Monitoring Agriculture with Remote-Sensing MARS

EUROPEAN COMMISSION
Joint Research Centre
I.P.S.C - MARS Unit

ipsc Institute for the Protection and Security of the Citizen

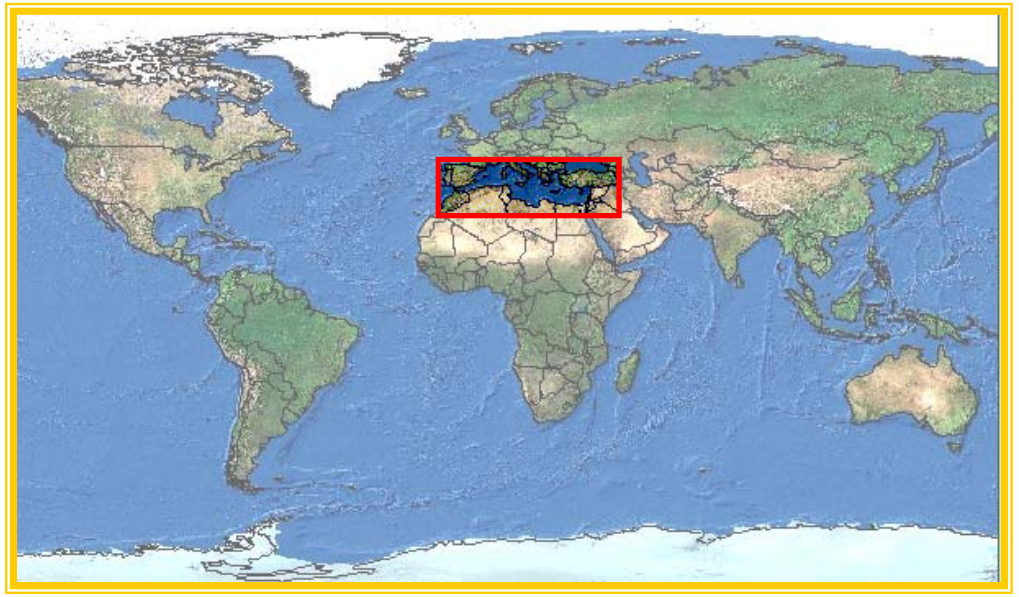
MONITORING AGRICULTURE for FOOD SECURITY

South and East Mediterranean Countries

Situation at the End of May 2004

Agro-meteorological overview for April - May 2004

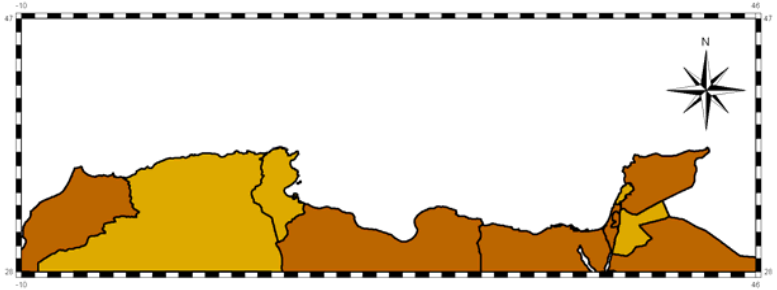
Bulletin №2 2004



Introduction

The present Bulletin is dedicated to the analysis of the agro-meteorological situation in the non-European countries of the Mediterranean basin during the period from the beginning of April to the end of May 2004. This is a period for winter crops ripening and harvesting in most countries of the region. Practically in all countries wheat and barley are the main winter crops. Additionally, sugar beets are cultivated in winter in Tunisia and Israel, as well as potatoes in Morocco. The main part of winter crops is cultivated in rain-fed conditions. In Israel, Libya and Syria about 20-30% of winter cereal crops and in Egypt and Saudi Arabia practically all crops are irrigated. The present Bulletin is devoted to the analysis of the meteorological conditions only for winter cereals.

The monitoring of the agro-meteorological situation is based on the analysis of the following dekadal data: minimal, maximal and average air temperature, sums of precipitation and global radiation, dekadal values of the climatic water balance, dekadal maps of the Normalized Difference Vegetation Indexes (NDVI), dekadal maps of Dry Matter Production. Meteorological data are derived from the outputs of the numerical meteorological model from ECMWF (UK), and were prepared for analysis by METEOCONSULT (NL). SPOT-VEGETATION data were used as a basis for calculation of the remote sensing indicators of crop growth. Data were preprocessed by VITO (BE). After that, dekadal maximal NDVI values were weighted for pixels within which winter crops are cultivated, and then – were weighted again on country level. Thus, weighted NDVI values were used as an indicator of crop status. Dry Matter Production maps were calculated by VITO based on SPOT-VEGETATION data and information about global radiation, applying the Monteith approach.
The Bulletin has the following structure. The first pages contain the main results of the analysis. The following pages are dedicated to the analysis of separate indicators of the crop growth during the period of analysis.



***Winter crop development stage during April-May**:*
gold – flowering-ripening; brown – ripening-harvesting.
(based on long-term average data, source FAO).

This is a Bulletin prepared by the MARS-FOOD sector, Agriculture & Fisheries Unit, IPSC, Joint Research Centre, European Commission.

Acknowledgements. *The following organizations were involved in data supply: VITO (BE), METEOCONSULT (NL), ECMWF (UK).*
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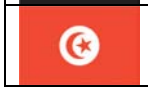
Highlights

Meteorological conditions during April-May 2004 were favorable for winter crop development in Morocco and Algeria, and were unfavorable in eastern Libya and in eastern Tunisia due to the low amount of precipitation. In general the meteorological situation during the current vegetative season was favorable for winter crops development in the Maghreb countries, and was close to normal in other countries, excluding eastern Libya.

Country by Country

	**Algeria**	The meteorological conditions during April-May were favorable for winter crops development, and better than in the previous year. The yield of winter cereals seems to be slightly higher than in the previous year.
	**Egypt**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year, or slightly lower.
	**Israel**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year.
	**Jordan**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year, or slightly higher.
	**Lebanon**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year, or slightly higher.
	**Libya**	The meteorological conditions during April-May were worse comparing with the previous year in eastern regions of the country. The yield of winter cereals seems to be lower than in the previous year.
	**Morocco**	The meteorological conditions during April-May were favorable for winter crops development, and better than in the previous year. But the yield of winter cereals seems to be slightly lower than in the previous year.
	**Palestine Auth.**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year.
	**Saudi Arabia**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year.
	**Syria**	The meteorological conditions during April-May were close to the previous year. The yield of winter cereals seems to be close to the previous year.
	**Tunisia**	The meteorological conditions during April-May were favorable for winter crops development, but slightly worse than in the previous year. The yield of winter cereals seems to be slightly higher than in the previous year.

The situation is detailed in the following pages.

Results of the analysis

The meteorological conditions during April-May 2004 were favorable and close to optimal for winter crops in the main cropping areas of Morocco, Algeria, Tunisia, and western Syria. Amount of precipitation was unfavorable for rain-fed winter crops Libya, Jordan, Israel, Palestine Auth., Lebanon and in eastern Syria. Extreme hot air temperatures took place only in Libyan, Egyptian, Syrian and Saudi Arabian oasis.

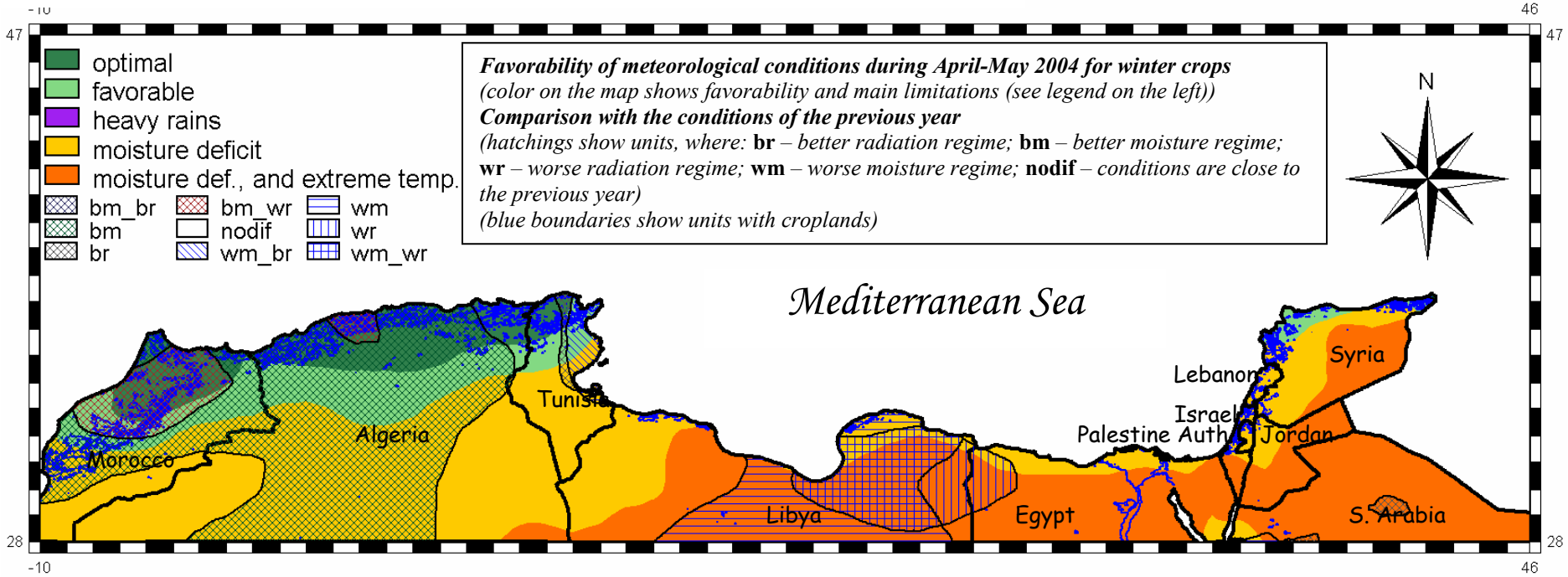
In general, the moisture and radiation regime during April-May 2004 was better as compared with the previous year in Morocco and Algeria. Worse moisture regime was observed in eastern Tunisia, and in eastern Libya. The moisture and temperature regime in the other countries of the region was close to the previous year.

It seems possible to conclude, that in general the meteorological situation during the current vegetative season was favorable for winter crops development in the Maghreb countries, and was close to normal in other countries, excluding eastern Libya, where it was worse due to the low precipitation.

The analysis of crop growth indicators shows that the winter crop status at the end of May 2004 seems to be better than in the previous year in Jordan, Lebanon, Tunisia, and especially in Algeria, and seems to be slightly worse in Egypt, Morocco, Palestine Auth., and Libya. The NDVI curve behavior shows that the winter crop development in Algeria, Morocco, and Tunisia has been similar to the previous season during which the yield of winter cereals was higher than normal. Crop development in Libya, Syria, and Lebanon was closer to the season 2000/2001 (yield of winter cereals was higher than normal in Syria and Lebanon, and lower than normal in Libya).

A summary of the analysis of the meteorological conditions for the winter cereals is given in the Table.

Comparing with previous season		
Country	***Meteorological conditions during April-May***	***Crop status at the end of May 2004***
Algeria	+	+
Egypt	=	-
Israel	=	=
Jordan	=	+
Lebanon	=	+
Libya	-	-
Morocco	+	-
Palestine Auth.	=	-
Saudi Arabia	=	=
Syria	=	=
Tunisia	-	+

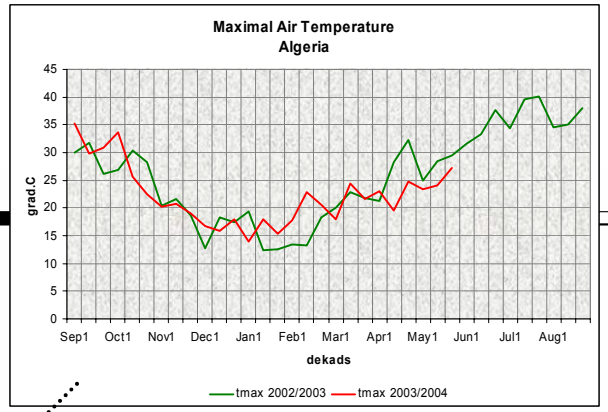


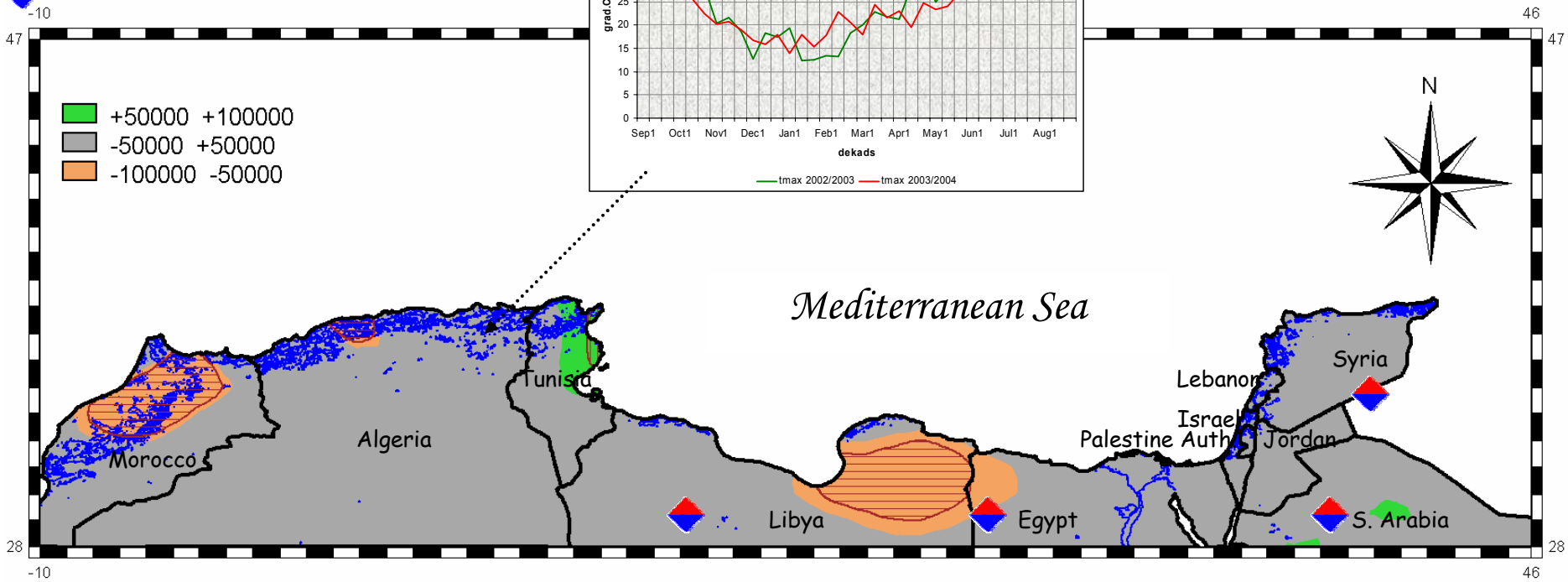
Global Radiation and Air Temperature

The amount of radiation was near long-term average values in all countries of the region, and close to the optimal for winter crops. The cumulated radiation during April-May was close to the previous year in most countries of the region, excluding Libya and Morocco, where radiation sum was slightly lower, and Tunisia, where it was slightly higher.
Average daily temperature was near +20+25^{0}C practically in all countries of the region. Tmin was higher than +5^{0}C practically everywhere. Tmax was extreme and near +40^{0}C during the period under analysis only in cropping areas of Libyan, Egyptian, Syrian and Saudi Arabian oasis. Maximal air temperature was near +25^{0}C in Morocco, Algeria, Tunisia, Libya, and Lebanon, and near +30 +35^{0}C in other countries of the region. The air temperature in general was slightly lower than in previous year in Maghreb countries, slightly higher in Libya, and close to the previous year in other countries of the region.

Global radiation (April-May)	Comparing with previous season *difference in %*
Algeria	**-4 +2**
Egypt	**-3 +1**
Israel	**-1 +1**
Jordan	**0 +2**
Lebanon	**-1 +1**
Libya	**-6 +2**
Morocco	**-6 0**
Palestine Auth.	**-1 +1**
Saudi Arabia	**+1 +3**
Syria	**-1 +2**
Tunisia	**-1 +6**

Difference in Global Radiation Sum (kJ/m^2) between current and previous seasons (April-May). Vertical hatching shows regions, where this difference was higher than 5%, and horizontal hatching – lower than 5%.
(blue boundaries show units with croplands)
- extreme air temperature



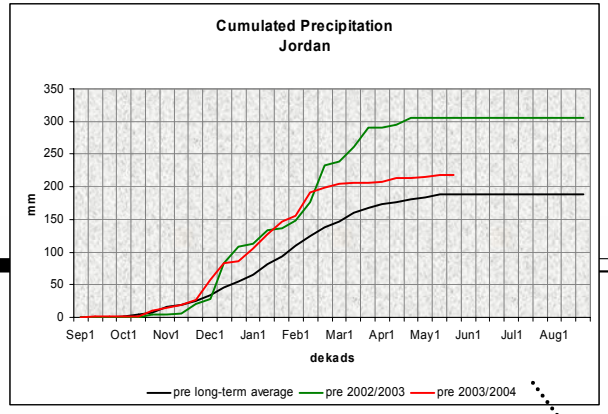


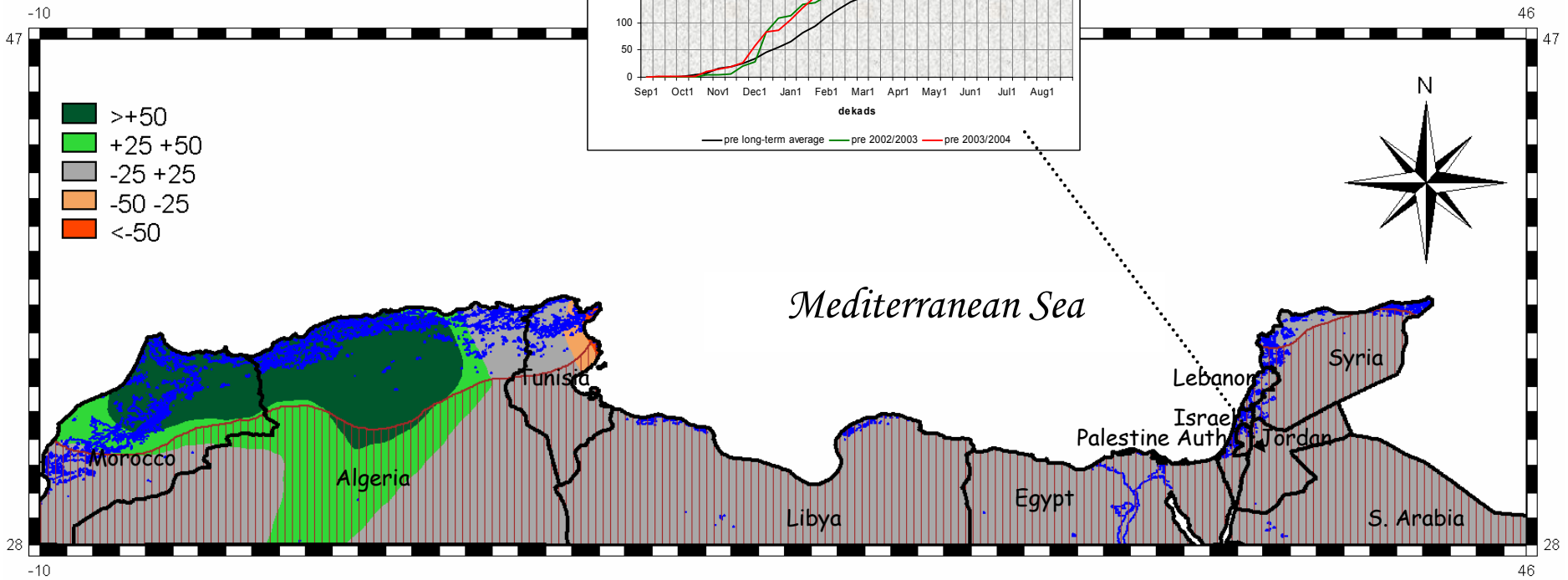
Precipitation Sum

Rains were very scarce during April-May 2004 in Libya, Egypt, Saudi Arabia, Israel, Jordan, and Palestine Auth.. Crops in Morocco and Algeria received near 150-200 mm of rain during the period under analysis.
In general, the amount of precipitation was close to normal in all countries of the region, excepting Morocco and Algeria, where it was higher than normal, and Saudi Arabia where it was slightly lower than normal.
The amount of precipitation during April-May was higher comparing with the previous year only in Morocco and Algeria, was lower in the eastern Tunisia, and was close to the previous year in other countries of the region.
The amount of precipitation cumulated for the current vegetative season (September-May) at the end of May, was higher comparing with the previous year in Morocco, Algeria, and eastern Syria, and lower in Israel, Palestine Auth., Jordan, Lebanon, and Libya. Simultaneously, the cumulated seasonal precipitation was higher than normal in the most countries of the region, excluding Saudi Arabia, and eastern Libya, where it was lower.

Precipitation for rain-fed winter crops (April-May)	Comparing with previous season
Algeria	+
Egypt	=
Israel	=
Jordan	=
Lebanon	=
Libya	=
Morocco	+
Palestine Auth.	=
Saudi Arabia	=
Syria	=
Tunisia	-

Difference in Precipitation Sum (mm) between current and previous seasons (April-May). Vertical hatching shows regions with amount of precipitation less than 60 mm during the period April-May 2004. (blue boundaries show units with croplands).





Climatic Water Balance

Dekads with negative climatic water balance (CWB) values were dominant during April-May 2004 in all countries of the region. As a result, cumulative climatic water balance for the period under analysis was negative everywhere.

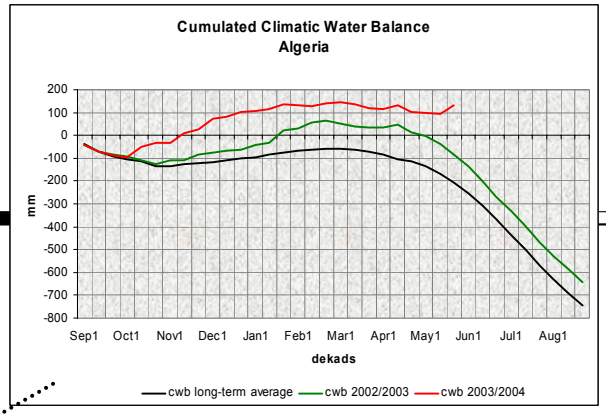
The climatic water balance situation during April-May was better than long-term average data for croplands in Tunisia, Morocco, and Algeria, and it was close to the normal for other countries of the region.

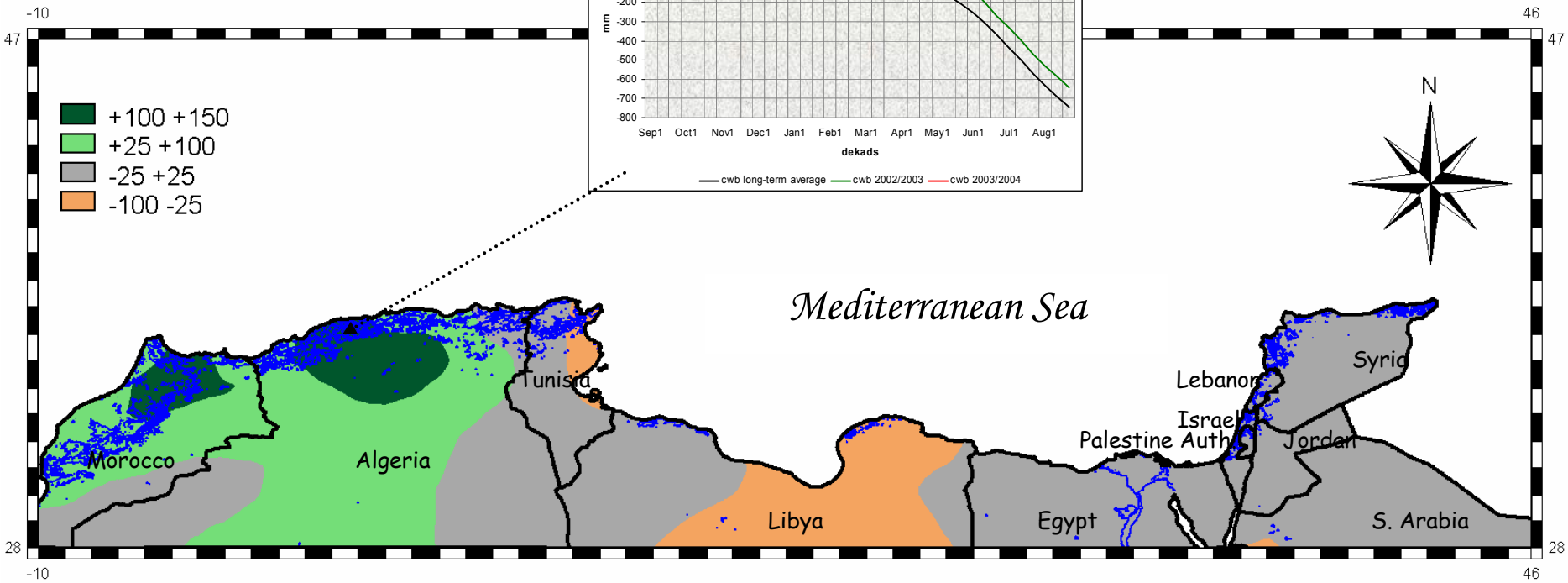
The CWB in April-May 2004 was better than in the previous year in Morocco and Algeria, and it was worse in Libya and Tunisia.

The Climatic Water Balance, cumulated for the current vegetative season (September-May) at the end of May was better comparing with the previous year in Morocco, Algeria, and eastern Syria, and worse in Israel, Palestine Auth., Jordan, Lebanon, and Libya. Simultaneously cumulated seasonal CWB is better than normal in the most

Climatic Water Balance for rain-fed winter crops (April-May)	Comparing with previous season
Algeria	+
Egypt	=
Israel	=
Jordan	=
Lebanon	=
Libya	-
Morocco	+
Palestine Auth.	=
Saudi Arabia	=
Syria	=
Tunisia	-

Difference in Climatic Water Balance (mm) for the period April-May 2004 and 2003.
(blue boundaries show units with croplands)





Remote Sensing Indicators and Dry Matter Production modeling

The NDVI curves demonstrate that the maximum of crop greenness was passed in March in all countries of the region, excluding Lebanon, where it was not yet observed at the end of May. The analysis of the NDVI profile's maximums shows that the crop status in current season was better comparing with previous year in Algeria, Jordan, Lebanon, Saudi Arabia, and Tunisia, and was slightly worse in Egypt, Libya, Morocco, and Palestine Auth.. Based on the NDVI curve behavior it seems possible to conclude that winter crop development in Algeria, Morocco, and Tunisia was close to the crop development in these countries during the previous season. Crop development in Libya, Syria, and Lebanon was closer to the season 2000/2001.

Dry matter production modeling shows better situation during April-May than in previous year in Algeria and Saudi Arabia, and worse situation in Libya, and Jordan. But these results aren't very significant for winter crop status determining in these countries, since crops are at the maturing stage.

Remote sensing indicators of winter crops status (current season)	Comparing with previous year	
	NDVI for winter wheat	Dry Matter Production modeling
Algeria	+	+
Egypt	-	=
Israel	=	=
Jordan	+	-
Lebanon	+	=
Libya	-	-
Morocco	-	=
Palestine Auth.	-	=
Saudi Arabia	+	+
Syria	=	=
Tunisia	+	=

Examples of weighted NDVI profiles for areas with winter wheat and for country level (blue color on the map indicates croplands)