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Period covered: 1 January 2019-18 February 2019
Issued: 25 February 2019

JRC MARS Bulletin
Crop monitoring in Europe
February 2019

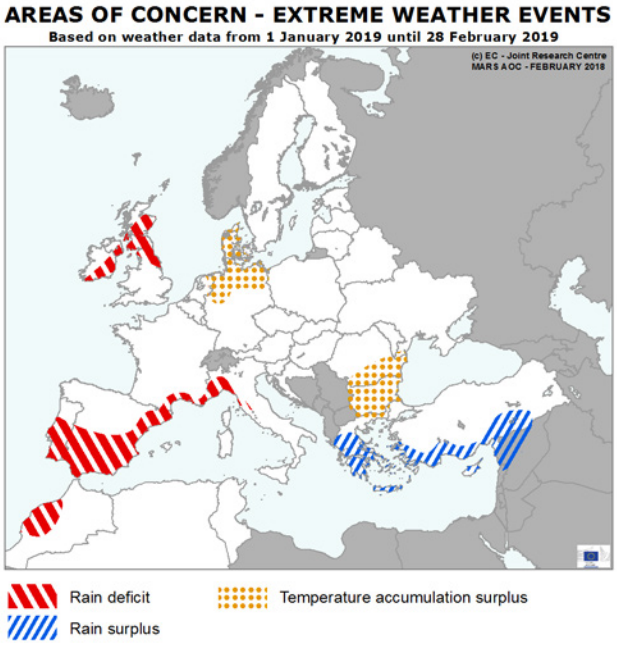
Frost tolerance weakening

So far, no threat to winter crops expected

The review period was predominantly warmer than usual in most of Europe, in particular during the first half of January and from the beginning of February. Slightly colder-than-usual conditions prevailed in southern Italy and northern Scandinavia.

As a consequence of the predominantly mild conditions, frost damage has been minor so far. However, due to the same mild weather conditions, the low-temperature acclimatisation of winter cereals (winter hardening) remains weak in large parts of Europe. According to our frost-kill model simulations, since late January, frost tolerance has weakened in the region between eastern France and western Poland, as well as in the Carpathian Basin, the northern half of the Balkan Peninsula and the western half of Turkey. The current low levels of hardening in Germany and Denmark, as well as in southern Romania and northern Bulgaria, are uncommon and raise some concern about possible frost-kill damage in the event of severe cold-air intrusion. Nevertheless, no further frost-kill losses are expected within the forecast period (up to the end of February), despite expected colder weather in the Balkan region.

Several parts of Europe recorded a rain deficit. This was most evident in large parts of the Iberian Peninsula and the western Maghreb region, where rainfall has been substantially below average since the beginning of December. Rain would be welcomed in these regions to restore soil water reserves and groundwater as spring approaches. So far, these dry conditions generally do not represent an immediate concern for crops.



In contrast, some parts of south-eastern Europe experienced more than 200 mm of rainfall within the analysis period, which corresponds to more than double the average amount for many areas in this region.

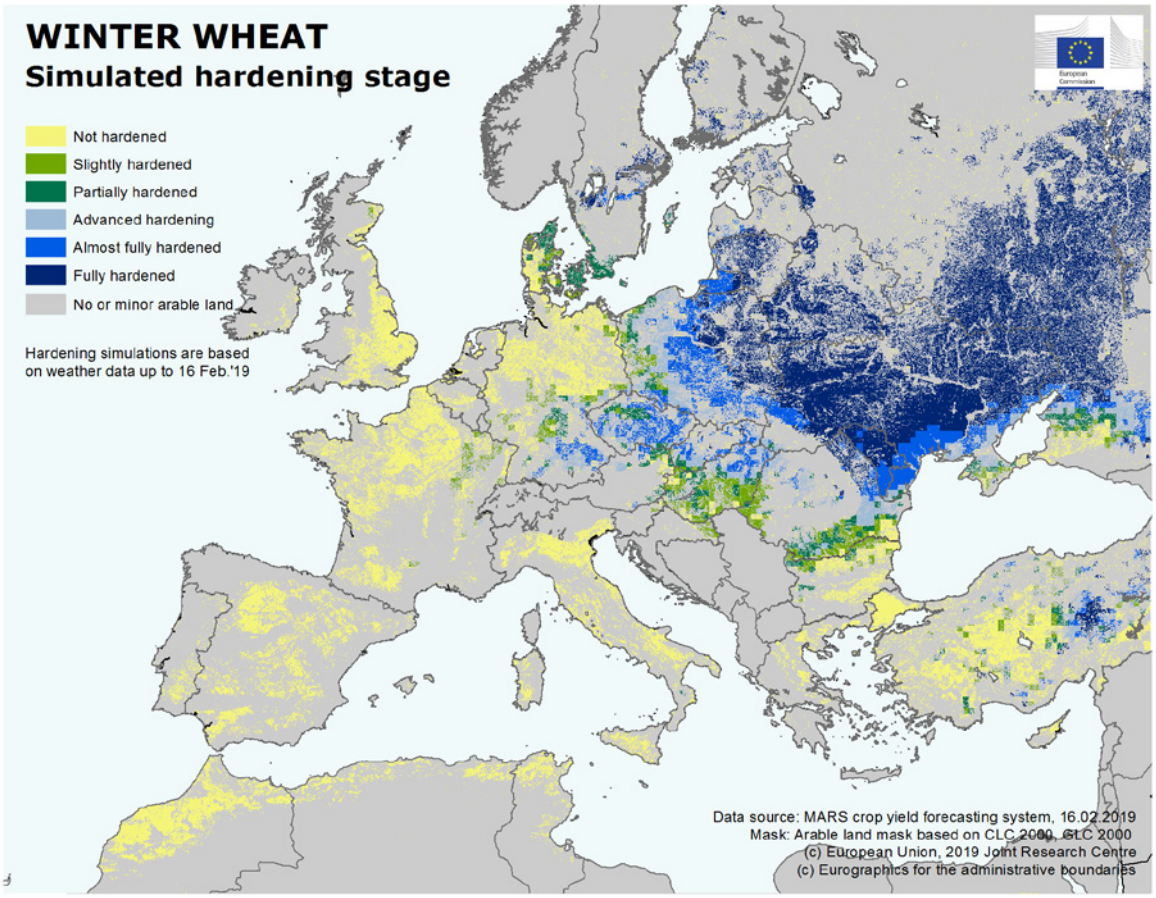
1 Winter hardening and frost-kill analysis

2 Agrometeorological overview

3 Atlas

Joint Research Centre

1. Winter hardening and frost-kill analysis



According to our latest frost-kill model simulations, winter cereals are not hardened or only slightly hardened ([1]) in the Atlantic and Mediterranean regions of Europe. In these regions, frost events with minimum temperatures reaching – 10 °C to – 12 °C can be harmful to winter wheat. In most parts of central and eastern Europe, the frost tolerance of winter cereals slightly improved in the second half of January. However, since late January, frost tolerance has weakened in the region between eastern France and western Poland, as well as in the Carpathian Basin, the northern half of the Balkan Peninsula and the western half of Turkey.

Winter cereals are generally not hardened in the UK, France, the Benelux countries, the northern half of Germany and southern Denmark.

Winter cereals have become slightly or partially hardened in the Carpathian Basin and in the northern half of the Balkan Peninsula, where low-temperature tolerance has started to weaken (dehardening) during the milder-than-usual first dekad of February. In mid-February, such a low level of hardening in Germany and Denmark, as well as in southern Romania and northern Bulgaria, is uncommon and raises concern about possible frost-kill damage in the event of severe cold air intrusion.

The hardening of winter cereals is advanced or almost full in southern Germany, Slovakia, the Czech Republic, central Poland, north-eastern Hungary, the northern half of Romania and eastern Turkey, as well as in southern regions of Ukraine and Russia.

Winter cereals are fully hardened in the cold northern and eastern areas of Europe, including most of the Scandinavian Peninsula, the Baltic countries, Belarus and most other parts of Ukraine and Russia.
Our frost-kill model suggests no notable frost-kill damage since mid-January.
Based on the medium-range weather forecast (issued on 22 February), frost tolerance will continue to weaken in central Europe during the rest of February, without significant changes elsewhere in Europe. No further frost-kill damage is expected during the forecast period.

([1]) Hardening is a bio-physiological process of winter cereals that occurs when, in response to cold conditions, the crops transform cellular starch to sugar thus gaining low-temperature tolerance to survive the harsh winter conditions.

2. Agrometeorological overview

Meteorological review (1 January-18 February 2019)

Warmer- or slightly warmer-than-usual conditions prevailed in most of Europe, except for large regions in south-western and southern Europe. Daily mean temperature anomalies (w.r.t. the LTA) were below 2 °C in most of these areas. Higher anomalies, up to 4 °C, were observed in western Russia and along the eastern side of the Black Sea. In all these regions, as well as in the Iberian Peninsula and northern/central Italy, daily maximum temperatures were above the LTA, with average anomalies up to 2 °C (4 °C locally and in western Russia and the eastern side of the Black Sea).

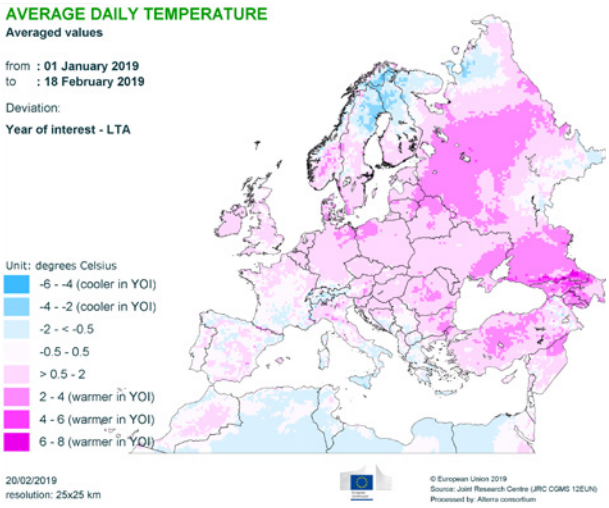
Cold events with daily minimum temperature below – 8 °C were observed in large areas of central, eastern and south-eastern Europe. In central and south-eastern Europe, the number of days with such cold events was generally up to six. More than 14 cold days were observed in northern Europe, western Russia and a large area of eastern Turkey.

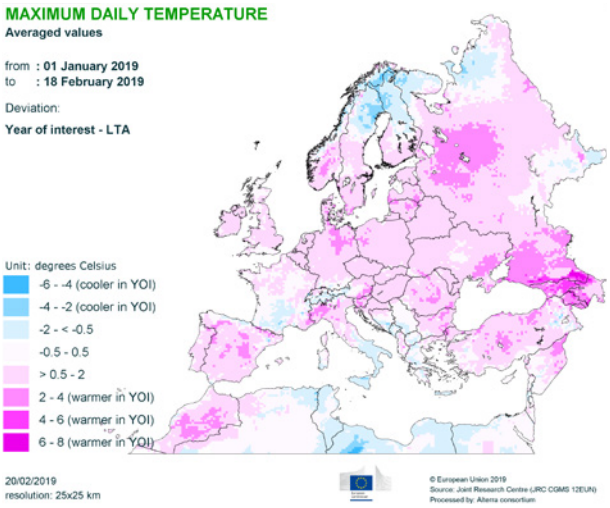
Colder- or slightly colder-than-usual conditions prevailed in southern Italy and the northern part of the Scandinavian Peninsula, with daily mean temperature anomalies (w.r.t. the LTA) ranging between – 2 °C (– 4 °C in northern Scandinavia) and – 0.5 °C.

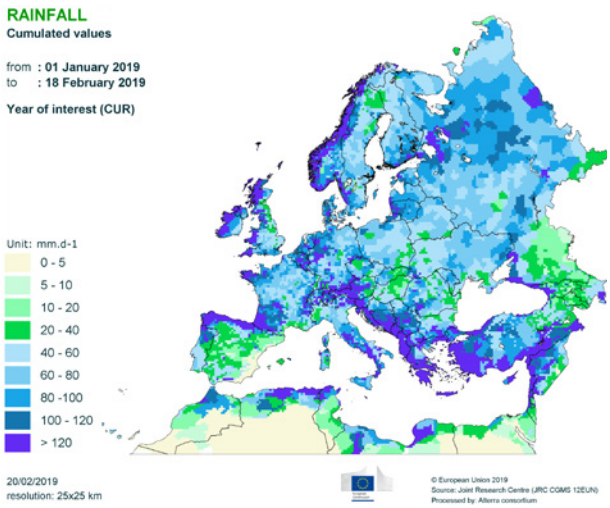
Drier-than-usual conditions continued in the Iberian Peninsula, with anomalies in total precipitation (w.r.t. the LTA) between – 100 % and – 50 %. Drier-than-usual conditions, with anomalies mainly ranging from – 50 % to – 30 %, were also observed in large regions of France, Italy, Hungary and the British Isles.

Wetter-than-usual conditions were mainly observed on the north-eastern side of the Alps, in some areas of eastern and south-eastern Europe, and in western Russia. Anomalies in total precipitation, w.r.t. the LTA, were mainly between 50 % and 150 %.

Intense precipitation events with daily total precipitation above 10 mm were observed in many European regions. More than 4 days with intense precipitation were recorded in the northern part of the Iberian Peninsula, central and southern Italy, along the north-eastern side of the Alps and along the Balkans, in large regions of eastern Europe as well as Turkey. However, with a few exceptions, daily precipitation levels remained below 40 mm.



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Cumulated values
from : 01 January 2019
to : 18 February 2019
Year of interest (CUR)
Unit: mm.d-1
0 - 5
5 - 10
10 - 20
20 - 40
40 - 60
60 - 80
80 -100
100 - 120
> 120
20/02/2019
resolution: 25x25 km
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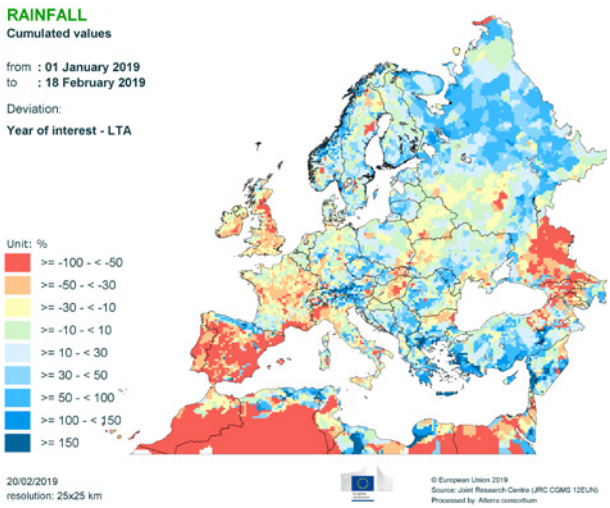
Processed by: Alterra consortium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to : 18 February 2019
Deviation:
Year of interest - LTA
Unit: %
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>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 100
>= 100 - < 150
>= 150
20/02/2019
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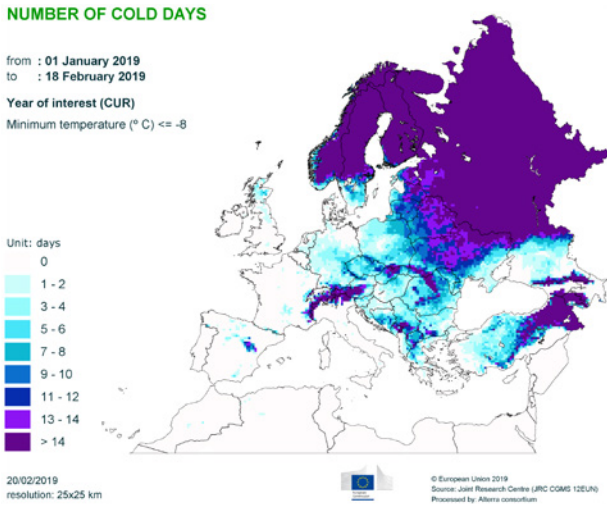
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to : 18 February 2019
Year of interest (CUR)
Minimum temperature (° C) <= -8
Unit: days
0
1 - 2
3 - 4
5 - 6
7 - 8
9 - 10
11 - 12
13 - 14
> 14
20/02/2019
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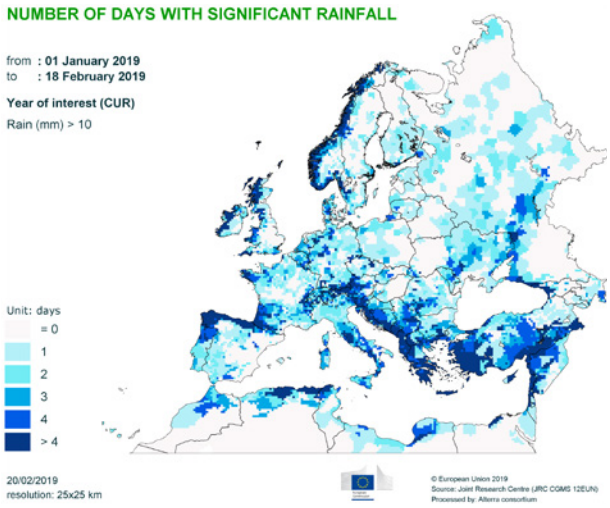
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
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to : 18 February 2019
Year of interest (CUR)
Rain (mm) > 10
Unit: days
= 0
1
2
3
4
> 4
20/02/2019
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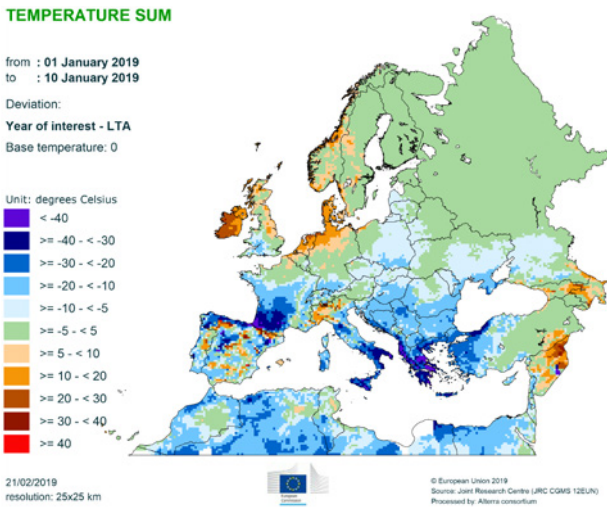
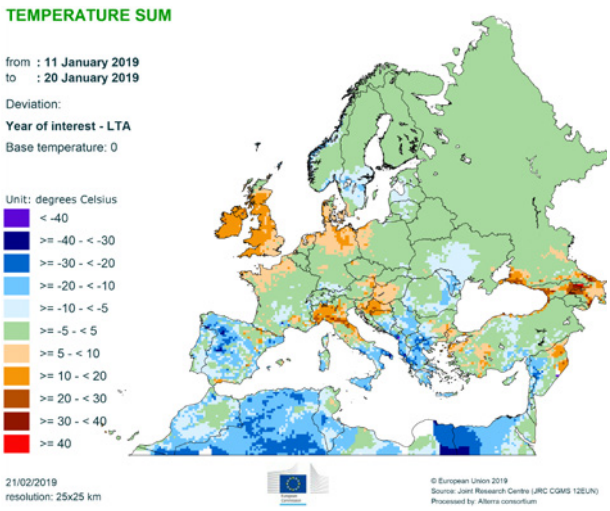
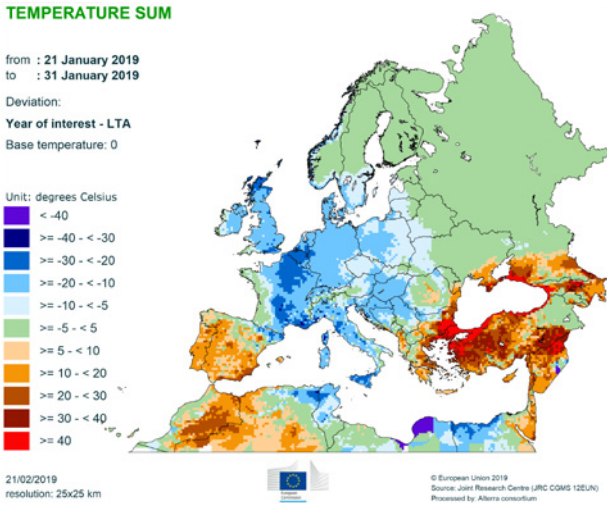
Processed by: Alterra consortium

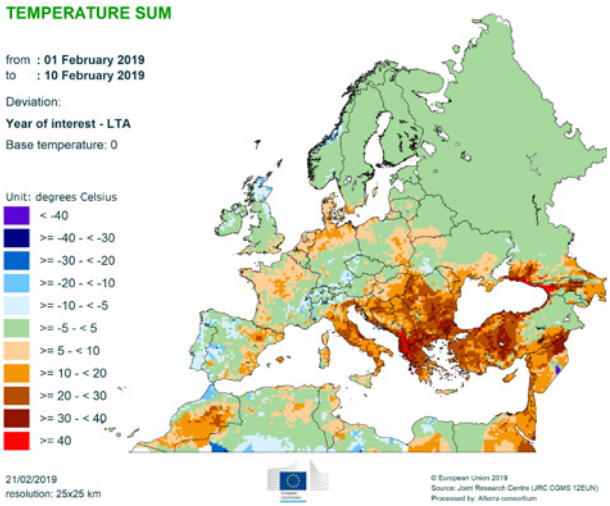
3. Atlas

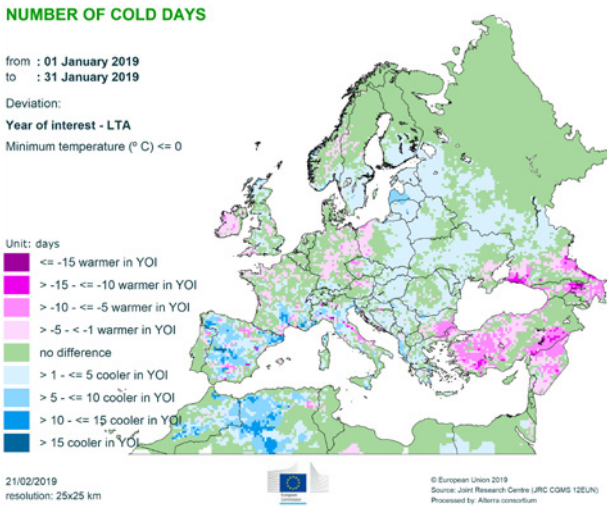
Temperature regime

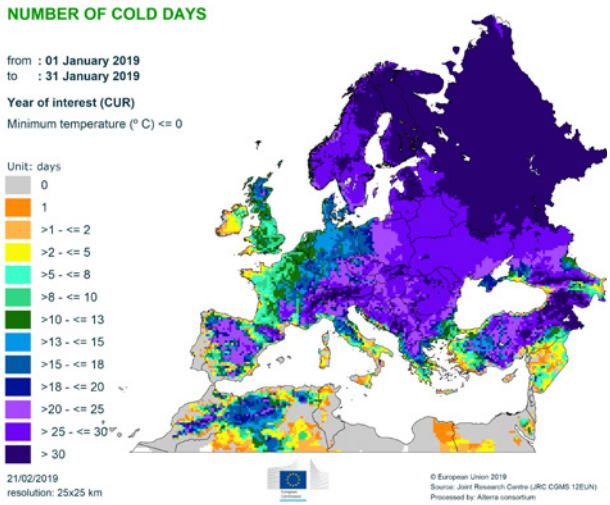


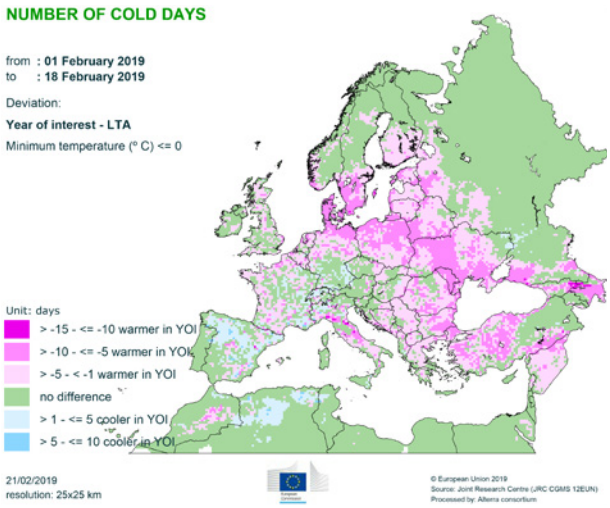


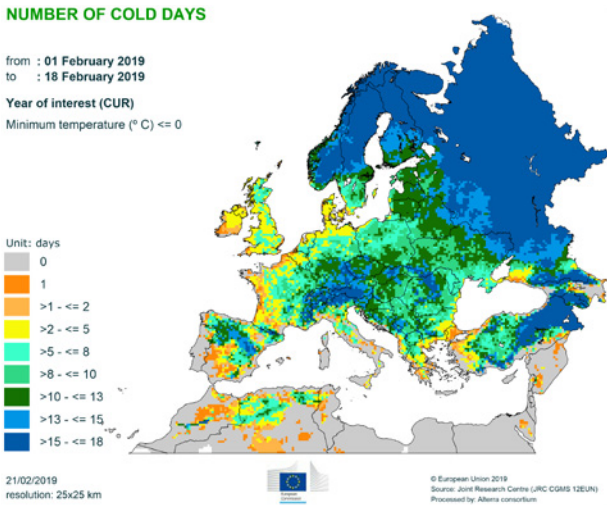




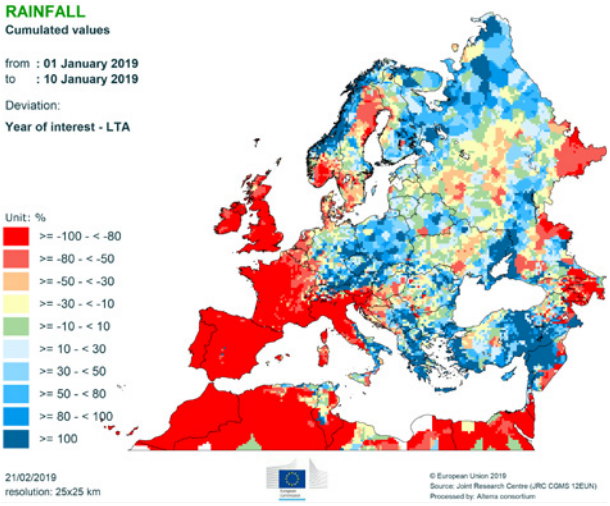


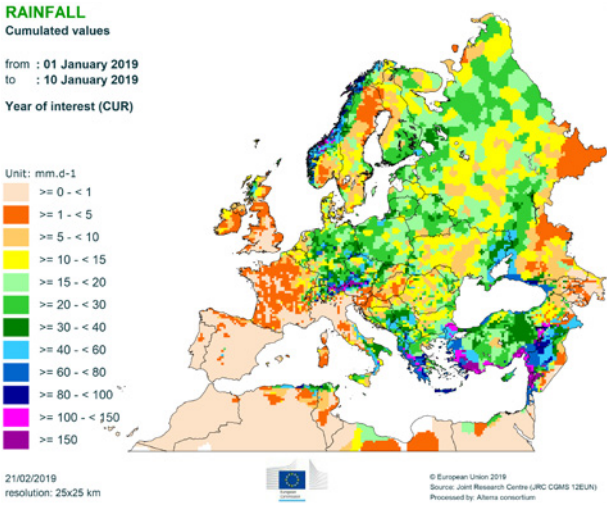


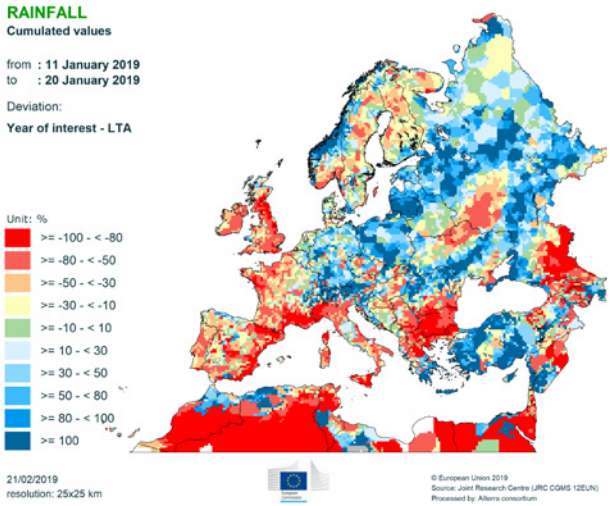


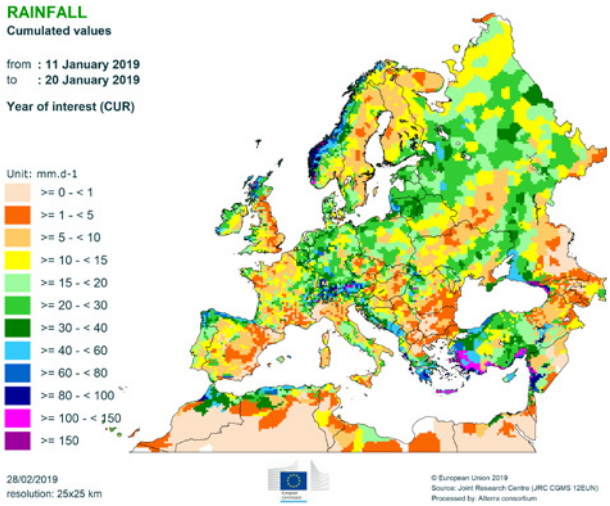


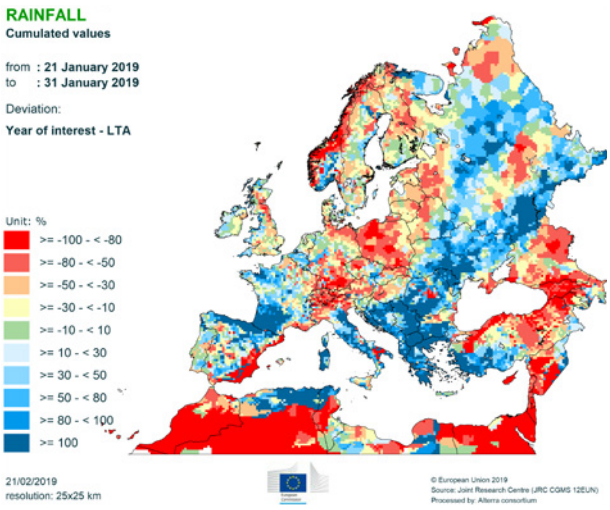
Precipitation







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Cumulated values
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to : 31 January 2019
Deviation:
Year of interest - LTA
Unit: %
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>= -80 - < -50
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>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
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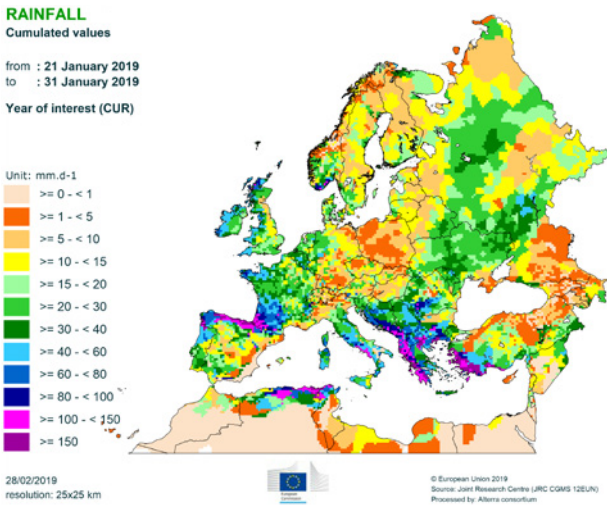
RAINFALL
Cumulated values
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to : 31 January 2019
Year of interest (CUR)
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>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
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>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
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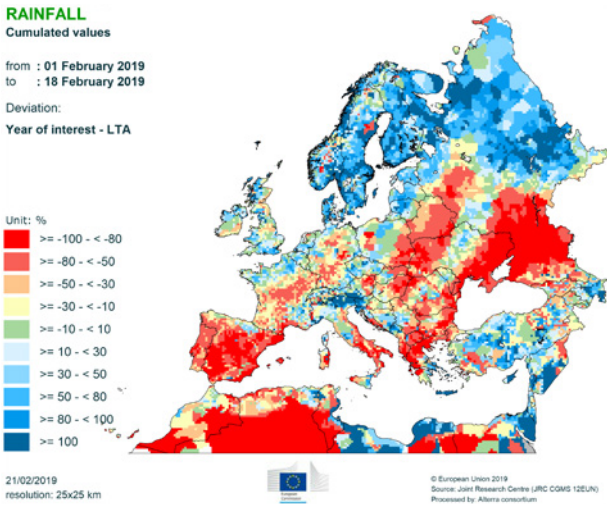
RAINFALL
Cumulated values
from : 01 February 2019
to : 18 February 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
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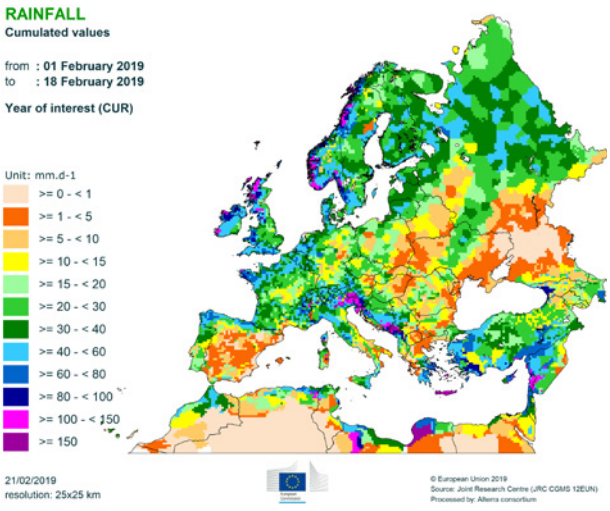
RAINFALL
Cumulated values
from : 01 February 2019
to : 18 February 2019
Year of interest (CUR)
Unit: mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
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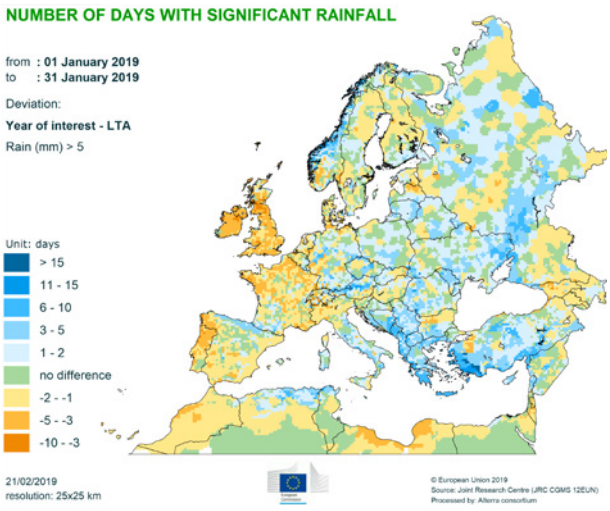
NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
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to : 31 January 2019
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
> 15
11 - 15
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
-10 - -3
21/02/2019
resolution: 25x25 km
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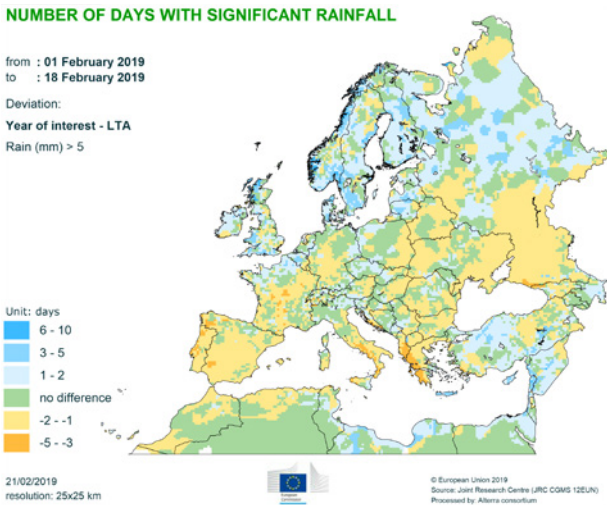
NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 February 2019
to : 18 February 2019
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
21/02/2019
resolution: 25x25 km
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Date	Publication	Reference
21 Jan	Agromet. analysis	Vol. 27 No 1
25 Feb	Agromet analysis	Vol. 27 No 2
18 Mar	Agromet analysis, yield forecast	Vol. 27 No 3
15 Apr	Agromet analysis, remote sensing, yield forecast, sowing conditions, pasture analysis	Vol. 27 No 4
20 May	Agromet analysis, remote sensing, yield forecast, sowing update, pasture analysis,	Vol. 27 No 5
17 Jun	Agromet analysis, remote sensing, yield forecast, pasture update, rice analysis	Vol. 27 No 6
22 Jul	Agromet analysis, remote sensing, yield forecast, harvesting conditions, pasture update	Vol. 27 No 7
26 Aug	Agromet analysis, remote sensing, yield forecast, pasture update, harvesting update	Vol. 27 No 8
16 Sep	Agromet analysis, remote sensing, yield forecast, rice analysis, harvesting update	Vol. 27 No 9
28 Oct	Agromet analysis, remote sensing, yield forecast, harvesting update, sowing conditions	Vol. 27 No 10
25 Nov	Agromet analysis, harvesting update, sowing update	Vol. 27 No 11
16 Dec	Agromet analysis	Vol. 27 No 12

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*MARS stands for Monitoring Agricultural Resources

Technical note:
The long-term average (LTA) used within this bulletin as a reference is based on an archive of data covering 1975–2017.

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