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MARS AGROMETEOROLOGICAL Bulletin

Monitoring Agriculture with Remote Sensing

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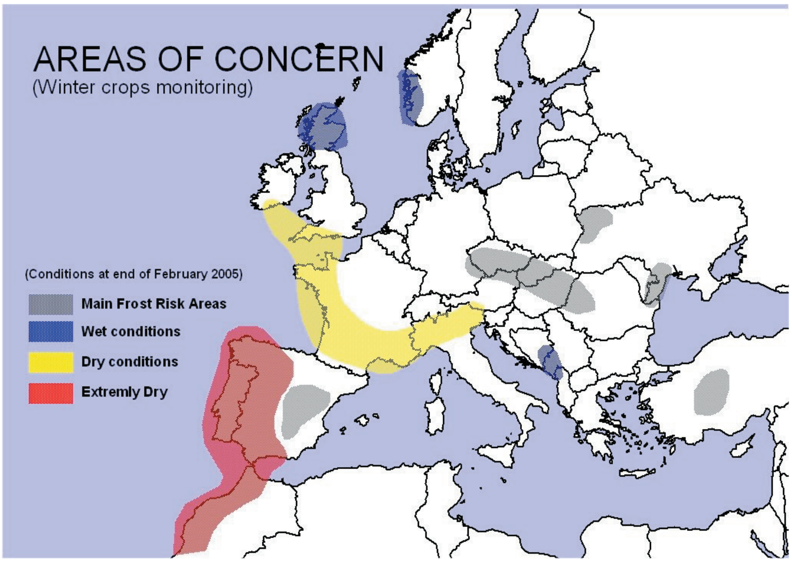
Cold and dry conditions in western areas; generally milder than seasonal temperatures in central and eastern areas, with extreme minimum temperatures



Agrometeorological overview

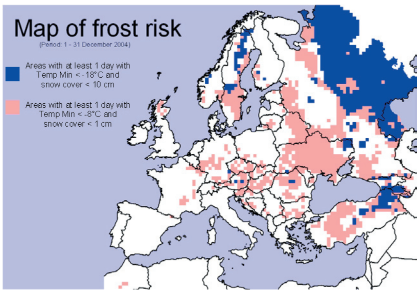
Low temperatures but also a low risk of frost damage in eastern Europe; unusually cold and dry in the Iberian Peninsula; higher than seasonal active temperatures in northern Europe, whilst quite lower in the Mediterranean Basin; dry conditions in western Europe (extremely dry in Portugal); better than normal in central and southern areas and the Balkans

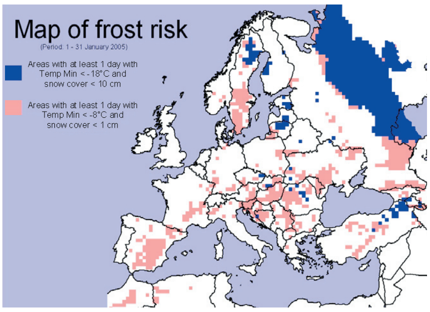
Contents

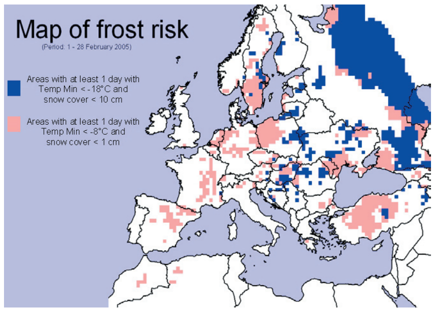
Temperature and evapotranspiration

During the period considered, the particular synoptic air masses circulation determined a cold air flux toward the central and western Mediterranean Basin and, consequently, lowered the 'active temperatures' (Tbase = 0°C). In contrast, in central and eastern Europe, conditions were warmer than average and frost damage risk on winter cereals was low (except for small and scattered areas in the Czech Republic, Poland, Ukraine, Belarus, Russia and Turkey).

Analysing the cumulated 'active temperatures' for the whole period, it is evident that for a large 'strip' connecting Ireland/England to the Black Sea, passing through Denmark, Sweden and the Balkans, values were significantly above normal. In some cases (e.g. Poland, southern Ukraine, eastern Romania and north-eastern Bulgaria), values exceeded 200–300 % of the average for the period (i.e. 200–250 cumulated degrees compared with the norm of 70–100). In those areas, **December** and, particularly, **January** showed quite mild temperatures for both minimum and maximum daily values. In **February**, a drastic change was recorded; temperatures dropped below the seasonal average (in Poland and Ukraine the minimum reached – 30 °C). Fortunately for the local winter crops, these low temperatures were counteracted by protective snow layers (in general more than 10–15 cm).







In contrast, in the western and southern Mediterranean, including south-west France, a normal **December** was followed by quite a cold **January** and **February** (especially the latter part of each month). In some spot areas in central Spain, the crops were exposed to unusually low temperatures (sometimes below – 15 °C) combined with a poor snow layer. Further damage is possible due to the genetic frost resistance of the local cultivars, and the situation is likely to be worse for winter barley because of its well-known low resistance.

Publication issue

The first printed *MARS Bulletin* for the 2004/05 agricultural campaign covers the December to February agrometeorological conditions.

It makes a synthesis of the major issues pertaining to:
— frost kill and soil moisture conditions;
— winter crop development.

Previous related analyses available:
— Conditions at sowing — beginning of November 2004 (Vol. 12, No 6)
— November–December 2004 climatic update

Contributions

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MARS stands for Monitoring Agriculture with Remote Sensing

Technical note

The long-term average used within this bulletin as a reference is based on an archive of data covering 1975–2004.
The CNDVI is an unmixed normalised vegetation index on the base of Corine land cover mainly for arable land or grassland.

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Next issue
Vol. 13, No 2 – 2005: March to April 2005 analysis.

As a consequence of the early development of the active crops, the abovementioned thermal conditions marginally influenced the values of the *potential evapotranspiration*, and *crop development* was significantly affected: there will clearly be a delay in all the Mediterranean countries, but development will be slightly advanced in the UK, Ireland and eastern countries.

Rainfall and climatic water balance

In January and February rainfall was above average over the Scandinavian area, Scotland, central eastern countries, Ukraine, Belarus, Turkey, Greece, southern Italy and Tunisia. Drier than average conditions were recorded in the Maghreb countries, the Iberian Peninsula (especially in Portugal), western and southern France, southern England, northern Italy and Slovenia.

The *cumulated rains for the whole period* show *higher values* (more than 70 %) than the long-term average for Tunisia, southern Italy (including the main islands) with, on average: 100–120 mm cumulated in the period considered for Austria, southern Poland, Slovakia, the Balkans (especially Bosnia and between Romania and Bulgaria); 80–100 mm between Ukraine and Moldova; and 200–220 mm for Russia, Norway and Scotland. In general, these rains, even if concentrated in a few rainy days, were of low intensity, except in Greece, southern Turkey, Norway and Scotland, where some intense rainfalls were recorded (more than 100–150 mm in one day).

Opposite conditions were observed over the Iberian Peninsula (and in particular in central and southern Portugal, where on average the cumulated rainfall hardly reached 20–25 mm, with a deficit estimable at more than 200 mm), southern and western France (on average 60–65 mm cumulated, equivalent to 50 % of the long-term average) and northern Italy (on average 15–20 mm cumulated equivalent to 30 % of the long-term average).

The possible impacts of these conditions on the active crops are not yet assessable, and are related to the future water supplies (rain and snow melt) subject to soil characteristics (soil water retention). In January and February, a thin (5–10 cm) but quite widespread snow layer covered the whole continent and also some areas in Tunisia.

These events are reflected in the *climatic water balance,* dividing the European continent into two parts: significant negative values compared with the average over Portugal, Spain, the Maghreb countries, southern and western France, southern England, northern Italy and Slovenia; and water surplus over Scotland, western Germany, Poland, the Balkans and central and eastern countries.

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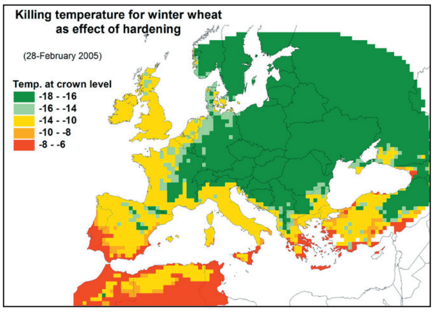
Highlights by region of interest

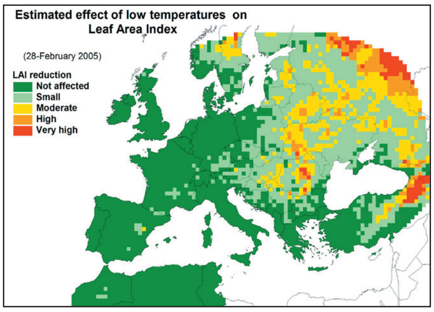
EU-25

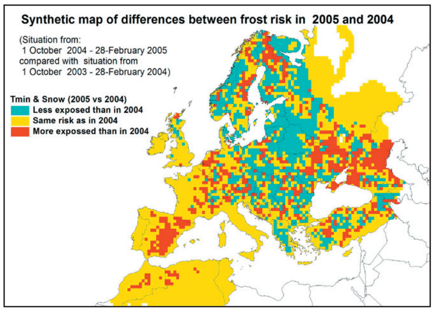
France: cold and dry

Up to the second dekad of *December 2004,* temperatures were lower in central and northern areas and warmer in the south. The situation was inverted during the latter part of the month. In *January,* the whole country experienced higher temperatures than average during the two first dekads; then, during the last 10 days, lower values prevailed. In *February,* the temperature started to be lower than the seasonal value for the south. Then, from mid-February, a cold spell hit the whole territory. Dormancy was maintained and the crop recorded a delay in the development stage.

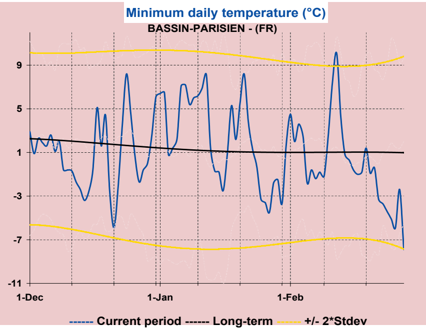
No extremely low temperatures were recorded and only few days were below – 8 °C. The reduction of temperature was slow enough for plant hardening, and the



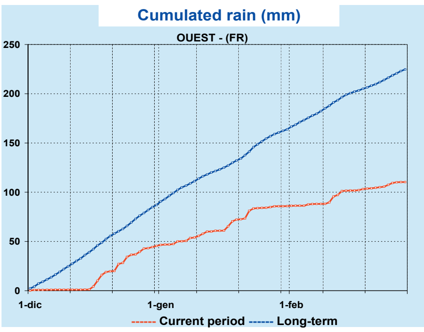




abundant snow cover during this period could protect the crop from frost kill.



For the period considered, *precipitations* were lower than normal, particularly for the western half of France where the whole deficit was lower than 100 mm. With most of the crops being at the dormancy phase, there was no big impact on crop development. However, the soil moisture needs to be replenished soon to face the increasing plant water demand during future regrowth.

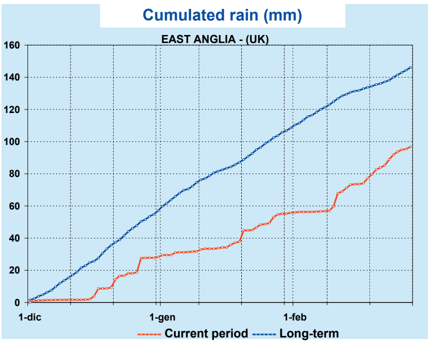


UK and Republic of Ireland: higher seasonal temperatures, relatively dry in southern UK and Ireland

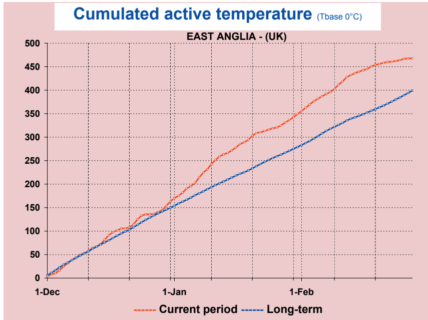
In the UK and Ireland, January was quite warmer than average but February was normal. The rains were divided into two areas over the islands: it was very wet in the north and rather dry in the south.

At the end of the period considered, in the UK and Ireland the cumulated active temperatures (Tbase = 0 °C) were higher than average for the season (60–80 °GDD). Actually, the warmer than normal periods mainly occurred between December and January and in the first part of February. During the remainder of December and January, normal conditions were recorded. In contrast, in the final days of February minimum temperatures dropped drastically, reaching – 5/– 6 °C.

Crop development responded positively to these conditions. In fact, according to MARS simulations, *crops in the UK were generally in a slightly advanced stage of development* at the middle of February. Lower than average temperatures during the last part of February prolonged winter crop dormancy. Moderate frost risk conditions probably occurred for the most sensitive active crops.



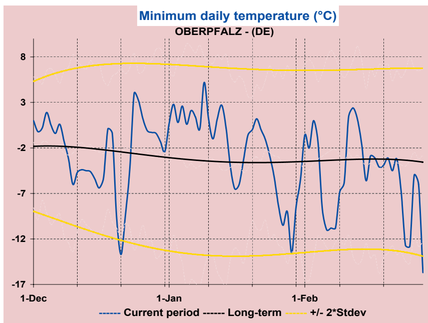
In England, rainfall was scarce throughout the period considered and cumulated values remained below average for the whole period. On average, in the UK the cumulated rain reached 90–100 mm (equivalent to 60–70 % of the long-term average) distributed over 20–25 rainy days. Only in Scotland were higher than average values recorded (in some cases exceeding 800 mm, equivalent to + 230 % compared with the long-term average). Local and temporary flooding is likely to have occurred in those areas.



Overall, cumulated values were higher in Ireland than in the UK, but slightly lower than average. Anyway, February was the driest month during the period considered.

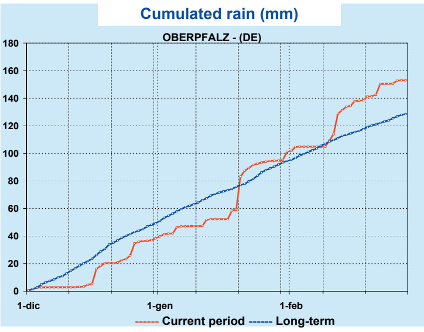
Germany and Austria: seasonal conditions in December, quite warm in January, colder and wetter than average in February, likely slight frost impact on vegetation

Thermal amplitude was large (especially the minimum: between + 8 °C to – 17 °C). However, active temperatures were higher than average (1.5 °C/day). In general, there was sufficient snow cover during frosting periods (last dekad of December, between January and February, between February and March). Seasonal water supplies were relatively more abundant in February.



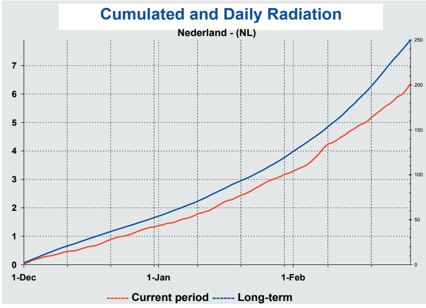
Temperatures were influenced by three cold waves (end of December, between January and February, and the last part of February), separated by unseasonably higher temperatures between the last dekad of December and the second dekad of January. During the cold periods, in several days the minimum temperatures passed the threshold of – 10 °C and in some cases reached – 15/– 16 °C (Oberpfalz). Frost risk was limited thanks to the snow cover that protected the fields and maintained temperatures above the critical threshold at ground level but, nevertheless, slight damage occurred at canopy level mainly in eastern Germany and northern Austria.

Precipitation was within the seasonal range of variation both in terms of cumulated amount and temporal distribution (on average 150–160 mm, distributed over 6–10 rainy days). The second half of February was wetter than the average, as some rainfalls and an abundant snow cover resulted in a generous water supply.

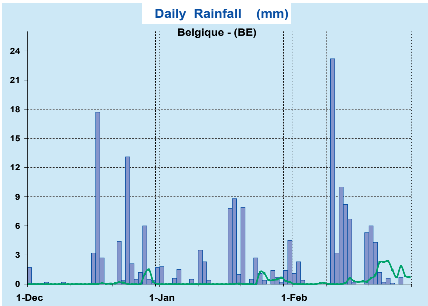


Belgium, the Netherlands and Luxembourg: slightly colder than normal in December and February, quite mild in January; relatively drier then usual in January and wetter in February

During the period considered, *thermal conditions,* even if within the normal range of variation, were characterised by large oscillations: broad daily variations during December, higher than seasonal values in January, and a drastic drop in the second part of February. Although in some cases minimum temperatures were several degrees below zero, no main frost risk seemed present.



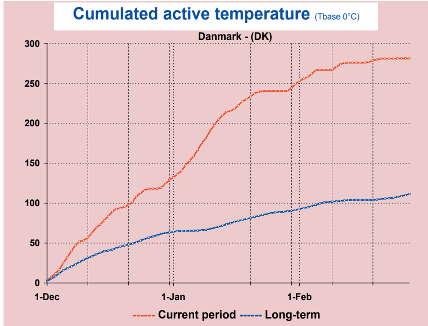
In general, cumulated rain was close to or slightly below seasonal values (on average 150–180 mm, compared with 170–200 mm for the seasonal average) and distributed over 12–15 rainy days, mainly in February. Consequently, in February, lower than average values were apparent for cumulated solar radiation, and this presented a possible limitation factor for the active crops.



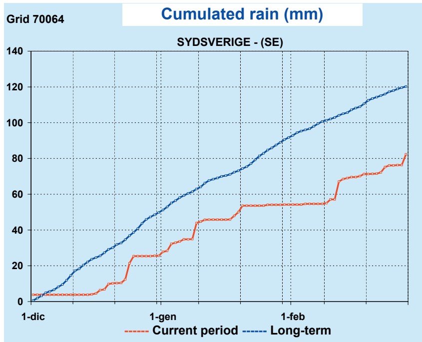
Denmark, Sweden and Finland: higher seasonal temperatures over Denmark and the south-east, normal conditions in Finland; very wet in January, except in Denmark.

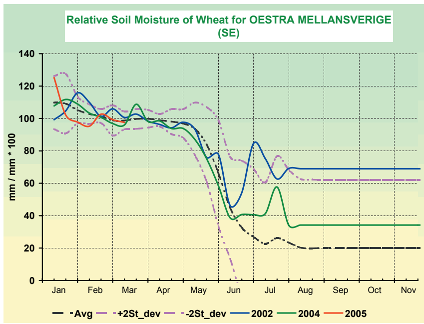
On the whole, in Denmark and Sweden, active temperatures (base temperature = 0 °C) were above average. However, normal temperatures but wet conditions were reported in Finland.

In Denmark and Sweden during the considered period both *maximum and minimum daily temperatures* were above the norm (on average 1–2 °C). Only during the last dekad of February did temperatures drop below seasonal values (the minimum reached – 6/– 8 °C). During that period, the frost effect on the crops was minimised by the presence of snow, so it seems that frost damage was unlikely.



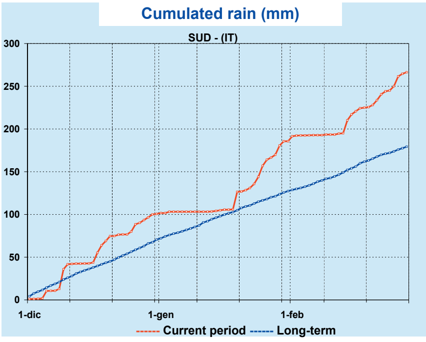
Cumulated rain values and distribution were close to normal in Denmark. On the contrary, they were quite abundant in Finland and slightly below normal in Sweden.



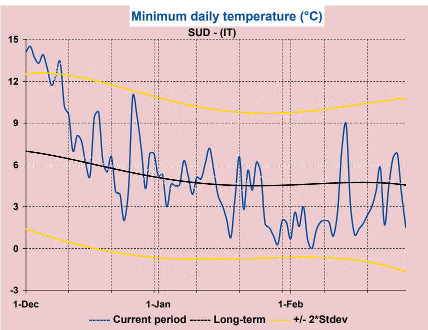


Italy: normal thermal conditions in December and January, very cold and snowy in February; very wet in the south, relatively dry in the north (Po valley)

During the period considered, the country experienced a progressive reduction of temperatures: a generally mild *December* (especially in the south) was followed by a normal or slightly colder than normal *January* coupled with snow also in the south (During the last dekad minimum temperatures dropped significantly below seasonal values and in some cases reached – 7/– 9 °C.) In *February,* temperatures dropped further and more snow was recorded. Generally, the snow cover protected crops, and frost damage is unlikely. In southern areas (Apulia and Sicily), on several consecutive days (7 to 10 February), the absolute minimum temperature values for the period were recorded in the MARS database. In those areas, the low temperatures in February significantly slowed down active crop development (winter cereal, rapeseed and sugar beet).



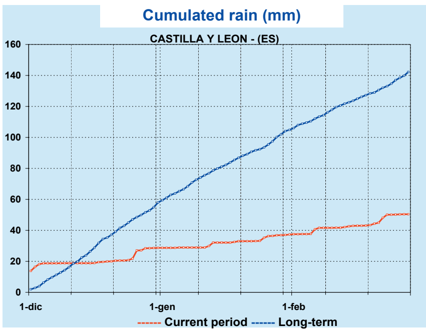
As regards *rainfall,* due to the particular and unusual synoptic air masses circulation, the country was divided into two parts. The northern part (Po valley) received only 40–50 % of the expected rainfall (in some cases 50 consecutive dry days were recorded, between the end of December and the last part of February). Consequently, the soil water content was drastically depressed. Southern areas experienced a very wet season (on average + 50/70 % of the seasonal cumulated values, with abundant and persistent rain (on average around 280–350 mm but with maximum up to 500–570 mm). It is likely that there was local and temporary water logging.



Spain and Portugal: unseasonable dry and cold conditions (especially in Portugal)

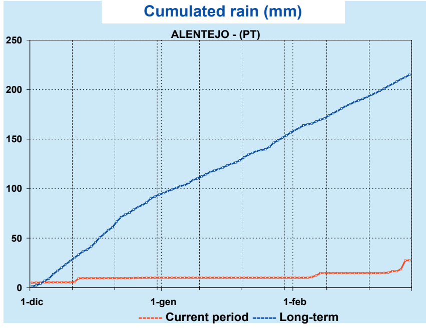
Temperatures rather below the seasonal average, scarce rain supply and very dry conditions in Portugal.

During the whole period, a particular synoptic circulation pushed Nordic air masses over the Iberian Peninsula and lower than average temperatures were consequently recorded, particularly in February. In January, northern and eastern areas (Castilla y Leon, Aragon) mainly experienced lower than average temperatures (minimum around – 5/– 6 °C) and some centimetres of snow but, in February, very cold air crossed the whole peninsula: both the minimum and, particularly, the maximum daily values dropped below seasonal temperatures and for some days the absolute extreme for the last 30 years was observed. For instance, in Andalucia and Catalonia, extreme lowest minimum temperatures for the last 30 years were recorded on several consecutive days between 26 January and 4 February and again on 15, 18, 19, 20 and 26 February. In those areas, the snow protection was insufficient and has resulted in a possible reduction in plant population of about 10 % for limited areas. Consequently, the cumulated active temperatures at the end of February showed a deficit estimated at around 150 °GDD (– 50 % of the seasonal value) and all winter crops have had their rate of development drastically reduced, prolonging winter dormancy. MARS simulations show this year to be the most delayed in the last 10. The adequate snow cover probably protected crops against frost damage.



Precipitation was practically zero between the second dekad of December and the last of February. During the whole period, only a few millimetres of rain fell (30–40 mm, compared with 140–150 mm normally), distributed over two or three days. The worst conditions were in Portugal, where only 10 % of the expected rain was measured.

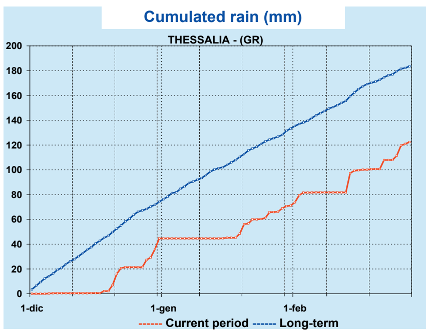
The soil water content was strongly depleted, particularly in southern areas (Andalucia, Alentejo), and water supplies in the first half of March will be determinant for the correct evolution of winter crop growth.



Greece: warmer and drier than average conditions from December to late January

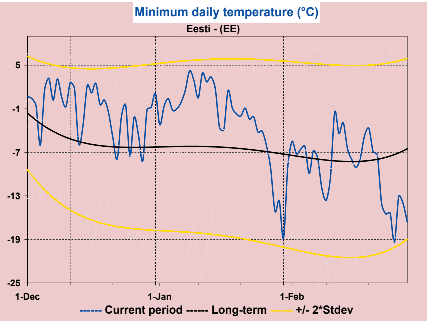
In the main production areas of Greece, temperatures remained on the high side from December to January but decreased significantly in February. This trend was coupled with dry conditions.

Cumulative active temperatures for winter cereals remained in line with the long-term averages in January. The same trend can be observed for minimum temperatures although they showed a significant decrease during the first dekad of February, but did not reach 'frost risk' (below – 8 °C) status in most of the main production areas in the interior of Thessalia and the Aegean coastal areas. In line with this, the development stage for the main winter cereals was simulated as *early tilling* in all the production areas. The situation of *crop water supply* can be considered less favourable. It revealed *an average overall deficit ranging between 5 and 20 mm* during January and February. This further worsened the 'dry' situation apparent since mid-November.



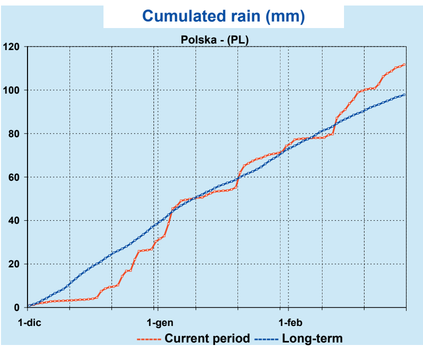
Estonia, Latvia and Lithuania: seasonable conditions

For all Baltic States the cumulated active temperatures were above the long term average for the first two months of 2005. Minimum temperature dropped twice below 18°C (at the limit of two standard deviation below average) while in some areas the snow cover was insufficient to offer a good protection. Due to the physiological plant status the simulated damages remained at a moderate level and in limited local areas from eastern Estonia and Latvia and also southern Lithuania.



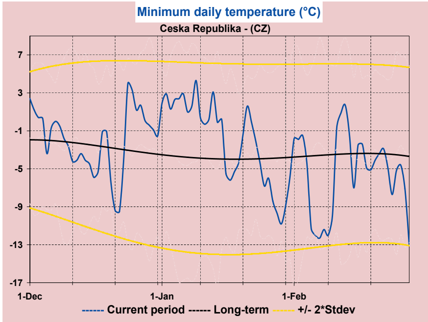
Poland: active temperature above average

The sum of active temperatures was higher (>+ 30 %) than long-term average level for most of the agricultural areas of Poland, except for the western part of the country where normal levels of active temperatures were recorded. The precipitation level was above the long-term average. Some moderate frost damage was simulated for the eastern part of Poland.



Czech Republic: cold February

Until the end of February, the sum of active temperatures was higher (>+ 30 %) than the long-term average. This drop in active temperature resulted in the slow development of winter wheat for February, reducing a previous slight advance. In February, minimum temperature dropped below – 12 °C, but the deep snow layer insulated the crops. So direct frost damage is considered to be quite small, and located mostly in the eastern part of the country.



Slovak Republic: possible frost hit in February

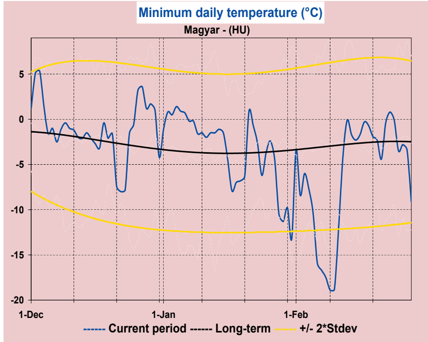
For most agricultural areas of the country, the sum of active temperatures was above the long-term average. The cumulated precipitation was above the long-term average until the end of the first dekad of December; after this it dropped below the long-term average but came up again at mid-February. In the first dekad of February the minimum temperature (average for arable land) went down below – 18 °C, when the snow layer was about 9 cm. The simulated hardening index for a reference cultivar showed only minor damage for winter wheat crops, but according to the frost resistance of local cultivars, the damage may be larger.

Slovenia

Precipitation during the vegetation period was below the long-term average. For most agricultural areas, the sum of active temperatures was above the long-term average. An unusual frost (– 18 °C) occurred at the beginning of the second dekad of February; however, the snow cover was about 12 cm.

Hungary: limited frost damages in southern Hungary

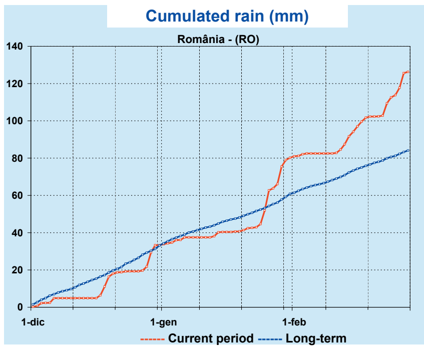
The thermal resources available for winter crops in January were high enough to compensate for the lower than long-term average sum of active temperatures (– 30 %) for February. Although temperatures were low all over the country, the risk of frost damage was generally limited by a snow layer. Leaf area reduction was more intensive along the southern border of the country.



Black Sea countries

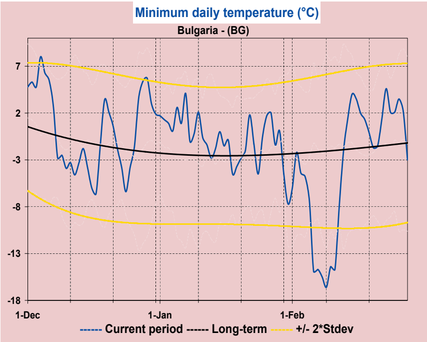
Romania: severe frosts but with limited effect due to good snow layer

Accumulation of active temperatures for January and February was higher (+ 30 %) for the main agricultural areas. For some limited areas, in south-west Romania this indicator was lower (– 30 %) for February than usual. Precipitation level was constantly above the long-term average, for example in February the cumulated difference was exceeding 40 mm. Consequently there was a protective snow cover when severe frosts occurred. But still moderate to high damage of the leaf area index was simulated for the winter crops, particularly for southern and western agricultural areas. For winter barley, the damage induced by the unusual frosts (<– 20 °C, in the first dekad of February) was certainly greater.



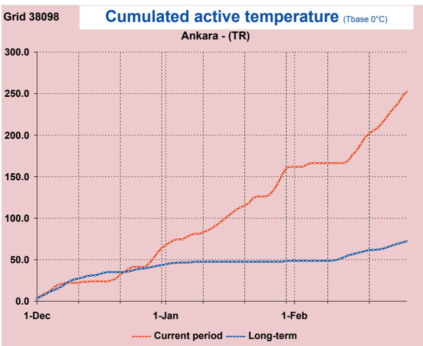
Bulgaria: frost wave at beginning of February

The sum of positive temperatures until the end of February was higher than usual. However, during February the plant growth in the north-west of the country was slightly delayed by a lower sum of active temperatures. The last two months of the previous year were drier than usual. Starting from the end of January the precipitation level was higher than normal. The frost wave at the end of the first dekad of February also hit Bulgaria but the snow layer minimised its impact.

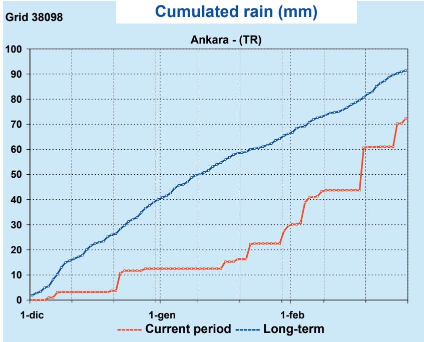


Turkey: early development of winter cereal favoured by higher than average temperatures and sufficient rain

Higher than average cumulated temperatures through January and February favoured early crop development that was not hampered by frost and was supported by sufficient rainfall.



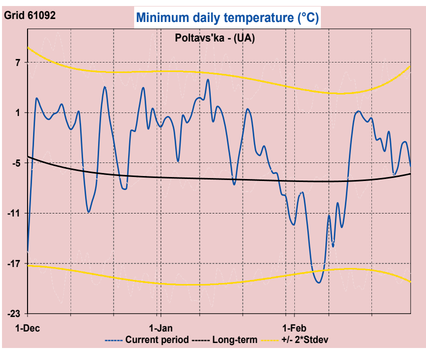
Reported minimum temperatures for December and January are in line with the seasonal average trends. An overall warming was observed at the end of January, beginning of February, **followed by a sudden decrease in temperature. These lower temperatures, however, did not reach a level low enough to damage crops (<– 8 °C).** This phenomenon particularly affected production of the major winter cereals in areas of west-central Turkey but was less relevant in the southern and coastal areas. However, the overall cumulative active temperature was slightly higher than the long-term average (> 100 °GDD on average) in January and February.



At the third dekad of February, simulated development stages of winter wheat and barley were completing the tilling stage and starting stem elongation. These stages were simulated for main production areas of winter cereal in the central highlands and the southern coastal areas of Turkey (a very sensitive period to climatic influences). In some of the coastal areas, the model simulation even reported the potential start of the heading stage. The overall cumulated rainfall kept below the long-term average for most of January but recovered in February, supporting the early development of winter crops.

Ukraine: severe frost effects limited by a good snow layer

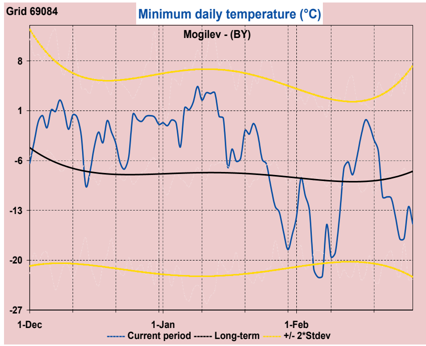
The precipitations in the last part of the previous year were higher than the long-term average. Although snowfalls in the first two months of 2005 were slightly below the long-term average, they were heavy enough to provide an efficient thermal shield for the winter crops. Due to this protective snow cover, the leaf area index was only slightly affected by severe frosts (<– 20 °C) on large surfaces of the Ukraine. The regions where foliar damage reached a moderate level do not exceed 20 % of the national area cultivated with winter wheat. Local calamities were possible for small areas where the thickness of the snow layer was reduced by the strong winds. Until now, the simulated data are suggesting an average year, but late frosts and spring diseases may still conduce a certain worsening of the situation.



Eastern countries

Belarus: moderate leaf damage due to frost

Very low minimum temperatures (below – 22 °C) occurred in the first dekad of February. The precipitation during this vegetation season was lower (– 30 mm) than normal for the central areas (Minsk) and slightly but constantly above normal (+ 10 mm) for other areas. The leaf area index was moderately affected by frost to high frost in large areas of central and southern Belarus. Simulated development of winter wheat is practically equal to the long-term average.



Russia: normal conditions for winter crops

The period under analysis is the dormant period of winter crops in all regions of the European part of Russia.

Temperatures during the winter were variable in the European part of Russia. The winter started later than normal, and the first wave of cold air came only at the end of November. The remote sensing indicators demonstrated the better status of winter crops before the winter compared with the previous year in the western and southern part of the European part of Russia. The crop status before the winter was worse in the Urals and the Volga regions than in the previous year.

Most of the cold air arrived at the beginning of December, when the minimal air temperature was lower than – 20 °C in the central part of Russia, and near – 10/– 20 °C in other regions. But winter crops seemed to be protected during this period by snow cover practically everywhere.

The first half of January was characterised by relatively warm weather, with the minimal air temperature near 0/– 7 °C, except for the Urals and the Volga regions where it was near– 10 °C. In some regions, particularly in the north-western part of Russia, the high air temperature should lead to the snow melting rapidly and the exposure of winter crops. Fortunately, the next cold wave, which came at the end of January, was accompanied by snow. As a result, the low air temperatures in February should not affect winter crops.

Anyway, such a wide variation in temperatures and the snow cover depth during the winter should lead to the winter crops having a low resistance to spring frosts and to a high risk of disease. Additionally, the warming in January should lead to a reduction of the soil moisture content, which will affect winter crop growth in summer.

Thus, the winter crop status at the end of the winter period in the European part of Russia was close to normal. The negative circumstances of the winter period could create some problems for winter crop growth in spring and summer, but the real situation depends on the weather in the coming months.

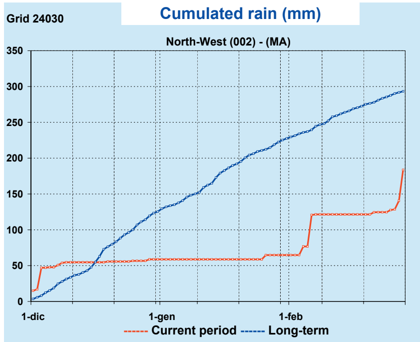
Maghreb countries

Cold and dry in the west, average temperature and good water supply in the east

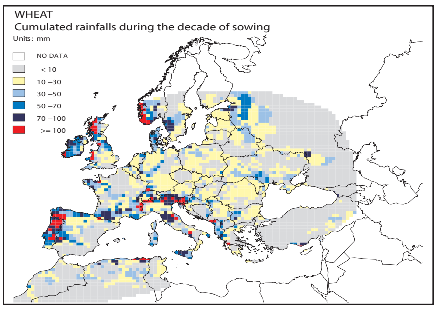
Better than average conditions in the eastern parts of Morocco, Tunisia and eastern Algeria; becoming drier and colder towards the west of northern Algeria and in the high and coastal regions of Morocco.

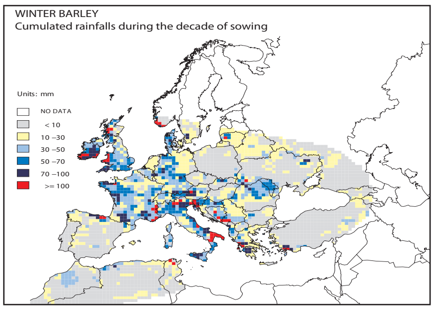
The overall situation in the eastern part of the Maghreb (Tunisia and eastern Algeria) is in line with the long-term averages for the period. Minimum temperatures kept well above *6 °C* for most of the period and never went below 0 °C in most of the region. Winter cereals, mainly durum wheat, are in the stem elongation phase, sufficiently supplied by moist soils. At the end of February the *cumulated rain exceeded the average by over 60 mm.*

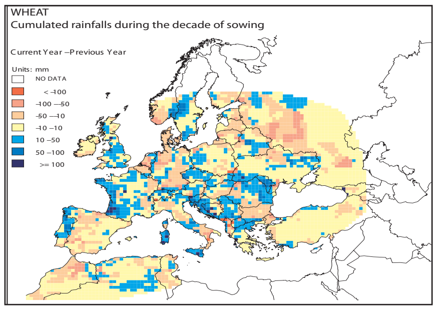
The situation in the northern Atlas Mountains and in north-eastern and Atlantic coast production areas of Morocco appears worse. While relative temperatures are only slightly below average, the overall water supply shows a significant deficit. Cumulated rainfall from early December up to now is half of the long-term average and ranges between 150 and 200 mm. Considering that crops are reaching the development phase in these areas, the negative effects on them could be significant. Heavy rains fell along the north-western coasts of Morocco during the first week of March. This could relieve the relative water supply deficit for crops at this delicate phase of development. The overall effect will have to be assessed in a further analysis.



Synthesis of the 2004/05 sowing campaign







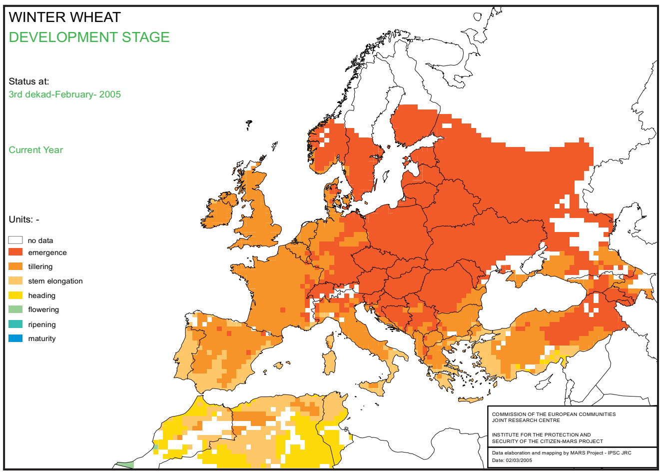
Sowing campaign: almost average, below last year's optimal conditions

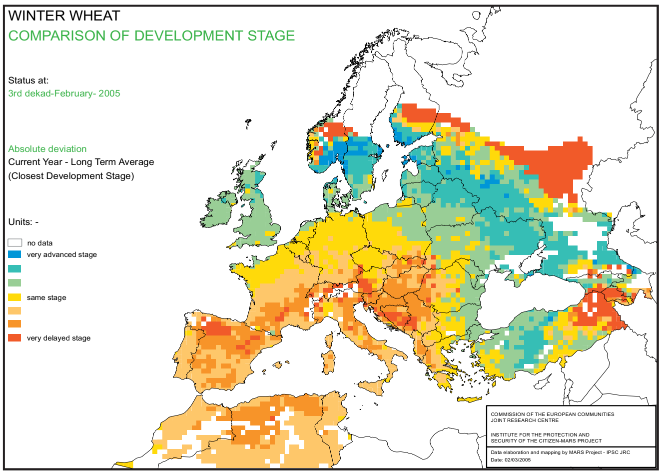
As a synthesis at EU level, the sowing of winter wheat was carried out in 'average/slightly suboptimal' conditions and that of winter barley in 'average/suboptimal conditions'. Compared with the previous year, the conditions can be considered less than optimal from the rain point of view.

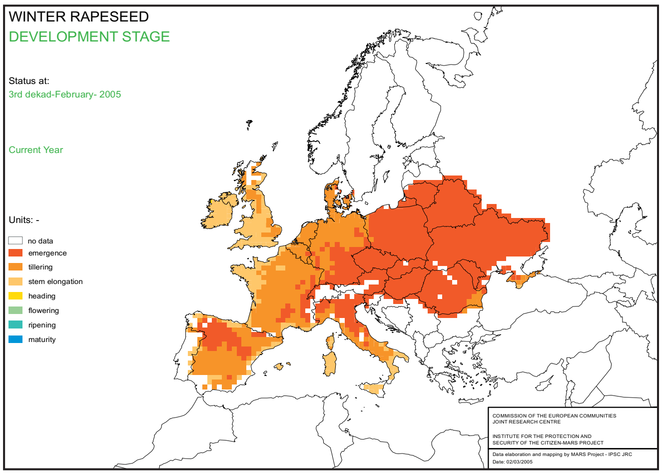
In absolute terms, rain intensity and distribution was normal or suboptimal for sowing periods and temperatures were optimal for supporting the emergence and pre-wintering stages.

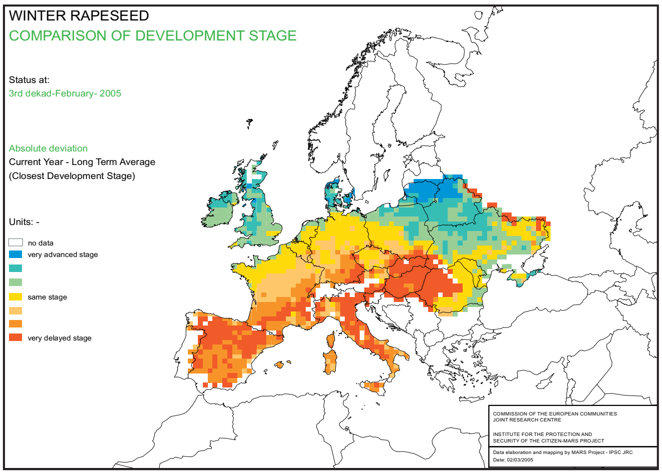
In fact, some areas were affected by intensive and/or prolonged rain, which delayed and hampered the sowing of winter wheat at the optimal periods in Portugal, Ireland and central and northern parts of the UK (especially in comparison with the previous year), Denmark and the North Sea side of the Nordic countries, the Benelux area (mainly in comparison with the previous year but generally on average), western Germany (only late varieties), southern and central Italy, north-western Spain and southern France. Thus, the main districts for soft winter wheat were not really affected, whilst the durum wheat areas could have suffered more of a delay. The areas of winter barley spoiled by rain were more extensive. The UK, Ireland, France, the Benelux countries and western Germany received too much rain during canonical periods and were wetter than the previous year and than average. The delayed sowing could be compensated for in almost average conditions during the coming weeks. A partial shift to spring barley is likely.

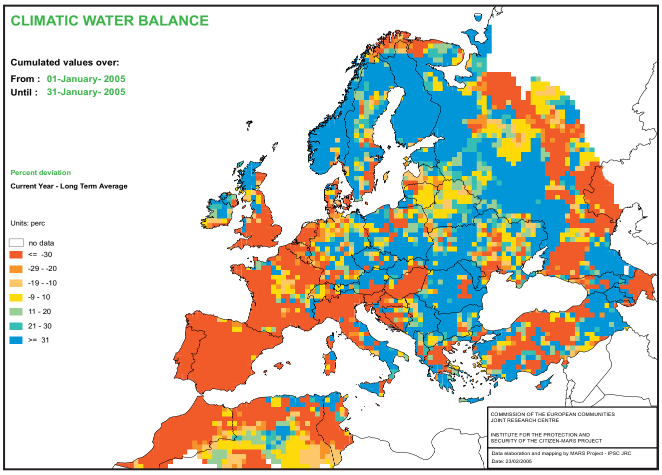
Crop and agrometeo maps — January and February 2005

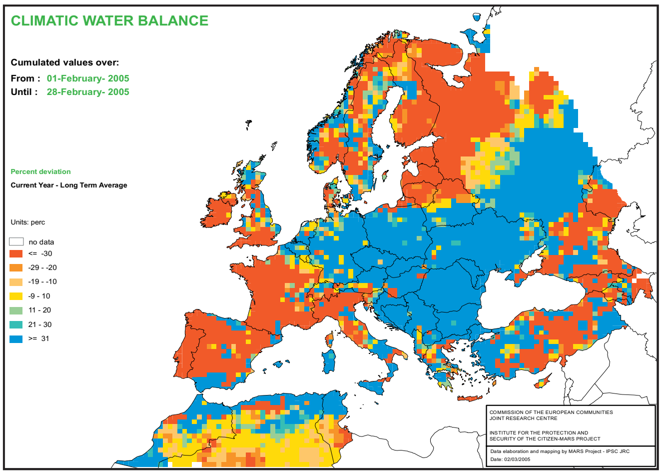


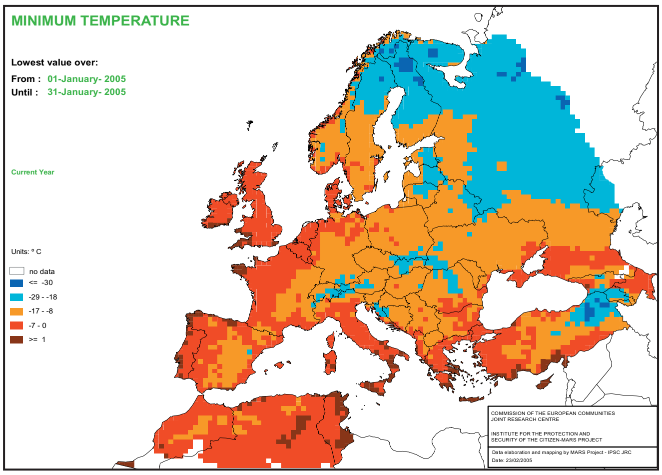


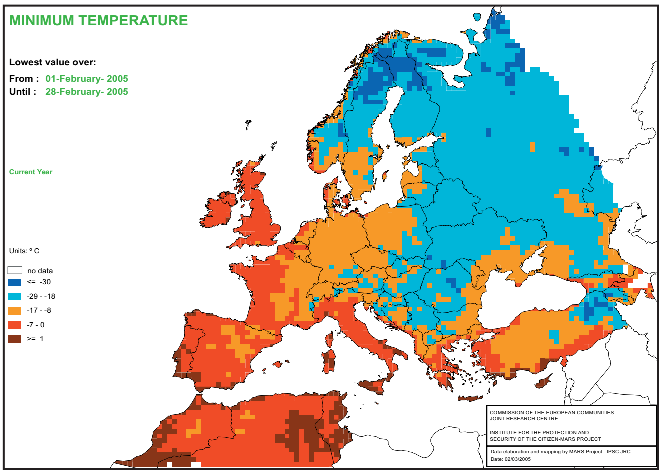






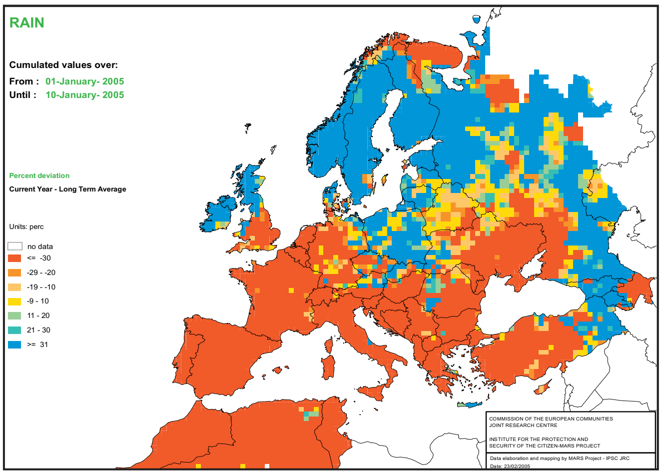


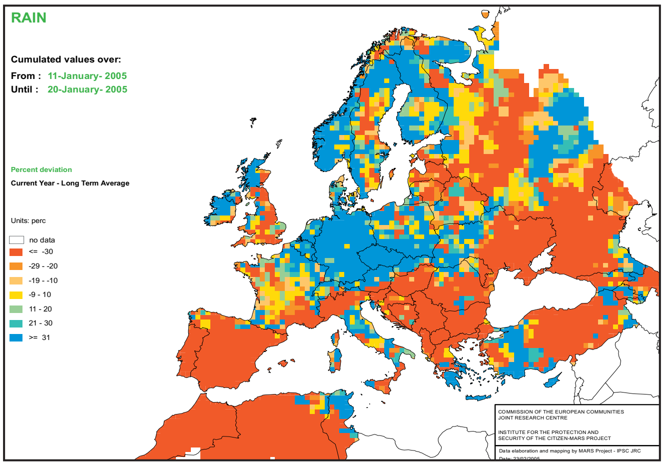


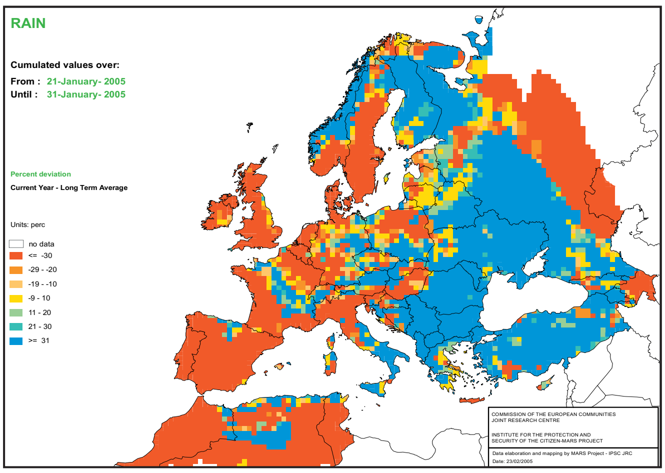


Ten-day rain maps — 1 January to 28 February 2005

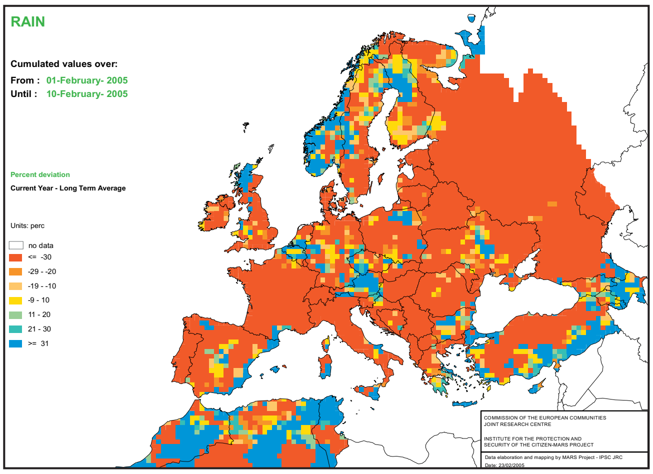
January

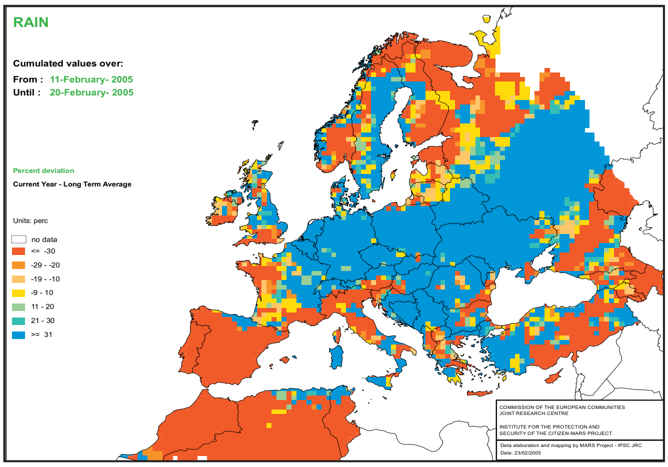


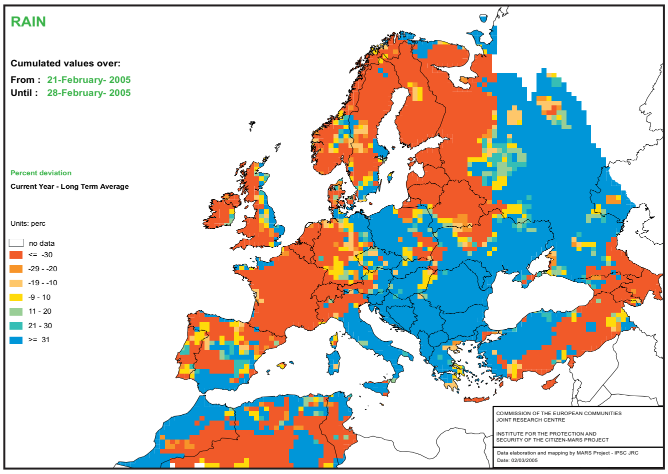




February



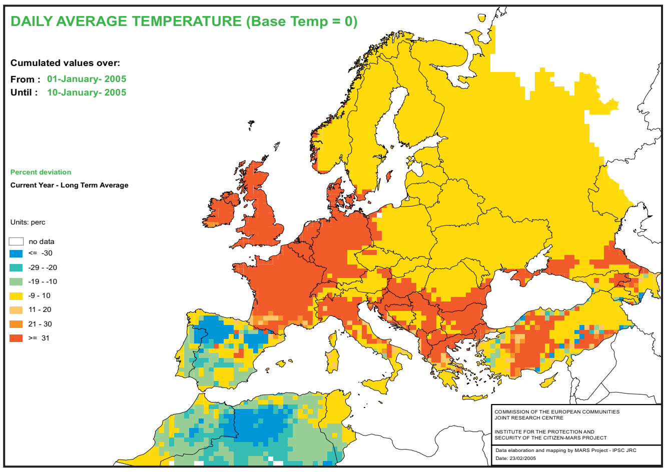


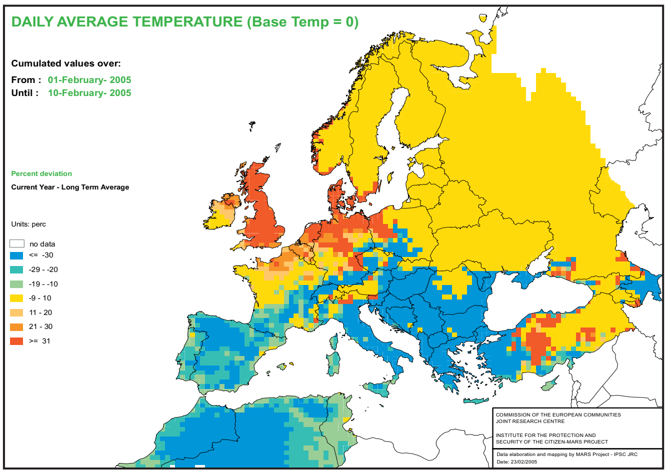


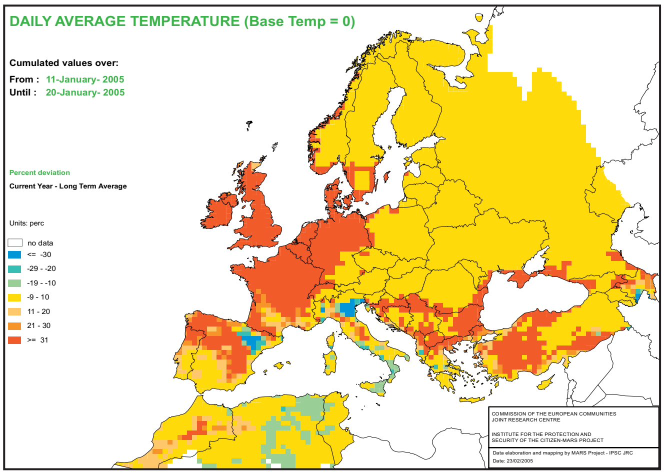
Ten-day temperature maps — 1 January to 28 February 2005

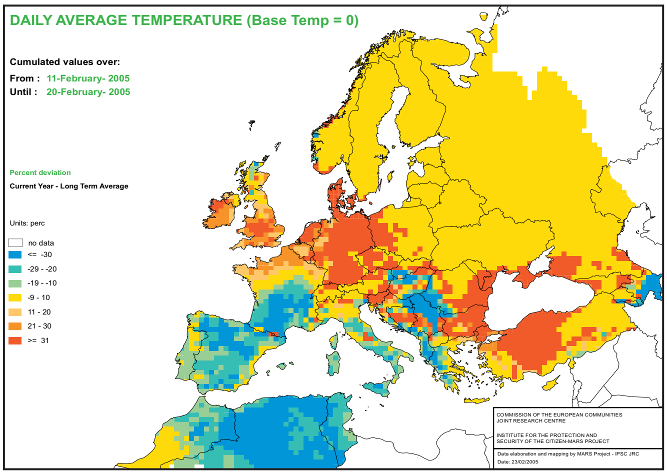
January

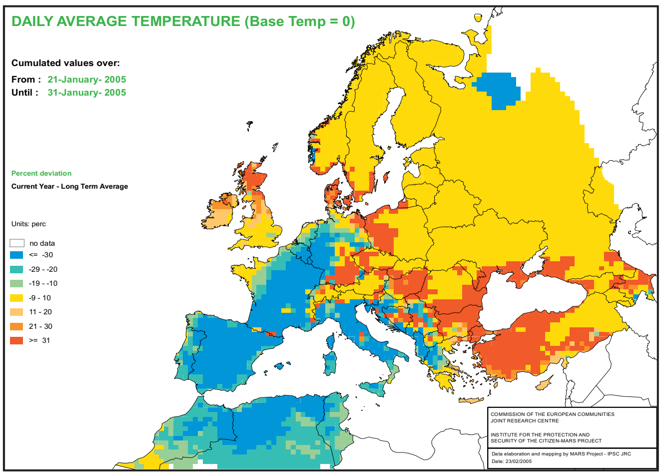
February

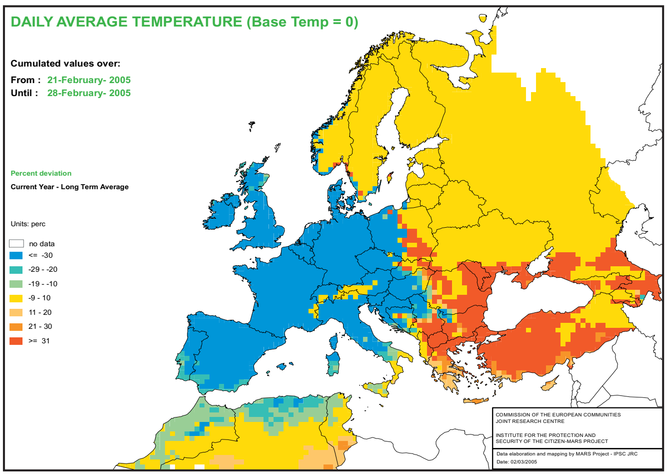




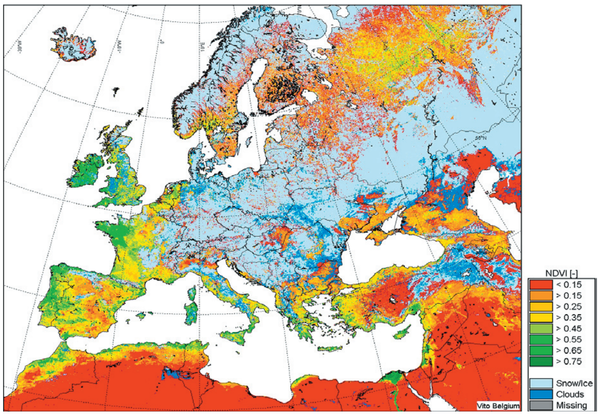


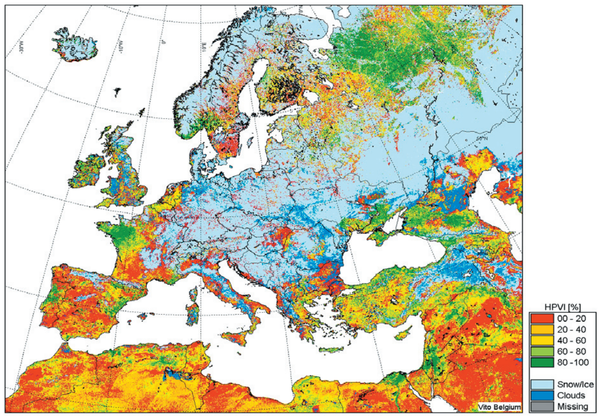






Spot-vegetation satellite analysis





Map highlights

Looking at the NDVI map derived from the spot-vegetation instrument for the last dekad of February, moderate values can be observed for the Mediterranean Basin for the start of the season. Moreover, areas that have been strongly affected by the cold and dry conditions can be discerned, revealing retarded crop development at a low level, e.g. southern Portugal. This is stressed by the second map showing the historical probability that the NDVI value actually occurs. Southern Portugal, huge parts of central Spain and the western part of Morocco appear red, underlining the fact that the biomass is less developed.

A good start to the season (at a very early stage) can be considered for the southern part of the UK as well as for France, where the difficult conditions (not enough water supply) do not seem to have held up crop development. Central and northern parts of Europe are snow covered preventing an NDVI interpretation.

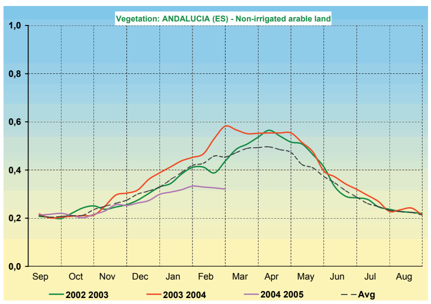
CNDVI profile highlights: optimal growth cycle for most of Europe

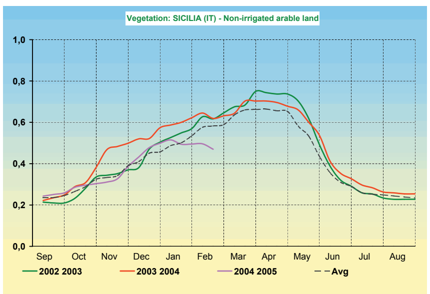
In Alentejo (Portugal) the current NDVI profile is noticeably below the average and that of the two last years, and shows a further decline in February, probably the consequences of missing water supply resulting in lower biomass production. Concerning central Portugal, the situation interpreted from the NDVI profile is less severe. A similar situation can be found for Andalucia (Spain), which suffered under the same climatic regime in the considered period, with biomass production well below average.

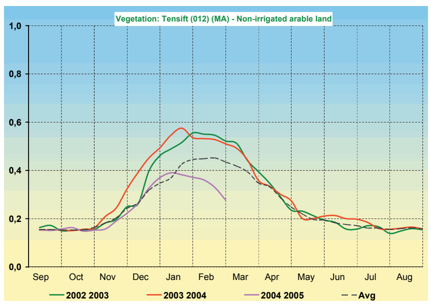
The two profiles for Italy show different situations compared with the Iberian Peninsula. In Tuscany NDVI values are oscillating near the average with a clear drop in February, related to snow cover. For Sicily, the start of biomass development can be clearly observed with values corresponding to the average and a slow decline starting in January, probably related to clouds/snow as the weather conditions so far do not suggest a hampered crop development.

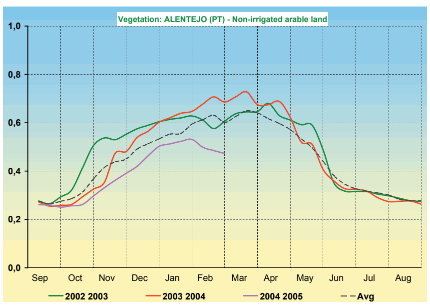
The dry and cold conditions in Morocco are reflected in the NDVI profile of Tensift. The normal NDVI increase at the beginning of the season came to an end early in January and was followed by a sharp decline in values, showing the affected vegetation and less biomass production. Besides the dry conditions, temperatures below – 2 °C were recorded, possibly harming the plants. The situation for north-west Morocco is less severe: a moderate start to the season, with values similar to the long-term average as these regions received more precipitation, but with a sharp decline in values for the last dekad of February, probably also a consequence of the cold wave reaching Morocco in the first day of February.

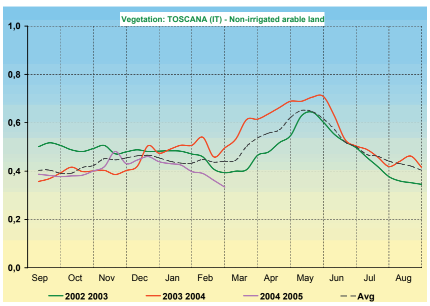
Another example from the Mediterranean Basin is visualised with the profile of Thessalia (Greece). The first increase in NDVI values is shifted towards mid-January instead of the end of December like the long-term average, followed by a flattening of the curve in February due to cold waves and dispersed snow cover but with biomass development starting again from the second dekad of February.

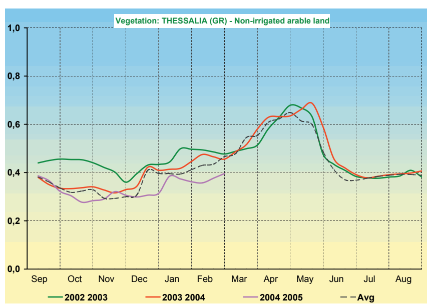












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