European Commission

JRC MARS Bulletin global outlook

2017

Crop monitoring European neighbourhood

Kazakhstan

April 2017

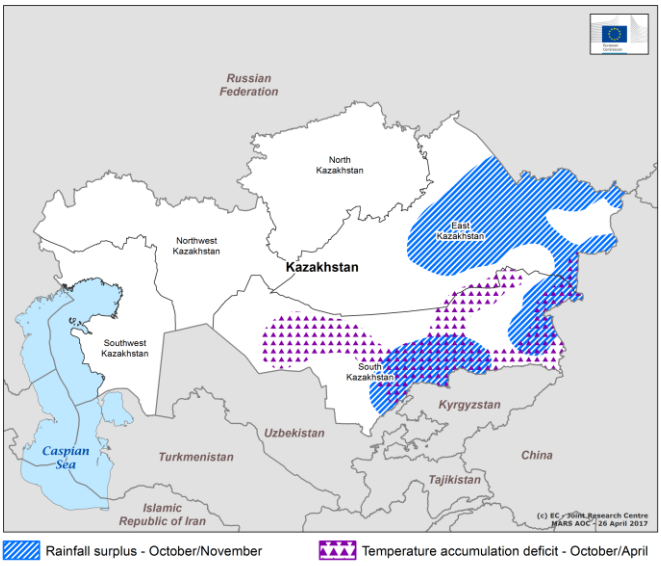
Good water supply but delayed crop development

Winter wheat development is delayed and biomass accumulation remains below average in the southern regions of Kazakhstan due to a problematic sowing campaign and low spring temperatures. However, soil moisture contents and water supply conditions are fair thanks to plentiful precipitation since October.

The sowing campaign of winter wheat suffered a delay due to wetter- and colder-than-usual conditions. Early crop development was suboptimal, and crops remained underdeveloped before the winter. Thanks to the protection provided by snow cover during the dormancy period it is likely that no significant winter frost-kill damages occurred. The start of the re-growth was also delayed due to below-average temperatures of early spring. The canopy expansion and the biomass accumulation present below-average values. The precipitation total is above average for the cropping season so far, and the soil moisture content is well replenished. The crop water supply is near optimal (at the end of April).

AREAS OF CONCERN - EXTREME WEATHER EVENTS

Based on ECMWF operational model data from 01 Sept. 2016 until 20 April 2017



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1. Agro-meteorological overview and winter crop conditions
2. Atlas

Covers the period from 1 September 2016 until 20 April 2017

Winter crops are primarily cultivated in southern regions of Kazakhstan (*Jambylskaya*, *Almatinskaya* and *Yujno-Kazachstanskaya Oblasts*). We are therefore focusing only on this area in this review, although there is a marginal winter wheat production in north-western (*Zapadno-Kazachstanskaya Oblast*) and in eastern Kazakhstan (*Vostochno-Kazachstanskaya Oblast*).

Joint Research Centre

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1. Agro-meteorological overview and winter crop conditions

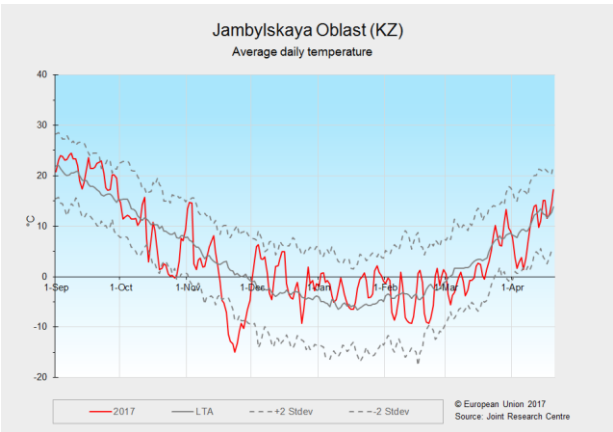
Frequent and plentiful rains delayed the sowing of winter wheat, and colder-than-usual daily temperatures hampered its early development. The dormancy period ended between late February and mid-March. The development of winter wheat is delayed due to below-average autumn and spring temperatures, but the water supply is excellent.

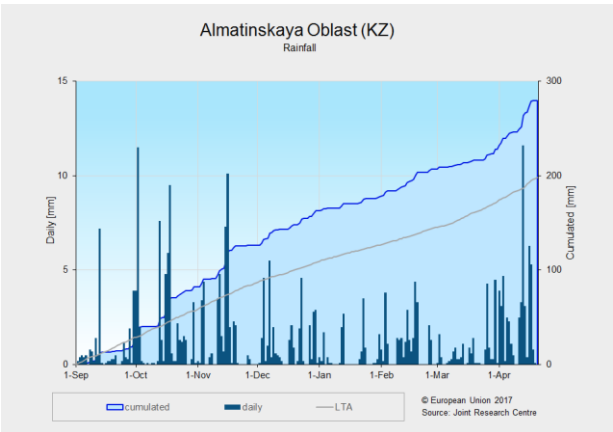
There was considerable rainfall in the second and third dekads of September, primarily in the *Almatinskaya Oblast* and some other limited regions of southern Kazakhstan. These rainfall events beneficially increased the soil moisture content of the upper soil layers. In October, precipitation frequency and rainfall total exceeded the average, temporarily hampering field accessibility. At the same time, October was much colder than usual, with daily temperatures typically fluctuating below the long-term average by 3-7°C, which slowed down crop development. The first autumn frost occurred during the second dekad of October, and the last dekad of the month was exceptionally cold. The first dekad of November was also moderately colder than usual, which facilitated the hardening of soft wheat, and helped it gain cold tolerance for winter.

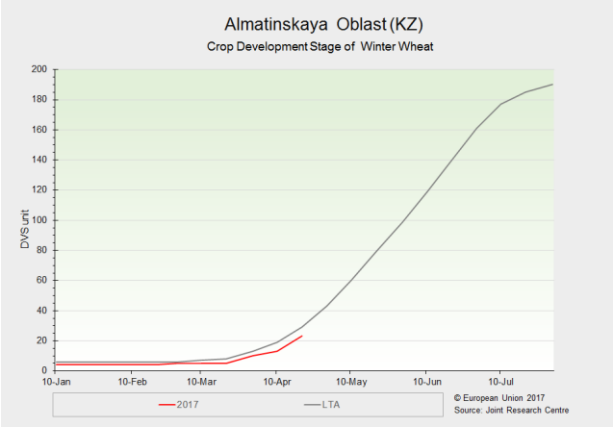
The crops were exposed to two severe cold spells during the past winter. In the third dekad of November and during February, daily minimum temperatures of below -15°C (and even -20°C) occurred on the coldest days, but this did not cause significant damage to the winter wheat stands due to the thermal insulation of the snow cover.

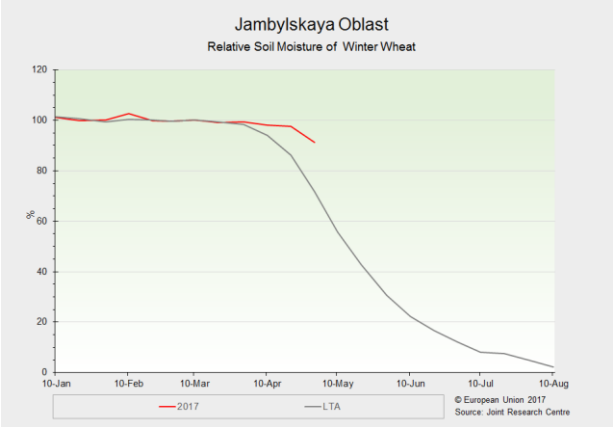
Precipitation totals (between 1 November and 28 February) exceeded the average in most of the southern territories of Kazakhstan, providing good conditions for the replenishment of soil water content. Winter precipitation fell mainly in the form of snow, establishing a sufficiently deep snow cover to protect against the most severe frost events.

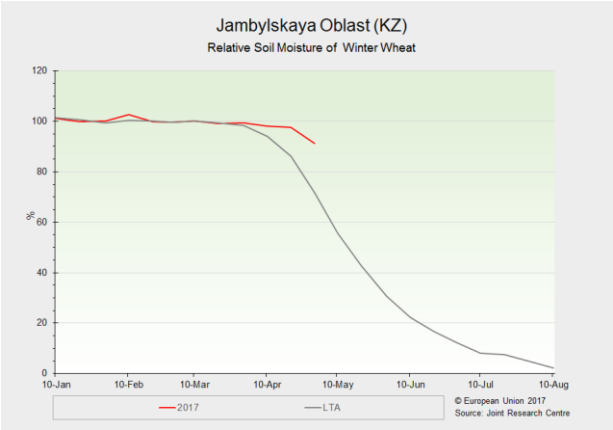
After mid-March, milder temperatures facilitated the re-growth of winter wheat. Unfortunately, the crop development remained slower than usual because of the below-average temperatures. Crop phenology indicates a delay of one to two weeks. Soil moisture reserves were replenished at the end of the winter period, and have remained at a persistently high level thanks to the rainy weather and moderate evapotranspiration. According to our model simulation, the leaf area index and biomass accumulation of winter wheat is below average. The limited growth is mainly a consequence of the delayed crop development, since the water supply is adequate. The current situation has no direct negative effect on the yield outlook, but due to the delayed growing season the crops could be more exposed to the risk of extreme high temperatures and limited water supply in summer.

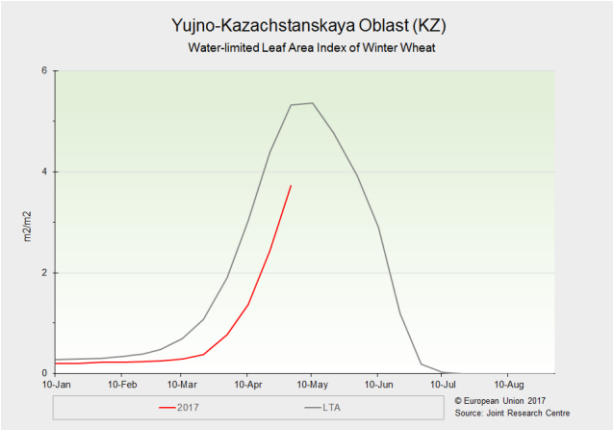




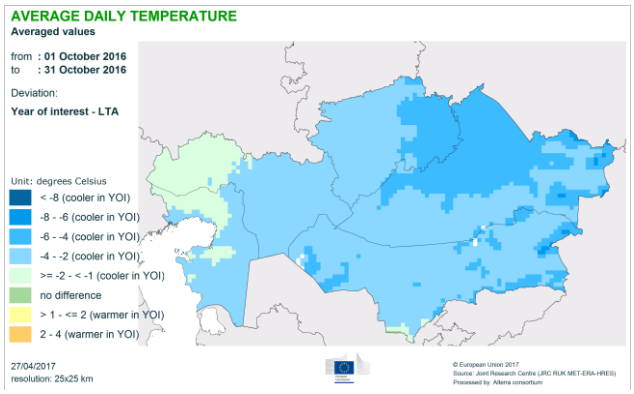

Almatinskaya Oblast (KZ)
Crop Development Stage of Winter Wheat
DVSunit
2017
LTA
© European Union 2017
Source: Joint Research Centre


Jambylskaya Oblast
Relative Soil Moisture of Winter Wheat
%
2017
LTA
© European Union 2017
Source: Joint Research Centre


Jambylskaya Oblast (KZ)
Relative Soil Moisture of Winter Wheat
%
2017
LTA
© European Union 2017
Source: Joint Research Centre


Yujno-Kazachstanskaya Oblast (KZ)
Water-limited Leaf Area Index of Winter Wheat
m2/m2
2017
LTA
© European Union 2017
Source: Joint Research Centre

2. Atlas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to : 31 October 2016
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Unit: degrees Celsius
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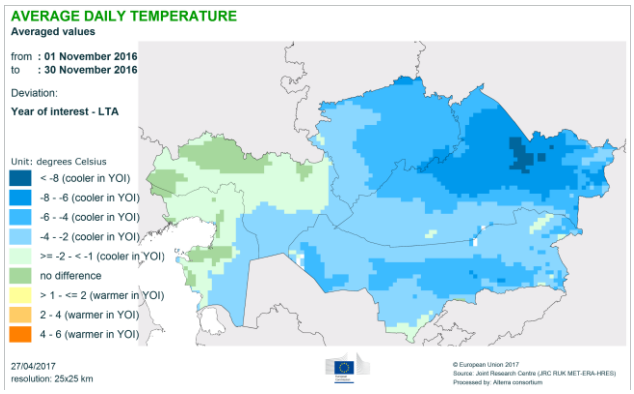
-8 - -6 (cooler in YOI)
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
27/04/2017
resolution: 25x25 km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Averaged values
from : 01 November 2016
to : 30 November 2016
Deviation:
Year of interest - LTA
Unit: degrees Celsius
< -8 (cooler in YOI)
-8 - -6 (cooler in YOI)
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
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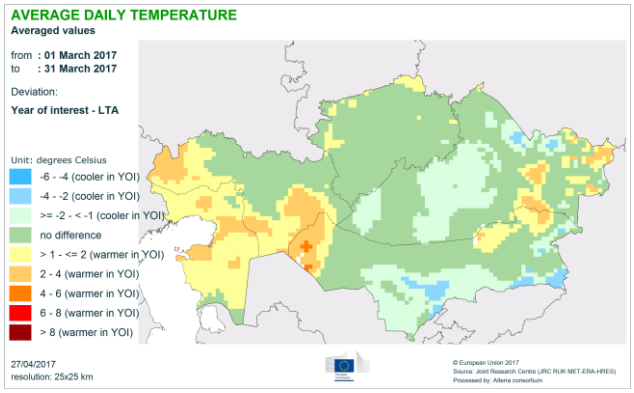
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
27/04/2017
resolution: 25x25 km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Averaged values
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to : 31 March 2017
Deviation:
Year of interest - LTA
Unit: degrees Celsius
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-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
27/04/2017
resolution: 25x25 km
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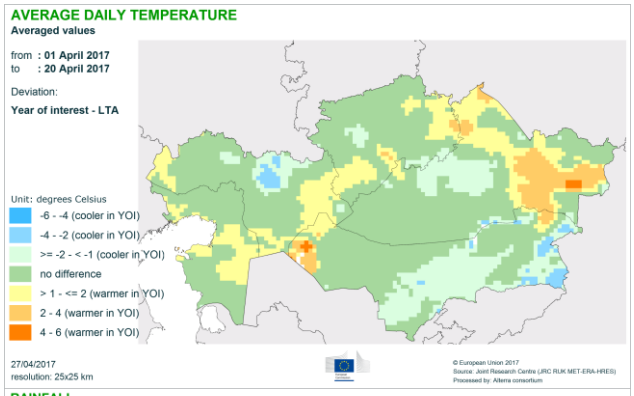
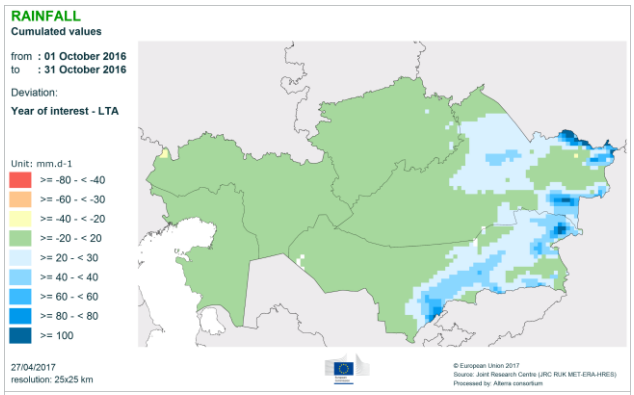
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 April 2017
to : 20 April 2017
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
27/04/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 October 2016
to : 31 October 2016
Deviation:
Year of interest - LTA
Unit: mm.d-1
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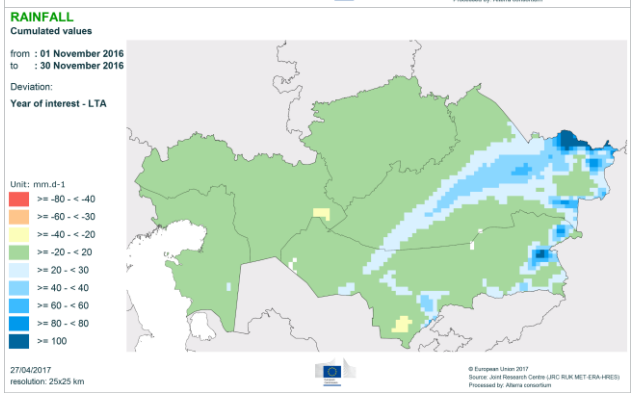
>= -40 - < -20
>= -20 - < 20
>= 20 - < 30
>= 40 - < 40
>= 60 - < 60
>= 80 - < 80
>= 100
27/04/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 November 2016
to : 30 November 2016
Deviation:
Year of interest - LTA
Unit: mm.d-1
>= -80 - < -40
>= -60 - < -30
>= -40 - < -20
>= -20 - < 20
>= 20 - < 30
>= 40 - < 40
>= 60 - < 60
>= 80 - < 80
>= 100
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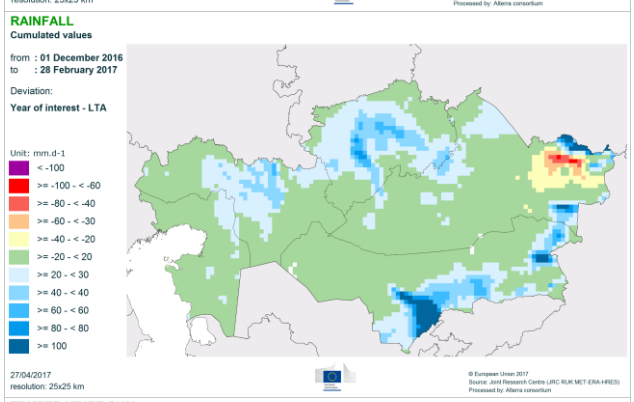
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium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to : 28 February 2017
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Year of interest - LTA
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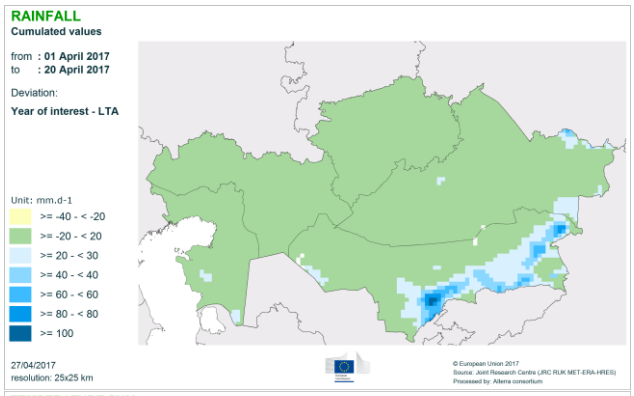
>= -40 - < -20
>= -20 - < 20
>= 20 - < 30
>= 40 - < 40
>= 60 - < 60
>= 80 - < 80
>= 100
27/04/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 April 2017
to : 20 April 2017
Deviation:
Year of interest - LTA
Unit: mm.d-1
>= -40 - < -20
>= -20 - < 20
>= 20 - < 30
>= 40 - < 40
>= 60 - < 60
>= 80 - < 80
>= 100
27/04/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
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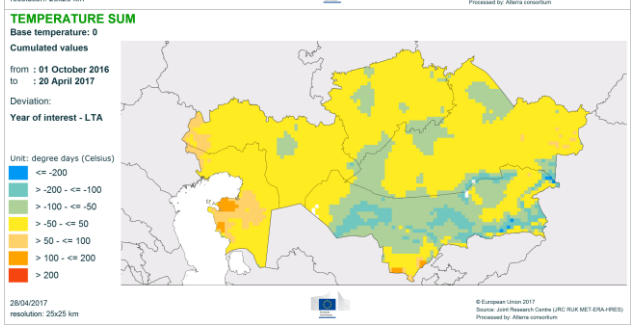
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Base temperature: 0
Cumulated values
from : 01 October 2016
to : 20 April 2017
Deviation:
Year of interest - LTA
Unit: degree days (Celsius)
<= -200
> -200 - <= -100
> -100 - <= -50
> -50 - <= 50
> 50 - <= 100
> 100 - <= 200
> 200
28/04/2017
resolution: 25x25 km
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Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
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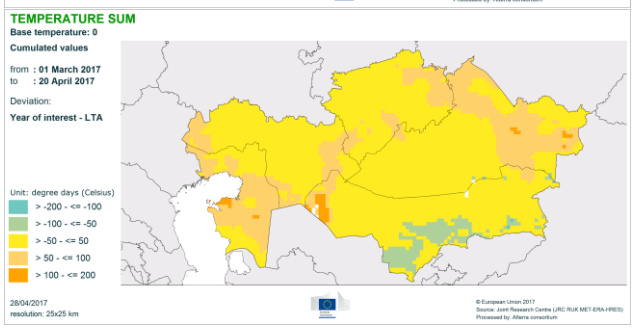
TEMPERATURE SUM
Base temperature: 0
Cumulated values
from : 01 March 2017
to : 20 April 2017
Deviation:
Year of interest - LTA
Unit: degree days (Celsius)
> -200 - <= -100
> -100 - <= -50
> -50 - <= 50
> 50 - <= 100
> 100 - <= 200
28/04/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
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Kazakhstan - reference map

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JRC MARS Bulletin global outlook 2017

Crop monitoring European neighbourhood

Kazakhstan

July 2017

Slightly above average yield outlook

Thermal conditions and water supply have been adequate in most of Kazakhstan, but some northern and eastern regions present a soil mositure deficit and below-average spring crop growth. Our analysis suggests an above-average yield potential for spring cereals, but further rains are needed to maintain it. Winter wheat (which is mainly confined to southern Kazakhstan) is close to maturity and also in good shape, with an above-average yield outlook.

The sowing of spring crops progressed well, since plentiful precipitation caused delays only during the completion of the sowing campaign. The development of spring crops is near-average in northern Kazakhstan, but it is somewhat delayed due to colder-than-usual conditions in the north-west. Crops are advanced in eastern Kazakhstan, due to the above-average temperatures that prevailed since late April. Soil moisture levels under spring cereals are adequate in most of Kazakhstan, but some areas of *Akmolinskaya*, *Kustanayskaya* and *Vostochno-Kazachstanskaya* present a soil moisture deficiency which limited crop growth and current yield expectations.

Content:

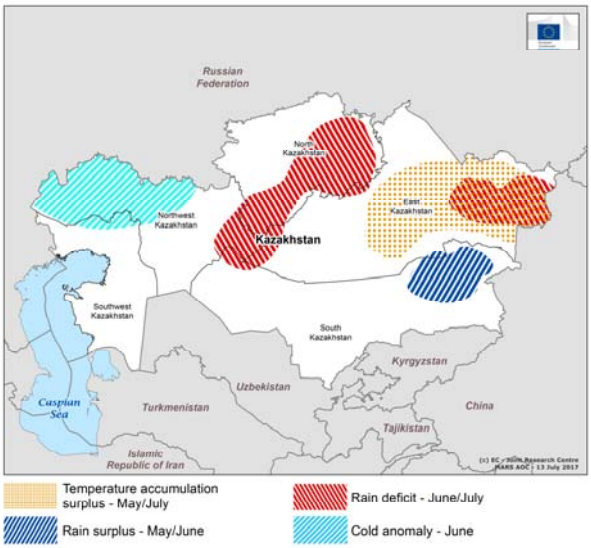
1. Meteorological overview
2. Crop conditions
3. Remote Sensing maps
4. Crop yield forecasts
5. Atlas

Covers the period from 1 April until 10 July

Weather conditions have mainly been favourable for winter wheat, the production of which is mainly limited to southern Kazakhstan; consequently, the yield outlook is positive.

AREAS OF CONCERN - EXTREME WEATHER EVENTS

Based on ECMWF operational model data from 01 April 2017 until 10 July 2017



Kazakhstan yield forecasts - July 2017 Bulletin

Country	Crop	Yield (t/ha)				
		Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	winter wheat	1.63	2.14	1.82	+11	-15
	spring wheat	1.05	1.18	1.23	+18	+5.0
	winter barley	2.13	2.17	2.27	+6.2	+4.4
	spring barley	1.32	1.70	1.54	+17	-9.3
	grain maize	5.40	5.71	5.61	+3.9	-1.8

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Joint Research Centre

1. Meteorological overview

After a cold first week of April, the main cereal-producing regions of Kazakhstan experienced near- to above-average thermal conditions. Rainfall was around average to above average in most of these regions, but has been below average in Akmolinskaya and the south-eastern part of Kustanayskaya, and some areas of Vostochno-kazachstanskaya.

In northern Kazakhstan (*Severo-kazachstanskaya*, *Kustanayskaya*, *Akmolinskaya*), after an unusually cold first week of April, average temperatures increased to above-zero levels, and predominantly above the long-term average until mid-May. Since then, temperatures have fluctuated around the long-term average. Thermal variability around the average was high, but did not reach extreme values. The predominantly mild temperatures provided good conditions for the normal development of spring cereals.

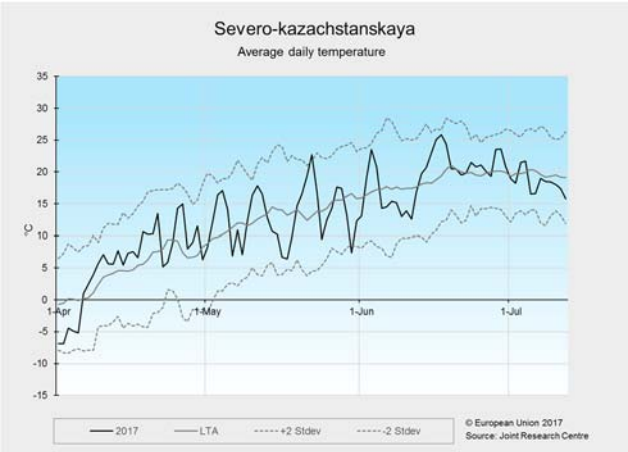
Below-average temperatures predominated in north-western Kazakhstan (*Zapadno-kazachstanskaya*), particularly in May and June, with a minimum of 11oC recorded at the end of May.

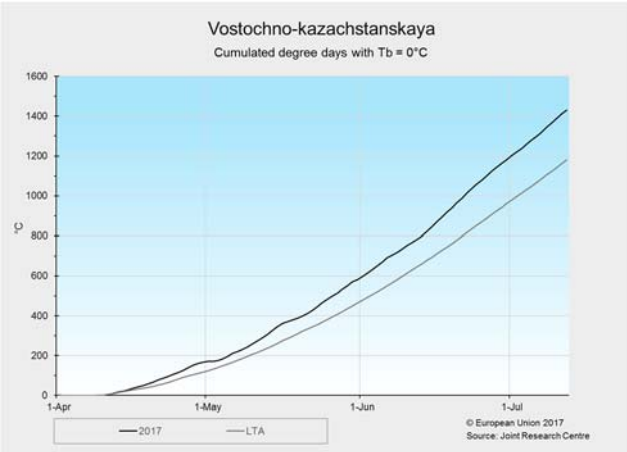
In the eastern areas (*Almatinskaya*, *Vostochno-kazachstanskaya*), thermal conditions were favourable for the development of cereals, with a prevalence of above-average temperatures from April to July, and with values higher than 20°C in mid-May and at the end of June. As a consequence, the cumulated thermal time (T_{base} = 0°C) in *Almatinskaya* and *Vostochno-kazachstanskaya* exceeded the long-term average by 6 and 21%, respectively, for the review period as a whole.

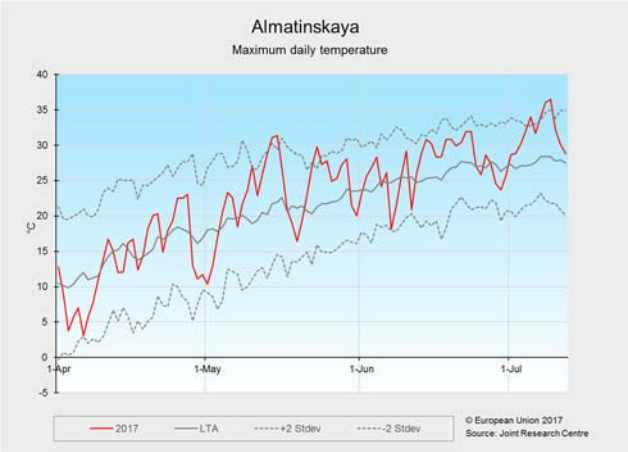
In the southern parts of the country, temperatures were mainly above average and increased sharply in late June, with daily averages reaching values above 30°C during the first week of July in *Kyzylordinskaya*, and maximum temperatures reaching 40°C during the same period.

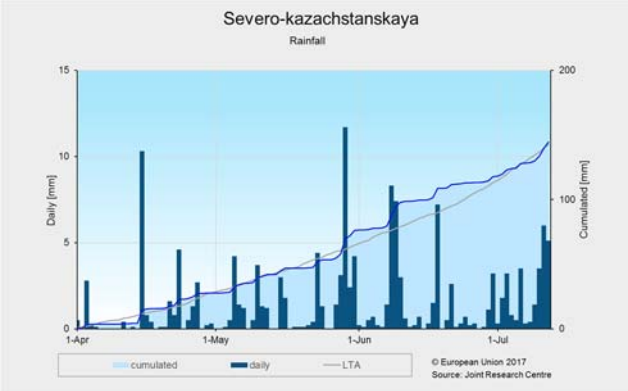
Rainfall in northern Kazakhstan was close to the long-term average in *Severo-kazachstanskaya* and northern *Kustanayskaya* during April and the first half of May, and increased to above-average levels since then. *Akmolinskaya* and the south-east part of *Kustanayskaya*, however, presented below-average rainfall from the end of April until the end of the review period. Some areas of *Vostochno-kazachstanskaya* also experienced below-average rainfall, mainly since the end of May.

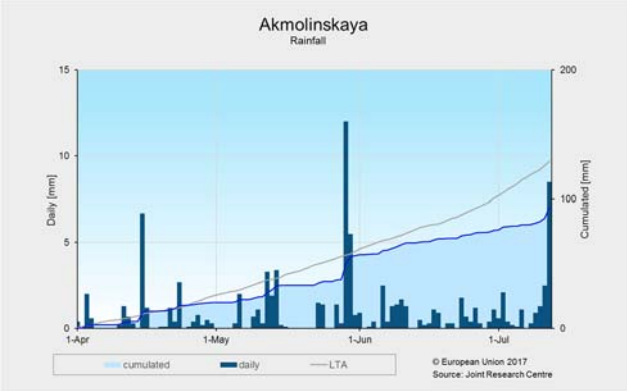
In south-eastern (*Almatinskaya*) and southern (*Kyzylordinskaya*) Kazakhstan, precipitation exceeded the average from April to July, probably slowing down the sowing progress of spring crops in May.

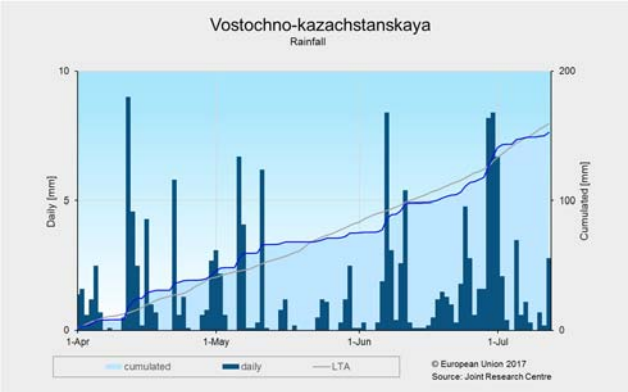


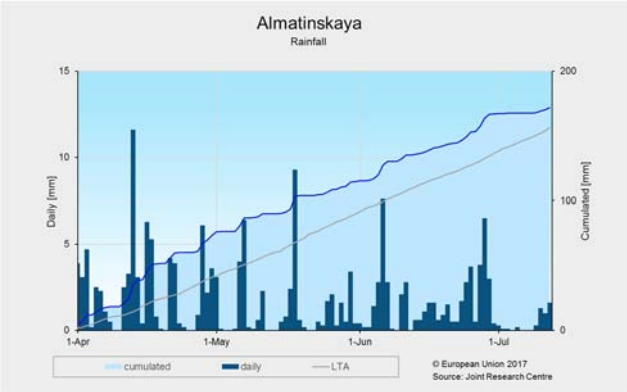












2. Crop conditions

In southern Kazakhstan, the sowing campaign of spring crops was mostly adequate, but rainfall after mid-April caused some delay and the establishment of early sown crops was hampered by colder-than-usual conditions in early April. The sowing of grain maize suffered no major constraints. In northern Kazakhstan, the sowing of spring crops started early and progressed well until the last dekad of May, when plentiful precipitation hampered the completion of the sowing campaign.

In northern Kazakhstan (the country's main spring cereal-producing region), the development of spring crops is near average, while it is advanced in eastern Kazakhstan. The water supply of spring cereals was adequate in most of the northern half of Kazakhstan, but some regions are affected by soil moisture deficiency. Model-based indicators suggest an above-average yield potential, but beneficial summer rains are crucial to realise this. Winter wheat in southern Kazakhstan is in good shape, and the yield outlook is good.

2.1 Spring sowing campaign

In the warmer southern regions of Kazakhstan (*Jambylskaya*, *Almatinskaya* and *Yujno-kazachstanskaya* Oblasts), the cultivation of winter wheat and thermophilic summer crops is dominating, but there is also spring wheat and spring barley production. The sowing of these spring cereals started in late March / early April, when average daily temperatures continuously exceeded 5°C. Sowing initially progressed well, but frequent and abundant precipitation in the second and third dekads of April caused delays. The sprouting and emergence of early sown crops was delayed due to significantly (2-4°C) colder-than-usual conditions during the first dekad of April. In May, however, crop development was accelerated due to the prevailing above-average thermal conditions.

The sowing of grain maize started in the second half of April and progressed well with no major constraints, thus allowing it to finish in mid-May in the main producing areas. Thermal conditions and soil moisture supply were adequate for the sprouting and early growth of maize.

In the northern half of Kazakhstan, the cultivation of spring crops is dominating. Thanks to the warmer-than-usual weather conditions, the sowing campaign of spring cereals (mainly spring wheat and spring barley) in these areas started in mid-April, ahead of the usual sowing period. Precipitation was typically below average or average until mid-May, which allowed for good progress. By contrast, the last dekad of May and the first dekad of June were rainy in the main regions of spring cereals cultivation (*Kustanayskaya*, *Severo-kazachstanskaya*, *Akmolinskaya*) and in the *Aktyubinskaya*, *Pavlodarskaya* and *Karagandinskaya* Oblasts, causing delays to the completion of the sowing campaign. Thermal conditions were favourable for sprouting, and the plentiful precipitation helped to maintain the soil moisture content at an adequate high level, thus providing good conditions for the early development of seedlings.

2.2 Spring and winter crop conditions

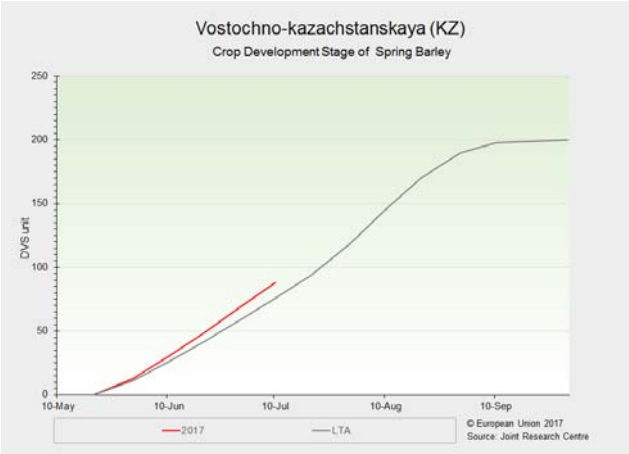
In north-western Kazakhstan (*Zapadno-kazachstanskaya*, *Aktyubinskaya Oblasts*), despite timely sowing, the development of spring cereals is delayed by about one week due to the colder-than-usual thermal conditions since late April. The soil moisture content is near-average or moderately higher than seasonal under spring wheat, thanks to the beneficial rains of May and June. According to our simulation models and remote sensing indicators, canopy expansion and biomass production are above average. In northern Oblasts (*Kustanskaya*, *Severo-kazachstanskaya*, *Akmolinskaya*), the spring crops caught up after the delayed sowing, and development returned to near average, or even slightly advanced in the case of early sown plant stands. The northern areas of the region (along the Russian border) received above-average precipitation, which provided favourable soil moisture conditions for the establishment of the spring crops. However, rainfall was sparse during the last dekad of June and the first dekad of July. This, in combination with high daily temperatures and increased crop water demand, resulted in a sharp decrease in soil moisture content. The simulated biomass accumulation and the leaf area development are still promising, but rain is crucial to avoid water stress damage and sustain good crop growth. By contrast, in the southern half of the northern Kazakhstan region (which suffered from rainfall deficiency since early June), soil moisture levels are below average under spring crops, and crop growth is less than optimal.

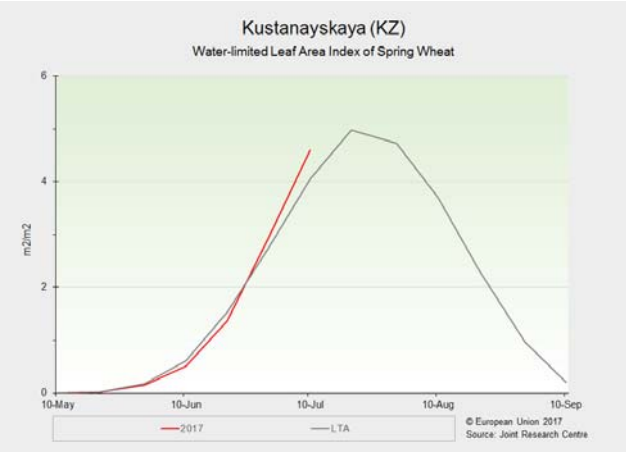
In southern and especially in eastern Kazakhstan, the development of spring cereals is considerably accelerated, because of the unusually high positive thermal anomaly. Precipitation in these regions has mostly been above average since the beginning of June; therefore water supply doesn't constrain the biomass accumulation, and the spring crops are in good shape.

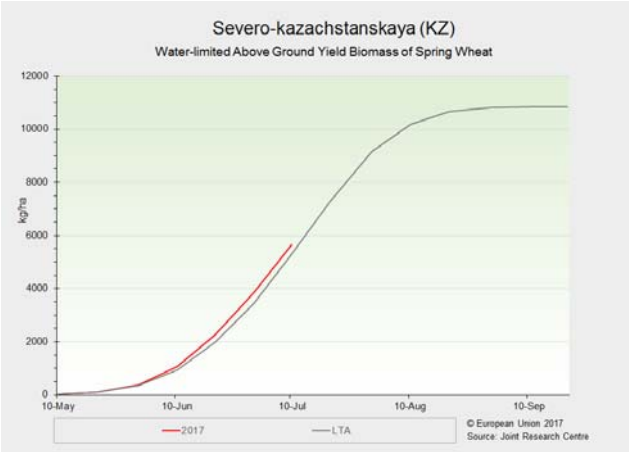
With respect to winter wheat, in southern Kazakhstan, the re-greening during early spring was delayed, but crop development accelerated considerably later in May. Currently (in early July) the phenological status is slightly advanced or near average. Depending on the region, the crop is in a very late stage of grain filling or in the ripening/ripened stage. Above-average precipitation during this growing season helped conserve the soil moisture, but also increased the weed and pest pressure, and may have lowered the grain quality. The abundant rainfall after mid-June could have caused some delay to the start of harvesting. Crop model indicators suggest substantially better-than-usual yield biomass accumulation. Therefore, the yield expectation for winter

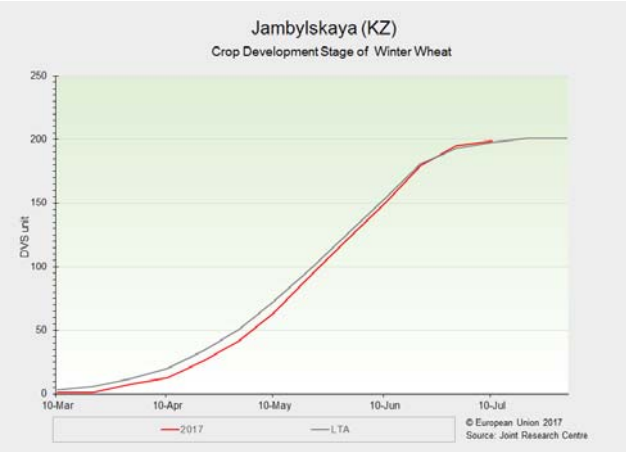
wheat is set above the trend.

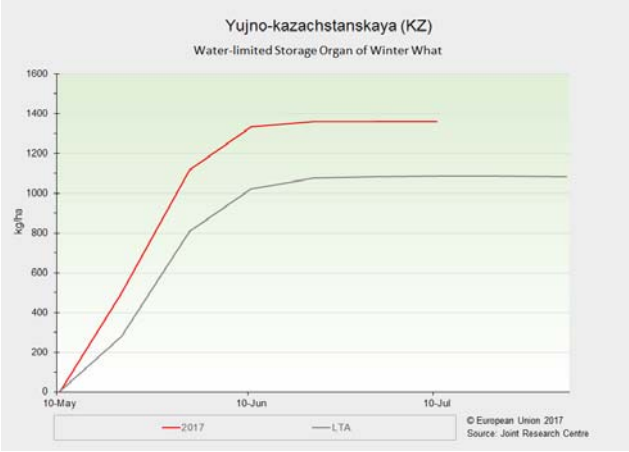
In Kazakhstan, grain maize is generally irrigated. Therefore, biomass accumulation is close to the potential level and the inter-annual variation of crop model indicators is relatively small. The phenological development of grain maize is slightly advanced, and is currently approaching the flowering stage. The canopy development and above-ground biomass accumulation are similar to previous years.

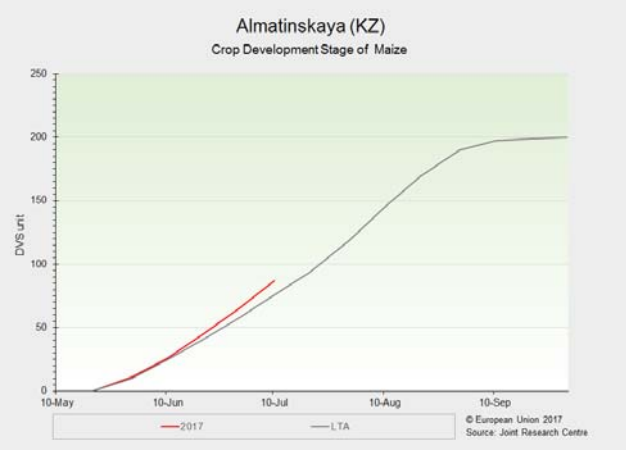




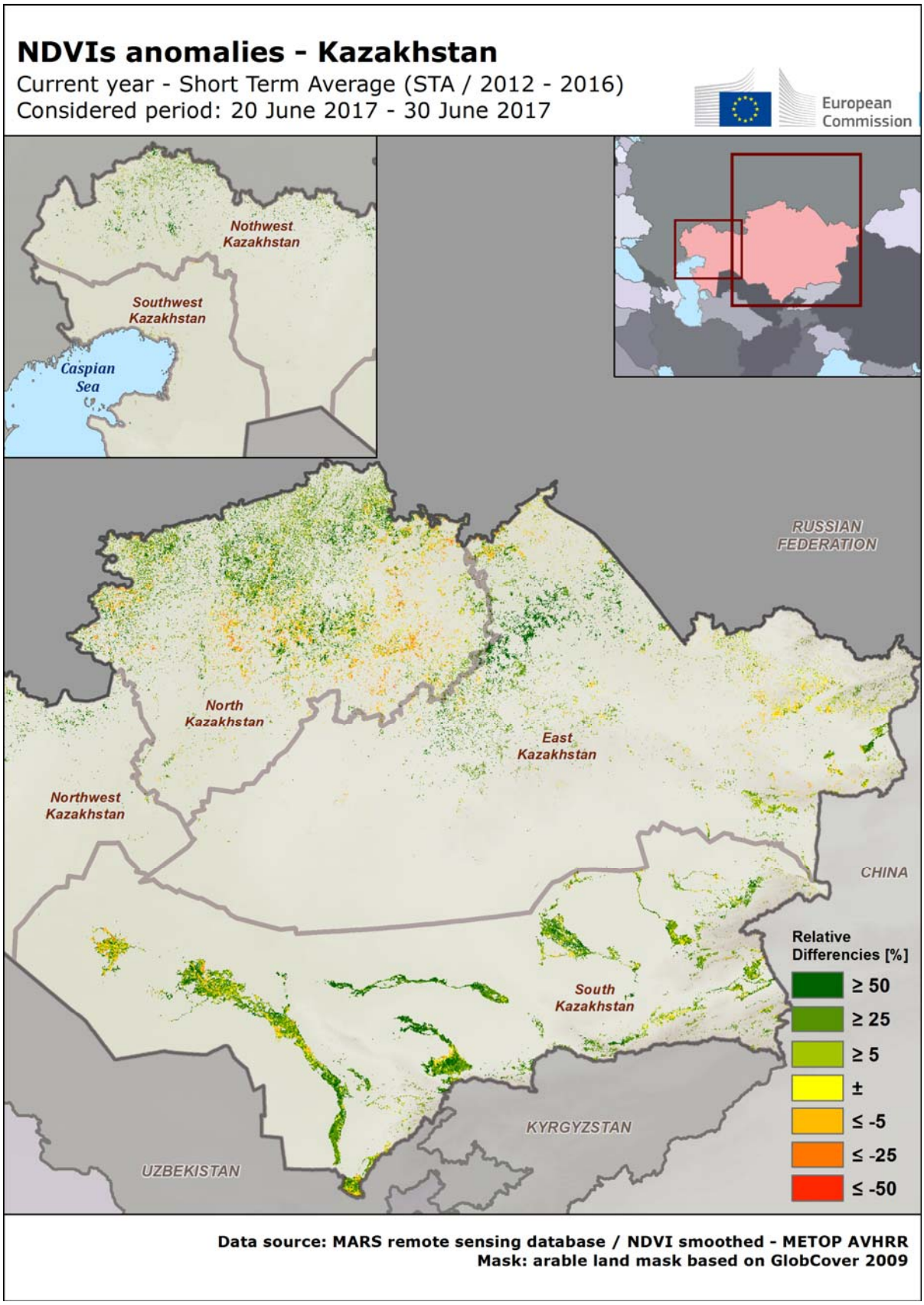








3. Remote sensing maps



4. Crop yield forecast tables

Kazakhstan yield forecasts - July 2017 Bulletin

Country	Crop	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
		Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	winter wheat	418	459	459	+10	+0.0	1.63	2.14	1.82	+11	-15	683	980	835	+22	-15
	spring wheat	11,829	11,913	11,913	+0.7	+0.0	1.05	1.18	1.23	+18	+5.0	12,419	14,000	14,704	+18	+5.0
	winter barley	17	18	18	+7.6	+0.0	2.13	2.17	2.27	+6.2	+4.4	37	40	42	+14	+4.4
	spring barley	1,845	1,876	1,876	+1.6	+0.0	1.32	1.70	1.54	+17	-9.3	2,433	3,191	2,895	+19	-9.3
	grain maize	120	132	132	+10	+0.0	5.40	5.71	5.61	+3.9	-1.8	646	753	739	+15	-1.8

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Kazakhstan yield forecasts for winter wheat - July 2017 Bulletin

Country	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
	Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	418	459	459	+10	+0.0	1.63	2.14	1.82	+11	-15	683	980	835	+22	-15
East Kazakhstan	17	32	32	+86	+0.0	1.97	2.19	2.22	+13	+1.7	34	70	71	+110	+1.7
North Kazakhstan	4	15	15	+288	+0.0	1.23	1.20	2.01	+63	+67	5	18	31	+532	+67
Nothwest Kazakhstan	34	34	34	-1.1	+0.0	1.62	3.14	1.76	+9.1	-44	55	105	59	+7.9	-44
South Kazakhstan	363	378	378	+4.2	+0.0	1.62	2.08	1.78	+10	-14	590	787	675	+14	-14
Southwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Kazakhstan yield forecasts for spring wheat - July 2017 Bulletin

Country	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
	Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	11,829	11,913	11,913	+0.7	+0.0	1.05	1.18	1.23	+18	+5.0	12,419	14,000	14,704	+18	+5.0
East Kazakhstan	1,291	1,393	1,393	+7.9	+0.0	0.98	1.13	1.17	+19	+3.9	1,271	1,572	1,634	+29	+3.9
North Kazakhstan	10,085	10,089	10,089	+0.0	+0.0	1.07	1.18	1.25	+17	+6.4	10,797	11,885	12,642	+17	+6.4
Nothwest Kazakhstan	396	377	377	-4.8	+0.0	0.64	1.16	0.86	+34	-26	253	436	323	+28	-26
South Kazakhstan	57	54	54	-4.9	+0.0	1.73	1.98	1.95	+13	-1.8	98	107	105	+7.3	-1.8
Southwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Kazakhstan yield forecasts for winter barley - July 2017 Bulletin

Country	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
	Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	17	18	18	+7.6	+0.0	2.13	2.17	2.27	+6.2	+4.4	37	40	42	+14	+4.4
East Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nothwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Kazakhstan	17	18	18	+7.6	+0.0	2.13	2.17	2.27	+6.2	+4.4	37	40	42	+14	+4.4
Southwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Kazakhstan yield forecasts for spring barley - July 2017 Bulletin

Country	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
	Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	1,845	1,876	1,876	+1.6	+0.0	1.32	1.70	1.54	+17	-9.3	2,433	3,191	2,895	+19	-9.3
East Kazakhstan	319	306	306	-4.2	+0.0	1.08	1.44	1.39	+29	-3.4	343	440	425	+24	-3.4
North Kazakhstan	1,068	1,081	1,081	+1.2	+0.0	1.35	1.68	1.57	+17	-6.3	1,440	1,812	1,698	+18	-6.3
Nothwest Kazakhstan	112	104	104	-7.0	+0.0	0.56	1.25	0.85	+51	-32	63	130	88	+41	-32
South Kazakhstan	346	385	385	+11	+0.0	1.70	2.10	1.78	+4.7	-16	587	809	684	+17	-16
Southwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

Kazakhstan yield forecasts for grain maize - July 2017 Bulletin

Country	Area (x 1000 ha)					Yield (t/ha)					Production (x 1000 t)				
	Avg 5yrs	2016	2017	%17/5yrs	%17/16	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16	Avg 5yrs	2016	2017	%17/5yrs	%17/16
Kazakhstan	120	132	132	+10	+0.0	5.40	5.71	5.61	+3.9	-1.8	646	753	739	+15	-1.8
East Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nothwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Kazakhstan	120	132	132	+10	+0.0	5.40	5.71	5.61	+3.9	-1.8	646	753	739	+15	-1.8
Southwest Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

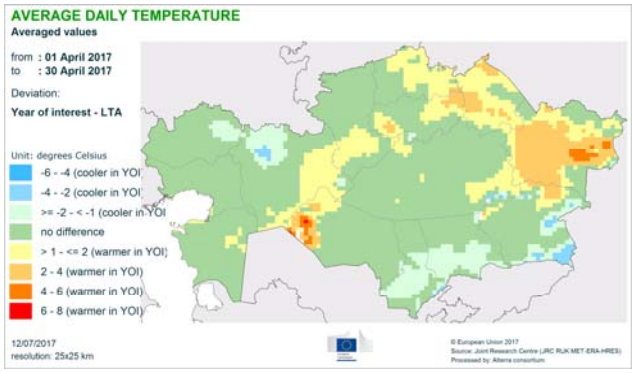
Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

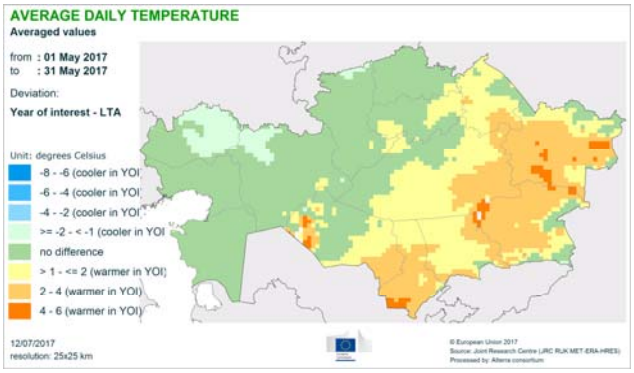
Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

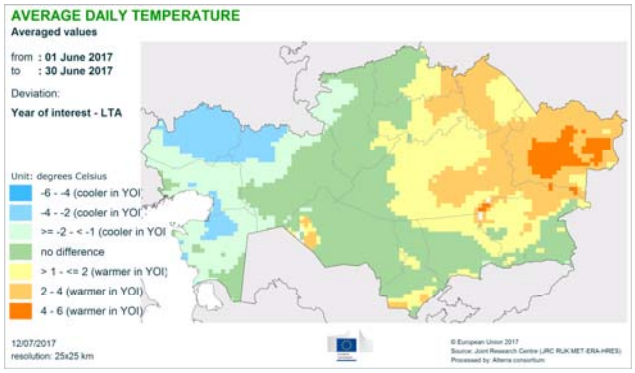
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

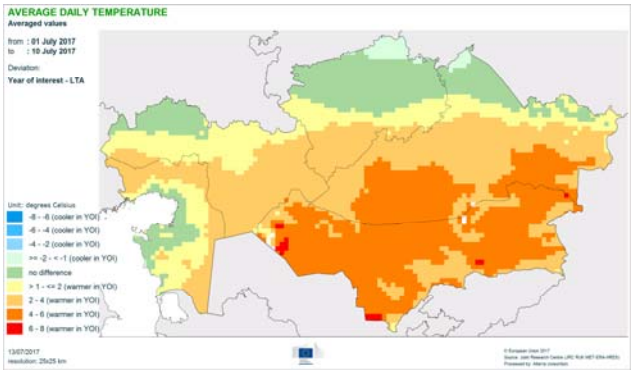
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 10/07/2017)

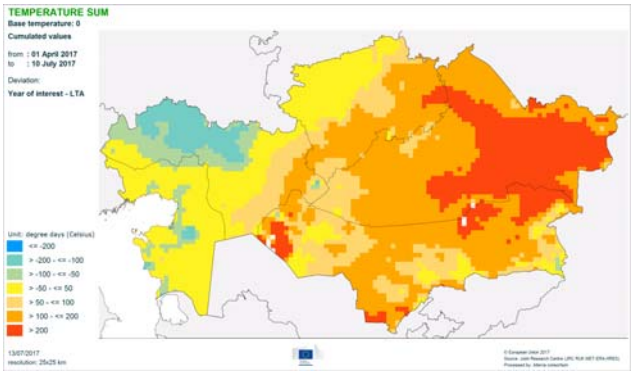
5. Atlas







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13/07/2017
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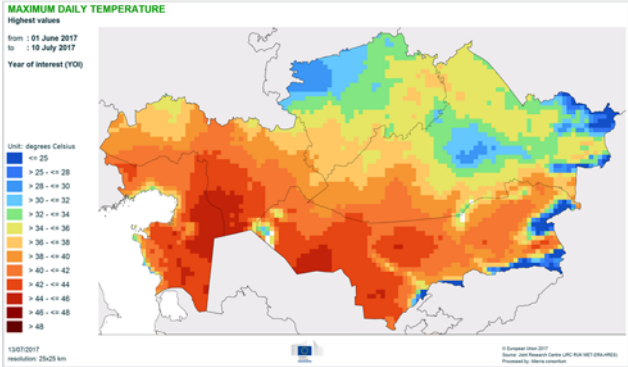
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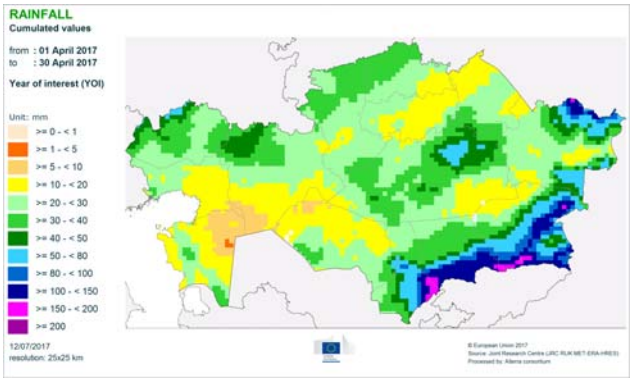
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12/07/2017
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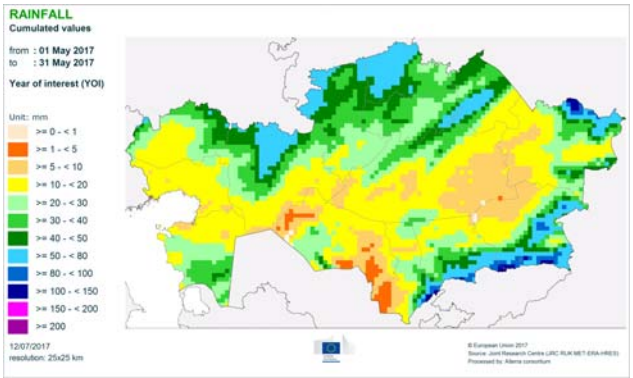
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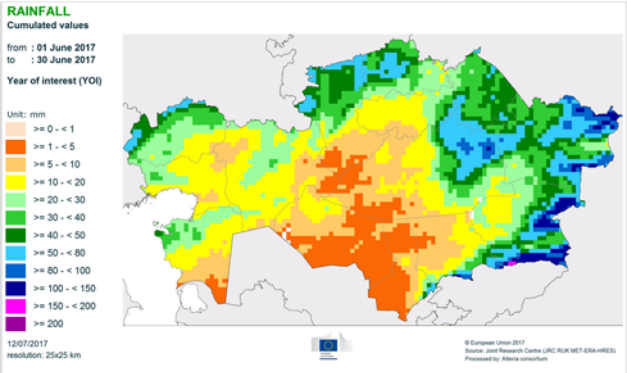
resolution: 25x25 km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12/07/2017
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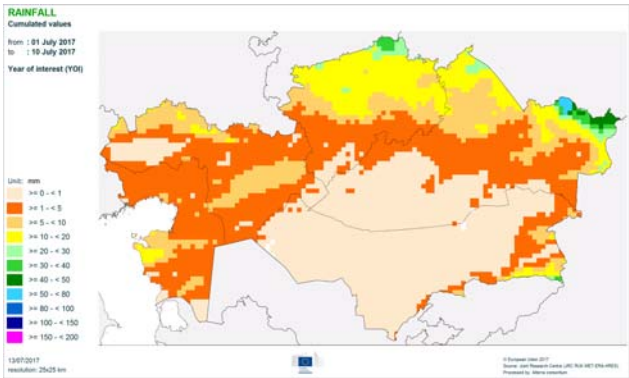
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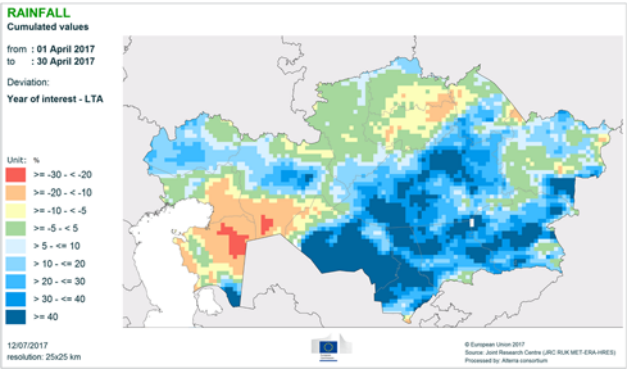
resolution: 25x25 km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to : 30 April 2017
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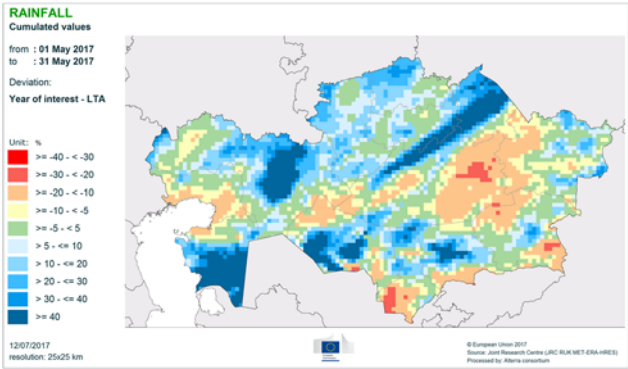
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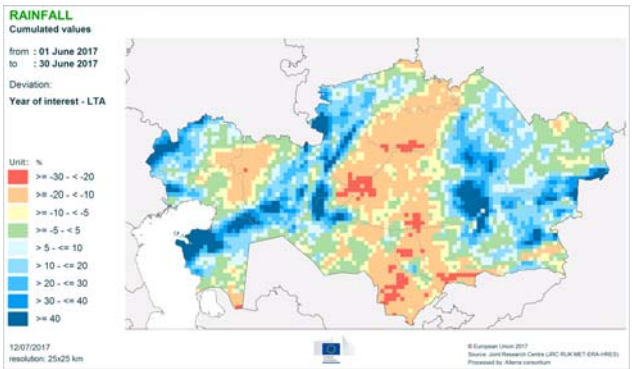
RAINFALL
Cumulated values
from : 01 June 2017
to : 30 June 2017
Deviation:
Year of interest - LTA
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12/07/2017
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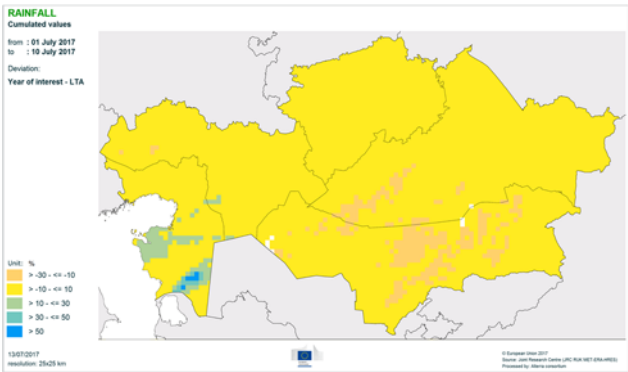
RAINFALL
Cumulated values
from : 01 July 2017
to : 10 July 2017
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Year of interest - LTA
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> 50
13/07/2017
resolution: 25x25 km

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MARS stands for Monitoring Agricultural Resources

Mission statement:

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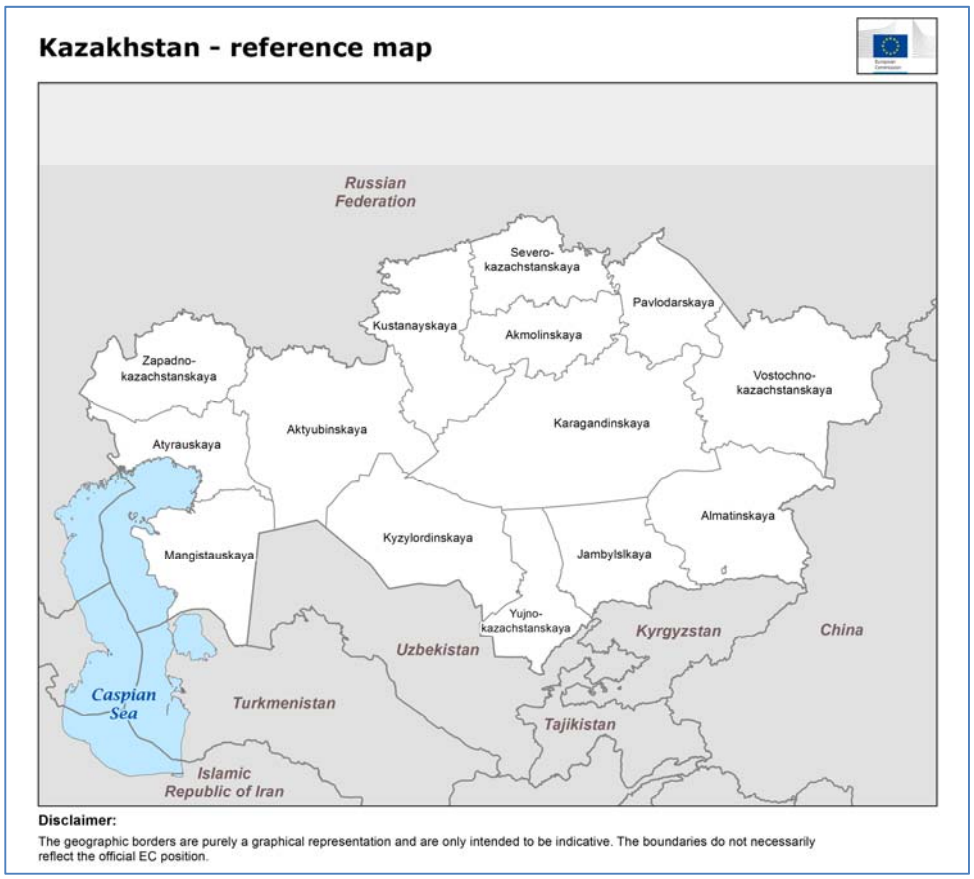


European Commission

JRC MARS Bulletin global outlook 2017

Crop monitoring European neighbourhood

Kazakhstan

October 2017

Dry weather lessens yield expectations of spring cereals

Yield forecasts remain above five-year average

Hot and dry weather conditions in the eastern half of Kazakhstan resulted in an inadequate water supply for spring cereals, with negative effects on biomass accumulation. Consequently, our previously optimistic yield forecast for spring wheat and spring barley was revised downwards. It remains above the five-year average but clearly below last year's levels. The yield expectations for winter wheat (which escaped the drought) and grain maize (which is irrigated) are also above average.

Crop development in eastern and southern Kazakhstan was accelerated by warmer-than-usual thermal conditions. In northern and north-western regions, spring cereals presented near-normal or even delayed development. Soil moisture levels under spring cereals decreased to below average after late June or early July. Hot weather conditions aggravated the negative effects of water deficiency, resulting in stunted growth and reduced yield outlook. The dry weather conditions allowed the quick progress of harvesting with minimal losses.

For winter wheat, weather conditions were mainly favourable, since the dry and hot weather arrived only in the late grain-filling phase, when the yield potential had already almost been realised. Consequently, the yield outlook is positive. Biomass accumulation of irrigated grain maize has exceeded the average this year; therefore, the yield forecast is above the historical trend.

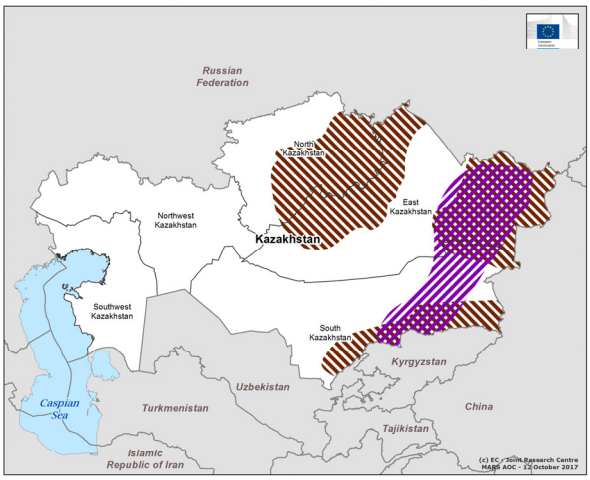
Content:

1. Meteorological overview
2. Crop conditions
3. Remote Sensing maps
4. Crop yield forecasts
5. Atlas

Covers the period from 1 July until 30 September

AREAS OF CONCERN - EXTREME WEATHER EVENTS

Based on ECMWF operational model data from 01 July 2017 until 30 Sept. 2017



Unusual dry conditions Heat waves

Kazakhstan yield forecasts - October 2017 Bulletin

Country	Crop	Yield (t/ha)				
		Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	winter wheat	1.63	2.14	**2.04**	+25	-4.5
	spring wheat	1.05	1.18	**1.13**	+7.6	-3.9
	winter barley	2.13	2.17	**2.27**	+6.2	+4.4
	spring barley	1.32	1.70	**1.48**	+13	-13
	grain maize	5.40	5.71	**5.67**	+5.0	-0.7

Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

Joint Research Centre

1. Meteorological overview

Warmer-than-usual temperatures prevailed during the review period. Cumulative rainfall was markedly below average in most of the country, except in the eastern areas of Pavlodarskaya, Vostochno-kazachstanskaya *and* Karagandiskaya. *Despite the low soil moisture levels, conditions were generally adequate for cereals to complete grain filling and ripening and for the conclusion of harvesting activities.*

In northern Kazakhstan (*Severo-kazachstanskaya*, *Kustanayskaya*, *Akmolinskaya*, *Pavlodarskaya*), the first half of July was relatively cold. This period roughly coincided with the flowering period of spring cereals, which are the main crops in northern Kazakhstan. This was followed by a warmer-than-usual period, until the first dekad of August, when temperatures dropped again and remained below average until 20 August. The end of August was characterised by higher-than-usual temperatures. In September, temperatures were mostly below average, except for the first days of the month and several days in mid- September. The highest daily average temperatures, of around 27°C, were recorded at the beginning of August in *Pavlodarskaya* and *Akmoliskaya*, where maximum temperatures reached up to 33°C.

Rainfall was below average in northern Kazakhstan, and mainly concentrated in July, but soil moisture for spring cereals declined since the beginning of July. The dry weather conditions in late August were optimal for harvesting activities.

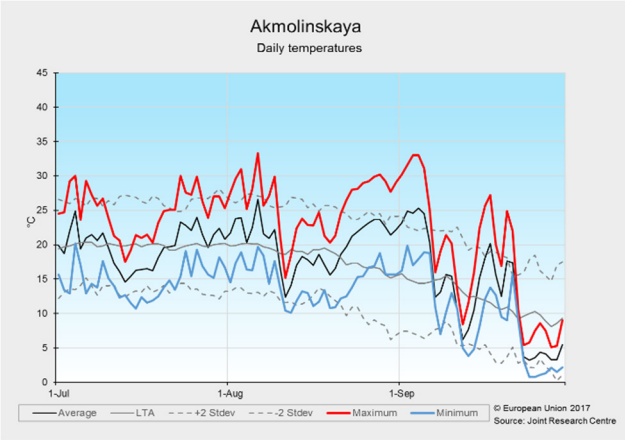
In eastern and central Kazakhstan (*Vostochno-kazachstanskaya*, *Almatinskaya* and *Karagandiskaya*), thermal conditions were generally warmer than usual from the beginning of July until the first dekad of September. The highest temperatures occurred at the beginning of July in *Almatinskaya*, with daily averages reaching 29.9°C and maxima of 36.5°C. After the first dekad of September, temperatures dropped below the long-term average, with daily averages even falling below zero for two days at the end of the month in *Vostochno-kazachstanskaya*. Fortunately, this had no consequences for the winter cereals, the dominant crops of the region, because harvesting was nearly complete. In the central region of *Karagandiskaya*, temperatures behaved similarly to those in *Vostochno-kazachstanskaya*, with daily average temperatures reaching their highest level of 26°C at the end of July and lows of 1.5°C at the end of September.

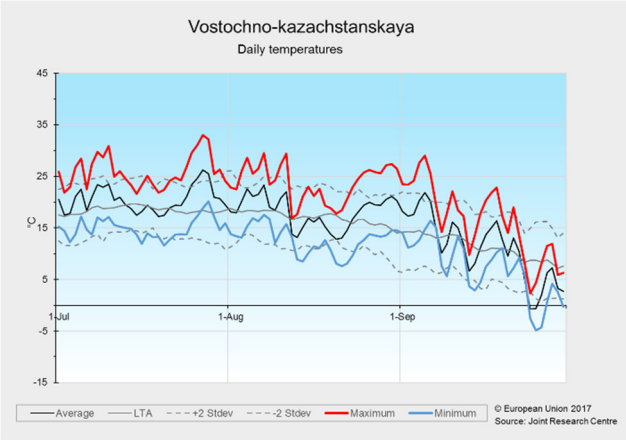
Rainfall in eastern and central Kazakhstan (*Pavlodarskaya*, *Vostochno-kazachstanskaya* and *Karagandiskaya*) was below or close to the seasonal average. Precipitation in July was insufficient to restore soil moisture to above-average levels. In September, however, rainfall was above average and frequent, hampering the preparation of fields for the sowing of winter wheat.

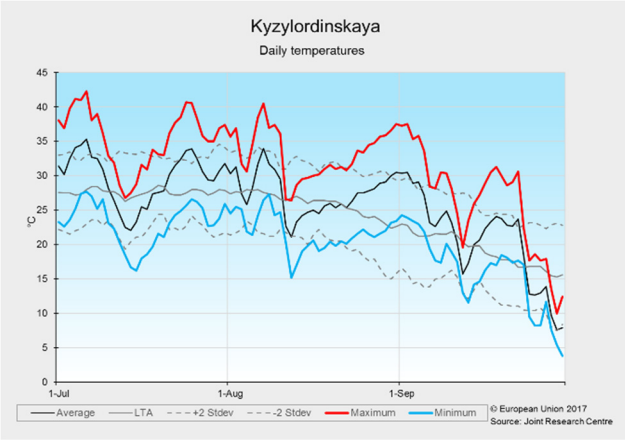
In the southern parts of the country (*Almatinskaya*, *Kyzylordinskaya*), temperatures were generally higher than in the east, with daily averages reaching 35°C and a maximum temperature of 42°C at the beginning of July in *Kyzylordinskaya*. Rainfall was well below average, and the lowest cumulative rainfall occurred in *Kyzylordinskaya*.

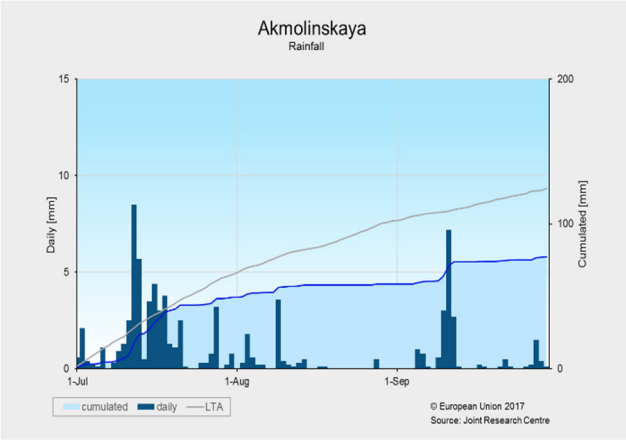
In the western parts of the country, above-average temperatures also predominated. Cumulative thermal time (Tbase = 0°C) exceeded the long-term average by 150 growing degree days in *Zapadno-kazachstanskaya* and *Aktyubinskaya* for the review period as a whole.

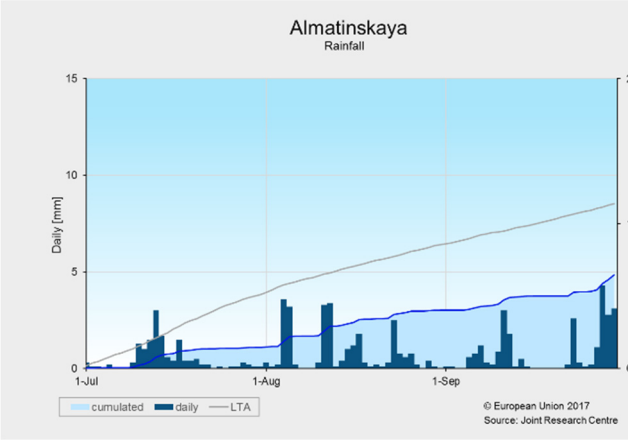
Rainfall in the western regions (*Aktyubinskaya*, *Zapadno-kazachstanskaya*) was markedly below average, and cumulative amounts were similar in the two regions.

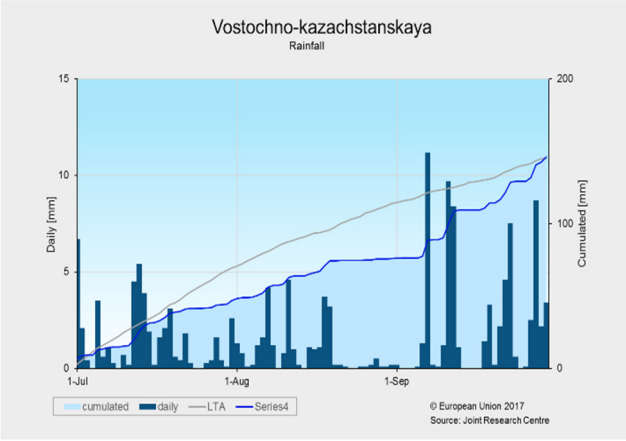

Akmolinskaya
Daily temperatures
°C
1-Jul
1-Aug
1-Sep
Average
LTA
+2 Stdev
-2 Stdev
Maximum
Minimum
© European Union 2017
Source: Joint Research Centre


Vostochno-kazachstanskaya
Daily temperatures
°C
1-Jul
1-Aug
1-Sep
Average
LTA
+2 Stdev
-2 Stdev
Maximum
Minimum
© European Union 2017
Source: Joint Research Centre


Kyzylordinskaya
Daily temperatures
°C
1-Jul
1-Aug
1-Sep
Average
LTA
+2 Stdev
-2 Stdev
Maximum
Minimum
© European Union 2017
Source: Joint Research Centre


Akmolinskaya
Rainfall
Daily [mm]
Cumulated [mm]
1-Jul
1-Aug
1-Sep
cumulated
daily
LTA
© European Union 2017
Source: Joint Research Centre


Almatinskaya
Rainfall
Daily [mm]
1-Jul
1-Aug
1-Sep
cumulated
daily
LTA
© European Union 2017
Source: Joint Research Centre


Vostochno-kazachstanskaya
Rainfall
Daily [mm]
Cumulated [mm]
1-Jul
1-Aug
1-Sep
cumulated
daily
LTA
Series4
© European Union 2017
Source: Joint Research Centre

2. Crop conditions

Spring crops made a promising start, but increasing soil moisture deficit compromised biomass accumulation in eastern and southern Kazakhstan. Northern and north-western areas were less affected. The yield outlook exceeds the five-year average but is less positive than last year. Winter wheat, in the main producing areas of southern Kazakhstan, benefitted from sufficient rain during most of the growing cycle, and the subsequent dry weather created good conditions for harvesting. Therefore, the yield outlook is above average.

Spring cereals

The phenology of spring wheat and spring barley was near normal, or somewhat delayed in northern and north-western Kazakhstan. In southern and eastern Kazakhstan, the development of spring cereals was accelerated by predominantly warmer-than-usual post-flowering conditions, unfavourably shortening the grain-filling period. During the vegetative growth phase of the cropping season, the water supply was mostly adequate, but soil moisture levels decreased sharply in June and reached below-average levels in early July as a result of sparse rainfall. In spite of some beneficial rainfall in mid-July easing the water deficiency, the soil moisture supply typically fell below optimal during the grain-filling period, especially in eastern and north-eastern Kazakhstan (*Pavlodarskaya*, *Karagandinskaya* and *Vostochno-kazachstanskaya* oblasts), resulting in early senescence and below-normal biomass accumulation.

In the main spring crop-producing region of northern Kazakhstan (approximately 10.5 million hectares of spring wheat and more than 1 million hectares of spring barley), the water supply was sufficient in *Severo-kazachstanskaya* oblast. However, from late June or early July, *Kustanayskaya* and *Akmolinskaya* oblasts were affected by moderate (locally severe) water deficiency, reducing the pace of biomass accumulation and decreasing yield expectations. During the flowering period (in July) the daily temperatures remained in the normal range and there were no heatwaves. In north-western Kazakhstan (*Zapadno-kazachstanskaya* and *Aktyubinskaya* oblasts), soil moisture levels followed a near-normal course, and, especially along the Russian border, the yield formation was above average; however, these regions are of minor agricultural importance. At the national level, the yield formation and yield biomass accumulation of spring wheat and spring barley exceed the five-year average but clearly remain below the last year's levels. The spring cereal harvest progressed well and was practically finished in late September or early October, thanks to the predominantly dry and warm weather conditions; only smaller rainfall events caused temporarily problems during the second dekad of September.

Winter cereals

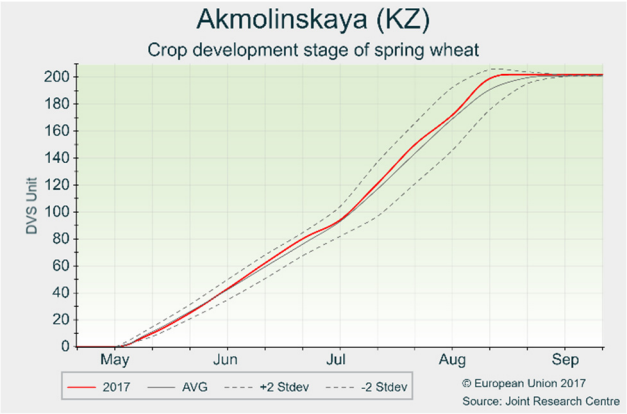
In southern Kazakhstan (*Almatinskaya*, *Jambylskaya* and *Yujno-Kazakhstanskaya*) and also in eastern Kazakhstan, the development of winter wheat was accelerated by above seasonal temperatures since May. In southern Kazakhstan, in contrast to the situation for spring cereals, the soil moisture content under winter wheat dropped below optimal levels only in the late grain-filling and ripening phase; therefore, this had only a minor negative effect on yield formation in southern Kazakhstan. Consequently, our model simulations indicate near- or above-average biomass accumulation, and our yield forecast is positive for southern Kazakhstan. In eastern Kazakhstan, considerable water deficits were experienced during the flowering and grain-filling periods, which had a significant impact on biomass accumulation and negatively affected the yield outlook in these regions. The dry weather conditions facilitated the harvest of winter cereals not only in the main producing southern, and less important eastern, regions, but also in north-western Kazakhstan, where the cultivation of winter wheat is marginal.

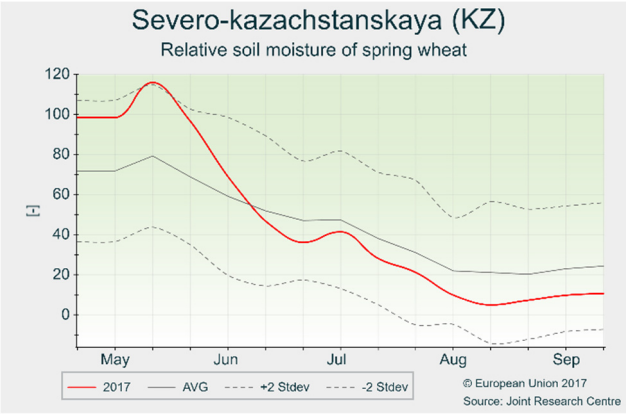
Overall, at the national level, the yield forecast for winter wheat greatly exceeds the five-year average, but it remains below last year's levels. The yield expectations for winter barley are clearly positive, because this less frost-tolerant small grain cereal crop is cultivated only in the southern regions where the growing conditions were more favourable.

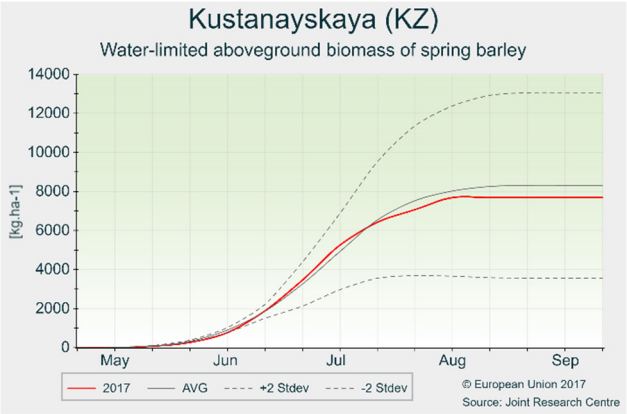
Grain maize

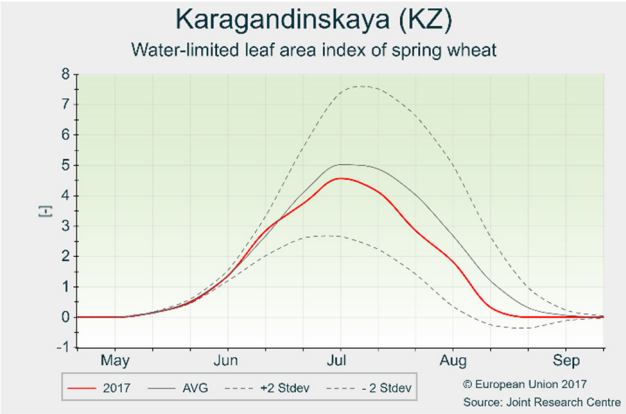
Grain maize is cultivated mainly in southern Kazakhstan as an irrigated crop. The crop development of grain maize was advanced throughout the season because of above-

average temperatures during the summer. During the current growing season, potential biomass accumulation was above average, though the inter-annual variability of maize is relatively small in Kazakhstan, as the supply of water for irrigated crops is normally near-optimal. The ongoing harvest of grain maize started in early September and has been free of significant problems so far. The yield forecast for grain maize exceeds the trend and the yield in 2016.

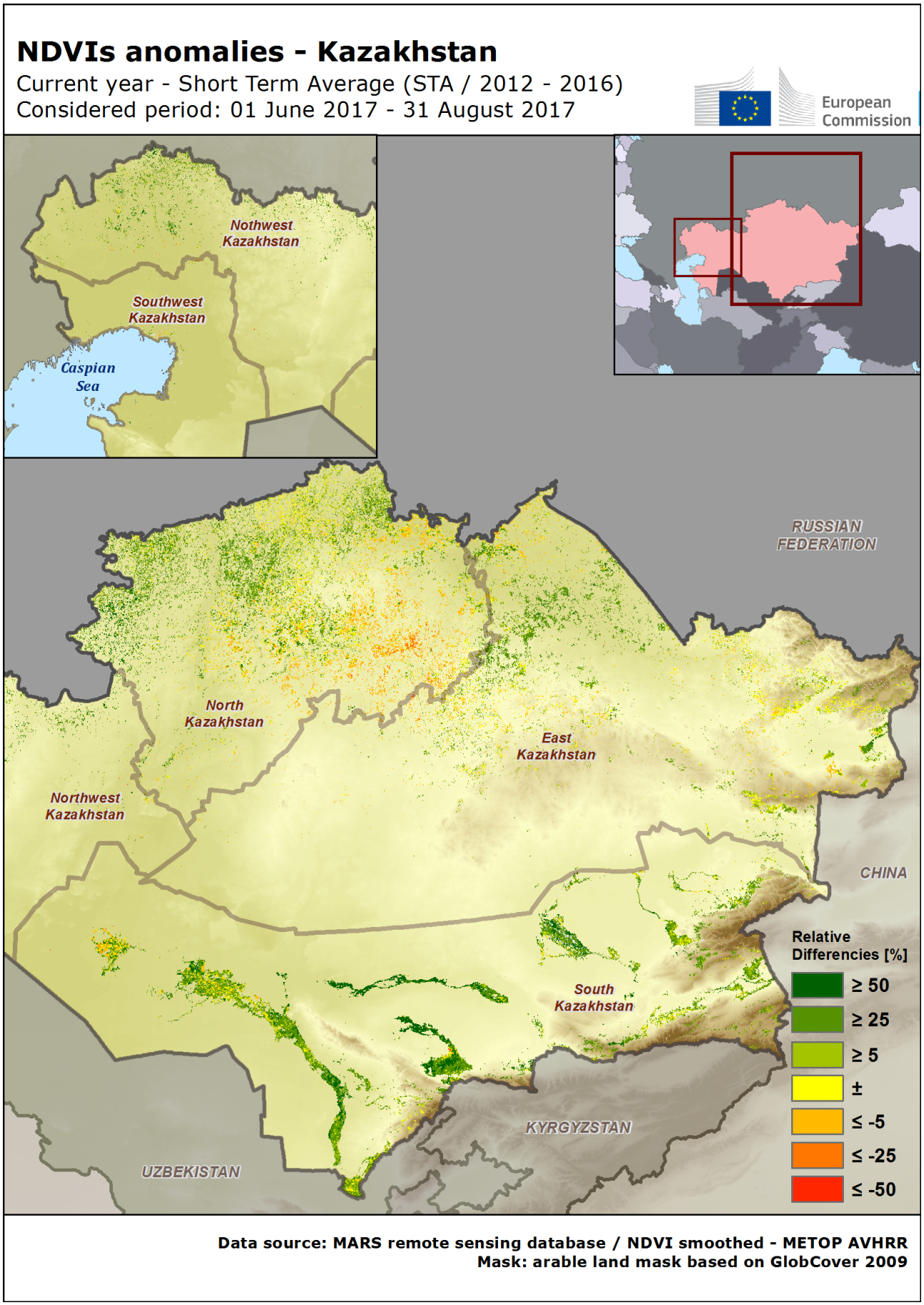








3. Remote sensing maps



4. Crop yield forecast tables

Kazakhstan yield forecasts - October 2017 Bulletin

Country	Crop	Yield (t/ha)				
		Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	winter wheat	1.63	2.14	**2.04**	+25	-4.5
	spring wheat	1.05	1.18	**1.13**	+7.6	-3.9
	winter barley	2.13	2.17	**2.27**	+6.2	+4.4
	spring barley	1.32	1.70	**1.48**	+13	-13
	grain maize	5.40	5.71	**5.67**	+5.0	-0.7

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics

2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

Kazakhstan yield forecasts for spring wheat - October 2017 Bulletin

Country	Yield (t/ha)				
	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	1.05	1.18	**1.13**	+7.6	-3.9
East Kazakhstan	0.98	1.13	**0.92**	-6.5	-18
North Kazakhstan	1.07	1.18	**1.16**	+8.0	-1.9
Nothwest Kazakhstan	0.64	1.16	**1.11**	+74	-3.8
South Kazakhstan	1.73	1.98	**1.75**	+1.4	-12
Southwest Kazakhstan	-	-	**-**	-	-

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

Kazakhstan yield forecasts for spring barley - October 2017 Bulletin

Country	Yield (t/ha)				
	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	1.32	1.70	**1.48**	+13	-13
East Kazakhstan	1.08	1.44	**1.14**	+6.2	-21
North Kazakhstan	1.35	1.68	**1.51**	+12	-10
Nothwest Kazakhstan	0.56	1.25	**1.14**	+104	-8.8
South Kazakhstan	1.70	2.10	**1.78**	+4.7	-16
Southwest Kazakhstan	-	-	**-**	-	-

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

Kazakhstan yield forecasts for winter wheat - October 2017 Bulletin

Country	Yield (t/ha)				
	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	1.63	2.14	**2.04**	+25	-4.5
East Kazakhstan	1.97	2.19	**1.48**	-25	-32
North Kazakhstan	1.23	1.20	**2.01**	+63	+67
Nothwest Kazakhstan	1.62	3.14	**1.76**	+9.1	-44
South Kazakhstan	1.62	2.08	**2.11**	+30	+1.5
Southwest Kazakhstan	-	-	-	-	-

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

Kazakhstan yield forecasts for winter barley - October 2017 Bulletin

Country	Yield (t/ha)				
	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	2.13	2.17	**2.27**	+6.2	+4.4
East Kazakhstan	-	-	-	-	-
North Kazakhstan	-	-	-	-	-
Nothwest Kazakhstan	-	-	-	-	-
South Kazakhstan	2.13	2.17	**2.27**	+6.2	+4.4
Southwest Kazakhstan	-	-	-	-	-

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

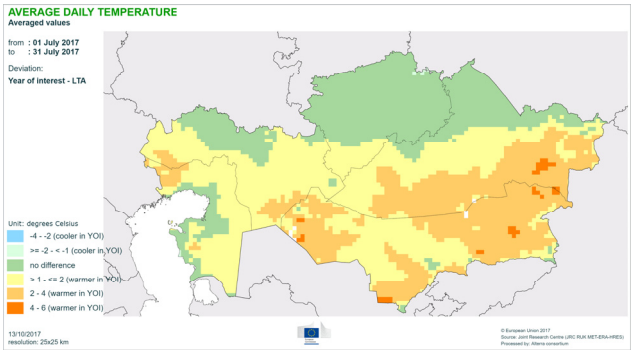
Kazakhstan yield forecasts for grain maize - October 2017 Bulletin

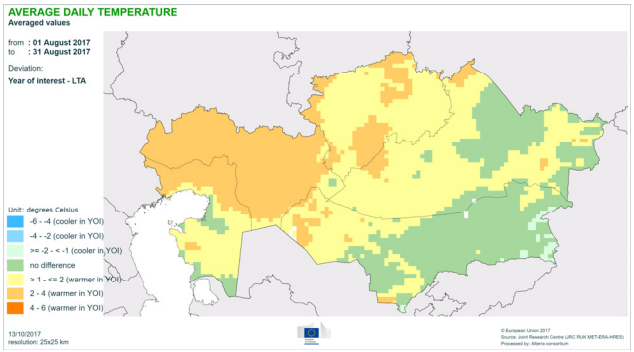
Country	Yield (t/ha)				
	Avg 5yrs	2016	MARS 2017 forecasts	%17/5yrs	%17/16
Kazakhstan	5.40	5.71	**5.67**	+5.0	-0.7
East Kazakhstan	-	-	-	-	-
North Kazakhstan	-	-	-	-	-
Nothwest Kazakhstan	-	-	-	-	-
South Kazakhstan	5.40	5.71	**5.67**	+5.0	-0.7
Southwest Kazakhstan	-	-	-	-	-

Note: Yields are forecast for crops w ith more than 10000 ha per country; figures are rounded to 10 kg

Sources: 1990-2016 data for area and yields come from Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 area copied from data of year 2016 published by Ministry of National Economy of the Republic of Kazakhstan - Committee on Statistics
2017 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/09/2017)

5. Atlas


AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 July 2017
to : 31 July 2017
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
13/10/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 August 2017
to : 31 August 2017
Deviation:
Year of interest - LTA
Unit: degrees Celsius
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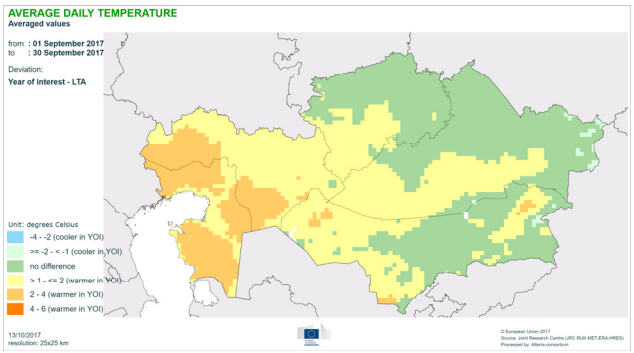
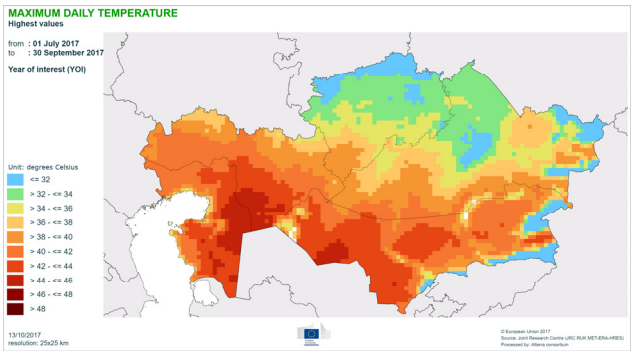
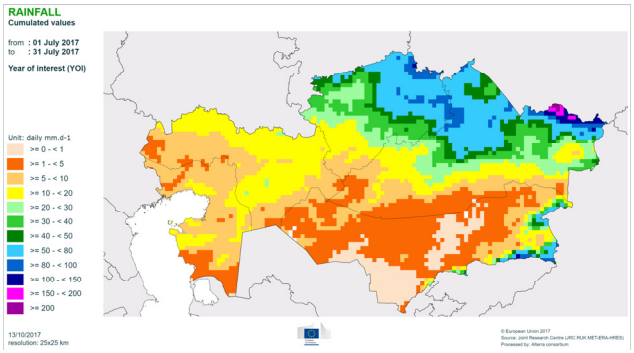
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
13/10/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 September 2017
to : 30 September 2017
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
13/10/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 July 2017
to : 30 September 2017
Year of interest (YOI)
Unit: degrees Celsius
<= 32
> 32 - <= 34
> 34 - <= 36
> 36 - <= 38
> 38 - <= 40
> 40 - <= 42
> 42 - <= 44
> 44 - <= 46
> 46 - <= 48
> 48
13/10/2017
resolution: 25x25 km
© European Union 2017
Source: Joint Research Centre (JRC RUK MET-ERA-HRES)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 July 2017
to : 31 July 2017
Year of interest (YOI)
Unit: daily mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150 - < 200
>= 200
13/10/2017
resolution: 25x25 km
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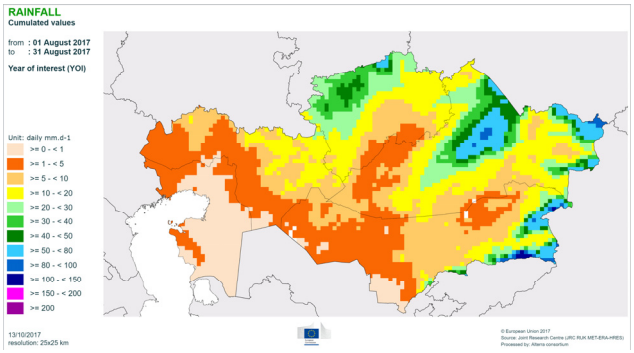
RAINFALL
Cumulated values
from : 01 August 2017
to : 31 August 2017
Year of interest (YOI)
Unit: daily mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150 - < 200
>= 200
13/10/2017
resolution: 25x25 km
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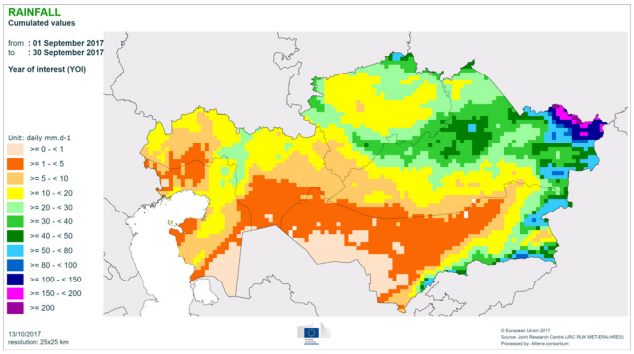
RAINFALL
Cumulated values
from : 01 September 2017
to : 30 September 2017
Year of interest (YOI)
Unit: daily mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150 - < 200
>= 200
13/10/2017
resolution: 25x25 km
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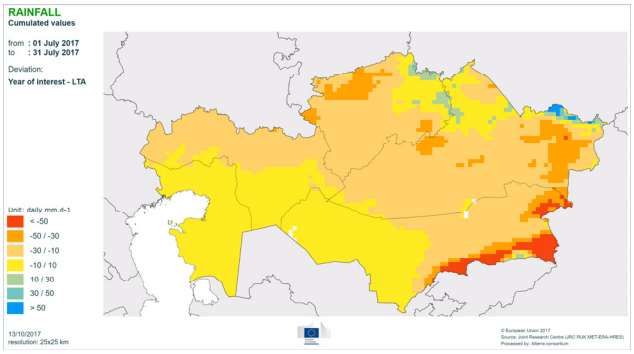
RAINFALL
Cumulated values
from : 01 July 2017
to : 31 July 2017
Deviation:
Year of interest - LTA
Unit: daily mm.d-1
< -50
-50 / -30
-30 / -10
-10 / 10
10 / 30
30 / 50
> 50
13/10/2017
resolution: 25x25 km
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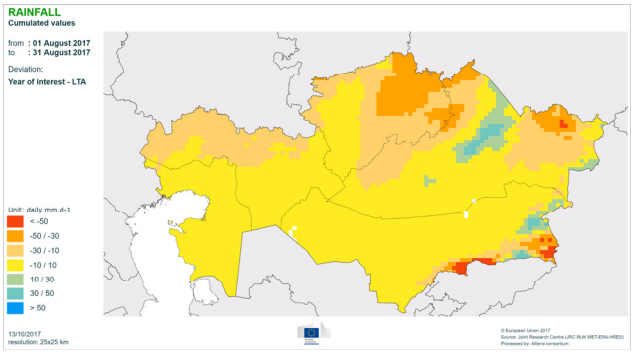
RAINFALL
Cumulated values
from : 01 August 2017
to : 31 August 2017
Deviation:
Year of interest - LTA
Unit: daily mm.d-1
< -50
-50 / -30
-30 / -10
-10 / 10
10 / 30
30 / 50
> 50
13/10/2017
resolution: 25x25 km
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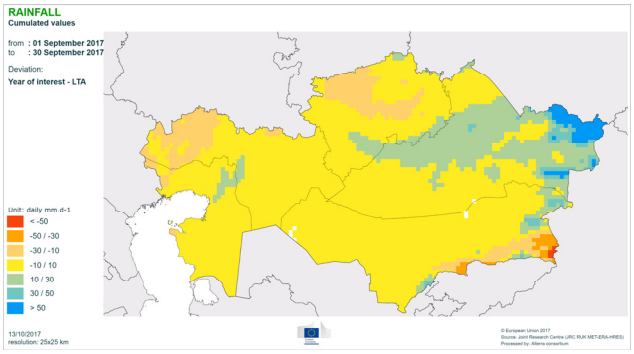
RAINFALL
Cumulated values
from : 01 September 2017
to : 30 September 2017
Deviation:
Year of interest - LTA
Unit: daily mm.d-1
< -50
-50 / -30
-30 / -10
-10 / 10
10 / 30
30 / 50
> 50
13/10/2017
resolution: 25x25 km
© European Union 2017
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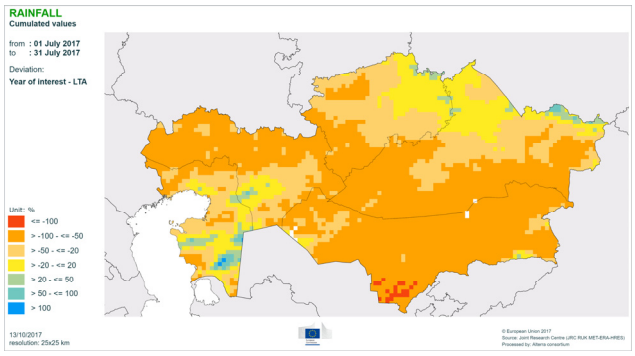
RAINFALL
Cumulated values
from : 01 July 2017
to : 31 July 2017
Deviation:
Year of interest - LTA
Unit: %
<= -100
> -100 - <= -50
> -50 - <= -20
> -20 - <= 20
> 20 - <= 50
> 50 - <= 100
> 100
13/10/2017
resolution: 25x25 km
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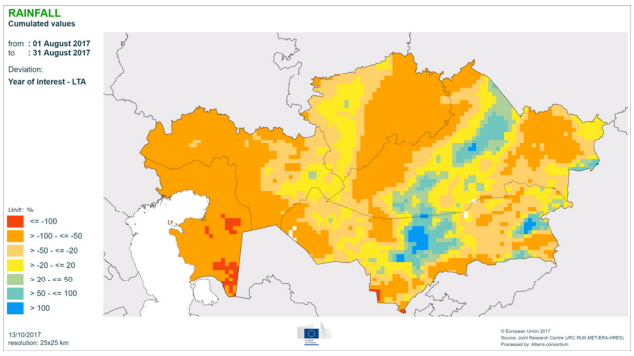
RAINFALL
Cumulated values
from : 01 August 2017
to : 31 August 2017
Deviation:
Year of interest - LTA
Unit: %
<= -100
> -100 - <= -50
> -50 - <= -20
> -20 - <= 20
> 20 - <= 50
> 50 - <= 100
> 100
13/10/2017
resolution: 25x25 km
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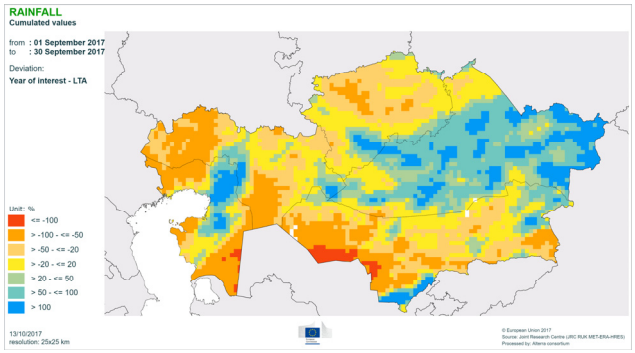
RAINFALL
Cumulated values
from : 01 September 2017
to : 30 September 2017
Deviation:
Year of interest - LTA
Unit: %
<= -100
> -100 - <= -50
> -50 - <= -20
> -20 - <= 20
> 20 - <= 50
> 50 - <= 100
> 100
13/10/2017
resolution: 25x25 km
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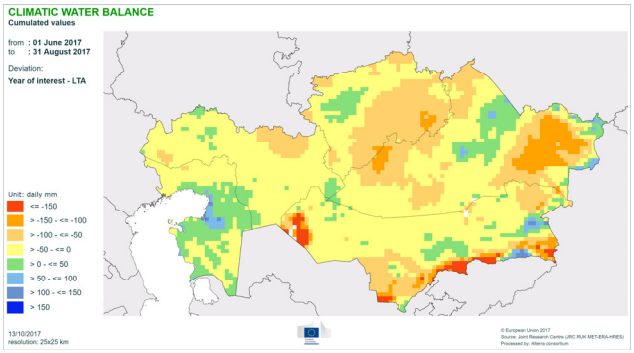
CLIMATIC WATER BALANCE
Cumulated values
from : 01 June 2017
to : 31 August 2017
Deviation:
Year of interest - LTA
Unit: daily mm
<= -150
> -150 - <= -100
> -100 - <= -50
> -50 - <= 0
> 0 - <= 50
> 50 - <= 100
> 100 - <= 150
> 150
13/10/2017
resolution: 25x25 km
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MARS stands for Monitoring Agricultural Resources

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Kazakhstan - reference map

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