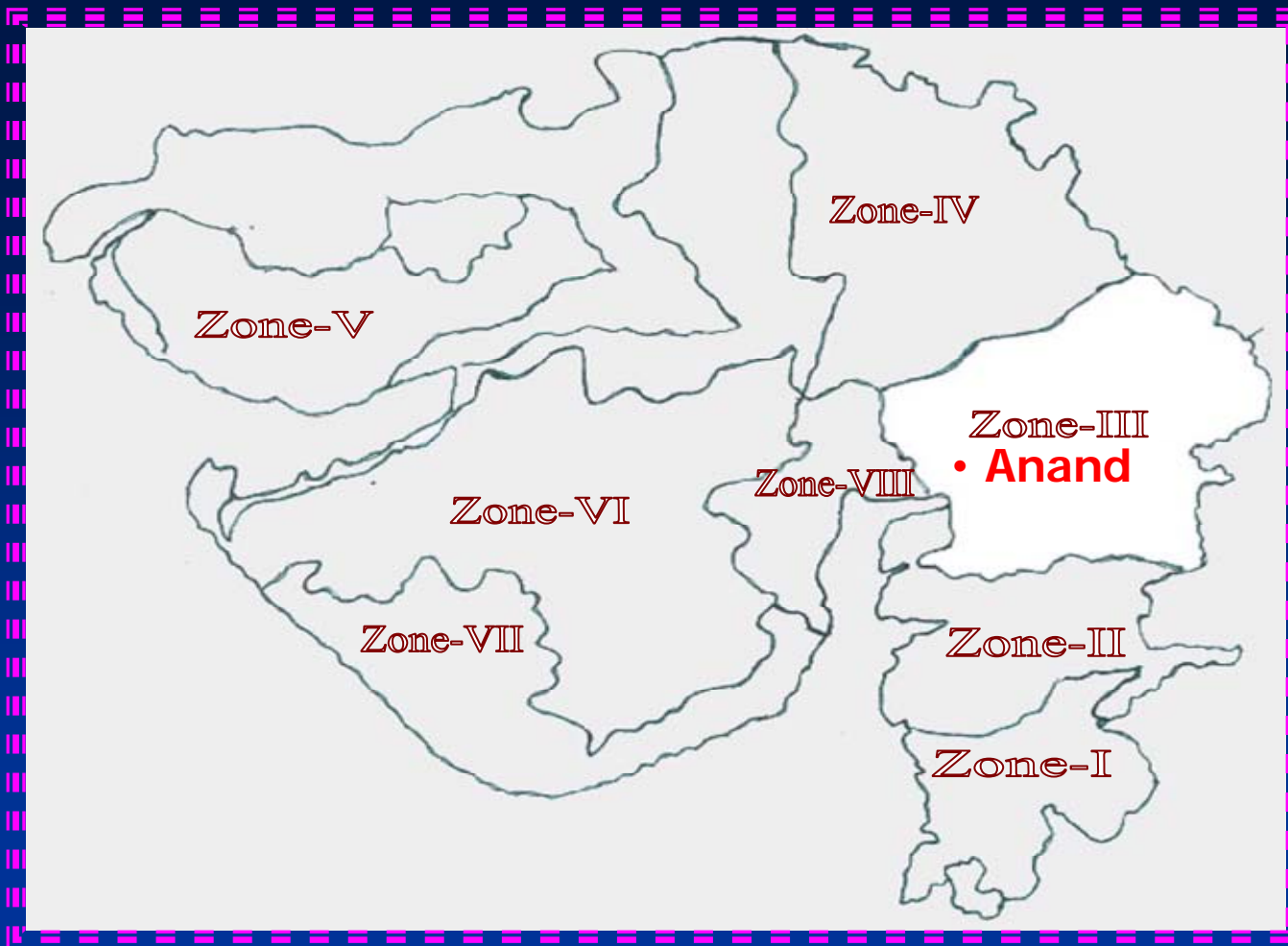


Usability and verification of Medium range weather forecast for Anand (Gujarat)

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Introduction

Weather plays a crucial role in agriculture. Day to day farm management decisions are often governed by weather events. Crop productivity is highly influenced by seasonal weather conditions. Occurrences of erratic weather are beyond human control. However, it is possible to adapt or mitigate the effects of adverse weather up to some extent if a forecast of the expected weather timely available. So an effort was made to verify the weather forecasts received on every Tuesday and Friday from NCMRWF Noida, very recently from IMD, Pune. The verification analysis was carried out on weekly, seasonal (as per IMD standard) as well as yearly basis using various verification techniques viz. ratio score, H.K. score, RMSE, usability analysis and correlation approach during 2006-07 to 2008-09.



Agro-climatic Zones of Gujarat State

Zone -I	South Gujarat (Heavy Rainfall Area)	Zone-V	North West Zone
Zone-II	South Gujarat	Zone-VI	North Saurashtra
Zone-III	Middle Gujarat	Zone-VII	South Saurashtra
Zone-IV	North Gujarat	Zone-VIII	Bhal & Coastal Area

Forecast verification methods

		Predicated	
		No rain	Rain
Observed	No rain	Z (NN)	F (NY)
	Rain	M (YN)	H (YY)

Where,

Z = Neither predicted nor observed

F = Predicted not but observed

M = Observed but not predicted

H = Predicted and observed

Ratio score: $(YY + NN) / (YY + NN + YN + NY)$

Hansen and Kuiper score: $(YY \times NN) - (NY \times YN) / (YY + YN) \times (NN + NY)$

Root mean square error: $\frac{\sqrt{\sum (O - P)^2}}{N}$

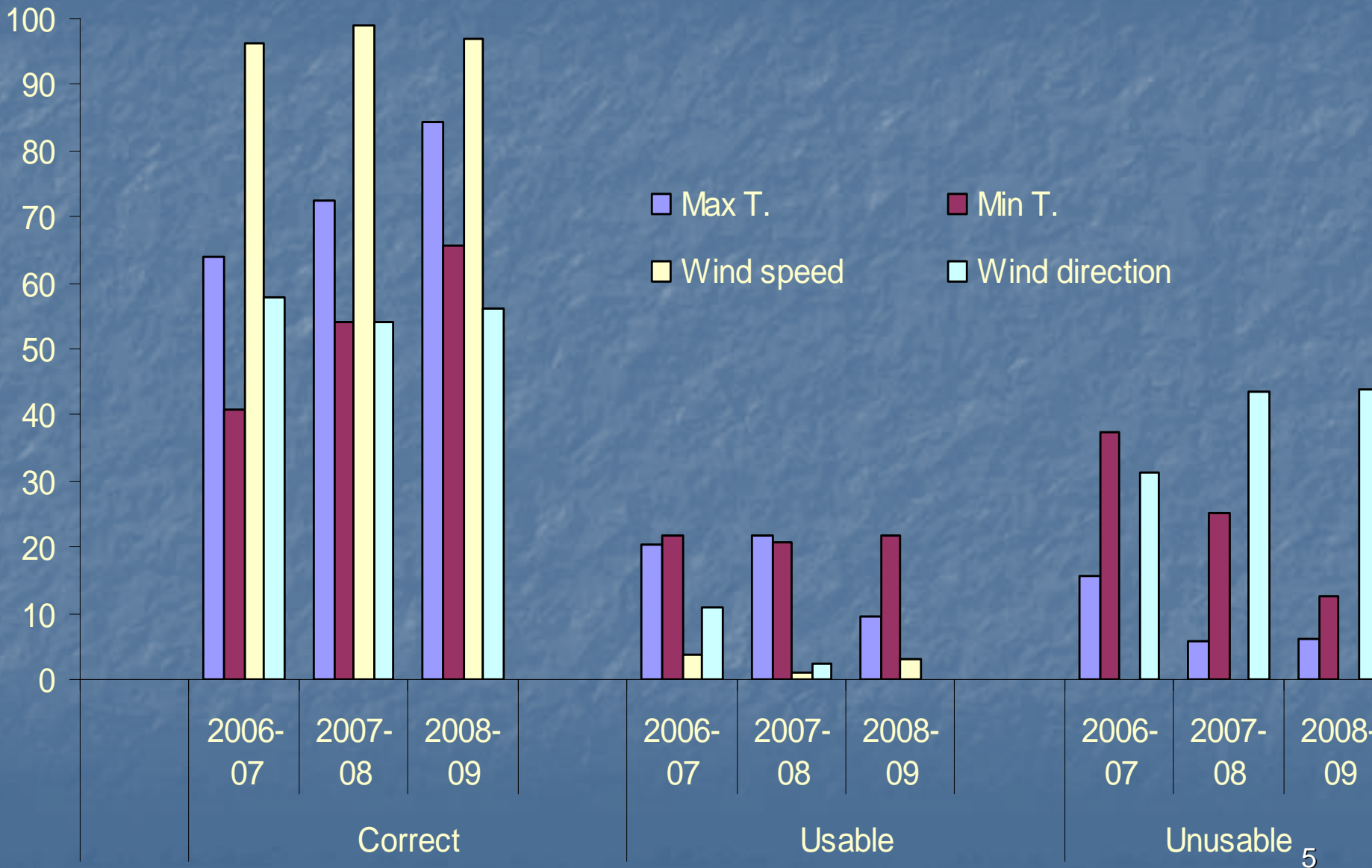
Where,

O = observed values

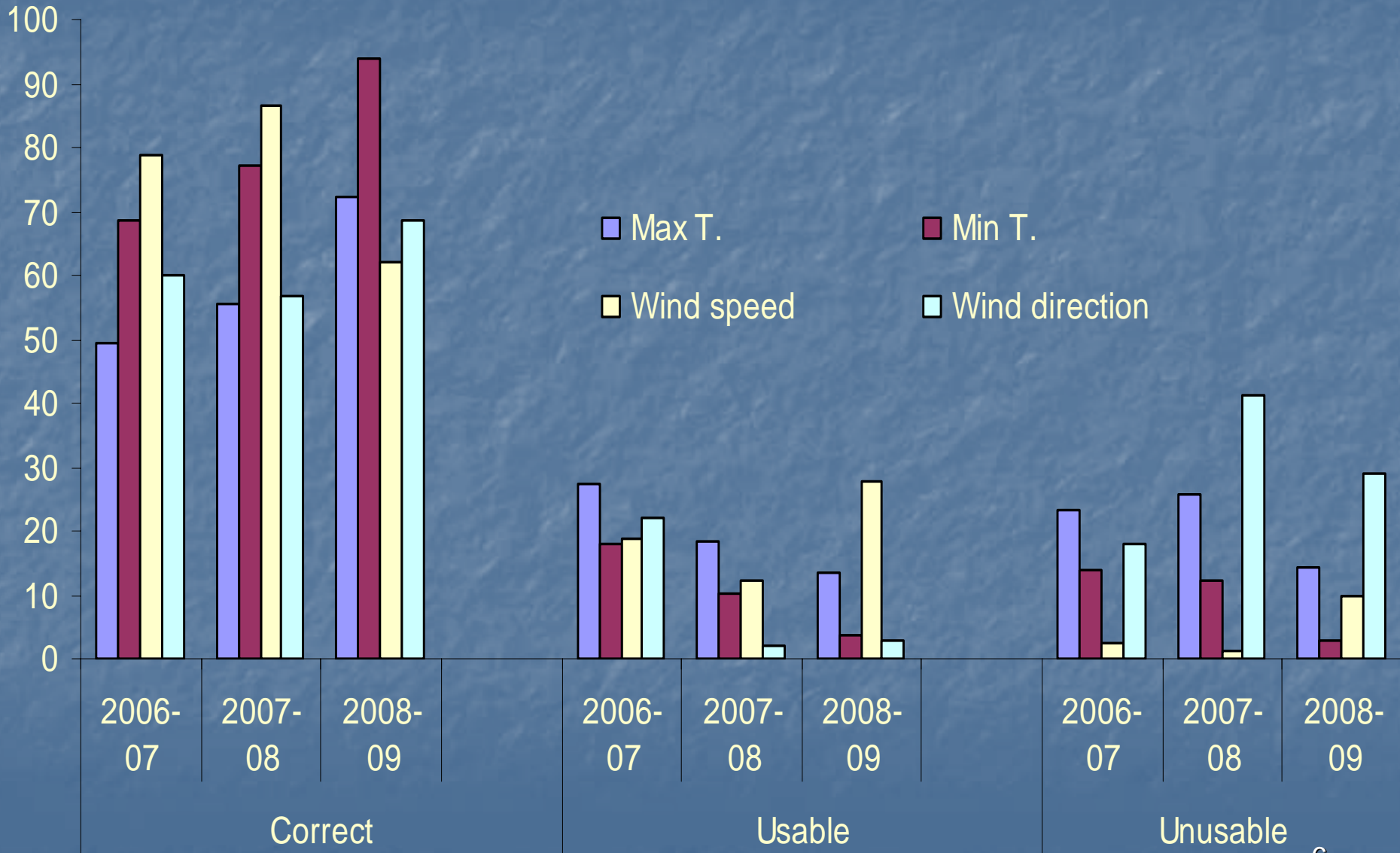
P = Predicted values

N = Total no. of observations

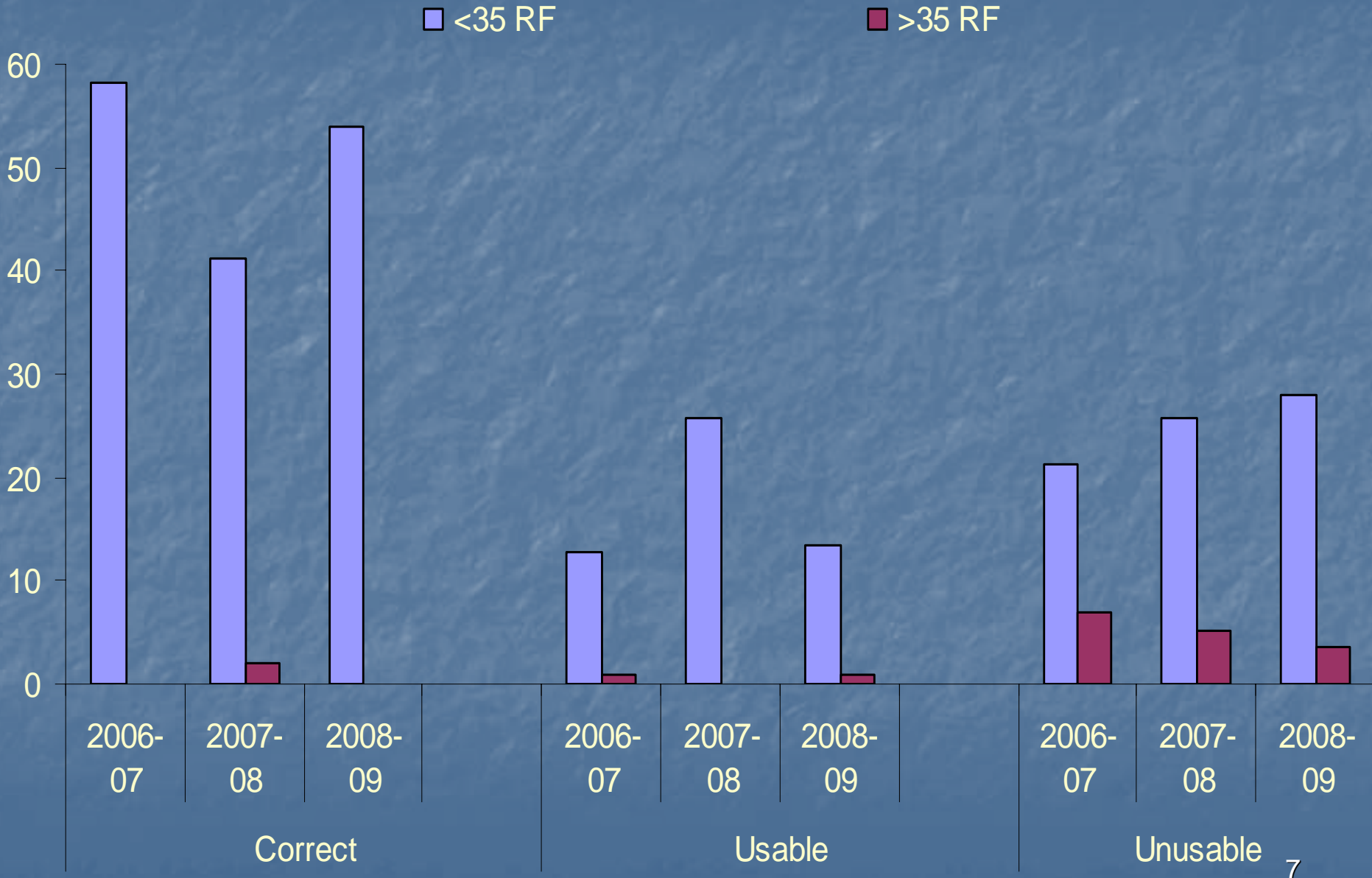
Pre-monsoon season (Mar-May)



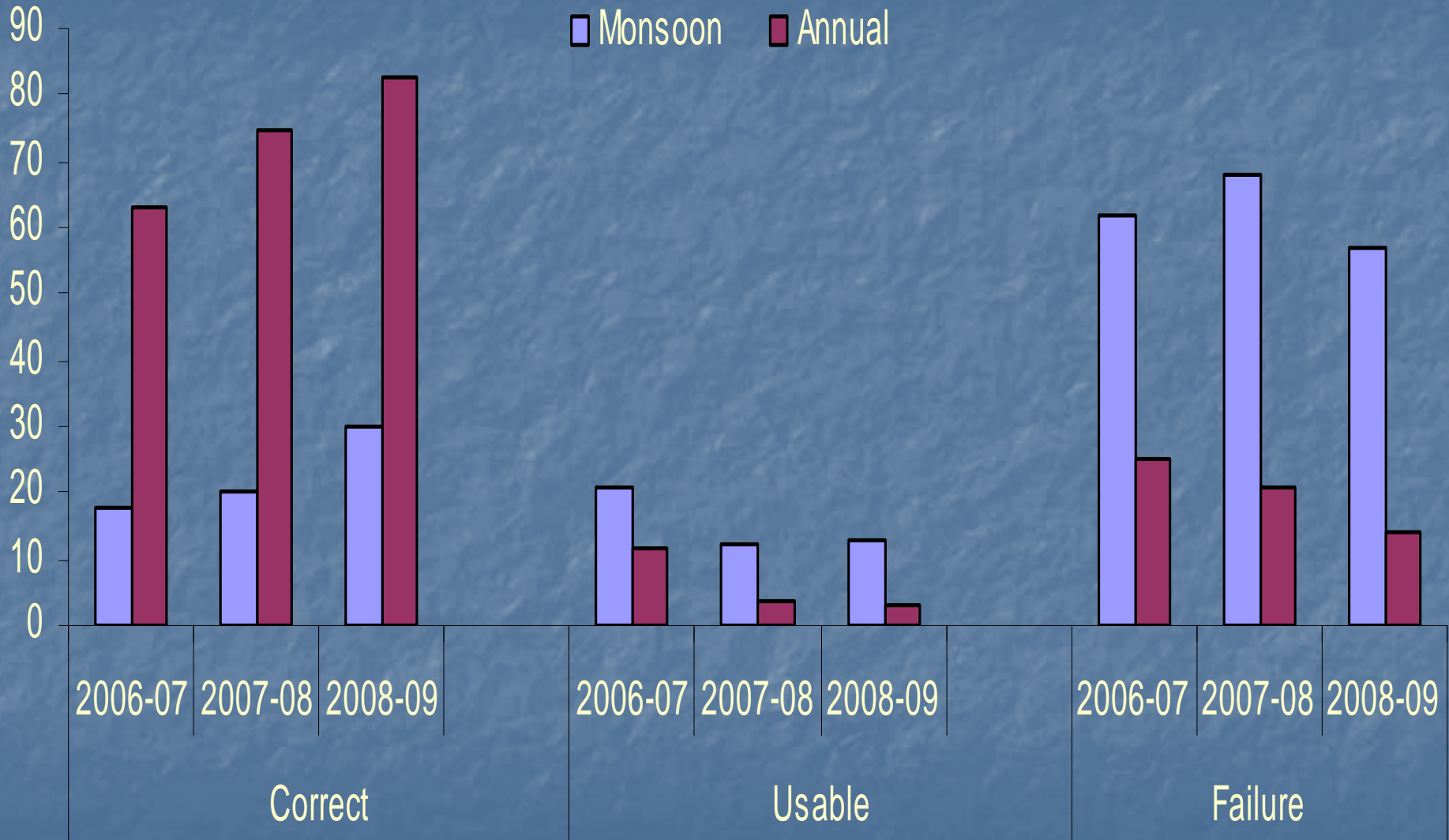
Monsoon season (Jun-Sep)



Monsoon season (Jun-Sep) Rainfall

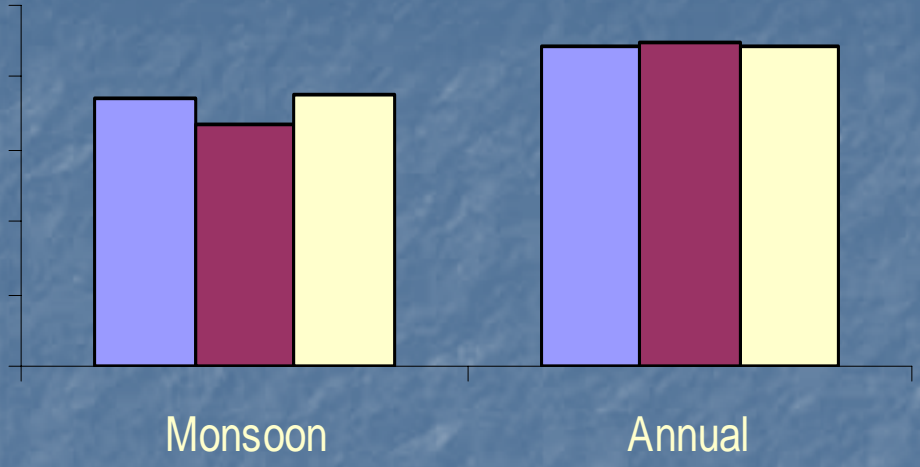


Weekly cumulative rainfall prediction usability

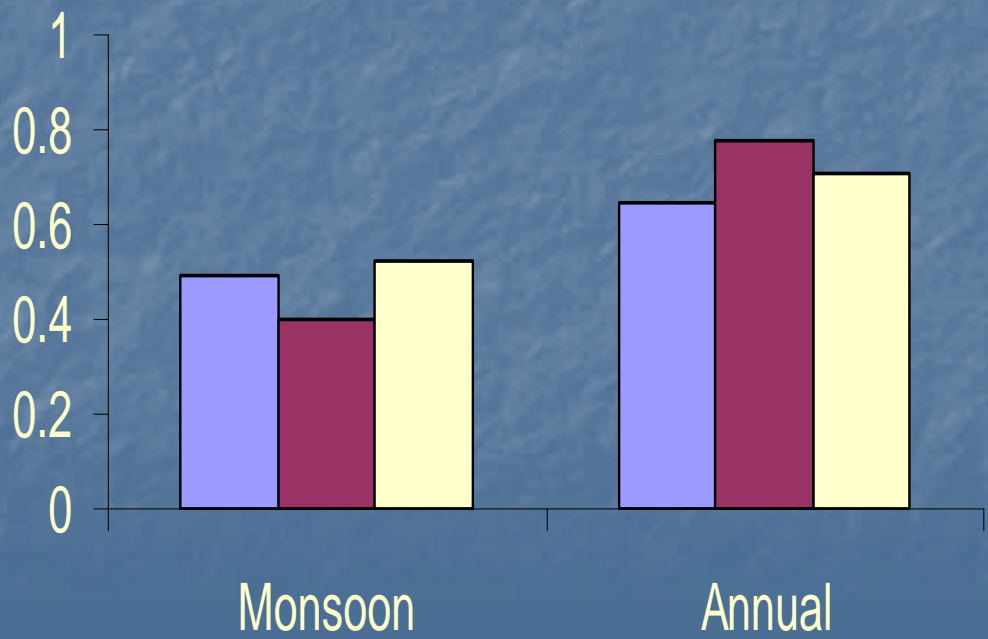


Seasonal Ratio score and HK Score of the rainfall prediction during last three years at Anand

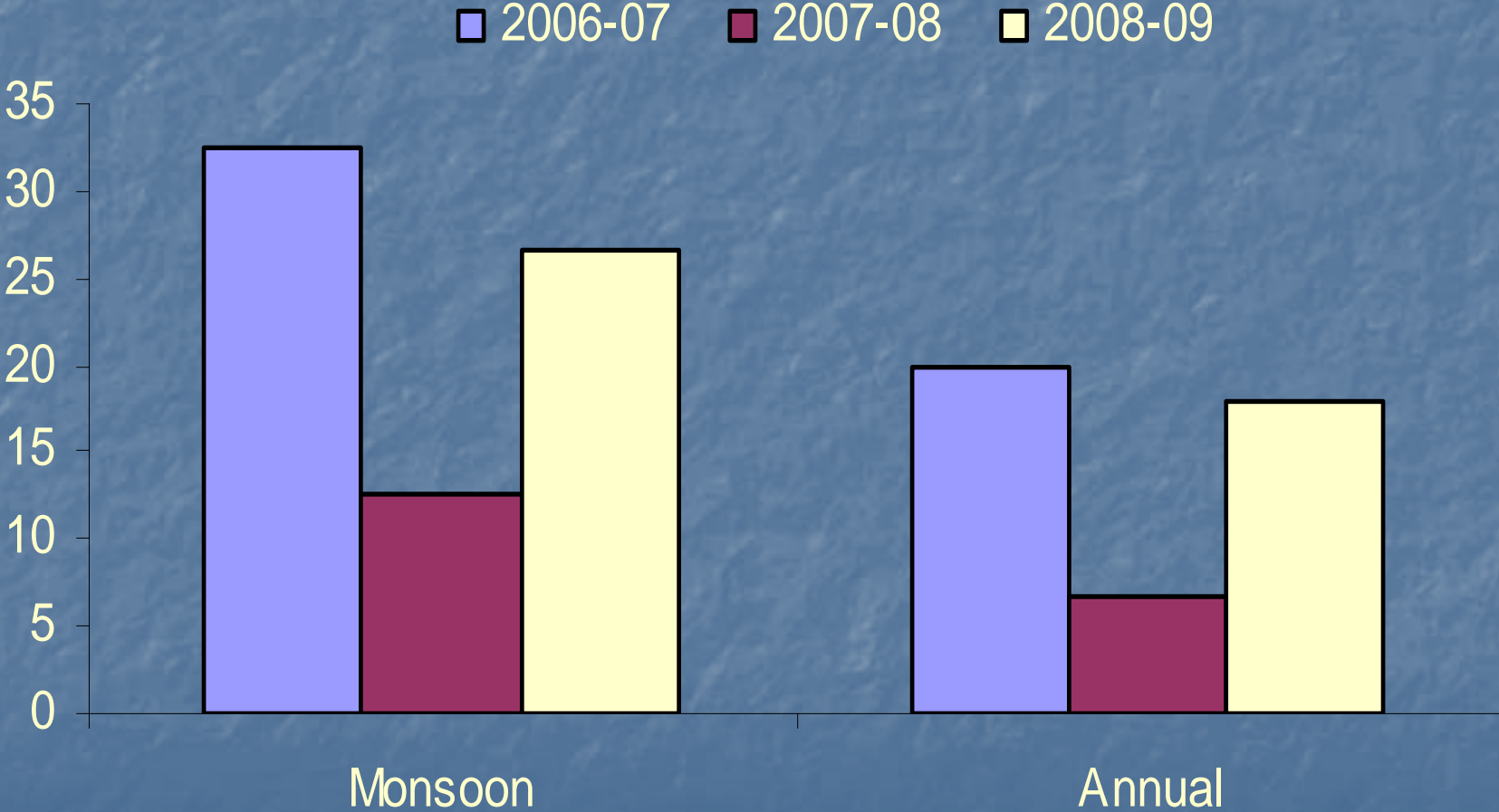
2006-07 2007-08 2008-09



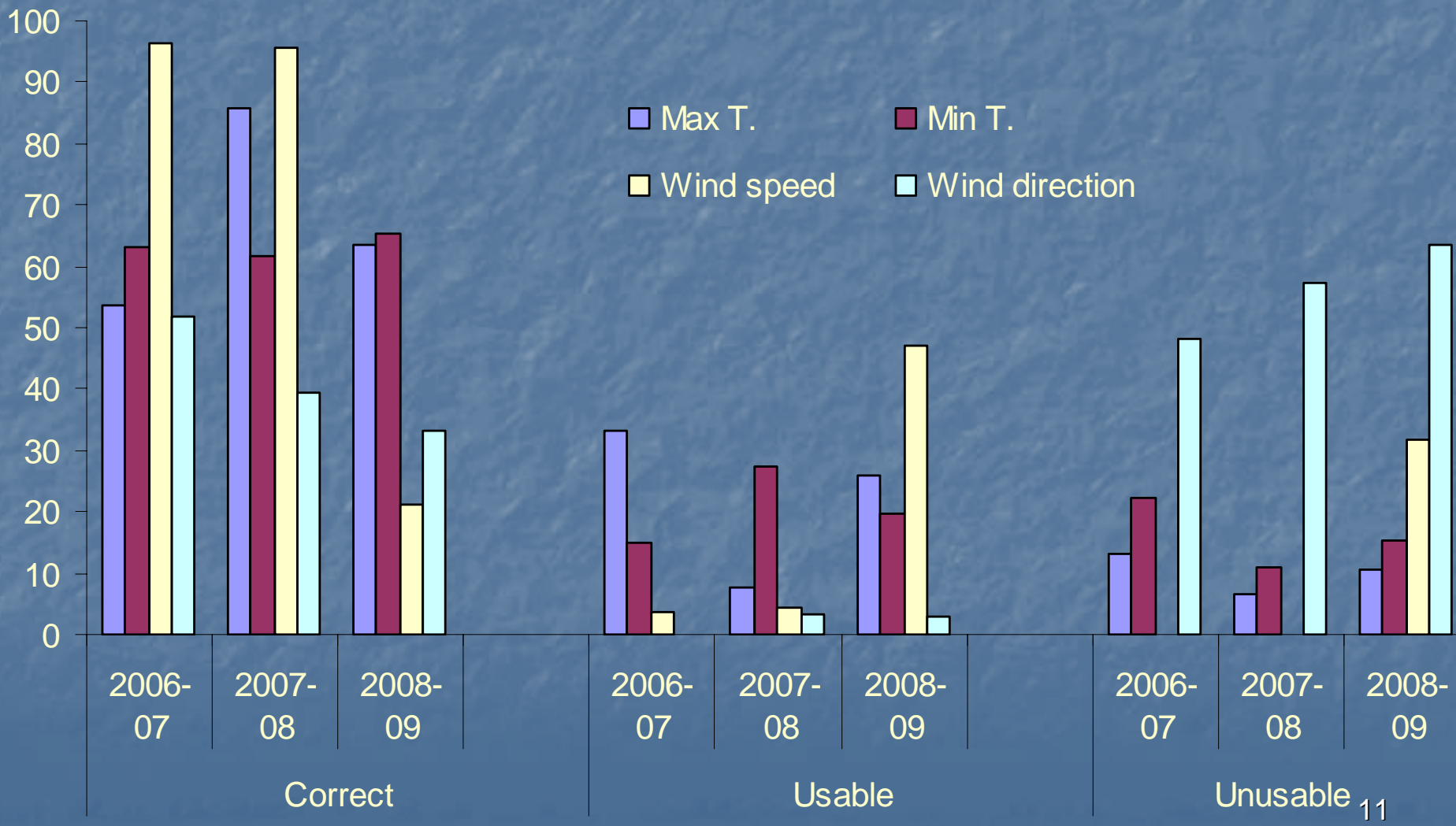
2006-07 2007-08 2008-09



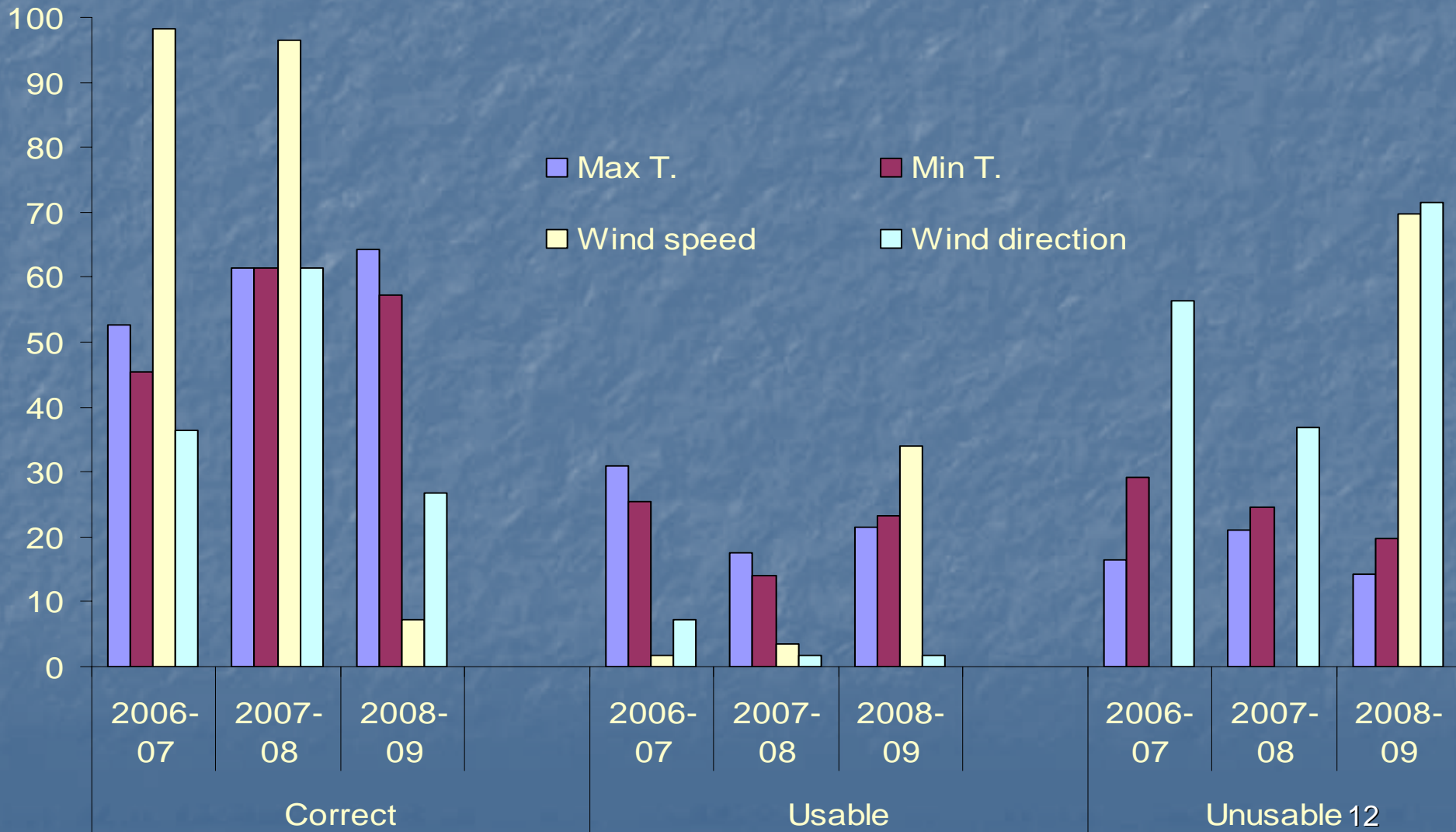
Root Mean Square Error in Rainfall forecast



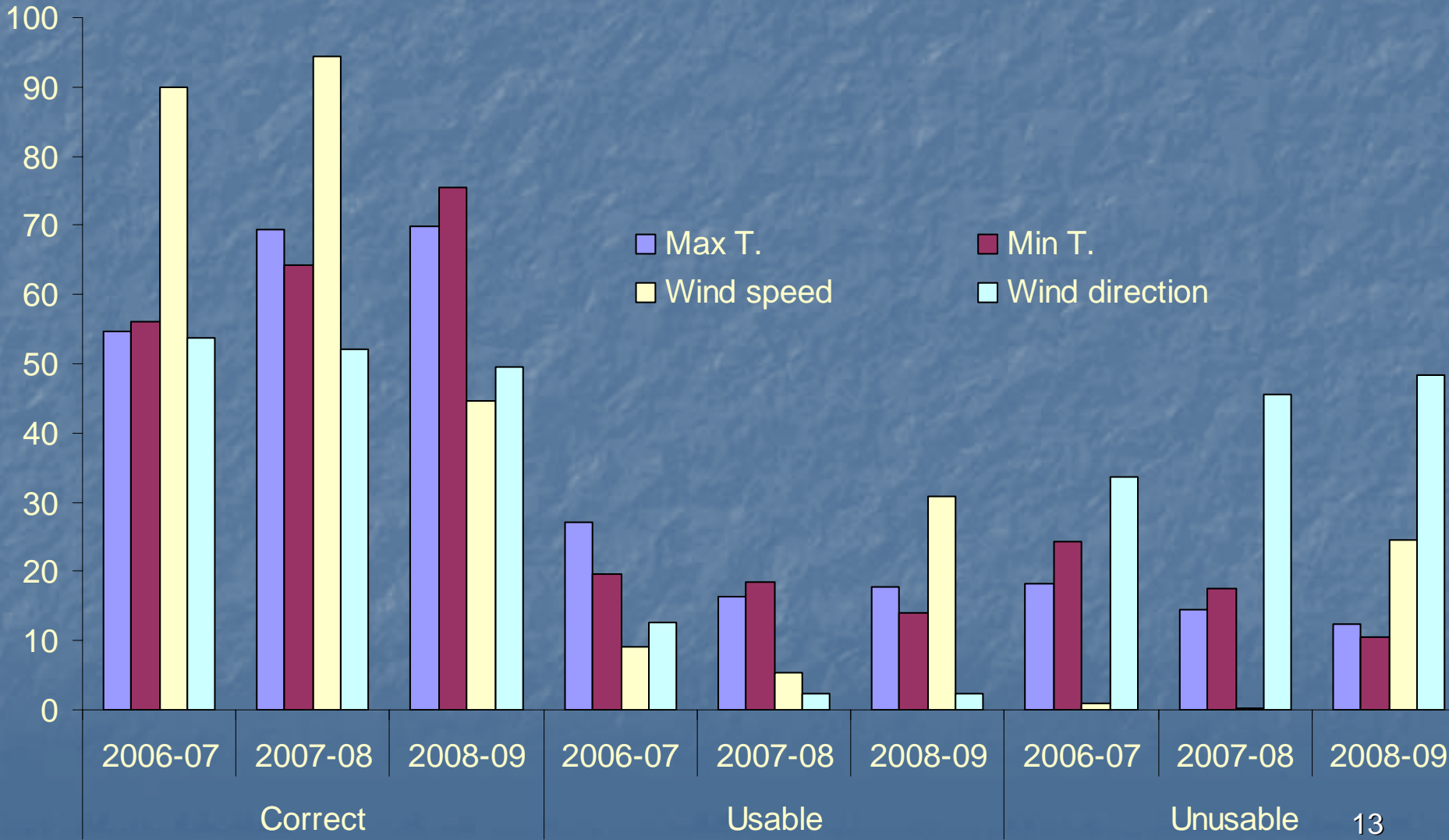
Post monsoon season (Oct-Dec)



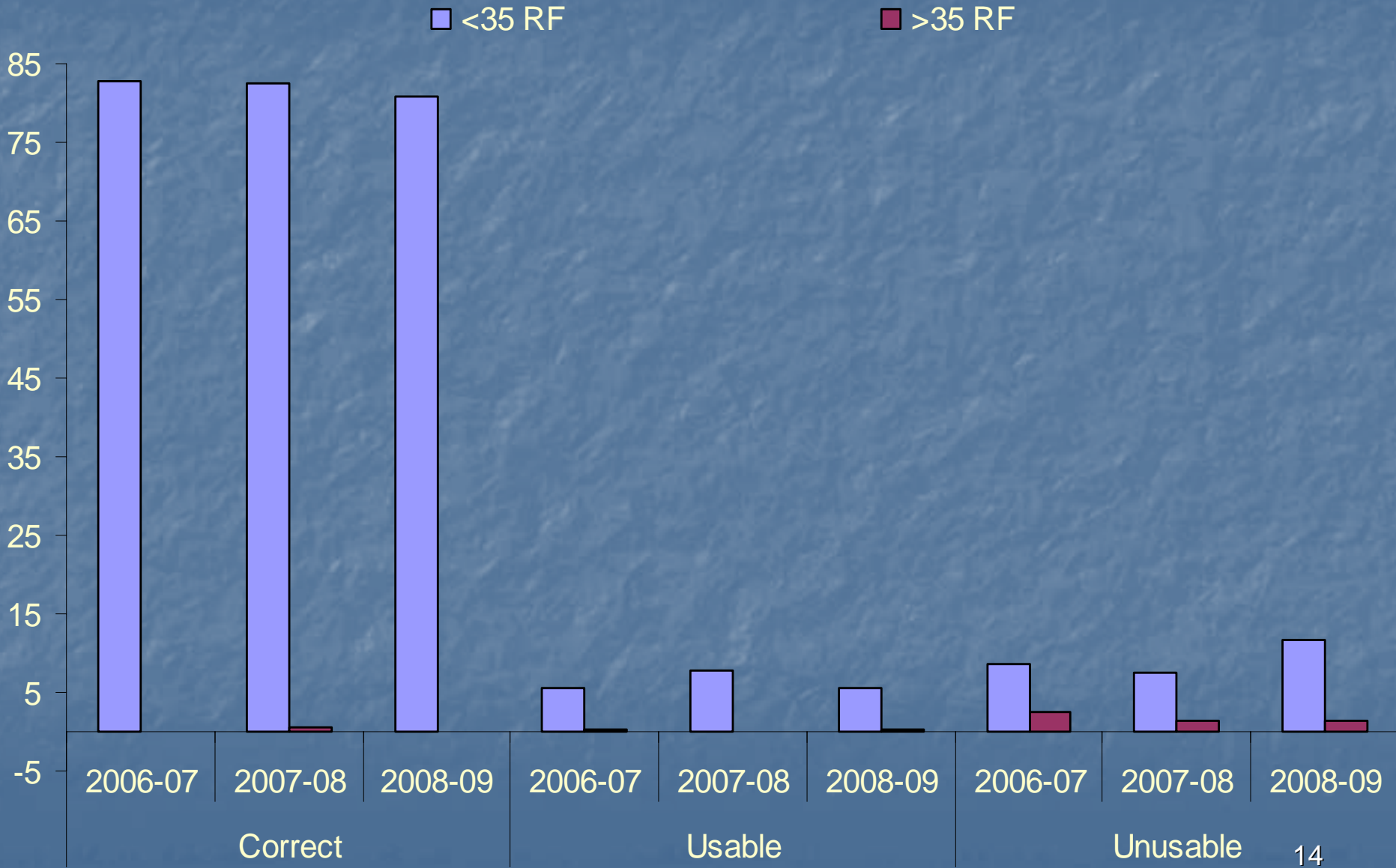
Winter (Jan-Feb) season



Annual (Mar-Feb) forecast performance



Annual (Mar-Feb) rainfall forecast performance



Correlation coefficient between observed and forecasted weather parameters

		Correlation coefficient				
Period		RF	WS	WD	MaxT	MinT
Pre monsoon	2006-07	-	0.61**	0.18	0.24*	-0.09
	2007-08	-	0.66**	0.42**	0.25*	-0.17
	2008-09	-	0.82**	0.14	0.19	0.23
Monsoon	2006-07	0.35**	0.37**	-0.09	0.03	0.16
	2007-08	0.48**	0.41**	0.11	0.08	0.05
	2008-09	0.16	0.38**	0.30**	0.24*	0.19*
Post monsoon	2006-07	-	0.34*	0.25	0.17	0.22
	2007-08	-	0.28*	0.24	0.08	0.19
	2008-09	-	0.54*	0.26*	0.22	0.20
Winter	2006-07	-	0.52**	0.24	0.35*	0.21
	2007-08	-	-0.13	0.39**	0.08	-0.04
	2008-09	-	0.29*	0.01	0.25	0.18
Annual	2006-07	0.42**	0.66**	0.35**	0.16**	0.08
	2007-08	0.60**	0.60**	0.40**	0.11*	0.00
	2008-09	0.26**	0.25**	0.21**	0.23*	0.19**

Conclusion

- Forecasted wind speed was found to be most accurately comparable with observed wind speed in all the season.
- Rainfall forecast performance was very good with low RMSE considering all seasons of year forecast but in monsoon season its performance was fair.
- Minimum temperature was poorly forecasted during pre monsoon and winter seasons and it was average in rest of the seasons and year as a whole.
- Maximum temperature performance was average in all seasons.
- There is improving trend in correct cases of Maximum and minimum temperature forecast during pre-monsoon, monsoon and annual basis for last three years.
- Wind direction performance was average in all the seasons and annual basis with high RMSE.
- Cumulative weekly rainfall forecast performance was satisfactory. There were high numbers of failure in monsoon season.

Thank You