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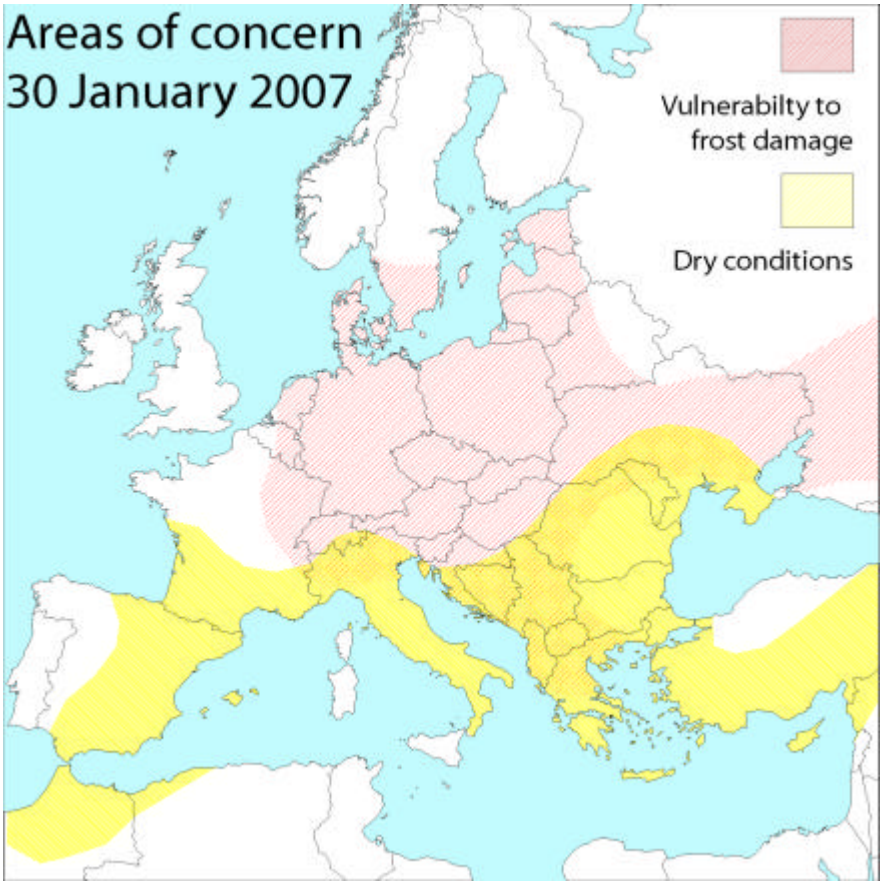
MARS Bulletin – November, December 2006, January 2007

This Bulletin focuses on major issues related to to Winter crop sowing conditions, water reserves status and risks of frost impacts

UNSEASONABLE MILD TEMPERATURES INCREASED VULNERABILITY OF WINTER CROPS TO FROST DAMAGES. DRY CONDITIONS IN MED AREAS



Contents

1. Agrometeorological overview

Persistent anomalous warm autumn and winter beginning: in particular in Eastern Europe and northern Italy. No relevant frost events. Wet at higher latitudes, quite dry in the Mediterranean Basin and Black Sea.

1.1 TEMPERATURES

Following a quite mild October, the warmer period continued until the 20th-22nd of January. Those higher than seasonal temperatures were favourable to a rapid germination and tillering of the new winter cereals but meanwhile exposing the new plants to a higher risk of frost damages (due the reduced "hardening" process). The effects of the anomalous but more favourable thermal conditions determined also a growth of the pasture canopy and in many case an earlier sprouting of natural vegetation. The most relevant anomalies were recorded in the Baltic's countries, Denmark and northern Germany, where at the end of January a surplus of 300-350°GDD (as compared to the LTA) was accumulated, equivalent in many case around to 300-400 % .

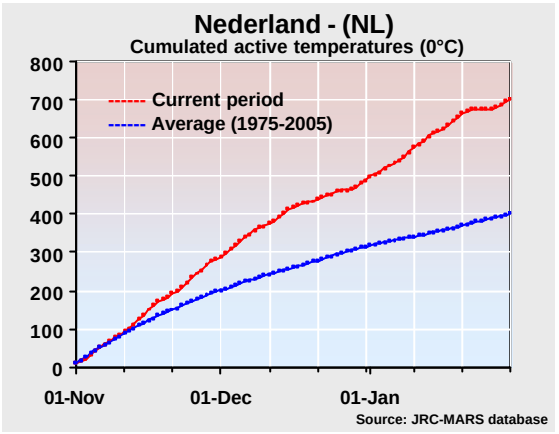
In **November**, the warmer than seasonal condition occurred mainly the second half of the month and affected the area between Portugal and Baltic Sea; on the contrary southern Italy, Greece and Turkey were slightly colder than average. In Germany, Denmark, Poland and The Netherlands the mean temperatures were in average 4-5°C above the seasonal values and in many cases reached the highest values for the period since 1975. Only in 1994 similar conditions were recorded. In these areas the minimum temperatures remained below the 0°C threshold only for 3-5 days. At the end of the month the cumulated active temperatures (Tbase 0°C) were 80-100° above the long term average.

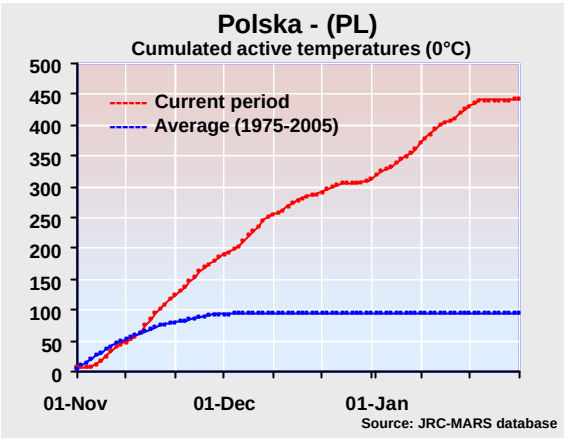
In **December** the warm anomaly was even more significant than in November: this phenomenon affected the whole continent and in particular in Baltic's States and eastern EU both the maximum and minimum temperatures were also 10-12°C above the seasonal values. They remained along the whole month above the seasonal averages. The most relevant anomalies occurred around the Baltic Sea basin, where at the end of December 120-160° GDD above the average were recorded. More seasonal conditions occurred in the Iberian Peninsula and western France. Those mild thermal conditions interrupted in many cases the winter cereal dormancy, increasing the risk of frost damages, but fortunately no relevant frost events occurred or were mainly concentrated at higher altitude. A relative higher than normal frequency of frost events was recorded in France and Spain, where in the second half of the month more seasonal conditions were re-established.

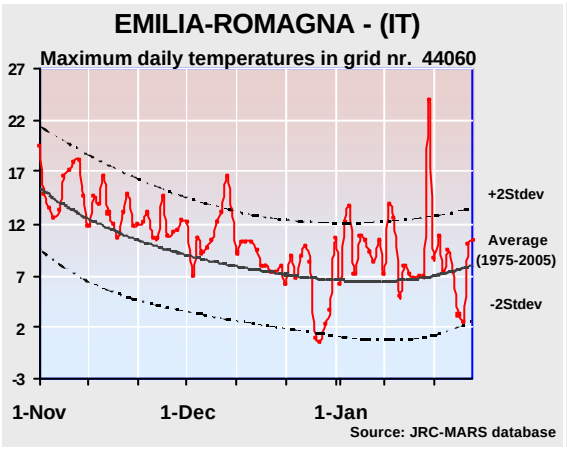
The New Year started without a significant change. A persistent high pressure system blocked on the Mediterranean area pushed to cold air to very high latitudes. Therefore also during the first and second decade of **January** warmer than seasonal conditions persisted. Again, the more continental part of EU ex-

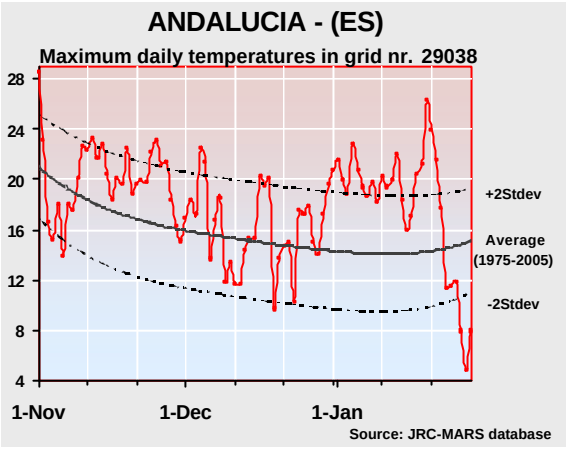
perienced anomalous mild temperatures. An extreme warm wave affected Italy between the 19th and 26th when a very warm wind (Föhn) determined an anomalous, sudden and rapid increase of the temperatures which reached values never registered since 1975: 17-20°C and even 22°C above the seasonal average!

In the last part of the month the general circulation definitively changed and cold artic air irrupted the continent and consequently a rapid drop of temperatures was registered, which was more significant in the western part of Europe (mainly Spain).



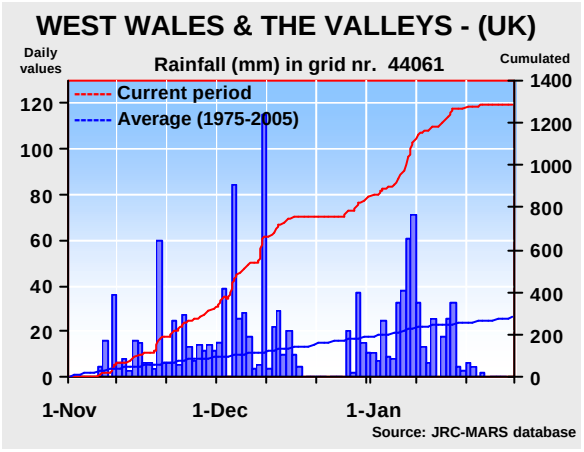


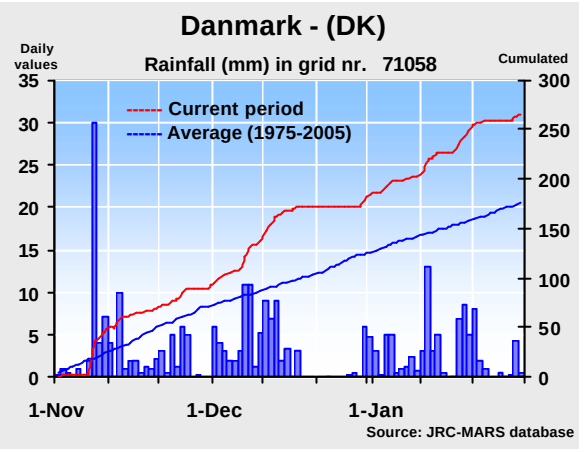


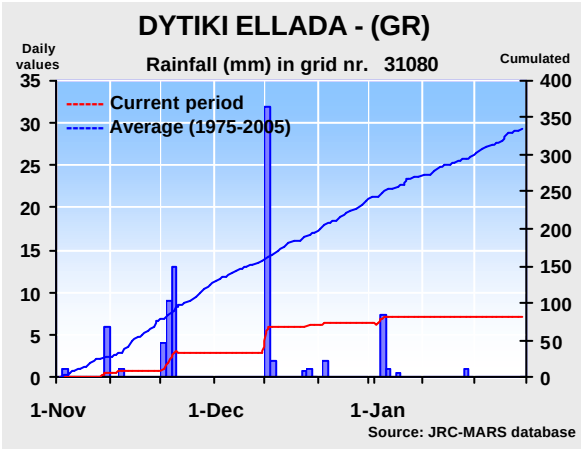


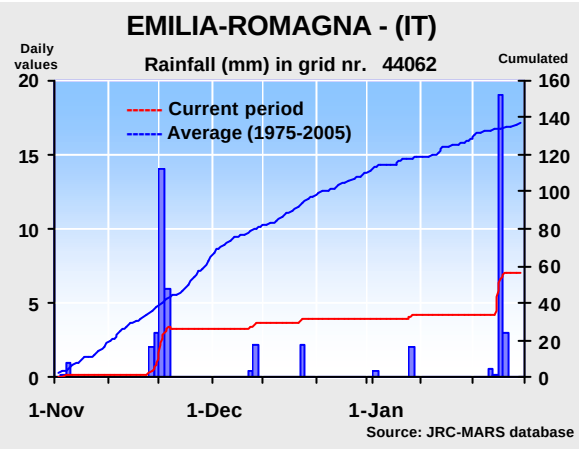
1.2 RAINFALL AND CLIMATIC WATER BALANCE

The particular synoptic circulation (persistent high pressure system based on central Mediterranean), which characterized the whole period, pushed the main Atlantic rainy fronts towards the higher latitudes. Therefore, in all the areas close to the Atlantic coastline (Normandy, Eire, Scotland, Wales, northern Germany, Scandinavia, Denmark, Poland and Baltic's) the cumulated values were largely higher than the seasonal norm: in average +50/60% as compared to the LTA, but in some case also +100/150% (northern Poland, southern Sweden, and Scotland). Because of the same reason, in the other areas a north-to-south gradient was evident and the Mediterranean regions (mainly: eastern Spain, southern France, Italy, Greece and Turkey) experienced a significant deficit: in average -50/-70% as compared to the LTA. At higher latitudes, practically the rain was persistent along the period even with some intense events (>80-100 mm/day). On the contrary in Southern Europe the significant rainy days (>5 mm/day) were just a few and scattered into the three months. Moreover, in these areas the water supply deficit was even more increased due to the higher potential evapotranspiration. Therefore, the climatic water balance presented in general larger deficits. It must be stressed that the impacts of the shortage of rain supply in this season will be evident only in the next moths when the crop water requirement will be significant.





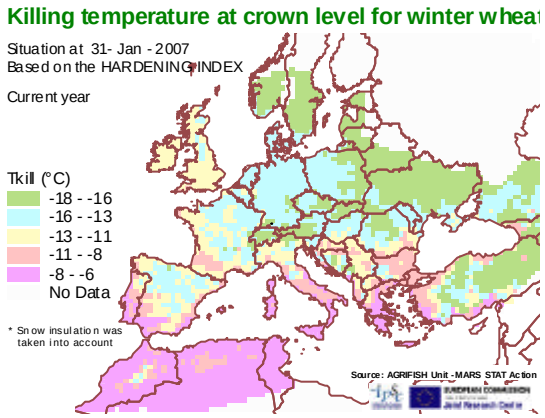


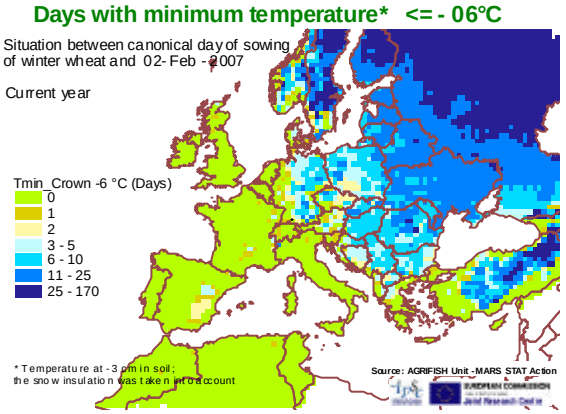


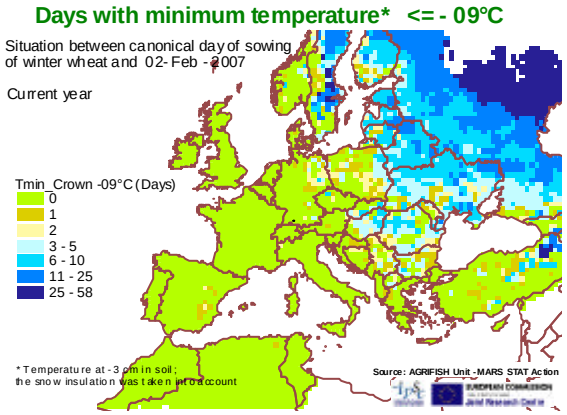
1.3 FROST RISK ANALYSIS: MINIMAL FROST DAMAGES

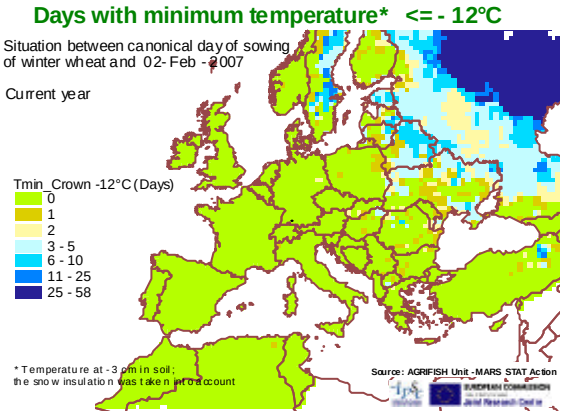
The unusual warm period minimised the frost damages for most of the continent. Fortunately, the decrease of crop resistance to frost induced by the temperatures above +10°C (dehardening) was not followed by sudden frost episodes. In fact, in most cases the fewer than usual frosty days occurred gradually after several cool and often sunny days in which the re-hardening process was possible. For the moment the highest risk for further frost damages (lower hardening index plus significant probability of occurrence of some frosty days) seems to be located in the southern part of lower Danube basin.

The analysis of minimum temperature adjusted for the soil depth -3 cm (crown level) is showing a clear milder situation compared with the last 5 years for Belarus, Ukraine and adjacent areas of Russia. Short moderate frost events (about -9°C), with possible impact on winter barley, occurred in south-eastern Spain, eastern Germany, Poland, Hungary, Romania and Bulgaria.

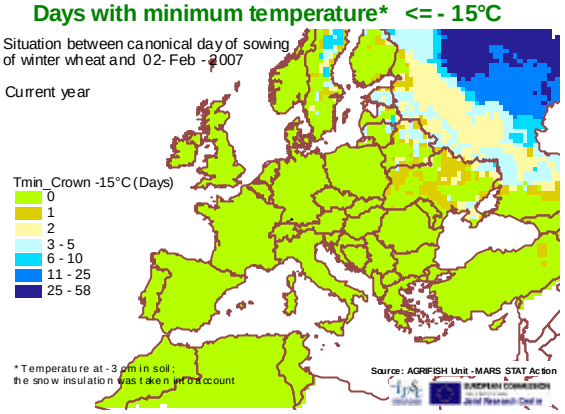




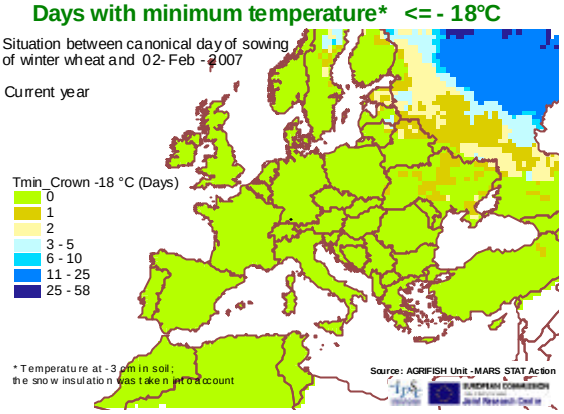




Days with minimum temperature* <= - 15°C



Days with minimum temperature* <= - 18°C



2. Synthesis of the 2006/07 sowing campaign

This text makes an update and recalls the previous text published in Bulletin n°6 Vol 14th

EU-27

Winter wheat: favourable conditions for sowings, except for some problems of soil moisture excess in Portugal and some areas in France and Germany. Mild thermal conditions for crop establishment

In general, winter wheat experienced favourable sowing conditions all over Europe, except in Portugal and some scattered areas at the border between France and Germany, where soil water excesses were recorded during almost all the sowing period. This could have made field access difficult and led to delayed sowings in these regions.

Early sowings have probably been hampered by soil moisture excesses in the western part of the Iberian Peninsula, in The Netherlands, in southern Norway, and in a belt covering central France and central Germany.

Problems to the sowings planned for the canonical period could have been created by the intense precipitations occurred in Portugal, central Spain (Castilla-La Mancha, Extremadura, Comunidad de Madrid), in France (Bretagne and Provence), at the border between France and Germany, in Ireland, in FYROM, and in Greece.

Conditions for late sowings have been characterized by water excesses in the northern part of the Iberian Peninsula, in Alentejo (PT), in Extremadura (ES), in the central – eastern part of France, and in eastern Greece.

Where the crop has been sown in September (e.g. Ireland, northern UK, Greece), the germination and emergence phases experienced mild thermal conditions and satisfactory soil moisture. Problems due to insufficient water availability during the germination phase could have verified in Eastern Europe, and in some scattered regions in Italy, in Greece, and in the Balkans. In these cases, in fact, precipitations were recorded as more than 30 % lower with respect to long term average.

In general, temperatures higher than the average were recorded after sowings in whole Europe, especially in the period between the second decade of November and the first of December.

Barley: no real problems related to field accessibility have affected sowings

Barley experienced favourable conditions for winter sowings. Soil water excesses have been limited both in terms of affected surfaces and in terms of length of the warning periods. In general, high temperatures have been recorded for the whole Europe in the emergence and post-emergence phases. Cumulated precipitations in the period between 1 November – 31 December have been decidedly lower than the average only at the border between Spain and France (Cataluña, Aragon, Provence – Alpes – Cote d'Azur, Languedoc – Roussillon), in southern Germany, Eastern France, Italy, Hungary, southern Slovak Republic, and Greece.

Early sowings have been generally carried out under favourable conditions. Only small areas in southern Portugal, central France, eastern Poland, The Netherlands, and FYROM could have encountered accessibility problems due to excesses of soil moisture.
Sowings in the standard period in Ireland, south-western UK, southern (Provence – Alpes – Cote d'Azur) and eastern (Lorraine, Champagne - Ardenne, Bourgogne, Franche - Comte, Alsace) regions of France probably suffered for soil water excesses which could have caused field accessibility problems.
Precipitations decidedly above the average have been recorded in the northern part of the Iberian Peninsula, in southern Germany, southern Austria, and southern part of Norway and Sweden during the period when late sowings are usually carried out.

Rapeseed: soil moisture excess in the sowing period should not have affected crops

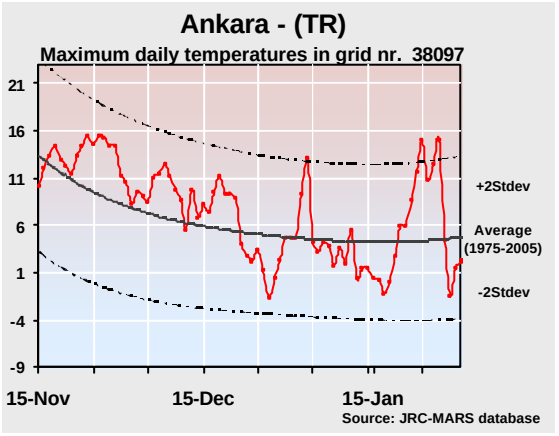
Water excesses could have threatened soil conditions during the canonical period of sowing in Poland, in the north – eastern part of the Slovak Republic and in central France. For early sowings, the problem verified only in the north – eastern and south – eastern regions of Poland (Warminsko – Mazurskie, Podlaskie, and Podkarpackie), in eastern France (especially in Lorraine, Alsace, and Franche – Comte), and in northern part of Germany.
Late sowings in Hungary and Slovak Republic could have suffered from insufficient water availability during the germination and emergence phases.

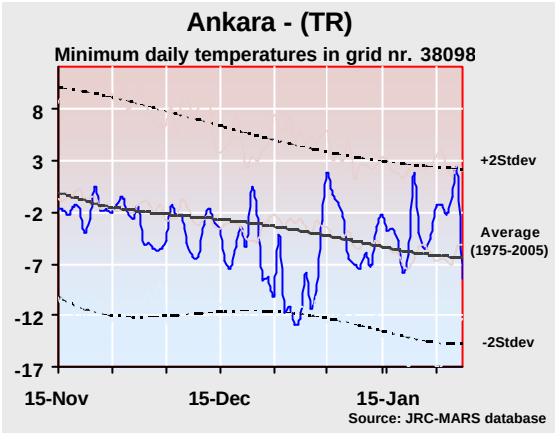
In case of sowings carried out in the standard period, temperatures higher than the average characterized the period immediately after sowing in southern Spain. Late sowings experienced warm conditions in the emergence and post – emergence stages.

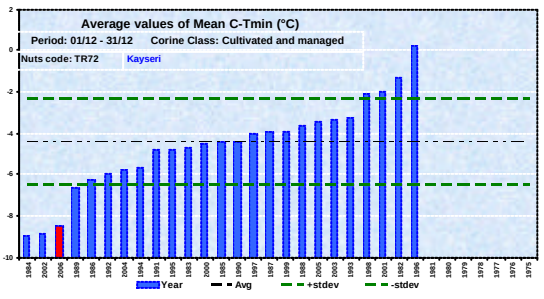
Black Sea Area

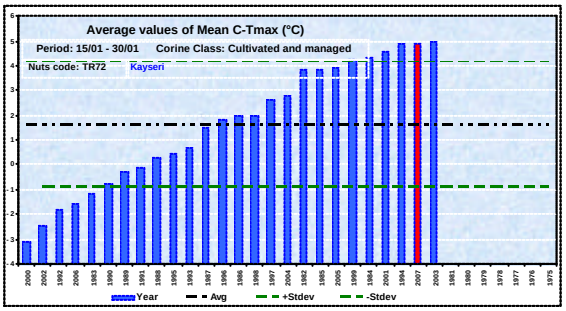
TURKEY: A cold spell in December was followed by warm weather in January

The beginning of the 2006 -2007 agricultural season in Turkey, from November to present, has been characterized, in close sequence, by both exceptionally low and high temperatures. In the second half of December 2006 minimum temperatures reached record levels below -12 °C in the central an eastern highlands of the country partly affecting, to the east, the main cultivation areas of winter cereals. This cold spell was associated with widespread snow cover and occurred when the crop was emerging and in the first phases of tillering. Even though there might have been a negative impact on the conditions of the first leaves, it is still early to quantify any possible damage. Opposed to this, the beginning of January saw the establishment of warm weather over most of the country. Temperatures increased to reach a peak in the third week of January, exceeding 10 °C for a limited period. This evolution may have had marginal effects on the hardening of durum wheat. The combined effect of cold and warm weather may place winter cereals and especially durum wheat in conditions of higher susceptibility to an unfavourable evolution of the season, especially for what concern the occurrence of frost events in the absence of snow cover. This same climatic trend was observed in the coastal regions of the Black Sea to the North and the Mediterranean to the South even though it did not reach the extreme levels reported inland. No particular event can be pointed out for the western Aegean coast.







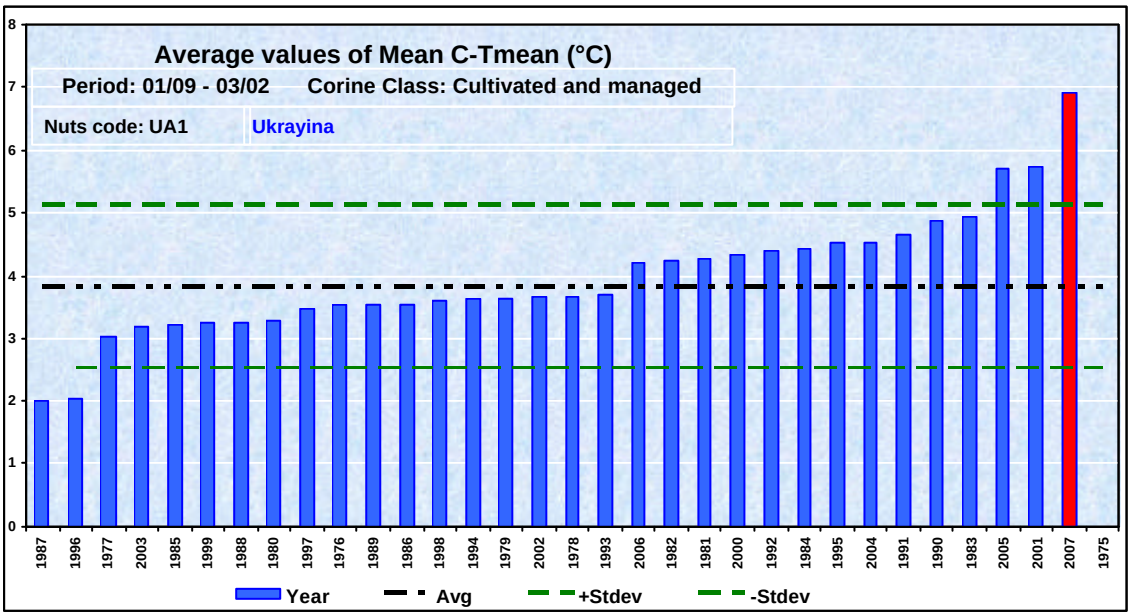


Ukraine: warm period continued, water balance improved but still remaining in deficit around the Black Sea regions

For all the agricultural areas of Ukraine, January 2007 was the warmest from the last 32 years. This situation is a continuation of the warm period started in September. The number of days with average temperatures below 0°C was the lowest from our records. Only three days with temperatures below -8°C were recorded since the beginning of the year and no direct frost kill event affecting the winter wheat was detected till now. In spite of the warmer period, at the beginning of February the potential resistance to frost of the winter wheat crops was good for most of Ukraine except Crimea, where the hardening index was moderate (but no exceptional frost is foreseen for the next week in this area).

The precipitation of January improved in a certain extent the poor water balance (calculated from September 2006) but the southern regions around Black remain in deficit. Regarding the possible evolution of this situation, it seems that the long term forecast for a somehow wetter February- March reduces the chances of occurrence for the pessimistic scenario of a spring drought following a dry winter.

The development stage of winter crops is anticipating but this is rather a disadvantage for reduced water availability and a frost risk still present for the rest of winter.



Eastern countries

RUSSIA: too favourable conditions for winter crop

The period under analysis is the dormant period of winter crop growth.

The current winter is extremely warm in the European part of Russia. The air temperature during November-January was near 0 degree practically everywhere, which is near 8-12 degrees above normal. Only during the last dekad of January the air temperature dropped to the normal values (-10 to -15 degrees). As a result snow cover was established only at the middle of January with an average delay of 2 months.

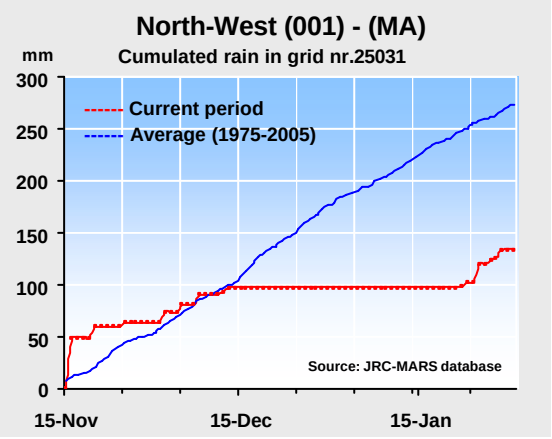
The amount of precipitation was higher than normal, and higher than in the previous season everywhere. Due to high air temperature, precipitation took place mainly in form of rain. Such conditions lead to high soil water content.

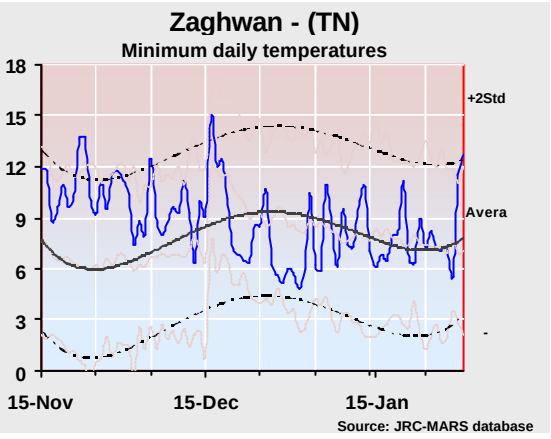
High air temperature and availability of moisture leads to advanced crop development with higher than normal amount of biomass accumulated before the winter. However, due to absence of low temperatures the crop is weak, and its resistance to frost and diseases is low. Thus, in spite of good crop development before the winter, the risk of low crop yield remains high. The situation is strongly depended on meteorological conditions in the coming two next months.

Maghreb

MAGHREB: Dry an mild weather in the west, favourable conditions elswhere

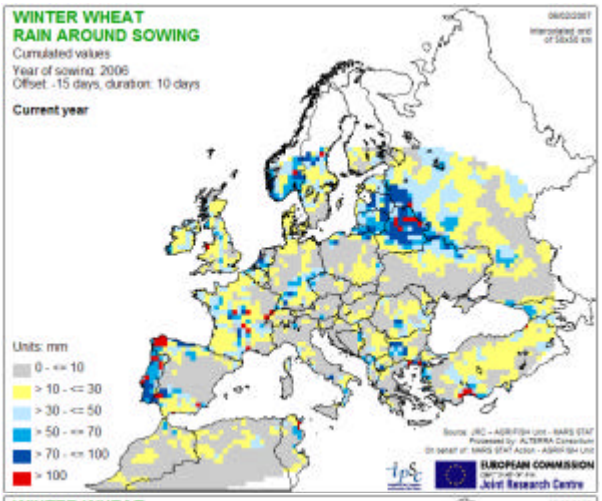
Precipitation has been scarce over most of western Maghreb at the onset of the 2006-2007 agricultural season, especially in the most relevant winter cereal cultivation areas of Morocco. Better conditions were reported on the central coast of Algeria and in western Tunisia. Temperatures were milder than average over most region, ranging from the Atlantic to the Tunisian Mediterranean coast. The dry and mild weather may affect hardening of winter cereals in the west (Morocco) increasing susceptibility to frost events and cold spells further on in the winter. For the rest of the region the climate should not affect the positive progress of the agricultural season.

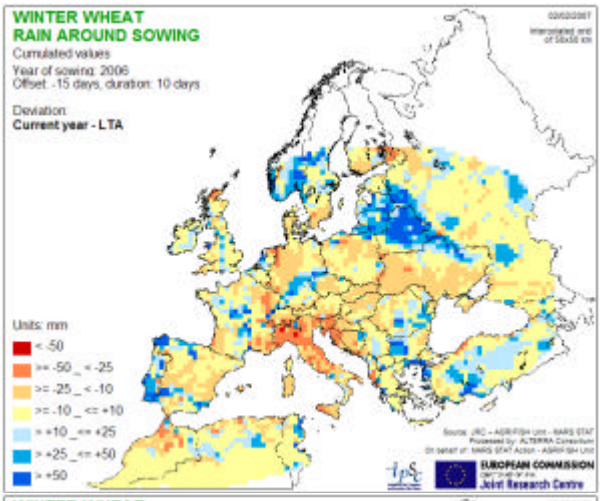


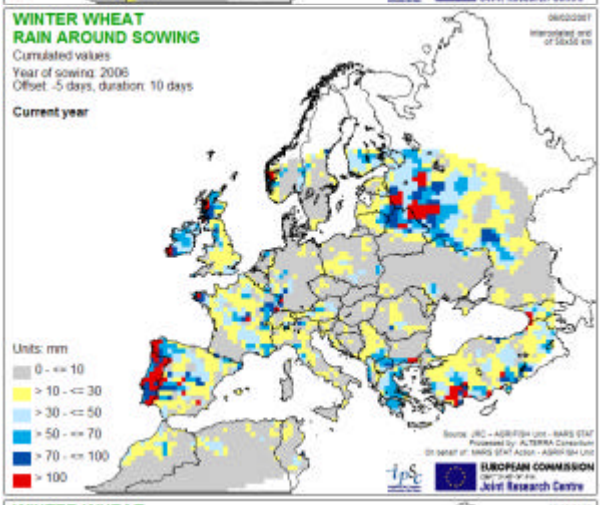


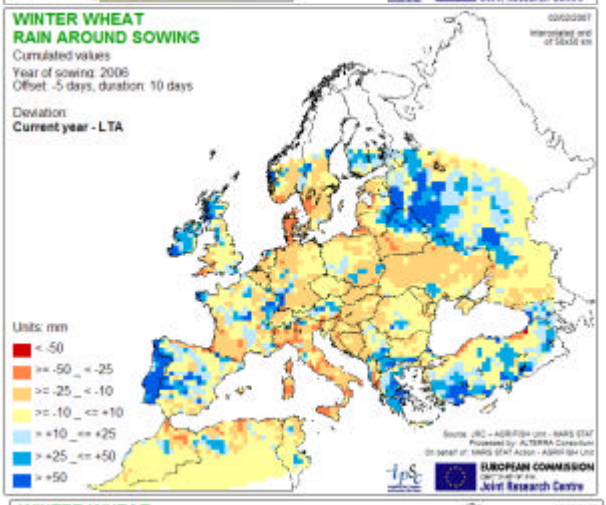
3. Maps

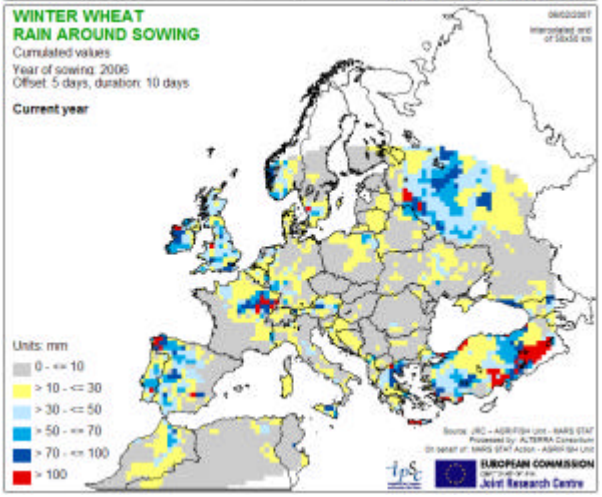
3.1 RAIN AROUND WINTER WHEAT SOWING

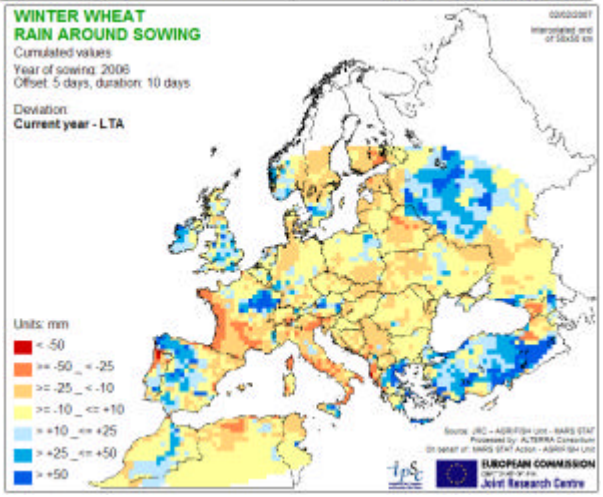




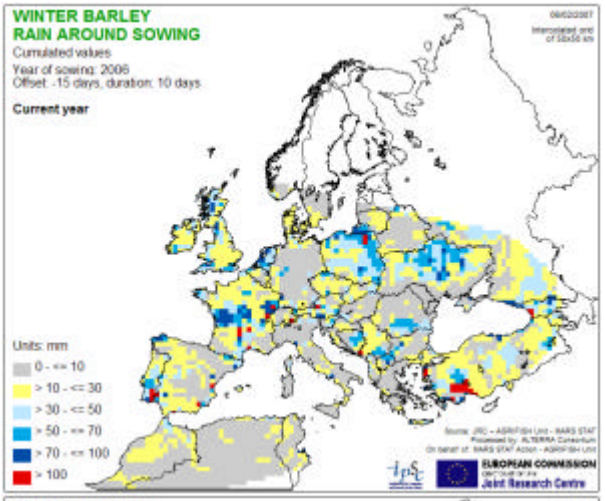


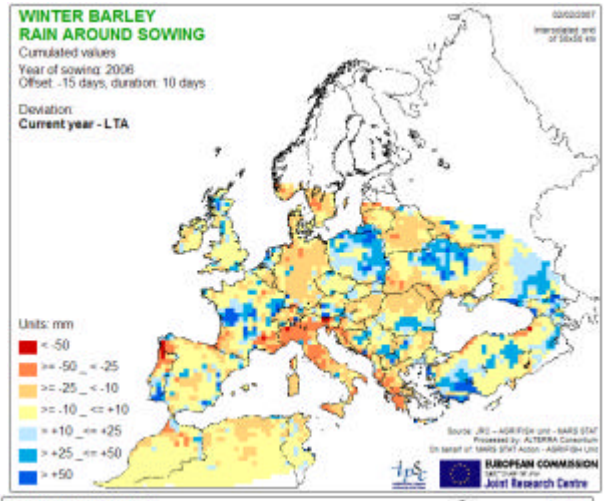


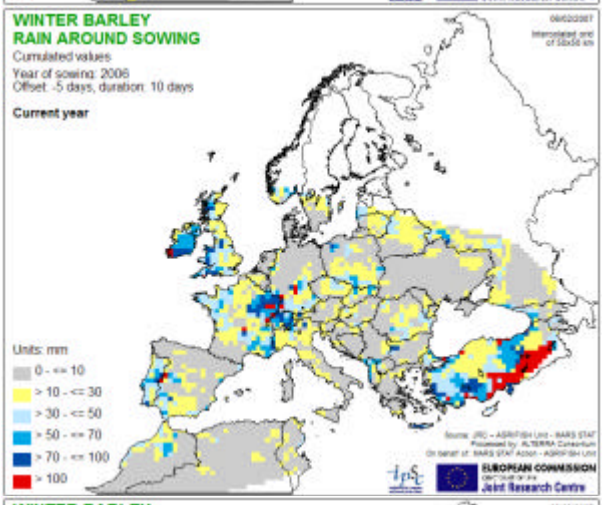


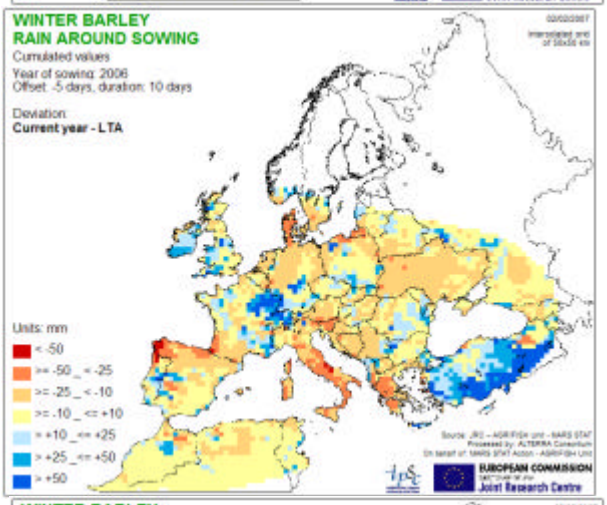


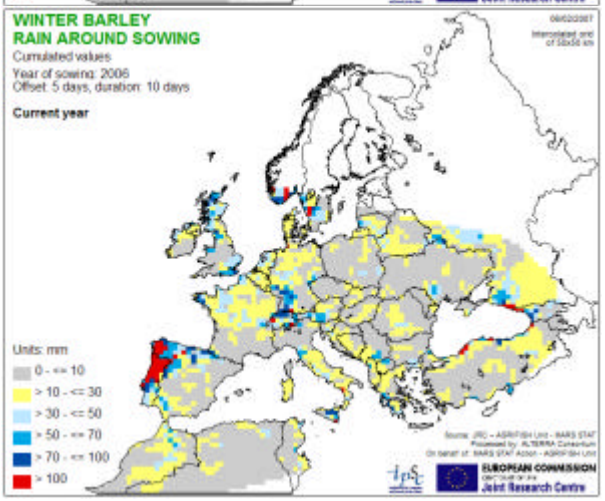
3.2 RAIN AROUND WINTER BARLEY SOWING

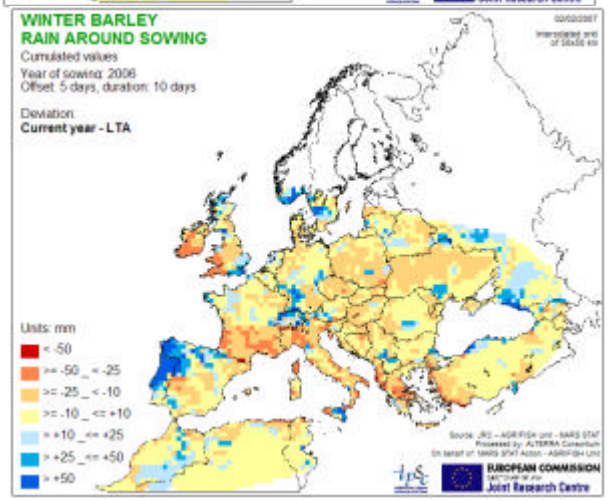




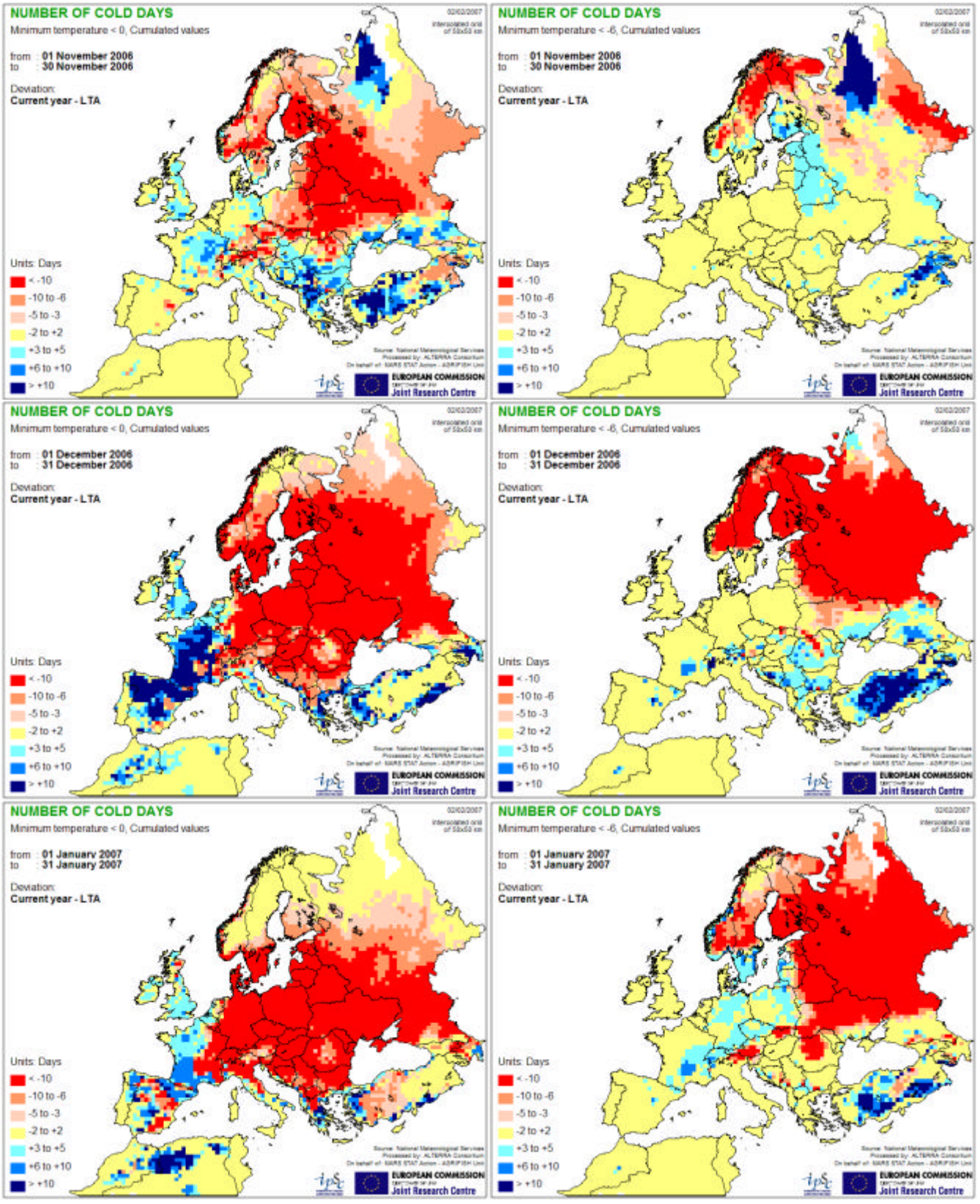




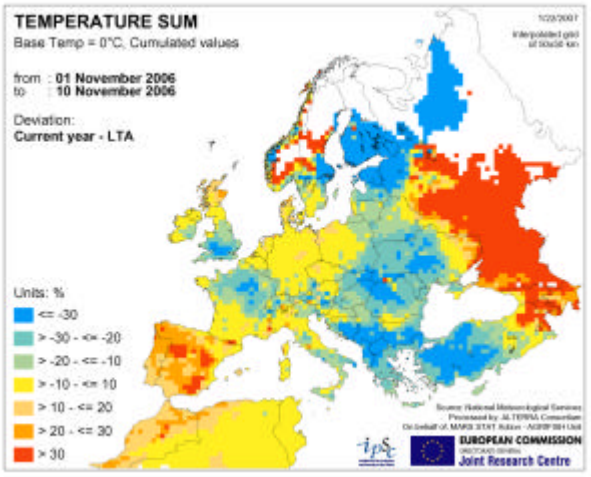


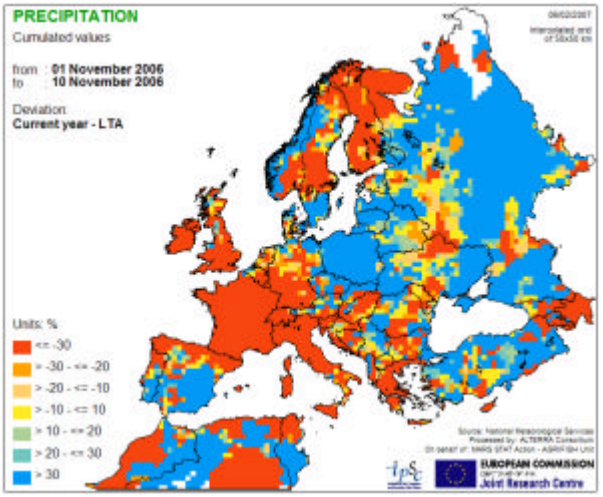


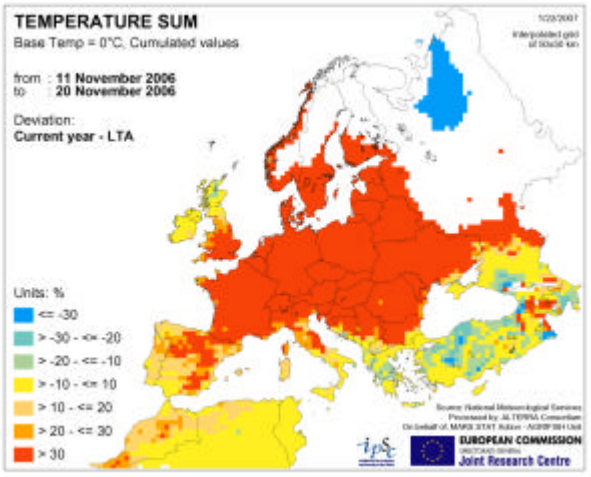
3.3 NUMBER OF COLD DAYS IN 2006/7

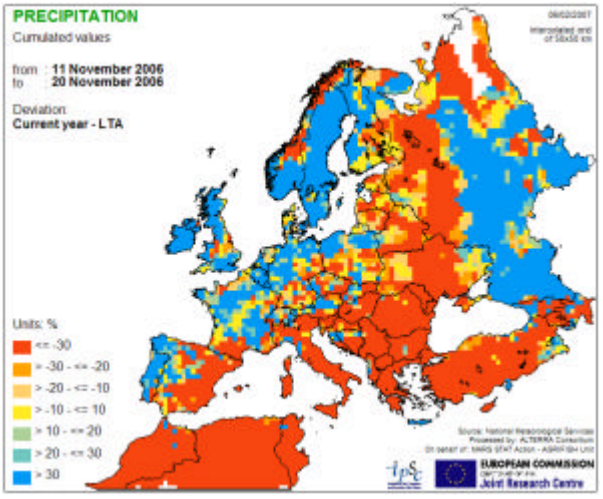


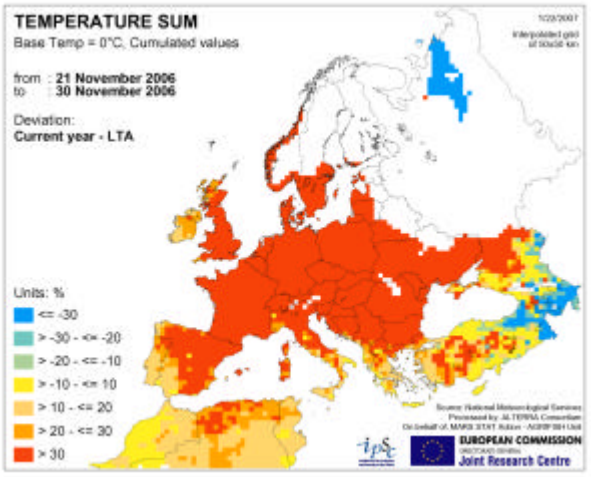
3.4 TEMPERATURE AND PRECIPITATIONS IN NOVEMBER 2006

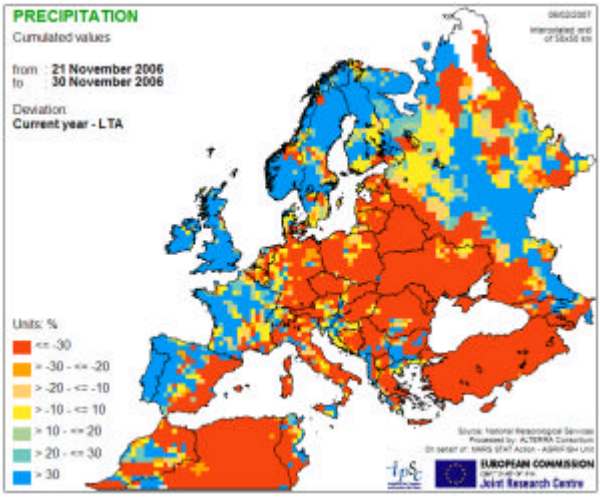




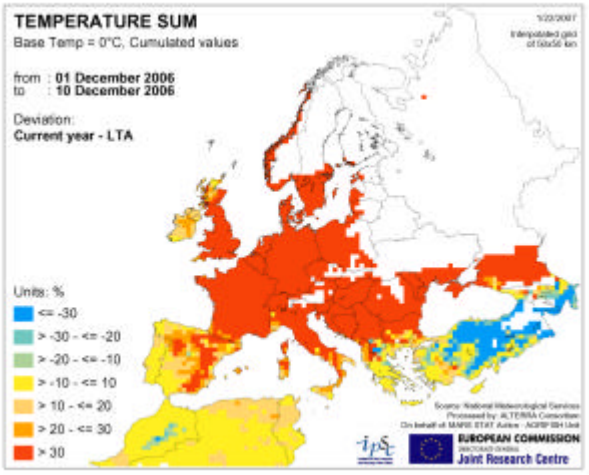


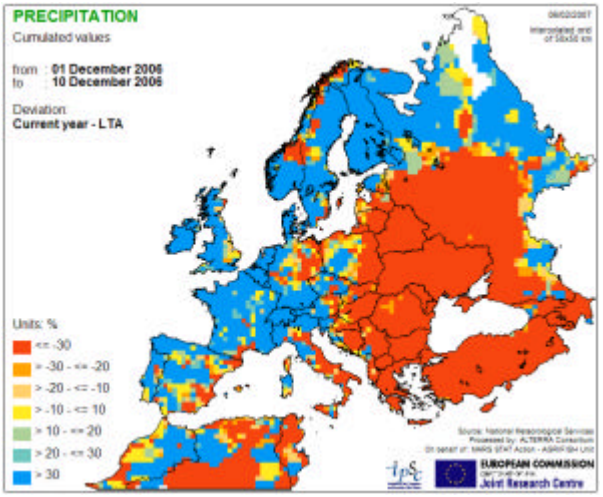


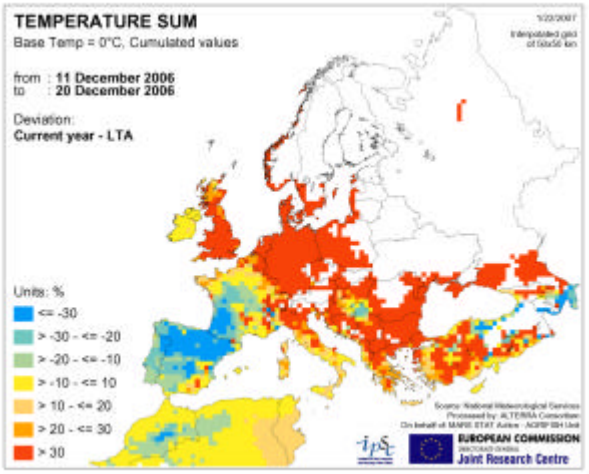


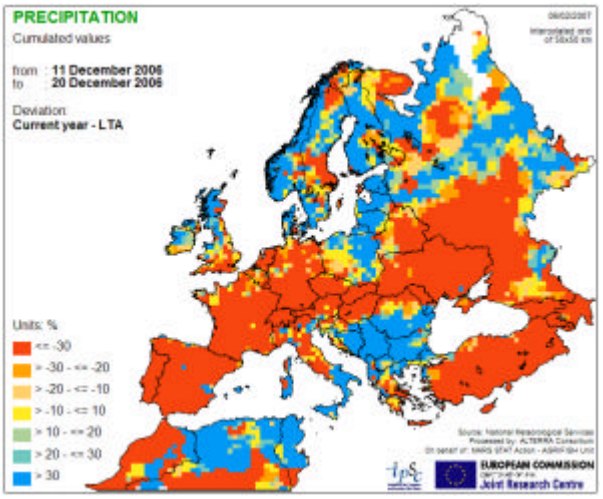


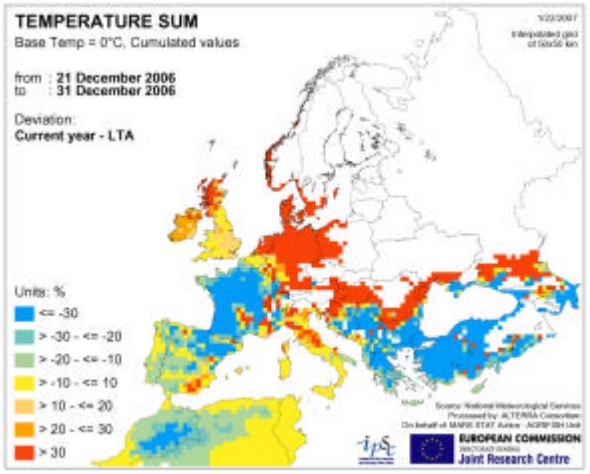
3.5 TEMPERATURE AND PRECIPITATIONS IN DECEMBER 2006

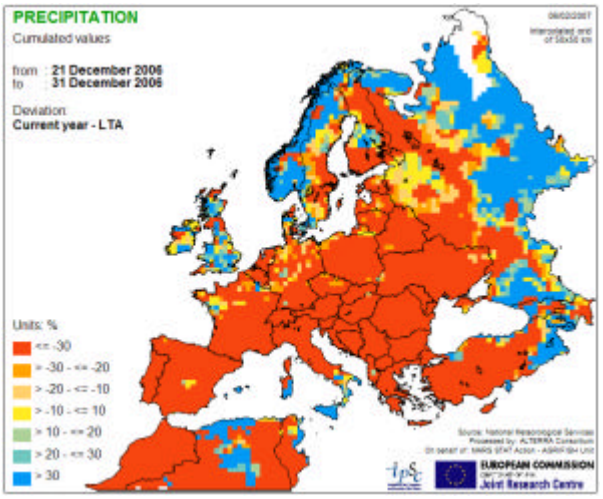




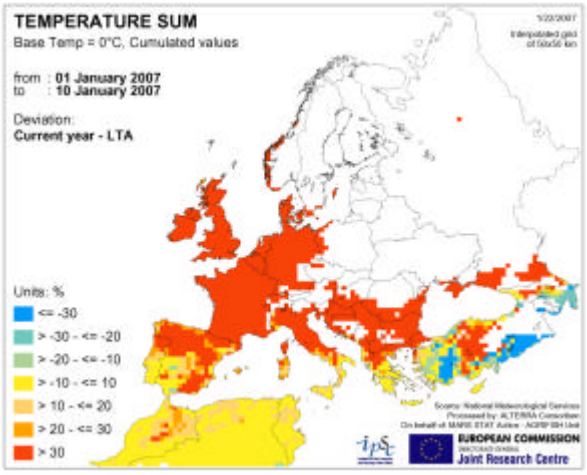


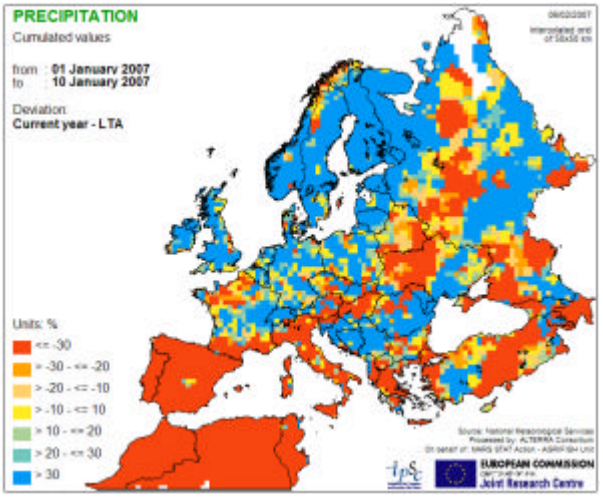


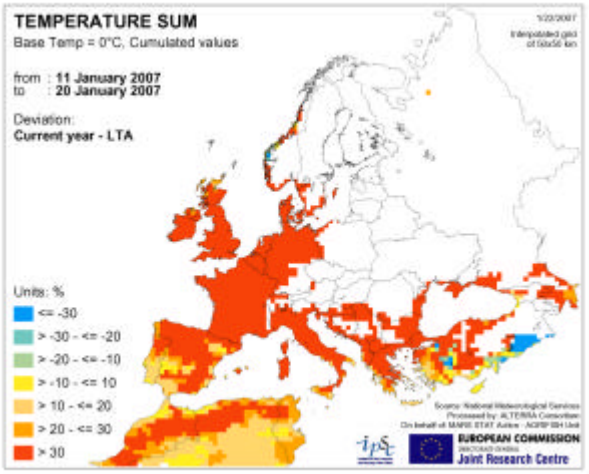


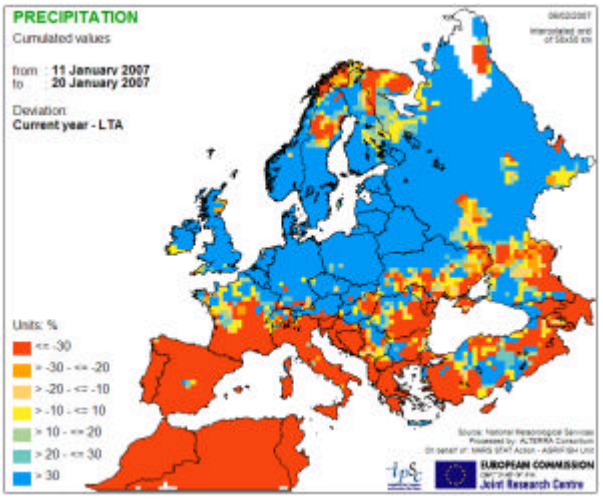


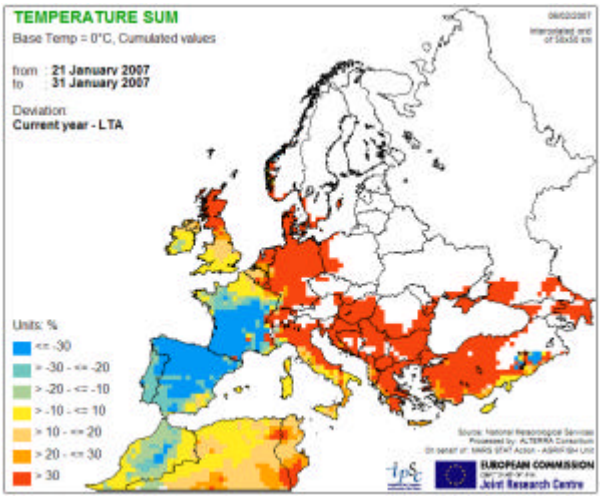
3.6 TEMPERATURE AND PRECIPITATIONS IN JANUARY 2007

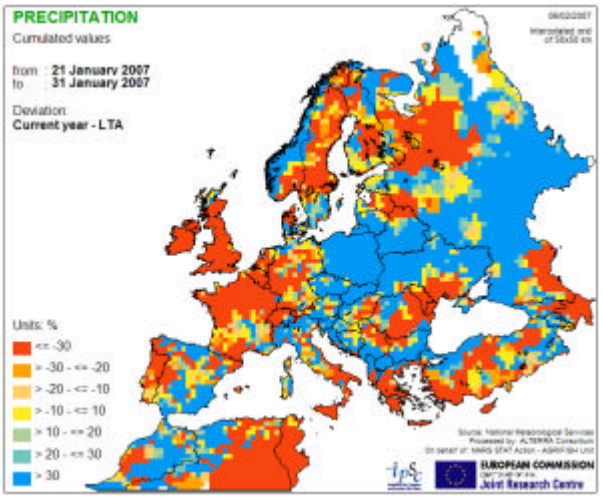






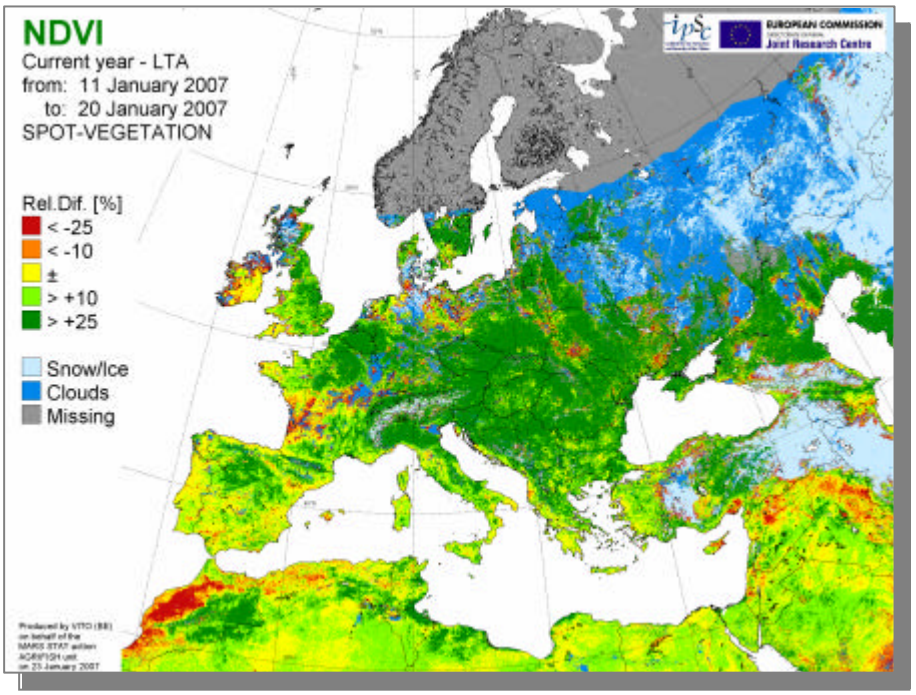






4. Satellite analysis – Spot Vegetation

Anomalous mild winter reflected in NDVI maps and profiles



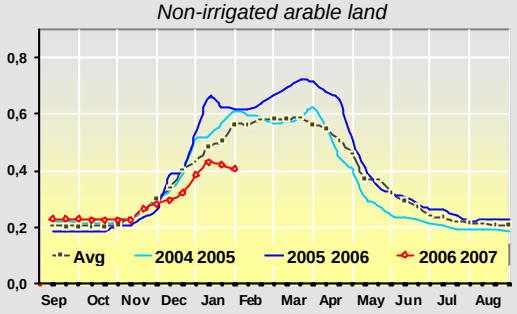
The NDVI map is showing the relative differences with the NDVI values of the second Jan. decade of last year. Most of Europe shows deviations in NDVI values with more than 25 % above the NDVI values that occurred last year. Moreover there is remarkable few snow cover compared to last year. Lower values are only recorded for Maghreb, where the growing season wasn't so favourable.

This is as well documented in the **NDVI profiles** for the Maghreb, when looking at non-irrigated arable land. The profile for **North-West (Morocco)** is below the average and biomass accumulation is as well far below the last two seasons, diminishing yield expectations. The same picture is obtained for **Tunisia**.

Other profiles around the **Mediterranean basin** show a more favourable start of the season and profile behaviour. NDVI values in **Puglia** are well above the average and a first vegetation boost can be detected since January. The north of Italy experienced dry and warm conditions and is showing a profile well above the average like the one given for **Emilia-Romagna**. Favourable profiles are also found for **Greece, Portugal** and **Spain**. For **Castilla y Leon**, in the centre of Spain we see exceptional high values, indicating already biomass accumulation. Whereas the start of the major vegetation boost is to be expected for early April. Similar situation is found for the Centre of France. An example of a northern country is given with the profile of **Denmark**, which experienced a mild winter as well showing NDVI values well above the average but not reaching extreme values for the winter months.

North-West (002) - (MA)

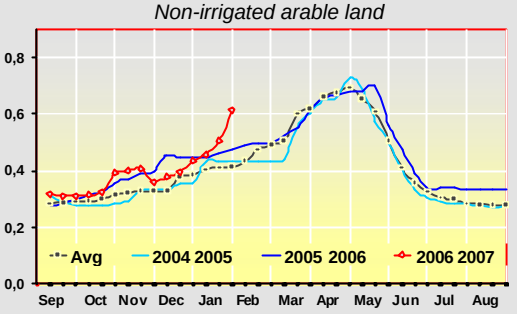
Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database

PUGLIA - (IT)

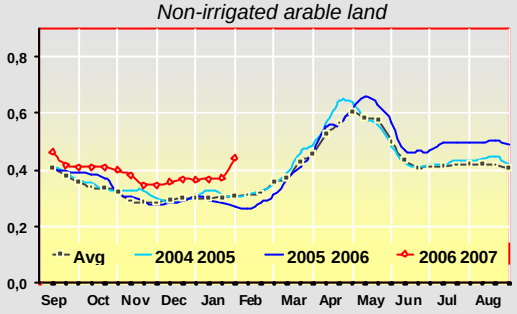
Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database

KENTRIKI MAKEDONIA - (GR)

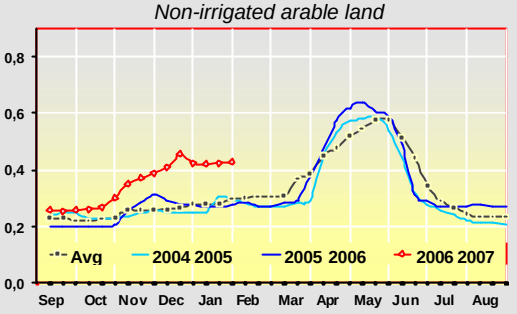
Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database

CASTILLA Y LEON - (ES)

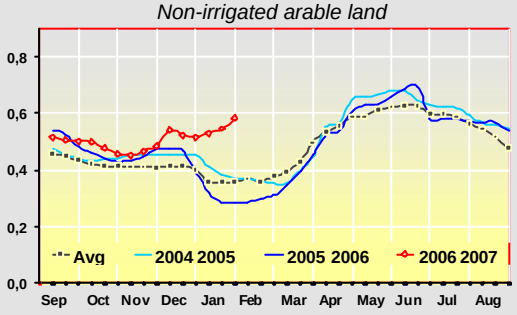
Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database

EMILIA-ROMAGNA - (IT)

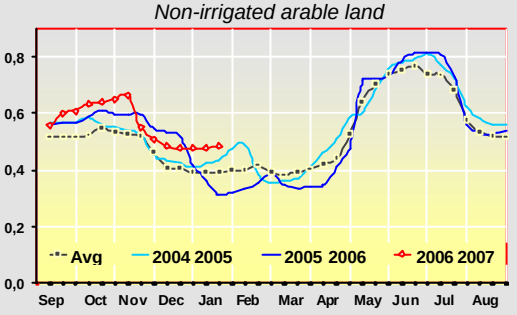
Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database

Danmark - (DK)

Non-irrigated arable land



Source: CNDVI based on SPOT Vegetation - JRC MARS database