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

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Introduction

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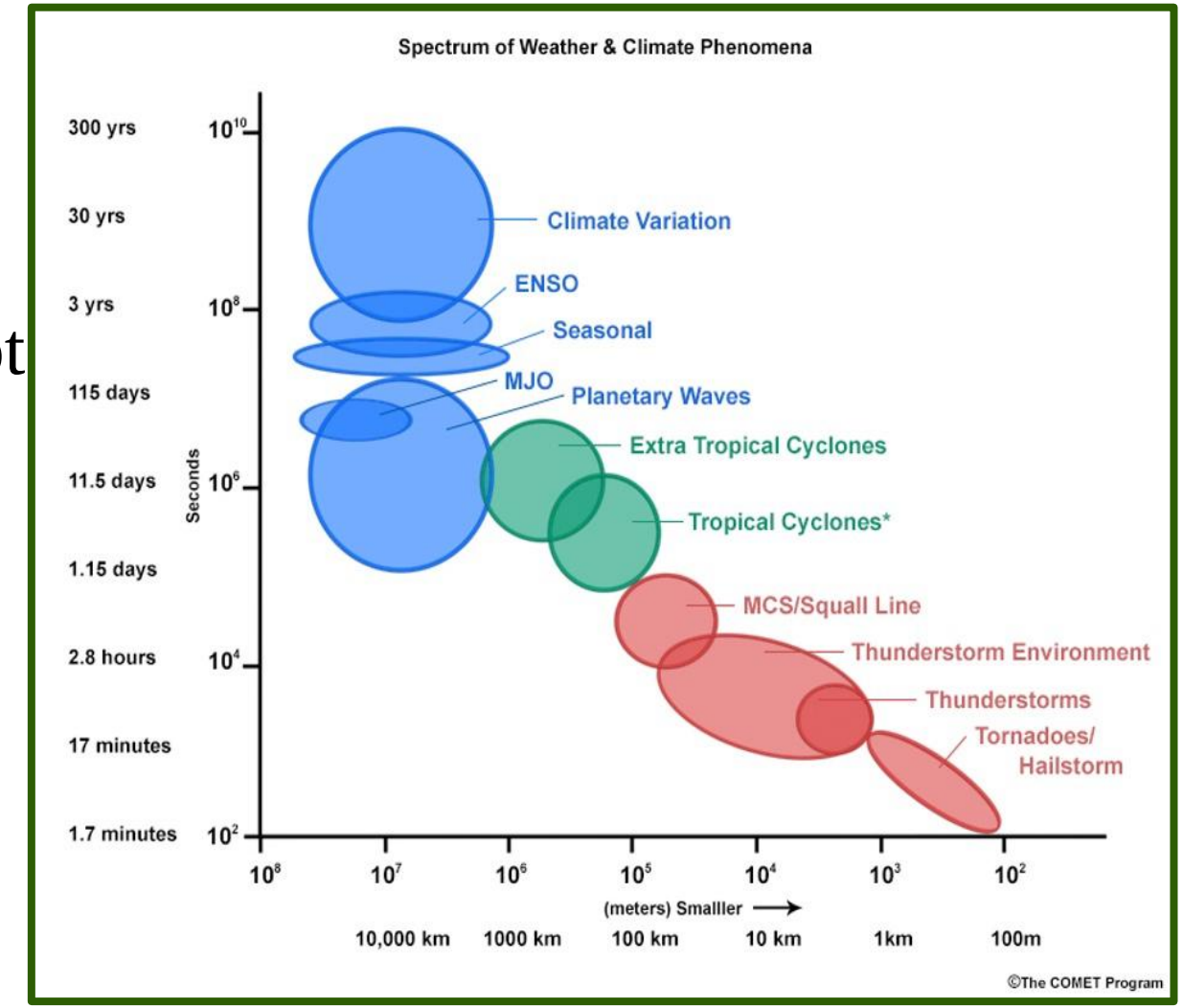
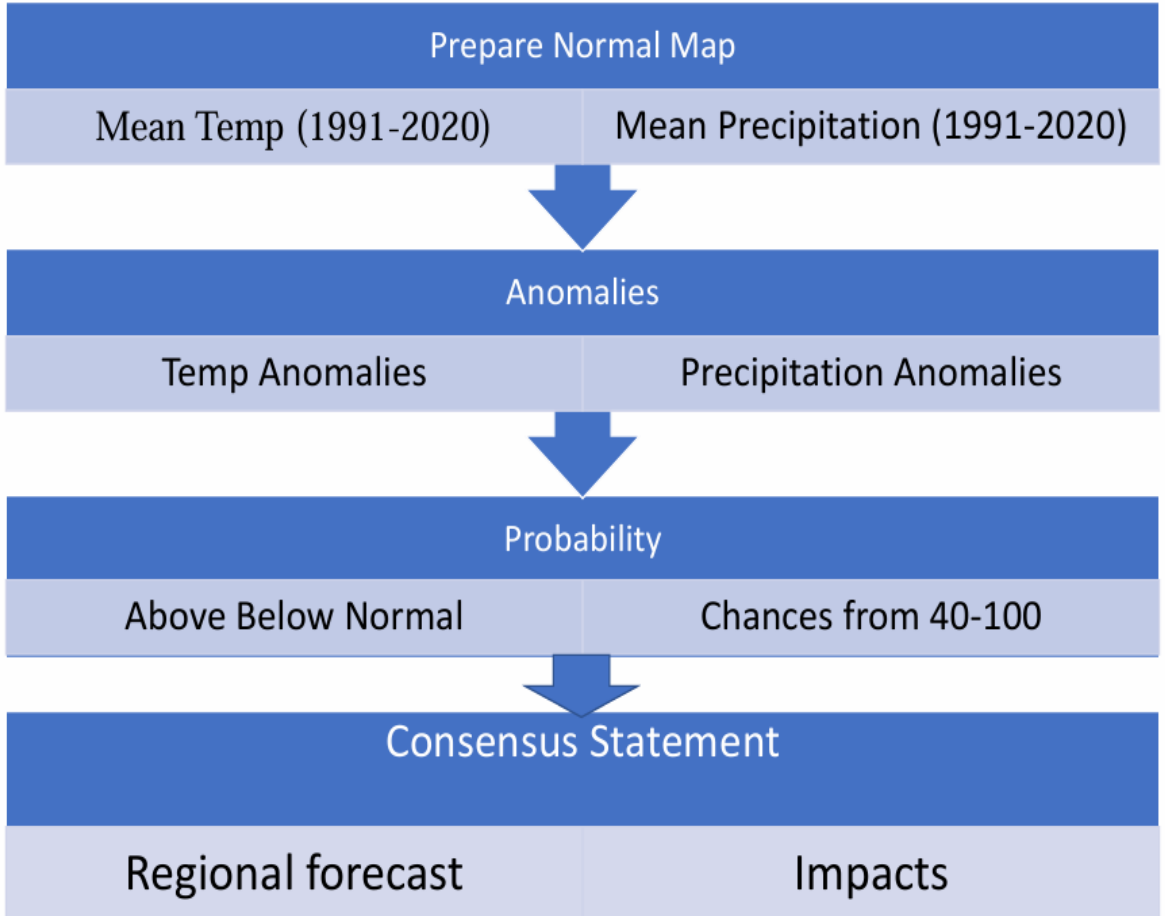
- What is a Forecast?
  - ✓ Weather forecast – Few days
  - ✓ Detailed day-to-day changes cannot be calculated beyond two weeks
  - ✓ Possible to say something about likely conditions
  - ✓ Seasonal Forecast – Few months



National Forecast Methodology



	Institution/Model	Ensembles	Hindcast Data
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

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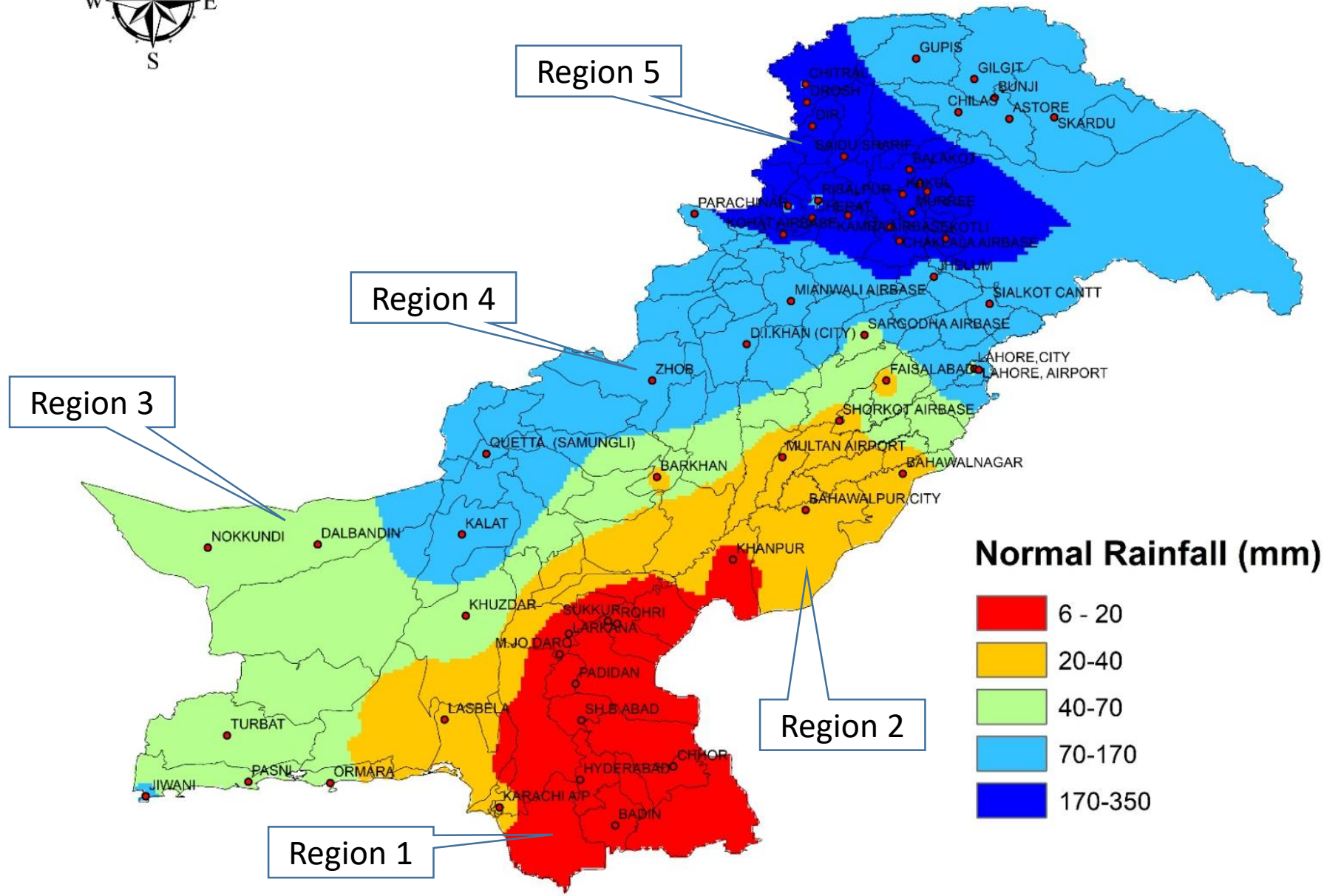
K-Mean Cluster Classification of DJF Rainfall



Probabilistic Forecast

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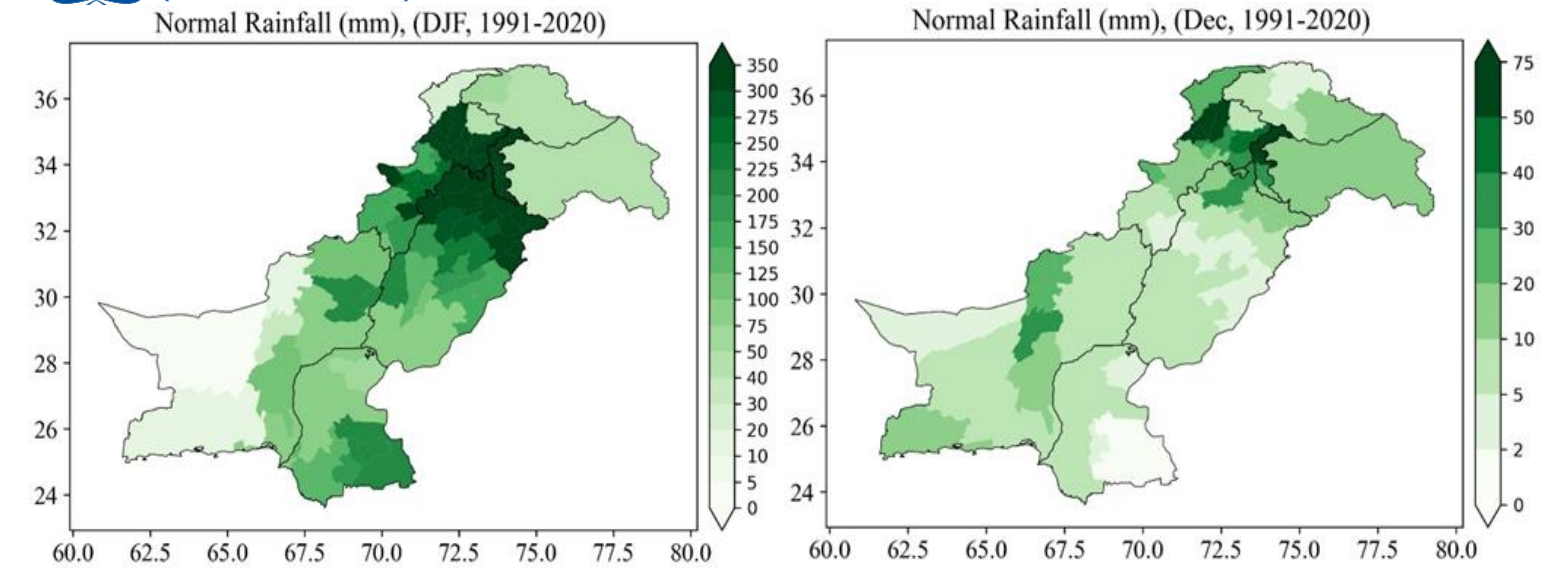

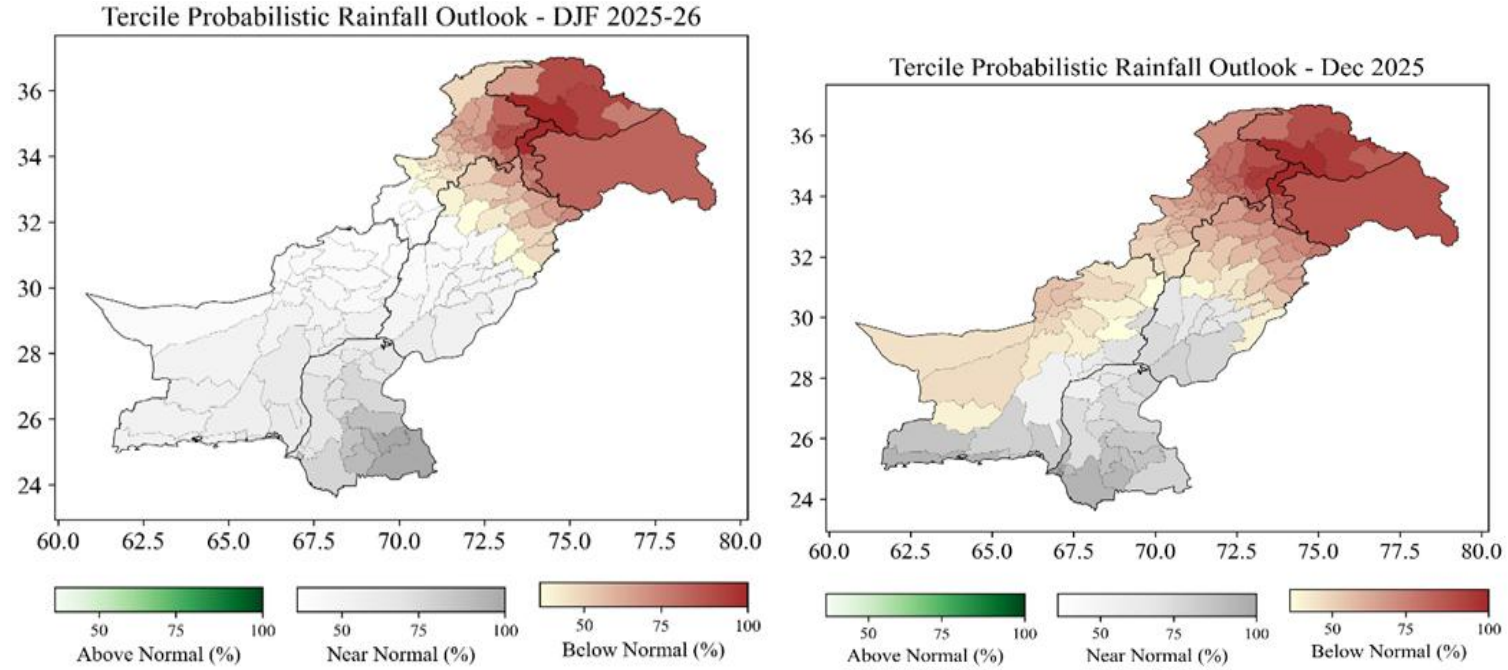

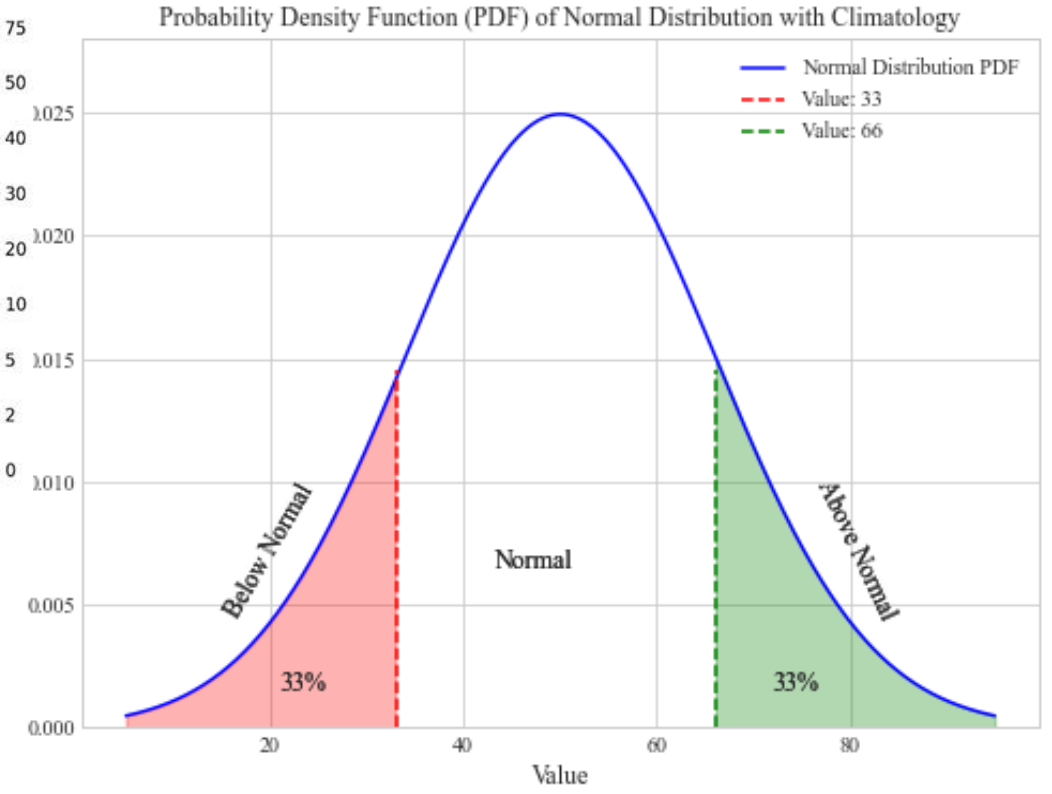

Previous Month Records

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

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Monsoon 2025 Forecast Evaluation

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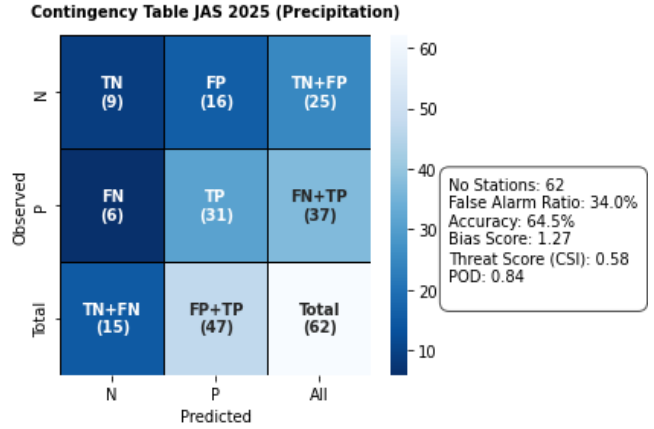
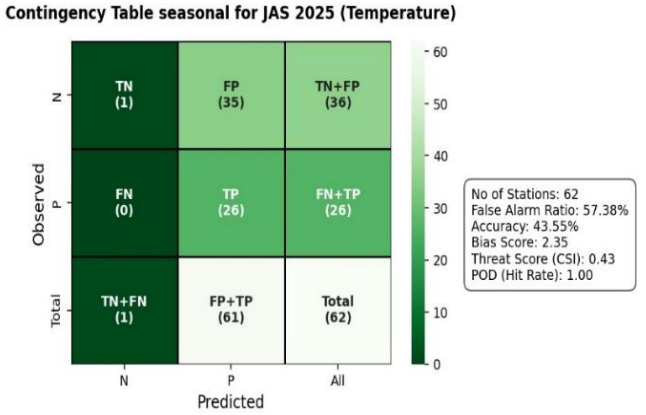
Forecast skill: Models effectively captured the **overall spatial distribution** of rainfall and temperature across Pakistan.

- **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**.





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Thank You!