



European Commission

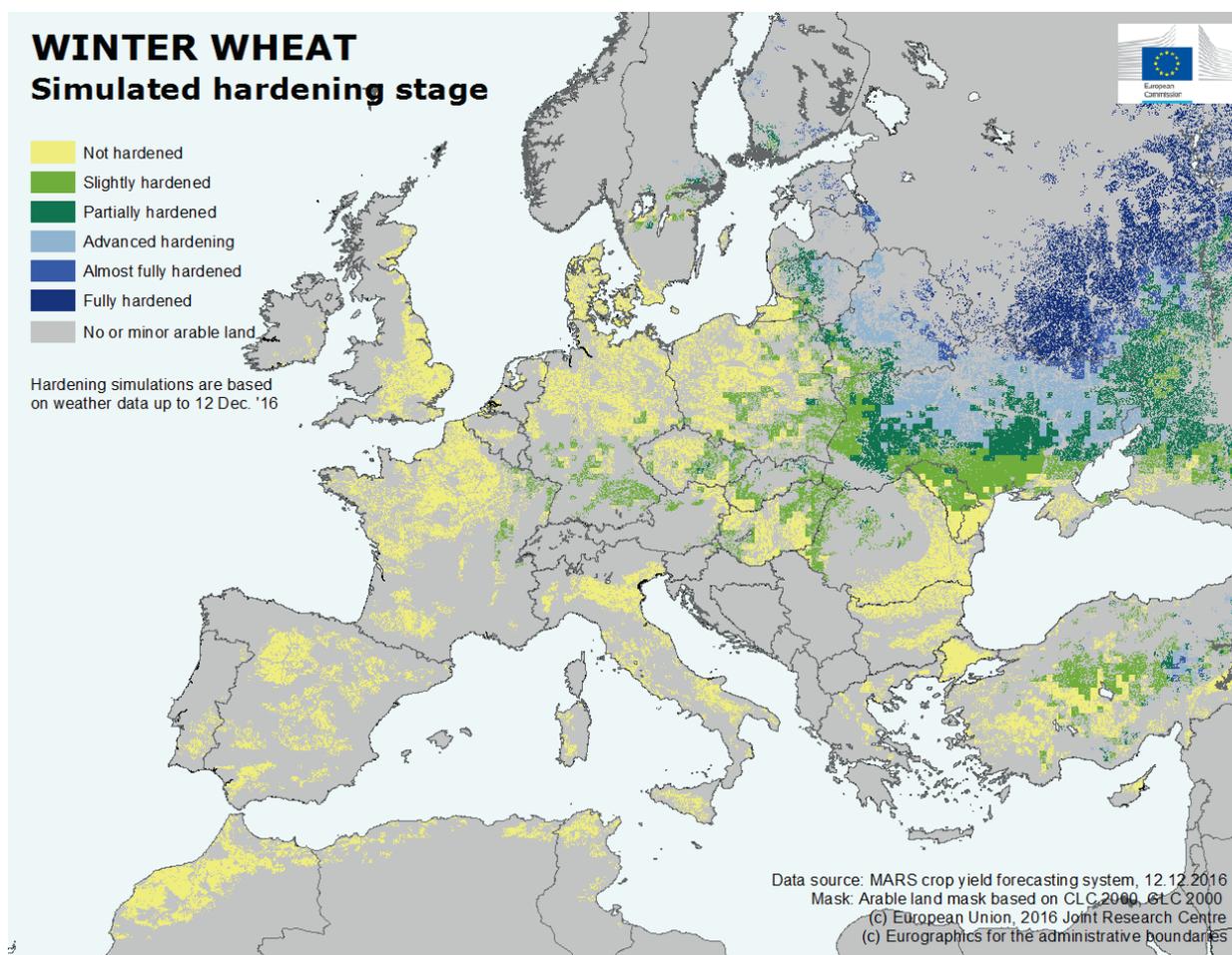
JRC MARS Bulletin

Crop monitoring in Europe

December 2016

Delayed hardening in large parts of Europe

Cold air intrusion expected after 21 December



Hardening is the biophysiological process whereby winter cereals gain low-temperature tolerance to withstand freezing conditions that occur during the winter dormancy period. Our model simulations indicate weak frost toler-

ance in most of the EU, except for some parts of Finland, Sweden and the Baltic States, where the winter crops are in a partial or advanced hardening state. In a wide area of the north, including the Baltic and Black Sea

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Atlas

areas, hardening is delayed as it only began in the first half of November and, in the second half of the month, a period of de-hardening occurred in most regions due to the significantly warmer-than-usual weather conditions. The situation improved slightly in early December, but the hardening of winter cereals is considerably delayed. The current situation is delicate, since a cold air intrusion could cause considerable frost-kill damage in the areas characterised by no snow cover and low frost tolerance of winter crops.

In some eastern areas of Belarus and north-eastern Ukraine, winter wheat has reached the advanced hardening stage. Further eastward, such as in the northern parts of the Central Okrug and in the Near Volga Okrug in Russia, winter cereals are expected to be fully or almost fully hardened. At the same time, winter wheat has still only

partially or slightly hardened in western and central Turkey, southern regions of Russia and western and southern Ukraine.

Due to the absence of low temperatures, frost kill has been very limited so far. Local frost-kill events have been simulated in some spots of eastern Turkey and in southern Russia, primarily areas along the Kazakh border. Taking into consideration the latest weather forecast, the increase in the hardening is probable in central and eastern Europe. After 21 December, a significant cold air intrusion is expected (with daily minimum temperatures reaching -20°C) in the eastern half of Europe. Possible frost kill is forecast for the Baltic states, eastern Poland, western Belarus, eastern Romania, Moldavia, some spots of Bulgaria and western and southern Ukraine.

1. Agro-meteorological overview — autumn 2016 (September, October, November)

Europe experienced a high temperature variability during the autumn period. September was warmer than usual in major parts of Europe, except in Russia and Turkey, where normal or slightly colder-than-usual conditions prevailed. Generally, a cold weather anomaly prevailed in October in parts of central, western and eastern Europe, whereas warmer-than-seasonal weather continued in the Iberian peninsula. In November, temperature conditions returned to normal values in central and western Europe, whereas a cold weather anomaly prevailed in eastern and north-eastern Europe.

Shorter periods of unusually warm weather conditions characterised this autumn. The first half of September was among the warmest in our records in large parts of western and central Europe, with positive temperature anomalies of up to 6 °C. Unusually warm weather conditions also prevailed during the first decadal of October in the southern half of Russia, the Caucasus region, Turkey, Spain and the Maghreb countries, with temperature anomalies of up to 7 °C. During the second half of November, unusually warm weather prevailed in regions surrounding the Alps, with temperature anomalies up to 6 °C above the long-term average.

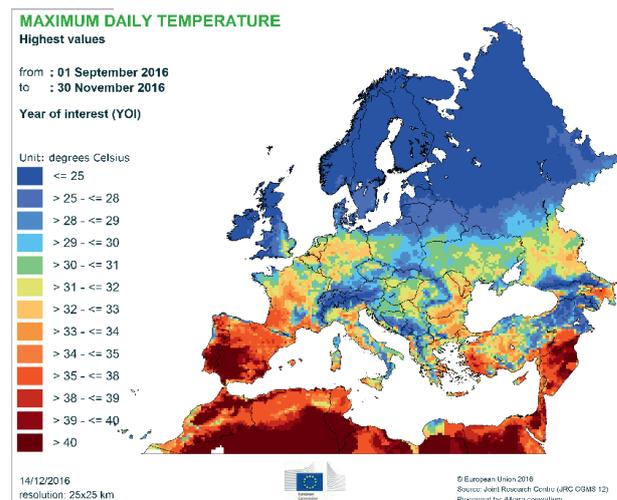
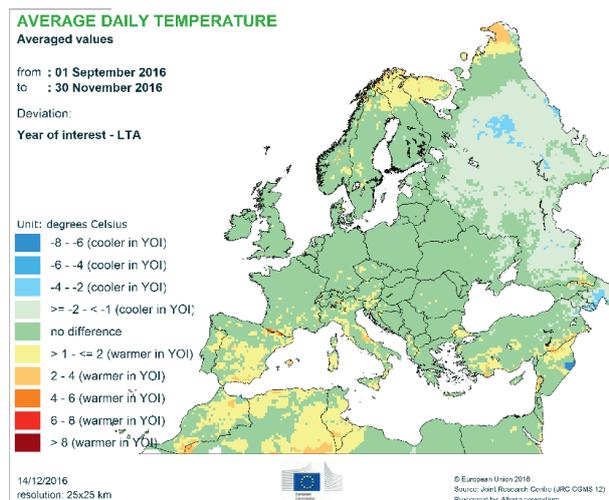
The first frosts generally appeared during the first half of October, when a cold air intrusion occurred in extended areas of central and northern Europe. Minimum temperatures of between – 3 °C and – 7 °C were recorded, especially in the northern and eastern half of Europe. Air temperatures below seasonal values also characterised the first half of November in central and northern Europe. Minimum air temperatures of between – 5 °C and – 10 °C were

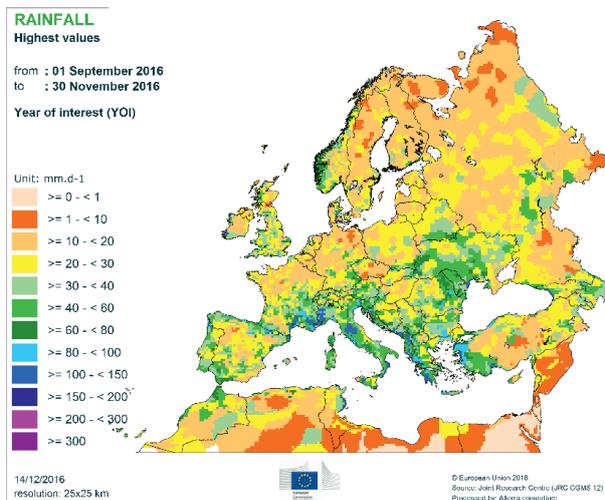
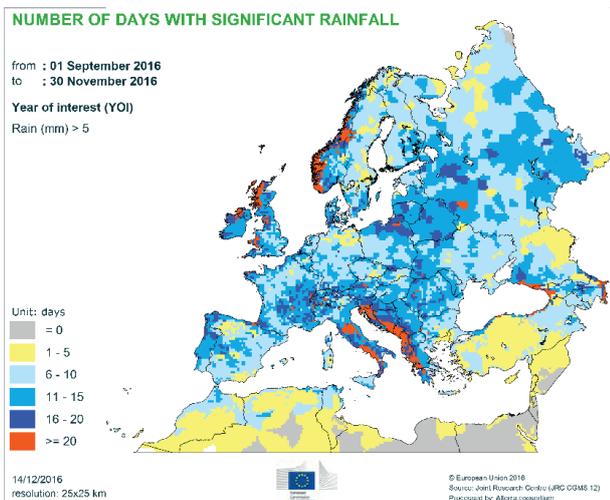
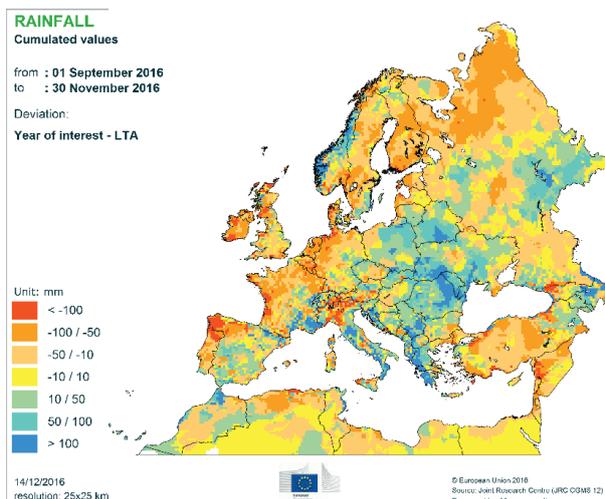
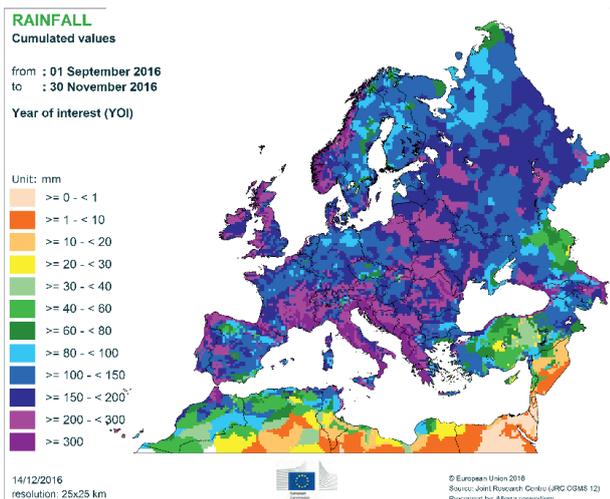
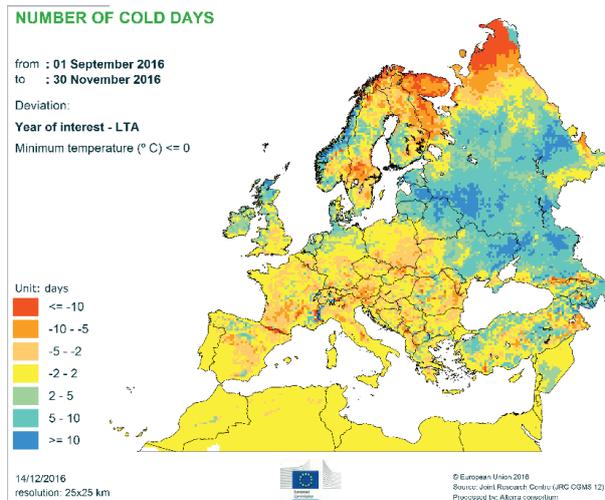
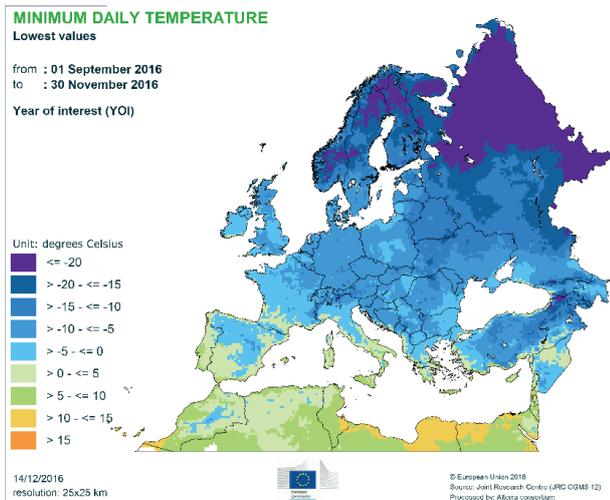
recorded in large areas of central Europe, whereas Scandinavia and north-eastern Europe recorded temperatures that were well below – 10 °C. During the second half of November, colder-than-usual weather prevailed in Ukraine, Russia and Turkey. Minimum temperatures in these regions generally dropped below – 10 °C.

A rainfall deficit occurred in many western European regions, including northern France, the north-eastern Iberian peninsula, northern Germany, the Benelux countries, Scandinavia and Turkey. Rainfall cumulates of less than 100 mm were recorded in northern Germany, regionally in the Iberian peninsula, the Czech Republic, the southern part of European Russia and Turkey.

A rainfall surplus was recorded in regions extending from the Baltic Sea to south-eastern Europe, southern Italy, south-eastern France and central European Russia. The long-term-average precipitation in these regions was generally exceeded by more than 30 %. A substantial wet anomaly (with values more than twice the long-term average) was recorded in north-eastern Romania, where recorded precipitation regionally exceeded 300 mm.

Intensive precipitation events with daily rainfall cumulates exceeding 80 mm were observed locally in central and north-eastern Italy, Sardinia, Sicily, south-western Alpine regions, the southern Dinaric Alps, the westernmost part of Turkey and north-western Black Sea regions. Intensive rainfall in these regions may have caused local flooding and waterlogging.





1.1. Meteorological review (1 November-12 December)

Air temperatures below seasonal values were recorded during the first half of November in central and northern Europe. Minimum air temperatures of between $-5\text{ }^{\circ}\text{C}$ and $-10\text{ }^{\circ}\text{C}$ were recorded in large areas of central Europe, while Scandinavia and north-eastern Europe recorded temperatures well below $-10\text{ }^{\circ}\text{C}$. During the second half of November and first decad of December, colder-than-usual weather occurred in Ukraine, Russia and Turkey. Minimum temperatures in these regions generally dropped below $-10\text{ }^{\circ}\text{C}$; however, the regions with minimum temperatures below $-18\text{ }^{\circ}\text{C}$ were limited to the central and northern parts of European Russia, northern Scandinavia, north-eastern Turkey and localised areas in north-eastern Ukraine.

Unusually warm weather conditions prevailed during the second half of November in regions surrounding the Alps, with temperature anomalies of up to $6\text{ }^{\circ}\text{C}$ above the long-term average.

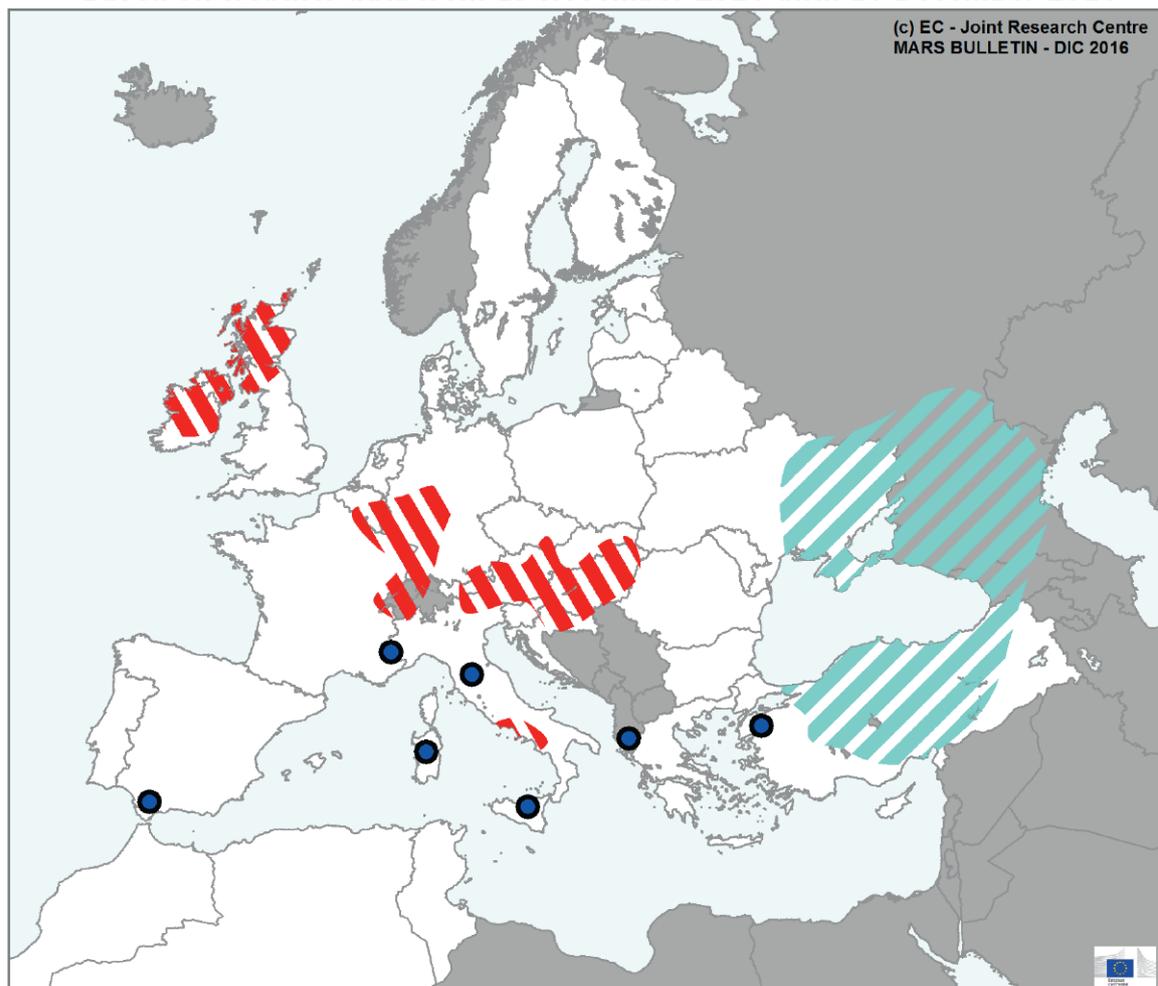
Wetter-than-usual conditions appeared mainly over central and southern Spain, south-western Alpine regions, locally in Italy and eastern Europe.

Intensive precipitation events with daily rainfall cumulates exceeding 100 mm were observed locally in central Italy, Sardinia, Sicily, south-western Alpine regions, southern Dinaric Alps and the westernmost part of Turkey. Intensive rainfall may have caused local flooding and waterlogging.

Drier-than-usual conditions occurred after mid November in Ireland, Scotland, northern France, the Benelux countries, Germany, Austria, Slovakia, western Czech Republic, southern Italy, south-eastern Europe and the north-western Iberian peninsula. Rainfall cumulates in major agricultural areas of south-eastern Europe and south-western Germany generally did not exceed 10 mm .

AREAS OF CONCERN - EXTREME WEATHER EVENTS

Based on weather data from 19 November 2016 until 16 December 2016



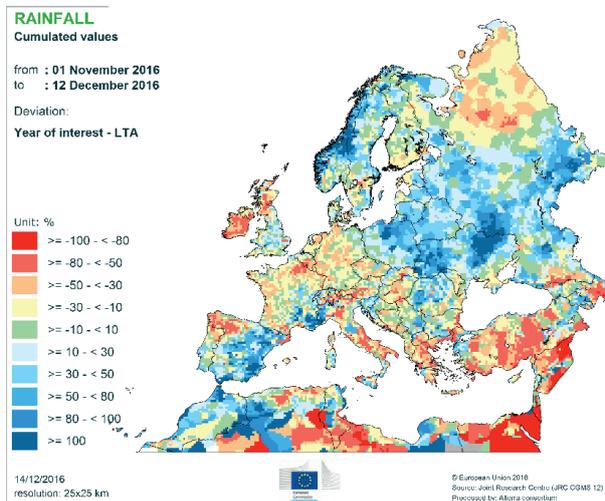
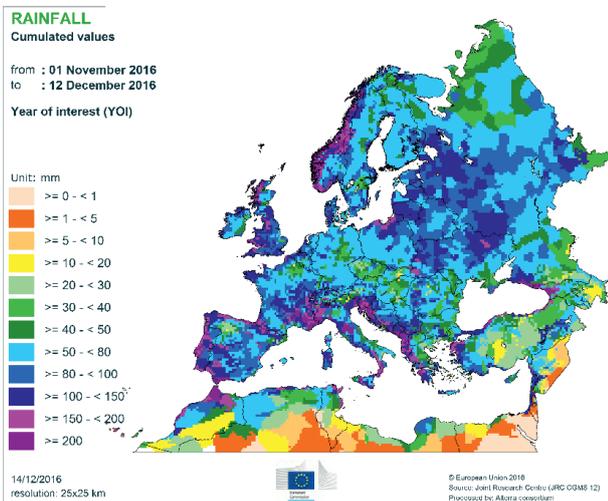
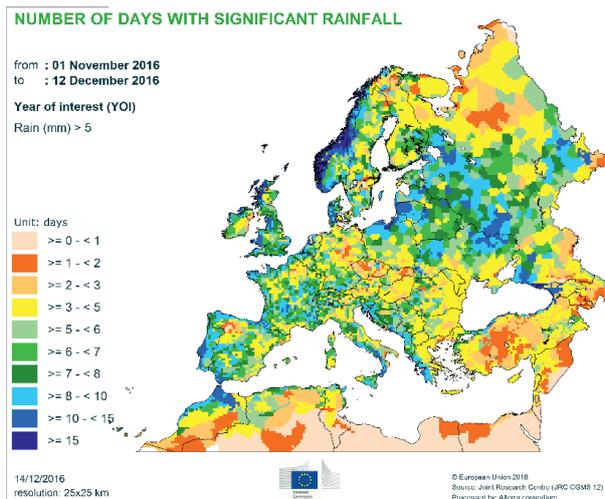
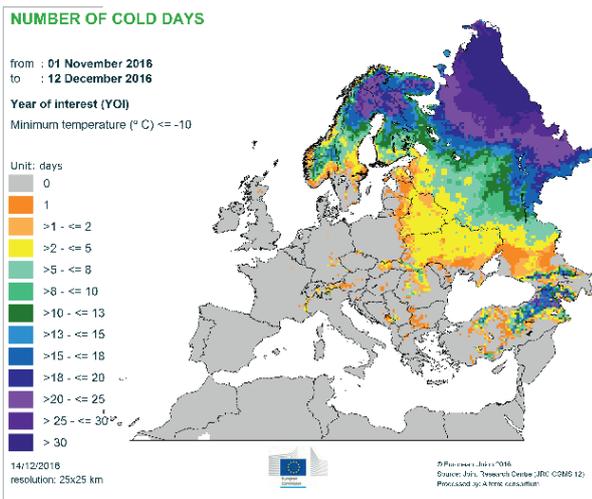
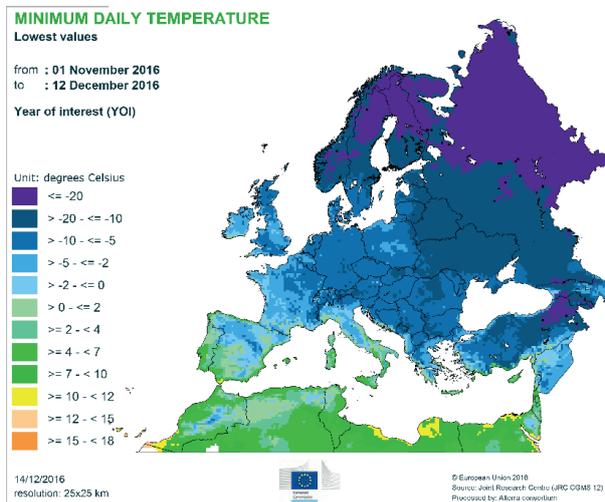
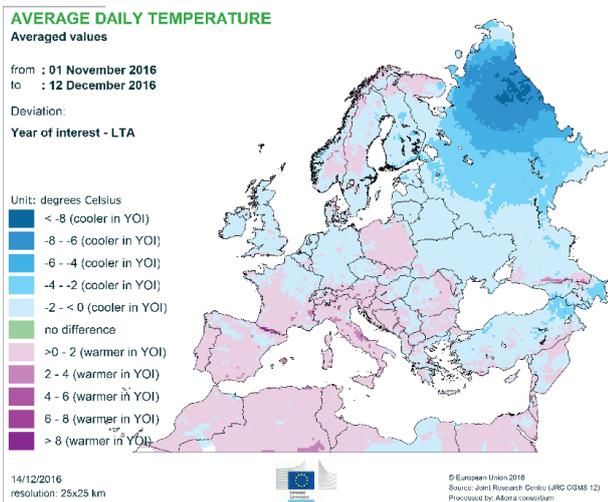
Rain deficit



Cold spell

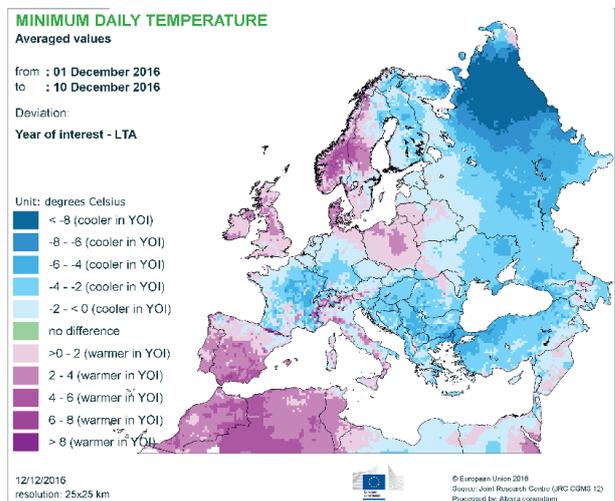
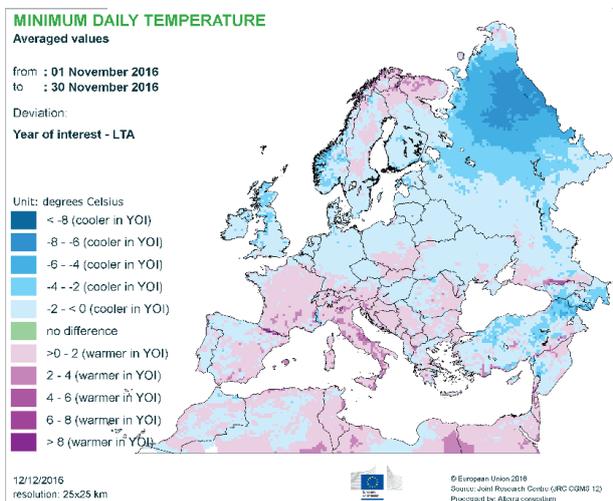
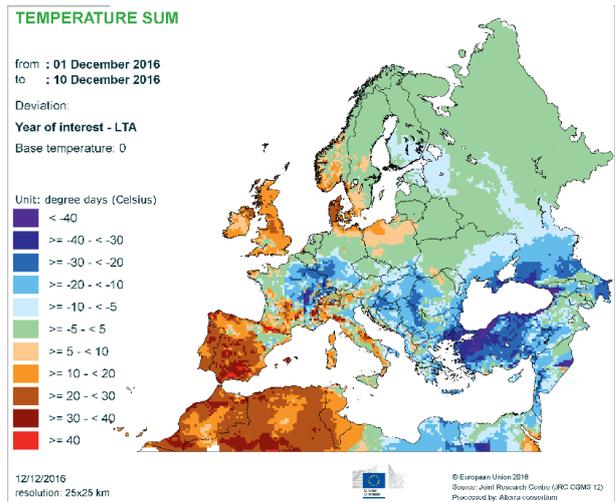
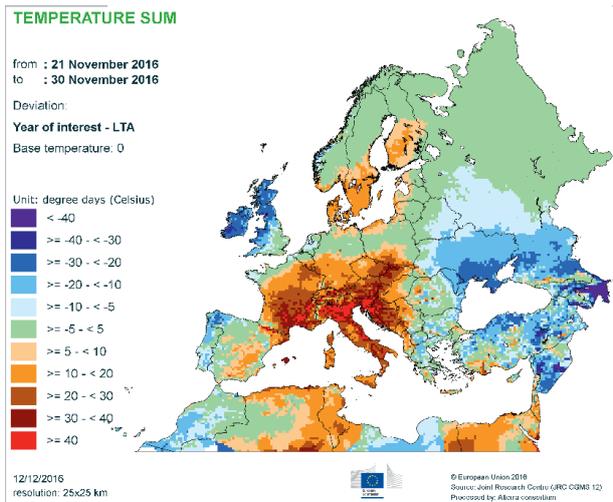
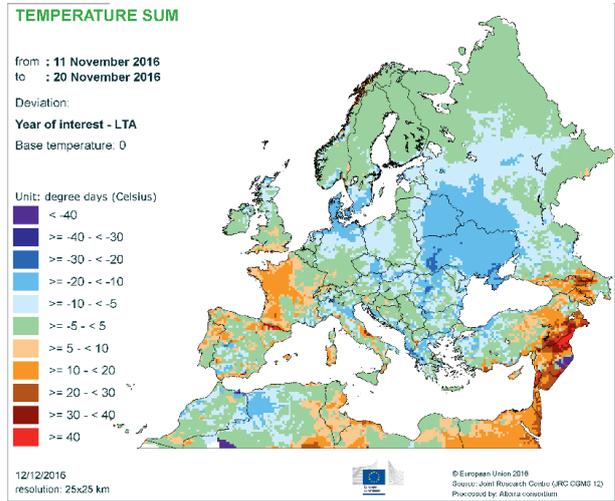
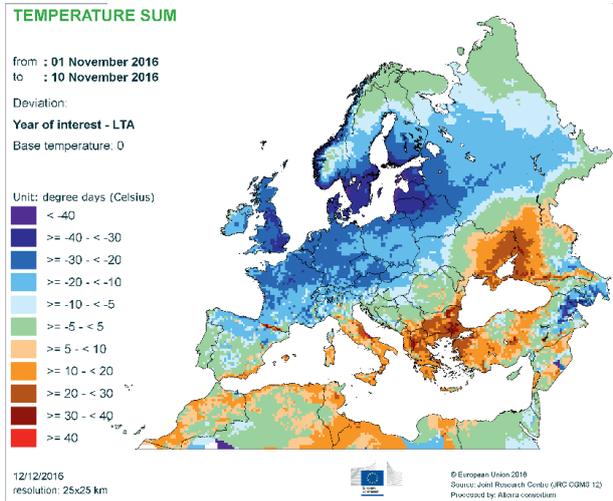


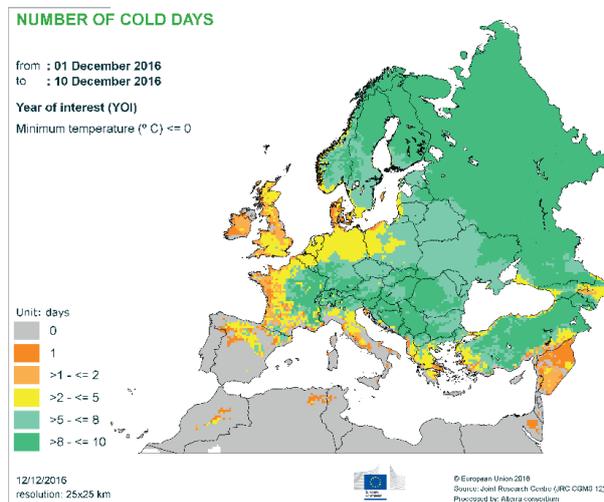
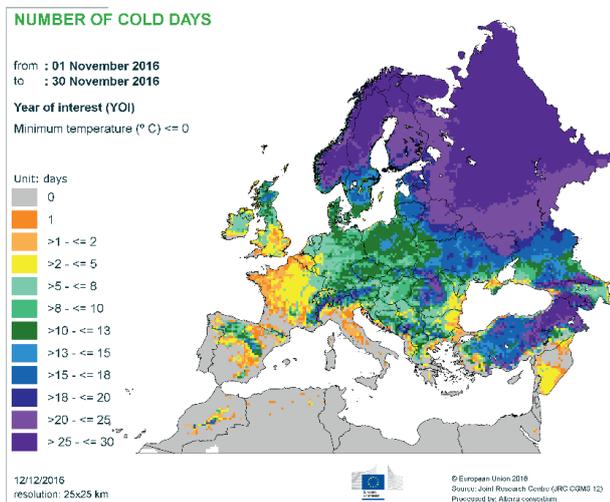
Heavy rains



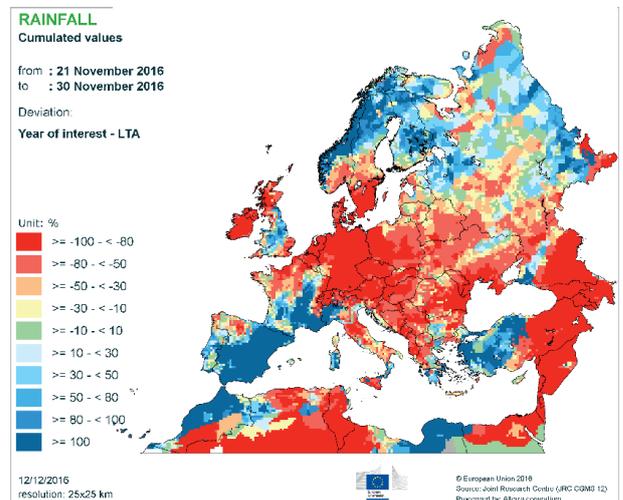
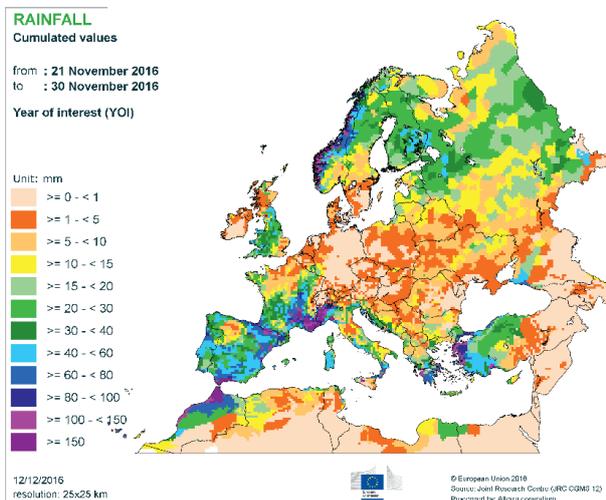
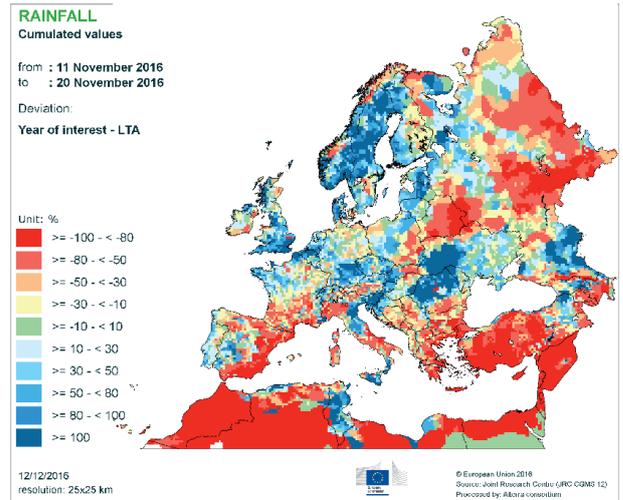
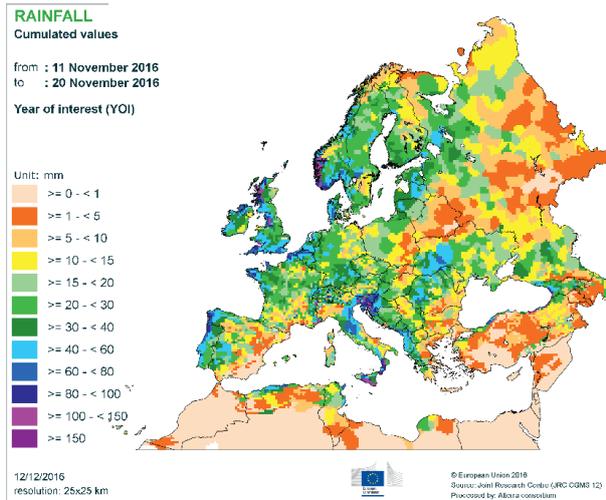
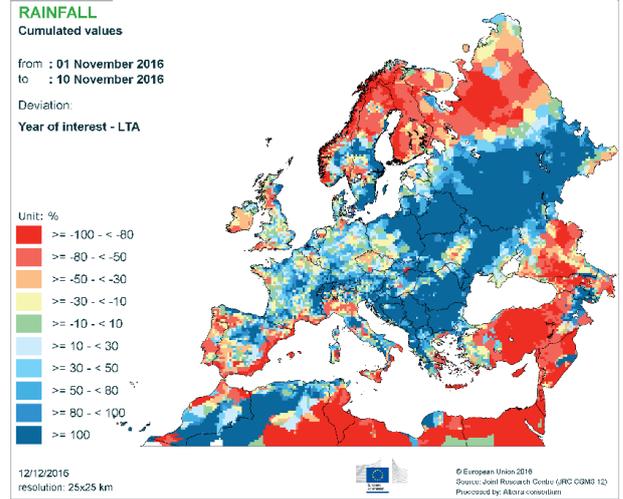
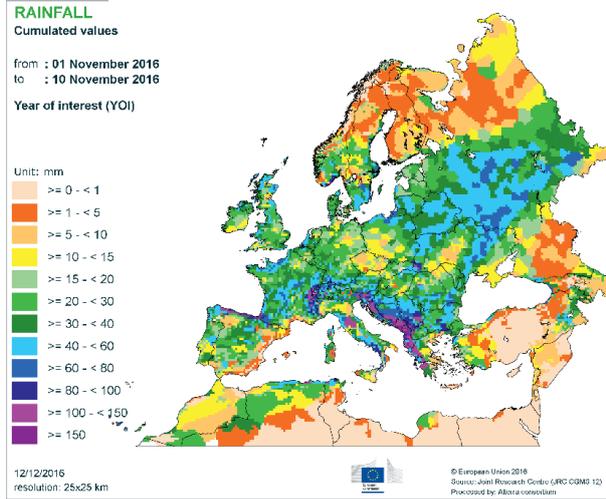
2. Atlas

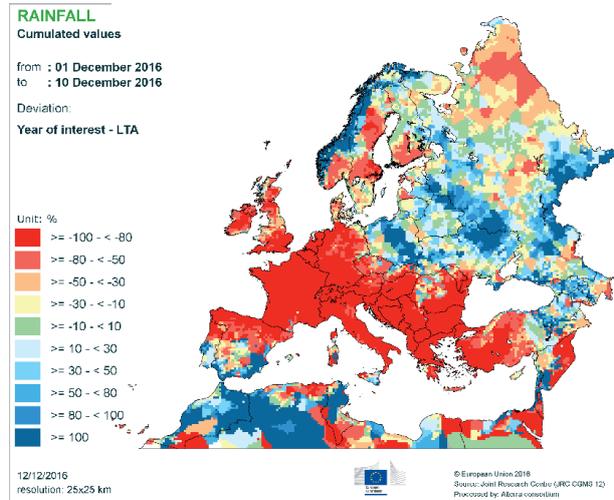
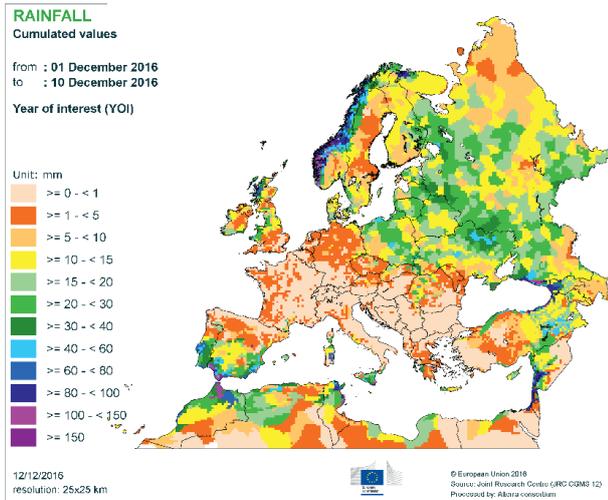
Temperature regime





Precipitation





JRC MARS Bulletins 2016

Date	Publication	Reference
25 Jan	Agromet analysis	Vol. 24 No 1
22 Feb	Agromet analysis	Vol. 24 No 2
21 Mar	Agromet analysis and yield forecast	Vol. 24 No 3
26 Apr	Agromet analysis, remote sensing, yield forecast and sowing conditions	Vol. 24 No 4
23 May	Agromet analysis, remote sensing, yield forecast, pasture analysis and sowing conditions	Vol. 24 No 5
20 Jun	Agromet analysis, remote sensing, yield forecast and pasture update	Vol. 24 No 6
25 Jul	Agromet analysis, remote sensing, yield forecast and rice analysis	Vol. 24 No 7
22 Aug	Agromet analysis, remote sensing, yield forecast and pasture update	Vol. 24 No 8
26 Sep	Agromet analysis, remote sensing and yield forecast	Vol. 24 No 9
24 Oct	Agromet analysis, remote sensing, yield forecast and rice analysis	Vol. 24 No 10
21 Nov	Agromet analysis, yield forecast and sowing conditions	Vol. 24 No 11
19 Dec	Agromet analysis	Vol. 24 No 12

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Analysis and reports

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*MARS stands for Monitoring Agricultural Resources

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