

Recent Experience with Seasonal Forecasting at the Bulgarian Weather Service

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Seasonal Forecasting in Bulgaria

- Seasonal category and other basics
- Regular seasonal forecast
- *Winter* forecast special
- Seasonal outlook for winter 2010/11

Seasonal Category

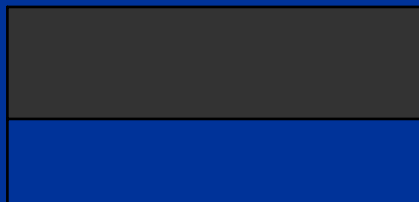
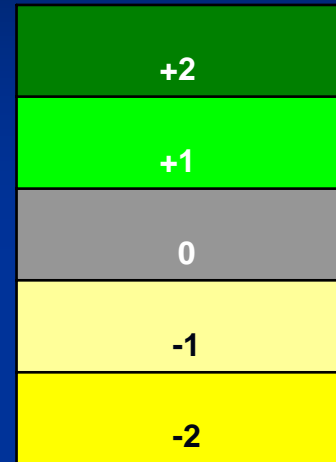
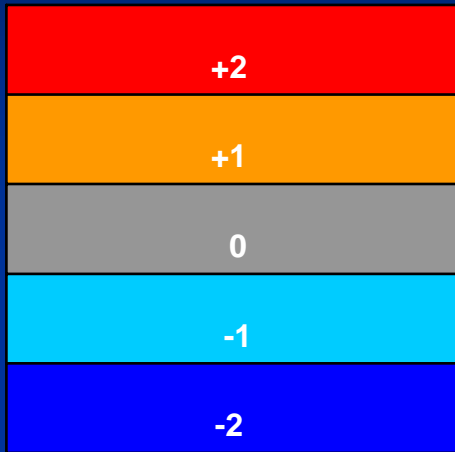
- Single seasonal or monthly category index
- Arguments:
- Small country and it is exceptional to have opposite categories within the country in a given month or season.
- The spatial uncertainty of the forecast is beyond the scale of countries like Bulgaria.

1/7	2/7	3/7	4/7	5/7	6/7	7/7
-2	-4/3	-2/3	0	+2/3	+4/3	+2

Regular Seasonal Forecast

- Based on subjective evaluation of probability and anomaly maps and other products available on the internet. These products are freely available on the websites of the centers:
- ECMWF
- MetOffice
- NCEP
- Beijing Climate Center
- Tokyo Climate Center
- IRI Italian Institute of Biometeorology, Ibimet (Multi regression model maps)

Regular Seasonal Forecast



Regular Seasonal Forecast

■ Skill

Year	Season	Forecast			Category	Score		
		Month-1	Month-2	Month-3		Month-1	Month-2	Month-3
2007	7	2	1	1	2.00	4	3	3
2007	8	1	1		1.76	3	3	1
2007	9	1	1	2	0.33	3	3	0
2007	10	1	0	0	-1.05	0	2	2
2007	11		1	0	-1.12	1	0	2
2007	12	-1	1	0	-1.62	3	0	0
2008	1		-1	1	-0.71	1	4	0
2008	2	1	1	0	0.95	4	4	3
2008	3	1	1	1	1.90	3	3	3
2008	4	1	1		1.90	3	3	
2008	5	0	1	0	1.50	2	4	2
2008	6	1	0	0	1.00	4	3	3
2008	7	0	0	-1	1.69	0	0	0
2008	8	0	0	-1	1.18	2	2	0
2008	9	0	0	-1	1.40	2	2	0
2008	10	0	0	0	1.04	2	2	2

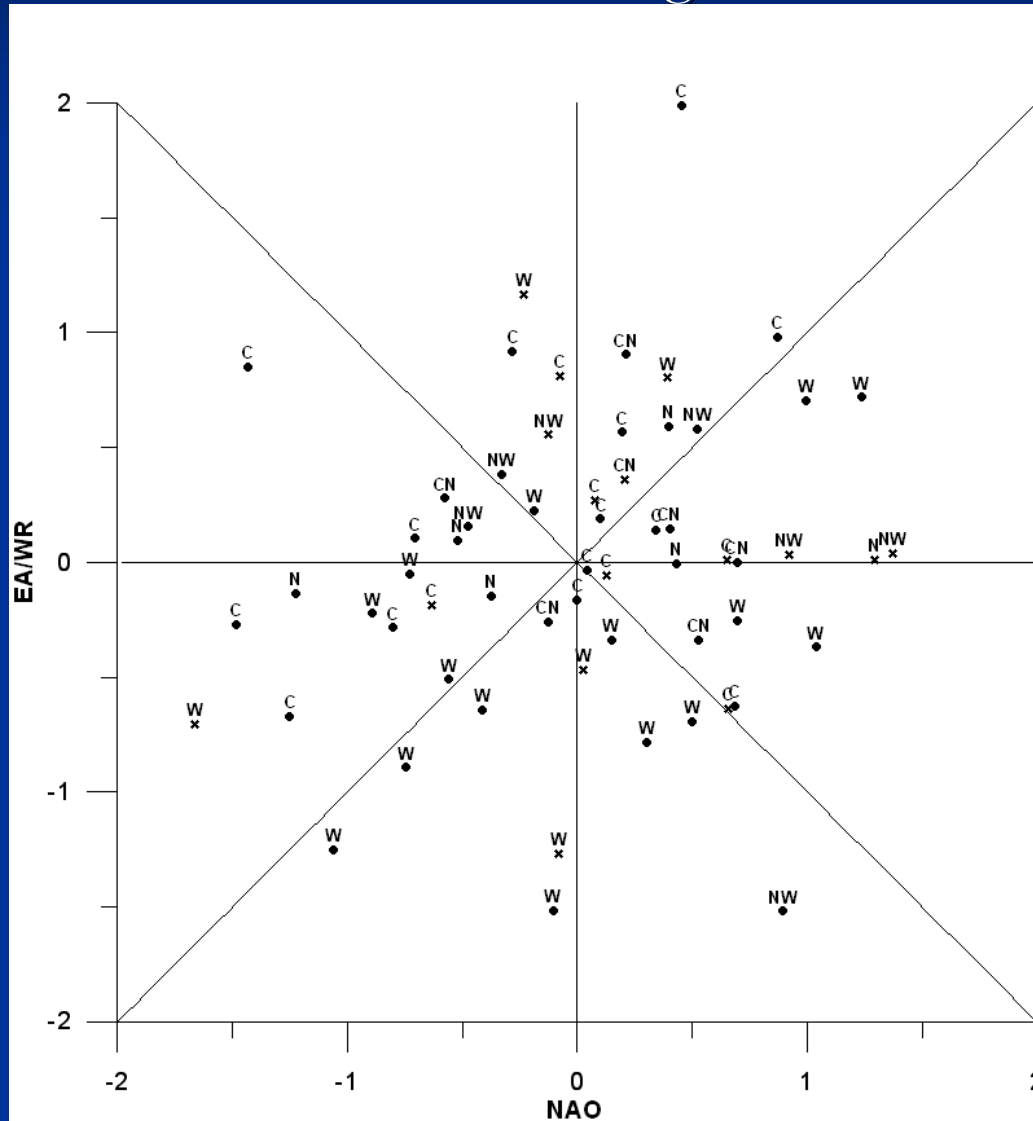
Regular Seasonal Forecast

- Skill

	ECMWF	MetOffice	NCEP	IRI	TCC	BCC	Random	Synthesis
Temperature	2.70	2.41	1.53	2.56	2.51	1.83	1.67	2.34
Precipitation	1.37	1.54	2.35		1.71	2.15	1.97	2.79

Winter Forecast Specials

- MetOffice NAO Forecast. How Bulgarian winters relate to NAO.



Winter Forecast Special

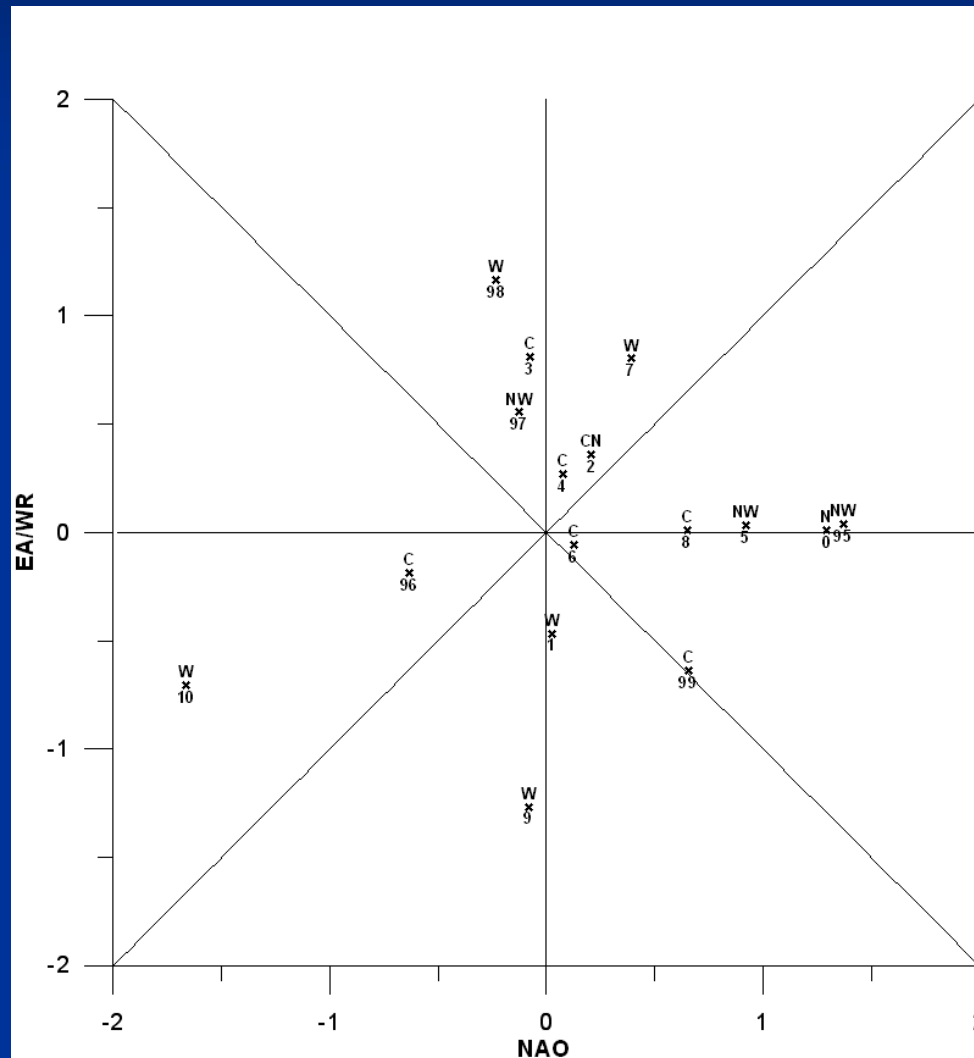
- How Bulgarian winters relate to NAO.

	CD	CW	WD	WW
NAO+	25	0	50	25
NAO-	25	50	0	25

	CD	CW	WD	WW
NAO+	25	17	33	25
NAO-	25	33	17	25

Winter Forecast Specials

- ENSO Forecast. How Bulgarian winters relate to ENSO (may be).



Winter Forecast Specials

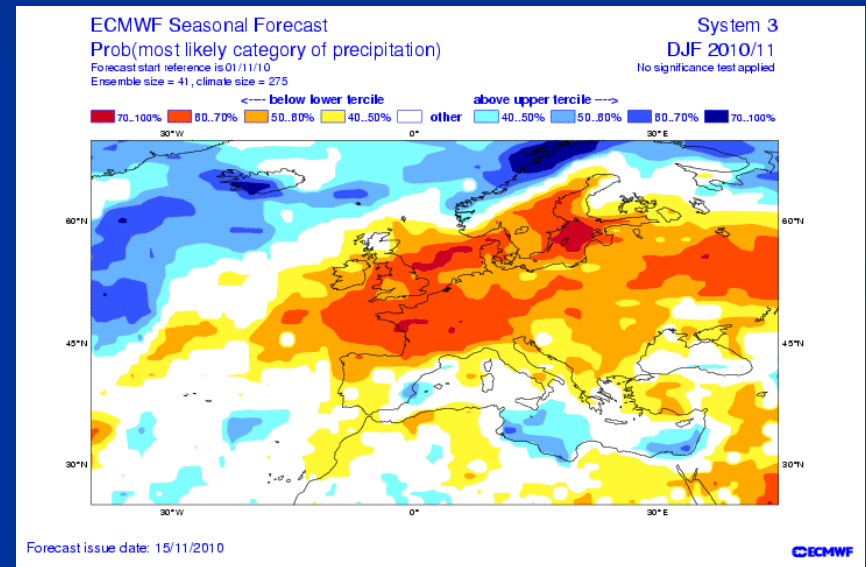
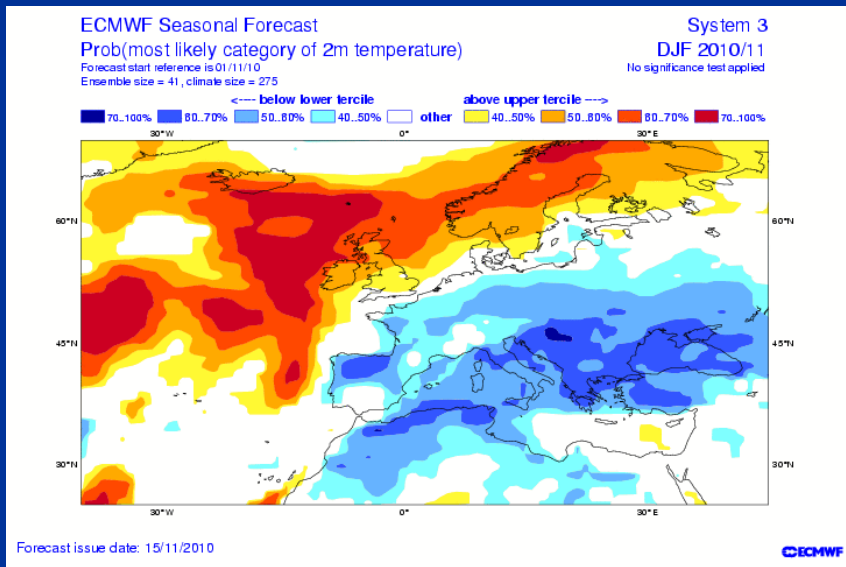
- How Bulgarian winters relate to ENSO (may be)

La Nina	CD	CW	WD	WW
NAO+	32	18	32	18
NAO-	32	32	18	18

El Nino	CD	CW	WD	WW
NAO+	18	18	32	32
NAO-	18	32	18	32

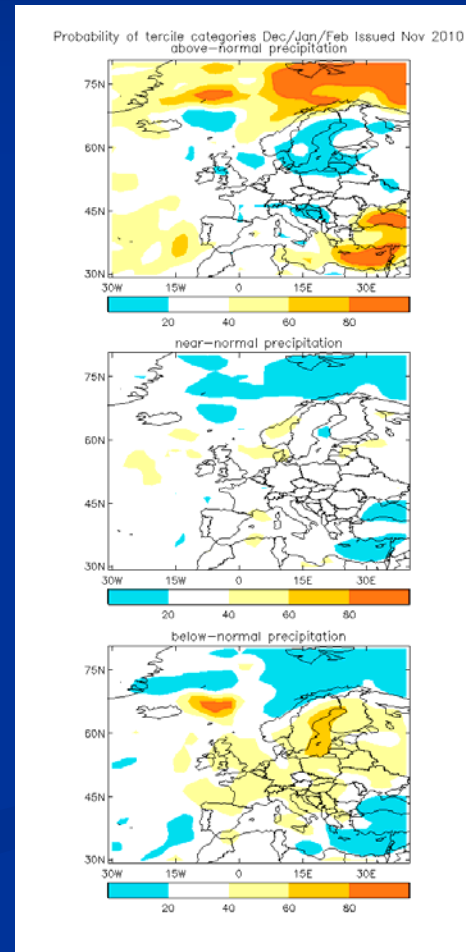
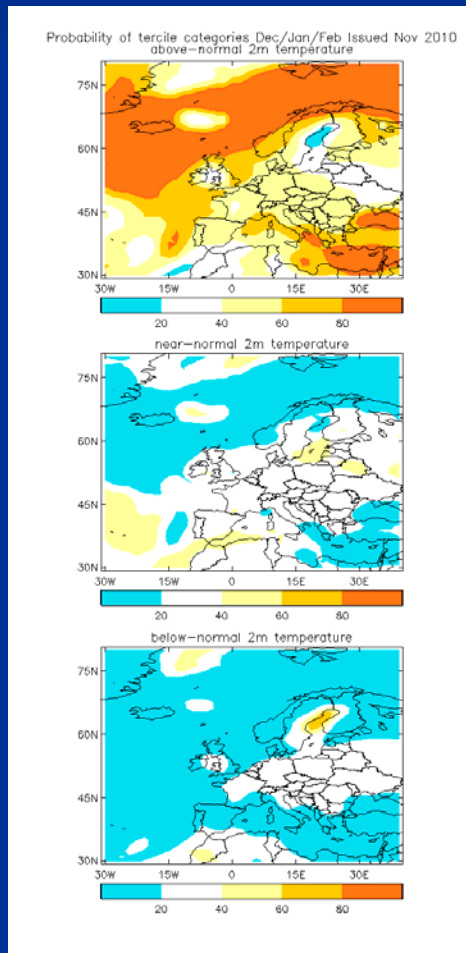
Seasonal Outlook for Winter 2010/11

■ ECMWF



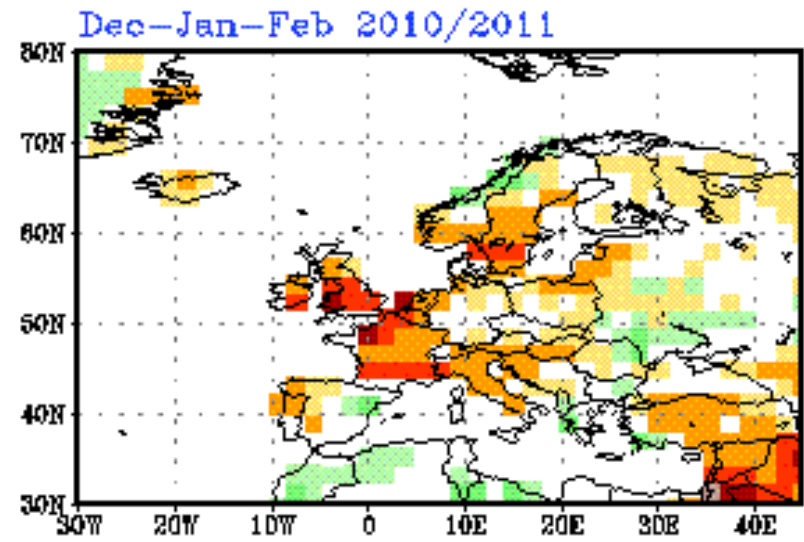
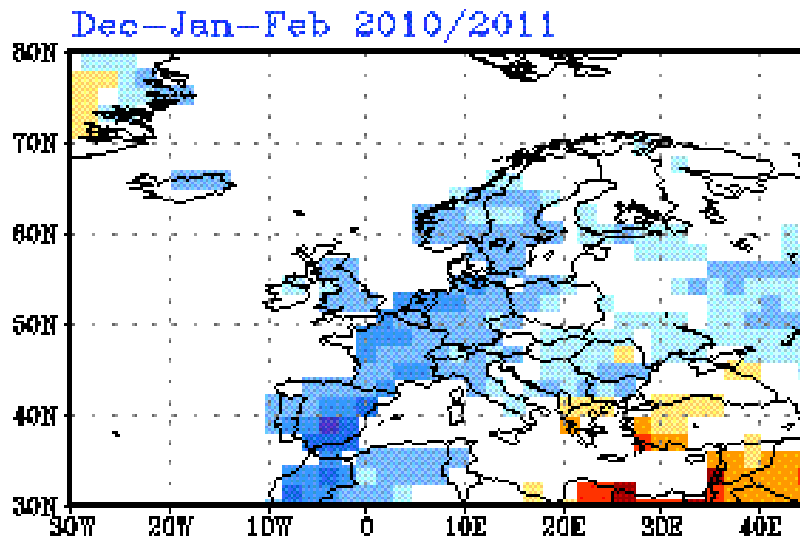
Seasonal Outlook for Winter 2010/11

UK MetOffice



Seasonal Outlook for Winter 2010/11

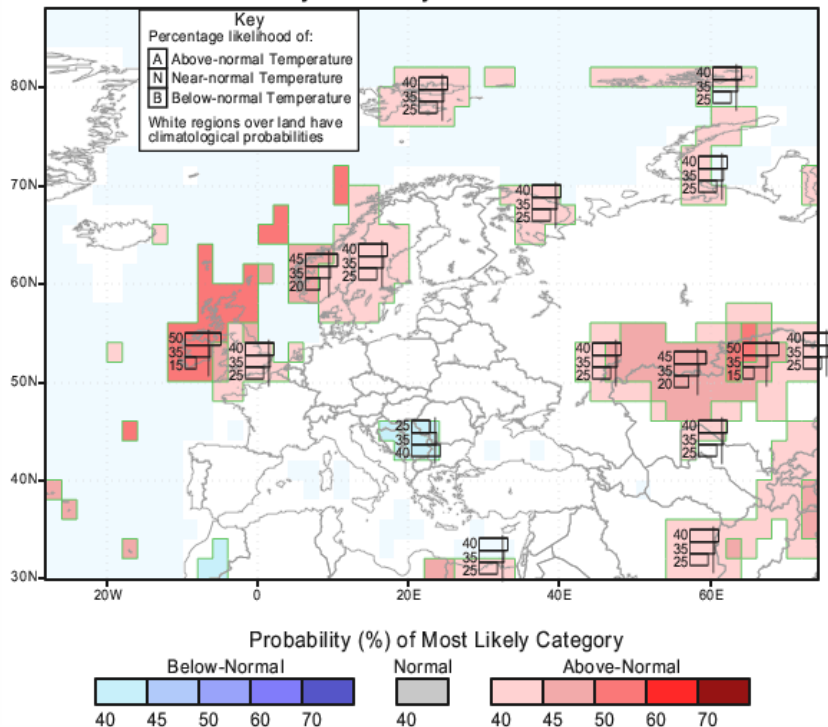
■ NCEP



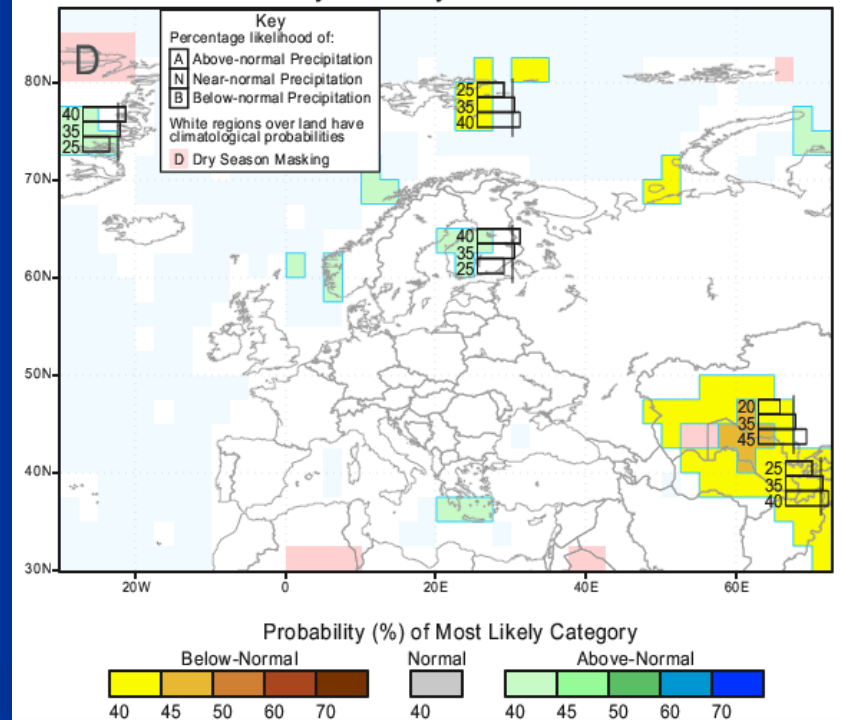
Seasonal Outlook for Winter 2010/11

IRI

IRI Multi-Model Probability Forecast for Temperature for December-January-February 2011, Issued November 2010

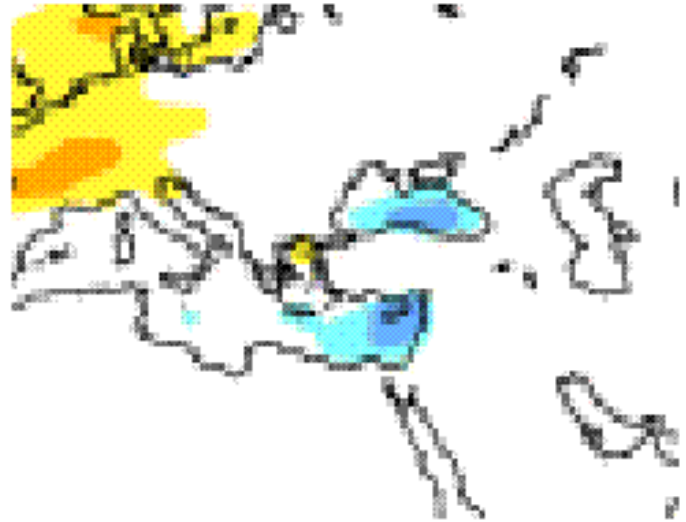
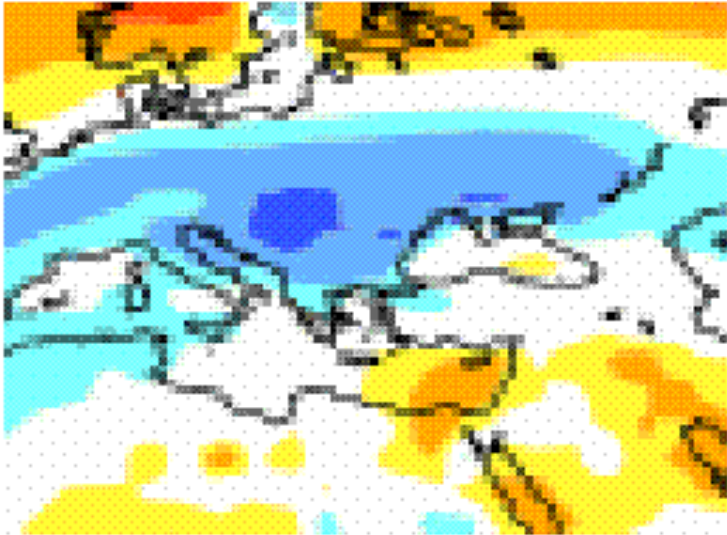


IRI Multi-Model Probability Forecast for Precipitation for December-January-February 2011, Issued November 2010



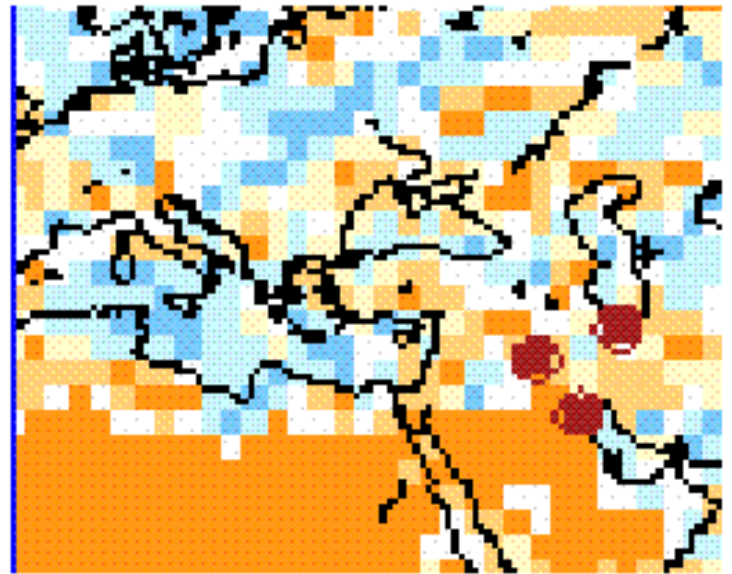
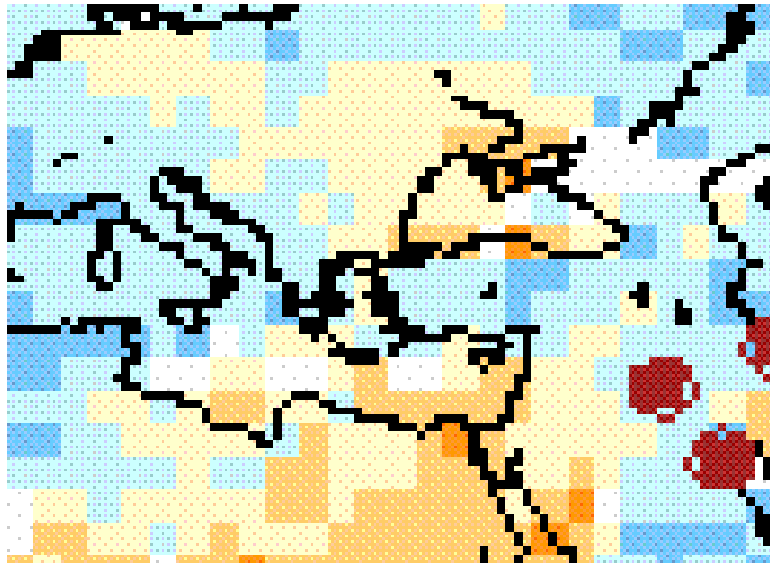
Seasonal Outlook for Winter 2010/11

- EUROSIP



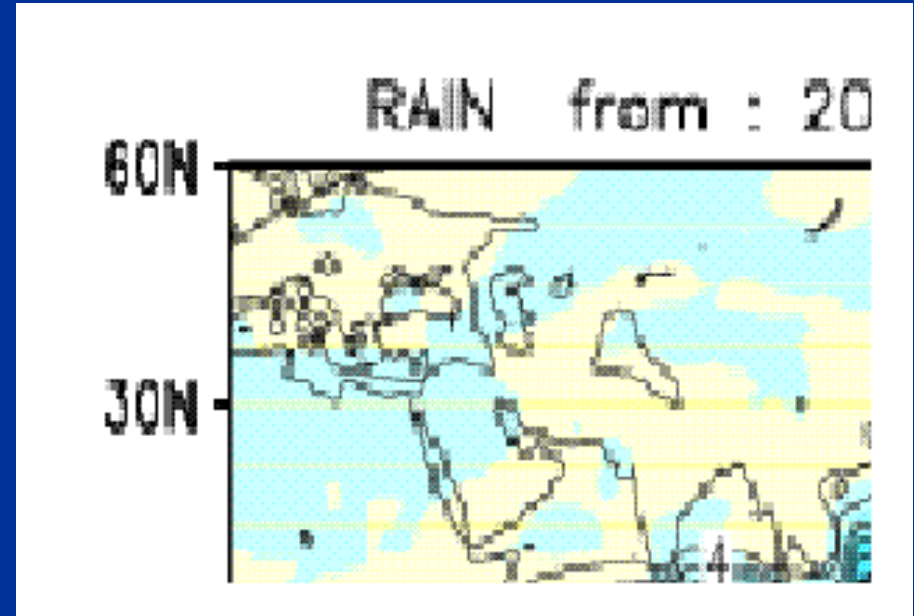
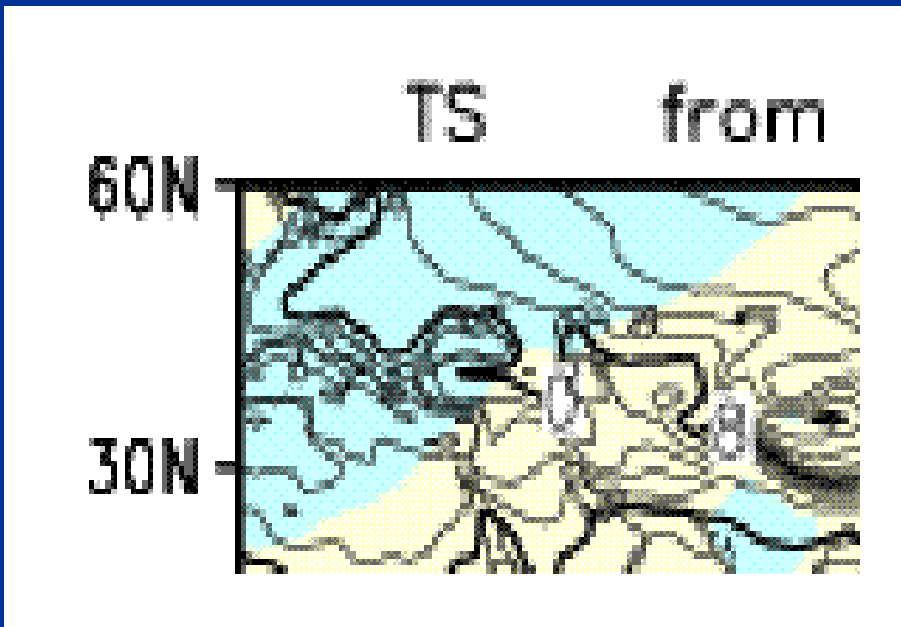
Seasonal Outlook for Winter 2010/11

- Beijing Climate Center



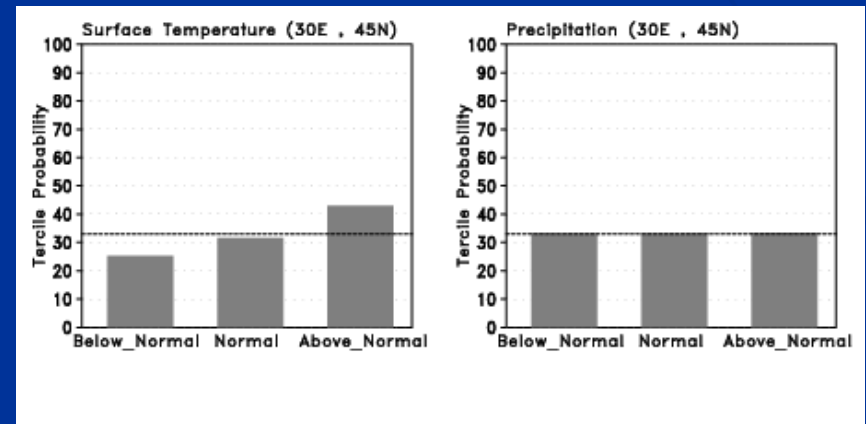
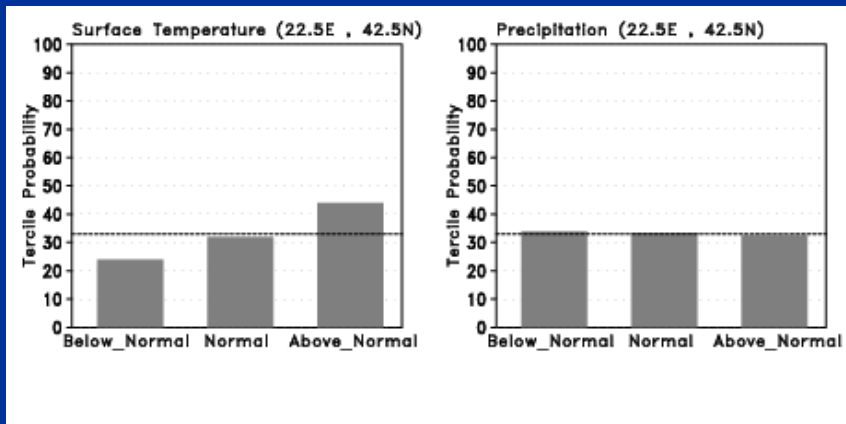
Seasonal Outlook for Winter 2010/11

- Tokyo Climate Center (GCM)



Seasonal Outlook for Winter 2010/11

■ Tokyo Climate Center (Predictability Tool)



Seasonal Outlook for Winter 2010/11

- Synthesis seasonal outlook for Dec2010-Feb2011 for Bulgaria by different models and predictability tools available on the web

Winter 2010/11	EURO SIP	ECMWF	Met Office	NCEP	IRI	TCC	BCC	Synthesis
Temperature	-2	-2	1	-1	-1	-1	0	-1
Precipitation	-1	-2	-1	0	-2	-1	0	-1

Winter 2010/11 by Months

- Synthesis of monthly predictions for the winter months in Bulgaria by different models and predictability tools available on the web

Temperature	NCEP	TCC	Ibimet	BCC	Synthesis
December	0	-1	1	1	0
January	-1	-1	1		0
February	1	-1	1		0

Precipitation	NCEP	TCC	Ibimet	BCC	Synthesis
December	1	-1	-1	0	0
January	-1	-1	0		-1
February	-1	1	-1		0

Winter 2010/11 by Months

- Available monthly forecast products on the internet
- ECMWF (4 weeks)
- NCEP (6 months)
- TCC (3 months)
- BCC (4 10-days periods or 1 month)
- Ibimet (3 months)

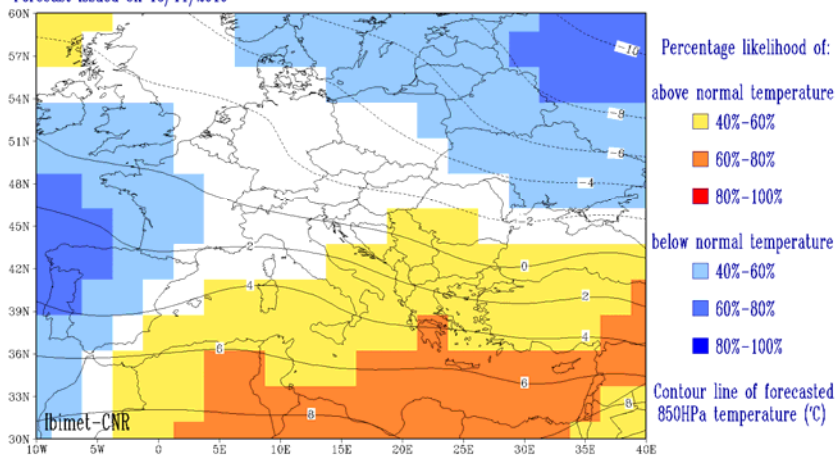
Winter 2010/11 by Months

Ibimet

December 2010

Most likely category for 850 HPa mean temperature
Forecast issued on 16/11/2010

Ibimet-CNR Seasonal Forecast
multi-regressive model
Hunter v2.01

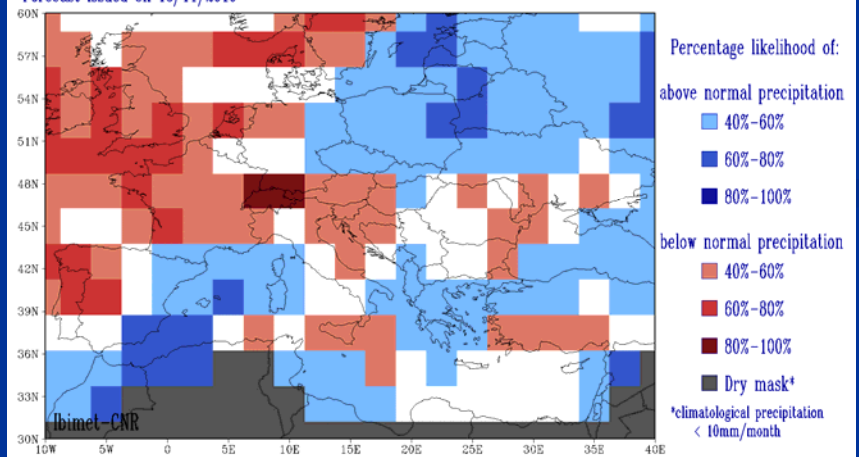


Based on NOAA NCEP-NCAR CDAS-1 monthly dataset at 2.5x2.5 spatial resolution with 1971-2000 climatological reference

December 2010

Most likely category for 1-month cumulated precipitation
Forecast issued on 16/11/2010

Ibimet-CNR Seasonal Forecast
multi-regressive model
Hunter v2.01



Based on NOAA NCEP-NCAR CDAS-1 monthly dataset at 2.5x2.5 spatial resolution with 1971-2000 climatological reference

Winter 2010/11 (NAO & ENSO)

- NAO forecast -1.54 ± 1.0
- It is kindly provided by the MetOffice by my private request because it is no longer available on their website. It use to be available as early as July. It is based on a relationship between the SST anomalies in the North Atlantic from an earlier month and the phase of NAO for the following winter. The skill is said to be 67% for the forecast of the sign of the NAO.
- ElNino/LaNina forecast (ECMWF, MetOffice, NCEP, BCC, TCC, and others)
- All centers predict that La Nina will stay for the winter. The ENSO forecast can be considered as reliable.

Winter 2010/11 (NAO & ENSO)

ENSO -	CD	CW	WD	WW
NAO+	32	18	32	18
NAO-	32	32	18	18

Winter 2010/11 Synthesis

Temperature	Month	Winter
December	0	-1
January	-1	
February	0	

Precipitation	Month	Winter
December		
January	-1	
February		

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