



Regional Climate Outlook Forums

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NIWA [www.niwa.co.nz/ncc/]

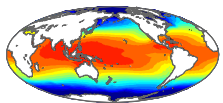
Theme Leader, RA-V WG-CLS

**WORLD METEOROLOGICAL ORGANIZATION
REGIONAL SEMINAR ON CLIMATE SERVICES
IN REGIONAL ASSOCIATION V (SOUTH-WEST PACIFIC)
*Honiara, Solomon Islands, 1-4 November 2011***



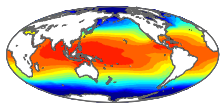
Introduction: RCOFs

- Regional Climate Outlook Forum concept initiated in 1996 (Zimbabwe)
 - Response to the 1997/8 El Niño event added impetus
- Now held routinely in several regions
 - RCOFs now a key mechanism for seasonal consensus climate forecasts
 - Dissemination to policymakers/users
 - Brings together climate scientists and users
 - To formulate climate guidance, and potential impacts and mitigation strategies
 - User involvement encouraged to aid dissemination and feedback



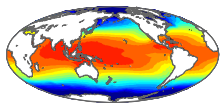
Development: PreCOF process

- Nationally -
 - Identify homogeneous regions
 - Calculate rainfall (etc) index for each region
 - Produce forecast for each region and calculate skill estimates
- Consensus -
 - Add all national (NMHS) forecasts to a map
 - Synthesise using regional and GCM predictions, plus neighbouring forecasts
 - Re-draw homogeneous regions if necessary
 - Combine regions with similar predictions



COF Consensus Process

- Major inconsistencies resolved by –
 - Democratic forecast combination rather than simple averaging
 - Consideration of model viability as opposed to skill (sometimes predictors have weak theoretical basis)
 - The large-scale structure of the forecast
 - Redefinition of regions, perhaps with examination of predictions for individual stations
 - Further analyses



COF process schematic



Background

- Average climate
- ENSO Climatology

Observations

- ENSO State
- Climate patterns

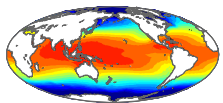
Assessment
(COF meeting)

- ENSO forecasts
- Global forecasts
- Regional forecasts

Forecasts

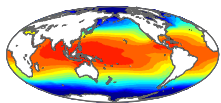
Regional, seasonal outlook

Products



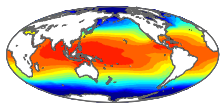
Case study: ICU

- Not a COF as such, but some elements
- Operating eleven years (since late 2000)
- All of southwest Pacific
- Consensus discussion
 - Pacific Islands Met Services
 - Bureau of Meteorology Australia
 - NIWA New Zealand
 - NOAA (NWS & CPC) USA
 - IRI USA
- Little direct user involvement, but informs NMHS interactions



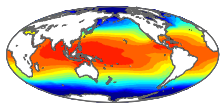
Consensus: Inputs

- Dynamical forecasts from GCM/RCM systems
 - Tier 1, coupled OAGCM
 - Tier 2, AGCM driven by SST (predicted or persisted)
 - Ensemble, MME
- Statistical forecasts
 - Usually driven by SST
- Conditional climatology
 - State of ENSO, knowledge of impacts
- Observed state
- Climatology



ICU outlook process

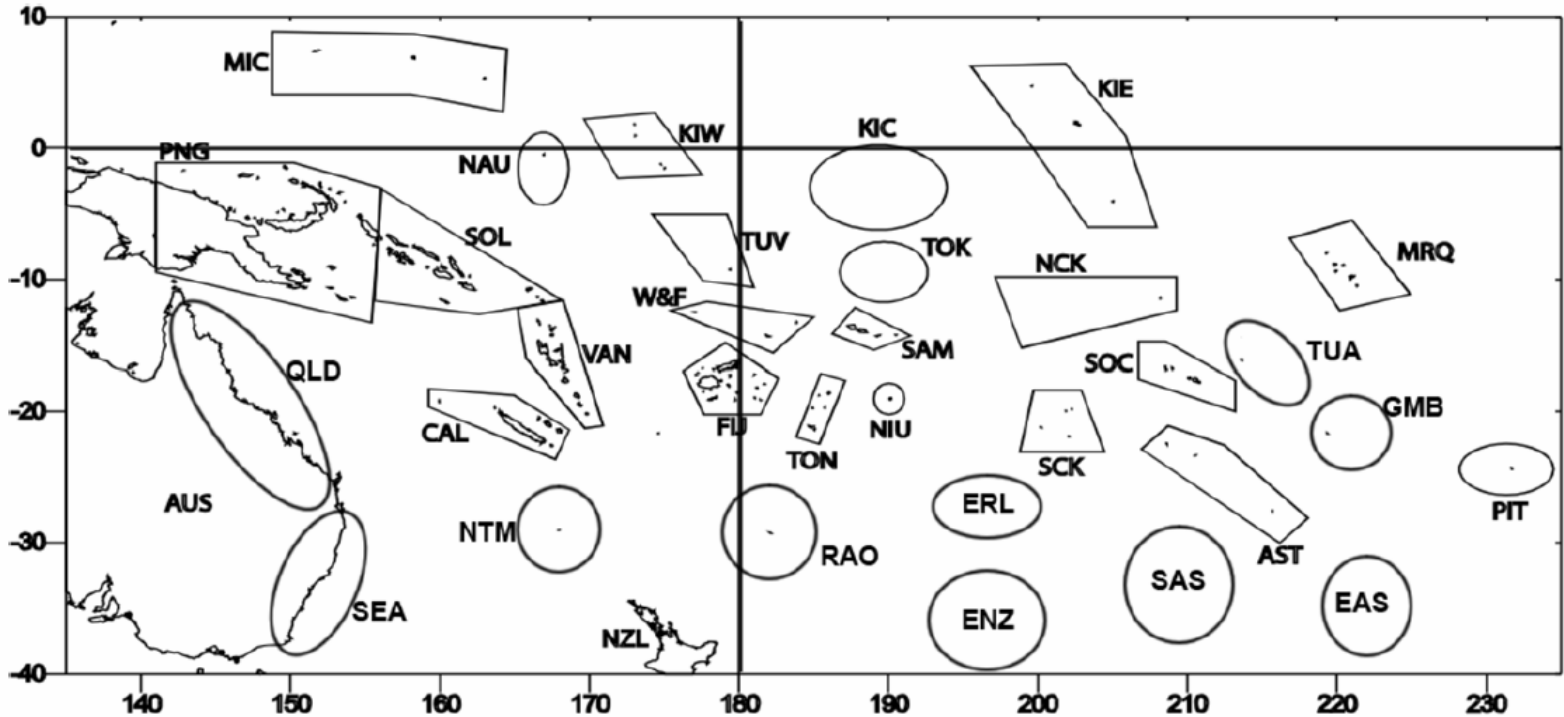
- Semi-objective
 - Several models, mostly dynamical
 - Strong emphasis on ENSO, SPCZ
 - Averaging (equal weighting) applied
 - Automated process developed (METPI)
 - Discussion and NMHS modifications
 - Alignment with SCOPIIC (BoM)/PICOF
- Validates well
 - 70% hit rate typical, peak over 90%



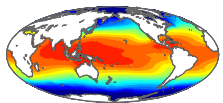


ICU: Regions & States

Pacific Island locator



- | | | | |
|---|---|---|---|
| <ul style="list-style-type: none"> • AST= Austral Island • AUS= Australia • CAL= New Caledonia • EAS= East of Austral Islands • ERL= East of Raoul • ENZ= East of New Zealand • FIJ= Fiji • GMB= Gambier • KIW= Kiribati (Western) | <ul style="list-style-type: none"> • KIC= Kiribati (Central) • KIE= Kiribati (Eastern) • MIC= Federated States of Micronesia • MRQ= Marquesas • NAU= Nauru • NCK= Northern Cook Islands • NIU= NIUE • NTM= North Tasman • NZL= New Zealand | <ul style="list-style-type: none"> • PNG= Papua New Guinea • PIT= Pitcairn Island • QLD= Queensland • VAN= Vanuatu • RAO= Raoul • SAM= Samoa • SAS= South of Austral Islands • TON= Tonga | <ul style="list-style-type: none"> • TOK= Tokelau • TUA= Tuamotu • TUV= Tuvalu • SCK= Southern Cook Islands • SEA= South East Australia • SOC= Society Islands • SOL= Solomon Islands • W&F= Wallis & Futuna (& Rotuma) |
|---|---|---|---|



ECMWF: Tercile probabilities - precipitation

ECMWF Seasonal Forecast

Prob(most likely category of precipitation)

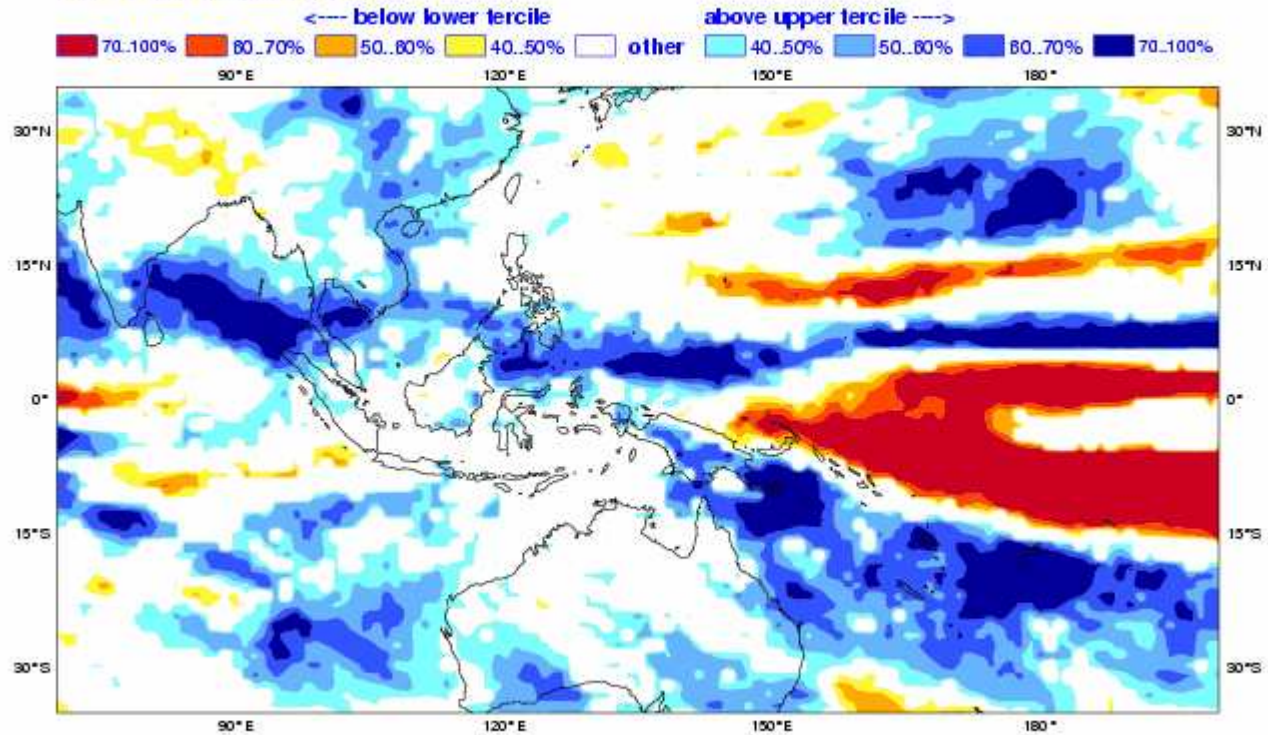
Forecast start reference is 01/10/11

Ensemble size = 41, climate size = 275

System 3

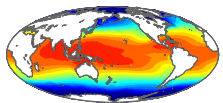
NDJ 2011/12

No significance test applied



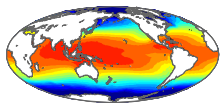
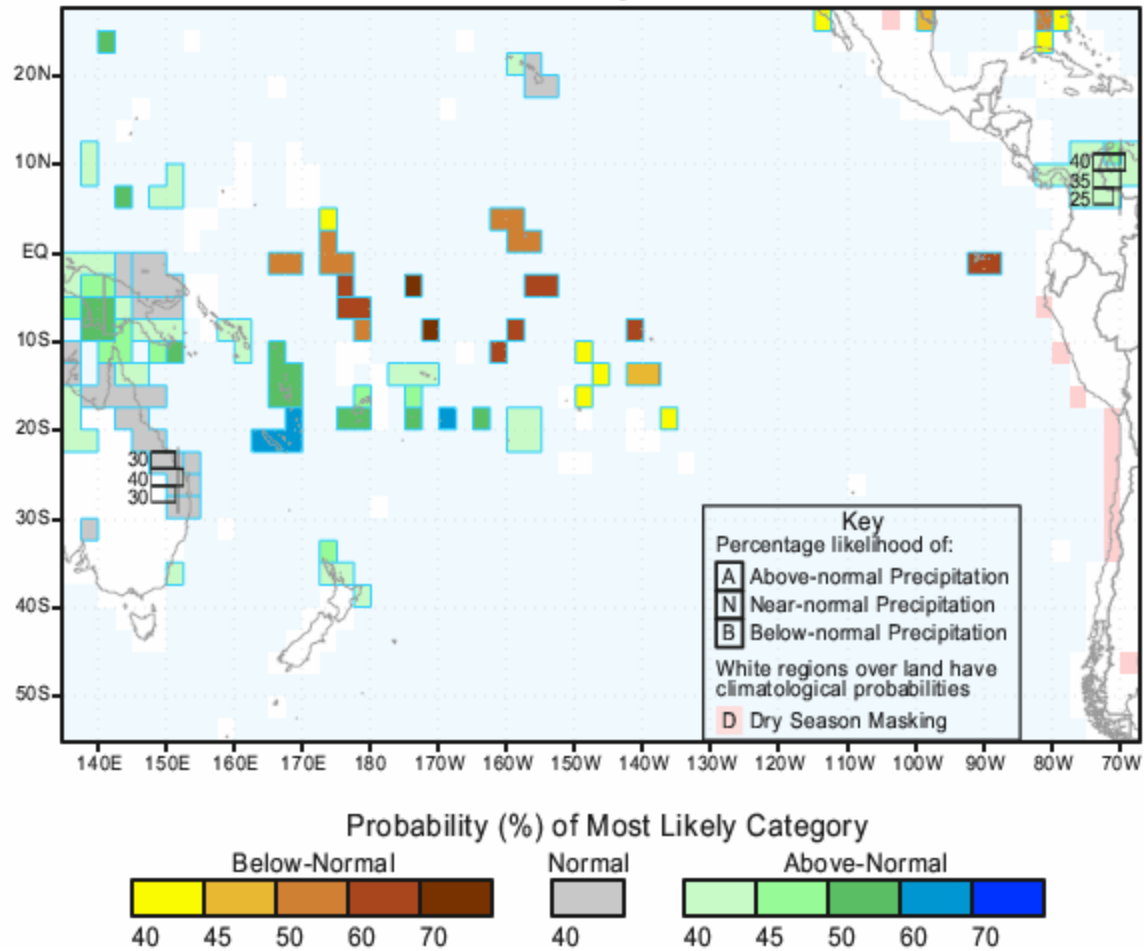
Forecast issue date: 15/10/2011

ECMWF



IRI Net Assessment

IRI Multi-Model Probability Forecast for Precipitation
for November-December-January 2012, Issued October 2011



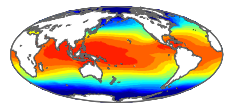
http://iri.columbia.edu/climate/forecast//net_asmt/



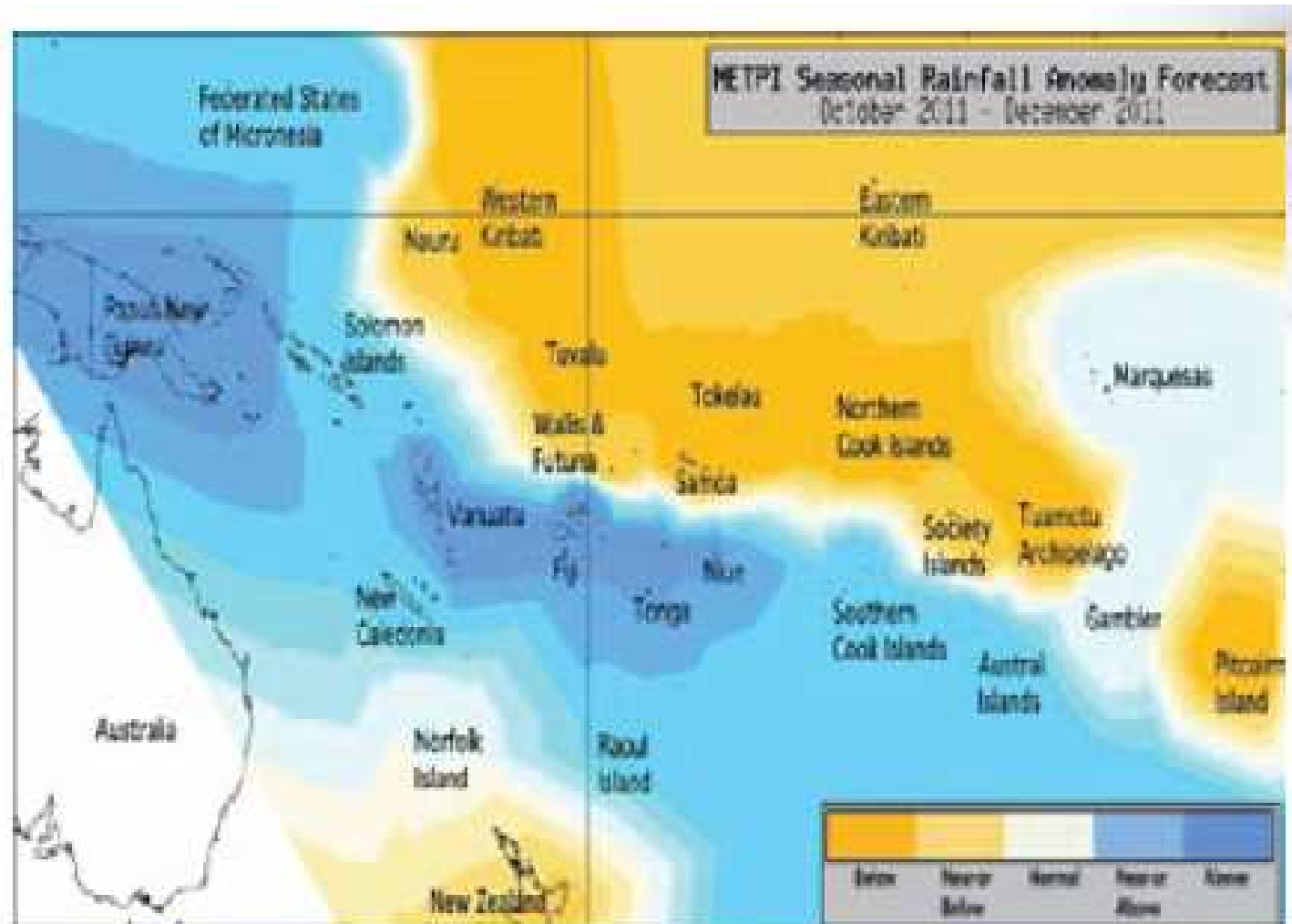
ICU: Rainfall guidance

Model	UKMO			NASA/SIPP			ECMWF			IRI			NCEP/CMF			NCEP/CAF			NCEP/CFS			APEC			AVERAGE			STD						
	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	L	M	U	AVG
Island																																		
Austral Islands	33	33	33	20	40	40	20	30	50	45	35	20	30	40	30	30	40	30	40	35	25	30	40	30	31	37	32	8.7	3.9	9.2	7.3			
Cook Islands (Northern)	10	30	60	30	40	30	20	30	50	20	35	45	20	40	40	30	40	30	25	35	40	25	35	40	23	36	42	6.5	4.2	10.0	6.9			
Cook Islands (Southern)	33	33	33	30	40	30	30	40	30	40	35	25	45	35	20	40	40	20	45	35	20	40	35	25	38	37	25	6.1	2.9	5.2	4.7			
Fiji	60	30	10	60	30	10	60	30	10	40	35	25	60	30	10	45	35	20	60	30	10	50	30	20	54	31	14	8.2	2.3	6.2	5.6			
Kiribati (Eastern)	10	30	60	10	30	60	10	30	60	10	30	60	20	30	50	20	35	45	10	30	60	20	30	50	14	31	56	5.2	1.8	6.2	4.4			
Kiribati (Western)	10	30	60	10	30	60	10	30	60	30	40	30	20	30	50	20	30	50	25	35	40	10	30	60	17	32	51	8.0	3.7	11.3	7.7			
Marquesas	45	35	20	45	35	20	60	30	10	45	35	25	40	35	25	25	35	40	40	35	25	45	35	20	43	34	23	9.6	1.8	8.4	6.6			
New Caledonia	60	30	10	40	35	25	50	30	20	40	35	25	40	35	25	20	40	40	40	35	25	30	40	30	40	35	25	12.0	3.8	8.5	8.1			
Niue	60	30	10	40	35	25	60	30	10	50	30	20	50	30	20	25	35	40	60	30	10	50	30	20	49	31	19	12.1	2.3	10.2	8.2			
Papua New Guinea	10	30	60	30	40	30	20	35	45	33	33	33	40	40	20	20	40	40	40	40	20	40	40	20	29	37	34	11.4	4.0	14.3	9.9			
Pitcairn Island	33	33	33	30	40	30	45	35	20	33	33	33				30	40	30	25	35	40	30	40	30	32	37	31	6.2	3.3	6.0	5.2			
Samoa	33	33	33	20	40	40	25	35	40	20	35	45	45	35	20	25	35	40	45	35	20	30	40	30	30	36	34	10.1	2.6	9.5	7.4			
Society Islands	10	30	60	30	40	30	20	30	50	25	35	40	20	40	40	20	35	45	20	35	40	25	40	35	21	36	43	5.8	4.2	9.3	6.4			
Solomon Islands	20	40	40	30	40	30	30	40	30	40	40	20	50	30	20	20	40	40	40	40	20	45	35	20	34	38	28	11.2	3.7	8.9	7.9			
Tokelau	10	30	60	10	30	60	20	30	50	25	35	40	25	35	40	25	35	40	25	35	40	30	40	30	21	34	45	7.4	3.5	10.7	7.2			
Tonga	60	30	10	50	30	20	60	30	10	45	35	20	50	30	20	40	40	20	60	30	10	45	35	20	51	33	16	7.9	3.8	5.2	5.6			
Tuamotu Islands	10	30	60	30	40	30	20	40	40	20	35	45	30	40	30	30	40	30	20	35	45	25	40	35	23	38	39	7.0	3.8	10.5	7.1			
Tuvalu	10	30	60	25	35	40	10	30	60	25	35	40	20	35	45	25	35	40	20	35	45	20	40	40	19	34	46	6.2	3.2	8.8	6.1			
Vanuatu	60	30	10	60	30	10	60	30	10	45	35	20	60	30	10	30	40	30	60	30	10	50	30	20	53	32	15	11.0	3.7	7.6	7.4			
Wallis & Futuna	45	30	25	20	40	40	50	30	20	40	35	25	40	35	25	30	40	30	45	35	20	30	40	30	38	36	27	10.0	4.2	6.5	6.9			

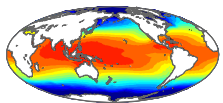
Rainfall outlooks are estimated from an average of dynamical models and statistical analogue models shown in the table above. The rainfall outlook for each island group is calculated as an average of each tercile probability from each model shown, which is then rounded up or down to the nearest whole or half decile. For example 28.3 is rounded up to 30, and 26.7 would be rounded down to 25. There are exceptions made to this rounding scheme occasionally, so that the totals don't exceed 100%. The confidence level for each island group is derived from the average standard deviation of the lower, middle, and upper terciles calculated from available model data. The scale converting standard deviation to confidence is: High ≤ 5 High - Moderate $\Rightarrow 10$ Moderate.



ICU: Current Forecast



Rainfall anomaly outlook map for October to December 2011



Summary

- RCOFs a useful framework for routine seasonal forecasting
 - Especially in multi-state regions
 - Ideally a mix of expert knowledge, model output, climatological studies etc
- Focus on user involvement fundamental
- ICU process successful
 - Built on communication across the region
 - Underpinned by numerical forecast information
- RCOF model feeds directly into GFCS

