

Verification of subjective probabilistic seasonal forecast for Bulgaria (2007-2015)

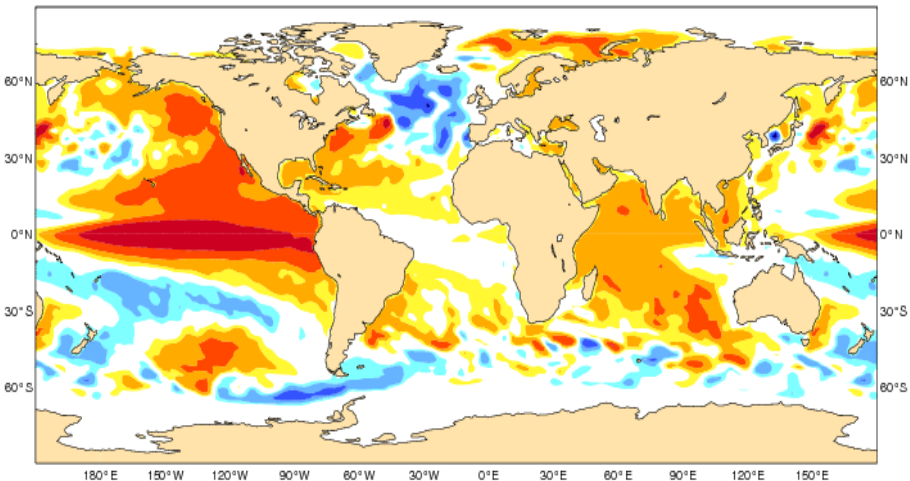
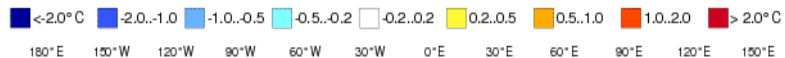
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SEECOF-14, Marrakesh, 25-26.11.2015

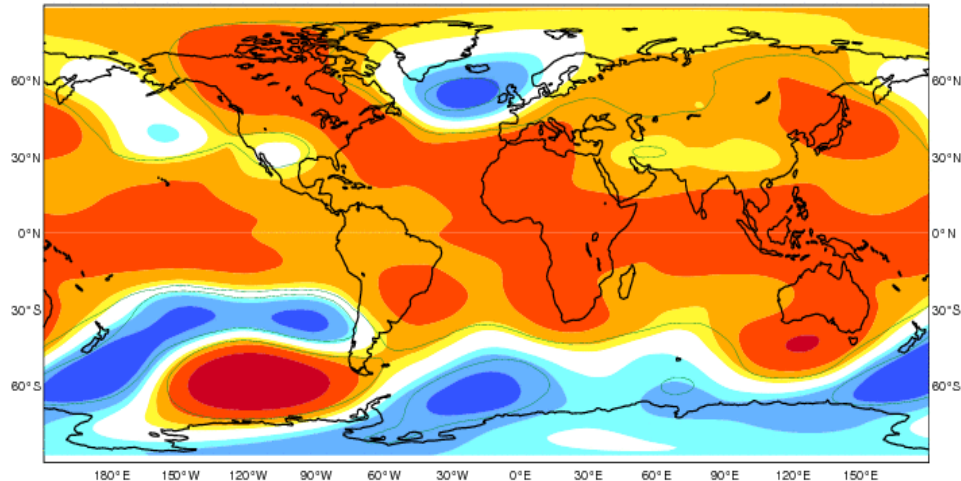
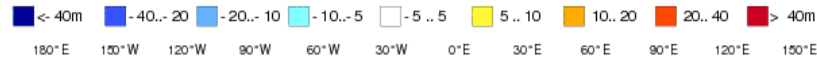
ECMWF Seasonal Forecast
 Mean forecast SST anomaly
 Forecast start reference is 01/09/15
 Ensemble size = 51, climate size = 450

System 4
 OND 2015



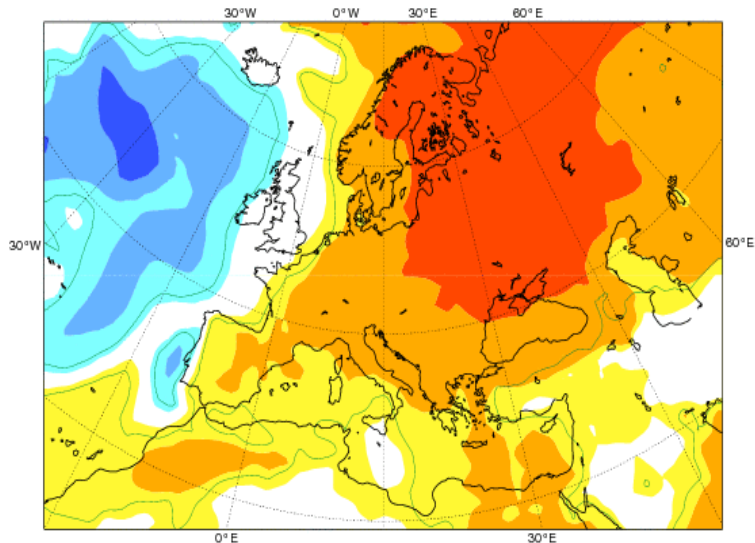
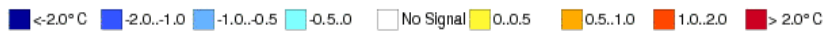
ECMWF Seasonal Forecast
 Mean Z500 anomaly
 Forecast start reference is 01/09/15
 Ensemble size = 51, climate size = 450

System 4
 OND 2015
 Solid contour at 1% significance level



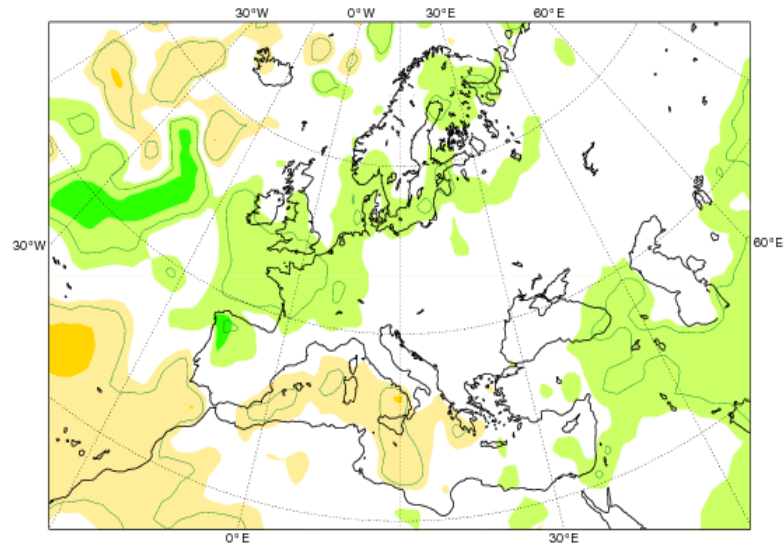
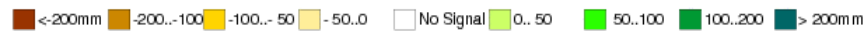
ECMWF Seasonal Forecast
 Mean 2m temperature anomaly
 Forecast start reference is 01/09/15
 Ensemble size = 51, climate size = 450

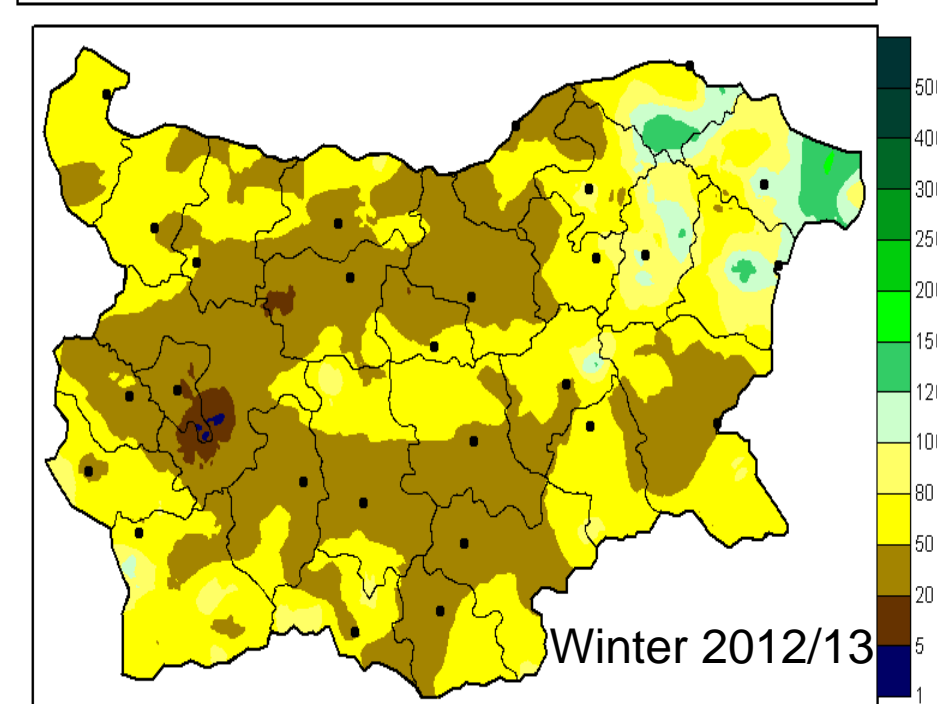
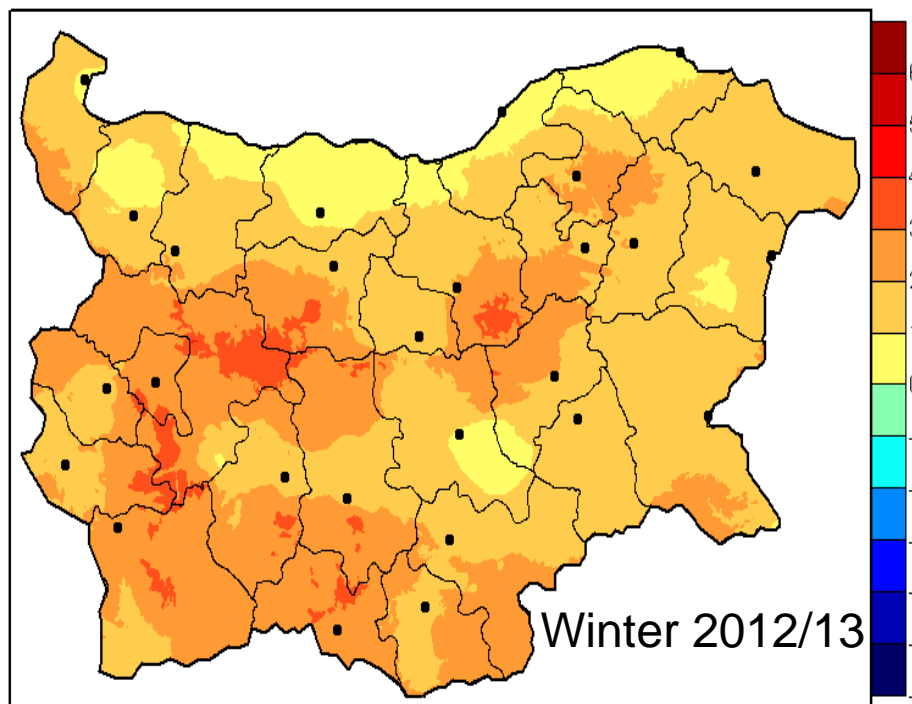
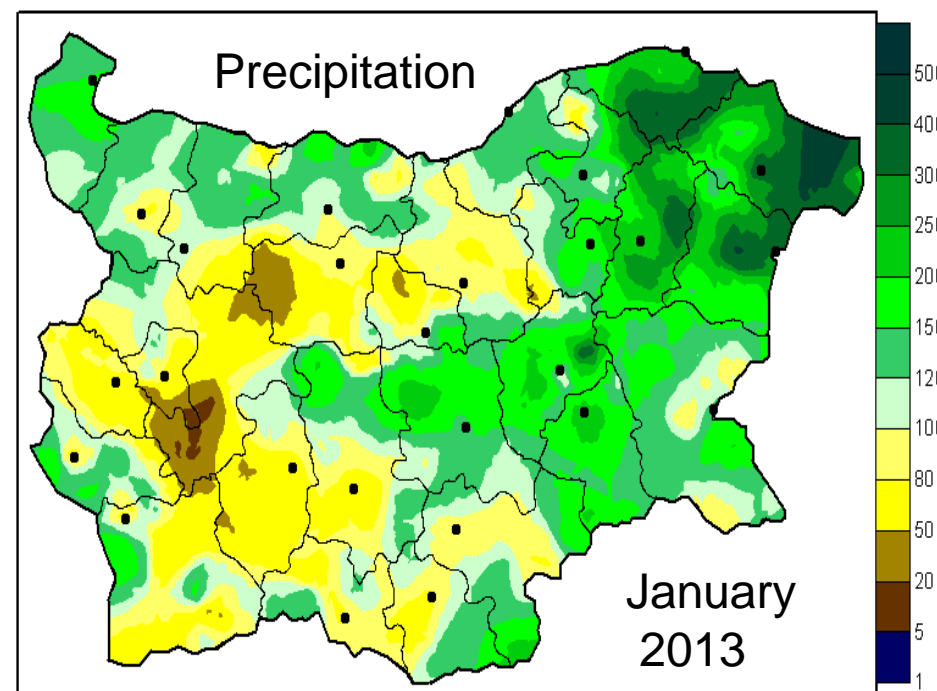
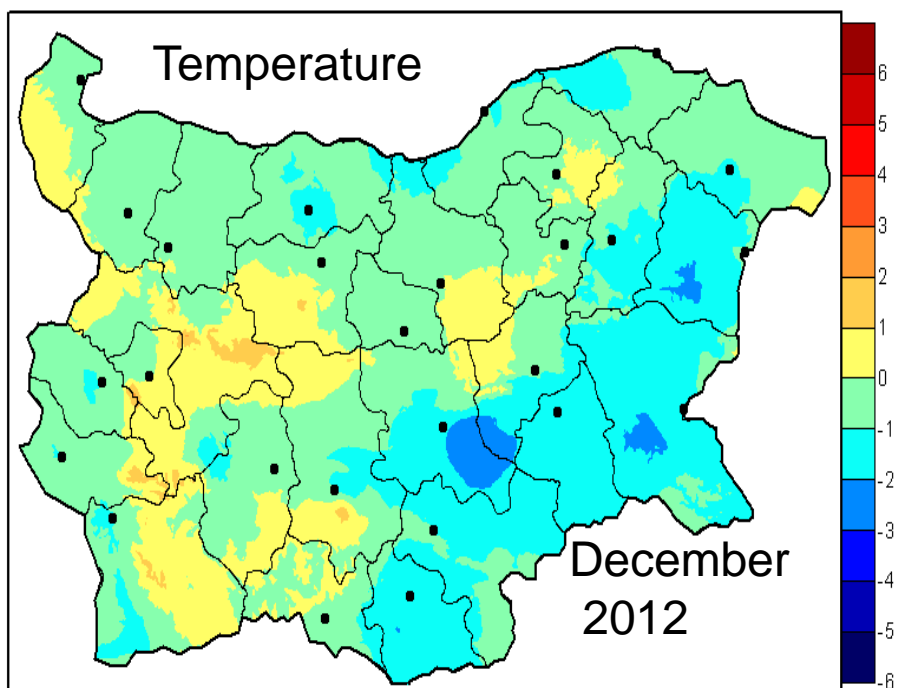
System 4
 OND 2015
 Shaded areas significant at 10% level
 Solid contour at 1% level

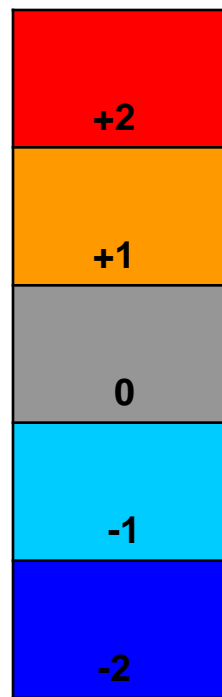
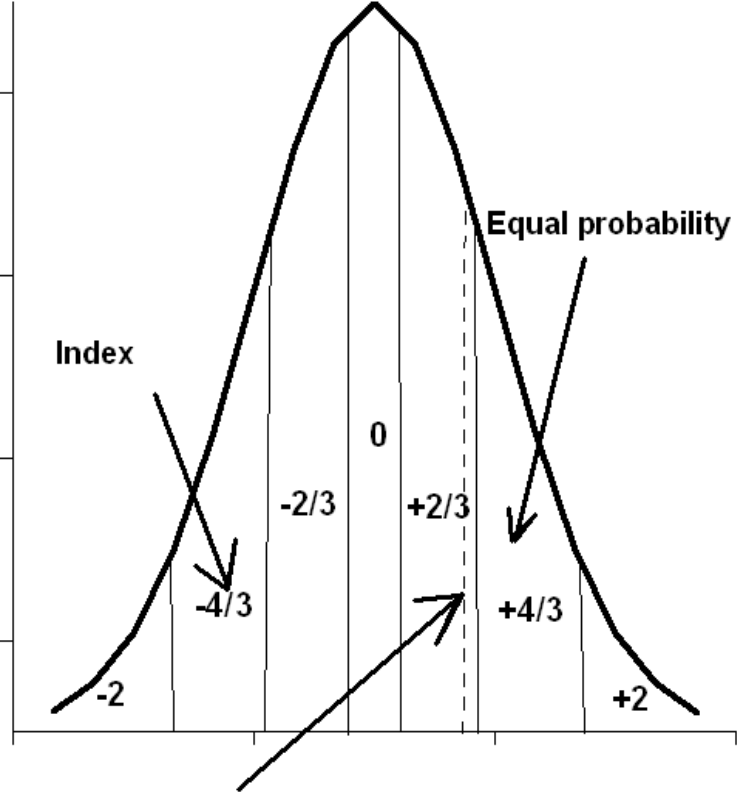


ECMWF Seasonal Forecast
 Mean precipitation anomaly
 Forecast start reference is 01/09/15
 Ensemble size = 51, climate size = 450

System 4
 OND 2015
 Shaded areas significant at 10% level
 Solid contour at 1% level







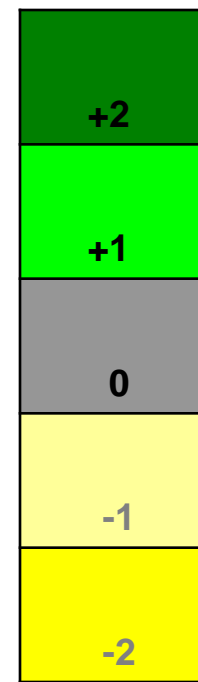
warm

warm or normal

normal

cold or normal

cold



wet

wet or normal

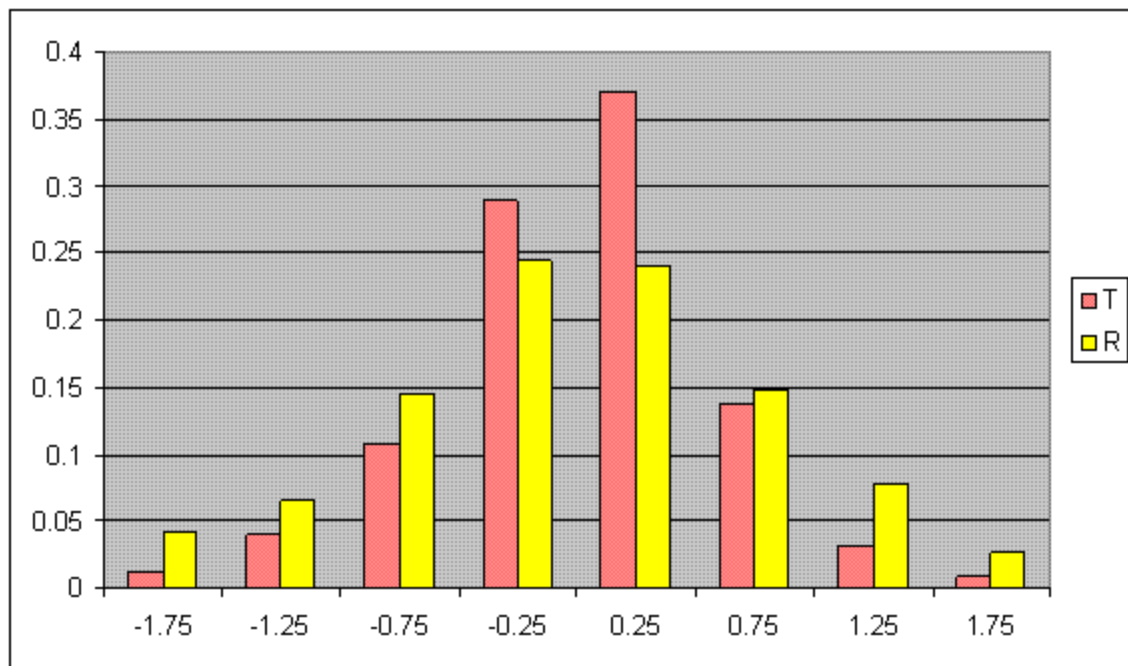
normal

dry or normal

dry

Average index

- **Baseline period**
1980-2009

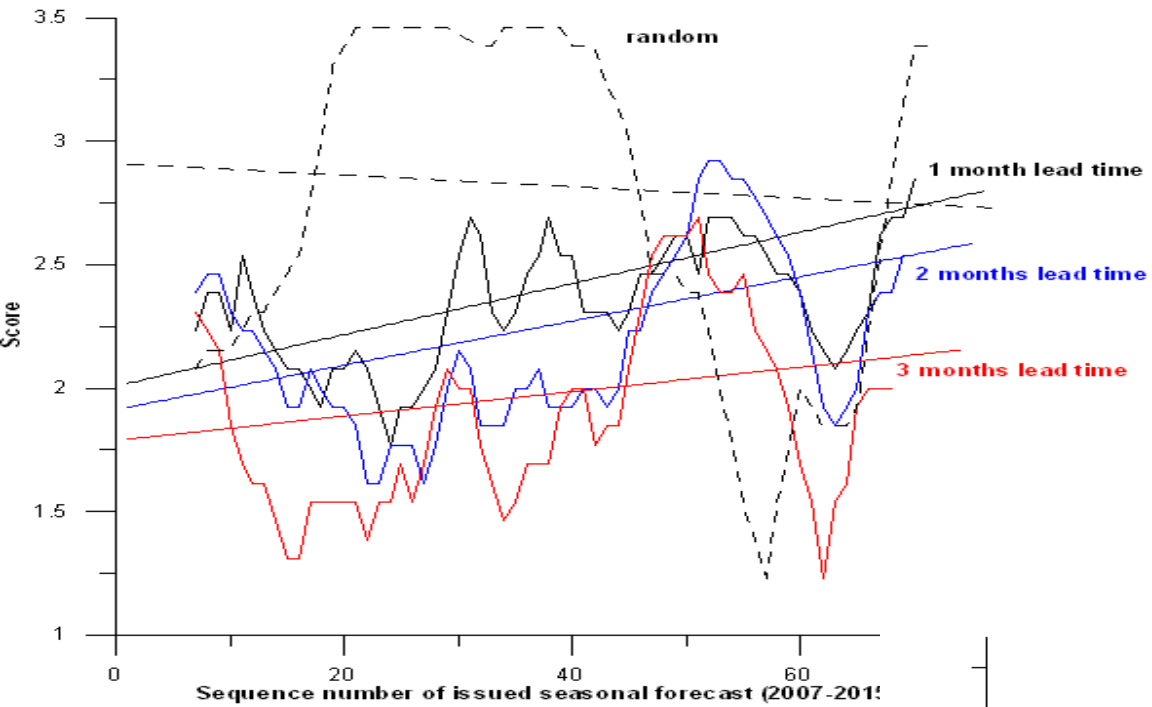


Quantifying the skill of the Seasonal Outlook for Bulgaria

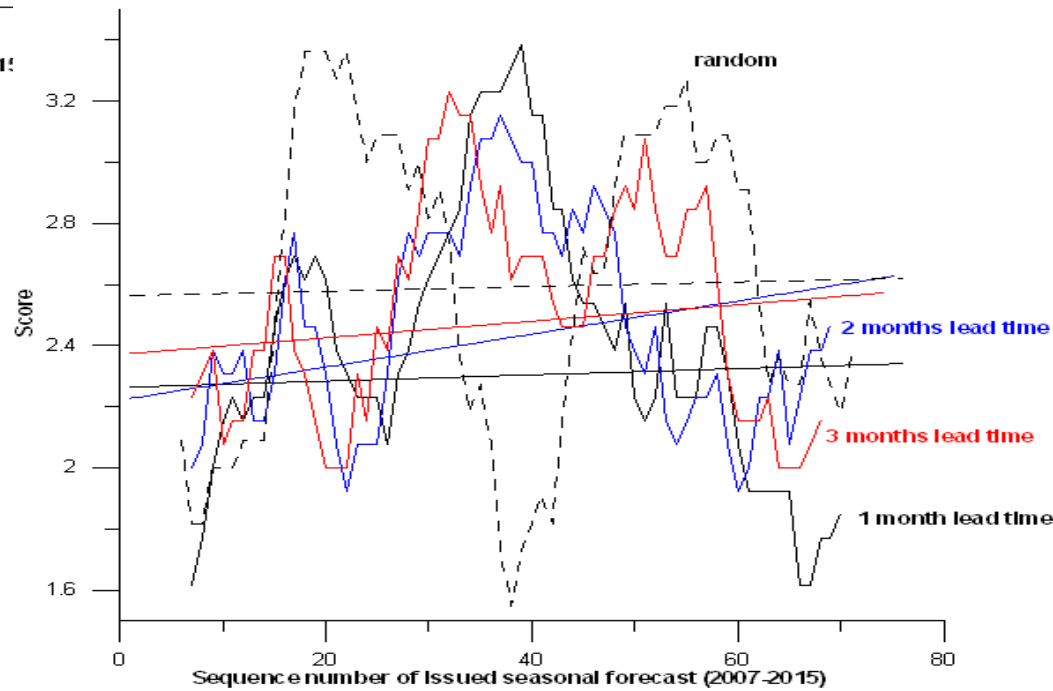
Temperature	Forecast			Index	Score		
	Month-1	Month-2	Month-3		Month-1	Month-2	Month-3
June	0		0	-0.76	3	1	3
July	-1	0		0.02	2	4	1
August	0	0	0	0.93	3	3	3
Summer	0		1	0.18	4	1	3

Precipitation	Forecast			Index	Score		
	Month-1	Month-2	Month-3		Month-1	Month-2	Month-3
June	1		1	1.48	4	1	4
July	1	1		1.16	4	4	1
August	0	0	1	0.47	4	4	3
Summer	1		0	1.6	3	1	0

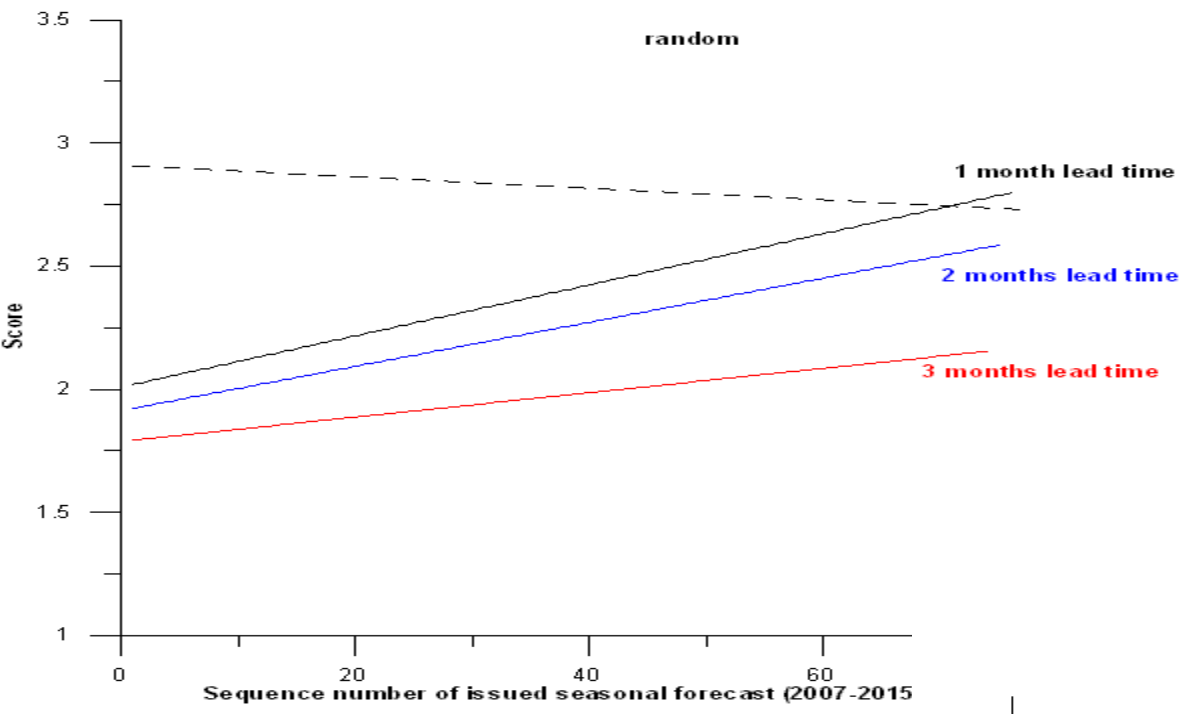
Temperature



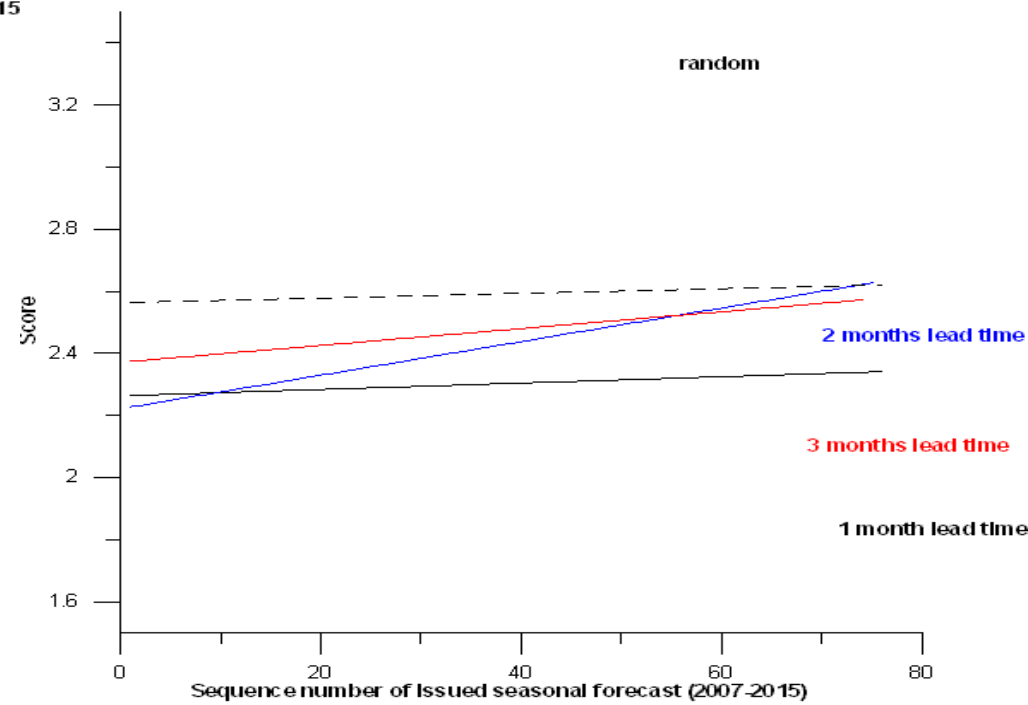
Precipitation



Temperature



Precipitation



Communicating the uncertainty associated with the seasonal forecast

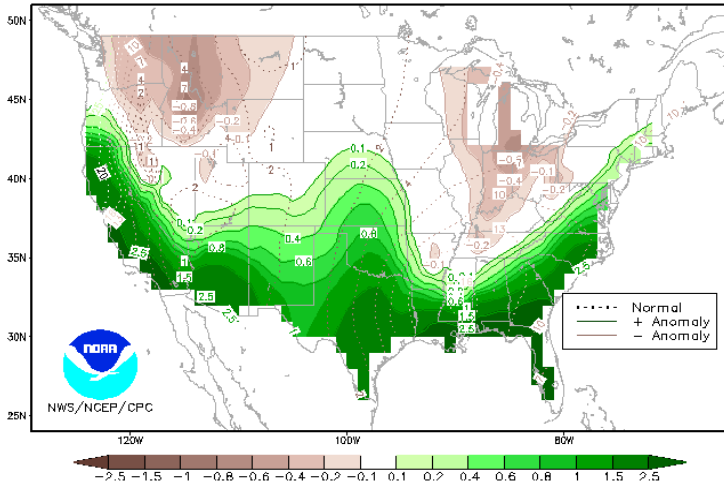
Autumn (September-October-November): With mean seasonal temperature near or above normal and seasonal rainfall near normal. Autumn 2015 should be warmer and drier than autumn 2014.

Month	Temperature	Season	Precipitation	Season
September	1	1	0	0
October	0		0	
November	1		0	

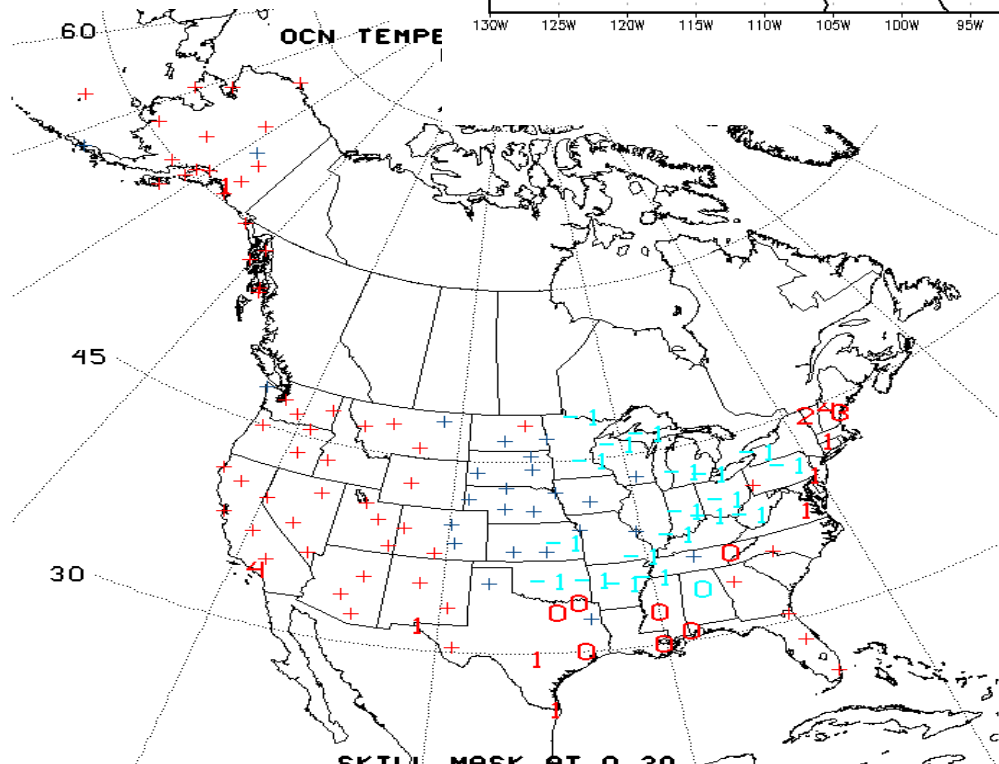
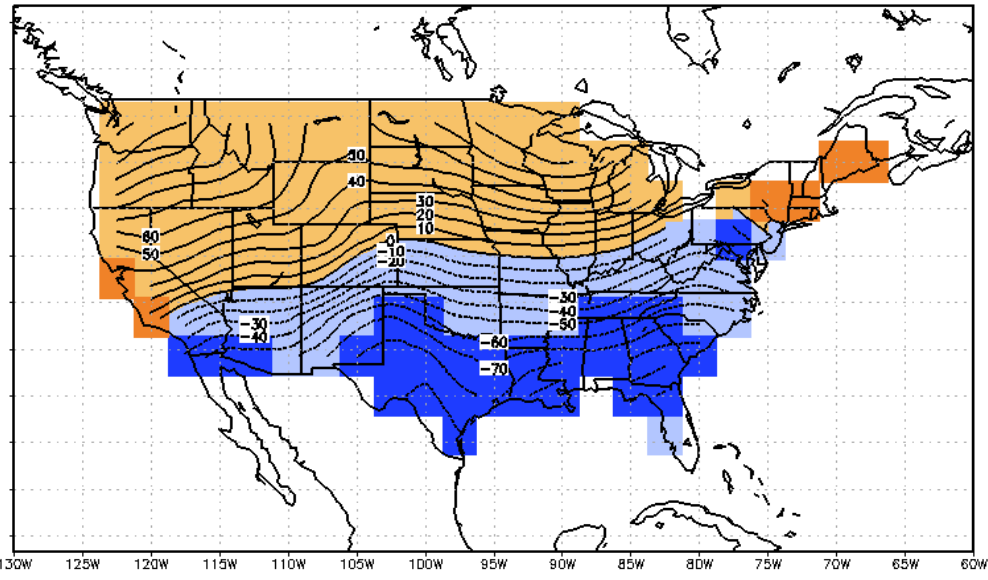
		Forecast			Score			
2014 г.	Month							
	Season	-1	-2	-3	Index	-1	-2	-3
Temperature	Autumn	0	0	0	0.27	4	4	4
	September	-1	-1	-1	0.22	2	2	2
	October	0	0	0	-0.18	4	4	4
	November	1	1	1	0.42	3	3	3
	Autumn	1	1	1	1.9	3	3	3
Precipitation	September	1	1	1	1.85	3	3	3
	October	0	1	1	1.58	0	3	3
	November	-1	0	0	0.27	2	4	4
	Autumn	1	1	1	1.9	3	3	3

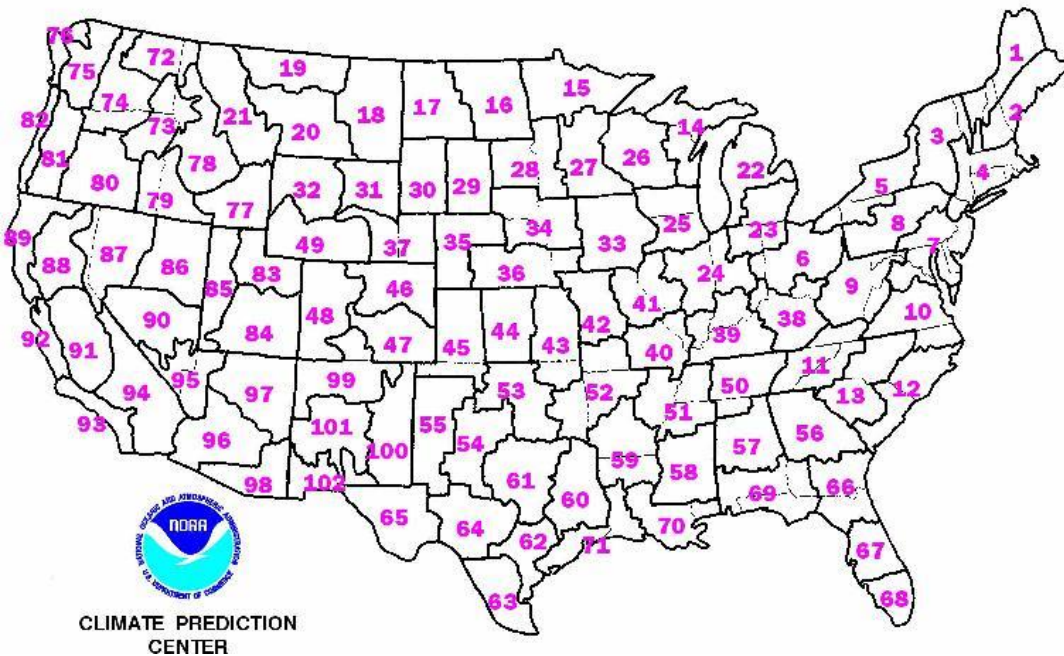
Anomaly (inches) of the Mid-value of the 3-Month Precipitation Outlook Distribution for DJF 2015-16

Dashed lines are the median 3-month precipitation (inches) based on observations from 1981-2010. Shaded areas indicate whether the anomaly of the mid-value is positive (green) or negative (brown) compared to the 1981-2010 average. Non-shaded regions indicate that the absolute value of the anomaly of the mid-value is less than 0.1. For a given location, the mid-value of the outlook may be found by adding the anomaly value to the 1981-2010 average. There is an equal 50-50 chance that actual conditions will be above or below the mid-value. Please note that this product is a limited representation of the official forecast, showing the anomaly of the mid-value, but not the width of the range of possibility. For more comprehensive forecast information, please see our additional forecast products.

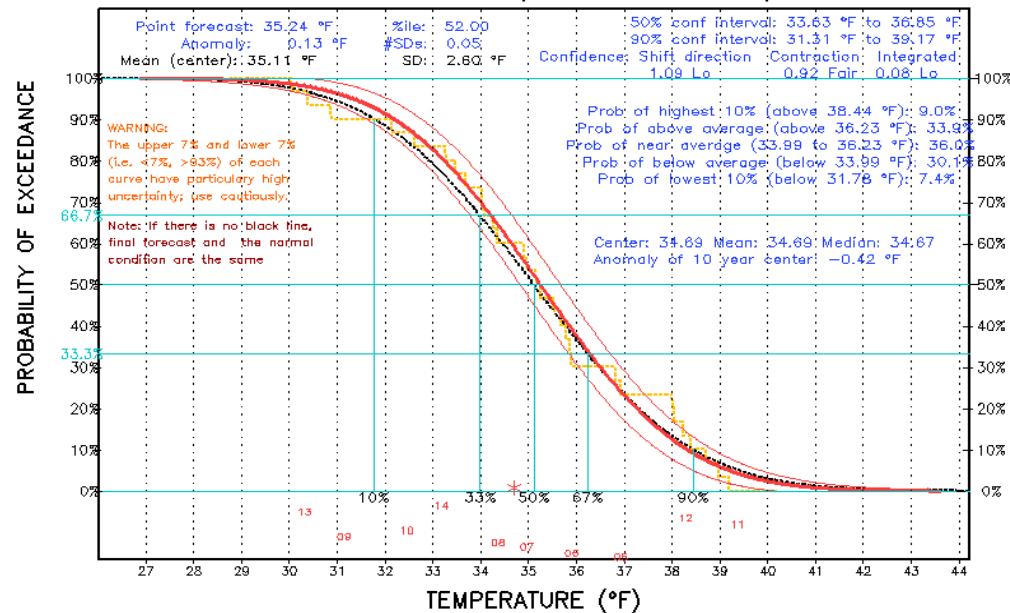


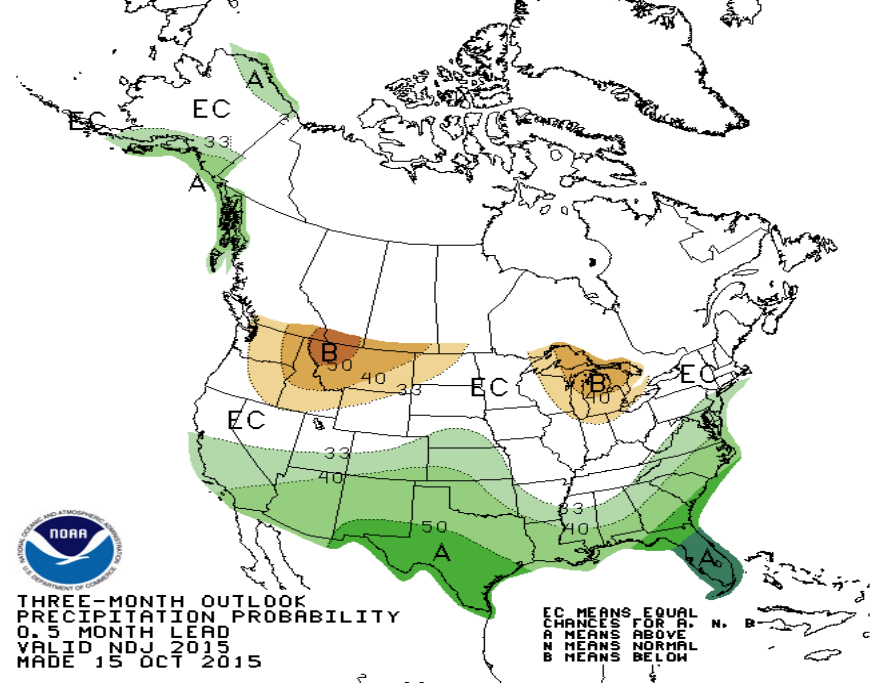
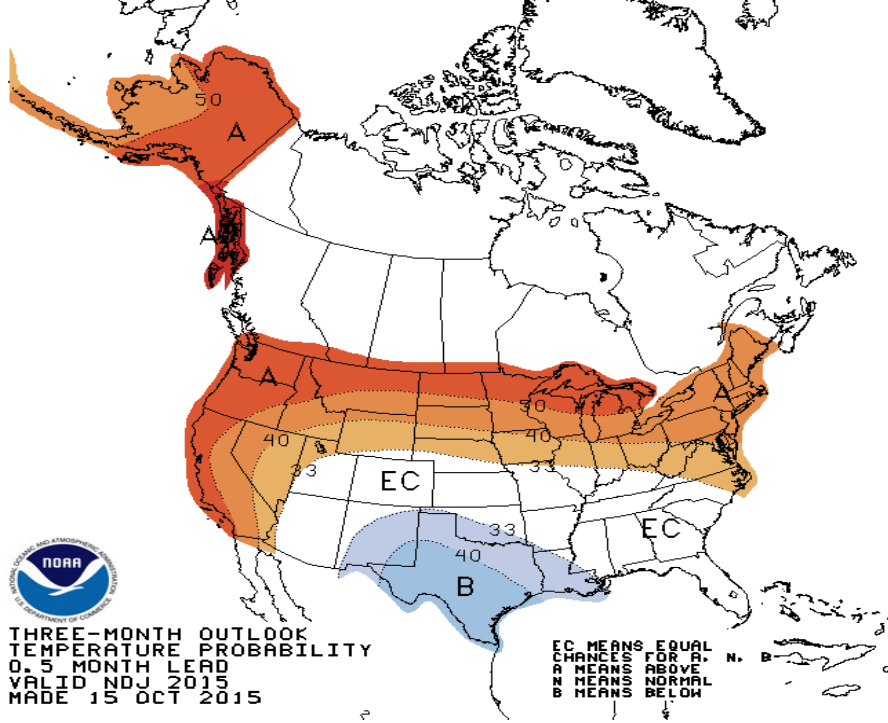
SFC Temperature for JFM 2016 (lead 1.5)
(units : anomaly*100/sd)





MEAN TEMPERATURE OUTLOOK FOR DJF 2015-16
0.5 MONTH LEAD OUTLOOK - MADE Nov 19 2015
 Climate Division 40 (Southeastern Missouri)





EXAMPLES: FORECAST PROBABILITY ANOMALIES OF 20%, 30% AND 40% FOR ABOVE NORMAL IMPLY PROBABILITIES FOR ALL THREE CLASSES (ABOVE - NEAR - BELOW) OF 53.3% - 33.3% - 13.3% --- 63.3% - 33.3% - 3.3% AND 73.3% - 23.3% - 3.3% RESPECTIVELY. OCCASIONALLY THE FORECAST CALLS FOR AN INCREASED CHANCE OF THE OBSERVATION FALLING IN THE MIDDLE CLASS. WHEN THIS OCCURS - HALF OF THE INCREASED PROBABILITY OF THE MIDDLE CLASS IS SUBTRACTED FROM EACH OF THE EXTREMES.

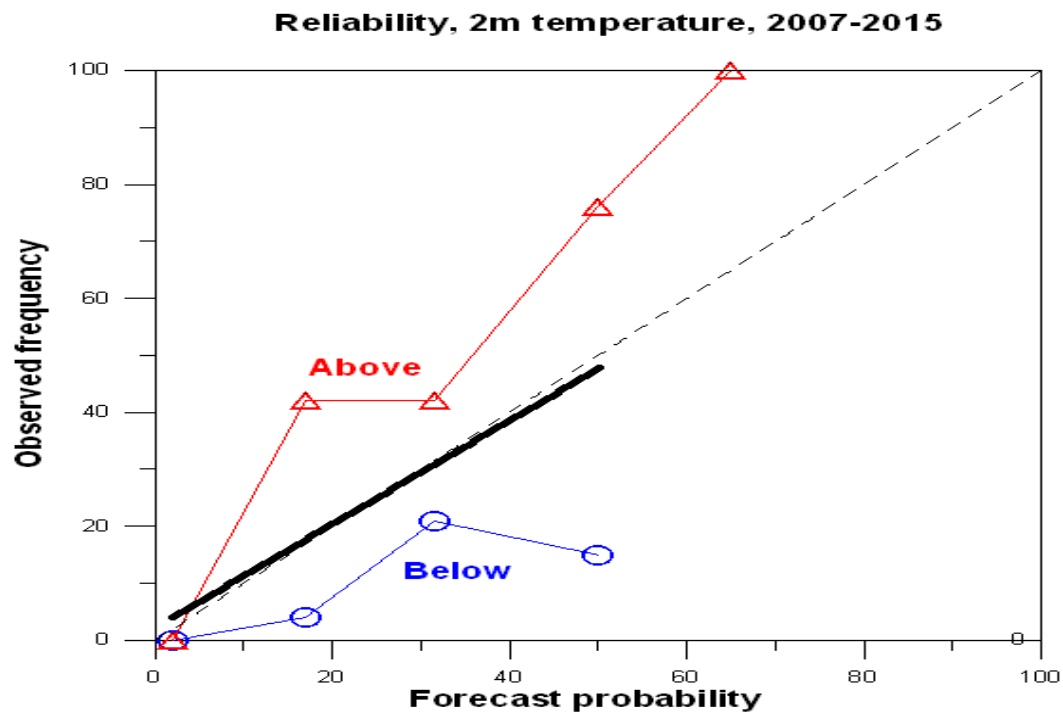
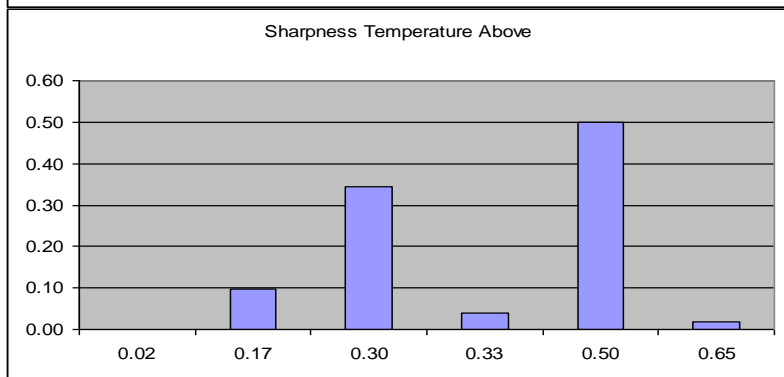
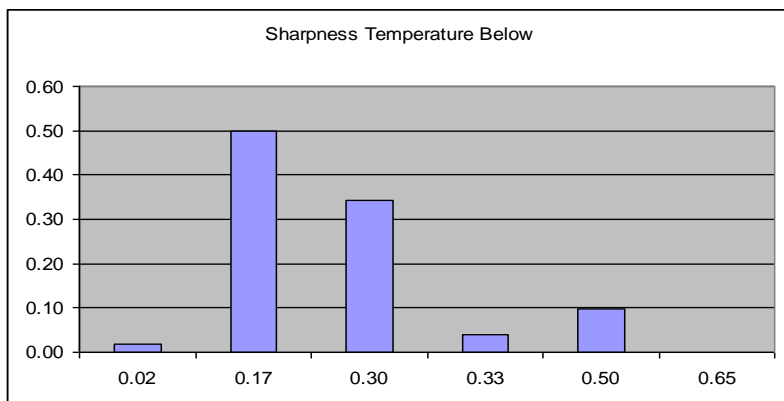
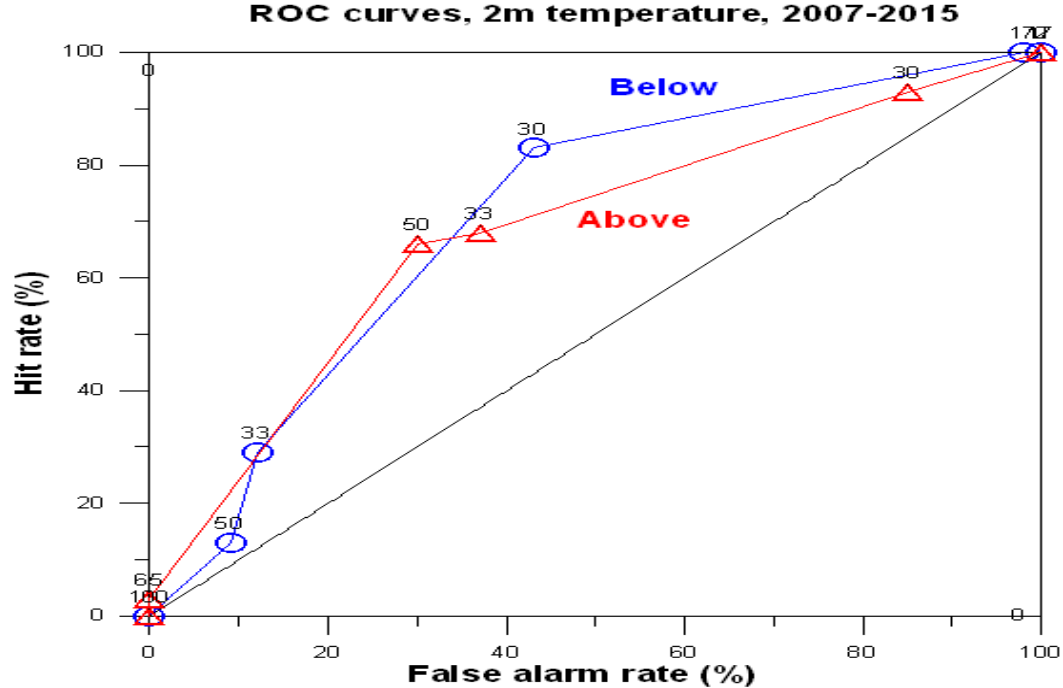
year	season	forecast	index	year	season	forecast	index	year	season	forecast	index	year	season	forecast	index
2007	3	1	1.57	2009	3	0	0.18	2011	5	1	-0.60	2013	7	1	1.22
2007	4	2	1.79	2009	4	1	0.69	2011	6	1	0.62	2013	8	-1	1.42
2007	5	0	1.95	2009	5	0	1.38	2011	7	1	0.91	2013	9	1	1.27
2007	6	1	2.00	2009	6	-1	1.64	2011	8	1	1.98	2013	10	1	1.62
2007	7	2	2.00	2009	7	0	1.22	2011	9	1	1.56	2013	11	1	0.91
2007	8	1	1.76	2009	8	0	1.20	2011	10	1	-0.24	2013	12	1	1.67
2007	9	1	0.33	2009	9	0	1.09	2011	11	0	-0.84	2014	1		1.42
2007	10	1	-1.05	2009	10	1	1.67	2011	12	0	-0.71	2014	2	1	1.78
2007	11		-1.12	2009	11	1	1.91	2012	1	0	-1.82	2014	3	1	1.69
2007	12	-1	-1.62	2009	12	1	1.38	2012	2	0	-1.58	2014	4	1	1.36
2008	1		-0.71	2010	1	1	0.38	2012	3	0	-0.53	2014	5	0	-0.18
2008	2	1	0.95	2010	2	0	-0.07	2012	4	0	1.47	2014	6		-0.49
2008	3	1	1.90	2010	3	-1	0.31	2012	5	1	2	2014	7	0	0.18
2008	4	1	1.90	2010	4	-1	0.82	2012	6	1	2	2014	8	-1	0.51
2008	5	0	1.50	2010	5	0	0.80	2012	7	1	2	2014	9	-1	0.31
2008	6	1	1.00	2010	6	0	0.56	2012	8	1	2	2014	10	0	0.27
2008	7	0	1.69	2010	7	0	1.31	2012	9	1	2	2014	11	1	0.93
2008	8	0	1.18	2010	8	1	1.64	2012	10	1	2	2014	12	1	1.53
2008	9	0	1.40	2010	9	1	0.69	2012	11	1	1.76	2015	1	1	1.64
2008	10	0	1.04	2010	10	0	1.76	2012	12	1	1.04	2015	2	1	1.07
2008	11	0	1.91	2010	11	1	1.51	2013	1	1	0.688889	2015	3	1	0.07
2008	12	-1	1.53	2010	12	0	1.80	2013	2	1	1.29	2015	4	0	-0.20
2009	1	0	1.29	2011	1	-1	-0.40	2013	3	1	1.36	2015	5	0	-0.42
2009	2	0	0.38	2011	2	0	-0.42	2013	4	1	1.82	2015	6	-1	0.80
				2011	3	0	-0.57	2013	5	0	1.98	2015	7	1	1.42
				2011	4	0	-0.74	2013	6	1	1.64	2015	8	1	1.98

		A	N	B
Above	2	55-65	33	12-2
Above/Normal	1	40-50	33	27-17
Normal	0	30-20	40-60	30-20
Below/Normal	-1	27-17	33	40-50
Below/Normal	-2	12-2	33	55-65
Climate		33.3	33.3	33.3

		A	N	B
Above	2	65	33	2
Above/Normal	1	50	33	17
Normal	0	30	40	30
Below/Normal	-1	17	33	50
Below/Normal	-2	2	33	65
Climate		33.3	33.3	33.3

2007	7	2	0.02	0.33	0.65	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2008	7	0	0.30	0.40	0.30	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2009	7	0	0.30	0.40	0.30	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0
2010	7	0	0.30	0.40	0.30	1	1	0	1	1	1	1	1	1	1	0	0	1	0	1	1	1	0	1	0	0
2011	7	1	0.17	0.33	0.50	1	0	0	1	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1
2012	7	1	0.17	0.33	0.50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2013	7	1	0.17	0.33	0.50	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	1
2014	7	0	0.30	0.40	0.30	-1	0	-1	0	0	0	1	1	1	0	0	0	-1	-1	0	0	0	-1	0	0	0
2015	7	1	0.17	0.33	0.50	1	1	1	1	1	1	1	1	1	1	1	1	-1	0	1	1	1	1	1	1	1

	Brier	Skill
my	0.579	0.68-0.69
ecmwf	0.582	
1	0.567	
clim	0.667	
best (index)	0.429	



	My forecast		Clim		Best		Index
2007	2	1			2	2	2
2008	0	1			2	2	1.688889
2009	0	1			2	1	1.222222
2010	0	1			2	1	1.311111
2011	1	1			2	1	0.911111
2012	1	1			2	2	2
2013	1	1			2	1	1.222222
2014	0	1			2	0	0.177778
2015	1	1			2	2	1.422222

Brier

0.579

0.485

0.667

0.416

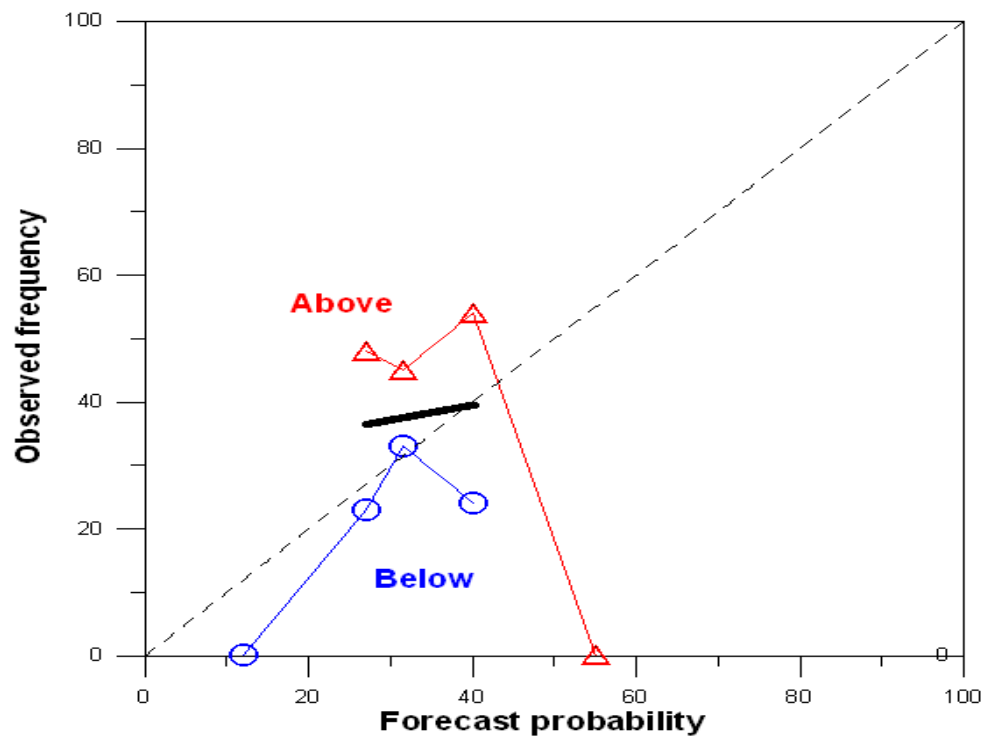
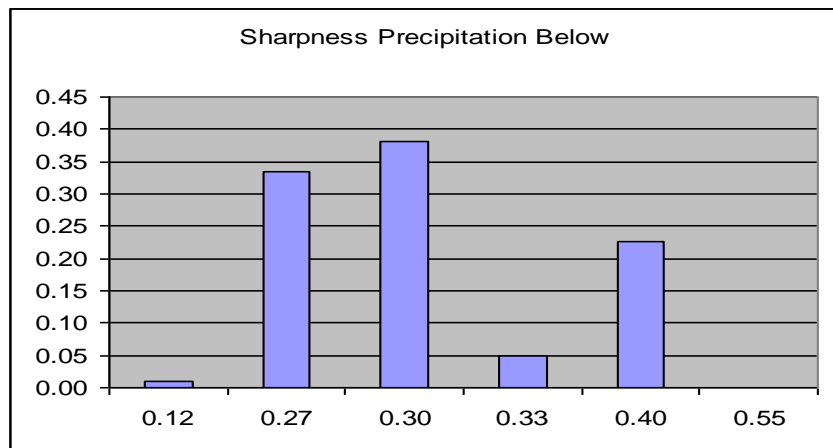
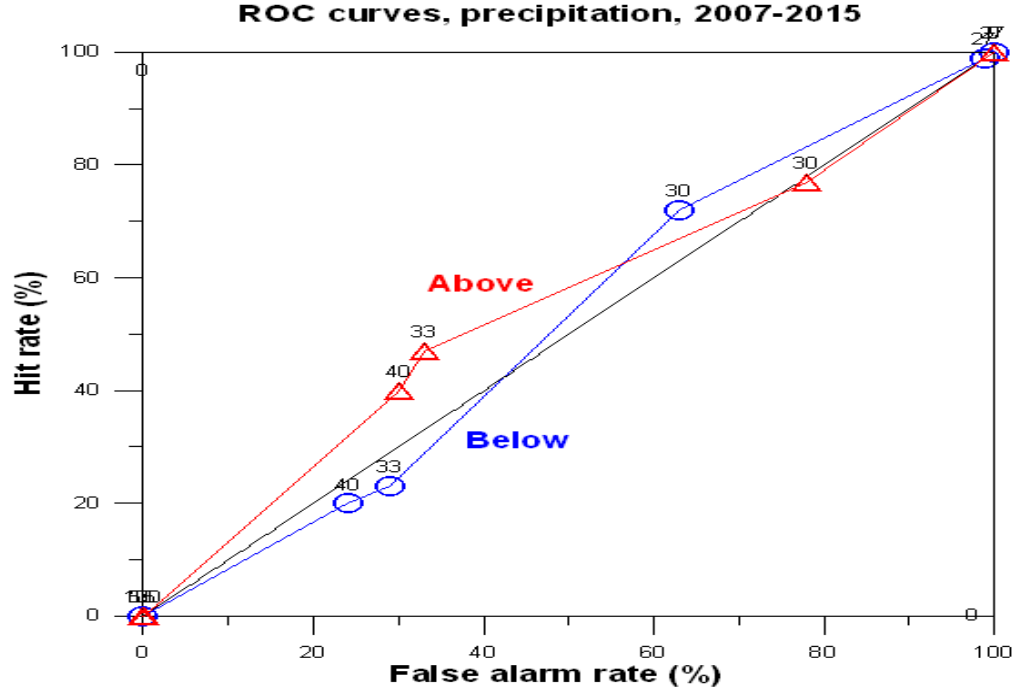
0.407

Temperature		A	N	B
Above	2	65	33	2
Above/Normal	1	50	33	17
Normal	0	30	40	30
Below/Normal	-1	17	33	50
Below/Normal	-2	2	33	65
Climate		33.3	33.3	33.3

Precipitation		A	N	B
Above	2	55	33	12
Above/Normal	1	40	33	27
Normal	0	30	40	30
Below/Normal	-1	27	33	40
Below/Normal	-2	12	33	55
Climate		33.3	33.3	33.3

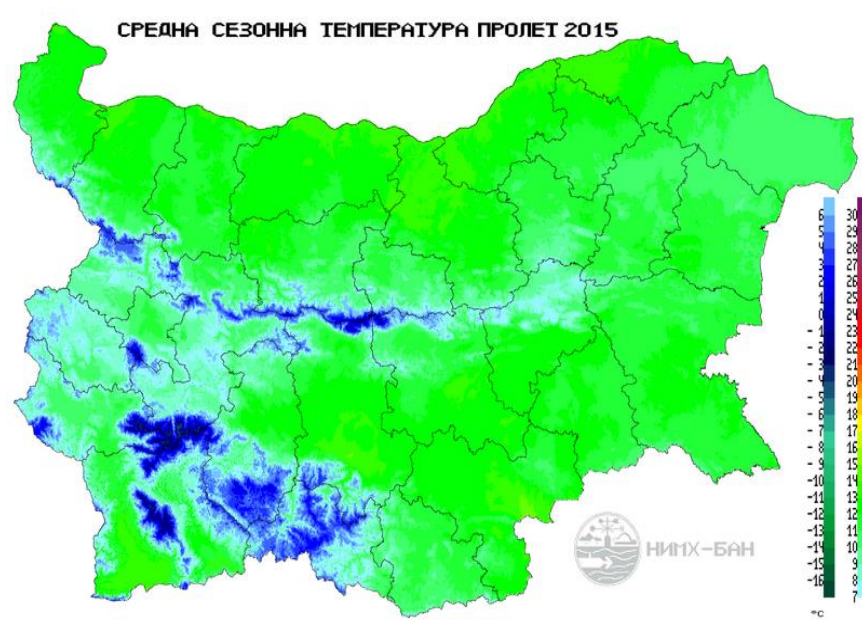
	my forecast		Clim		Best	Index
2007	-1	0		1	0	-0.08
2008	0	0		1	-1	-0.62
2009	0	0		1	0	-0.10
2010	0	0		1	1	1.16
2011	-1	0		1	0	0.12
2012	0	0		1	-2	-1.65
2013	0	0		1	0	0.30
2014	1	0		1	2	1.60
2015	0	0		1	0	0.44
Brier	0.665	0.675	0.667	0.664	0.573	

	Brier
My forecast	0.672
ecmwf	0.681
1	0.651
clim	0.667
best (index)	0.576



Conclusions - recommendations

- 33% normal
- Sharper probability spread for temperature but less sharp for precipitation
- Smooth transition between regions with enhanced above or below separated by similarly large zones with equal chances



Verification of subjective probabilistic seasonal forecast for Bulgaria (2007-2015)

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