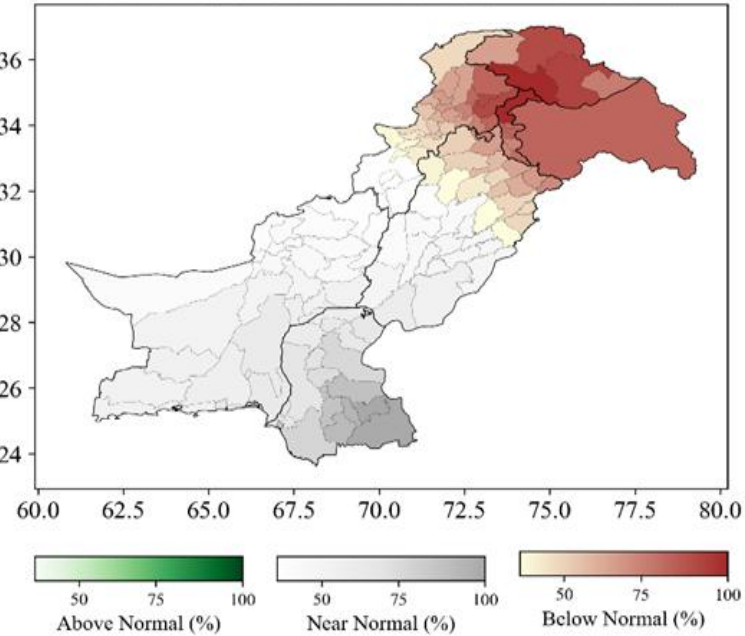
Normal Rainfall (mm), (DJF, 1991-2020)



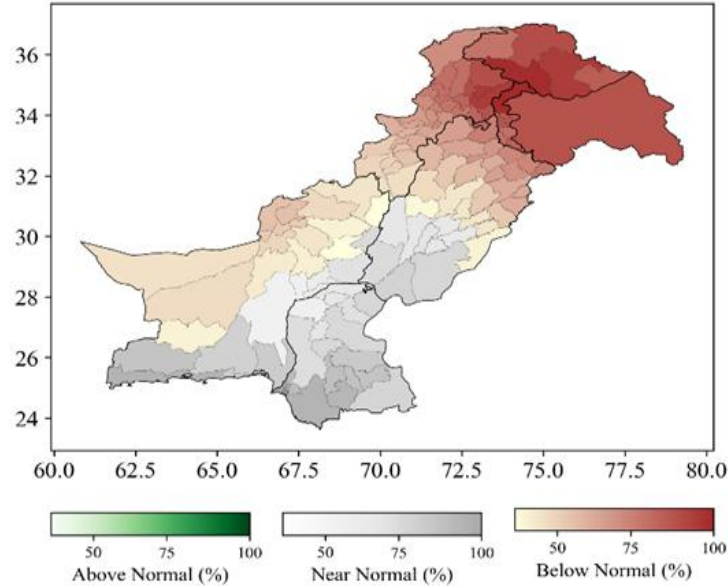
Normal Rainfall (mm), (Dec, 1991-2020)



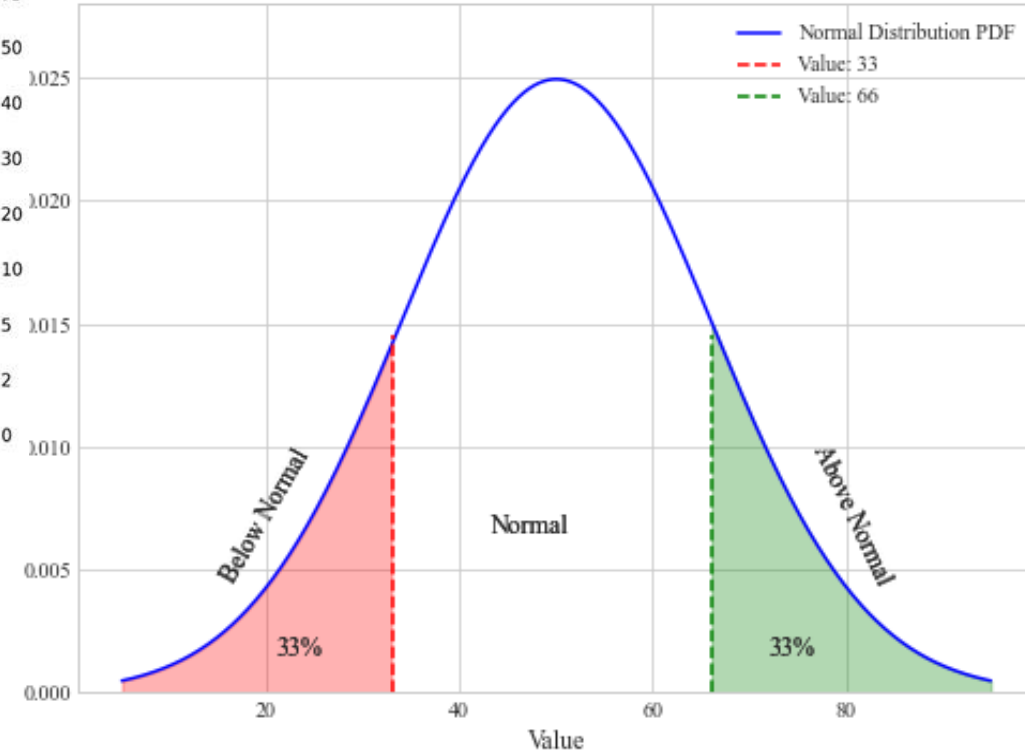
Tercile Probabilistic Rainfall Outlook - DJF 2025-26



Tercile Probabilistic Rainfall Outlook - Dec 2025



Probability Density Function (PDF) of Normal Distribution with Climatology





# Previous Month Records



## Pakistan January-October 2025

36

34

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

During the period Pakistan Rainfall with 279.1mm (0.1%)  
was near average

During the period Pakistan Mean temperature with 25.53°C  
(+1.05 °C) was warmer than normal temperature.

Coldest Place (Avg Period Min)

7.0 °C at Skardu (GB)

Coldest Month (Avg Min)

-8.0 °C at Gupis (GB) Jan-2025

Coldest Day

0.5 °C at Astore on 9<sup>th</sup> January

Coldest Night

-12 °C at Astore on 9<sup>th</sup> January

Warmest Night

34 °C Chilas (Gilgit-Baltistan) on  
06<sup>th</sup> July

Wettest Place (Period rain)

1461.0 mm at Malam Jabba (KP)

AWR:524.1mm

(-17.7%)

AWR:222.0mm

(-24.2%)

Jammu  
Kashmir

AWR:846.6 mm

(-3.3%)

Khyber  
Pakhtunkhwa

Punjab

AWR:431.7 mm

(15.9%)

Wettest Day

363.3 mm at Sialkot (Punjab)

on 27<sup>th</sup> August

Wettest Month

730.8 mm at Sialkot (Punjab)

in August 2025

Warmest Night

34 °C Sibi (Balochistan) on 21<sup>st</sup> June

Hottest Day

50.5 °C Sibi (Balochistan)

on 23<sup>rd</sup> May

Hottest Place (Avg Period Max)

37.8 °C at Sibbi (Balochistan)

Hottest Month (Avg Max)

46.4 °C at Sibbi (Balochistan) June-2025

Driest Place (Period rain)

0.5 mm at Panjgur (Balochistan)

Balochistan

AWR :115.8mm

(-19.9%)

Hottest Day

50.5 °C Jacobabad (Sindh)

on 13<sup>th</sup> June

Sindh

AWR:223.3mm

(33.7%)

# Integrating National Data

- National model outputs, statistical forecasts, observational trends
- Weight inputs based on historical performance
- Identify conflicts between regional and national guidance



# Contextualizing for National Impacts

- Map climate anomalies to sectoral vulnerabilities
- Consider phase of ENSO/IOD and local teleconnections
- Consult with agricultural, water, and disaster management experts

# Monsoon 2025 Forecast Evaluation

**Forecast skill:** Models effectively captured the **overall spatial distribution** of rainfall and temperature across Pakistan.

## •Rainfall performance:

- Observed rainfall was **+19% above normal**, slightly higher than the **forecasted +13%**, showing **underestimation of rainfall intensity**.
- Accuracy: ~64%**, indicating good prediction of rainfall patterns.
- Wettest regions:** Punjab, Sindh, and Balochistan experienced **strong wet anomalies**.

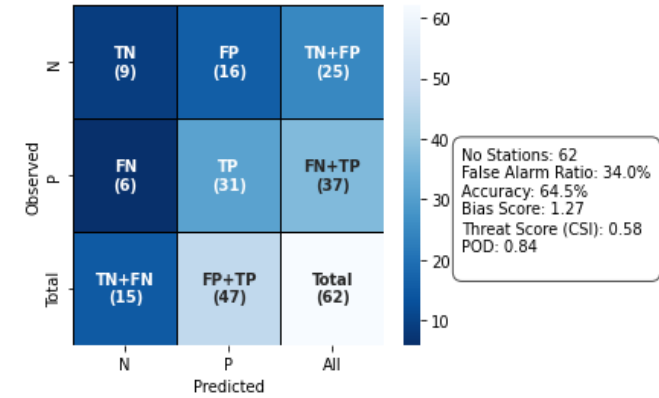
## •Temperature performance:

- Observed temperature was **+0.5°C**, close to the **forecasted +0.6°C**, showing a **slight warm overestimation**.
- Accuracy: ~44%**, with a **warm bias** over Gilgit-Baltistan, northern KP, and Balochistan.

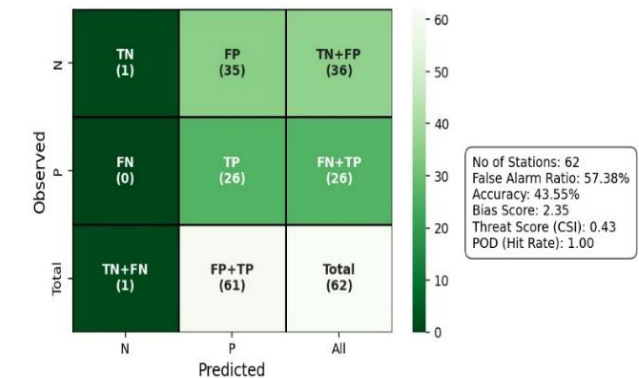
## •Overall conclusion:

- Forecasts showed **good spatial agreement** with observed anomalies.
- Models displayed **satisfactory performance** in representing the **broad-scale monsoon climate behavior** across Pakistan for **JAS 2025**.

Contingency Table JAS 2025 (Precipitation)



Contingency Table seasonal for JAS 2025 (Temperature)



# Thank You!