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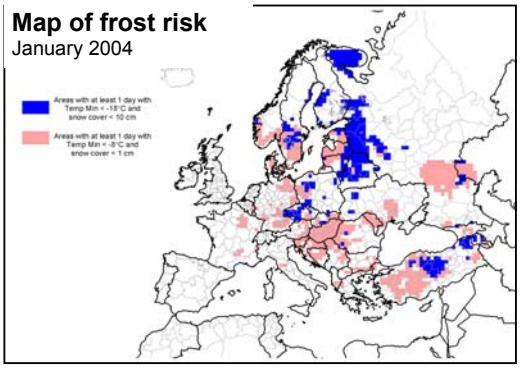
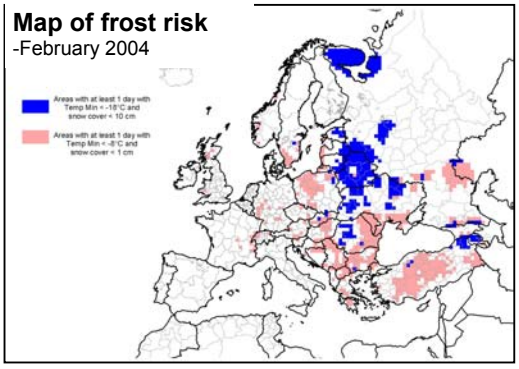
MARS Bulletin - January and February 2003

Generally mild winter.
Dry conditions in the Mediterranean area and eastern European Russia.

1. Agrometeorological overview *(January – February 2004)*

Generally higher seasonal temperatures. Low risk of frost damages due to extended and sufficient snow cover. Relatively dry in central and western Mediterranean Countries, wet in Eastern and Central countries and changeable in Russia.



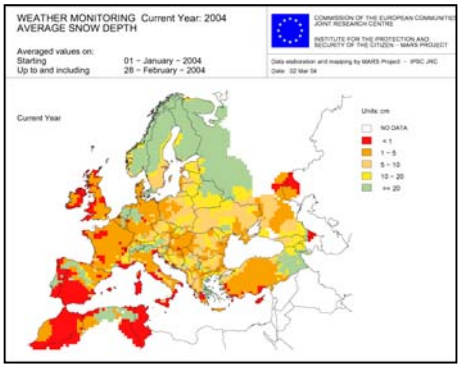


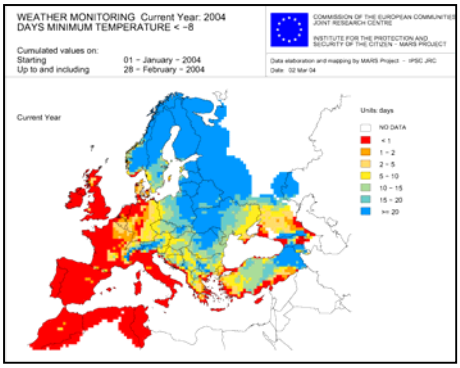
TEMPERATURE AND EVAPOTRANSPIRATION

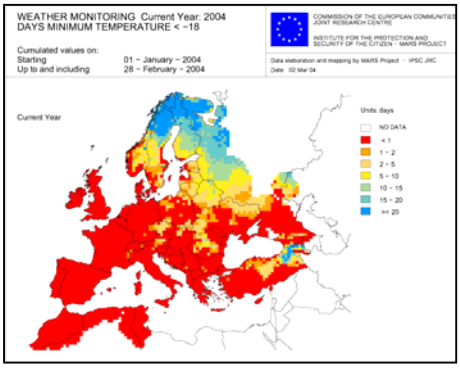
Warmer than average conditions in the central and eastern areas and low risk of frost damage on winter cereals (except small and scattered areas in the Czech Republic, Poland, Ukraine, Byelorussia, Russia and Turkey). Temperatures closer to average and relatively dry conditions on Maghreb, Iberian Peninsula and costal areas in France, Italy and Greece.

Analyzing the cumulated "active temperatures" (with base temperature = 0°C) in the whole period, it is evident that all the European territories experienced warmer than average temperatures, especially in Central-Eastern countries, Germany, Benelux, Austria, Denmark, Sweden, England and North-eastern France.

Studying in depth the **dekadal temperatures values** it appears that, in the period under consideration, the warmer conditions were interrupted by several cold waves: **in January,** during the first dekad, a cold wave crossed Greece, western Turkey, Hungary, southern Italy and France (in many areas in Germany, France, Central-Eastern countries, the minimum temperatures reached -10/-15°C, combined with consistent snowfalls); this was followed by a very warm period (with the exception of







Central-Eastern Europe).I In the last part of the month a second cold wave crossed the continent from Denmark to Greece (with more severe minimum values and abundant snow). In small and scattered areas in western Czech Republic, western Poland, Ukraine, and parts of Byelorussia, Russia and Turkey where the snow cover was insufficient, there were low or moderate levels of frost risk. At the beginning of **February**, all over Europe warmer than average temperatures were recorded (in several areas in Germany, Benelux, Poland and Czech Republic both minimum and maximum temperatures were also 8/10°C above the average); in the second dekad a new very cold wave, coming from the north-east, crossed Southern Italy, the Balkans, Turkey, and Greece, where exceptional negative peaks (8/10°C below the expected values and maximum daily values also below 0°C) were recorded. In the last part of the month another polar front, with intense snowfalls, invested Western Europe, England, Ireland, Benelux, Germany and part of Central Countries.

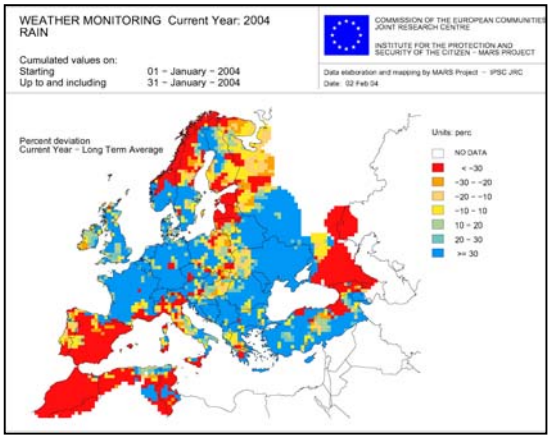
Due to the early stage of development of the active crops, the above-mentioned thermal conditions marginally influenced the values of the **potential evapotranspiration,** the **crops' development** and the **biomass production**. These were close to the norm in general all over Europe , with some localized exceptions in Great Britain, Germany, Benelux, Spain and Southern Italy where values slightly above the average were recorded.

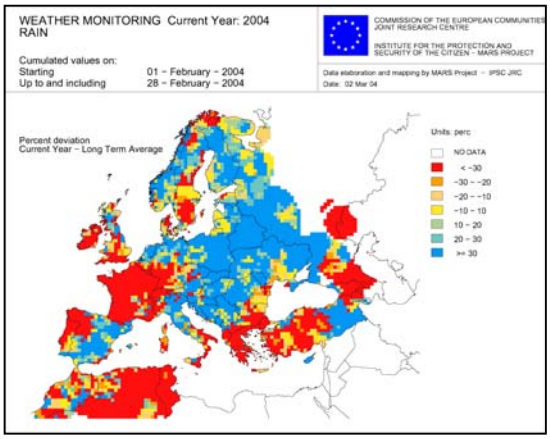
RAIN AND CLIMATIC WATER BALANCE

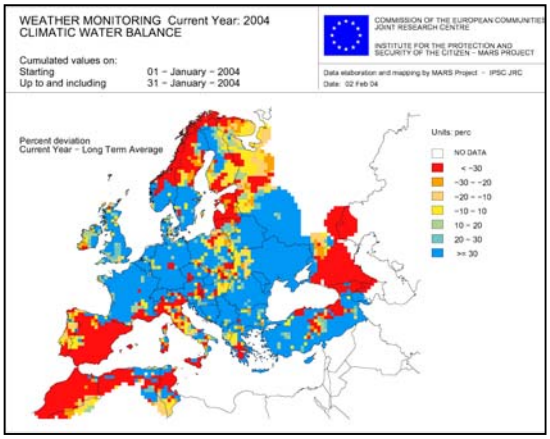
Both in January and February above average rains fell over the Central-Eastern Countries, Ukraine, Byelorussia and Turkey. Drier than average conditions on the coastal Mediterranean Countries (with the exclusion of Turkey), Iberian Peninsula, North Africa and Russia were recorded.

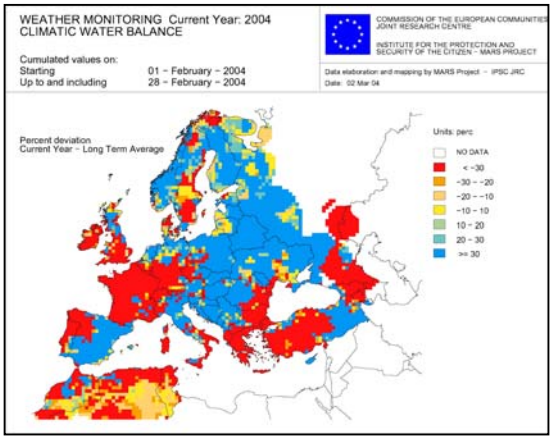
The **cumulated rains of the whole period** and their comparison with the long term average show significant higher values over South-west and central France (Midi-Pyrenees, Centre), North-East Italy (Veneto, Friuli), East-Central and South Germany (Niedersachsen, Sachsen-Anhalt, Bayern) Netherlands, Southern Sweden, Central-Eastern Countries, Ukraine, Byelorussia, Turkey (except the northern coast), North Balkans and Austria. In general these rains were well distributed, except in the Central and Eastern Countries where several consecutive rainy days were recorded.

On the contrary as a whole, Greece, North and Western Spain (Castilla y Leon, Aragon, Cataluña, Comunidad Valenciana), southern Italy (Sicily, Puglia, Sardinia) Maghreb and southern Russia received a **reduced amount of rain** and conse-









quently experienced a reduction of soil moisture. The possible impacts of these conditions on the active crops are not yet estimable, but are related to the future water supplies (rain and snow melt) and with the soil characteristics (soil water retention). The worst conditions seem to be present in southern Russia; where also in previous months (October-December 2003) the area received scarce rain supplies.

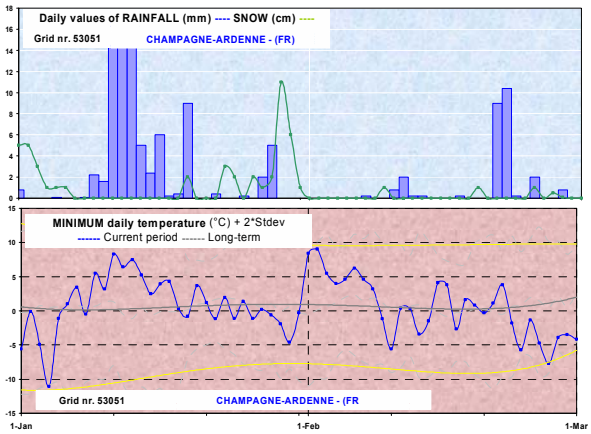
According to the rainfalls the **climatic water balance** present significant negative values compared to the average in Maghreb, Portugal, majority of Spain, southern Italy, southern France, Greece and southern Russia.
The areas most likely affected by **excessive rain** were Netherlands, Eire, South-West England, Northern Germany (Schleswing-Holstein), Central and North-West France (Bretagne), North Poland, Byelorussia, Eastern Ukraine and Southern Turkey where not very intense but persistent rains caused possible local and temporary excessive moisture conditions. The following maps show the distribution of the number of the rainy days (daily rain above 5 mm).

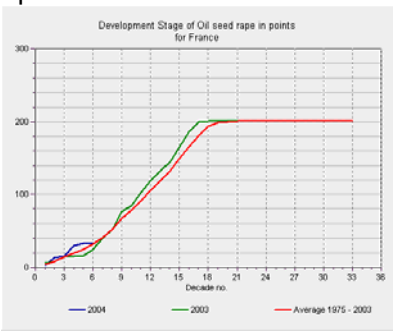
2. Highlights by region of interest

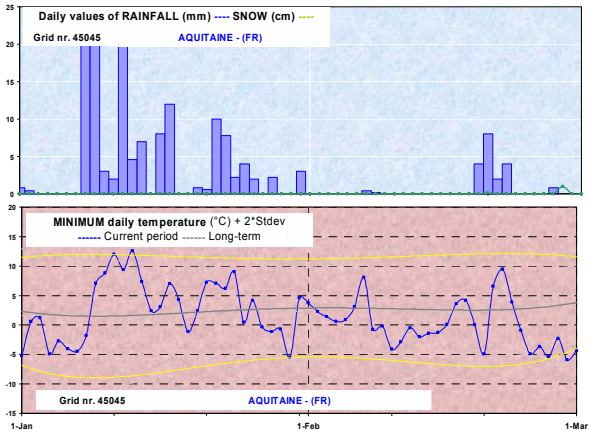
EU15

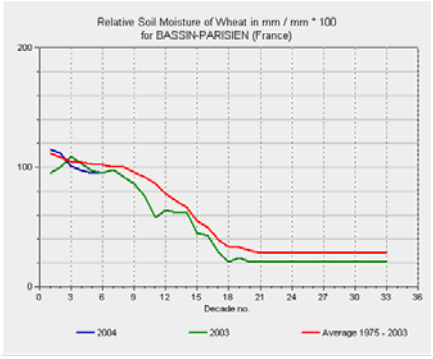
FRANCE: Mild winter

The period was characterized by milder temperature than average that shortened the dormancy period and favoured an early restart of the vegetation activity. However during the last decade of February the temperature felt below seasonal value.
Only few areas (mainly in Champagne Ardennes and Alsace) were exposed to possible frost kill conditions where temperatures below -8°C were recorded during 2 to 5 days. Except these limited zones, most of the crops could start the regrowth period with all their potential.
After a wet January with around 100mm, February recorded few precipitations (less than 30mm for most of the arable area) far below the long term average (<-30%). Auvergne was the drier region in France with less than 100 mm during the 2 month period. Further precipitation will be important to replenish the soil moisture in order to meet the winter crops needs at a new development phase.





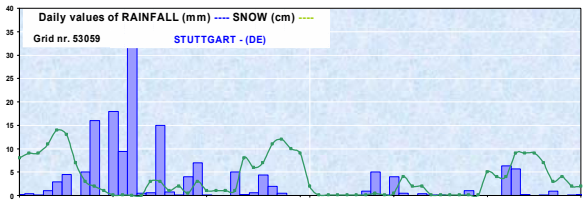


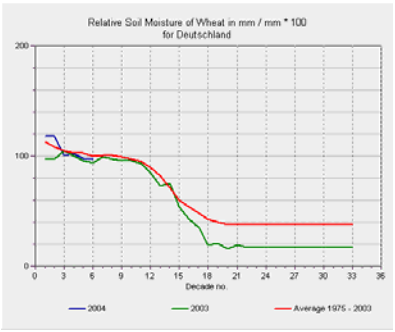


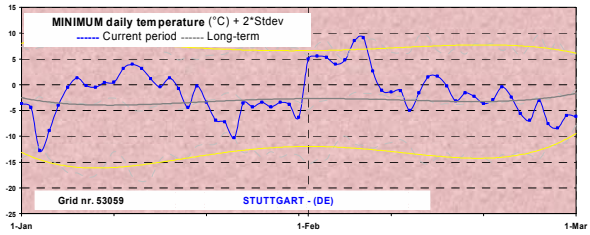
GERMANY AND AUSTRIA: Higher temperature than expected

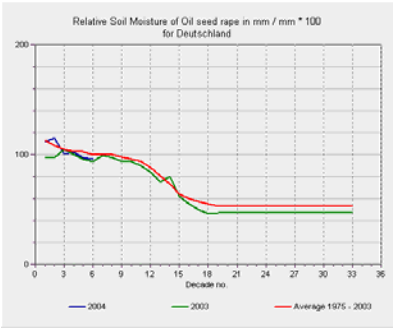
Germany experienced temperature above the average (more than 30% higher) during most of the period. At the beginning of February the minimum temperature increased up to 10°C for the half western part of the country. At the end of January and February the temperatures fall down below the seasonal level. Up to 10 days with minimum temperature below -8°C were recorded on the eastern part of the country but the sufficient snow cover should have prevented from frost damages.

Germany received at least 30% more rains than normal with 120 to 170 mm excepted in the central part where less than 100mm were recorded. After significant precipitations in January, February was drier than expected in the southern part.
Despite a reduction of the soil moisture particularly for the winter wheat and rape seed the soil water reserve should keep all the crops growth potential after the dormancy stage.

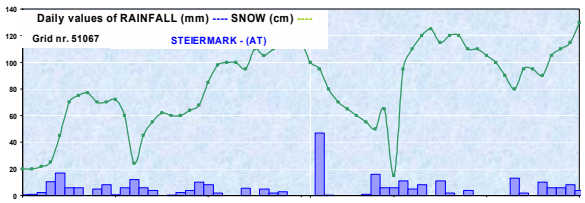


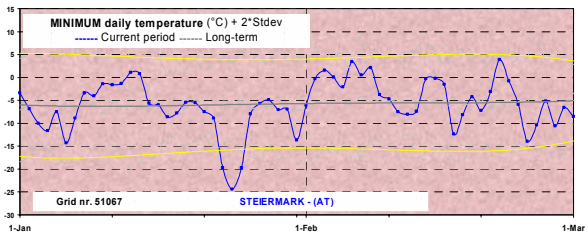






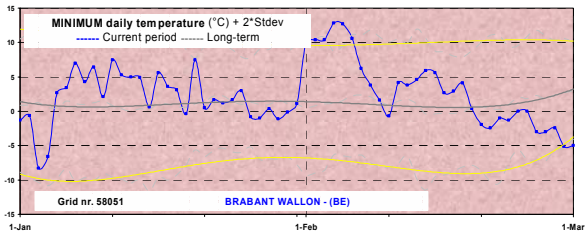
Austria received from 120 to 170 mm of rainfall in the central and western areas. The eastern part experienced relatively drier conditions with less than 100mm. The temperature remained higher than seasonal level during the 2 month period. However some extreme minimum temperature (up to – 25°C) was recorded and the snow cover was sufficient to prevent crop from frost kill.

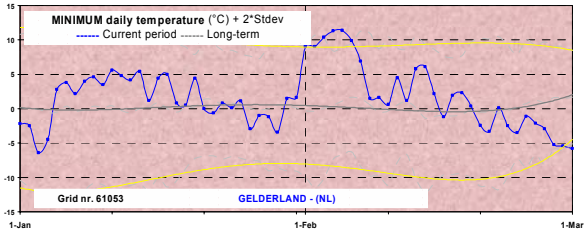




BELGIUM, THE NETHERLANDS, LUXEMBOURG: Mild, mild, mild.

The three countries recorded higher temperature than average (>30%). Except at the beginning of January and the end of February most of the daily minimum temperatures were above 0°C. This mild condition should have shortened the crop dormancy period.





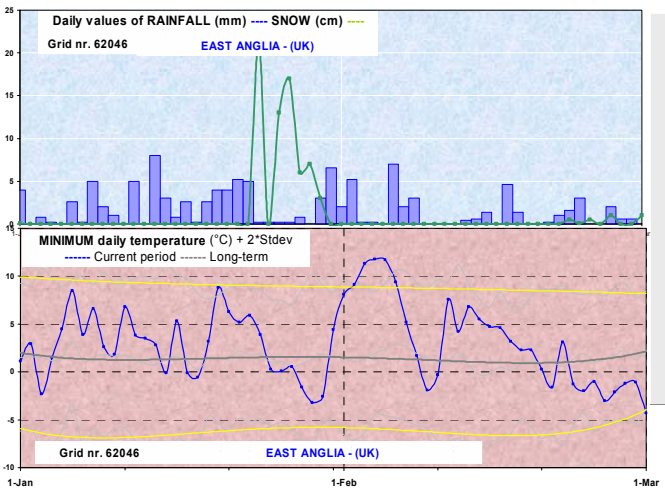
The Netherland with more than 165mm received abundant rainfall, **Belgium** and **Luxembourg** recorded more than 120mm mainly during the month of January. The crops that will start a new development will benefit from a normal soil moisture reserve.

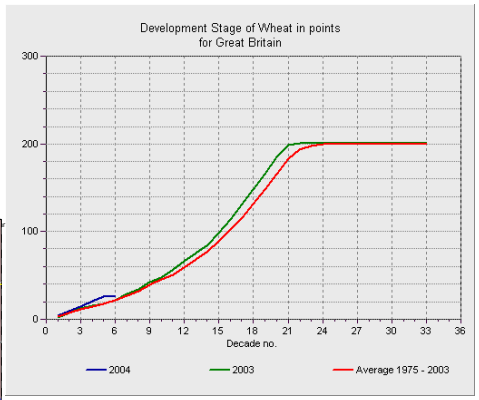
UK AND REPUBLIC OF IRELAND: in UK higher seasonal temperatures, normal in IE

In the UK, both in January and February the thermal conditions were higher than the average for the period. On the contrary, in Ireland the temperature values were very close to the normal.

In the UK, excluding the last dekad of February, during the remaining part of the considered period the **temperatures** (in particular the minimum daily values) were, on average, constantly 1°-2°C above the normal values. The rate of crops' development positively responded to these conditions. In fact, at the end of the period, according to the MARS simulations, **the crops in UK generally presented a slight advanced stage of development**. No frost risk conditions were observed. In the second half of February the temperatures dropped below the average prolonging the winter dormancy.

The cumulated values of **rainfalls** (between 100 and 250 mm, distributed over 25-30 days) were close to the normal, only in Scotland higher than average values were recorded (in some cases past 350 mm, equivalent to +70% compared to long term average). The rains were mainly concentrated between January and the first dekad of February. The last two dekads of February were practically dry. Overall, Ireland presented higher cumulated values compared to UK but slightly lower compared to the average.



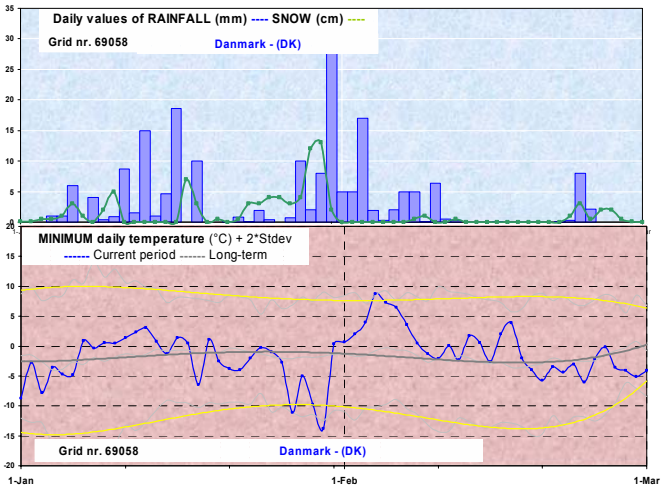


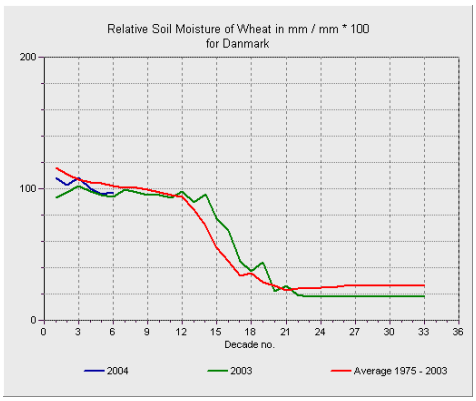
DENMARK, SWEDEN AND FINLAND: normal January, higher seasonal temperatures in February.

As a whole, during the period in Denmark and Sweden the "active temperatures" (base temperature = 0°C) were above the average. On the contrary, in Finland normal conditions were reported.

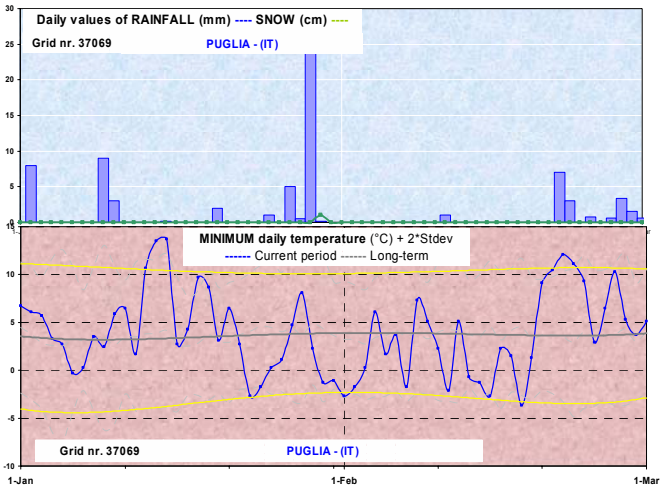
In Denmark and Sweden, during the considered period the **maximum daily temperatures** were relatively close to the norm, only during the first and second dekad of February they were significantly above the average. On the contrary, the **minimum daily temperatures** oscillated within a large digression; especially between the last dekad of January and the first of February, when temperatures passed from -14/-16°C to 7/9°C in a few days. The frost effect on the crops was minimized by the snow presence and frost damages seem unlikely.

The cumulated rain values were close to the norm and also their distribution was such as not to determine problems.

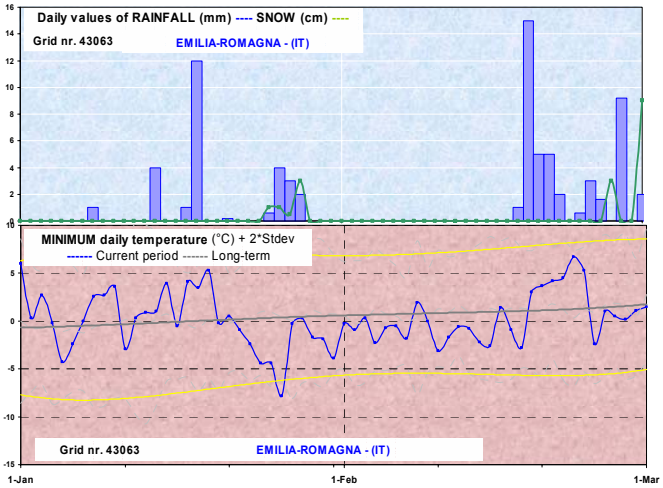




ITALY: Temperatures close to the norm (except North-East), relatively dry North-West and Southern areas, extended snow cover.

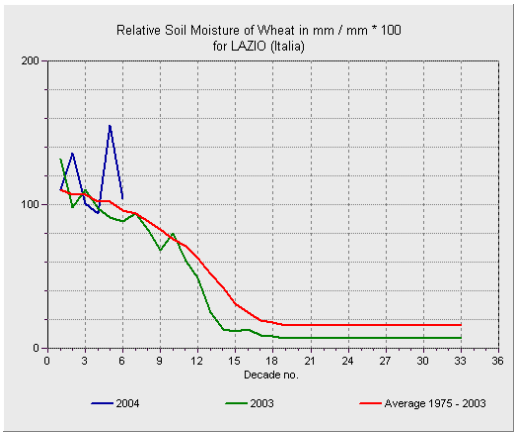


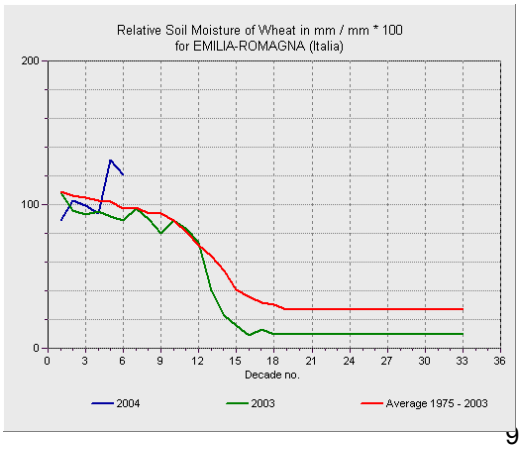
During the period under consideration the **temperatures** oscillated according to the synoptic fluxes. Especially the southern areas were affected by air masses coming from different quadrants (from south-west to north-east), with consequent rapid variations in temperatures. In **January** two cold waves (with extended snowfalls) were separated by a southern flux which rapidly and significantly increased the temperatures (especially the minimum values). **February** started with higher seasonal temperatures in Northern areas but in the second part a new cold flux invested the South and in the last part it left these areas and moved towards the North. The snow cover protected the crops and frost damages are not likely.



As a whole, the **rain** was abundant in the North-East (+30/40%), normal in the Central areas and relatively scarce in the South and North-West (-40/-50%). During the second dekad of February some intense showers (60-70 mm) or consecutive rainy days were reported in North-East and Centre areas. In these areas local and temporary excess of soil moisture was possible.

Due to the early stage of development and the snow cover presence, the winter crops should not be affected by frost kill.



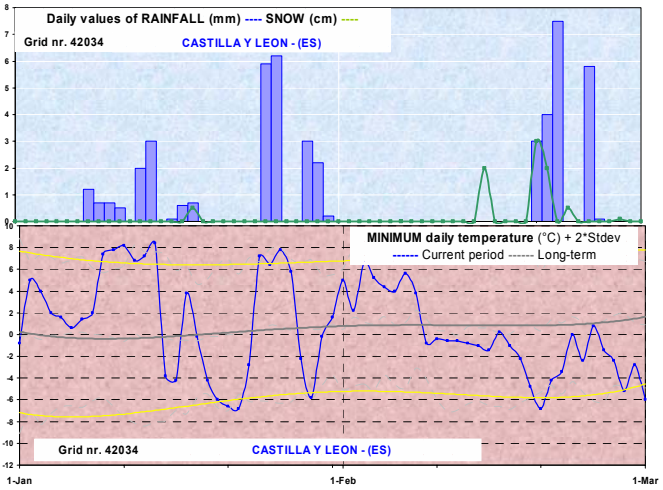


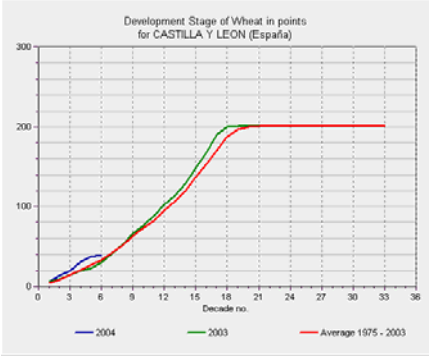
SPAIN AND PORTUGAL: Temperatures slightly above the average, normal rain supply (except North-West areas)

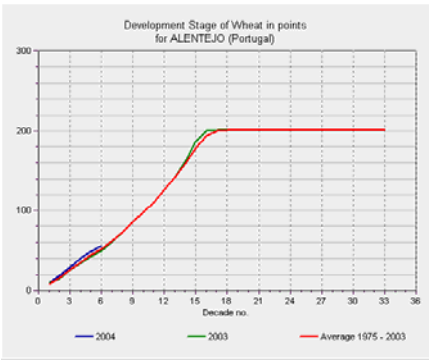
The New Year started with four consecutive dekads warmer than average especially in Central and Northern areas. In the second half of **February** the temperatures dropped (in particular the maximums) below the seasonal values and at the end of the month in the Central-Northern areas snowfalls were reported.

The **rain** was globally close to expected (only the north-western Spain and Northern Portugal received lower than average cumulated values) but varied in distribution in the north-west and South and East areas, respectively: scattered in January and in the last dekad of February; very dry in January and several consecutive rainy days in the second part of February.

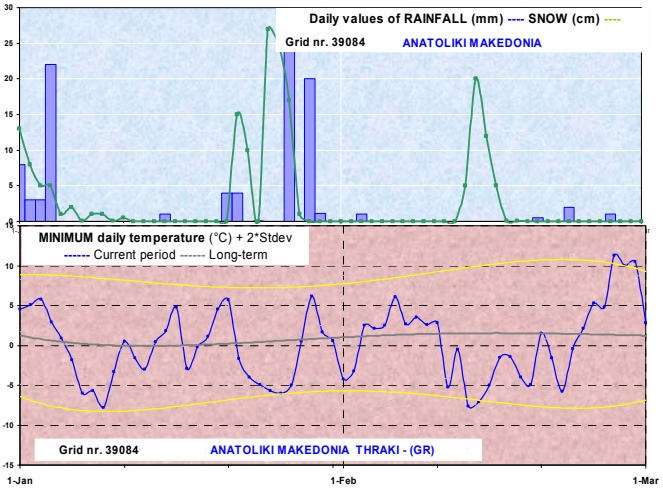
In January, the crops' development positively responded to the favourable thermal condition, but at the end of February, due to the cooler conditions, more normal values are simulated.



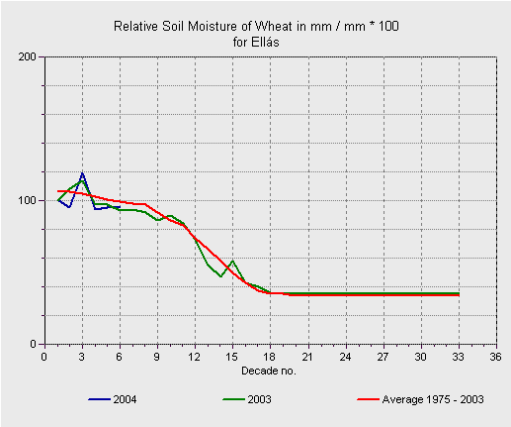




GREECE: Cold and wet conditions in January, warmer and drier than average in February.



As a whole, the **active temperatures** (base temperature = 0°C) during the considered period were close to the norm, but actually the temperatures oscillated according to the general air masses' circulation. **January** started and finished with temperatures lower than seasonal values associated to extensive and significant snowfalls, especially in Kentriki Makedonia and Anatoliki Makedonia. In the first half of **February** similar char-



acteristics were present and the second snowfalls affected practically the whole country. In the last part the weather changed drastically and higher than normal temperatures were recorded.
The **rain** was mainly concentrated in January during the first and last dekads. On the contrary in February the only precipitation recorded was practically only due to the snow. According to the rain's course, at the end of January, the soil moisture reached higher than normal values, but rapidly compensated in February.

CENTRAL EUROPEAN COUNTRIES

ESTONIA, LATVIA, LITHUANIA: Normal winter conditions.

The temperature for the first two months of the year was close to normal, except for a warmer February for the seashore area of Lithuania and for parts of Latvia. The snowfall ensured a protective layer for the well hardened winter crops so although a serious reduction of the leaf index is expected, the plants will be able to recover in the spring but with some delay.

POLAND: Frost risk present in limited areas.

Although January and February were warmer than usual, in some limited areas winter crops were affected by some frosty days (below -18 °C) in January when a reduction of initial plant population was possible to occur and in larger areas unfolded leaves of winter crops were damaged in spite of the good cold hardening status due to the thin snow layer. The crops from these areas are expected to recover in the spring and larger zones from centre and south-west of the country experienced less difficult conditions.

CZECH REPUBLIC, SLOVAK REPUBLIC, HUNGARY, and SLOVENIA: No serious frost problems identified.

Low temperatures reduced the leaf area index of wheat crops from the Czech and Slovak Republics but recovery is expected in the spring.
For Hungary and Slovenia no special frost problems are expected even if for some days temperatures decreased to below -8°C and the thickness of the snow layer was less than 1 cm because the winter wheat crops were supposed to be in good hardening conditions.

ROMANIA: Possible frost-induced problems in the centre of the country, but better conditions expected for the rest of the country.

Winter crops from the centre of Romania may be injured by the temperatures below -18°C in January. Above the ground biomass in southern and eastern parts of Romania should be also affected by the temperatures below -8°C which occurred when the snow cover was too thin to provide a good protection, however the wintering conditions are much better than in the previous year.

BULGARIA: Crops with no major damage but vulnerable to a late frost.

Most of the Bulgarian territory received fewer precipitations than in the previous year except the eastern part of the centre of the country where the weather was warmer.
Even if the air temperature decreased on large surfaces below -8°C and the thickness of the snow layer was less than 1 cm, the above ground biomass was affected only on different zones along the western and southern borders of the country and also in the northern area of the country. The damages are not important for the winter wheat, which seems ready for a quick start in the spring, but as a counterpart the lowering hardening index (less than 60% from maximum value) suggests that the crops may be vulnerable to an occasional late frost.

TURKEY: Leaf area index reduced by frost especially in the central areas of the country.

Large areas from north-west to the centre of Turkey were affected by frost in January and partially in February, leaf area index being decreased by frost. Above ground biomass is at a lower level than in the previous year, except some areas along the western and southern seashore. The relative soil moisture is at the long term average level.

EASTERN COUNTRIES

UKRAINE: A better situation than previous year.

Repeated moderate frost risk (less than -8°C and less than 1 cm of snow) occurred in January and February for South-Eastern Ukraine, meanwhile temperatures below -18 °C were recorded for some areas in the north and north-west of the country. It may be supposed that strong winds induced local alterations of the depth of the snow layer and its thermal insulation capacity. The leaf area index of the crops from west and north was decreased by frost but from this point of view the situation of the winter wheat seems better in comparison with the previous year.

BELARUS: Wet and frost conditions.

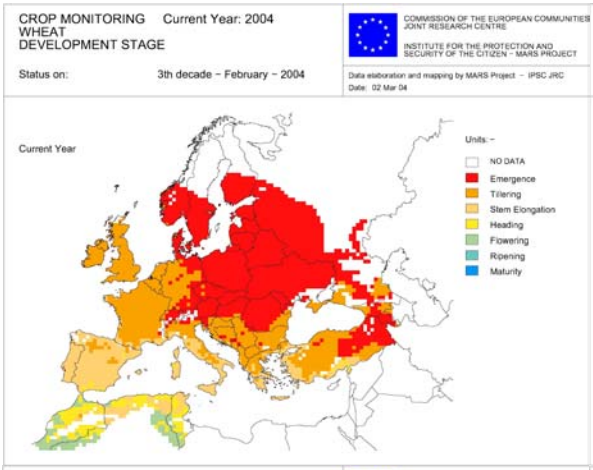
The precipitations received in January – February 2004, exceeded by 30% the long term average for the same period. The temperatures below -18°C combined with snow layers thinner than 10 cm reduced significantly leaf area index of the crops especially in the north of the country.

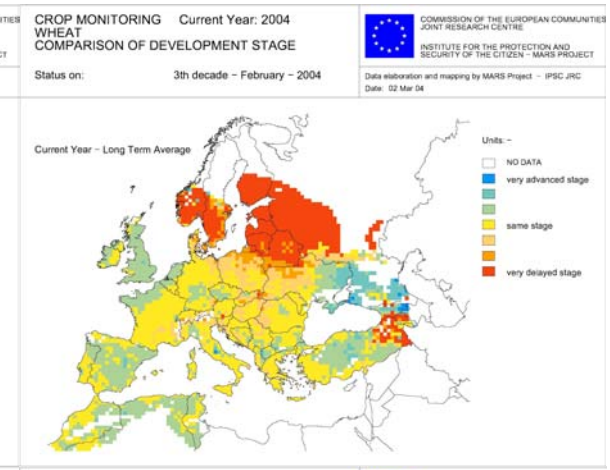
RUSSIA: Considerable frost risk in some areas.

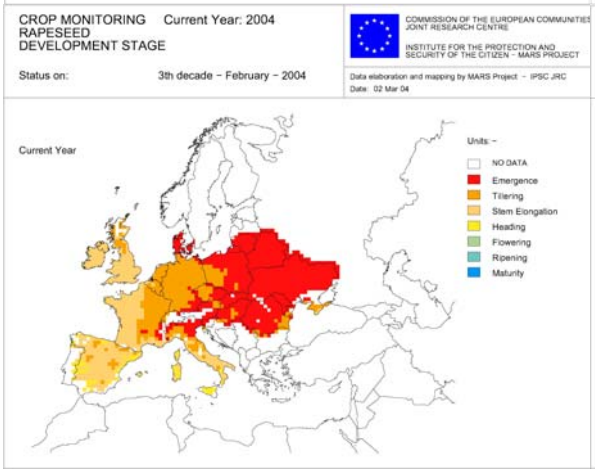
According to the available weather data, it may be suggested that the winter crops were damaged around the Ulianovsk zone, (including parts of the administrative units of ("oblast") of Saratov, Nizhniy-Novgorod and Penza). Here it was a the coincidence of low temperatures, thin snow cover and low values of the calculated hardening index, but the crop status at the end of February is somehow better than in the previous year.
Leaf area index of the crops from other regions should be also decreased by frost. Soil water supply which was at a lower level already at the time of sowing decreased even more due to the lack of precipitations in the first 50 days of the year 2004, but at the end of February the long term average level was reached.

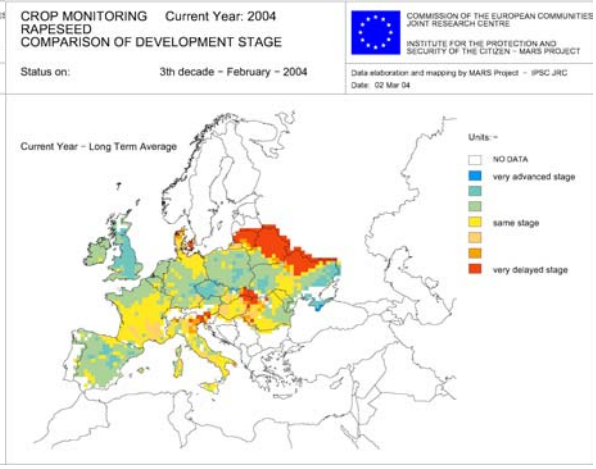
3. MAPS

CROP MAPS

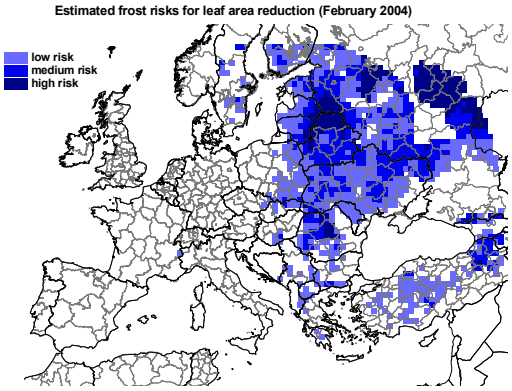


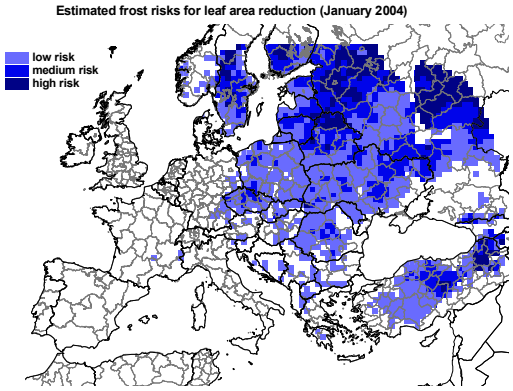




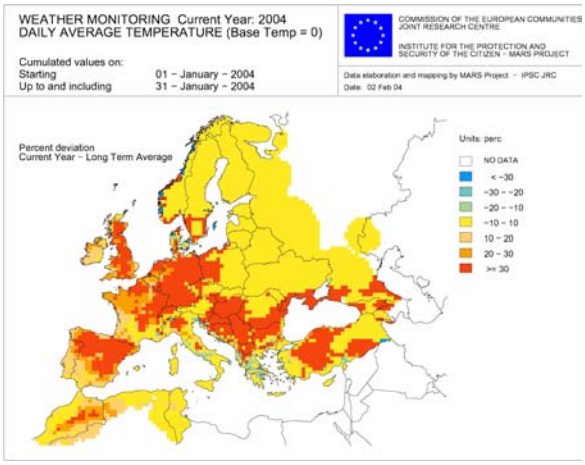


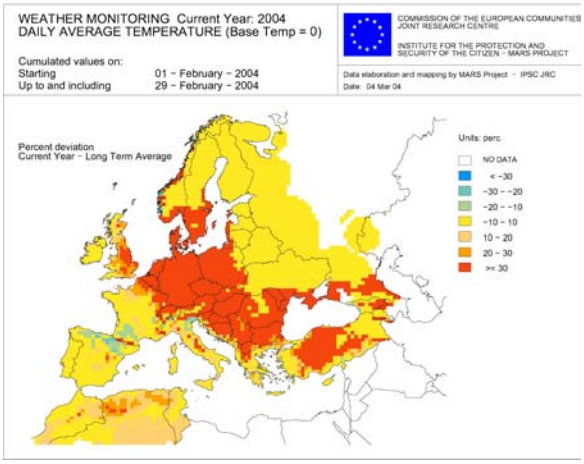
Frost risk for leaf area





TEMPERATURE MAPS





RAINFALLS