



Department of Hydro-met
Services, Bhutan

SASCOF-8 OUTLOOK AND SEASONAL(JJAS) OUTLOOK OF BHUTAN 2016

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Presentation outline

- Consensus forecast of Eight South Asian Climate Outlook Forum (SASCOF-8)
- Monsoon 2015 forecast verification for Bhutan
- Monsoon 2016 forecast for Bhutan
- Monsoon 2016 forecast by International Climate Prediction Centers
- Conclusion



South Asian Climate Outlook Forum (SASCOF): Background

- In Asia, China has been coordinating a RCOF called 'Forum on Regional Climate Monitoring, Assessment and Prediction for Regional Association II (FOCRA II) since 2005, covering the entire Asian continent.
- Asia is a large continent with large differences in the climatological settings on a sub-regional scale. Therefore WMO's Regional Association II (Asia) recommended sub-regional RCOFs devoted to specific needs of groups of countries having similar climatic characteristics.
- Implementation of South Asian Climate Outlook Forum (SASCOF) in 2010 is a step in that direction with specific focus on the climate information needs of nations affected by the Asian summer monsoon climate.



South Asian Climate Outlook Forum (SASCOF): Background

- The annual Climate of the south Asia is dominated by two monsoons: SW and NE monsoons.
- The summer monsoon plays a crucial role in the entire socio-economic fabric of South Asia, highly influencing all walks of life.
- The summer monsoon (June–September) rainfall accounts for 75–90% of the annual rainfall of the most of the countries of the region.



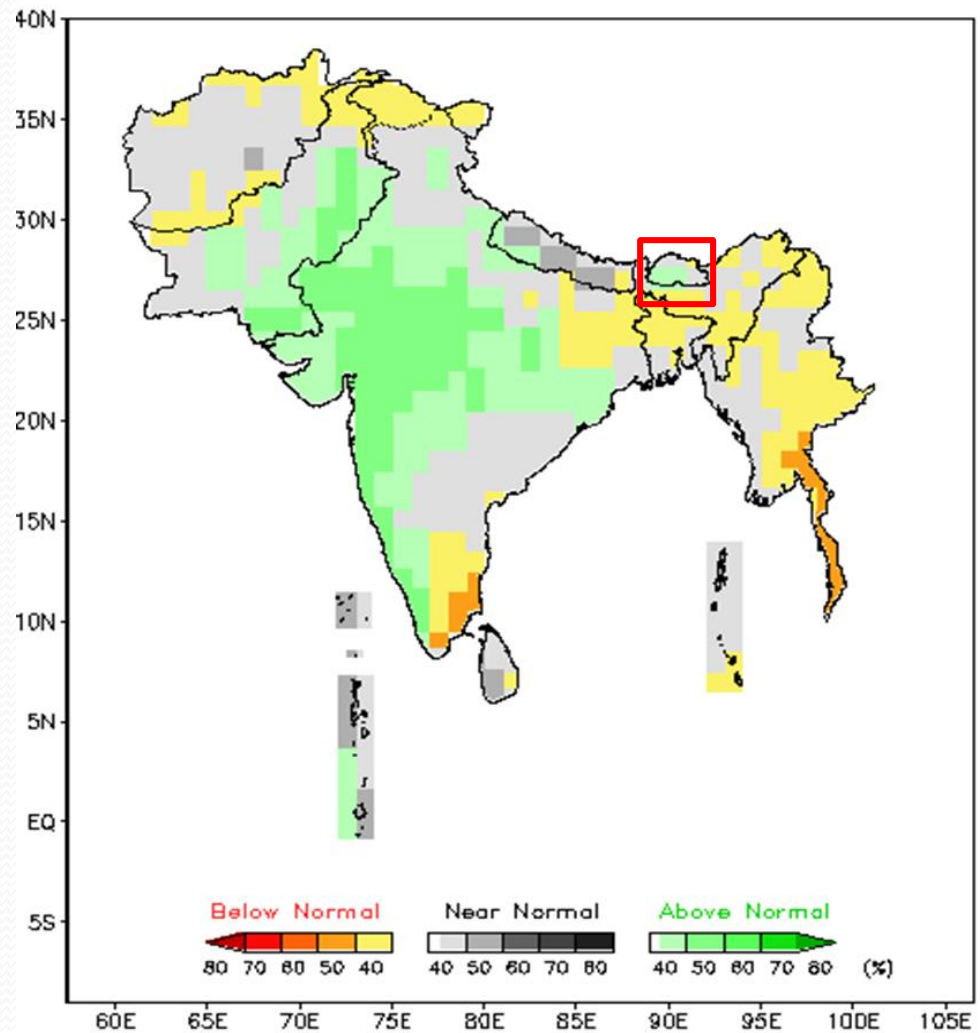
Consensus outlook for the 2016 southwest monsoon rainfall over South Asia

- Developed during Eight South Asian Climate Outlook Forum(SASCOF-8) in Colombo, Sri Lanka, 25-26 April 2016.
- Based on expert assessment of the prevailing global climate conditions and forecasts from different climate models from the participating NMSs and from around the world.



Consensus outlook for the 2016 Southwest monsoon rainfall over South Asia

- Above-normal rainfall is likely over broad areas of central and western parts of South Asia.
- Below-normal rainfall is most likely over eastern parts of the region and the south-eastern part of the peninsula.
- Normal rainfall is likely over the remaining areas.





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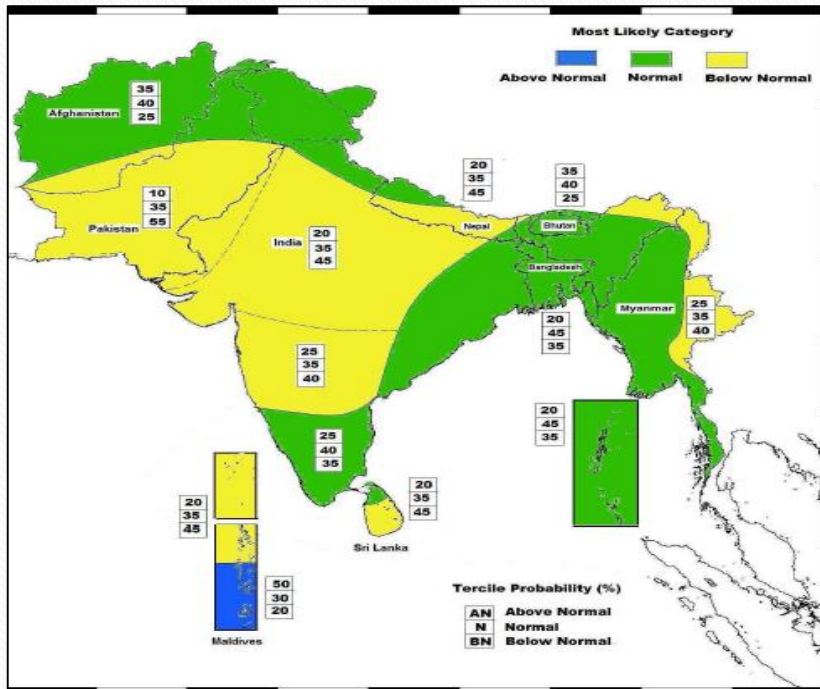
2015 Outlook verification for Southwest Monsoon Season in Bhutan

NCOF-2, Thimphu, 12-13 May 2016

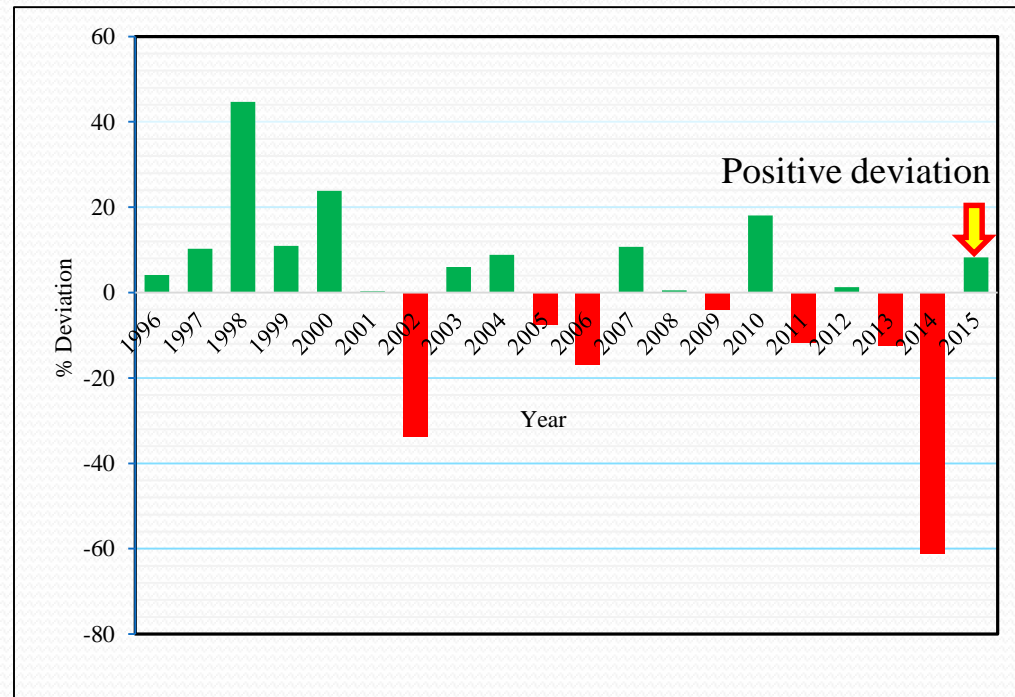


Monsoon 2015 forecast verification

SASCOF 6



Observed RF deviation from mean



- SASCOF-6 – JJAS above normal
- Using CPT for 2015 = JJAS above normal with slight positive deviation predicted
- Observed: slightly above normal



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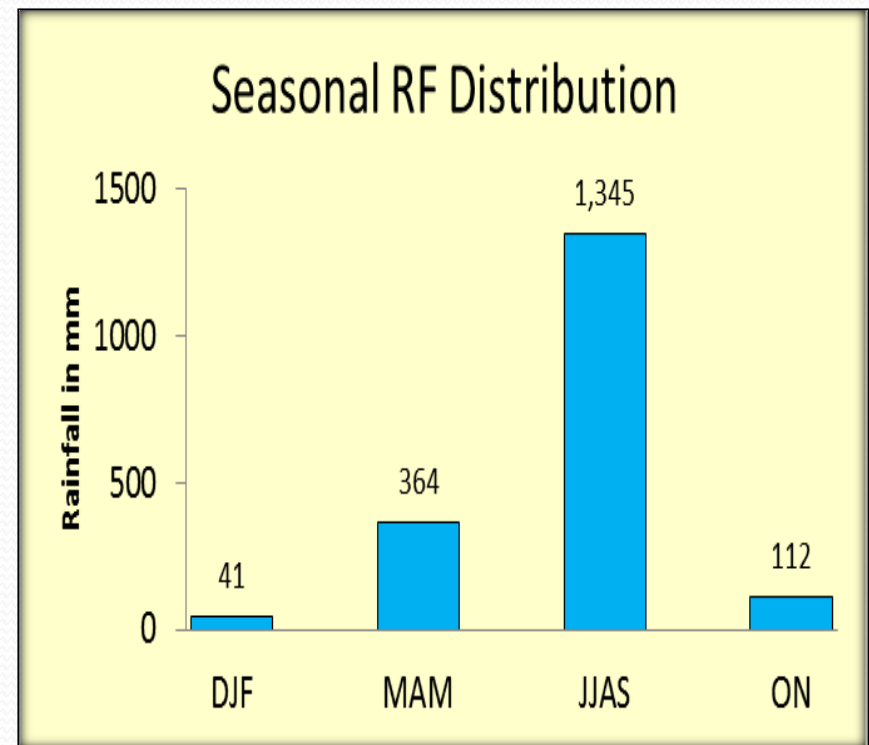
2016 Outlook for Southwest Monsoon Season in Bhutan

NCOF-2, Thimphu, 12-13 May 2016



Seasonal rainfall distribution

- Monsoon contributes the maximum rainfall annually
- Agriculture activities depend on monsoon
- Occurrence of frequent hydro-met hazards/disasters during monsoon season



DJF	MAM	JJAS	ON
2%	20%	72%	6%



Monsoon forecast 2016

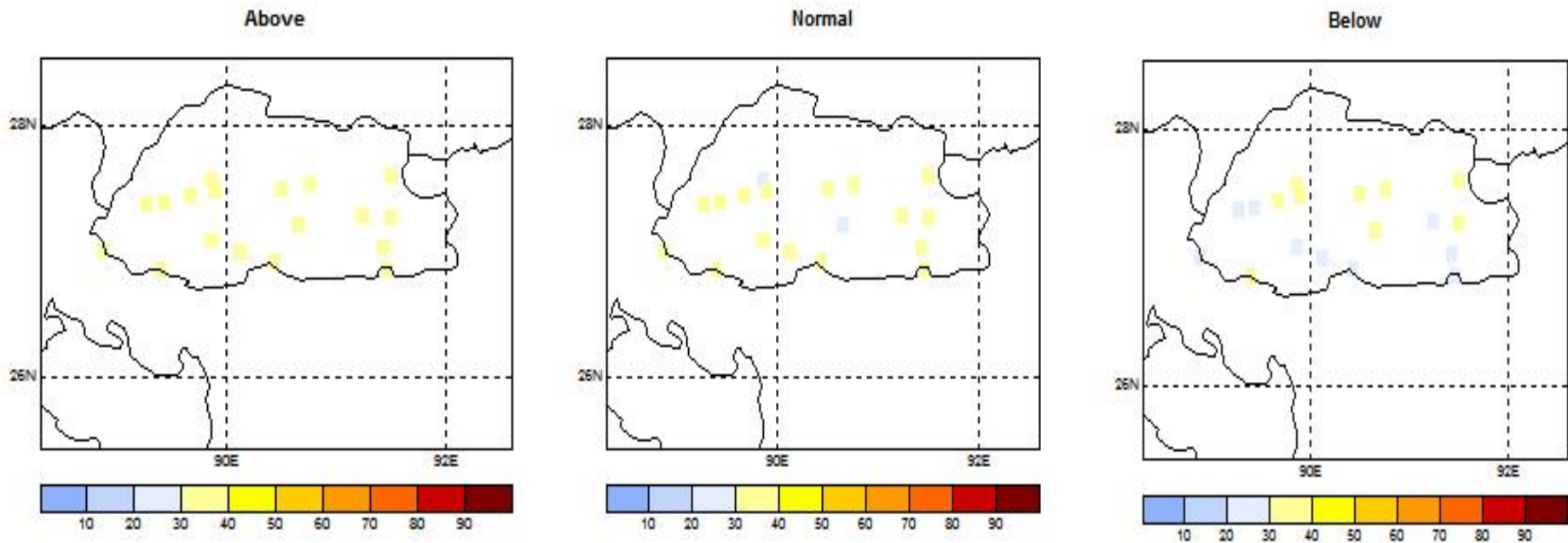
Data set

- Station data (1996-2015) –Forecast station wise
- Station average rainfall(1996-2015) of monsoon (JJAS)
- GPCC
- GCM OUTPUTS



Station wise result

- Goodness=0.181
- All stations indicate above normal RF

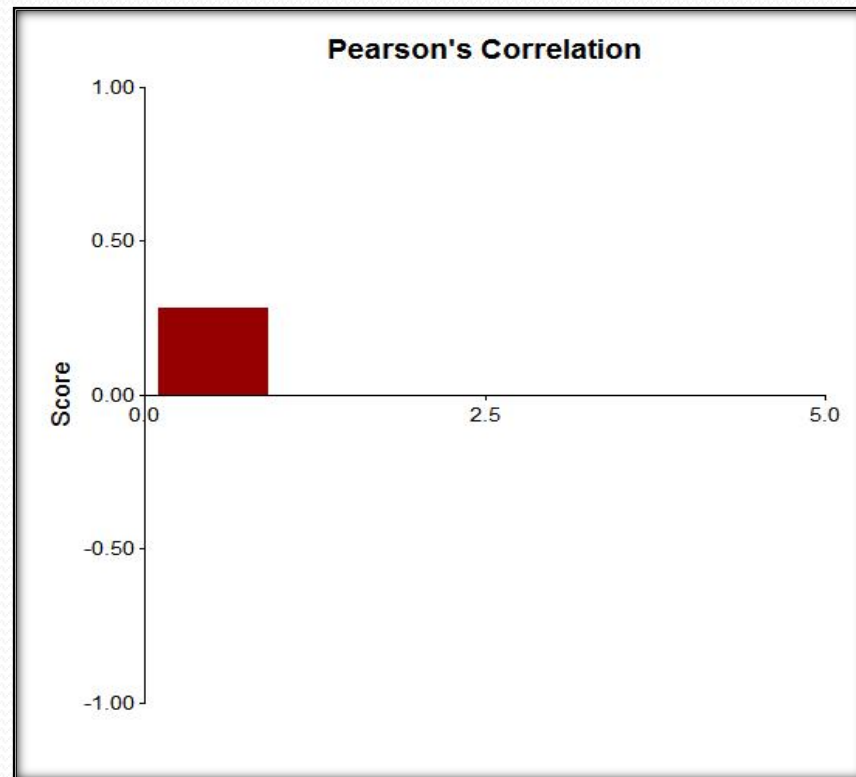
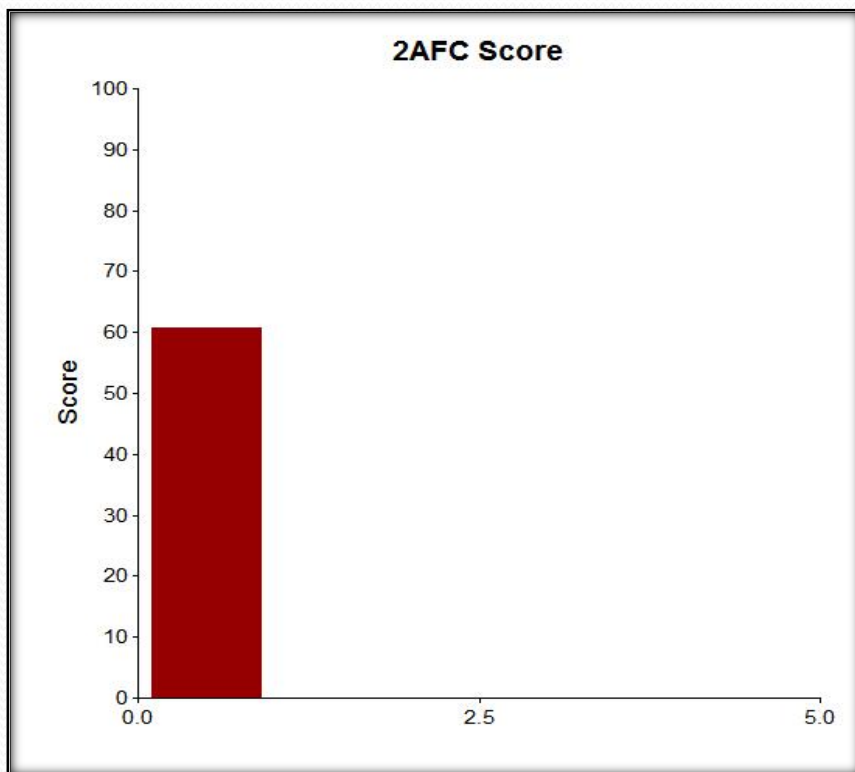




Spatial rainfall analysis (JJAS) result

- Goodness= 0.390

Skill scores

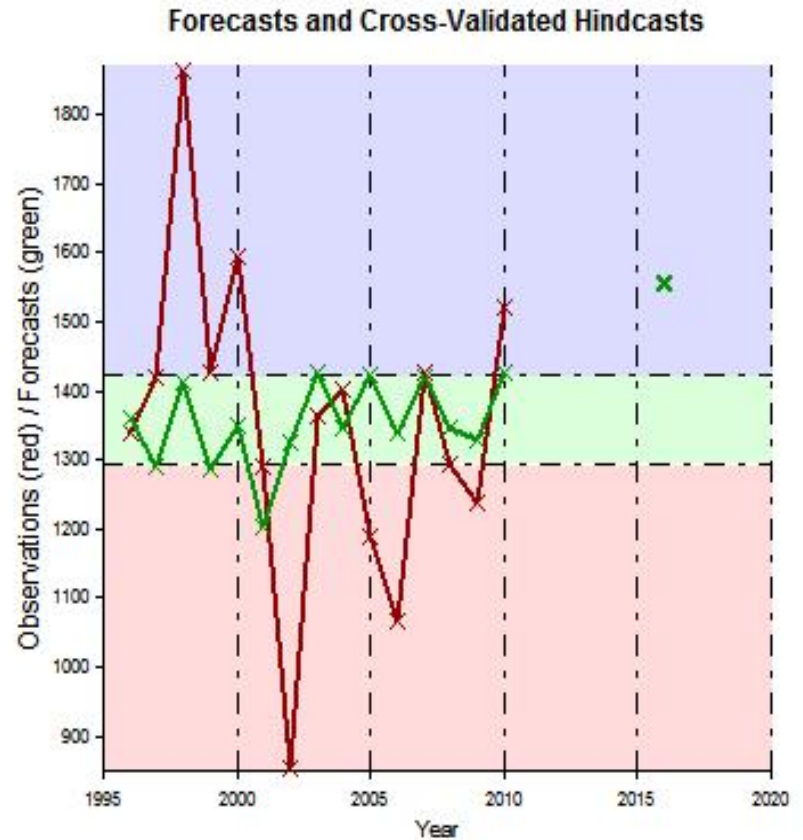




Forecast 2016

Forecasts:									
Probabilities:									
Year	Probabilities			Odds			Relative Odds		
	B	N	A	B	N	A	B	N	A
2016	6	20	74	0.07	0.25	2.81	0.14	0.50	5.62

Forecast ranges:			
Year	Forecast	Lower	Upper
2016	1555.295	1385.125	2012.659



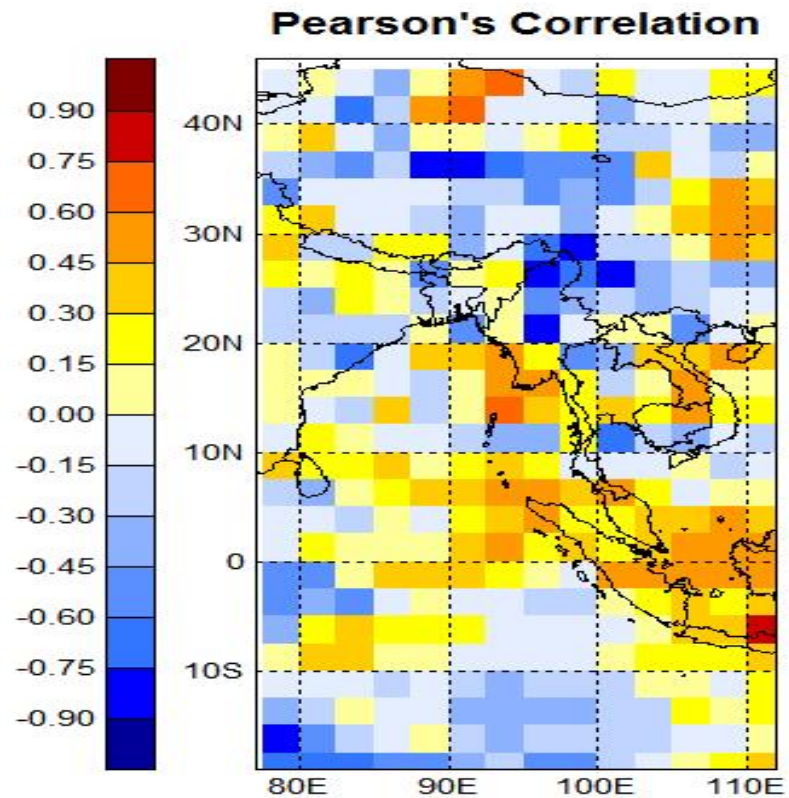
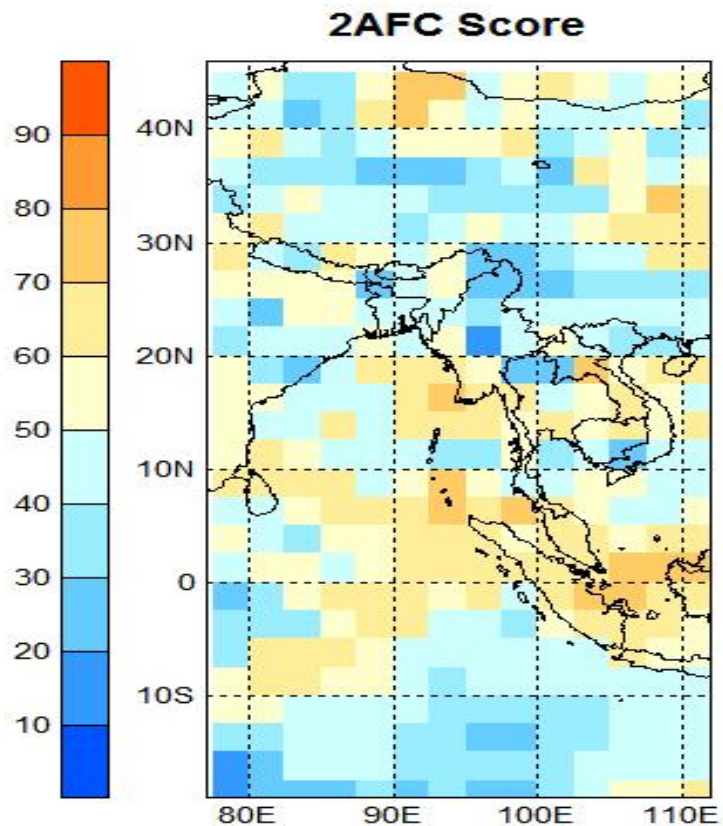
❖ Above normal RF is predicted in the both cases for 2016



GPCC data for JJAS

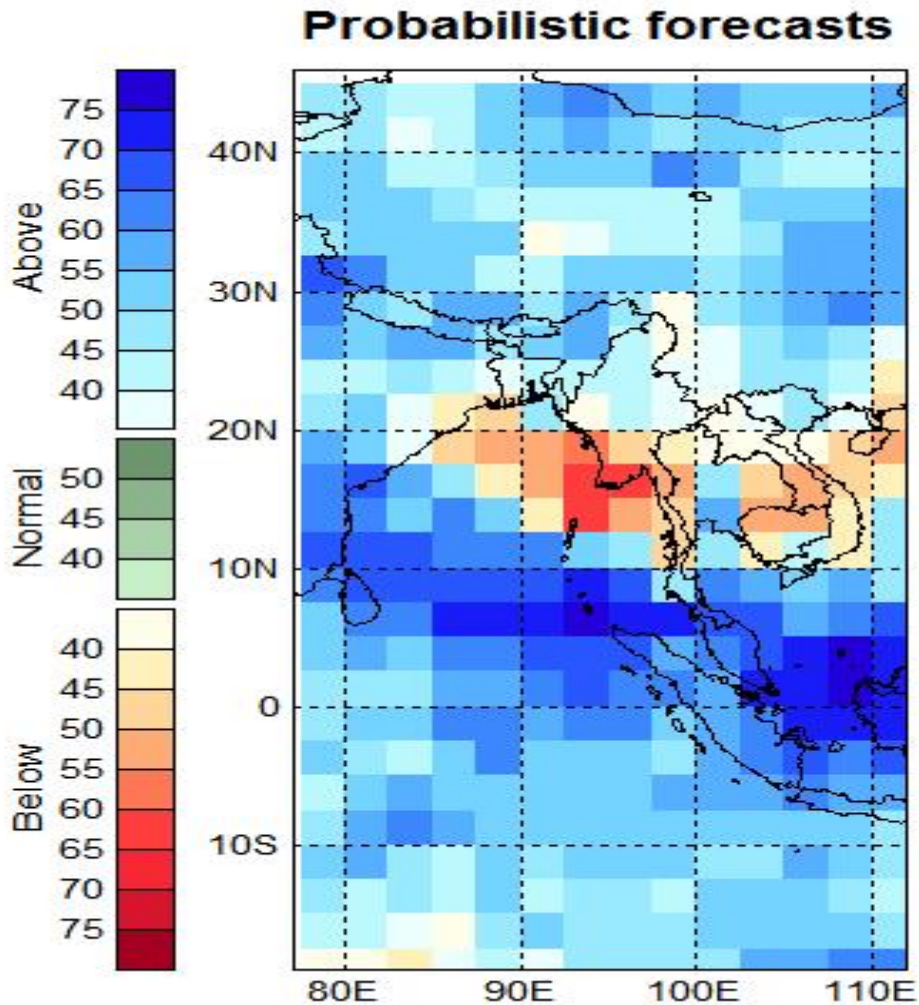
Goodness= 0.152

Skill Scores





Forecast for 2016



Forecasts:									
Probabilities:									
Year	Probabilities			Odds			Relative Odds		
	B	N	A	B	N	A	B	N	A
2016	21	24	55	0.26	0.32	1.23	0.52	0.64	2.46
Forecast ranges:									
Year	Forecast	Lower	Upper						
2016	1.004	0.684	1.573						

- Use of GPCC data also predicted above normal RF



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2016 Rainfall predictions by International Climate Prediction Centers



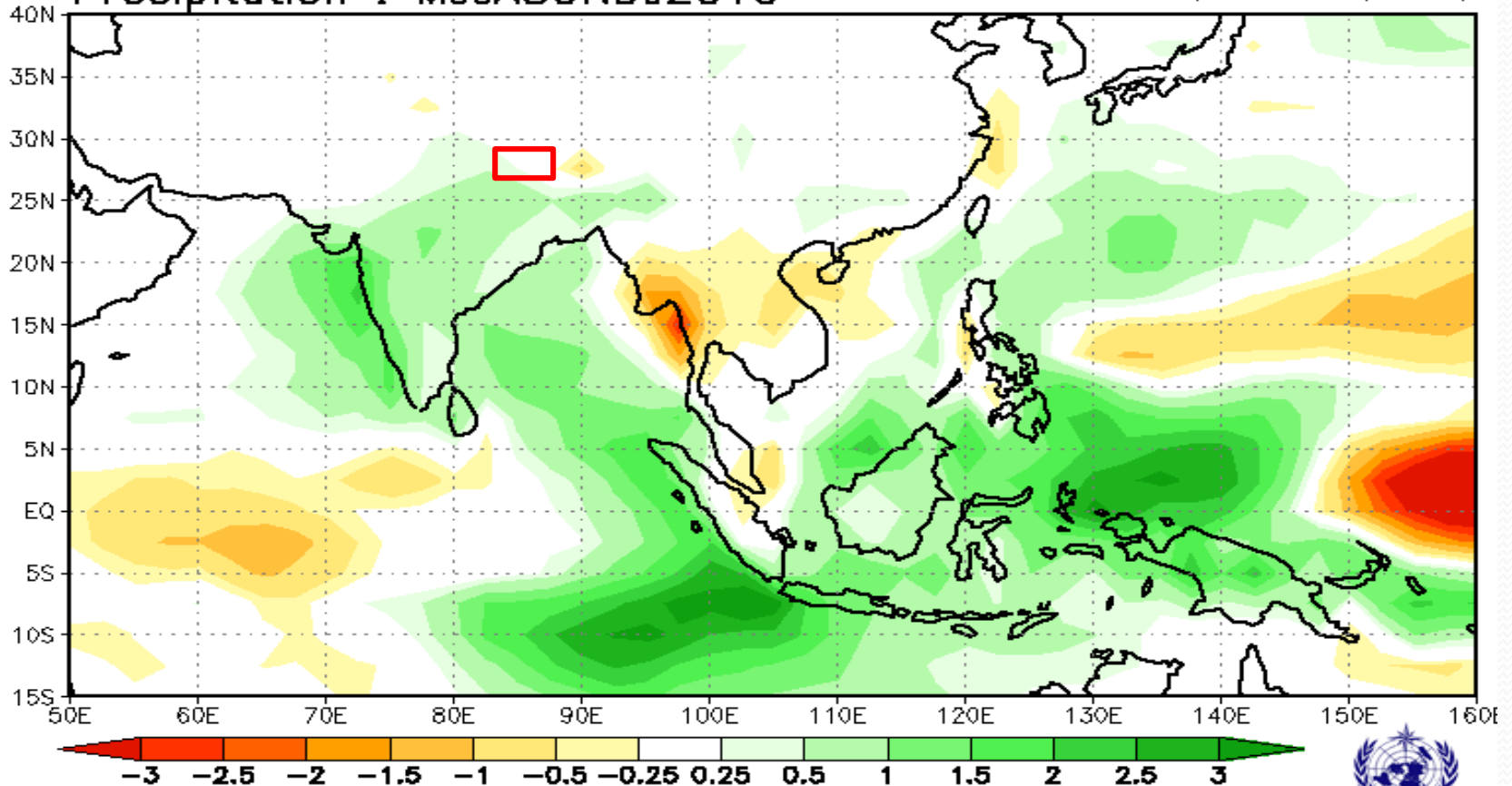
GPC_Washington

Simple Composite Map

GPC_Washington

Precipitation : MJJASONDJ2016

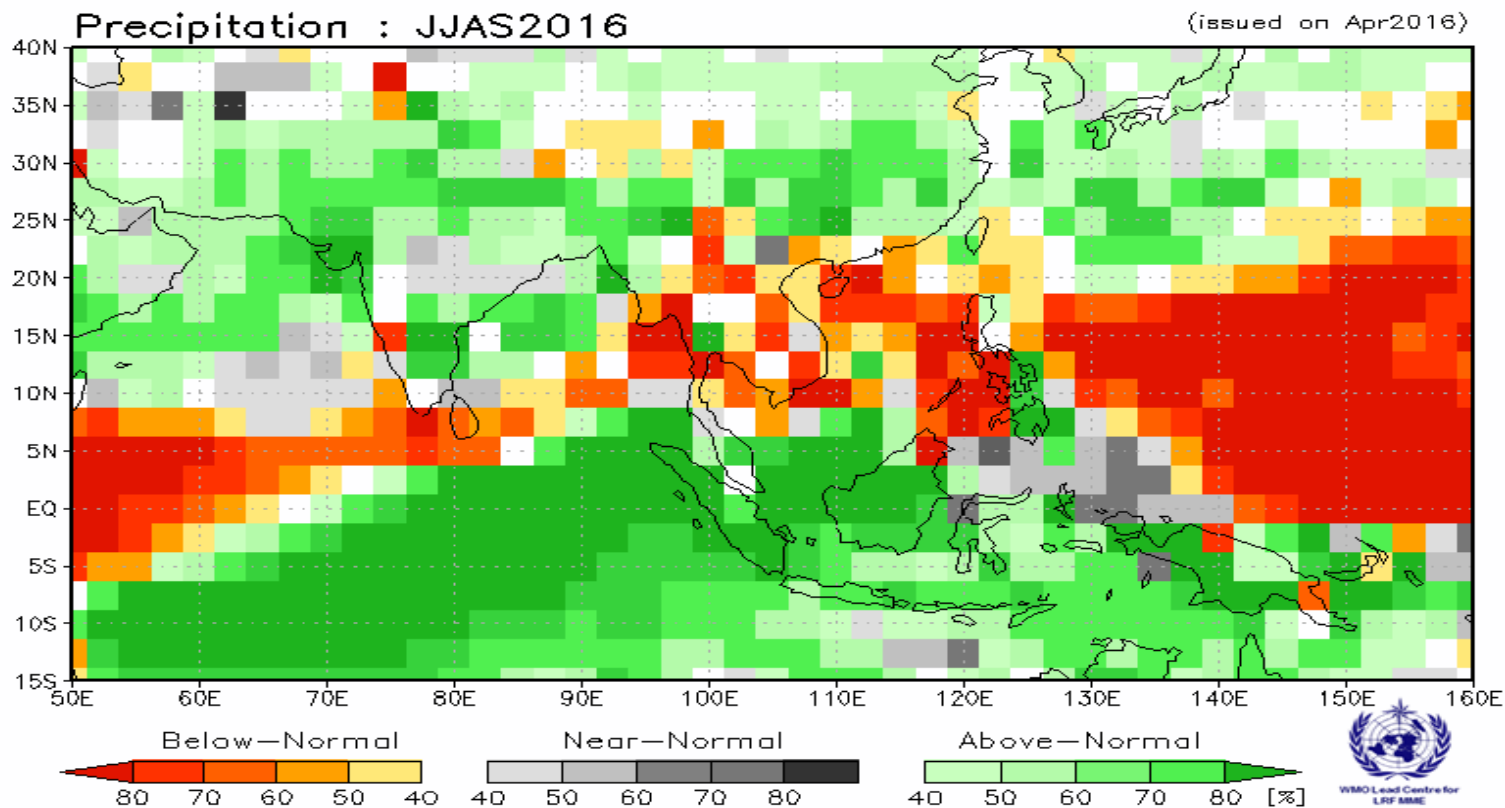
(issued on Apr2016)





Probabilistic Multi-model Ensemble Forecast

Probabilistic Multi-Model Ensemble Forecast
GPC_seoul



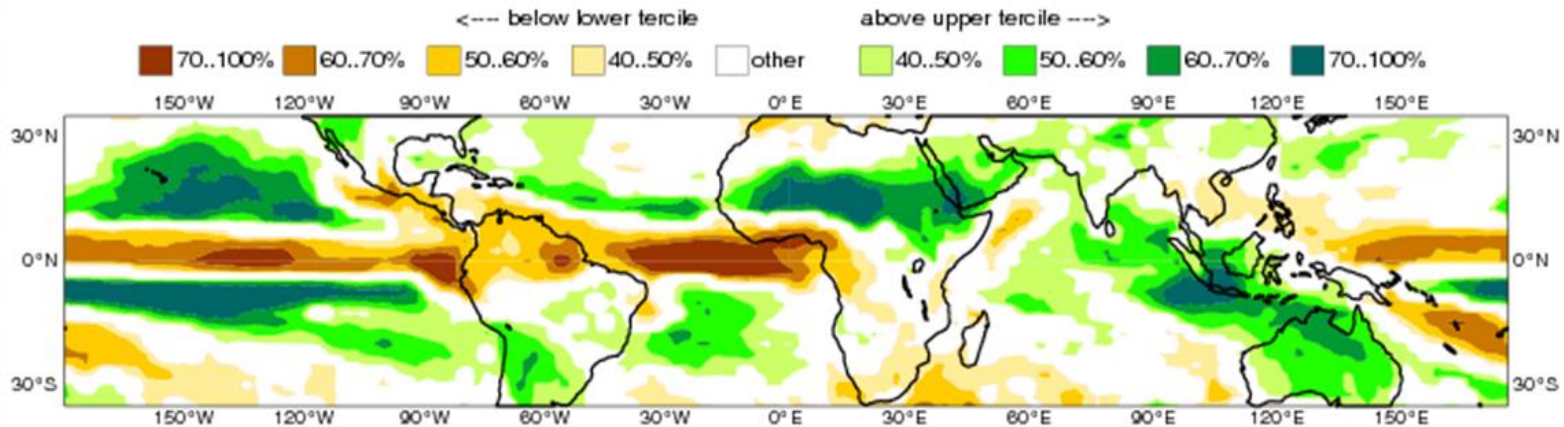
Source: GPC Seoul



Probabilistic forecasts of precipitation EuroSIP

EUROSIP multi-model seasonal forecast
Prob(most likely category of precipitation)
Forecast start reference is 01/03/16
Unweighted mean

ECMWF/Meteo-France/NCEP
JJA 2016



3 Models:

ECMWF

Meteo-France
NCEP CFSV2

	AFG	BAN	BHU	MYN	NEP	PAK	SRI	MAL	India
ECMWF									
Meteo-France	N	N	N	BN	N(+)	N(+)	N	N	N(+)
NCEP CFSV2									



Conclusion

- Normal to above-normal rainfall is predicted for the 2016 southwest monsoon season over most of South Asia
- Over Bhutan both station wise and spatial analysis indicated above normal rainfall
- Most International Climate Prediction centers indicated normal to above- normal rainfall
- *Forecast for Bhutan Monsoon 2016- likely to be positive side of the normal.*



Thank you

